MYANMAR INITIAL ENVIRONMENTAL EXAMINATION
&
ENVIRONMENTAL MANAGEMENT PLAN

BEVERAGE (coffee,Tea and Milk powder) MANUFACTURING & DISTRIBUTION FACTORY

(LLUVIA Co.,Ltd)

PREMIER®

lluvia

The Letter of Commitment

As per the Administrative Instruction of Environmental Impact Assessment procedure 2015, the Lluvia Limited required the Initial Environmental Examination (IEE) along with the Environmental Management Plan (EMP) for Premier Factory (Beverage Manufacturing and Distribution) located in Hlaing Thar Yar Township, Yangon, Myanmar to submit the report to the Environmental Conservation Department, Ministry of Natural Resources and Environmental Conservation (MONREC) for approval.

The proposed project is located at No. 108 (A) and 108 (B), Quarter (3), Hlaing Thar Yar Industrial Zone, Hlaing Thar Yar Township, Yangon, Myanmar.

This IEE study has been completed in accordance with the following articles:
Chapter (2) Establishment of the Environmental Impact Assessment Process, Article 8, 9, 10, 11,

Chapter (3) Screening, Article 23,24,25,26

Chapter (7) Environmental Consideration in Project Approval, Article 76,77,82 of the Myanmar EIA procedure (2015) by the Myanmar registered consultant company Environmental Quality Management Co. Ltd. (EQM).

The Lluvia Limited endorses and confirms to the Environmental Conservation Department, Ministry of Natural Resource and Environmental Conservation the following:

- The accuracy and completeness of the IEE and EMP
- The IEE and EMP has been prepared in compliance with applicable Environmental Conservation Law, Rules and Procedures, and
- That all the information contained in the report is accurate and a truthful representation of all findings as relating to the project.
- The commitments and obligations including all laws and regulations as detailed in the report determined to be relevant with the planned project, mitigation measures and plans set out in the report has been prepared in compliance with the respective Laws and Regulations.

Address – Premier Coffee Lluvia Ltd, No.108 Seikkanthar st, Industrial Zone (3), Hlaing Thar Yar Township, Yangon, Myanmar.

- The project proponent unequivocally pledges to adhere strictly to the extant laws and regulations of the Republic of the Union of Myanmar, encompassing the Environmental Conservation Law, Environmental Conservation Rules, Environmental Impact Assessment Procedures, and any subsequent directives that may be promulgated. This commitment extends to compliance with all pertinent laws, rules, procedures, orders, and instructions governing the project's operations. In the event of non-compliance, the project proponent willingly acknowledges that repercussions will be administered in accordance with the prevailing laws and rules.

The undersigned is authorized to issue this Letter of Commitment on behalf of the Lluvia Limited, Yangon, Myanmar.

Yours sincerely,

Manager

Lluvia Limited (Premier Factory)

The Letter of Commitment

As per the Administrative Instruction of Environmental Impact Assessment procedure 2015, the LLUVIA Co., Ltd required the Initial Environmental Examination (IEE) along with the Environmental Management Plan (EMP) for BEVERAGE MANUFACTURING & DISTRIBUTION FACTORY (LLUVIA Co., Ltd) located in Hlaing Thar Yar Township, Yangon, Myanmar to submit the report to the Environmental Conservation Department, Ministry of Natural Resources and Environmental Conservation (MONREC) for approval.

The proposed project is located at No. 108 (A) and 108 (B), Quarter (3), Hlaing Thar Yar Industrial Zone, Hlaing Thar Yar Township, Yangon, Myanmar.

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Chapter (2) Article 8, 9, 10, 11,

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- The accuracy and completeness of the IEE & EMP
- The IEE and EMP has been prepared in compliance with applicable Environmental Conservation Law, Rules and Procedures, and
- That all the information contained in the report is accurate and a truthful representation of all findings as relating to the project.
- The commitments and obligations including all laws and regulations as detailed in the IEE and EMP determined to be relevant with the planned project, mitigation measures and plans set out in the report has been prepared in compliance with the respective Laws and Regulations.

The undersigned is authorized to issue this Letter of Commitment on behalf of the Environmental Quality Management Co., Ltd., Yangon, Myanmar.

Yours sincerely,

Ohn

Ohnmar May Tin Hlaing
Environmental Health Consultant/ Managing Director
Environmental Quality Management Co., Ltd

List of Commitment Table according to the Respective Chapters of the IEE Report

The project proponent shall commit to adhere the following chapters and their respective commitments described in this IEE Report.

Chapter	Description	Commitments
1.	Executive Summary	The overall executive summary describing in this chapter is strongly committed by Lluvia Ltd (Premier Factory) to conduct.
2.	Company Information and Declaration of EIA team	EIA Consultancy team, Environmental Quality Management Co. Ltd. (EQM) and the Lluvia Ltd (Premier Factory) shall commit that the description about company information and EIA Team declaration in this report are truly stated in chapter 2.
3.	Policy and Legal Framework	Lluvia Ltd (Premier Factory) shall commit all operations, performed in an environmentally friendly manner by following Environmental Conservation Law (2012), Environmental Conservation rules (2014), National Environmental Quality (Emission) Guidelines (2015), Environmental Impact Assessment Procedure(2015), National Environmental Policy (2019), International Environmental Conventions/Protocols/Agreements Signed/ Ratified by Myanmar and other related laws and rules along with Mitigation Measures and Monitoring Plan.
5.	Description of the surrounding environment	Air, Noise, Potable Water, Wastewater, Solid waste monitoring were conducted according to the respective methodologies (attached in the annex VI) and compared with the NEQG guideline.
6.	Impact and Risk Assessment and Mitigation Measures	The Lluvia Ltd (Premier Factory) has to comply with the feasible measures available for adoption to mitigate the potential impacts of the project activities.
8.	Environmental Management Plan	Lluvia Ltd (Premier Factory) shall commit to follow the mitigation measures, specific action and monitoring plan and sub-management plan listed in EMP of this chapter in accordance with National Environmental Quality (Emission) Guidelines and in line with other relevant international standards.
8.	Environmental Monitoring Plan	Lluvia Ltd (Premier Factory) shall perform biannual environmental monitoring of project activities and submit monitoring reports biannually to the Environmental Conservation Department (ECD).
10.	Cooperate Social Responsibility and Community Development	The Lluvia Limited (Premier Factory) shall spend the 2% of the Net Profit for the community development and corporate social responsibility annually.

Chapter	Description	Commitments
9.	Emergency Plan	Lluvia Ltd (Premier Factory) shall commit the emergency response plan, health and safety plan for workers, disaster risk management plan and fire response plan mentioned in detail in this chapter and will always monitor and update the necessary emergency events in case which have occurred.
10.	Public Consultation and Public Participation	Lluvia Ltd (Premier Factory) is committed to consistently considering the community's concerns arising from the socio-economic survey. The project proponent shall address public complaints through grievance mechanism and public consultation meetings.

Manager

Lluvia Limited (Premier Factory)

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Abbreviations

3R	Reduce, Reuse, Recycle
ASTM	American Society for Testing and Materials
BOD	Bio-Chemical Oxygen Demand
BW	Body weight
CNG	Compressed Natural Gas
COD	Chemical Oxygen Demand
CWTS	Constructed Wetland Treatment System
DISI	Directorate of Industrial Supervision and Inspection
DO	Dissolved Oxygen
DSWG	Domestic Solid Waste Generation
DW	Dry Waste
ECD	Environmental Conservation Department
ED	Exposure Duration
EF	Exposure Frequency
EIA	Environmental Impact Assessment
EIAC	Environmental Impact Assessment Committee
EMP	Environmental Management Plan
EQG	Environmental Quality Guideline
ERP	Emergency Response Plan
ESHIA	Environmental, Social and Health Impact Assessment
ESIA	Environmental and Social Impact Assessment
FADD	Field Average Daily Dose
GHG	Greenhouse Gas

HQ	Hazard Quotient
HRS	Health Risk Assessment
IEE	Initial Environmental Examination
IFC	International Finance Corporation
IPCC	Intergovernmental Panel on Climate Change
IR	Inhalation Rate
IS	Integrated System
ISW	Industrial Solid Waste
ISWM	Integrated Solid Waste Management
IWW	Industrial Waste Water
LTR	Leather/Textile/Rubber
MOECAF	Ministry of Environmental Conservation and Forestry
MSW	Municipal Solid Waste
MSWM	Municipal Solid Waste Management
NAAQS	National Ambient Air Quality Standards
NIOSH	National Institute of Occupation Safety and Health
OSHA	Occupational Safety and Health Administration
$PM_{10}/PM_{2.5}$	Particulate Matter
SADD	Safe Average Daily Dose
SESIA	Supplementary Environmental and Social Impact Assessment
SG	Source Segregation
SIA	Social Impact Assessment
SOP	Standard Operation Procedure
SW	Solid Waste

TC	Total Coliforms
TDS	Total Dissolved Solid
TSPM	Total Suspended Particulate Matter
TSS	Total Suspended Solid
UN	United Nations
UNEP	United Nation Environmental Program
UNFCCC	United Nations Framework Convention on Climate Change
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
WARM	Waste Reduction Model
WG	Waste Generation
WGR	Waste Generation Rate
WHO	World Health Organization
WW	Wet Waste
YCDC	Yangon City Development Committee

၁။ အစီရင်ခံစာ အကျဉ်းချုပ် (ပရီမီယာ ကော်ဖီမှုန့် ထုတ်လုပ်သည့်စက်ရုံ)

၁.၁။ နိဒါန်း

Lluvia Limited (Premier Factory) သည် ကော်ဖီ၊ လက်ဖက်ရည်နှင့် **quaker oats** ကဲ့သို့သော အဖျော်ယမကာများကို ထုတ်လုပ်သည့် စားသောက်ကုန် လုပ်ငန်းတစ်ခုဖြစ်သည်။ အဆိုပြုစက်ရုံသည် အမှတ် (၁၀၈) (က) နှင့် (ခ)၊ ဆိပ်ကမ်းသာလမ်း၊ (၃) ရပ်ကွက်၊ လှိုင်သာယာစက်မှုဇုန်၊ လှိုင်သာယာမြို့နယ်၊ ရန်ကုန်တိုင်းဒေသကြီးတွင် တည်ရှိပြီး စက်ရုံဧရိယာမှာ ၉.၆၈၇ ဧက ရှိပါသည်။ **Lluvial Limited (Premier Factory)**သည် **Lluvia Limited** (၈၅ ရာခိုင်နှုန်း) နှင့် **MC Food Holdings Asia Pte, Limited** ၊ ဂျပန်နိုင်ငံ (၁၅ ရာခိုင်နှုန်း) တို့ကြား နှစ်ဦးအကျိုးတူ ပူးပေါင်းဆောင်ရွက်သော ဖက်စပ်လုပ်ငန်း တစ်ခုဖြစ်ပါသည်။ **Lluvia Limited** သည် လုပ်ငန်းများကို တိုးချဲ့လုပ်ကိုင်လျက်ရှိသော ထိပ်တန်းစက်မှုလုပ်ငန်းအုပ်စုဖြစ်ပါသည်။

Lluvia Limited (Premier Factory) ၏ ဒါရိုက်တာအဖွဲ့နှင့် ပရောဂျက် တင်ပြသူများ၏ ဆက်သွယ်ရန် အသေးစိတ် အချက်အလက်များမှာ အောက်ပါအတိုင်းဖြစ်ပါသည်။

- ကုမ္ပဏီအမည် – **Lluvia Limited (Premier Factory) (Lluvia** နှင့် **MC Food Holdings Asia Pte Limited** (ဂျပန်) နှင့် ဖက်စပ်လုပ်ငန်း၊
- ရင်းနှီးမြှုပ်နှံသူအမည် - ဦးကိုကိုကြီး (က) ဦးစိုးနိုင်
- လုပ်ငန်းအမျိုးအစား - အစားအသောက် ထုတ်လုပ်ခြင်းနှင့် ဖြန့်ဖြူးခြင်း (အဖျော်ယမကာ-ပရီမီယာကော်ဖီ၊ **Happy, All Time, Tea Master)**
- ရင်းနှီးမြှုပ်နှံမှုတည်နေရာ - အမှတ် (၁၀၈) (က) နှင့် (ခ)၊ (၃) ရပ်ကွက်၊ လှိုင်သာယာစက်မှုဇုန်၊ လှိုင်သာယာမြို့နယ်၊ ရန်ကုန်၊ မြန်မာ။
- တယ်လီဖုန်း-01 2585107, 01 2585108, 01 2585109၊
- **Fax-** 2585107, 2585108

ဤလေ့လာမှုသည် လှိုင်သာယာစက်မှုဇုန်ရှိ စားသောက်ကုန်ထုတ်လုပ်သည့် စက်ရုံ၏ ပရောဂျက်လည်ပတ်မှုအတွက် ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း (**IEE**) နှင့်အတူ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် (**EMP**) အတွက် လုပ်ဆောင်ပါသည်။

ကနဦး ပတ်ဝန်းကျင်ဆိုင်ရာ ဆန်းစစ်ခြင်း (**IEE**) နှင့်အတူ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ် (**EMP**) အား **Lluvia** စားသောက်ကုန် ထုတ်လုပ်ရေးနှင့် ဖြန့်ဖြူးရေး လုပ်ငန်းအတွက် **Environmental Quality Management Co. Ltd** ၏ ပတ်ဝန်းကျင်ဆိုင်ရာ အကြံပေးအဖွဲ့မှ ဆောင်ရွက်ခဲ့ပါသည်။

နယ်ပယ်အတိုင်းအတာသတ်မှတ်ခြင်းဆောင်ရွက်နိုင်ရန်အတွက် ကနဦးကွင်းဆင်းလေ့လာခြင်းအား ဆောင်ရွက်ခဲ့ပြီး ၂၀၁၅ ခုနှစ် အောက်တိုဘာလအတွင်း ကနဦး ပတ်ဝန်းကျင်ဆိုင်ရာ ဆန်းစစ်ခြင်း (**IEE**) နှင့်အတူ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ် (**EMP**) အား စတင်ဆောင်ရွက်ခဲ့ပါသည်။ ထို့အပြင် စက်ရုံသည် စက်မှုဇုံအတွင်းတည်ရှိ **ပြီး Project Area** ၏ (၂-၅) ကီလိုမီတာအတွင်း၌ အခြေခံ စစ်တမ်း ကောက်ယူမှုများကိုဆောင်ရွက်ခဲ့ပါသည်။ လေတိုင်းတာခြင်း၊ ဆူညံသံတိုင်းတာ ခြင်းနှင့် ရေအရည် အသွေး တိုင်းတာခြင်း လုပ်ငန်းစဉ် များကို စက်ရုံနှင့် စက်ရုံ၏ အနီးတဝိုက်တွင် ဆောင်ရွက်ခဲ့ပါသည်။ အများသူငှာ တိုင်ပင်ဆွေးနွေးခြင်း နှင့် သတင်းအချက်အလက် ထုတ်ဖော်ခြင်းများ ပြုလုပ်သော အခြေခံစောင့်ကြည့်ခြင်း၊ ပြည်သူများ ၏ သဘောထားထုတ်ဖော်မှုများနှင့် လူထုတွေ့ဆုံဆွေးနွေးပွဲ ရလာဒ် များအရ အခြားသော စက်ရုံ

များ နှင့် နှိုင်းယှဉ်ပါက ပတ်ဝန်းကျင် အပေါ် ဆိုးရွားသော အကျိုးသက်ရောက်မှု နည်းပါး ပါသည်။

စီမံကိန်း၏ အဓိကရည်ရွယ်ချက်များမှာ အောက်ပါတိုင်းဖြစ်ပါသည်။

၁။ စီမံကိန်းဧရိယာ၏ လက်ရှိ ပတ်ဝန်းကျင်အခြေအနေနှင့် လုပ်ဆောင်မှုများကို ဖော်ပြရန်၊

၂။ စီမံကိန်းလုပ်ငန်းကြောင့် ထိခိုက်နိုင်သော စီမံကိန်းပတ်ဝန်းကျင်အနီးအနားရှိ လေထု၊ ဆူညံသံ ၊ရေ အရည်အသွေး၊ စွန့်ပစ်အမှိုက်၊ မြေ၊ အဆောက်အအုံ၊ တိရစ္ဆာန်နှင့်အပင်များအပေါ် သက်ရောက်မှုများကို စစ်ဆေးရန်

၃။ ဆိုးကျိုးသက်ရောက်မှုများရှိခဲ့ပါက ဆိုးကျိုးလျော့ပါးစေသော နည်းလမ်းများအသုံးပြုနိုင်ရန်

၄။ ကောင်းကျိုးသက်ရောက်မှုများရှိခဲ့ပါက ကောင်းကျိုးဖြစ်ထွန်းစေသော နည်းလမ်းများပိုမို အသုံးပြုနိုင်ရန်

၅။ ပတ်ဝန်းကျင်အား ပိုမိုကောင်းမွန်စွာ ကာကွယ်နိုင်ရန်အတွက် စီမံကိန်း၏လုပ်ငန်းစဉ်များ အားလုံးအား ကောင်းမွန်စွာ စီမံရန်အတွက် ပတ်ဝန်းကျင်ဆိုင်ရာစီမံခန့်ခွဲမှု အစီအစဉ်အား ရေးဆွဲရန်

ပတ်ဝန်းကျင်ဆိုင်ရာ အကြံပေးအဖွဲ့ **Environmental Quality Monitoring Co. Ltd** မှ ကနဦး ပတ်ဝန်းကျင်ဆိုင်ရာ ဆန်းစစ်ခြင်း **(IEE)** နှင့်အတူ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ် **(EMP)** အား ရေးဆွဲမည်ဖြစ်ပါသည်။

ပတ်ဝန်းကျင်ဆိုင်ရာအတိုင်ပင်ခံကုမ္ပဏီ **(EQM)** သည် ကျွမ်းကျင်သော အတိုင်ပင်ခံများနှင့် နည်းပညာရှင်များ ဖြင့် ဖွဲ့စည်းထားပြီး ပတ်ဝန်းကျင်ဆိုင်ရာ အကဲဖြတ်ခြင်းနယ်ပယ်တွင် ခိုင်မာ သော နောက်ခံနှင့် အသိပညာများ ရရှိထားပြီး **Environmental, Social and Health Impact Assessment (ESHIA)** ကို 5 နှစ်ကျော်ကြာ ဆောင်ရွက်ထားရှိခဲ့ပြီး၊ နိုင်ငံအနှံ့ စီမံကိန်းများ ဆောင်ရွက်ခဲ့ပါသည်။ သဘာဝပတ်ဝန်းကျင်ဆိုင်ရာ စီမံကိန်း ၃၀ ခန့် (**ESIA/IEE/EPM**၊ သဘာဝ ပတ်ဝန်းကျင် ဆိုင်ရာ အခြေခံစောင့်ကြည့်ရေး ပရောဂျက်များနှင့် နိုင်ငံတော်နှင့် ဌာနဆိုင်ရာ ပရောဂျက်များ အပါအဝင်) ကို ပိုမိုကောင်းမွန်တိကျသော အကဲဖြတ်မှုဖြင့် ဆောင်ရွက်ခဲ့ပါသည်။

EQM Co. Ltd မှ **EIA** လုပ်ငန်းစဉ်စီမံကိန်းများနှင့်ပတ်သက်၍ အောက်ပါ စီမံကိန်းများအား ဆောင်ရွက်ခဲ့ပါ သည်။

၁။ ရေနံနှင့် သဘာဝဓာတ်ငွေ့လုပ်ငန်း

၂။ မုန့် စက်ရုံ၊

၃။ ဆောက်လုပ်ရေးလုပ်ငန်းသုံး အမှုန့်စက်ရုံ

၄။ ဟိုတယ်စီမံကိန်း

၅။ ဂျုံမှုန့်

၆။ ဆိပ်ကမ်းလုပ်ငန်း

၇။ ဆပ်ပြာစက်ရုံ

၈။ ဆန်စက်စက်ရုံ၊

၉။ ပတ်ဝန်းကျင်ဆိုင်ရာအခြေခံစစ်တမ်း စောင့်ကြည့်ရေး ပရောဂျက်များ

စီမံကိန်းအတွက် အကြံပေးကုမ္ပဏီ၏ အစိုးရမှတ်ပုံတင်ခွင့်ပြုမိန့်ရရှိမှုမှာ အောက်ပါအတိုင်း ဖြစ်ပါသည်။

၁	ပတ်ဝန်းကျင်ဆိုင်ရာ ကုမ္ပဏီ မှတ်ပုံတင် အမှတ်	**117491021 (2023-2024)**
၂	ပတ်ဝန်းကျင်ဆိုင်ရာ ကနဦးစစ်ဆေးမှု၊ ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံချက်	၂၆.၂.၂၀၁၅

	ဆောင်ရွက်ရေးဆွဲရန် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး နှင့် သစ်တောရေးရာ ဝန်ကြီးဌာန ၏ ထောက်ခံချက် နေ့စွဲ	

ဤဆောင်ရွက်ချက်၏ အဓိက ရည်ရွယ်ချက်သည် စက်ရုံနှင့် စက်ရုံလုပ်ငန်းဆောင်ရွက်မှုများ ကြောင့် ကျန်းမာ ရေးနှင့် ပတ်ဝန်းကျင်အပေါ် သက်ရောက်သည့် ဆိုးကျိုးများကို လျှော့ချရန်နှင့် စက်ရုံ၏ ရေရှည်တည်တံ့သည့် ဖွံ့ဖြိုးတိုးတက်မှုကို တိုးမြှင့်ပေးရန် ဖြစ်သည်။

The Lluvia Co., Ltd (Premier) ၏ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းလုပ်ငန်းစဉ်များ အတွက် လေ့လာဆန်းစစ်ခြင်းလုပ်ငန်းများဆောင်ရွက်ရာတွင် စီမံကိန်း၏ ရည်ရွယ်ချက်ပြည့်မီရန် လက်တွေ့အကောင် အထည်ဖော်ရန်အတွက် အောက်ပါ ဆောင်ရွက်ချက်များနှင့် နည်းလမ်း များကို အသုံးပြုပါသည်။

- နိုင်ငံနှင့် နိုင်ငံတကာအဆင့် မူဝါဒများ၊ ဥပဒေများနှင့် စည်းမျဉ်းစည်းကမ်းများနှင့် သက်ဆိုင်သည့် စာရွက်စာတမ်းများ ဖတ်ရှုလေ့လာခြင်း
- စက်ရုံနှင့် အစိုးရဌာန အသီးသီးမှ တာဝန်ရှိသူများနှင့် မေးမြန်းဆွေးနွေးခြင်း (လူဦးရေစာရင်းစစ်တမ်း ကောက်ယူခြင်း၊ စီမံကိန်းအား ပတ်ဝန်းကျင်ပြည်သူလူထုမှ အမြင် သဘောထားရယူခြင်း၊ ယဉ်ကျေးမှု အမွေအနှစ်ဆိုင်ရာ ထိခိုက်မှု ဆန်းစစ်ခြင်း၊ သက်ရှိများ အပေါ်ထိခိုက်မှုဆန်းစစ်ခြင်း၊ လူမှုဘဝထိခိုက်မှု ဆန်းစစ်ခြင်းအပါအဝင် စီမံကိန်းဧရိယာနှင့် အနီးပတ်ဝန်းကျင်တွင် လူမှုစီးပွားထိခိုက်မှုဆန်းခြင်းများ စစ်တမ်းကောက်ယူခြင်း)
- ပတ်ဝန်းကျင်ဆိုင်ရာ အခြေခံ အချက်အလက်များကို စောင့်ကြည့် မှတ်သား စစ်ဆေးခြင်း
- ပတ်ဝန်းကျင်ဆိုင်ရာ သက်ရောက်မှုများကို စစ်ဆေး အကဲဖြတ်ခြင်း
- လူထုထိခိုက်မှုဆန်းစစ်ခြင်းလုပ်ငန်းစဉ်များအား အုပ်စုတွင်း အစည်းအဝေးများ၊ အဓိက သတင်းပေး အင်တာဗျူးများ နှင့် တစ်အိမ်တက်ဆင်း မေးမြန်းမှုများတွင် ပါဝင်ဆောင်ရွက် သူများ အချင်းချင်း ဖွင့်လှစ် ဆွေးနွေးခြင်းများလုပ်ဆောင်ခြင်းနှင့် ပြန်လည် အစီရင်ခံတင်ပြခြင်း

၁-၂ မူဝါဒ၊ ဥပဒေဆိုင်ရာ နှင့် အဖွဲ့အစည်းဆိုင်ရာ မူဘောင်

ကနဦး ပတ်ဝန်းကျင်ဆိုင်ရာဆန်းစစ်ခြင်း **(IEE)** ဆောင်ရွက်ရာတွင် သက်ဆိုင်ရာဥပဒေများကို လျော်ညီ စွာ သုံးသပ်ဆောင်ရွက်ခဲ့ပါသည်။ အောက်ပါတို့သည် အကျုံးဝင်သည့် လမ်းညွှန်ချက်များ၊ စံနှုန်းများနှင့် စည်းမျဉ်းစည်းကမ်းများ ဖြစ်ပါသည်။

- ပြည်ထောင်စုသမ္မတ မြန်မာနိုင်ငံတော် ဖွဲ့စည်းအုပ်ချုပ်ပုံ အခြေခံ ဥပဒေ ၂၀၀၈ အပိုဒ် ၃၇
- အမျိုးသားပတ်ဝန်းကျင်ထိန်းသိမ်းရေး မူဝါဒ (၁၉၉၄)
- The Myanmar Agenda 21 (2007)
- သက်ဆိုင်သည့် ဒေသတွင်း လုပ်ငန်းခွင် ကျန်းမာရေးနှင့် ဘေးကင်းလုံခြုံရေးဆိုင်ရာ ဥပဒေများနှင့် စည်းမျဉ်းများ
- သယံဇာတနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာန၊ ပတ်ဝန်းကျင် ထိန်းသိမ်းရေးဦးစီးဌာန ၏ လက်မှတ်ရေးထိုးထားသည့် နိုင်ငံတကာ သဘောတူညီချက်များ၊ စာချုပ်များနှင့် သဘောတူညီချက် များ
- အမျိုးသားမြေအသုံးချမှု မူဝါဒ (၂၀၁၆)

- ပတ်ဝန်းကျင် ထိန်းသိမ်းရေး ဥပဒေ (၂၀၁၂)
- မြန်မာနိုင်ငံရင်းနှီးမြှုပ်နှံမှုဥပဒေ (၂၀၁၆)
- မြန်မာနိုင်ငံရင်းနှီးမြှုပ်နှံမှု နည်းဥပဒေများ (၂၀၁၇)
- ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးနည်းဥပဒေများ (၂၀၁၄)
- ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း (၂၀၁၅)
- အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များ (၂၀၁၅)
- အမျိုးသားပတ်ဝန်းကျင်မူဝါဒ (၂၀၁၉)
- တိုင်းရင်းသားလူမျိုးများ အခွင့်အရေး ကာကွယ်စောင့်ရှောက်ရေးဥပဒေ၊ (၂၀၁၅)
- မြန်မာ့အာမခံလုပ်ငန်းဥပဒေ (၁၉၉၃)
- မြန်မာ့မီးသတ်တပ်ဖွဲ့ဥပဒေ (၂၀၁၅)
- ပို့ကုန်သွင်းကုန်ဥပဒေ (၂၀၁၂)
- အလုပ်သမားအဖွဲ့အစည်းဥပဒေ (၂၀၁၁)
- အလုပ်သမားအငြင်းပွားမှုဖြေရှင်းရေးဥပဒေ (၂၀၁၂)
- အလုပ်အကိုင်နှင့် ကျွမ်းကျင်မှု ဖွံ့ဖြိုးတိုးတက်ရေးဥပဒေ (၂၀၁၃)
- အနည်းဆုံးအခကြေးငွေဥပဒေ (၂၀၁၃)
- အခကြေးငွေ ပေးချေရေးဥပဒေ (၂၀၁၆)
- လူမှုဖူလုံရေးဥပဒေ (၂၀၁၂)
- အလုပ်ရုံများအက်ဥပဒေ (၁၉၅၁), ပြင်ဆင်ချက် ၂၀၁၆
- ခွင့်နှင့် အလုပ်ပိတ်ရက်များဥပဒေ (၁၉၅၁), ပြင်ဆင်ချက် ၂၀၁၄
- မြန်မာနိုင်ငံပြည်သူ့ကျန်းမာရေးဥပဒေ (၁၉၇၂)
- ကူးစက်ရောဂါများကာကွယ်နှိမ်နှင်းရေးဥပဒေ (၁၉၅၅)
- ပေါက်ကွဲစေတတ်သော ဝတ္ထုပစ္စည်းများဆိုင်ရာ ဥပဒေ (၁၉၀၈)
- လုပ်ငန်းခွင်သုံးပေါက်ကွဲစေတတ်သော ဝတ္ထုပစ္စည်းများဆိုင်ရာ ဥပဒေ (၂၀၁၈)
- လုပ်ငန်းခွင်ဘေးအန္တရာယ်ကင်းရှင်းရေးနှင့် ကျန်းမာရေး ဥပဒေ (၂၀၁၉)
- ဓာတုပစ္စည်းနှင့် ဆက်စပ်ပစ္စည်းအန္တရာယ်မှ တားဆီးကာကွယ်ရေး ဥပဒေ (၂၀၁၃)
- အမျိုးသားအစားအသောက်ဥပဒေ (၁၉၉၇) ပြင်ဆင်ချက် ၂၀၁၃
- စားသုံးသူကာကွယ်ရေးဥပဒေ (၂၀၁၄)
- တိုင်းရင်းသားလူမျိုးများ၏ အခွင့်အရေးကာကွယ်စောင့်ရှောက်သည့် နည်းဥပဒေ (၂၀၁၉)
- သဘာဝဘေးအန္တရာယ် စီမံခန့်ခွဲမှု ဥပဒေ (၂၀၁၃)

၁.၃ စီမံကိန်း ဖော်ပြချက်နှင့် အခြားရွေးချယ်စရာများ

အဆိုပြုစက်ရုံသည် အမှတ် **(၁၀၈) (က)** နှင့် **(ခ)**၊ ဆိပ်ကမ်းသာလမ်း၊ **(၃)** ရပ်ကွက်၊ လှိုင်သာယာစက်မှုဇုန်၊ လှိုင်သာယာမြို့နယ်၊ ရန်ကုန်တိုင်းဒေသကြီးတွင် တည်ရှိပြီး စက်ရုံဧရိယာမှာ ၉.၆၈၇ ဧက ရှိပါသည်။

စက်ရုံ၏ တစ်နှစ်လျှင် စုပေါင်းထုတ်လုပ်နိုင်မှုပမာဏမှာ **(၂၆,၅၄၉)** မက်ထရစ်တန် ဖြစ်ပါသည်။ ပရိမီယာစက်ရုံသည် လိုအပ်သော ကုန်ကြမ်းအမျိုးအစားများကို ပြည်ပနိုင်ငံများ **(ဗီယက်နမ်နှင့် မလေးရှား)**

နှင့်ဒေသတွင်း (ရှာင်နှင့်တောင်ကြီး)တို့မှ တင်သွင်းပါသည်။ ကုန်ပစ္စည်းအမျိုးအစား တစ်ခုစီအတွက် တစ်နေ့လျှင် ကုန်ကြမ်းအသုံးပြုမှု ပမာဏမှာ (၈၀) မက်ထရစ်တန် ဖြစ်ပါသည်။ ကုန်ကြမ်းလိုအပ်ချက်များကို လည်းပြည့်ဝစွာ ဖြည့်ဆည်းနိုင်ပါသည်။

၁.၃.၁ အဆိုပြုထားသော စီမံကိန်း၏ လက်ရှိပတ်ဝန်းကျင် အခြေအနေ

အနီးနားရှိ စက်ရုံများနှင့် တည်နေရာအရ **New World mart**၊ **Newway** စက်ရုံနှင့် ရေဥက္ကံ ရပ်ကွက်တို့သည် အဆိုပြုထားသည့် စက်ရုံ၏မြောက်ဘက်တွင် တည်ရှိပါသည်။ **Mirae C&T** စက်ရုံ၊ **Standard General Trading** စက်ရုံ၊ **Pyan Hlwar Manufacturing** စက်ရုံနှင့် **Lobster** ဂိုဒေါင်တို့သည် အဆိုပြုထားသော စက်ရုံ၏ အနောက်ဘက်တွင် တည်ရှိပါသည်။ ရောဝတီ စားသောက်ကုန်လုပ်ငန်း၊ **Perfect Bakery** ဆက်စပ်ပစ္စည်းဆိုင်နှင့် ပန်းလှိုင်မြစ်တို့သည် အဆိုပြုစက်ရုံ၏ တောင်ဘက်တွင် တည်ရှိပါသည်။ ဘုန်းကြီးကျောင်း၊ **Pioneer Special Polybag Industry** နှင့် **Yae Oakkan** ရပ်ကွက်တို့သည် အဆိုပြုထားသည့် စက်ရုံ၏အရှေ့ဘက်တွင် တည်ရှိပါသည်။ အဆိုပြုထားသည့် စက်ရုံသည် ပန်းလှိုင်မြစ်အနီး ၀.၁၄ ကီလိုမီတာ အကွာတွင် တည်ရှိပါသည်။

အဆိုပြုစက်ရုံ အနီးပတ်ဝန်းကျင်တွင် ဘုန်းကြီးကျောင်းနှစ်ကျောင်းရှိပါသည်။ ၎င်းတို့မှာ ရေဥက္ကံကျောင်းတိုက်နှင့် တောင်ကလေးကျောင်းတိုက်တို့ဖြစ်ပါသည်။ ရေဥက္ကံကျောင်းတိုက်သည် မြောက်လတ္တီကျူ ၁၆ ဒီဂရီ ၅၀ မိနစ်နှင့် ၉၀.၇ စက္ကန့်နှင့် အရှေ့လောင်ဂျီတွဒ် ၀.၇၆ ဒီဂရီ ၃၀ မိနစ်တွင် တည်ရှိပါသည်။ ဘုန်းကြီးကျောင်းများသည် ထိုဒေသအတွက် ယဉ်ကျေးမှုအမွေအနှစ်များကို ထိန်းသိမ်းရန် လိုအပ်သော တစ်ခုတည်းသောနေရာဖြစ်သည်။ ထိုဒေသအနီးပတ်ဝန်းကျင်တွင် သင်္ချိုင်းမရှိပါ။ ထို့အပြင် ဒေသတွင်း ရှေးဟောင်း သုတေသန နယ်မြေများ မရှိကြောင်းကိုလည်း လေ့လာတွေ့ရှိရပါသည်။ အရေးကြီးသော ယဉ်ကျေးမှုဆိုင်ရာ လှုပ်ရှားမှုများနှင့် ပတ်သက်၍ ဆွမ်းသိမ်းပွဲသည် ထိုဒေသအတွက် အကြီးမားဆုံးနှင့် အရေးပါသော ပွဲတော်ဖြစ်ကြောင်း မှတ်သားရပါသည်။

၁.၃.၂။ တည်နေရာ၏ လက်ရှိအသုံးပြုမှု

အဆိုပြုထားသော စက်ရုံတည်နေရာ၏ အဓိကအစိတ်အပိုင်းများအဖြစ် ရုံးခန်းအဆောက်အဦများ၊ ထုတ်လုပ်ခြင်းနှင့် သိုလှောင်ခြင်း အဆောက်အဦများ၊ စားသောက်ဆိုင်၊ အခြားအဆောက်အဦများ၊ **(roasting area, Reverse Osmosis (RO) area, generators, MME, etc.)** နှင့် မြေနေရာလွတ်များ ပါဝင်ပါသည်။ စက်ရုံဝန်းအတွင်းတွင် သရက်ပင်၊ ပိတောက်ပင်များ စသည်ဖြင့် တွေ့ရှိရပြီး စက်ရုံဝန်းအတွင်းရှိ စားသောက်ဆိုင်တွင် အလုပ်သမားများအတွက် စားသောက်ဖွယ်ရာများ ရှိပါသည်။

ဇယား 1.1 စက်ရုံအဆောက်အဦများ

စဉ်	ပုံပိုးမှု	ဧရိယာ (m)	ယူနစ်(%)
၁	အုပ်ချုပ်ရေးရုံး	၉၇၅.၁	၂.၄၈
၂	လုပ်ငန်းလည်ပတ်သည့် အဆောက်အဦများ	၄၄၄၃.၄	၁၁.၃၂
၃	စားသောက်ဆိုင်	၄၅၂.၉	၁.၁၅
၄	ကုန်လှောင်ရုံ	၁၅၀၂၆	၃၈.၂၈
၅	အခြားအဆောက်အဦများ	၁၅၁၅၉.၄	၃၈.၆၂

၆	ဟင်းလင်းပြင်	၃၁၉၇.၇	၈.၁၅
	စုစုပေါင်း	**၃၉,၂၅၄.၅**	**၁၀၀**

၁.၃.၃ အဆိုပြုစက်ရုံ၏ ယေဘုယျ ထုတ်လုပ်သည့်အဆင့်များ

ဤကော်ဖီမစ်စက်ရုံသည် ကော်ဖီမှုန့်ကုန်ကြမ်းများကို လက်ခံရရှိပြီး ရရှိလာသော ကုန်ကြမ်းများကို အရည်အသွေး ထိန်းချုပ်သည့် အဖွဲ့မှ စစ်ဆေးပါသည်။ စစ်ဆေးရေးအဖွဲ့မှ ခွင့်ပြုထားသော ကော်ဖီမှုန့်များအား **Mixer** စက်များကို အသုံးပြု၍ လိုအပ်သော ပါဝင်ပစ္စည်းများဖြင့် သင့်တင့်သော အချိုးအစားအတိုင်း ရောစပ်ပါသည်။ လိုအပ်သော အချိုးအစားဖြင့် ရောစပ်ထားသော ကော်ဖီမစ်အမှုန့်များကို လူအား၊စက်အား နှစ်မျိုးအသုံးပြု၍ ထုပ်ပိုးပါသည်။ ထုပ်ပိုးပြီးသော ကော်ဖီမစ်ထုပ်များကို အရည်အသွေး ထိန်းချုပ်သည့် အဖွဲ့မှ စစ်ဆေးပါသည်။ စစ်ဆေးရေးအဖွဲ့မှ ခွင့်ပြုသော ကော်ဖီမစ်ထုပ်များကို မြန်မာပြည်တစ်ဝှမ်းရှိ ဈေးကွက်များသို့ ပို့ဆောင်ပါသည်။

၁.၃.၃.၁ ထုတ်လုပ်မှုလုပ်ငန်းစဉ်

အဆိုပြုစက်ရုံ၏ ထုတ်လုပ်မှုလုပ်ငန်းစဉ်သည် ထုတ်ကုန်အမျိုးအစားအပေါ်တွင် အခြေခံ၍ ထုတ်လုပ်ပါသည်။ အဓိကထုတ်ကုန်များမှာ **instant coffee mix (3in1), instant coffee mix (2 plus1), instant milk powder and instant tea mix** တို့ဖြစ်ပါသည်။

(၁) Instant coffee mix (3in1) ထုတ်လုပ်မှု လုပ်ငန်းစဉ်

အဆိုပြုထားသော ပရီမီယာ စက်ရုံ၏ **Instant coffee mix (3 in1)** ကော်ဖီမစ်ထုတ်လုပ်လုပ်ခြင်း လုပ်ငန်းစဉ်အတွက် လည်ပတ်မှုတွင် အဓိကလုပ်ဆောင်မှု (၂) ခု ပါဝင်ပါသည်။

• **Mixer** စက်ကြီးများကို အသုံးပြု၍ **Non-Dairy Creamer, Instant Coffee Powder** နှင့် **Refined Sugar** တို့ကို လိုအပ်သော အချိုးအစားအလိုက် ထည့်သွင်း၍ မိနစ် (၂၀) ခန့်ကြာရောစပ်ခြင်း ။

• ထုပ်ပိုးခြင်းနှင့် နောက်ဆုံးအဆင့်ထုတ်ကုန်ပြုလုပ်ခြင်း တို့ပါဝင်ပါသည်။

(၂) Instant coffee mix (2 plus1) ထုတ်လုပ်မှု လုပ်ငန်းစဉ်

အဆိုပြုထားသော ပရီမီယာ စက်ရုံ၏ **Instant coffee mix (2 plus1)** ကော်ဖီမစ်ထုတ်လုပ်လုပ်ခြင်း လုပ်ငန်းစဉ်အတွက် လည်ပတ်မှုတွင် အဓိကလုပ်ဆောင်မှု (၉)ခု ပါဝင်ပါသည်။

- ကုန်ကြမ်းပစ္စည်းများကို လက်ခံရယူခြင်း
- ကုန်ကြမ်းပစ္စည်းများကို အရည်အသွေး ခွဲခြားသတ်မှတ်ခြင်း
- (ကော်ဖီစေ့အနက်ရောင်၊ မကောင်းသော ကော်ဖီစေ့၊ ကျောက်ခဲနှင့် အခြား ကော်ဖီမဟုတ်သော အရာများ) ကို ခွဲခြားခြင်း
- ပုံမှန်ကော်ဖီအရောင်နှင့် **espresso** အရောင်ဟူ၍ **Roasting** ပြုလုပ်ခြင်း
- (ကော်ဖီစေ့အနက်ရောင်၊ မကောင်းသော ကော်ဖီစေ့၊ ကျောက်ခဲနှင့် အခြား ကော်ဖီမဟုတ်သော အရာများ) ကို နောက်ထပ်တစ်ကြိမ်ထပ်မံ ခွဲခြားခြင်း
- **Fine & Coarse & 2 Plus 1 Powder** ရရှိရန် ကြိတ်ခွဲခြင်း
- **Fine Powder** ရရှိရန် **Sifting** ပြုလုပ်ခြင်း
- **Mixer** စက်ကြီးများအသုံးပြု၍ **(Fine Powder, NDC & Sugar)** တို့ကို ရောစပ်ခြင်း
- ထုပ်ပိုးခြင်းနှင့် နောက်ဆုံးအဆင့်ထုတ်ကုန်ပြုလုပ်ခြင်း တို့ပါဝင်ပါသည်။

(၃) Instant milk powder and instant tea mix ထုတ်လုပ်မှု လုပ်ငန်းစဉ်

အဆိုပြုထားသော ပရိမီယာ စက်ရုံ၏ **Instant milk powder and instant tea mix** တီးမစ်ထုတ်လုပ်လုပ်ခြင်း လုပ်ငန်းစဉ်အတွက် လည်ပတ်မှုတွင် အဓိကလုပ်ဆောင်မှု (၂) ခု ပါဝင်ပါသည်။

• **Mixer** စက်ကြီးများကို အသုံးပြု၍ **Non-Dairy Creamer, Tea Powder** နှင့် **Refined Sugar** တို့ကို လိုအပ်သော အချိုးအစားအလိုက် ထည့်သွင်း၍ ရောစပ်ခြင်း ။

• ထုပ်ပိုးခြင်းနှင့် နောက်ဆုံးအဆင့်ထုတ်ကုန်ပြုလုပ်ခြင်း တို့ပါဝင်ပါသည်။

လည်ပတ်မှု လုပ်ငန်းစဉ်တစ်လျှောက် အသုံးပြုသည့် စက်ပစ္စည်းများစာရင်းကို အောက်ပါအတိုင်း ဖော်ပြထားပါသည်။

- **Coffee Grinding Machine**
- **Mixer Machine**
- **20KG Buhler Roaster**
- **Sanko Packing Machine (sachets)**
- **Sifter Machine**

၁.၃.၄ လုပ်ငန်းလည်ပတ်သည့် အဆင့်

(က) ဓါတ်အားလိုအပ်မှု

အဆိုပြုယူနစ်အတွက် စုစုပေါင်း လျှပ်စစ်ဓါတ်အားသည် တစ်လလျှင် (၂၃၆,၃၅၈) ကီလိုဝက် ဖြစ်သည်။ ဓါတ်အားလိုအပ်ချက်ကို အစိုးရလျှပ်စစ်ဓါတ်အားလိုင်းမှ ရရှိမည်ဖြစ်သည်။ သို့သော်လည်း လျှပ်စစ်ဓါတ်အားပြတ်တောက်မှု နှင့် သုံးစွဲသူများထဲမှ ပစ္စည်းလိုအပ်ချက်များ အရေးပေါ် ဖြစ်ပေါ်ခဲ့ပါက အသုံးပြု နိုင်ရန် (၅၀၀) ကီလိုဗို့စွမ်းဆောင်ရည်ရှိ မီးစက် (၃) လုံးအား အသင့်အနေအထား ဖြင့် အသုံးပြုပါသည်။ ပင်မဓါတ်အားလိုင်းမှ ချို့ယွင်းချက်များ ဖြစ်ပေါ်လျှင် မီးစက်များလည်ပတ်၍ အရေးပေါ်နေရာများတွင် လျှပ်စစ်ဓါတ်အား ထောက်ပံ့ပေး သွားမည်ဖြစ်သည်။

(ခ) ရေလိုအပ်မှု

ထုတ်လုပ်မှု လုပ်ငန်းစဉ်အတွက် အဓိကလိုအပ်သော ရေအရင်းအမြစ်ကိုအဝိစိတွင်းများမှ ရရှိပါသည်။ အဆိုပြုစက်ရုံသည် ပန်းလှိုင်မြစ်အနီးနားတွင် တည်ရှိသောကြောင့် မြေအောက်ရေညစ်ညမ်းမှု အနည်းငယ်ရှိပါသည်။ သို့ဖြစ်ပါ၍ **RO** နည်းပညာကို အသုံးပြုပြီးရေကိုသန့်စင်စေပြီးမှသာလျှင် ထုတ်လုပ်မှုလုပ်ငန်းများနှင့် ဝန်ထမ်းများအသုံးပြုရန်အတွက် ဖြန့်ဝေပေးပါသည်။ စက်ရုံ၏ စုစုပေါင်း ရေလိုအပ်ချက်သည် တစ်ရက်လျှင် ရေဂါလံ (၅၀၀၀) ဖြစ်သည်။

(ဂ) လုပ်အားလိုအပ်မှုနှင့် ဝန်ထမ်းအမျိုးအစားများ

အဓိကအားဖြင့် ဝန်ထမ်းအမျိုးအစား (၂) မျိုးရှိသည်။ လခစား အမြဲတမ်းဝန်ထမ်းအုပ်စု (စက်ရုံမန်နေဂျာ၊ စီမံခန့်ခွဲရေး၊ လုံခြုံရေး၊ စာရင်းကိုင်၊ အရည်အသွေး ထိန်းချုပ်ရေး၊ လုပ်ငန်းချိတ်ဆက်ရေး၊ ပြုပြင်ထိန်းသိမ်းရေးဝန်ထမ်းများ၊ ကုန်လှောင်ရုံဝန်ထမ်းများ၊ ထုတ်လုပ်ရေးဝန်ထမ်း များ) နှင့် အချိန်ပိုင်းဝန်ထမ်းများအစရှိသဖြင့် ဖြစ်ပါသည် ။ အဆိုပြုစက်ရုံ၏ ဝန်ထမ်းအင်အားစာရင်းကို အောက်ပါဇယားတွင် ဖော်ပြထားပါသည်။

ဇယား ၁.၂။ ပရီမီယာစက်ရုံ၏ ဝန်ထမ်းအင်အားစာရင်း

စဉ်	ဝန်ထမ်းအမျိုးအစား	ဝန်ထမ်းအရေအတွက်
၁	စက်ရုံမန်နေဂျာ	၁
၂	စီမံခန့်ခွဲရေး	၃၆
၃	လုံခြုံရေး	၂၄
၄	လုပ်ငန်းချိတ်ဆက်ရေး	၃
၅	စာရင်းကိုင်	၈
၆	ကုန်လှောင်ရုံ	၂၇
၇	အရည်အသွေး ထိန်းချုပ်ရေး	၅၂
၈	ပြုပြင်ထိန်းသိမ်းရေး	၂၃
၉	ထုတ်လုပ်ရေး (အမြဲတမ်းဝန်ထမ်း)	၄၉၆
၁၀	ထုတ်လုပ်ရေး (နေ့စားဝန်ထမ်း)	၂၂၃
စုစုပေါင်း		၈၉၃

(ဃ) လုံခြုံရေး စီမံဆောင်ရွက်ချက်များ

လုပ်ငန်းလည်ပတ်စဉ် ဝန်ထမ်းနှင့် အလုပ်သမားများအတွက် လုံခြုံရေး စီမံဆောင်ရွက်ချက်များအနေဖြင့်

- နားအကာ
- လက်အိတ်
- ဖိနပ်
- ဖုံအကာ
- ဦးထုပ်အမာ နှင့် ကတ်ဦးထုပ်များ
- ကာကွယ်ရေး ဆင်တူဝတ်စုံများ

၁.၄ အခြားရွေးချယ်စရာများ

စီမံကိန်းလုပ်ငန်းများကြောင့် ဖြစ်လာနိုင်သော သဘာဝပတ်ဝန်းကျင်နှင့် လူမှုရေးဆိုင်ရာ ထိခိုက်မှုအားလုံးကို တားဆီးနိုင်မည့် စက်ရုံဖြစ်သည့်အတွက် အစားထိုးဖွံ့ဖြိုးရေး ရွေးချယ်စရာမရှိပါ။

အဆိုပြုစက်ရုံနှင့် ဒေသခံများအကြား ကောင်းမွန်သော ပူးပေါင်းဆက်ဆံရေးရှိပါက စက်ရုံလုပ်ငန်းများ ဖွံ့ဖြိုးတိုးတက်မှု ရလဒ်အနေဖြင့် အလုပ်အကိုင် အခွင့်အလမ်းများ တိုးတက်လာခြင်း၊ အခြေခံအဆောက်အဦများ အဆင့်မြှင့်လာခြင်းနှင့် အခြားသော အကျိုးခံစားခွင့်များဖြစ်သည့် သဘာဝပတ်ဝန်းကျင်နှင့် လူမှုရေးဆိုင်ရာ အကျိုးကျေးဇူးများ ရရှိနိုင်မည်ဖြစ်ပါသည်။

Lluvia စက်ရုံသည် စားသောက်ကုန်ထုတ်လုပ်သည့် လုပ်ငန်းဖြစ်သောကြောင့် ပတ်ဝန်းကျင် ညစ်ညမ်းမှုကို ဖြစ်ပေါ်စေသော အခြားသော စက်ရုံများနှင့် နှိုင်းယှဉ်ပါက ပတ်ဝန်းကျင်အပေါ် အပျက်သဘော သက်ရောက်မှု နည်းပါးပါသည်။

ထို့အပြင် စီမံကိန်းအဆိုပြုသူသည် **IEE&EMP** တွင် ဖော်ပြထားသည့် လျော့ပါးရေး အစီအမံများနှင့် စီမံခန့်ခွဲမှု

အစီအစဉ်များကို အသိအမှတ်ပြုပြီး လိုက်နာဆောင်ရွက်ပါက အလုံးစုံအကျိုးသက်ရောက်မှုများသည် လျော့နည်းသွားမည် ဖြစ်ပါသည်။

၁.၅ ပတ်ဝန်းကျင်၊ သက်ရောက်မှုနှင့် အန္တရာယ် အကဲဖြတ်စစ်ဆေးခြင်းနှင့် လျော့ပါးစေသည့် စီမံချက်များ

၁.၆.၁ ပတ်ဝန်းကျင်လေအရည်အသွေး

လက်ရှိ အခြေခံ ပတ်ဝန်းကျင်လေအရည်အသွေးနှင့် ဒေသတွင်း မိုးလေဝသ စောင့်ကြည့်မှတ်သား စစ်ဆေးမှုကို **Premier** စက်ရုံနှင့်ပတ်ဝန်းကျင်ဒေသများတွင် ၂၀၁၅ ခုနှစ် အောက်တိုဘာလ **(**မိုးရာသီ**)** ကတည်းက ဆောင်ရွက်ပြီးဖြစ်သည်။

ထို့အပြင် သက်ဆိုင်ရာ စံနှုန်းများကို နှိုင်းယှဉ်ရန်အတွက် အသုံးပြုခဲ့သည်။

စောင့်ကြည့်မှတ်သား စစ်ဆေးမှုတွင် စောင့်ကြည့်မှတ်သား လေ့လာသည့် နေရာတွင်ရှိ အမှုန်များ **(PM10** နှင့် **PM2.5)** ၊ ကာဗွန်မိုနောက်ဆိုဒ် **(CO)**၊ မတည်မြဲသော အော်ဂဲနစ် ဒြပ်ပေါင်းများ **(VOC)**၊ ဆာလ်ဖာဒိုင်အောက်ဆိုဒ် **(SO2)** ၊ နိုက်တြိုဂျင်ဒိုင်အောက်ဆိုဒ် **(NO2)** ၊ အမိုးနီးယား **(NO3)** ၊ မီသိန်း **(CH4)** ၊ အိုဇုန်း **(O3)** ၊ မိုးလေဝသဆိုင်ရာ ဓါတ်ရောင်ခြည်များ၏ ၂၄ နာရီစာ ပျမ်းမျှခြင်း ပါဝင်သည်။

ဤတိုင်းတာမှု သတ်မှတ်ချက်ဘောင်များမှ စက်ရုံ၏ ထုတ်လုပ်မှု လုပ်ငန်းစဉ်မှ အဓိကထုတ်သည့် အမှုန်များ (**PM10** နှင့် **PM2.5)** သည် အဓိက ညစ်ညမ်းစေသည့်အရာများ ဖြစ်သည်။ ယေဘူယျအားဖြင့် (**PM10** နှင့် **PM2.5)** အမှုန်များ စုစုပေါင်း ထုတ်လုပ်မှု ၂၄နာရီပျမ်းမျှ သည် **66µg/m3** နှင့် **22µg/m3** အသီးသီး ဖြစ်ကြသည်။ **PM10** ထုတ်လွှတ်မှုသည် **NEQG (50µg/m3 for PM10)** ထက်ပိုလျက်ရှိပြီး **PM2.5** ထုတ်လွှတ်မှုသည် **NEQG (25µg/m3 for PM2.5)** အောက် လျော့နည်းနေပါသည်။

အခြားသော ထုတ်လွှတ်မှုများသည့် ညစ်ညမ်းစေသည့်အရာများမှာ **SO2 (174ppb)** ဖြစ်ပြီး NEQG **guildlne** ထက်သာလွန်နေကြောင်း တွေ့ရှိရသည်။

သို့သော်လည်း လေထုညစ်ညမ်းမှု ဓာတ်ငွေ့ထုတ်လွှတ်မှုအားလုံး၏ အကျိုးသက်ရောက်မှုများကို သက်ရောက်မှုအကဲဖြတ်မှုအရ အလယ်အလတ်အဖြစ် အဆင့်သတ်မှတ်ထားပါသည်။ လေထုအရည်အသွေးတွေ့ရှိမှု၏ အသေးစိတ် အချက်အလက်များကို အောက်ပါကဏ္ဍတွင် ဖော်ပြထားပါသည်။

ထို့အပြင် ထုတ်လုပ်မှုလုပ်ငန်းစဉ်မှ ထွက်ရှိလာသော လေထုအမှုန်များနှင့် ထိတွေ့မှုမှ ကာကွယ် ရန် ထုတ်လုပ်မှုလုပ်ငန်းစဉ်တွင်ပါဝင်သော အလုပ်သမားများသည် သင့်တော်သည့် အလုပ် အလေ့အထကောင်း တစ်ခုအနေဖြင့် N95 **Respirators/masks** များကို တပ်ဆင်ပါသည်။ ထို့အပြင် လေထု စောင့်ကြည့် မှတ် သား စစ်ဆေးမှု စီမံချက်ကို ဖလတကြိမ်ဆောင်ရွက်သင့်သည်။ အထူးသဖြင့် စက်ရုံတွင်း စက်ကိရိယာသစ်များ ပြောင်းလဲတပ်ဆင်သည့် အခါများတွင် ပိုမိုလိုအပ်ပါသည်။ သက်ရောက်မှု လျော့ပါး စေသည့် စီမံချက်များကို သက်ဆိုင်ရာ အပိုင်းကဏ္ဍ များတွင် အသေးစိတ်ဖော်ပြ ထားသည်။

၁.၆.၂ အခန်းတွင်းလေ

အခန်းတွင်းလေကို စောင့်ကြည့်ခြင်းတွင် **Lluvia (Conference room)**၊ **QC** ဓာတ်ခွဲခန်းနှင့် ထုတ်လုပ်မှုလုပ်ငန်းစဉ်များတွင်လည်း ဆောင်ရွက်ခဲ့ပါသည်။ အခန်းတွင်းလေကို တိုင်းတာခြင်းတွင် ဇီဝဖြစ်စဉ် (ဘက်တီးရီးယားနှင့် မှို) လေအရည်အသွေး၊ အခန်းတွင်းလေထုညစ်ညမ်းမှု၏ အဓိကအချက်များဖြစ်သည့် အမှုန်အမွှားများနှင့် ဓာတ်ငွေ့များ ပါဝင်ပါသည်။ ရုပ်ပိုင်းဆိုင်ရာ

အတွင်းပိုင်းလေထုကို တိုင်းတာခြင်း (အခန်းနှင့် နံရံ အပူချိန်၊ လေဝင်လေထွက် ရွေ့လျားမှု/စီးဆင်းမှု) နှင့် အစိုဓါတ် (မျက်နှာကျက်နှင့် နံရံများ) ပါဝင်၍ ယင်းကန့်သတ် ချက်များသည် ရုံးရှိ ရောဂါပိုးမွှားများ ကြီးထွားမှုကိုသာမက အလုပ်သမားများ၏ ကျန်းမာရေး၊ အပြင်လေထုကို တိုင်းတာရန်အတွက် ကန့်သတ်ချက်များအပေါ်တွင်လည်း လွှမ်းမိုးမှု ရှိပါသည်။ တွေ့ရှိချက်များအရ အခန်းတွင်း လေထုအရည်အသွေးသည် **OSHA** လမ်းညွှန်ချက်နှင့် ကိုက်ညီပါသည်။

၁.၆.၃ ကာဗွန်ထုတ်လွှတ်မှု

Lluvia စက်ရုံသည် စက်အစားထိုးအသုံးပြုမှု အလွန်မြင့်မားပြီး လုပ်ငန်းစဉ်၏ အစိတ်အပိုင်းအားလုံး သည် ကွန်ပျူတာ ထိန်းချုပ်မှုဖြင့် အလွယ်တကူ အသားကျပြီး ဖြစ်သည်။ ထို့အပြင် **Lluvia** စက်ရုံသည် ၎င်း၏လုပ်ငန်းစဉ်အားလုံးအတွက် အစိုးရလျှပ်စစ်ဓာတ်အားကို အသုံးချလျက်ရှိပါသည်။ ထို့ကြောင့် လျှပ်စစ်ဓါတ်အား အသုံးပြုမှုမှ **CO**2 ထုတ်လွှတ်မှု ပမာဏသည် 2,123.2 မက်ထရစ်တန်သာ ရှိပါသည်။

သယ်ယူပို့ဆောင်ရေးကဏ္ဍမှ **CO**2 ထုတ်လွှတ်မှု ပမာဏသည် တစ်နှစ်လျှင် ၉၁,၄၁၆ မက်ထရစ်တန်ဖြစ်ပါသည်။ စက်ရုံမှ စွန့်ပစ်အမှိုက်များကို မြေပေါ်သို့ မစွန့်ပစ်ဘဲ ပြန်လည်အသုံးပြုခြင်း (Recycle) အလေ့အကျင့်ကြောင့် တစ်နှစ်လျှင် စွန့်ပစ်အမှိုက်မှ **CO**2 ထုတ်လွှတ်မှု ပမာဏစုစုပေါင်း 2,214.616 မက်ထရစ်တန် (1,731.2 မက်ထရစ်တန်) ကို လျှော့ချနိုင်ပါသည်။

ထို့ကြောင့် **Lluvia** စက်ရုံ၏ နှစ်စဉ် **CO**2 ထုတ်လွှတ်မှုသည် ၄၈၃.၄၁၆ မက်ထရစ်တန်ဖြစ်ပါသည်။

လျှပ်စစ်ဓာတ်အားကို အဓိကအသုံးပြုခြင်းကြောင့်၊ အသင့်အနေအထားအဖြစ် ထားရှိသော မီးစက်များမှ ထုတ်လွှတ်သည့် ညစ်ညမ်းစေသည့် အရင်းအမြစ်များကို လျစ်လျူရှုနိုင်ပါသည်။

၁.၄.၄ **လေထုထုတ်လွှတ်မှုအတွက် လျော့ပါးရေးအစီအမံများ**

၁.၄.၄.၁ အမှုန်အမွှားထုတ်လွှတ်မှုအတွက် လျော့ပါးရေးအစီအမံများ

အဆိုပြုထားသော စက်ရုံ၏ (**PM**10 နှင့် **PM**2.5) ကဲ့သို့သော အမှုန်အမွှားများ ထုတ်လွှတ်မှုအား စက်ရုံလုပ်ငန်းစဉ်များမှ အထူးသဖြင့် ထုတ်လုပ်မှုလုပ်ငန်းစဉ်နှင့် အလူမီနီယံဖလင် မီးရှို့သည့် နေရာများမှ အဓိက ထုတ်လွှတ်ပါသည်။ ထုတ်လုပ်မှုလုပ်ငန်းစဉ်တွင် လေထုညစ်ညမ်းမှုကို လျော့ပါးသက်သာစေရန် **fabric filter** သို့မဟုတ် ဖုန်မှုန့်စုဆောင်းမှုစနစ် ကဲ့သို့သော အပိုထိန်းချုပ်မှုစနစ်များ တပ်ဆင်ရန် လိုအပ်ပါသည်။

ထို့အပြင် အလူမီနီယမ်ဖလင်များကို မီးရှို့ခြင်းသည် သင့်လျော်သော လုပ်ဆောင်မှုမဟုတ်ပါ။ မီးရှို့ခြင်းမှ ညစ်ညမ်းသော အခိုးအငွေ့ ထုတ်လွှတ်မှုကို လျော့ပါးစေရန်အတွက် အသေးစား မီးရှို့စက် တပ်ဆင်ထားပါသည်။

အလူမီနီယံဖလင်များကို မီးရှို့ရန်အတွက် အသေးစား အမှိုက်မီးရှို့စက်ကို ယခင်က အသုံးပြုခဲ့သော်လည်း ယခုအခါ ဖြတ်စက်များကို အသုံးပြု၍ ဖြတ်ချကာ **YCDC** တွင် စွန့်ပစ်ပါသည်။

စက်ရုံ၏ဂိုဒေါင်များတွင် လေဝင်လေထွက်ကောင်းမွန်စေရန်အတွက် **Roof Air Ventilation System** ထားရှိထားပါသည်။ ထုတ်လုပ်ရေးအဆောက်အဦ အတွင်းရှိ လေထုအရည်အသွေးကို မြှင့်တင်ရန်အတွက် **exhaust fans နှင့် ကောင်းမွန်သော လေဝင်လေထွက် စနစ်ကို အသုံးပြုထားပါသည်။ Roaster အခန်းတွင် exhaust fans များကို တပ်ဆင်ထားပြီး အခြားထုတ်လုပ်ရေး အခန်းများတွင် လေအေးပေးစက်များကို တပ်ဆင်ထားပါသည်။ ထုတ်လုပ်ရေး လုပ်ငန်းရှိ စက်ကြီးများတွင် ဖုန်စုပ်သည့် စနစ်ကို တပ်ဆင်ထားပါသည်။**

လေထုထဲသို့ **PM**10 နှင့် **PM**2.5 အမှုန်အမွှားများ ထုတ်လွှတ်မှုသည် အမျိုးသားပတ်ဝန်းကျင် အရည်အသွေး

အခိုးအငွေ့ထုတ်လွှတ်မှု လမ်းညွှန်ချက်များမှ သတ်မှတ်ထားသည့်အတိုင်း **PM**10 (50 **µg/m**³) နှင့် **PM**2.5 (25 **µg/m**³) အောက်အဆင့်သို့ လျော့ပါးသွားမည်ဖြစ်ပါသည်။

၁.၄.၄.၂ ဓါတ်ငွေ့ထုတ်လွှတ်မှုအတွက် လျော့ပါးရေးအစီအမံများ

အဆိုပြုထားသော စက်ရုံမှ ညစ်ညမ်းမှု ဓာတ်ငွေ့အချို့ထုတ်လွှတ်မှု အထူးသဖြင့် **SO2** ထုတ်လွှတ်မှုသည် **NEQG** စံနှုန်းများ ကို ကျော်လွန်နေပါသည်။ အဓိက SO2 ဓာတ်ငွေ့ ညစ်ညမ်းမှုဖြစ်စေသော အကြောင်းအရင်းမှာ စက်မှုလုပ်ငန်းဆိုင်ရာ လုပ်ဆောင်မှုများမှ လောင်စာ လောင်ကျွမ်းခြင်းဖြင့် ဓာတ်ငွေ့ ထုတ်လွှတ်မှု ဖြစ်ပါသည်။ ထို့ကြောင့် လောင်ကျွမ်းမှုဖြစ်စဉ်မှထုတ်လွှတ်သော SO2 ပမာဏကို လျှော့ချရန် အရိုးရှင်းဆုံးနည်းလမ်းတစ်ခုမှာ ဆာလဖာပါဝင်မှုနည်းသော လောင်စာဆီသို့ ပြောင်းလဲအသုံးပြုခြင်းဖြင့် လျှော့ချနိုင်ပါသည်။ အဆိုပြု စက်ရုံသည် ယာဉ်အသွားအလာများမှ ဓာတ်ငွေ့ထုတ်လွှတ်မှုကို လျှော့ချရန် ဘက်ထရီဖြင့် အသုံးပြုသော Forklifts များကို အသုံးပြုပါသည်။
ထို့အပြင် ဂျင်နရေတာများ၊ Roasting process များတွင် လက်ရှိအသုံးပြုနေသော မီးခိုးခေါင်းတိုင်များ၏ အမြင့်တို့ကို သတ်မှတ်ထားသည်နှင့် လိုက်လျောညီစွာ တိုးမြှင့်သင့်ပါသည်။
လေထုထဲသို့ ညစ်ညမ်းစေသော ဓာတ်ငွေ့ **SO2** ထုတ်လွှတ်မှုသည် အမျိုးသားပတ်ဝန်းကျင် အရည်အသွေး ဓာတ်ငွေ့ထုတ်လွှတ်မှု လမ်းညွှန်ချက်များမှ သတ်မှတ်ထားသော စံချိန်စံညွှန်း 20 **µg/m**³ အောက်သို့ လျော့ပါးသွားမည်ဖြစ်ပါသည်။

၁.၄.၅ ဆူညံသံ

Lluvia စက်ရုံ၏ ဆူညံသံ အဆင့်သတ်မှတ်ချက်ကို အဓိကကျသည့် နေရာဒေသ အမျိုးမျိုး (ထုတ်လုပ်သည့် နေရာ၊ သိုလှောင်သည့် နေရာ၊ **Green bean sizing** နေရာ၊ Roasting နေရာ၊ အလူမီနီယံဖလင် မီးရှို့သည့်နေရာ၊ ဂျင်နရေတာ ထားသည့်နေရာ နှင့် ဟင်းလင်းပြင်ကွက်လပ်) တို့တွင် တိုင်းတာပါသည်။ စက်ရုံတစ်ခုလုံး၏ ဆူညံသံအဆင့်သည် **NEQG** စံချိန်စံညွှန်း **(**စက်မှုလုပ်ငန်းအတွက် 70**dB)** အောက်တွင် ရှိနေပါသည်။ နေ့အချိန် (44.15**dB)** နှင့် ညအချိန် (44.06**dB)** ပျမ်းမျှ ဆူညံသံ အဆင့်သည် N**EQG** ၏ ပတ်ဝန်းကျင် အရည်အသွေး လမ်းညွှန်ချက်(**70dB for industrial)** ထက်ကျော်လွန်မှု မရှိသည်ကို တွေ့ရပါသည်။
အနီးပတ်ဝန်းကျင် ဆူညံသံ သက်ရောက်မှု အကဲဖြတ်ခြင်း အရ လျော့နည်း သည်ဟု အကြမ်းဖျင်း သတ်မှတ်နိုင်သည်။ ထို့အပြင် ဒုံးပျံဂျုံမှုန့်စက်ရုံ၏ ထုတ်လုပ်မှု လုပ်ငန်းစဉ်အတွင်း ဆူညံသံမှ ကာကွယ်ရန် အလုပ်သမားများနှင့် ဝန်ထမ်းများသည် လုပ်ငန်းခွင် အလေ့အထကောင်း တစ်ခုအနေဖြင့် နားအဆို့ကို တပ်ဆင် သင့်ပါသည်။ ဆူညံသံ စောင့်ကြည့် မှတ်သား စစ်ဆေးမှု စီမံချက်ကို (၆)လတစ်ကြိမ်ဆောင်ရွက်သင့်သည်။ အထူးသဖြင့် စက်ရုံတွင်း စက်ကိရိယာသစ်များ ပြောင်းလဲတပ်ဆင်သည့် အခါများတွင် ပိုမိုလိုအပ်ပါသည်။

၁.၄.၆ မြေအရည်အသွေး

ပုံ 5.20 တွင်ပြထားသည့်အတိုင်း စီမံကိန်းဧရိယာ၏ မြေနေရာ အများစုသည် စက်ရုံအဆောက်အဦများ ပါဝင်ပြီး စက်မှုဇုန်အဖြစ် ဖွံ့ဖြိုးတိုးတက်လာသည်မှာ နှစ် ၂၀ ရှိနေပြီဖြစ်ပါသည်။ စီမံကိန်းဧရိယာသည် ထွန်ယက်စိုက်ပျိုးမှုနည်းပါးသော ဆင်ခြေဖုံးမြေပြန့်ဒေသဖြစ်ပါသည် (မြေ၏ 90% ခန့်သည် စက်မှုဇုန်အတွင်းရှိ ကွန်ကရစ်ခင်းထားသော နေရာများဖြစ်ပါသည်)။

ကွင်းဆင်းလေ့လာမှုအရ စက်မှုဇုန်နှင့် စက်မှုဇုန်အနီးတစ်ဝိုက်တွင် နေထိုင်သူများသည် မြို့ပြဖွံ့ဖြိုးမှုကြောင့် စိုက်ပျိုးခြင်းနှင့် စိုက်ပျိုးခြင်းအလေ့အထနည်းပါးကြောင်း သိရပါသည်။

၁.၄.၇ ဒေသရင်းအပင်နှင့်တိရစ္ဆာန်များ

စီမံကိန်းဧရိယာရှိ ဇီဝမျိုးစုံမျိုးကွဲများကို လေ့လာဆန်းစစ်မှုများ ပြုလုပ်ခဲ့ပါသည်။ **Lluvia** စက်ရုံဝန်းကျင် အပါအဝင် စက်မှုဇုံတစ်ခုလုံးတွင် ထိန်းသိမ်းကာကွယ်ထားသော ဧရိယာ၊ အရေးကြီးဇီဝမျိုးကွဲ ဧရိယာ၊ နိုင်ငံတော်နှင့် ဒေသတွင်း အဆင့် အရေးကြီးသော ဇီဝမျိုးကွဲ ဧရိယာများနှင့် ထိခိုက်လွယ်သော ဧရိယာများ မတွေ့ရှိရပေ။

လှိုင်သာယာစက်မှုဇုန်ကို ၁၉၉၆ ခုနှစ်ခန့်တွင် စတင်တည်ဆောက်ခဲ့ပြီး စီမံကိန်းဧရိယာတဝိုက်တွင် မြို့ပြများ ဖွံ့ဖြိုးတိုးတက်လာပြီးနောက် အနှစ် ၂၀ ခန့်အကြာတွင် တည်ထောင်ခဲ့ခြင်းဖြစ်ပါသည်။ သမရိုးကျ ဇီဝမျိုးကွဲဆိုင်ရာ အသိပညာ စစ်တမ်းအရ စက်မှုဖွံ့ဖြိုးမှုများ ကြောင့် သဘာဝပတ်ဝန်းကျင်၊ ဒေသတွင်း တိရစ္ဆာန်များ၊ အပင်များနှင့် စားကျက်မြေများ စသည်တို့အပေါ်တွင် ဆိုးကျိုးရော ကောင်းကျိုး သက်ရောက်မှုမရှိကြောင်း တွေ့ရှိရသည်။

စက်ရုံနှင့် စက်ရုံလုပ်ငန်းများကြောင့် ဇီဝပတ်ဝန်းကျင်ပေါ်တွင် သက်ရောက်မှု အနည်းငယ် သာ ရှိကြောင်း သုံးသပ်နိုင်ပါ သည်။ ထို့ကြောင့် နိုင်ငံတကာ ငွေကြေး ပူးပေါင်းဆောင်ရွက်ရေးအဖွဲ့ (**IFC**) ၏ လမ်းညွှန်ချက် အရ ဇီဝမျိုးကွဲဆိုင်ရာ တစ်စုံတစ်ရာသော စစ်ဆေးအကဲဖြတ်မှုမလိုအပ်ပေ။

၁.၄.၈ အမှိုက်

လူတို့လှုပ်ရှားမှုများနှင့် စက်ရုံလုပ်ငန်းစဉ်အရ ထွက်ရှိလာသော အိမ်တွင်းနှင့် လုပ်ငန်းသုံး အမှိုက်များကို ထွက်ရှိလာသော လမ်းကြောင်းတလျှောက်စစ်ဆေးပါသည်။ Lluvia (Premier) စက်ရုံအတွက် အမှိုက်စစ်ဆေး မှုကို နိုင်ငံတကာစံနှုန်း စစ်ဆေးမှုကို အသုံးပြု၍ဆောင်ရွက်ပါသည်။ အိမ်တွင်း အမှိုက်နှင့် ပက်သက်၍ နှစ်စဉ် တန်ချိန် ၁၃.၅ တန် ထုတ်လုပ်ပြီး နေ့စဉ်ထုတ်လုပ်မှုမှာ ၀.၀၄ ကီလိုဂရမ် ရှိသည်။ အဓိက အမှိုက်အမျိုးအစား များမှာ စားသောက်ကုန်မှ ထွက်ရှိသည့် အမှိုက်များဖြစ်ပြီး အခြားထွက်ရှိသည့် အမှိုက်များမှာ ပလက်စတစ်၊ စက္ကူ၊ လျှပ်စစ် ပစ္စည်း၊ အမျိုးသမီး လစဉ်သုံးပစ္စည်းများနှင့် အခြား အမှိုက်သရိုက်များ ပါဝင်ပါသည်။ စားသောက်ကုန် အမှိုက်များသည် အများဆုံး (၈၆%) ဖြစ်ပြီး ထုတ်ပိုး ပစ္စည်းများသည် (၁၁%) ဖြင့် ဒုတိယနေရာတွင် ရှိသည်။

စက်ရုံနှင့် ပက်သက်သည့် အမှိုက်များသည် နှစ်စဉ် ၅၈၄တန် ထွက်ရှိသည်။ အများစုမှာ ပလတ်စတစ်အိတ်များနှင့် ပလတ်စတစ်ဘူးခွံများ၊ ထုပ်ပိုးသည့် ပလတ်စတစ် အိတ်ခွံများ၊ စက္ကူလိပ်၊ ကတ္တူစက္ကူများ သည် စက်ရုံနှင့် ပက်သက်သည့် စွန့်ပစ်ပစ္စည်း စွန့်ပစ်မှု စုစုပေါင်း၏ ၂၇ ရာခိုင်နှုန်းမှ ၃၆ ရာခိုင်နှုန်းအထိ ရှိပါသည်။ ထုတ်လုပ်မှု လုပ်ငန်းများမှ စွန့်ပစ်သည့် အခြားအမှိုက်အမျိုးအစားများမှာ လျှပ်စစ်ပစ္စည်းများနှင့် ခြံထွက် အမှိုက်များ ဖြစ်ပါသည်။

Lluvia (Premier) စက်ရုံ၏ ထုတ်လုပ်မှုစနစ်တွင် ယခုအခါ အမှိုက်ခွဲခြားစွန့်ပစ်သည့်စနစ်အား အနည်းငယ်သာ ကျင့်သုံးလျှက်ရှိပါသည်။ စွန့်ပစ်အမှိုက်များကို နောက်ဆုံးစွန့်ပစ်ရန်အတွက် စည်ပင်သာယာရေးဌာနသို့ မပို့ဆောင်မီ အမှိုက်ပုံးများနှင့် ယာယီအမှိုက်သိမ်းဆည်းသည့်ဧရိယာ ထဲတို့တွင် သိမ်းဆည်းထားပါသည်။

စွန့်ပစ်ပစ္စည်းများ ပြန်လည်အသုံးပြုခြင်းတွင် စက်ရုံမှထွက်ရှိသည့် စုစုပေါင်း စွန့်ပစ်ပစ္စည်းများ၏ 97% နီးပါးကို မတူညီသော အရင်းအမြစ်အမျိုးမျိုးမှ စွန့်ပစ်ပါသည်။ စွန့်ပစ်အမှိုက်များ ပြန်လည်အသုံးပြုခြင်း လုပ်ငန်းစဉ်ကို စက်ရုံအတွင်းတွင် ဆောင်ရွက်လျက်ရှိပါသည်။

အမှိုက်သရိုက်နှင့် ပက်သက်၍ သက်ရောက်မှု စစ်ဆေးအကဲဖြတ်ခြင်းကို ထည့်သွင်းစဉ်းစား ရာတွင် ကမ္ဘာ့ကျန်းမာ ရေးအဖွဲ့၏ ဖွံ့ဖြိုးဆဲနိုင်ငံများ၏ အမှိုက်ထုတ်လုပ်နှုန်းထက် လျော့နည်းသဖြင့် စက်ရုံအမှိုက်ထုတ်လုပ်မှုသည် လျော့ နည်းသည်ဟု သတ်မှတ်နိုင်သည်။ သို့ရာတွင် အမှိုက်အနည်းဆုံးသို့ လျော့ချခြင်းနှင့် အမှိုက်လုံးဝမရှိစေရန် ပြုလုပ်ခြင်း တို့အတွက် အမှိုက်သရိုက်ဆိုင်ရာစီမံချက် နှစ်ခုနှင့် အမှိုက်လျော့ချရန် နည်းလမ်းများ အကြံပြု နိုင်ပါသည်။

၁.၄.၉ **သောက်ရေ နှင့် ညစ်ညမ်းရေ**

စားသောက်ကုန် ထုတ်လုပ်သည့် လုပ်ငန်းစဉ်တွင် ထုတ်လုပ်မှု လုပ်ငန်းများ ချောမွေ့လွယ်ကူစေ ရန်အတွက် ရေ အသုံးပြုရပါသည်။ ထို့အပြင် ရေကို အိမ်တွင်းအသုံးပြုမှု အဖြစ် စားသောက်ဆိုင်လုပ်ငန်းစဉ်များ၊ သောက်သုံးရေ ၊သန့်စင်ခန်းများနှင့် ကော်ဖီထုတ်လုပ်သည့်စက်များကို ဆေးကြောခြင်းနှင့် ထုတ်လုပ်မှုလုပ်ငန်းစဉ်များတွင် အသုံးပြုပါသည်။ ရယူသော ရေအရင်းအမြစ်သည် တွင်းရေဖြစ်သည်။ အဆိုပြုစက်ရုံ အတွက် တစ်နေ့တာ ရေအသုံးပြုမှုသည် ၂၅ကုဗမီတာ ခန့်ဖြစ်ပြီး ထုတ်လုပ်မှုလုပ်ငန်း၊ ရုံးသုံးနှင့် စားသောက်ဆိုင် တို့တွင် အသုံးပြုပါသည်။

သောက်သုံးရေရင်းမြစ်အဖြစ် စက်ရုံတွင် စက်ရေတွင်းနှစ်တွင်းရှိသည်။ ထိုရေတွင်းတစ်ခုစီမှ နမူနာနှစ်ခု၊ **reverse osmosis (RO)** ဖြင့်သန့်စင်ပြီးသော ရေနမူနာတစ်ခု၊ ရေပိုက်ခေါင်းမှ ရေနမူနာတစ်ခုနှင့် **overhead tank** မှ ရေနမူနာ တစ်ခု စုစုပေါင် ရေနမူနာ (၅)ခုကို သောက်သုံးရေ ခွဲခြမ်းစိတ်ဖြာရန်အတွက် ကောက်ယူခဲ့ပါသည်။ သောက်သုံးရေ စစ်ဆေးတိုင်းတာသည့် သတ်မှတ်ချက်ဘောင် ၁၈ ခု (ဓာတုဆိုင်ရာ၊ ရုပ်ပိုင်းဆိုင်ရာနှင့် ဇီဝဆိုင် ရာ)တို့ ပါဝင်ပြီး ယင်းတို့သည် လူ့ကျန်းမာရေးနှင့် နေထိုင်ရာပတ်ဝန်းကျင်အတွက်အလွန် အရေးပါ ပါသည်။

RO ဖြင့် သန့်စင်ထားသော ရေအရင်းအမြစ်သည် အမျိုးသား သောက်သုံးရေ စံနှုန်းများနှင့် ကိုက်ညီကြောင်း တွေ့ရှိရပါသည်။ သို့ရာတွင် အခြားရင်းမြစ်များမှ ကောက်ယူရရှိသော သောက်သုံးရေများသည် စံနှုန်းများနှင့် ကိုက်ညီမှုမရှိပါ။ ထို့ကြောင့် ဝန်ထမ်းများနှင့် ထုတ်ကုန်များအတွက် သောက်သုံးသောရေ၏ အရေးပါမှုကို ကွဲပြားခြားနားသော ရလဒ်များပေါ်မူတည်၍ မြင့်သော၊ အလယ်အလတ်နှင့် နိမ့်သော ဟူ၍ အဆင့်သတ်မှတ်ထားပါသည်။ ထို့ကြောင့် စက်ရုံ၏ သောက်သုံးရေအသုံးပြုခြင်းစနစ် (အထူးသဖြင့် သောက်သုံးခြင်းနှင့် ကုန်ထုတ်လုပ်မှု လုပ်ငန်းစဉ်များ) တွင် **Reverse Osmosis** ကဲ့သို့သော သင့်လျော်သော ရေသန့်စင်စနစ်ကို အသုံးပြုသင့်ပါသည်။

စွန့်ပစ်ရေတိုင်းတာမှုတွင် (ဓာတုဆိုင်ရာနှင့် ရုပ်ပိုင်းဆိုင်ရာ) တို့ပါဝင်ပြီး စုစုပေါင်း သတ်မှတ်ချက် (၁၀) ခုကို ခွဲခြမ်းစိတ်ဖြာတိုင်းတာခဲ့ပါသည်။ သတ်မှတ်ချက်ဘောင်များကို ခွဲခြမ်းစိတ်ဖြာ တိုင်းတာရာတွင် (**pH**၊ **Total Suspended Solid**၊ **Ammonia Nitrogen**၊ **Nitrate Nitrogen**၊ Oil and **Grease**၊ **Phosphorus**၊ **BOD**၊ **COD** နှင့် **coliform)** နှင့် **TSS** တို့သည် သတ်မှတ်ထားသော လမ်းညွှန်ချက်များကို ကျော်လွန်နေပါသည်။ ထို့ကြောင့် ညစ်ညမ်းရေ၏ ပတ်ဝန်းကျင် အပေါ်သက်ရောက်မှုကို ကွဲပြားခြားနားသော ရလဒ်များပေါ်မူတည်၍ မြင့်သော၊ အလယ်အလတ်နှင့် နိမ့်သော ဟူ၍ အဆင့်သတ်မှတ်ထားပါသည်။

ထို့ကြောင့် ညစ်ညမ်းရေသန့်စင်မှုစနစ် တစ်ခုဖြစ်သည့် သဲနှင့်ကျောက်စရစ်အသုံးပြု၍ စစ်ထုတ်ခြင်း နည်းလမ်းကဲ့သို့သော လျော့ပါးသက်သာစေရေး အစီအမံများအဖြစ် ဖြစ်နိုင်သောနည်းလမ်းအချို့ကို အကြံပြုခဲ့ပါသည်။

၁.၄.၁၀ ဘွိုင်လာ အသုံးပြုမှု

အဆိုပြုစက်ရုံတွင် ဘွိုင်လာ အသုံးပြုမှု မရှိပါ။

၁.၅ စုပေါင်း သက်ရောက်မှု စမ်းသပ်စစ်ဆေးခြင်း

ဤကဏ္ဍတွင် **Lluvia (Premier)**စက်ရုံ၏ လေထုတွင်း ထုတ်လွှတ်သည့်အရာများ၊ ဆူညံသံ၊ ညစ်ညမ်းသည့်ရေ စွန့်ထုတ်ခြင်း နှင့် အမှိုက်သရိုက်များ၏ ပတ်ဝန်းကျင်အပေါ်သို့ စုပေါင်း သက်ရောက်မှု များကို အကဲဖြတ် စစ်ဆေးမည် ဖြစ်သည်။ ယင်းသည် စက်ရုံ၏ အမျိုးမျိုးသော လှုပ်ရှားဆောင်ရွက်မှုများ ကြောင့် တိုးပွားလာ သည့် သက်ရောက်မှုများ ကို စစ်ဆေးအကဲဖြတ်သည့် လုပ်ငန်းဖြစ်သည်။

လူထုတွင်း ကွင်းဆင်းခြင်းနှင့် မေးမြန်းခြင်းများအရ **Lluvia (Premier)**စက်ရုံ၏ အနီးပတ်ဝန်းကျင်ရှိ စက်ရုံအများစု သည် စားသောက်ကုန်စက်ရုံများနှင့် အထည်အလိပ်စက်ရုံများ ဖြစ်ကြသည်။

ဒေသတွင်းအဆင့်တွင် ဖော်ထုတ်နိုင်သည့် စုပေါင်းသက်ရောက်မှု အကဲဖြတ်ခြင်းအဆင့်သည့် အလယ်အလတ်ရှိသည်။ နိုင်ငံနှင့် ဒေသတွင်း အဆင့်များတွင်မူ စက်ရုံအများစုသည် ဓာတ်ငွေ့ နှင့် ညစ်ညမ်းလေ ထုတ်လုပ်သည့် စက်ရုံများ မဟုတ်ဘဲ အထည်အလိပ်စက်ရုံများသာဖြစ်သဖြင့် စက်ရုံများ၏ စုပေါင်းသက် ရောက်မှု အကဲဖြတ်ခြင်းသည် သိသာထင် ရှား သည့် သက်ရောက်မှု မရှိပေ။

(၁) ရွေ့လျားနေသော ဖုံမှုန့်နှင့် လေညစ်ညမ်းစေသည့် အရာများ

စက်ရုံအနီးပတ်ဝန်းကျင်မှ ဖုံမှုန့်များနှင့် စက်ရုံလုပ်ငန်းစဉ်မှ အမှုန်များ အချိန်တိုအတွင်း ထွက်ရှိမှုသည် အနီးပတ်ဝန်းကျင်ရှိ အခြားစက်ရုံများမှ ထုတ်လွှတ်မှုများနှင့် မော်တော်ယာဉ်များ သွားလာမှုများကြောင့် တိုးပွားလာလေ့ ရှိပါသည်။

(၂) ဆူညံသံ

စက်ရုံပတ်ဝန်းကျင်ရှိ လက်ရှိအခြေခံ ဆူညံသံအဆင့်သည် လက်ရှိယာဉ်အသွားအလာများ၊ လျှပ်စစ်ဓာတ်အားပေးစက်များ အသုံးပြုခြင်းနှင့် အနီးစပ်ဆုံး စက်ရုံအလုပ်ရုံများမှ စက်ပစ္စည်းများအသုံးပြု၍ လုပ်ငန်းလည်ပတ်မှု များ ကြောင့် တိုးပွားလာနိုင်ပါသည်။

(၃) ညစ်ညမ်းရေ

စက်ရုံမှ ထွက်ရှိသော စွန့်ပစ်ရေကို အများသုံး ရေနုတ် မြောင်းထဲသို့ စွန့်ထုတ်လိုက်ခြင်းကြောင့် အခြားစက်ရုံများမှ စွန့်ထုတ်သည့် အခြားသော စွန့်ပစ်ပစ္စည်းများနှင့်ပေါင်းစပ်သွား၍ အနီးနားရှိ ကန်များနှင့် မြစ်များပေါ်တွင် စုပေါင်း သက်ရောက်မှုများ ရှိနိုင်ပါသည်။

(၃) အမှိုက်

Lluvia စက်ရုံမှ စွန့်ပစ်အမှိုက်များ၏ သက်ရောက်မှုသည် စက်မှုဇုန်အတွင်း လည်ပတ်နေသော အခြားစက်ရုံများ၏ လှုပ်ရှားလုပ်ကိုင်ရမှု တို့အပေါ် တိုးမြှင့် အကျိုးသက်ရောက်မှုကို အတန်အသင့်ဖြစ်စေနိုင်ဖွယ်ရှိပါသည်။

၁.၆ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်

၁.၆.၁ လေအရည်အသွေးနှင့် ပက်သက်သည့် ပတ်ဝန်းကျင် ထိန်းသိမ်းရေး စီမံချက်

ဤ **IEE** အစီရင်ခံစာတွင် **Lluvia (Premier)** စက်ရုံ၏ ထုတ်လုပ်မှုနှင့် ဖြန့်ဖြူးရေးစနစ်များသည် နိုင်ငံတော်နှင့် နိုင်ငံတကာ ပတ်ဝန်းကျင်ဆိုင်ရာ စည်းမျဉ်းများနှင့် စည်းမျဉ်းများနှင့်အညီ လိုက်နာဆောင်ရွက်မှုရှိရန်အတွက် သက်ဆိုင်ရာ **EMP** အစီအစဉ်ကို ထည့်သွင်းရေးဆွဲထားပါသည်။

အဓိက ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး စီမံချက်အနေဖြင့် လေထုညစ်ညမ်းမှုနှင့် ပက်သက်သည့် စီမံချက်ကို အမှုန်အမွှား ထုတ်လုပ်မှု မြင့်မားသည့် ထုတ်လုပ်မှုဧရိယာ၊ အလူမီနီယံဖလင် မီးရှို့သည့်နေရာ၊

ကော်ဖီစေ့အစိမ်း sizing ပြုလုပ်သည့်နေရာ နှင့် ဂျင်နရေတာ နေရာတို့တွင် အဓိကဆောင်ရွက်ရန် လိုအပ်ပါသည်။ အလုပ်သမားအများအပြားသည် ထုတ်လုပ်မှုဧရိယာနှင့် ကော်ဖီစေ့အစိမ်း sizing ပြုလုပ်သည့်နေရာတို့တွင် လုပ်ကိုင် ဆောင်ရွက်ကြပါသည်။ ထိုဧရိယာများအတွင်း လုပ်ငန်းဆောင်ရွက်မှုများသည် အထူးသဖြင့် အမှုန်အမွှားများကို ပိုမိုထုတ်လွှတ်ပါသည်။ ထို့ကြောင့် အဆိုပြုစက်ရုံ၏ လည်ပတ်မှုလုပ်ငန်းစဉ်မှ ဖုန်မှုန့်များနှင့် အခြားလေထဲတွင်ပျံ့နှံ့နေသော အမှုန်အမွှားများကို ထိန်းချုပ်ရန်အတွက် ဇဟိုဖုန်မှုန့်စုဆောင်းမှုစနစ် **(fabric filter baghouse)** ကို တပ်ဆင်ရန် အဆိုပြုထားပါသည်။ မီးရှို့ခြင်းမှ ညစ်ညမ်းသော အခိုးအငွေ့ ထုတ်လွှတ်မှုကို လျော့ပါးစေရန်အတွက် အသေးစား မီးရှို့စက် တပ်ဆင်ထားပါသည်။ အလူမီနီယံဖလင်များကို မီးရှို့ရန်အတွက် အသေးစား အမှိုက်မီးရှို့စက်ကို ယခင်က အသုံးပြုခဲ့သော်လည်း ယခုအခါ ဖြတ်စက်များကို အသုံးပြု၍ ဖြတ်ချကာ **YCDC** တွင် စွန့်ပစ်ပါသည်။ ထို့အပြင် ဂျင်နရေတာများ၊ Roasting process များတွင် လက်ရှိအသုံးပြုနေသော မီးခိုးခေါင်းတိုင်များ၏ အမြင့်တို့ကို သတ်မှတ်ထားသည်နှင့် လိုက်လျော်ညီစွာ တိုးမြှင့်သင့်ပါသည်။

Premier စက်ရုံ၏ ပတ်ဝန်းကျင် ထိန်းသိမ်းရေးဆိုင်ရာ စီမံချက် (**EMP)** သည် စက်ရုံလုပ်ငန်း လည်ပတ်မှုမှ ထုတ်လွှတ်သည့် အမှုန်များကို ရှောင်ရှားရန် အဓိကထားသဖြင့် အမှုန်များနှင့် အများဆုံးထိတွေ့နိုင်သည့် အလုပ်သမား များသည် အလုပ်အလေ့အထကောင်းတစ်ခုအနေဖြင့် အလုပ်လုပ်ချိန်တိုင်း **NOISH certifited N95 respirators/masks** များ တပ်ဆင်ထားရှိပါသည်။ **Lluvia** စက်ရုံ၏ လုပ်ငန်းခွင်အခြေအနေများ တိုးတက်ကောင်းမွန်စေရန်အတွက် လုပ်ငန်းလည်ပတ်မှုအားလုံးတွင် လေဝင်လေထွက်စနစ်ကို တပ်ဆင်သွားပါမည်။

စက်ရုံဝန်ထမ်းများ ပါဝင်သော လေထုညစ်ညမ်းမှု ထိန်းချုပ်ရေးဆိုင်ရာ တာဝန်ရှိအဖွဲ့တစ်ဖွဲ့ ဖွဲ့စည်းရပါမည် သို့မဟုတ် သက်ဆိုင်ရာ ပတ်ဝန်းကျင်ဆိုင်ရာ အကြံပေးပုဂ္ဂိုလ်အား စီမံချက်များနှင့်အညီ အကောင်အထည်ဖော်ဆောင်ရွက်နိုင်စေရပါမည်။ ထို့အပြင် ပတ်ဝန်းကျင်နှင့် စက်ရုံတွင်း လေစောင့်ကြည့် မှတ်သား စစ်ဆေးခြင်းကို ၆လ တကြိမ် ဆောင်ရွက်သွားပါမည်။

၁.၆.၂ ဆူညံသံနှင့် ပက်သက်သည့် ပတ်ဝန်းကျင်ဆိုင်ရာ ထိန်းသိမ်းရေး စီမံချက်

ဆူညံသံ စောင့်ကြည့်မှတ်သားစစ်ဆေးခြင်းကို သက်ဆိုင်ရာ အချက်အလက်များရရှိရန်အတွက် စက်ရုံတစ်ခု လုံး တွင် ၂၄နာရီ ကြာ အဆက်မပြတ် ဆောင်ရွက်ခဲ့သည်။ ရရှိလာသော အချက်အလက်များသည် ပတ်ဝန်း ကျင်ထိန်းသိမ်းရေး ဌာန(**ECD)** ၏ ပတ်ဝန်းကျင် အရည်အသွေး လမ်းညွှန်ချက်များ(**NEQG)** နှင့်ကိုက်ညီမှုရှိသည်ကို တွေ့ရှိ ရပါသည်။

ယေဘူယျအားဖြင့် ဆူညံသံဆိုင်ရာ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး စီမံချက်သည် လုပ်ငန်းဌာန အသီးသီး၏ နံရံများတွင် အသံတားဆီးသည့်ကိရိယာများ(**sound barriers)** တပ်ဆင်သင့်ပါသည်။ ဆူညံသံနှင့်ပက်သက်သည့် သက်ရောက်မှု များ မှ ကာကွယ်ရန် အခြားနည်းလမ်းတစ်ခုမှာ လုပ်ငန်းခွင်လုပ်ငန်း လည်ပတ်စဉ် တစ်လျှောက်လုံး အလုပ်သမားများ သည် အသံညစ်ညမ်းမှု၏ ဆိုးကျိုးများမှ ကာကွယ်ရန် **Earmuffs** နားအကာများတပ်ဆင်ထား ရှိပါသည်။ ထို့အပြင် တာဝန်ရှိပုဂ္ဂိုလ်များ အနေဖြင့် လုပ်ငန်းပတ်ဝန်းကျင်ရှိ ဆူညံသံရင်းမြစ်အားလုံးတွင် သတ်မှတ်ချက် များနှင့် ကိုက်ညီမှု ရှိမရှိနှင့် ကိရိယာသစ်များ တပ်ဆင် ရန် လိုအပ်မှုရှိမရှိကို ၆ လတကြိမ် စောင့်ကြည့် မှတ်သားစစ်ဆေးခြင်း ပြုလုပ်သွား ပါမည်။

၁.၆.၃ အမှိုက်နှင့် ပက်သက်သည့် ပတ်ဝန်းကျင်ဆိုင်ရာ ထိန်းသိမ်းရေး စီမံချက်

အမှိုက်နှင့် ပက်သက်သည့် ပတ်ဝန်းကျင်ဆိုင်ရာ ထိန်းသိမ်းရေး စီမံချက်သည် စက်ရုံလုပ်ငန်းစဉ်ကြောင့်

သဘာဝပတ် ဝန်းကျင်နှင့် လူမှုပတ်ဝန်းကျင် သက်ရောက်မှုများကို ထိန်းချုပ်ကန့်သတ်ရန် အခြေခံသဘော တရားများ၊ ချဉ်းကပ်ပုံများ နှင့် နည်းလမ်းများကို အသုံးပြုသည်။

သတ်မှတ်ထားသည့် ပြီးမြောက်အောင်မြင်မှုရရှိရန်အတွက် ရုပ်ပိုင်းဆိုင်ရာ လက္ခဏာများပေါ် အခြေခံ၍ အမှိုက်စစ်ဆေး ခြင်းကို တစ်လလျှင်တစ်ကြိမ် ပြုလုပ်သင့်ပါသည်။ သို့ရာတွင် ဓာတ်သဘောစစ်ဆေးမှုများကို တစ်နှစ်လျှင်လေးကြိမ် ပြုလုပ်သင့်သည်။ ပတ်ဝန်း ကျင်ဆိုင်ရာ ထိန်းသိမ်းရေး စီမံချက်သည် လုပ်ငန်းလည်ပတ်မှုလုပ်ငန်းစဉ်စံနှုန်း **standard operation procedure (SOP)** နှင့်အညီ ကြပ်မတ်ထားသည့် စာရွက်စာတမ်းများ ထားရှိရမည် ဖြစ်ပြီး အစီရင်ခံရမည့် အကြောင်းအရာ သို့မဟုတ် အချိန်နှင့် တပြေးညီသည့် အစီအစဉ်နှင့်အညီ နှစ်စဉ် ဖြည့်စွက်မွမ်းမံမှုရှိရမည်။

ဇယား ၁.၃ အမှိုက်သရိုက်နှင့်ပက်သက်သည့် စီမံချက်

စွန့်ထုတ်မှု သတ်မှတ်ချက် မူဘောင်	အမှိုက်အရင်းမြစ်	စီမံချက်နှင့် လုပ်ဆောင်ရမည့် အရာများ	အတိုင်းအတာ ပမာဏ	အကျုံးဝင်သည့် သတ်မှတ်ချက် မူဘောင်
အမှိုက်စွန့်ထုတ်နှုန်း	ထုတ်လုပ်မှုလုပ်ငန်းစဉ်နှင့် အိမ်တွင်း အမှိုက်သရိုက် အစရှိသည့် အမှိုက်ရင်းမြစ် အားလုံး	တစ်ပတ်တစ်ကြိမ်စက်အသုံးပြု ချိန်တွယ်ခြင်း ရုပ်ပိုင်းဖွဲ့စည်းမှု နှင့် ဖြစ်နိုင်လျှင် ဓာတ် သဘော ဖွဲ့စည်းမှုကိုပါ အမေရိကန် ဒြပ်ပစ္စည်း စစ်ဆေးမှုအဖွဲ့(**ASTM**)၏ စံနှုန်းနှင့် အညီ တစ်လတစ်ကြိမ် ဆောင်ရွက်ရန် လိုအပ်သည်။	လူတစ်ဦး တစ်နေ့ ထုတ်လုပ်သည့် ကီလိုဂရမ်	ပတ်ဝန်းကျင် ထိန်းသိမ်းရေးဌာန (**ECD**) နှင့် ကမ္ဘာ့ကျန်းမာရေးအဖွဲ့(**WHO**)၏ ဖွံ့ဖြိုးဆဲနိုင်ငံများ၏ အမှိုက်စွန့်ထုတ်မှုနှုန်း သတ်မှတ်ချက်
အမှိုက် စစ်ဆေးခြင်း			ရုပ်ပိုင်းဖွဲ့စည်းမှု(%) နှင့် ဓာတ်သဘော ဖွဲ့စည်းမှု (%)	ပတ်ဝန်းကျင် ထိန်းသိမ်းရေးဌာန (**ECD**) နှင့် ကမ္ဘာ့ကျန်းမာရေးအဖွဲ့(**WHO**)၏ ဖွံ့ဖြိုးဆဲနိုင်ငံများတွင် အမှိုက်ဖွဲ့စည်းမှု သတ်မှတ်ချက်
ပမာဏများစွာ အမှိုက်စုပုံမှု		**ASTM** ၏ စံနှုန်းနှင့် အညီ တစ်လတစ်ကြိမ် စစ်ဆေးခြင်း	တစ်ကုဗမီတာလျှင် ရှိသည့် ကီလိုဂရမ်	**ECD** နှင့် **WHO**၏ ဖွံ့ဖြိုးဆဲနိုင်ငံများ၏ ပမာဏများစွာ အမှိုက်စုပုံမှု သတ်မှတ်ချက်

၁.၆.၄ သောက်ရေ၊ ညစ်ညမ်းရေနှင့် ပက်သက်သည့် ပတ်ဝန်းကျင်ဆိုင်ရာ ထိန်းသိမ်းရေး စီမံချက်

သောက်သုံးရေသန့်စင်မှုဆိုင်ရာ စီမံခန့်ခွဲမှုအစီအစဥ်ကို တိုးတက်ကောင်းမွန်စေရန်အတွက် စစ်ထုတ်ခြင်းနည်းလမ်း၊ **Reverse Osmosis** နည်းလမ်း၊ Boiling water နှင့် **Chlorination** တို့ကို အဆိုပြုခဲ့ပါသည်။

စစ်ဆေးစမ်းသပ်မှုရလဒ်များအရ ညစ်ညမ်းရေတွင် **TSS**၊ **Ammonia Nitrogen**၊ Oil and **Grease**၊ **BOD**၊ **COD**၊ **Total Coliforms** နှင့် **E-coli** ပါဝင်မှုကြောင့် ပတ်ဝန်းကျင်အပေါ် သက်ရောက် သည့် ဆိုးကျိုးသက်ရောက်မှုသည် မြင့်မားသည်၊ အလယ်အလတ်တွင်ရှိသည် စသဖြင့် အသီးသီး သတ်မှတ်နိုင်ပါသည်။ ထို့ကြောင့် သောက်သုံးရေ၊ ညစ်ညမ်းရေနှင့်ပက်သက်သည့် သက်ရောက်မှုလျှော့ချရေးနှင့် စီမံချက်ကို အဆိုပြုထားသည့် ကြိတ်ခွဲစက်ရုံ အတွက် တင်ပြထားသည်။ အခြားသော ဖြစ်နိုင်သည့် နည်းလမ်းများအနေဖြင့် ညစ်ညမ်းရေသန့်စင်မှုစနစ် တစ်ခုဖြစ်သည့် သဲနှင့်ကျောက်စရစ်အသုံးပြု၍ စစ်ထုတ်ခြင်း နည်းလမ်းကဲ့သို့သော လျော့ပါးသက်သာစေရေး အစီအမံများအဖြစ် ဖြစ်နိုင်သောနည်းလမ်းအချို့ကို အကြံပြုခဲ့ပါသည်။

စီမံခန့်ခွဲ့ရေး စနစ်နှင့် ပက်သက်၍ ရေအရင်းအမြစ်အားလုံး (သောက်ရေနှင့် ညစ်ညမ်းရေ)ကို ၁ နှစ်လျှင် သုံးကြိမ် စစ်ဆေးမည်ဖြစ်ပါသည်။ ထို့နောက် အမျိုးသားသောက်သုံးရေစံချိန်စံနှုန်းနှင့် စက်ရုံမှ စွန့်ထုတ်သော ညစ်ညမ်းရေ အား **NEQG** နှင့် နှိုင်းယှဥ်သင့်ပါသည်။

ပတ်ဝန်းကျင် ထိန်းသိမ်းရေး စီမံချက်၏ အောင်မြင်မှုတွင် အဓိကအကြောင်းရပ်အနေဖြင့် စက်ရုံတွင်းအလုပ် သမားများ ၏ ထိရောက်သည့်အရည်အသွေးများဖြင့် ဆောင်ရွက်ခြင်းအပေါ်တွင် မူတည်ပါသည်။ ဤကဲ့သို့ဆောင်ရွက်မှုများအား ပြင်ပမှ အကြံပေး များ၏နည်းပညာဆိုင်ရာ အကူအညီနှင့် အကောင်အထည်ဖော်ဆောင်ရွက်မည်ဖြစ်ပါသည်။

ပတ်ဝန်းကျင်ဆိုင်ရာ ထိန်းသိမ်းရေး စီမံချက်အား ဆောင်ရွက်ခဲ့သည့် လုပ်ငန်းဆောင်ရွက်မှု စာရွက်စာတမ်းများဖြင့် အစီရင်ခံ တင်ပြရမည့် အကြောင်းအရာများနှင့် ၆လ တကြိမ် ဆောင်ရွက်မည်ဖြစ်သည်။

၁.၇ ကျန်းမာရေး ဘေးအန္တရာယ် အလားအလာ အကဲဖြတ်စစ်ဆေးခြင်း

၁.၇.၁ PM2.5 ကျန်းမာရေး ဘေးအန္တရာယ် အလားအလာ အကဲဖြတ်စစ်ဆေးခြင်း

Health Risk Assessment (HRA) သည် ပတ်ဝန်းကျင်ညစ်ညမ်းစေသော အရာများနှင့် ထိတွေ့ခြင်းကြောင့် ဖြစ်လာသော လူ့ကျန်းမာရေးအန္တရာယ်များကို ခန့်မှန်းရန် အသုံးဝင်သောကိရိယာတစ်ခုဖြစ်သည်။ စာအုပ်စာတမ်းများအရ **PM** 2.5 သည် ၎င်း၏ရေရှည်ထိတွေ့မှုကြောင့် နှလုံးသွေးကြောနှင့် အသက်ရှူလမ်းကြောင်းဆိုင်ရာရောဂါများနှင့် အဆုတ်ကင်ဆာတို့ ဖြစ်ပွားစေနိုင်ပြီး သေဆုံးမှုဖြစ်စေသည့် အဓိကအန္တရာယ်တစ်ခုအဖြစ် သတ်မှတ်ဖော်ပြထားသည်။

စက်ရုံတွင်းနှင့် စက်ရုံပတ်ဝန်းကျင်တွင် စောင့်ကြည့် မှတ်သား စစ်ဆေး ထားသော အချက်အလက်များကို **PM2.5** နှင့် ထိတွေ့မှုအဆင့်များအရ စက်ရုံအလုပ်သမား များနှင့် လူထု၏ လူမှုဘဝကို မည်မျှပြင်းပြင်းထန်ထန် သက်ရောက်မှုရှိနိုင်ကြောင်း ခန့်မှန်းရာတွင် အသုံးပြုမည် ဖြစ်သည်။

စက်ရုံဝန်ထမ်းအရေအတွက် ၈၉၃ ယောက်သည် NEQG Guidelines

အောက်လျော့နည်းသည့်အဆင့်ကိုထိတွေ့မှု ရှိသည်ဟု သတ်မှတ်ထားသည်။

PM2.5 ပါဝင်သည့်လေကိုရှူရှိုက်မိပါက **Lluvia (Premier)** စက်ရုံရှိ လူအရေအတွက်သည် **PM2.5**နှင့် ထိတွေ့ရန်အလားအလာရှိသည့်ပမာဏဖြစ်သဖြင့် ယင်းကို တွက်ချက်တိုင်းတာရန် အတွက် အမေရိကန် ပြည်ထောင်စု ပတ်ဝန်းကျင်ထိန်းသိမ်းကာကွယ်ရေး အေဂျင်စီ (**USEPA)** ၏ ညီမျှခြင်း (**equation)** ကို အသုံး ပြုပါသည်။

အထက်ဖော်ပြပါ တွေ့ရှိချက်များအရ Coffee green bean sizing ဧရိယာ၊ သိုလှောင်သည့်ဧရိယာ၊ ဂျင်နရေတာ လည်ပတ်နေချိန်နှင့် အလူမီနီယမ် ဖလင်မီးရှို့သည့်နေရာများတွင် လုပ်ကိုင်နေကြသည့် အလုပ်သမားများသည် အခြားသူများထက် **PM** 2.5 နှင့် ထိတွေ့မှု ကျန်းမာရေးအန္တရာယ်ပိုများပါသည်။

အဆိပ်ဖြစ်စေမှုနှင့် ပက်သက်သည့် အန္တရာယ်တွင် ပရီမီယာကော်ဖီမှုန့်စက်ရုံ၏ မတူညီသည့်နေရာများ Coffee green bean sizing ဧရိယာ၊ သိုလှောင်သည့်ဧရိယာနှင့် အလူမီနီယမ် ဖလင်မီးရှို့သည့်နေရာများတွင် တွင် ၁ ထက်ပိုသည်။ ထိုသို့သော အလုပ်နေရာများတွင် အလုပ်သမားများသည် နှစ်ပေါင်း ၃၀ ကြာ အလုပ်လုပ်မည်ဆိုပါက **PM2.5** ကြောင့်ဖြစ်သော ပြင်းထန်သည့် ကျန်းမာရေး အန္တရာယ်များကို ခံစားရဖွယ်ရှိပြီး ယင်းတို့တွင် အသက်ရှူလမ်းကြောင်း ဆိုင်ရာ ရောဂါလက္ခဏာများ ဖြစ်သည့် လည်ချောင်းနာခြင်း၊ ချောင်းဆိုးခြင်း သို့မဟုတ် အသက်ရှူကြပ်ခြင်း တို့ကို တိုးပွားစေခြင်းနှင့် ရင်ကြပ်ခြင်းကို တိုးပွားစေခြင်းနှင့် အဆုတ်၏ လုပ်ငန်းဆောင်တာများကို နှေးကွေးစေပါသည်။

၁.၇.၂ PM10 ကျန်းမာရေး ဘေးအန္တရာယ် အလားအလာ အကဲဖြတ်စစ်ဆေးခြင်း

ဘေးအန္တရာယ် ခွဲခြားသတ်မှတ်ခြင်းနှင့် ထိတွေ့မှု အကဲဖြတ်မှုအတွင်း ရရှိသော အချက်အလက်များကို အသုံးပြု၍ လူသားများတွင် သိသာထင်ရှားသော ကျန်းမာရေးအန္တရာယ်များ ဖြစ်စေနိုင်ဖွယ်ရှိသော **PM**10 ပြင်းအားကို ခန့်မှန်းခဲ့ပါသည်။

စောင့်ကြည့် မှတ်သားထားသော **PM10** အချက်အလက်များကို အသုံးပြု၍ ထိတွေ့မှု အနည်းအများအလိုက် စက်ရုံအလုပ်သမားများ၏ ကျန်းမာရေးအပေါ် သက်ရောက်နိုင်ချေနှင့် သက်ရောက်မှု အနည်းအများကို ခန့်မှန်း တွက်ချက်သည်။

စက်ရုံဝန်ထမ်းအရေအတွက် ၈၉၃ ယောက်သည် NEQG Guidelines အောက်လျော့နည်းသည့်အဆင့်ကိုထိတွေ့မှု ရှိသည်ဟု သတ်မှတ်ထားသည်။ လေရှူရှိုက်ခြင်းသည် ထိတွေ့မှု၏ အရေးအပါဆုံးသောလမ်းကြောင်းဖြစ်ပြီး ယင်းအလုပ်သမားများသည် တစ်နေ့လျှင် ၈နာရီ ထိတွေ့မှုရှိသည်။

အမေရိကန်ပြည်ထောင်စု ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး အေဂျင်စီ (**USEPA)**၏ ညီမျှခြင်းကို လုပ်ငန်းခွင် နေ့စဉ် ပျမ်းမျှထိတွေ့မှုပမာဏ ကိုတွက်ချက်ရန် အသုံးပြုပြီး ယင်းသည် **PM10**ကို ရှူသွင်းမိသည့်အခါ ထိတွေ့မှုရှိနိုင် သည့် **Lluvia (Premier)**စက်ရုံ ဝန်ထမ်းအရေအတွက် ပင်ဖြစ်သည်။

Lluvia (Premier)စက်ရုံ Coffee green bean sizing ဧရိယာ၊ သိုလှောင်သည့်ဧရိယာ၊ ထုတ်လုပ်သည့်ဧရိယာ၊ ဂျင်နရေတာ လည်ပတ်နေချိန်နှင့် အလူမီနီယမ် ဖလင်မီးရှို့သည့်နေရာများတွင် ကျန်းမာရေး အန္တရာယ်အလားအလာသည် ၁.၁ မှ ၁၀ ကြားတွင် ရှိသည်။ ယင်းသည် ထိုအလုပ်နေရာများတွင် လုပ်ကိုင် လျက်ရှိသော အလုပ်သမားများသည် နှစ်ပေါင်း၃၀ခန့် ဆက်လက်လုပ်ကိုင်ပါက **PM10**ကြောင့် ကျန်းမာရေး ထိခိုက် နိုင်မှုအလားအလာသည် အလယ်အလတ် အဆင့်တွင်ရှိသည် ဟုဆိုလိုသည်။

၁.၁၁.၅ လည်ပတ်မှုအဆင့်အတွင်း ပရိမီယာကော်ဖီမှုန့်စက်ရုံ၏ ပတ်ဝန်းကျင်နှင့် လူမှုစီမံခန့်ခွဲမှုအစီအစဉ်

အဆိုပြုထားသည့် စက်ရုံကြောင့် ဖြစ်နိုင်ခြေရှိသော အကျိုးသက်ရောက်မှုများကို လျှော့ချရန် လျှော့ပါးသက်သာရေး အစီအမံများနှင့် တိကျသော အရေးယူဆောင်ရွက်မှုများကို အောက်ပါအတိုင်း အသေးစိတ်ဖော်ပြထားသည်။

ဇယား ၁.၄ စီမံကိန်းလည်ပတ်ဆဲကာလအတွင်း ဆိုးကျိုးလျှော့ချရေးနည်းလမ်းများနှင့် လိုအပ်သည့် လုပ်ငန်းစီမံချက်

ပတ်ဝန်းကျင်ဆိုင်ရာအချက်များ/အကြောင်းအရာများ	ဆောင် ရွက်မှု	ဖြစ်နိုင်ချေသက်ရောက်မှု များ	လျှော့ချနိုင်ရေး နည်းလမ်းများ	ဘေးဆိုးအကြွင်းကျန်များ	အသေးစိတ်ဆောင်ရွက်ချက်များ	တာဝန်ယူမှု	သတ်မှတ်ဇယား	မှတ်တမ်းများ
a) Physical Environment								
၁။ လေအရည်အသွေး	၁.၁ ကော်ဖီပမာဏနှင့် ကြိုတင်သန့်ရှင်းခြင်း	၁.၁.၁ အမှုန်အမွှားများကြောင့် လေအရည်အသွေးကျဆင်းခြင်း	၁.၁.၁.၁ ဆိုင်ကလုန်းဖုန်မှုန့်နှင့် စစ်ထုတ် စက်ကဲ့သို့သော လေထုညစ်ညမ်းမှုထိန်းချုပ်ရေးကိရိယာများကို တပ်ဆင်ခြင်း၊	နည်းပါးသော	• ကုန်ကြမ်းများနှင့် လေထုထဲမှ ဖုန်မှုန့်များနှင့် အညစ်အကြေးများကို ဖယ်ရှားရန် ဖုန်မှုန့်စုဆောင်းမှုစနစ်ပါရှိသော	စီမံကိန်းစီမံအုပ်ချုပ်မှုအဖွဲ့၊ HSE၊ အလုပ်သမားများ	စီမံကိန်းစီမံအုပ်ချုပ်မှုအဖွဲ့၊ HSE၊ အလုပ်သမားများ	စောင့်ကြည့်လေ့လာရေး အစီရင်ခံစာ
	၁.၂ သန့်ရှင်းပြီးသော ကော်ဖီစေ့များကို Roasting ပြုလုပ်ခြင်း	၁.၂.၁ အမှုန်အမွှားများကြောင့် လေအရည်အသွေးကျဆင်းခြင်း	၁.၂.၁၁ Fabric filter ကဲ့သို့သော လေထုညစ်ညမ်းမှုထိန်းချုပ်ရေးကိရိယာများကို	နည်းပါးသော	• လေထုထဲမှ ဖုန်မှုန့်များနှင့် အညစ်အကြေးများကို ဖယ်ရှားရန် Filter bag	စီမံကိန်းစီမံအုပ်ချုပ်မှုအဖွဲ့၊ HSE၊ အလုပ်သမားများ	စီမံကိန်းစီမံအုပ်ချုပ်မှုအဖွဲ့၊ HSE၊ အလုပ်သမားများ	စောင့်ကြည့်လေ့လာရေး အစီရင်ခံစာ

ပတ်ဝန်းကျင်ဆိုင်ရာ အချက်များ/အ ကြောင်းအရာများ	ဆောင် ရွက်မှု	ဖြစ်နိုင်ချေ သက်ရောက်မှု များ	လျှော့ချနိုင်ရေး နည်းလမ်းများ	ဘေးဆိုးအ ကြွင်းကျန် များ	အသေးစိတ် ဆောင်ရွက်ချက်များ	တာဝန်ယူမှု	သတ်မှတ်ဇ ယား	မှတ်တမ်း များ
			တပ်ဆင်ခြင်း၊		နှင့် PCL ထိန်းချုပ်မှု system တပ်ဆင်ခြင်း			
	၁.၃ roasted ကော်ဖီစေ့များကို ကြိတ်ခွဲခြင်း	၁.၃.၁ ကော်ဖီအမှုန်အမွှား များ ကြောင့် လေအ ရည်အသွေးကျ ဆင်းခြင်း	၁.၃.၁.၁ စက်ရုံတွင် လေဝင်လေထွက် ကောင်းသော ကြိတ်ခွဲစနစ် တပ်ဆင်ခြင်း။	နည်းပါးသော	• ကော်ဖီကြိတ် သည့်နေရာတွင် လေဝင်လေထွက်ကောင်း အောင်ပြုလုပ်ခြင်းသည် ကော်ဖီမှုန့် အမှုန်အမွှား များကို လျှော့နည်းစေရန် ကူညီပေးပါသည် • စက်ရုံခေါင်မိုး	Project Management Team, Workers and/or HSE Team	Throughou t the operation Phase	Monitoring Report

ပတ်ဝန်းကျင်ဆိုင်ရာ အချက်များ/အကြောင်းအရာများ	ဆောင် ရွက်မှု	ဖြစ်နိုင်ချေ သက်ရောက်မှု များ	လျှော့ချနိုင်ရေး နည်းလမ်းများ	ဘေးဆိုးအကြွင်းကျန် များ	အသေးစိတ် ဆောင်ရွက်ချက်များ	တာဝန်ယူမှု	သတ်မှတ်ဇယား	မှတ်တမ်းများ
					တွင် Exhaust fanများ တပ်ဆင်ခြင် တပ်ဆင်ခြင်း သည် ကော်ဖီမှုန့် အမှုန်အမွှား ထွက်ရှိမှု လျှော့ကျစေပါသည်။ • လေထုမှ အမှုန်အမွှား များနှင့် ထိတွေ့မှုကို တားဆီးရန်အတွက် အလုပ်သမား များသည် စက်ရုံတွင် Personal			

ပတ်ဝန်းကျင်ဆိုင်ရာ အချက်များ/အကြောင်းအရာများ	ဆောင် ရွက်မှု	ဖြစ်နိုင်ချေ သက်ရောက်မှု များ	လျှော့ချနိုင်ရေး နည်းလမ်းများ	ဘေးဆိုးအကြွင်းကျန်များ	အသေးစိတ် ဆောင်ရွက်ချက်များ	တာဝန်ယူမှု	သတ်မှတ်ဇယား	မှတ်တမ်းများ
					Protective Equipment (PPE) ကို အသုံးပြုကြသည်။ • ကော်ဖီကြိတ်ခြင်းအတွက် လေဝင်လေထွက်ကောင်းမွန်စေရန်အတွက် စက်ရုံတွင် လေထုထဲသို့ အမှုန်များစုစည်းမှု နည်းစေသော အလုံပိတ်ကြိတ်စက်များကို အသုံးပြုပါသည်။			

ပတ်ဝန်းကျင်ဆိုင်ရာ အချက်များ/အကြောင်းအရာများ	ဆောင် ရွက်မှု	ဖြစ်နိုင်ချေ သက်ရောက်မှု များ	လျော့ချနိုင်ရေး နည်းလမ်းများ	ဘေးဆိုးအကြွင်းကျန် များ	အသေးစိတ် ဆောင်ရွက်ချက်များ	တာဝန်ယူမှု	သတ်မှတ်ဇယား	မှတ်တမ်း များ
	၁.၄ ပါဝင်ပစ္စည်းများကို Mixer စက်ထဲတွင် အချိုးအစားအလိုက် ရောစပ်ခြင်း။	• ၁.၄.၁ volatile organic compounds (VOCs) နှင့်အခြားဓာတ်ငွေ့များကို လေထဲသို့ ထုတ်လွှတ်ခြင်း။	၁.၄.၁.၁ စနစ်တကျ ဒီဇိုင်းထုတ်ထိန်းသိမ်းထားသော လေဝင်လေထွက်စနစ်များ တပ်ဆင်ခြင်း၊ ညစ်ညမ်းသော အခိုးအငွေ့ထုတ်လွှတ်မှု ထိန်းချုပ်ခြင်း။	နည်းပါးသော	• စနစ်တကျ ဒီဇိုင်းထုတ်ထိန်းသိမ်းထားသော လေဝင်လေထွက်စနစ်များ တပ်ဆင်ခြင်း၊ ညစ်ညမ်းသောအခိုးအငွေ့ထုတ်လွှတ်မှု ထိန်းချုပ်ခြင်း	စီမံကိန်းစီမံအုပ်ချုပ်မှုအဖွဲ့၊ HSE၊ အလုပ်သမားများ	စီမံကိန်းလည်ပတ်စဉ်တလျှောက်	စောင့်ကြည့်လေ့လာရေး အစီရင်ခံစာ
	၁.၅ လူအင်အားဖြင့် ထုပ်ပိုးခြင်းနှင့် စက်ပစ္စည်းဖြင့် ထုပ်ပိုးခြင်း	၁.၅.၁ ကော်ဖီမှုန့်၊ အမှုန်အမွှားများနှင့် ကော်ဖီ၏အနံ့များကို လေထဲသို့ လွှတ်ထုတ်ခြင်း	၁.၅.၁.၁ ကောင်းမွန်သော လေဝင်လေထွက်စနစ်နှင့် ထိရောက်သော exhaust fan စနစ်ကို တပ်ဆင်ခြင်း။	နည်းပါးသော	• အိပ်ဇောပန်ကာ၊ ဖုန်စုပ်စက်၊ လေအေးပေးစက်တို့ပါဝင်သော လေဝင်လေထွက် ကောင်းမွန်စေ	စီမံကိန်းစီမံအုပ်ချုပ်မှုအဖွဲ့၊ HSE၊ အလုပ်သမားများ	စီမံကိန်းလည်ပတ်စဉ်တလျှောက်	စောင့်ကြည့်လေ့လာရေး အစီရင်ခံစာ

ပတ်ဝန်းကျင်ဆိုင်ရာ အချက်များ/အကြောင်းအရာများ	ဆောင် ရွက်မှု	ဖြစ်နိုင်ချေ သက်ရောက်မှု များ	လျှော့ချနိုင်ရေး နည်းလမ်းများ	ဘေးဆိုးအကြွင်းကျန် များ	အသေးစိတ် ဆောင်ရွက်ချက်များ	တာဝန်ယူမှု	သတ်မှတ်ဇယား	မှတ်တမ်း များ
					သောဒီဖိုင်းစနစ်ကို စက်ရုံ အမိုးတွင် တပ်ဆင်ခြင်း။			
	၁.၆ လုပ်ငန်းလည်ပတ်စဉ် လုပ်ဆောင်မှုများ	၁.၆.၁ အလုံးစုံသော သက်ရောက်မှုများ	• ၁.၆.၁.၁ပြီးပြည့်စုံသော ပြုပြင်ထိန်းသိမ်းမှု အစီအစဉ်ကို အကောင်အထည်ဖော်ခြင်း •	နည်းပါးသော	• ဖုန်စုပ်စနစ်များ၊ exhaust fansနှင့် filters များ အပါအဝင် စက်ပစ္စည်းအားလုံးကို ပုံမှန်စစ်ဆေးခြင်း၊ သန့်ရှင်းခြင်းနှင့် စနစ်တကျ ထိန်းသိမ်းထားနိုင်စေရန် ပြီးပြည့်စုံသော ပြုပြင်ထိန်းသိ	စီမံကိန်းစီမံအုပ်ချုပ်မှုအဖွဲ့၊ HSE၊ အလုပ်သမားများ	စီမံကိန်းလည်ပတ်စဉ်တလျှောက်	စောင့်ကြည့်လေ့လာရေး အစီရင်ခံစာ

ပတ်ဝန်းကျင်ဆိုင်ရာ အချက်များ/အကြောင်းအရာများ	ဆောင် ရွက်မှု	ဖြစ်နိုင်ချေ သက်ရောက်မှု များ	လျှော့ချနိုင်ရေး နည်းလမ်းများ	ဘေးဆိုးအကြွင်းကျန်များ	အသေးစိတ် ဆောင်ရွက်ချက်များ	တာဝန်ယူမှု	သတ်မှတ်ဇယား	မှတ်တမ်းများ
					မ်းမှု အစီအစဉ်ကို အကောင်အထည်ဖော်ခြင်း။ • Lluvia စက်ရုံ၏ HSE အဖွဲ့မှ ဦးဆောင်၍ ကောင်းမွန်သအခန်းတွင်း လေထုအရည်အသွေးကို ထိန်းသိမ်းခြင်း၏ အရေးပါမှုကို မြှင့်တင်ခြင်းနှင့် ညစ်ညမ်းသော လေထုအရည်အသွေးနှင့်			

ပတ်ဝန်းကျင်ဆိုင်ရာ အချက်များ/အကြောင်းအရာများ	ဆောင် ရွက်မှု	ဖြစ်နိုင်ချေ သက်ရောက်မှု များ	လျှော့ချနိုင်ရေး နည်းလမ်းများ	ဘေးဆိုးအကြွင်းကျန် များ	အသေးစိတ် ဆောင်ရွက်ချက်များ	တာဝန်ယူမှု	သတ်မှတ်ဇယား	မှတ်တမ်း များ
					ဆက်စပ်နေသော ကျန်းမာရေးအန္တရာယ်များကို အသိပညာပေးခြင်း • လေထုအရည်အသွေးကို ဖလတစ်ကြိမ် စောင့်ကြပ်ကြည့်ရှုခြင်း။ • အမှုန်အမွှားများထွက်ရှိရာနေရာတွင် exhaust fans များထားရှိပြီး အမှုန်အမွှားများကို စုပ်ယူစေခြင်းဖြင့်			

ပတ်ဝန်းကျင်ဆိုင်ရာ အချက်များ/အကြောင်းအရာများ	ဆောင် ရွက်မှု	ဖြစ်နိုင်ချေ သက်ရောက်မှု များ	လျှော့ချနိုင်ရေး နည်းလမ်းများ	ဘေးဆိုးအကြွင်းကျန်များ	အသေးစိတ်ဆောင်ရွက်ချက်များ	တာဝန်ယူမှု	သတ်မှတ်ဇယား	မှတ်တမ်းများ
					လေဝင်လေထွက်ကောင်းမွန်စေခြင်း (ထုတ်လုပ်သည့်နေရာ၊ ထုပ်ပိုးသည့်နေရာ၊ ကုန်ကြမ်းပစ္စည်းများ အတင်အချပြုလုပ်သည့်နေရာ) • ဖုန်စုပ်စက်ဖြင့် ကြမ်းပြင်များ၊ အခန်းမျက်နှာပြင်များနှင့် စက်ပစ္စည်းများကို ပုံမှန်သန့်ရှင်း			

ပတ်ဝန်းကျင်ဆိုင်ရာအချက်များ/အကြောင်းအရာများ	ဆောင် ရွက်မှု	ဖြစ်နိုင်ချေ သက်ရောက်မှု များ	လျှော့ချနိုင်ရေး နည်းလမ်းများ	ဘေးဆိုးအကြွင်းကျန် များ	အသေးစိတ် ဆောင်ရွက်ချက်များ	တာဝန်ယူမှု	သတ်မှတ်ဇယား	မှတ်တမ်း များ
					ခြင်းနှင့် ဝန်ထမ်းများ အား ၎င်းတို့အလုပ် လုပ်ကိုင်သည့် အလုပ်ရုံများ တွင် ဖုန်မှုန့်များ ကင်းစင်၍ သန့်ရှင်းသပ်ရပ်နေစေရန် ဆောင်ရွက်စေခြင်း			
	၁.၇ မီးစက်များ	၁.၇.၁ ဖန်လုံအိမ်ဓာတ်ငွေ့ ထုတ်လွှတ်ခြင်း၊	၁.၇.၁.၁ အခိုးအငွေ့ထုတ်လွှတ်မှုနည်းသော မီးစက်အမျိုးအစားအသုံးပြုခြင်း	နည်းပါးသော	• အခိုးအငွေ့ထုတ်လွှတ်မှုနည်းသော မီးစက်အမျိုးအစားအသုံးပြုခြင်း။	စီမံကိန်းစီမံအုပ်ချုပ်မှုအဖွဲ့၊ HSE၊ အလုပ်သမားများ	စီမံကိန်းလည်ပတ်စဉ်တလျှောက်	စောင့်ကြည့်လေ့လာရေး အစီရင်ခံစာ

ပတ်ဝန်းကျင်ဆိုင်ရာအချက်များ/အကြောင်းအရာများ	ဆောင် ရွက်မှု	ဖြစ်နိုင်ချေ သက်ရောက်မှု များ	လျှော့ချနိုင်ရေး နည်းလမ်းများ	ဘေးဆိုးအကြွင်းကျန်များ	အသေးစိတ် ဆောင်ရွက်ချက်များ	တာဝန်ယူမှု	သတ်မှတ်ဇယား	မှတ်တမ်းများ
၂။ ဆူညံသံ နှင့် တုန်ခါခြင်း	၂.၁ ကြိတ်ချေခြင်း၊ ရောစပ်ခြင်းနှင့် ပစ္စည်းကိရိယာများကိုင်တွယ်ခြင်းကဲ့သို့သော လုပ်ငန်းစဉ်များ	၂.၁.၁ လုပ်ငန်းဆောင်ရွက်နေစဉ် ဆူညံမှုအဆင့် တိုးမြင့်စေခြင်း	၂.၁.၁.၁ ဆူညံမှု လျှော့နည်း သည့် ကိရိယာများ နှင့် စက်များ အသုံး ပြုရန်	နည်းပါးသော	• ဆူညံမှု လျော့နည်း သည့် ကိရိယာများ နှင့် စက်များ အသုံး ပြုရန် • ဝန်ထမ်းများ စက်လည်ပတ်မှု အသံများ ရေရှည်အချိန်ကြာ မြင့်စွာ ထိတွေ့မှုနည်းပါးစေရန် အတွက် အလုပ်အဆိုင်း အလှည့် ကျစနစ် နှင့် အားလပ်ချိန်များကို စီစဉ်ပေး ခြင်း။ • Mufflers သို့မဟုတ် စက်ပစ္စည်းများတွင် အသံတိတ်စက်များထည့်ခြင်းကဲ့သို့သော ဆူညံသံလျှော့ချသည့် ပြုပြင်မွမ်းမံမှုများကို အသုံးပြုခြင်း၊	စီမံကိန်းစီမံအုပ်ချုပ်မှုအဖွဲ့၊ HSE၊ အလုပ်သမားများ	စီမံကိန်းလည်ပတ်စဉ်တလျှောက်	စောင့်ကြည့်လေ့လာရေး အစီရင်ခံစာ

ပတ်ဝန်းကျင်ဆိုင်ရာ အချက်များ/အကြောင်းအရာများ	ဆောင် ရွက်မှု	ဖြစ်နိုင်ချေ သက်ရောက်မှု များ	လျှော့ချနိုင်ရေး နည်းလမ်းများ	ဘေးဆိုးအကြွင်းကျန်များ	အသေးစိတ် ဆောင်ရွက်ချက်များ	တာဝန်ယူမှု	သတ်မှတ်ဇယား	မှတ်တမ်းများ
			၂.၁.၁.၂ စက်ပစ္စည်းများ၏ ဆူညံသံထုတ်လွှင့်မှုကို လျှော့ချရန် တုန်ခါမှု သီးခြားခွဲထုတ်သည့် တပ်ဆင်မှုများ သို့မဟုတ် pads ကို အသုံးပြုခြင်း	နည်းပါးသော	• HPD များကို သင့်လျော်စွာအသုံးပြုမှုနှင့် ဆူညံသံအန္တရာယ်များ၊ ဆူညံသံစီမံခန့်ခွဲမှုဆိုင်ရာ အရေးပါမှုတို့ကို ပုံမှန်လေ့ကျင့်မှုပြုလုပ်ခြင်း။			
			၂.၁.၁.၃ ဆူညံသံအဆင့်ကို လျှော့ချရန် စက်ကိရိယာများကို ပုံမှန်ထိန်းသိမ်းမှု ပြုလုပ်ပါ။	နည်းပါးသော	• ဆူညံသံအဆင့်ကို လျှော့ချရန် စက်ကိရိယာများကို ပုံမှန်ထိန်းသိမ်းခြင်း		စီမံကိန်းလည်ပတ်စဉ်တလျှောက်	
			၂.၁.၁.၄ တစ်ကိုယ်ရေ အကာအကွယ် ပစ္စည်းများကို အသုံးပြုစေခြင်း။		• ဝန်ထမ်းများအား နားအကာများ သို့မဟုတ် နားကြပ်များကဲ့သို့သော အကြားအာရုံကာကွယ်		စီမံကိန်းလည်ပတ်စဉ်တလျှောက်	

ပတ်ဝန်းကျင်ဆိုင်ရာ အချက်များ/အကြောင်းအရာများ	ဆောင် ရွက်မှု	ဖြစ်နိုင်ချေ သက်ရောက်မှု များ	လျှော့ချနိုင်ရေး နည်းလမ်းများ	ဘေးဆိုးအကြွင်းကျန် များ	အသေးစိတ် ဆောင်ရွက်ချက်များ	တာဝန်ယူမှု	သတ်မှတ်ဇယား	မှတ်တမ်း များ
			2.1.1.5 အသံလုံသည့်ပစ္စည်းများ (Rock Wool Sandwich Panel) ကို အသုံးပြုရန်		ရေးကိရိယာများ (HPDs) များ ပံ့ပိုးပေးပြီး ၎င်းတို့၏ သင့်လျော်စွာအသုံးပြုမှုကို သေချာစေခြင်း။ • စက်ကိရိယာများ ကောင်းမွန်စွာ အလုပ်လုပ်နိုင်စေရန်အတွက် ပုံမှန်ပြုပြင်ထိန်းသိမ်းမှု အစီအစဉ်တစ်ရပ်ကို ထူထောင်ခြင်း၊ • ထွက်ပေါ်လာမည့် ဆူညံသံအရင်းအမြစ်အသစ်များကို ဖော်ထုတ်ခြင်း။			
	၂.၂ မီးစက်နှင့် ယာဉ်များ	• ၂.၂.၁ လည်ပတ်မှုလုပ်ငန်းစဉ်အတွ	• ၂.၂.၂.၁ မီးစက်များအတွက် အရံအတားများကို အသုံးပြုစေခြင်း		• မီးစက်များအတွက် အရံအတားများကို		စီမံကိန်းလည်ပတ်စဉ်တလျှောက်	

ပတ်ဝန်းကျင်ဆိုင်ရာ အချက်များ/အကြောင်းအရာများ	ဆောင် ရွက်မှု	ဖြစ်နိုင်ချေ သက်ရောက်မှု များ	လျှော့ချနိုင်ရေး နည်းလမ်းများ	ဘေးဆိုးအကြွင်းကျန်များ	အသေးစိတ် ဆောင်ရွက်ချက်များ	တာဝန်ယူမှု	သတ်မှတ်ဇယား	မှတ်တမ်းများ
		င်း ဆူညံသံ အဆင့်ကို တိုးလာစေခြင်း			အသုံးပြုစေခြင်း			
			၂.၂.၂.၂ ယာဉ်ကြောထိန်းချုပ်မှု အစီအမံများကို အထူး လိုက်နာပါ။		• ယာဉ်ကြောထိန်းချုပ်မှု အစီအမံများကို အထူး လိုက်နာပါ။			
၃။ စွန့်ပစ်အမှိုက်	• ၃.၁ ကုန်ကြမ်းများ၊ စက်ရုံလုပ်ငန်းစဉ်များ၊ ထုတ်ပိုးခြင်း များမှ	၃.၁.၁ ပတ်ဝန်းကျင် (မြေပေါ်နှင့် မြေအောက်ရေ) ကိုညစ်ညမ်းစေသည့်အပြင် ရောဂါပိုးမွှားများပါ ဖြစ်စေနိုင်သည်။	၃.၁.၁.၁ အမှိုက်စိုနှင့် အမှိုက် ခြောက် ခွဲခြား၍ ထားရှိခြင်း	နည်းပါးသော	• အမှိုက်စိုနှင့် အမှိုက် ခြောက် ခွဲခြား၍ ထားရှိခြင်း • အမှုန်အမွှားများ၊ ထုပ်ပိုးပစ္စည်းများနှင့် အခြားဘေးထွက်ပစ္စည်းများကဲ့သို့သော စွန့်ပစ်ပစ္စည်းများ၏ ခွဲခြားဖော်ထုတ်ခြင်း၊	စီမံကိန်းစီမံအုပ်ချုပ်မှုအဖွဲ့၊ HSE၊ အလုပ်သမားများ	စီမံကိန်းလည်ပတ်စဉ်တလျှောက်	စောင့်ကြည့်လေ့လာရေး အစီရင်ခံစာ

ပတ်ဝန်းကျင်ဆိုင်ရာအချက်များ/အကြောင်းအရာများ	ဆောင် ရွက်မှု	ဖြစ်နိုင်ချေ သက်ရောက်မှု များ	လျှော့ချနိုင်ရေး နည်းလမ်းများ	ဘေးဆိုးအကြွင်းကျန်များ	အသေးစိတ် ဆောင်ရွက်ချက်များ	တာဝန်ယူမှု	သတ်မှတ်ဇယား	မှတ်တမ်းများ
	ထွက်ရှိသော စွန့်ပစ်အမှိုက်များ		3.1.1.2 Wastes (by products) such as plastics box, paper box, etc.		• စက်ရုံတွင်းစွန့်ပစ်ပစ္စည်းများ (စားကြွင်းစားကျန်များ) ကဲ့သို့သော စွန့်ပစ်ပစ္စည်းများကို တိရစ္ဆာန်အစာအဖြစ် အသုံးပြုမည်ဖြစ်သည် • ထုတ်လုပ်မှု မှ ထွက်ရှိလာသော ကျောက်၊ သဲ နှင့် ရွံ့အနည်းငယ်ကို ရန်ကုန်မြို့တော်စည်ပင်သာယာရေး ကော်မတီတွင်စွန့်ပစ်ပါသည်။ • အော်ဂဲနစ်စွန့်ပစ်ပစ္စည်းများ၊ ပြန်လည်အသုံးပြုနိုင်သော (ပလပ်စတစ်၊ စက္ကူ၊ သတ္တုများ) နှင့်			

ပတ်ဝန်းကျင်ဆိုင်ရာအချက်များ/အကြောင်းအရာများ	ဆောင် ရွက်မှု	ဖြစ်နိုင်ချေ သက်ရောက်မှု များ	လျှော့ချနိုင်ရေး နည်းလမ်းများ	ဘေးဆိုးအကြွင်းကျန် များ	အသေးစိတ် ဆောင်ရွက်ချက်များ	တာဝန်ယူမှု	သတ်မှတ်ဇယား	မှတ်တမ်း များ
					ပြန်လည်အသုံးပြု၍မရသောအမှိုက်များကဲ့သို့သော မတူညီသောစွန့်ပစ်ပစ္စည်းများအတွက် ရှင်းလင်းစွာတံဆိပ်တပ်ထားသောပုံးများ သို့မဟုတ် ကွန်တိန်နာများကို ထားရှိခြင်း၊			
			3.1.1.3 ထုပ်ပိုးခြင်းမှ ထွက်ရှိသော စွန့်ပစ်ပစ္စည်းများ (အလူမီနီယမ်သတ္တုပြား) များကို ဖြတ်တောက်ပြီး DOWA အဖွဲ့အစည်းသို့		• ဘူးခွံပေါ်တွင်ဖော်ပြထားသော စွန့်ပစ်ခြင်းနည်းလမ်းများအတိုင်း လိုက်နာခြင်း၊ ဘူးခွံအလွတ်များပြန်လည်အသုံးမပြုခြင်း၊ ဘူးခွံလွတ်များကို			

ပတ်ဝန်းကျင်ဆိုင်ရာအချက်များ/အကြောင်းအရာများ	ဆောင် ရွက်မှု	ဖြစ်နိုင်ချေ သက်ရောက်မှု များ	လျှော့ချနိုင်ရေး နည်းလမ်းများ	ဘေးဆိုးအကြွင်းကျန်များ	အသေးစိတ် ဆောင်ရွက်ချက်များ	တာဝန်ယူမှု	သတ်မှတ်ဇယား	မှတ်တမ်းများ
			ပေးပို့ခြင်း		သတ်မှတ်ထားသော အမှိုက်စွန့်ပစ်သည့် နေရာတွင်သာ စနစ်တကျ စွန့်ပစ်ခြင်း၊			
	၃.၂ စားဖိုဆောင်မှ စက်ရုံတွင်း (စားကြွင်းစားကျန်)စွန့်ပစ် ပစ္စည်းများ	၃.၂.၁ ပတ်ဝန်းကျင် (အပေါ်ယံနှင့် မြေပြင်ရေ) ကို ညစ်ညမ်းစေပြီး ရောဂါအတွက် အားနည်းချက်ဖြစ်နိုင်သည်။	၃.၂.၁.၁ အစားအစာစွန့်ပစ်ပစ္စည်း (အော်ဂဲနစ်အမှိုက်) ကို တိရစ္ဆာန်အစာအဖြစ် အသုံးပြုမည်ဖြစ်သည်။		• ၃.၂.၁.၁ အစားအစာစွန့်ပစ်ပစ္စည်း (အော်ဂဲနစ်အမှိုက်) ကို တိရစ္ဆာန်အစာအဖြစ် အသုံးပြုမည်ဖြစ်သည်။			
၄။ ရေအရည်အသွေး	4.1 လည်ပတ်မှုမှာ အရည်မသုံးသော ခြောက်သွေ့သည့် လုပ်ငန်းစဉ် ဖြစ်သောကြောင့် သန့်ရှင်းရေးနှင့် စီမံဆောင်ရွက်ခြင်း	၄.၁.၁ ရေမျက်နှာပြင် ကို ညစ်ညမ်း စေခြင်း	၄.၁.၁.၁ ဒီဇယ်/ဆီသိုလှောင်ကန် ယိုစိမ့်မှုမဖြစ်စေရန် ဂရုတစိုက်စစ်ဆေးစေခြင်း	နည်းပါးသော	ဒီဇယ်/ဆီသိုလှောင်ကန် ယိုစိမ့်မှုမဖြစ်စေရန် ဂရုတစိုက်စစ်ဆေးစေခြင်း			

ပတ်ဝန်းကျင်ဆိုင်ရာအချက်များ/အကြောင်းအရာများ	ဆောင် ရွက်မှု	ဖြစ်နိုင်ချေသက်ရောက်မှု များ	လျှော့ချနိုင်ရေးနည်းလမ်းများ	ဘေးဆိုးအကြွင်းကျန်များ	အသေးစိတ်ဆောင်ရွက်ချက်များ	တာဝန်ယူမှု	သတ်မှတ်ဇယား	မှတ်တမ်းများ
	လုပ်ဆောင်ရာတွင် ထုတ်လုပ်မှုလုပ်ငန်းစဉ်မှ စက်မှုလုပ်ငန်းအညစ်အကြေးအရည်မထွက်ရှိပါ။ သို့သော် အချို့သောအနံ့ဆိုးများကိုဖယ်ရှားရန်နှင့်အရည်အသွေးထိန်းချုပ်ရန်အတွက် ပိုးသတ်ဆေးများကိုအသုံးပြုလျက်ရှိပါသည်။		**4.1.1.2** အန္တရာယ်ရှိသော ဓာတုပစ္စည်းများ/ဆီများ မတော်တဆယိုဖိတ်မှုအတွက် အရေးပေါ်တုံ့ပြန်မှု အစီအစဉ်ကို စီစဉ်ထားခြင်း		အန္တရာယ်ရှိသော ဓာတုပစ္စည်းများ/ဆီများ မတော်တဆယိုဖိတ်မှုများအတွက် အရေးပေါ်တုံ့ပြန်မှု အစီအစဉ်ကို စီစဉ်ပေးခြင်း (Spill Kit များ အသုံးပြု၍ ချက်ခြင်း ဖယ်ရှားခြင်း)			

ပတ်ဝန်းကျင်ဆိုင်ရာအချက်များ/အကြောင်းအရာများ	ဆောင် ရွက်မှု	ဖြစ်နိုင်ချေ သက်ရောက်မှု များ	လျှော့ချနိုင်ရေး နည်းလမ်းများ	ဘေးဆိုးအကြွင်းကျန် များ	အသေးစိတ် ဆောင်ရွက်ချက်များ	တာဝန်ယူမှု	သတ်မှတ်ဇယား	မှတ်တမ်း များ
	၄.၂ ပိုးသတ်ဆေးရည်အသုံးပြုခြင်းမှထွက်သော မျက်နှာပြင်ရှိရေများမှ ညစ်ညမ်းခြင်း။	၄.၂.၁ မြေပေါ်ရေ ကို ညစ်ညမ်း စေခြင်း	၄.၂.၁.၁ အညွှန်းလမ်းညွှန်ချက်အား လိုက်နာခြင်း		အန္တရာယ်ကင်းစွာကိုင်တွယ်ရောစပ်၊ မြေပေါ်ရေကို ညစ်ညမ်းမှု မရှိစေဘဲ စွန့်ပစ်နိုင်ရန် သီးခြားလမ်းညွှန်ချက်ပေးထားသည့် ပိုးသတ်ဆေးဘူးခွံပေါ်ရှိ အညွှန်းညွှန်ကြားချက်များကို ဂရုတစိုက်ဖတ်ရှုပြီး လိုက်နာဆောင်ရွက်ခြင်း			
			၄.၂.၁.၂ ရာသီဥတုအခြေအနေများကို စစ်ဆေးခြင်း		မိုးသည်းထန်စွာခါနီးအချိန်တွင် ပိုးသတ်ဆေးအသုံးပြုမှုကို ရှောင်ကြဉ်ခြင်း လေတိုက်နှုန်းနည်းသောအချိန်များတွင် ပိုးသတ်ဆေးများ ပျံ့လွင့်ခြင်းနည်းပါးသည့်အတွက် ယင်းအချိန်တွင်ဆောင်ရွက်ခြင်း၊			

ပတ်ဝန်းကျင်ဆိုင်ရာ အချက်များ/အကြောင်းအရာများ	ဆောင် ရွက်မှု	ဖြစ်နိုင်ချေ သက်ရောက်မှု များ	လျှော့ချနိုင်ရေး နည်းလမ်းများ	ဘေးဆိုးအကြွင်းကျန် များ	အသေးစိတ် ဆောင်ရွက်ချက်များ	တာဝန်ယူမှု	သတ်မှတ်ဇယား	မှတ်တမ်း များ
			၄.၂.၁.၃ Buffer Zones များထားရှိခြင်း		ရေထုနှင့် နီးစပ်သော (သို့) ပိုးသတ်ဆေးဖြန်းထားသော ဧရိယာအနီးတွင် အစိမ်းရောင် အပင်တန်းများအား Buffer Zone အဖြစ်ထားရှိခြင်း၊ ထိုကဲ့သို့ထားရှိခြင်းသည် ရေစီးဆင်းသည့်အခါ ပိုးသတ်ဆေးအကြွင်းအကျန်များ မြေဆီလွှာသို့ ရောက်ရှိမှုနည်းပါးစေခြင်း၊			
			၄.၂.၁.၄ ပိုးသတ်ဆေးများ အန္တရာယ်ကင်း၍ လုံခြုံသည့်နေရာတွင် သိမ်းဆည်းရန်၊		ပိုးသတ်ဆေးများအား လုံခြုံ၍ လေဝင်လေထွက်ကောင်းသော နေရာတွင် ထားရှိပြီး၊ ရေလမ်းကြောင်းထဲသို့ မရောက်အောင်ကာကွယ်ထားသည်။ Secondary Containement များထားရှိသည်။			

ပတ်ဝန်းကျင်ဆိုင်ရာ အချက်များ/အကြောင်းအရာများ	ဆောင် ရွက်မှု	ဖြစ်နိုင်ချေ သက်ရောက်မှု များ	လျှော့ချနိုင်ရေး နည်းလမ်းများ	ဘေးဆိုးအကြွင်းကျန် များ	အသေးစိတ် ဆောင်ရွက်ချက်များ	တာဝန်ယူမှု	သတ်မှတ်ဇယား	မှတ်တမ်း များ
			၄.၂.၁.၅ ဘူးခွံများ၊ ကိရိယာများကို သင့်တော်စွာ ရေဆေးရန်၊		ဘူးခွံကိရိယာများကို / သတ်မှတ်ထားသည့် နေရာတွင်သာ သန့်စင်ဆေးကြောခြင်း၊ ဆေးကြောရေများကို သင့်တော်စွာ စွန့်ပစ်နိုင်ရန် ညွှန်ကြားချက်များကို လိုက်နာခြင်း၊			
			၄.၂.၁.၆ ပိုးသတ်ဆေးရောစပ် သိုလှောင်သည့်နေရာ သီးသန့်ထားရှိခြင်း၊		ဖိတ်စင်၊ စီးဆင်းခြင်းမှ ကာကွယ်ရန် သိုလှောင် ရောစပ်သည့်နေရာတွင်/ Containment များ အသုံးပြုခြင်း၊			
			၄.၂.၁.၇ အလွန်အကျွံ ပိုးသတ်ဆေးဖြန်းခြင်းမှ ရှောင်ကြဉ်ခြင်း၊		လမ်းခင်းထားသော (သို့) ရေလမ်းကြောင်းနေရာများတွင် ပိုးသတ်ဆေးအလွန် အကျွံမဖြန်းစေရန် ကန့်သတ်ထားခြင်း၊			

ပတ်ဝန်းကျင်ဆိုင်ရာအချက်များ/အကြောင်းအရာများ	ဆောင် ရွက်မှု	ဖြစ်နိုင်ချေသက်ရောက်မှု များ	လျှော့ချနိုင်ရေးနည်းလမ်းများ	ဘေးဆိုးအကြွင်းကျန်များ	အသေးစိတ်ဆောင်ရွက်ချက်များ	တာဝန်ယူမှု	သတ်မှတ်ဇယား	မှတ်တမ်းများ
	၄.၃ ရေမြောင်းများသို့ ညစ်ညမ်းရေ စီးဆင်းမှု	၄.၃.၁ မြေပေါ်ရေ ညစ်ညမ်းခြင်း	**4.3.1.1** ရေများလွှတ်ထုတ်ခြင်းမပြုမီ အရင်းအမြစ်တွင် စစ်ထုတ်ခြင်းနည်းလမ်းကို အသုံးပြုခြင်း။ ၄.၃.၁.၁ ကုန်ကြမ်းများအား မိုးရာသီတွင် ရေဘေးပါမှုအား ထိန်းသိမ်းခြင်း၊		• ကုန်ကြမ်းများအား မိုးရာသီတွင် ရေဘေးပါမှုအား ထိန်းသိမ်းရန် အမိုးအကာများအောက်တွင် ထားရှိခြင်း၊			
			၄.၃.၁.၂ အနည်အနှစ် ပိတ်ဆို့မှုကို ကာကွယ်ရန် ရေနုတ်မြောင်းစနစ်ကို ပုံမှန် ဆယ်ယူထိန်းသိမ်းခြင်း		စက်ရုံပတ်လည်ရှိ ရေမြောင်းစနစ်ကောင်းမွန်စေရန် ပုံမှန် ဆယ်ယူထိန်းသိမ်းခြင်း၊			

ပတ်ဝန်းကျင်ဆိုင်ရာ အချက်များ/အကြောင်းအရာများ	ဆောင် ရွက်မှု	ဖြစ်နိုင်ချေ သက်ရောက်မှု များ	လျှော့ချနိုင်ရေး နည်းလမ်းများ	ဘေးဆိုးအကြွင်းကျန် များ	အသေးစိတ် ဆောင်ရွက်ချက်များ	တာဝန်ယူမှု	သတ်မှတ်ဇယား	မှတ်တမ်း များ
			၄.၃.၁.၄ ပုံမှန်လေ့ကျင့်ခြင်း၊ စောင့်ကြည့်ခြင်းနှင့် စစ်ဆေးခြင်းအစီအစဥ်များဆောင်ရွက်ခြင်း သည် ရေကိုခြေရာခံခြင်းနှင့်အတူ မှားယွင်းသောချိတ်ဆက်မှုများနှင့် faucets များကြောင့် စွန့်ပစ်ပစ္စည်းများ ယိုစိမ့်မှုတို့ကို လျှော့နည်းစေရန်။		ပုံမှန်လေ့ကျင့်ခြင်း၊ စောင့်ကြည့်ခြင်းနှင့် စစ်ဆေးခြင်းအစီအစဥ်များဆောင်ရွက်ခြင်း သည် ရေကိုခြေရာခံခြင်းနှင့်အတူ မှားယွင်းသောချိတ်ဆက်မှုများနှင့် faucets များကြောင့် စွန့်ပစ်ပစ္စည်းများ ယိုစိမ့်မှုတို့ကို လျှော့နည်းစေခြင်း၊			
	၄.၄ ရုံးအသုံးပြုမှုမှ အိမ်တွင်းရေဆိုးများကို စွန့်ပစ်ခြင်း	၄.၄.၁ မြေပေါ်ရေကို ညစ်ညမ်းစေခြင်း။	4.4.1.1 ရေချိုးခြင်း/ဆေးကြောခြင်းမှ ထွက်ရှိသော အိမ်တွင်းသုံး ရေဆိုးများကို		ရေချိုးခြင်း/ဆေးကြောခြင်းမှ ထွက်ရှိသော အိမ်တွင်းသုံး ရေဆိုးများကို သဲဖြင့်စကာချခြင်းနည်းဖြင့် သန့်စင်ခြင်း၊			

ပတ်ဝန်းကျင်ဆိုင်ရာအချက်များ/အကြောင်းအရာများ	ဆောင် ရွက်မှု	ဖြစ်နိုင်ချေ သက်ရောက်မှု များ	လျှော့ချနိုင်ရေး နည်းလမ်းများ	ဘေးဆိုးအကြွင်းကျန်များ	အသေးစိတ် ဆောင်ရွက်ချက်များ	တာဝန်ယူမှု	သတ်မှတ်ဇယား	မှတ်တမ်းများ
			သဲဖြင့်စကာချခြင်းနည်းဖြင့် သန့်စင်ခြင်း၊					
	4.5 အလုံးစုံသက်ရောက်မှုများ	၄.၅.၁ မြေပေါ်ရေနှင့် မြေအောက်ရေ ညစ်ညမ်းစေခြင်း	4.5.1.1 မိုးရာသီတွင် ရေမြောင်းများ ရေလျှံခြင်းမှ ကာကွယ်ရန် ဂရုတစိုက် စစ်ဆေးခြင်း		မိုးရာသီတွင် ရေမြောင်းများ ရေလျှံခြင်းမှ ကာကွယ်ရန် ဂရုတစိုက် စစ်ဆေးခြင်း			
၅။ လုပ်ငန်းခွင် ဘေးကင်းလုံခြုံရေး နှင့်ကျန်းမာရေး	5.1 လက်ဖြင့် ကိုင်တွယ်ခြင်းကဲ့သို့ အန္တရာယ်များသော အရာများ၊ inhalable	၅.၁.၁ အလုပ်သမားများ ၏ ကျန်းမာရေးအပေါ် ဆိုးရွားစွာ အ ကျိုးသက်ရောက်ခြင်း	၅.၁.၁.၁ လုပ်ငန်းခွင်အတွက် သင့်လျော်သော ကိုယ်ရေးကိုယ်တာ အကာအကွယ်ပစ္စည်းများ ပေးအပ်ခြင်း။	နည်းပါးသော	• ကော်ဖီမစ်စက်ရုံအတွက် အသုံးများသော PPE ပစ္စည်းများဖြစ်သည့် မျက်မှန်များ၊ N95 respirators/masks, လက်အိတ်များ၊	စီမံကိန်းစီမံအုပ်ချုပ်မှုအဖွဲ့၊ HSE၊ အလုပ်သမားများ	စီမံကိန်းလည်ပတ်စဉ်တလျှောက်	စောင့်ကြည့်လေ့လာရေး အစီရင်ခံစာ

ပတ်ဝန်းကျင်ဆိုင်ရာအချက်များ/အကြောင်းအရာများ	ဆောင် ရွက်မှု	ဖြစ်နိုင်ချေ သက်ရောက်မှု များ	လျှော့ချနိုင်ရေး နည်းလမ်းများ	ဘေးဆိုးအကြွင်းကျန် များ	အသေးစိတ် ဆောင်ရွက်ချက်များ	တာဝန်ယူမှု	သတ်မှတ်ဇယား	မှတ်တမ်း များ
	dustများအန္တရာယ်, ဆူညံသံ				အကြားအာရုံကာကွယ်ရေးနှင့် ချော်ထွက်မှုဒဏ်ခံနိုင်သော ဖိနပ်များကဲ့သို့ အပြည့်အဝထောက်ပံ့ခြင်း			
			၅.၁.၁.၂ အလုပ်သမားများ၏ ကျန်းမာရေးကို ပုံမှန်စစ်ဆေးခြင်း		• အလုပ်သမားများ၏ ကျန်းမာရေးကို ပုံမှန်စစ်ဆေးခြင်း			
			၅.၁.၁.၃ ယာဉ်များနှင့် စက်များ ကောင်းမွန်စွာ အလုပ်လုပ်နိုင်စေရန် သေချာစေရန်/ ယာဉ်အန္တရာယ်ကင်းရှင်းရေးနှင့် မော်တော်ယာဉ် စီမံခန့်ခွဲမှုဥပဒေနှင့် အညီ		• ထုတ်လုပ်သူလမ်းညွှန်ချက်များနှင့် OHS စံချိန်စံညွှန်းများနှင့်အညီ စက်ပစ္စည်းများနှင့် စက်ပစ္စည်းများအားလုံးကို စနစ်တကျ ထိန်းသိမ်းခြင်း၊ စစ်ဆေးခြင်းနှင့် လည်ပတ်ခြင်းတို့ကို သေချာစေခြင်း။ • ညှံ့ဖျင်းသောလေထုအရည်အသွေးနှင့်			

ပတ်ဝန်းကျင်ဆိုင်ရာ အချက်များ/အ ကြောင်းအရာများ	ဆောင် ရွက်မှု	ဖြစ်နိုင်ချေ သက်ရောက်မှု များ	လျှော့ချနိုင်ရေး နည်းလမ်းများ	ဘေးဆိုးအ ကြွင်းကျန် များ	အသေးစိတ် ဆောင်ရွက်ချက်များ	တာဝန်ယူမှု	သတ်မှတ်ဇ ယား	မှတ်တမ်း များ
			ယာဉ်မတော်တဆမှု များကို ဂရုပြုရန်၊		ဆက်စပ်နေသော ကျန်းမာရေးအန္တရာယ် များကို အသိပညာပေးခြင်းနှင့် HSE မှ ကောင်းမွန်သောအိမ် တွင်းလေထုအရည်အ သွေးကို ထိန်းသိမ်းခြင်း၏အ ရေးကြီးမှုကို ပညာပေးခြင်း၊ • လေဝင်လေထွက်စနစ် များနှင့် ဖုန်မှုန့်စုဆောင်းမှုစနစ် များကဲ့သို့သော စနစ်များကို အင်ဂျင်နီယာထိန်းချုပ် မှုဖြင့် ကောင်းမွန်စွာ သေချာစေခြင်း၊			

ပတ်ဝန်းကျင်ဆိုင်ရာ အချက်များ/အကြောင်းအရာများ	ဆောင် ရွက်မှု	ဖြစ်နိုင်ချေ သက်ရောက်မှု များ	လျှော့ချနိုင်ရေး နည်းလမ်းများ	ဘေးဆိုးအကြွင်းကျန် များ	အသေးစိတ် ဆောင်ရွက်ချက်များ	တာဝန်ယူမှု	သတ်မှတ်ဇယား	မှတ်တမ်း များ

			• ၅.၁.၁.၄ ညစ်ညမ်းမှုထိန်းချုပ်ရေးစနစ်များကို ပုံမှန်စစ်ဆေးခြင်းနှင့် ပြုပြင်ထိန်းသိမ်းခြင်း
			
			• ၅.၁.၁.၅ ရုံးခန်းအဆောက်အအုံရှိ အခန်းတစ်ခန်းကို ဖျားနာသူများအတွက် အနားယူခန်းအဖြစ်ထားရှိရန်၊
					• ၅.၁.၁.၄ ညစ်ညမ်းမှုထိန်းချုပ်ရေးစနစ်များကို ပုံမှန်စစ်ဆေးခြင်းနှင့် ပြုပြင်ထိန်းသိမ်းခြင်း
					  • ဖုန်စုပ်စက်များဖြင့် ကြမ်းပြင်များ၊ မျက်နှာပြင်များနှင့် စက်ပစ္စည်းများကို ပုံမှန်သန့်ရှင်းခြင်း သို့မဟုတ် ဝန်ထမ်းများအား ၎င်းတို့၏ အလုပ်ရုံများကို ဖုန်မှုန့်များ ကင်းစင်စေရန် သန့်ရှင်းနေစေခြင်း၊
					  • လေဝင်လေထွက်စနစ်များ၊ စစ်ထုတ်စက်များနှင့် ဖုန်မှုန့်စုဆောင်းကိရိ			

ပတ်ဝန်းကျင်ဆိုင်ရာ အချက်များ/အကြောင်းအရာများ	ဆောင် ရွက်မှု	ဖြစ်နိုင်ချေ သက်ရောက်မှု များ	လျှော့ချနိုင်ရေး နည်းလမ်းများ	ဘေးဆိုးအကြွင်းကျန် များ	အသေးစိတ် ဆောင်ရွက်ချက်များ	တာဝန်ယူမှု	သတ်မှတ်ဇယား	မှတ်တမ်း များ
			၅.၁.၁.၆ အဆောက်အဦအားလုံးတွင် အရေးပေါ် First Aid Kit များ ထားရှိခြင်း၊		ယာများ၏ ထိရောက်မှုကို ထိန်းသိမ်းရန် ပုံမှန်စစ်ဆေးပြီး သန့်ရှင်းခြင်း၊ • ဝန်ထမ်းများအား အရေးပေါ်လုပ်ထုံးလုပ်နည်းများနှင့် ဘေးလွတ်ရာသို့ ရွှေ့ပြောင်းရေးလမ်းကြောင်းများနှင့် ရင်းနှီးစေရန် လေ့ကျင့်ခန်းများပြုလုပ်စေခြင်း၊ သင်တန်းများပေးခြင်း၊ ပြုလုပ်ခြင်း။ • ဝန်ထမ်းများအား အရေးပေါ်လုပ်ထုံးလုပ်နည်းများနှင့် ဘေးလွတ်ရာသို့			

ပတ်ဝန်းကျင်ဆိုင်ရာ အချက်များ/အကြောင်းအရာများ	ဆောင် ရွက်မှု	ဖြစ်နိုင်ချေ သက်ရောက်မှု များ	လျှော့ချနိုင်ရေး နည်းလမ်းများ	ဘေးဆိုးအ ကြွင်းကျန် များ	အသေးစိတ် ဆောင်ရွက်ချက်များ	တာဝန်ယူမှု	သတ်မှတ်ဇ ယား	မှတ်တမ်း များ
					ရွှေ့ပြောင်းရေးလမ်းကြောင်းများနှင့် ရှင်းနိုးစေရန် လေ့ကျင့်ခန်းများပြုလုပ်စေခြင်း၊ သင်တန်းများပေးခြင်း၊ ပြုလုပ်ခြင်း။			
	၅.၂ ပိုးသတ်ဆေးအသုံးပြုခြင်းနှင့် ပိုးသတ်ဆေး မှိုင်းတိုက်ခြင်း အားအကောင်အထည် ဖော်ခြင်း။	၅.၂.၁ အန္တရာယ်ရှိသော ဓာတုပစ္စည်းများ (Fumigants နှင့် Insecticides) နှင့် ထိတွေ့ခြင်းမှ အလုပ်သမားများ အတွက် ကျန်းမာရေး ထိခိုက်မှုများ	၅.၂.၁.၁ သင်တန်းများ ပို့ပိုးပေးခြင်း		• ပိုးသတ်ဆေး ကိုင်တွယ်သည့် အလုပ်သမားများအားလုံး ၎င်းတို့၏ ဘေးကင်းလုံခြုံစွာ အသုံးပြုမှု၊ ကိုင်တွယ်မှု၊ သိုလှောင်မှုနှင့် စွန့်ပစ်မှုတို့တွင် လေ့ကျင့်မှုများသေချာပေးထားခြင်း			
			၅.၂.၁.၂ တစ်ကိုယ်ရေ အကာအကွယ်ပစ္စည်း ပေးအပ်ခြင်း။		• လက်အိတ်များ၊ မျက်မှန်များ သို့မဟုတ် မျက်နှာအကာများ၊ N95 Mask၊ ကာဗာများနှင့် ဘွတ်ဖိနပ်များအပါအဝင် PPE သည် သီးခြား			

ပတ်ဝန်းကျင်ဆိုင်ရာ အချက်များ/အကြောင်းအရာများ	ဆောင် ရွက်မှု	ဖြစ်နိုင်ချေ သက်ရောက်မှု များ	လျှော့ချနိုင်ရေး နည်းလမ်းများ	ဘေးဆိုးအကြွင်းကျန် များ	အသေးစိတ် ဆောင်ရွက်ချက်များ	တာဝန်ယူမှု	သတ်မှတ်ဇယား	မှတ်တမ်း များ
					အသုံးချနည်းလမ်းပေါ်မူတည်၍ ပံ့ပိုးပေးခြင်း။ • အလုပ်သမားတစ်ဦးစီသည် PPEကောင်းမွန်သေချာ စွာ တပ်ဆင်ထားကြောင်း သေချာစေခြင်း။			
			၅.၂.၁၃ သင့်လျော်သော လေဝင်လေထွက် ထားရှိရန်၊		• ပိုးသတ်မှိုင်းတိုက်ခြင်း အသုံးပြုခြင်းနှင့် ကိုင်တွယ်ခြင်းအတွက် အသိအမှတ်ပြုခံရသူများသာ ပိုးသတ်မှိုင်းတိုက်ခြင်းလုပ်ငန်းစဉ်တွင် ပါဝင်ဆောင်ရွက်စေခြင်း၊ • ဤဓာတုပစ္စည်းများနှင့်ဆက်စပ်သော ဖြစ်နိုင်ခြေရှိသော ကျန်းမာရေးဆိုင်ရာအန္တရာယ်များဆိုင်ရာ အချက်အလက်များကို ထုတ်ဖော် ဖြေရှင်းခြင်း၊			

ပတ်ဝန်းကျင်ဆိုင်ရာ အချက်များ/အကြောင်းအရာများ	ဆောင် ရွက်မှု	ဖြစ်နိုင်ချေ သက်ရောက်မှု များ	လျှော့ချနိုင်ရေး နည်းလမ်းများ	ဘေးဆိုးအကြွင်းကျန် များ	အသေးစိတ် ဆောင်ရွက်ချက်များ	တာဝန်ယူမှု	သတ်မှတ်ဇယား	မှတ်တမ်း များ
			၅.၂.၁.၄ သိုလှောင်ခြင်း၊ ကိုင်တွယ်ခြင်း၊		• ပိုးသတ်ဆေးများအား ၎င်းတို့ သဟဇာတမဖြစ်သောပစ္စည်း များ၏ ဝေးရာသီးခြားတွင် သာ သိမ်းဆည်းခြင်း၊ • ကွန်တိန်နာများကို စနစ်တကျတံဆိပ်တပ်ပြီး အလုံပိတ်ထားကြောင်း သေချာစေခြင်း။ • ဓာတုပစ္စည်းများ ယိုဖိတ်ခြင်းနှင့် ဖိတ်စိမ့်ခြင်းတို့မဖြစ်စေရန် တက်နိုင်သမျှ ရှောင်ကြဉ်ခြင်း၊			
			5.2.1.5 အရေးပေါ်တုံ့ပြန်မှု ကို ဖော်ဆောင်ထားရှိခြင်း		• မတော်တဆမှု၊ ဖိတ်စင်မှု၊ သို့မဟုတ် ထိတွေ့မှုဖြစ်စဉ်များတွင် ရှင်းလင်းပြတ်သားသော အရေးပေါ်တုံ့ပြန်မှုလုပ်ငန်းစဉ်များကို ဖော်ဆောင်ခြင်းနှင့် ဆက်သွယ်ခြင်း။			

ပတ်ဝန်းကျင်ဆိုင်ရာ အချက်များ/အကြောင်းအရာများ	ဆောင် ရွက်မှု	ဖြစ်နိုင်ချေ သက်ရောက်မှု များ	လျှော့ချနိုင်ရေး နည်းလမ်းများ	ဘေးဆိုးအကြွင်းကျန် များ	အသေးစိတ် ဆောင်ရွက်ချက်များ	တာဝန်ယူမှု	သတ်မှတ်ဇယား	မှတ်တမ်း များ
					• အရေးပေါ်မျက်လုံးဆေးသည့်နေရာများ၊ သီးခြားရေချိုးခန်းများနှင့် Spill-Kit များထားရှိခြင်း၊			
			၅.၂.၁.၆ အသက်ရှူလမ်းကြောင်းဆိုင်ရာ အကာအကွယ် ပေးရန်၊		• ပိုးသတ်ဆေးများနှင့် အလုပ်လုပ်သည့်အခါ N95 အသက်ရှူကိရိယာကို စမ်းသပ်အသုံးပြု၍ အလုပ်သမားများအား ယင်းကိရိယာများအား သင့်လျော်စွာ သင့်လျော်စွာအသုံးပြုမှုအပေါ် သေချာစေခြင်း၊			
			5.2.1.7 ရှေးဦးသူနာပြုစုခြင်းနှင့် ဆေးဘက်ဆိုင်ရာ ထောက်ပံ့ပေးခြင်း၊		• ရှေးဦးသူနာပြုစုနည်း/First Aid Kit နှင့် ဆေးခန်းတစ်ခု ပံ့ပိုးပေးခြင်း။ • အလုပ်သမားများအား ဓာတုထိတွေ့မှုလက္ခဏာများ ခံစားရပါက			

ပတ်ဝန်းကျင်ဆိုင်ရာ အချက်များ/အကြောင်းအရာများ	ဆောင် ရွက်မှု	ဖြစ်နိုင်ချေ သက်ရောက်မှု များ	လျှော့ချနိုင်ရေး နည်းလမ်းများ	ဘေးဆိုးအကြွင်းကျန် များ	အသေးစိတ် ဆောင်ရွက်ချက်များ	တာဝန်ယူမှု	သတ်မှတ်ဇယား	မှတ်တမ်း များ
					ဆေးကုသမှုခံယူရန် တွန်းအားပေးခြင်း။			
၆။ လူမှုစီပွားရေး	၆.၁ စီမံကိန်းလုပ်ငန်း ဆောင်ရွက်မှုများ	၆.၁.၁ ဒေသခံများအတွက် အလုပ်အကိုင်အခွင့်အလန်းများ ၆.၁.၂ အစိုးရအခွန်ငွေ တိုးပွားခြင်း	_	ကောင်းသောသက်ရောက်မှု		လူထုတွေ့ဆုံဆွေးနွေးခြင်း	စီမံကိန်း ကာလ တလျှောက်	အစည်းအဝေးမှတ်တမ်း
၇. အနံ့ထွက်ခြင်း	၇.၁ ရေချိုးခန်းအတွင်း ကော်ဖီမှုန့်ကို သန့်ရှင်းစေခြင်း	• ၇.၁.၁ ချဉ်သော သို့မဟုတ် အချဉ်ပေါက်ခြင်း ကဲ့သို့သော အနံ့များ	• ၇.၁.၁.၁ သင့်လျော်သော လေဝင်လေထွက်များထားရှိခြင်း	နည်းပါးသော	• လေဝင်လေ ထွက်ကောင်းပြီး အနံ့အသက်ကို မြန်မြန်ဆန်ဆန် ပြေပျောက်စေရန် သန့်ရှင်းရေးပြုလုပ်သည့် နေရာရှိ	စီမံကိန်းစီမံအုပ်ချုပ်မှုအဖွဲ့၊ HSE၊ အလုပ်သမားများ	စီမံကိန်းလည်ပတ်စဉ်တလျှောက်	စောင့်ကြည့်လေ့လာရေး အစီရင်ခံစာ

ပတ်ဝန်းကျင်ဆိုင်ရာ အချက်များ/အကြောင်းအရာများ	ဆောင် ရွက်မှု	ဖြစ်နိုင်ချေ သက်ရောက်မှု များ	လျှော့ချနိုင်ရေး နည်းလမ်းများ	ဘေးဆိုးအကြွင်းကျန်များ	အသေးစိတ် ဆောင်ရွက်ချက်များ	တာဝန်ယူမှု	သတ်မှတ်ဇယား	မှတ်တမ်းများ
					ရေချိုးခန်းအတွင်း လုံလောက်သောလေဝင်လေထွက်ထားရှိခြင်း၊ ပါသည်။			
			၇၂.၁.၁. ထိရောက်သော သန့်စင်ဆေးများကို အသုံးပြုခြင်း။		• အော်ဂဲနစ်အနံ့ဆိုးများကို ကိုင်တွယ်ဖြေရှင်းရန် အနံ့ဆိုးများကို ဖယ်ရှားသည့် သန့်စင်ဆေးရည်များကို အသုံးပြုခြင်း။			
			၇၃.၁.၁. တစ်ကိုယ်ရေ အကာအကွယ်ပစ္စည်း ပေးအပ်ခြင်း။		• လက်အိတ်များ၊ မျက်နှာဖုံးများနှင့် ကဲ့သို့သော သင့်လျော်သော PPE အလုပ်သမားများကို ပေးအပ်ခြင်း။ ၎င်း PPE များ သည် အချဉ်ဖောက်ထားသော			

ပတ်ဝန်းကျင်ဆိုင်ရာ အချက်များ/အကြောင်းအရာများ	ဆောင် ရွက်မှု	ဖြစ်နိုင်ချေ သက်ရောက်မှု များ	လျှော့ချနိုင်ရေး နည်းလမ်းများ	ဘေးဆိုးအကြွင်းကျန် များ	အသေးစိတ် ဆောင်ရွက်ချက်များ	တာဝန်ယူမှု	သတ်မှတ်ဇယား	မှတ်တမ်း များ
					ကော်ဖီမှုန့်အနံ့နှင့် တိုက်ရိုက်ထိတွေ့မှုကို လျှော့ချရန် ကူညီပေးနိုင်သည်။			
			၇.၁.၁.၄ အနံ့ခံဆေးများကို အသုံးပြုခြင်း။		• အနံ့ပြင်းသော အနံ့ဆိုးများကို ဖယ်ရှားရန် အနံ့ဆိုးထိန်းသည့်အရာကို ထားရှိခြင်း၊			
			၇ ၅.၁.၁. ဆိုက်အတွင်း အဝတ်လျှော်ရုံများ ထားရှိခြင်း၊		• အလုပ်သမားများ၏ယူနီဖောင်းများအတွက် ဆိုက်တွင်းအဝတ်လျှော်စက်ရုံများ ထားရှိခြင်း၊			

ပတ်ဝန်းကျင်ဆိုင်ရာ အချက်များ/အကြောင်းအရာများ	ဆောင် ရွက်မှု	ဖြစ်နိုင်ချေ သက်ရောက်မှု များ	လျှော့ချနိုင်ရေး နည်းလမ်းများ	ဘေးဆိုးအကြွင်းကျန် များ	အသေးစိတ် ဆောင်ရွက်ချက်များ	တာဝန်ယူမှု	သတ်မှတ်ဇယား	မှတ်တမ်း များ
			အလုပ်သမားများ၏ ယူနီဖောင်းများအတွက် ဆိုက်တွင်းအဝတ်လျှော်စက်ရုံများ ထားရှိခြင်း၊		• ဘက်တီးရီးယား၊ ဗိုင်းရပ်စ်များ၊ မှိုများနှင့် ရေညှိများကဲ့သို့သော အဏုဇီဝသက်ရှိများ၏ ကြီးထွားမှုနှင့် ကြီးထွားမှုကို ဟန့်တားရန် ပိုးသတ်ဆေးများကို အသုံးပြုခြင်း။ • အချိန်ကြာလာသည်နှင့် အမှု အနံ့ဆိုးများ စုပုံလာခြင်းမှ ကာကွယ်ရန် ရေချိုးခန်းကို ပုံမှန်သန့်ရှင်းရေးနှင့် ပြုပြင်ထိန်းသိမ်းခြင်း။			

ဇယား ၁.၅ ပတ်ဝန်းကျင်၊ လူမှုရေးနှင့် ကျန်းမာရေး သက်ရောက်မှုများအတွက် စောင့်ကြည့်လေ့လာရေးစီမံချက်

Factors	Index/ Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location	Responsible Person
လေအရည်အသွေး	• PM-10 • PM-2.5 • NO2, • SO2 • CO • Ozone	**Method** - လေထုစောင့်ကြည့်လေ့လာရေး survey အား **HAZ-SCANNER EPAS Wireless Environmental Perimeter Air Monitoring Station** (**EPAS**) ကို အသုံးပြု၍ ဆောင်ရွက်ပါသည်။ • ၂၀၁၂ ခုနှစ် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဥပဒေနှင့်အညီ ၂၀၁၅	ကာလ - (၂၄) နာရီ ဆက်တိုက် ကြိမ်ရေ - တစ်နှစ်လျှင် (၂) ကြိမ် • လုပ်ငန်းလည်ပတ်စဉ် တစ်နှစ်လျှင် ၂ ကြိမ်နှင့် စက်ရုံဖျက်သိမ်းခြင်း အဆင့်တွင် တစ်ကြိမ် လေအရည်အသွေးနှင့်ပတ်သက်၍ တိုင်ကြားချက်တစ်စုံတစ်ရာ ရှိပါက ၊	၁။ စက်ရုံဝန်း၊ 16` 50' 56.9" N, 096` 03' 48.2" E ၂။ ကော်ဖီစေ့အစိမ်း sizing ပြုလုပ်သည့် နေရာ 16` 50' 54.4" N, 96` 03' 44.4" E ၃။ သိုလှောင်သည့် နေရာ 16` 50' 52.3"N, 096` 03' 44.5"E ၄။ ထုတ်လုပ်သည့်နေရာ 16` 50' 55.0"N 096` 03' 42.9"E ၅။ ကော်ဖီ roasting ပြုလုပ်သည့်နေရာ	• HSE တာဝန်ခံ (သို့) တတိယ အဖွဲ့အစည်း

Factors	Index/ Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location	Responsible Person
		ခုနှစ်တွင် အသက်ဝင်သော မြန်မာနိုင်ငံ၏ အမျိုးသားအဆင့် ပတ်ဝန်းကျင်ဆိုင်ရာ လမ်းညွှန်ချက်များ (EQEG)	သီးခြားတိုင်ကြားမှုများ အတွက် နောက်တစ်ကြိမ် လေ အရည်အသွေးတိုင်းတာမှု ကို လိုအပ်ပါက လုပ်ဆောင်ပါမည်။	16` 50' 54.8" N, 96` 03' 45.2" E ၆။ (က) ဂျင်နရေတာ (လည်ပတ်နေစဉ်) 16` 50' 54.1" N, 96` 03' 45.5" E (ခ)ဂျင်နရေတာ (ရပ်နားထားစဉ်) 16` 50' 54.1" N, 96` 03' 45.5" E ၇။ အလူမီနီယံဖလင် မီးရှို့သည့် နေရာ 16` 50' 57.1" N, 096` 03' 42.0" E	
ဆူညံသံ	• Leq (၂၄)နာရီ • Lmax • Ldn	Method -siteတစ်ခုစီတွင်၊ (နေ့ခင်းဘက် (**LAeq** 90 **D**)၊ ညအချိန် (**LAeq** 90 **N**))၊ နှင့် ၂၄ နာရီ (**LAeq** 90) အတွက်	ကာလ - (၂၄) နာရီ ဆက်တိုက် ကြိမ်ရေ - တစ်နှစ်လျှင်(၂)ကြိမ် • လုပ်ငန်းလည်ပတ်စဉ် တနှစ်လျှင် ၂	၁။ ဟင်းလင်းပြင် (စက်ရုံဝန်း)၊ 16` 50' 56.9" N, 096` 03' 48.2" E ၂။ သိုလှောင်သည့် နေရာ 16` 50' 52.3"N, 096` 03' 44.5"E	HSE တာဝန်ခံ (သို့) တတိယ အဖွဲ့အစည်း

Factors	Index/ Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location	Responsible Person
		Sound Level Meter (မော်ဒယ်- **SL-**4023**SD**) နှင့်အတူ **SD** ကတ်တွင် အချိန်နှင့်တပြေးညီ ဒေတာအသံဖမ်းစက် (**USB/RS**232)ကို အသုံးပြု၍ လေ့လာမှုဧရိယာအတွင်း နောက်ခံပတ်ဝန်းကျင် ဆူညံသံအဆင့်များကို စောင့်ကြည့်မည် ။ ဤ **SLM** သည် **IEC**61672 class 2 နှင့် ကိုက်ညီပြီး **tolerance** +/- 1.4**dB** ဖြစ်သည်။ • ၂၀၁၂ ခုနှစ် ပတ်ဝန်းကျင်ထိန်း သိမ်းရေးဥပဒေနှင့်အညီ ၂၀၁၅ ခုနှစ်တွင် အသက်ဝင်သော	ကြိမ်နှင့် စက်ရုံဖျက်သိမ်းခြင်းအဆင့်တွင် တစ်ကြိမ် ဆူညံသံနှင့်ပတ်သက်၍ တိုင်ကြားချက်တစ်စုံတစ်ရာ ရှိပါက ၊ နောက်တစ်ကြိမ် ဆူညံသံတိုင်းတာမှုကို လိုအပ်ပါက လုပ်ဆောင်ပါမည်။	၃။ ထုတ်လုပ်သည့်နေရာ 16` 50' 55.0"N 096` 03' 42.9"E ၄။ ကော်ဖီစေ့အစိမ်း sizing ပြုလုပ်သည့်နေရာ 16` 50' 54.4" N, 96` 03' 44.4" E ၅။ ကော်ဖီ roasting ပြုလုပ်သည့် နေရာ 16` 50' 54.8" N, 96` 03' 45.2" E ၆။ အလူမီနီယံဖလင်မီးရှို့သည့်နေရာ 16` 50' 57.1" N, 096` 03' 42.0" E ၇။ ဂျင်နရေတာ (လည်ပတ်နေစဉ်) 16` 50' 54.1" N, 96` 03' 45.5" E	

Factors	Index/ Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location	Responsible Person
		မြန်မာနိုင်ငံ၏ အမျိုးသားအဆင့် ပတ်ဝန်းကျင်ဆိုင်ရာ လမ်းညွှန်ချက်များ (EQEG)			
ညစ်ညမ်းရေ	ရုပ်ပိုင်းဆိုင်ရာ သတ်မှတ်ချက်များ : • pH ဓါတုဆိုင်ရ သတ်မှတ်ချက်များ : • Total Suspended Solid (TSS) • Ammonia Nitrogen • Nitrate Nitrogen • Oil and Grease • Phosphorus • DO • BOD	နည်းလမ်း • အမျိုးသားပတ်ဝန်းကျင် အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက် (EQEG) မှ အကြံပြုထားသော ရေနှင့် စွန့်ပစ်ရေ ဆန်းစစ်ခြင်းအတွက် ခွဲခြမ်းစိတ်ဖြာမှုနည်းလမ်းများ	• လုပ်ငန်းဆောင်ရွက်သည့်ကာလအတွင်း • ညစ်ညမ်းရေအတွက် တစ်နှစ်လျှင် နှစ်ကြိမ် • သောက်သုံးရေအတွက် သုံးလတစ်ကြိမ်	• ရေနုတ်မြောင်း (၁) 16°50'58.98"N 96° 3'47.06"E • ရေနုတ်မြောင်း (၂) 16°50'58.13"N 96° 3'42.33"E • နောက်ဆုံးစွန့်ထုတ်သည့် ပိုက်လိုင်း 16°50'55.77"N 96° 3'41.10"E	• HSE တာဝန်ခံ (သို့) တတိယ အဖွဲ့အစည်း

Factors	Index/ Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location	Responsible Person
	• COD ဇီဝဆိုင်ရာ သတ်မှတ်ချက်များ : • Total Coliform • *Escherichia coli*				
အန္တရာယ်ရှိသော နှင့် အန္တရာယ်မရှိသော စွန့်ပစ်ပစ္စည်းများ	ရှင်းလင်းစွာ စွန့်ပစ်ခြင်းနှင့် ခြေရာခံခြင်း အစီရင်ခံစာ	စွန့်ပစ်သည့်အမျိုးအစားနှင့် စွန့်ပစ်သည့်နေရာလိုက်၍ အမှိုက်ပမာဏကို ခြေရာခံခြင်း	• လုပ်ငန်းလည်ပတ်စဉ်ကာလ အတွင်း	• စီမံကိန်း တည်နေရာအားလုံး	• HSE တာဝန်ခံ (သို့) တတိယ အဖွဲ့အစည်း
လူမှုရေး	• တိုင်ကြားချက် • စောင့်ကြည့်လေ့လာခြင်းနှင့် အဖြေရှာခြင်း	• တိုင်ကြားချက်ကိုမှတ်တမ်းတင်ရန် • သင့်တော်သောအဖြေများကို စောင့်ကြည့်ဖော်ထုတ် အကောင်အထည်ဖော်ရန်	• လုပ်ငန်းစဉ်အားလုံးတစ်လျှောက်	• စီမံကိန်းဧရိယာ၊စီမံကိန်းဧရိယာ ဝန်းကျင်နှင့် သယ်ယူပို့ဆောင်ရေးလမ်းကြောင်း	• HSE တာဝန်ခံ (သို့) တတိယ အဖွဲ့အစည်း
အများပြည်သူနှင့် လုပ်ငန်းခွင် ကျန်းမာရေးနှင့် ဘေးကင်းလုံခြုံရေး	• မတော်တဆဖြစ်ပွားမှု ဆိုင်ရာ အချက်အလက်များ (စက်များနှင့် လုပ်ကိုင်ရာတွင် မတော်တဆမှုများ၊	• စစ်ဆေးတွေ့ရှိချက်များ(တော်တဆ) အား အကျဉ်းချုပ်အစီရင်ခံစာ ပြုစုရန် • အဖွဲ့တာဝန်ခံမှ	• လုပ်ငန်းစဉ်တစ်လျှောက်လုံး ကြိမ်ရေ - လစဉ် • လုပ်ငန်းဆောင်ရွက်သည့်ကာလအတွ	• စီမံကိန်းဧရိယာ၊စီမံကိန်းဧရိယာ ဝန်းကျင်နှင့် သယ်ယူပို့ဆောင်ရေး လမ်းကြောင်း • စီမံကိန်းဧရိယာနှင့်	•

Factors	Index/ Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location	Responsible Person
	ချော်လဲခြင်း၊ပြုတ်ကျခြင်းများ၊ အခြားအသေးစားထိခိုက်ဒဏ်ရာရမှုများ) • လုပ်ငန်းခွင်အတွင်း အသက်ရှူလမ်းကြောင်းဆိုင်ရာ ရောဂါများ • ရေရှည်တွင် ဆူညံသံနှင့် ထိတွေ့မှုကြောင့် ဖြစ်ပေါ်သော အကြား အာရုံထိခိုက် ပျက်စီးခြင်း (NHL) နှင့် အခြားသော ဇီဝကမ္မဆိုင်ရာ သက်ရောက်မှုများ • လျှော့ချရေးနည်း လမ်းများ	အလုပ်သ မားများ၏ ကျန်းမာရေးအချက်အလက်များကို ပုံမှန်အကဲဖြတ်ရန် • အခါအားလျော်စွာဆေး စစ်ရန် • လူထုအကြံပြုချက်များ ရယူခြင်း • အများပြည်သူသို့ သတင်း အချက်အလက်များ ထုတ် ဖော်ကြေညာခြင်း • မတော်တဆမှုများနှင့် အသေးစားမတော်တဆမှုများအား သတင်းပို့ရန် အရေးပေါ် တုံ့ပြန်ရေးသင်တန်း	င်း ကြိမ်ရေ - ရုံဖန်ရုံခါ ကြိမ်ရေ - လစဉ် ကြိမ်ရေ - ရုံဖန်ရုံခါ • ကာလ – တစ်ရက် ကြိမ်ရေ - နှစ်စဉ် ကာလ – (၁) သို့ (၂) ရက် ကြိမ်ရေ - နှစ်စဉ် ကာလ – (၁) သို့ (၂) ရက် ကြိမ်ရေ - အခါအားလျော်စွာ- ကာလ - ပြင်ဆင်ထားသော ပတ်ဝန်းကျင်ဆိုင်ရာအစီအမံပေါ် မူတည်၍	ထိတွေ့ဧရိယာများ	

Factors	Index/ Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location	Responsible Person
		/ ကျန်းမာရေးနှင့် ဘေးကင်း လုံခြုံရေးသင်တန်း များနှင့် မတော်တဆမှုများ အား အစီရင်ခံတင်ပြခြင်း • HSE ပူးပေါင်းတာဝန်ရှိသူ မှ ကျန်းမာရေးနှင့် ဘေး ကင်းလုံခြုံရေးနှင့် ပတ် သက်၍ ပုံမှန်သင်တန်းပေး ခြင်း • လက်ရှိ ပတ်ဝန်းကျင်ဆိုင် ရာ စီမံချက်အား ဆန်းစစ် ရန်			

၁.၈ လူထုတွေ့ဆုံဆွေးနွေးခြင်းနှင့် အများပြည်သူအား ထုတ်ဖော်ပြောကြားခြင်း

စစ်တမ်းကောက်ယူရခြင်း၏ ရည်ရွယ်ချက်မှာ သတင်းအချက်အလက်ဖြန့်ဖြူးခြင်းအားဖြင့် စီမံကိန်းအကြောင်း လူထုကပိုမိုနားလည်သိရှိစေရန်နှင့် စီမံကိန်းဆောင်ရွက်ချက်များကြောင့် တိုက်ရိုက်ဖြစ်စေ၊ သွယ်ဝိုက်၍ဖြစ်စေ ဖြစ်နိုင်ချေရှိသည့် သက်ရောက်မှုများကို စီမံကိန်းဆောင်ရွက်သူများနှင့် လူထုအကြား ဖလှယ်ရန် ဖြစ်သည်။

ဤအနှစ်ချုပ်သည် လူမှုပတ်ဝန်းကျင် သက်ရောက်မှု အကဲဖြတ်ခြင်းကို ထည့်သွင်းဆွေးနွေးမည်ဖြစ်ပြီး အခြေခံကျသည့် ကဏ္ဍ လေးရပ်ပါဝင်မည်ဖြစ်သည်။

- လူမှုပတ်ဝန်းကျင် သက်ရောက်မှု အကဲဖြတ်ခြင်းပညာသြ သွင်ပြင်လက္ခဏာကို ဖော်ဆောင်ခြင်း။
- လူထုတွေ့ဆုံဆွေးနွေးခြင်းများ။
- လူမှုအဖွဲ့အစည်း အသီးသီးရှိ အဓိကသက်ဆိုင်သူများ (ရပ်ကွက်အုပ်ချုပ်ရေးမှူးနှင့် ဆရာမ၊ အစရှိသည်ဖြင့်) နှင့် အစိုးရ အရာရှိများနှင့် မေးမြန်းဆွေးနွေးခြင်း။
- အိမ်ထောင်စု ၁၀၀ ၏ လူမှုစီးပွားနှင့် သဘောထားအမြင် စစ်တမ်းကောက်ယူခြင်း။

စစ်တမ်းကောက်ယူရရှိသည့် ရလဒ်များကို **SPSS** ဗားရှင်း 21 ကို အသုံးပြု၍ ခွဲခြမ်းစိတ်ဖြာထားပါသည်။

လူမှုစီးပွားနှင့် သဘောထားအမြင် စစ်တမ်းကောက်ယူခြင်းအရ စက်မှုဇုန် ပတ်ဝန်းကျင်မှာ နေထိုင်သော လူမှုအဖွဲ့အစည်းများ၏ ယေဘုယျအဆောက်အဦများသည် တိုးတက်မှု မရှိသေးသည်ကို တွေ့ရပါသည်။ ပညာရေးကဏ္ဍတွင် ဘုန်းတော်ကြီးစာကျောင်းတစ်ကျောင်းမှလွဲ၍ ထိုရပ်ကွက်တွင် စာသင်ကျောင်းမရှိပါ။ ကျန်းမာရေးကဏ္ဍတွင် ထိုရပ်ကွက်အနီးတွင် ပုဂ္ဂလိက ဆေးခန်းတစ်ခု နေ့စဉ် ဖွင့်လှစ်လျက်ရှိသည်ကို တွေ့ရပါသည်။ စစ်တမ်းကောက်ယူမှု အချက်အလက်များကို အခြေခံ၍ လေ့လာကြည့်ခြင်းအားဖြင့် ထိုဒေသတွင်
ငှက်ဖျား၊ တီဘီ၊ ဝမ်းပျက်ဝမ်းလျှောနှင့် ဝမ်းကိုက်ရောဂါ အစရှိသည့် ကြီးကြီးမားမား ကျန်းမာရေးပြဿနာများ မဖြစ်ပွားသည်ကို တွေ့ရှိရပါသည်။

အခြေခံအဆောက်အဦဆိုင်ရာ အချက်အလက်များတွင် အများစုဖြစ်သော (၅၇) ရာခိုင်နှုန်းသည် တစ်ထပ်သစ်သား အဆောက်အဦများတွင် နေထိုင်ကြပါသည်။ စစ်တမ်းကောက်ယူမှုအရ ရပ်ကွက်အတွင်း လမ်းအခြေအနေသည် ကွန်ကရစ် မခင်းထားသောလမ်းများဖြစ်သော်လည်း၊ လမ်းမကြီးသည် ကွန်ကရစ်ခင်းထားပါသည်။ သယ်ယူပို့ဆောင်ရေးကဏ္ဍတွင် ၎င်းတို့သည် အများပြည်သူသုံး သွားလာရေးလမ်းကြောင်းကိုသာ အသုံးများကြပါသည်။ ထို့ကြောင့် ခြုံငုံသုံးသပ်ကြည့်ပါက အခြေခံအဆောက်အဦကဏ္ဍသည် ကောင်းမွန်စွာ ဖွံ့ဖြိုးတိုးတက်မှု မရှိဘဲ ပတ်ဝန်းကျင်သည် သန့်ရှင်းသပ်ရပ်မှုနည်းသည်ကို တွေ့ရှိရပါသည်။

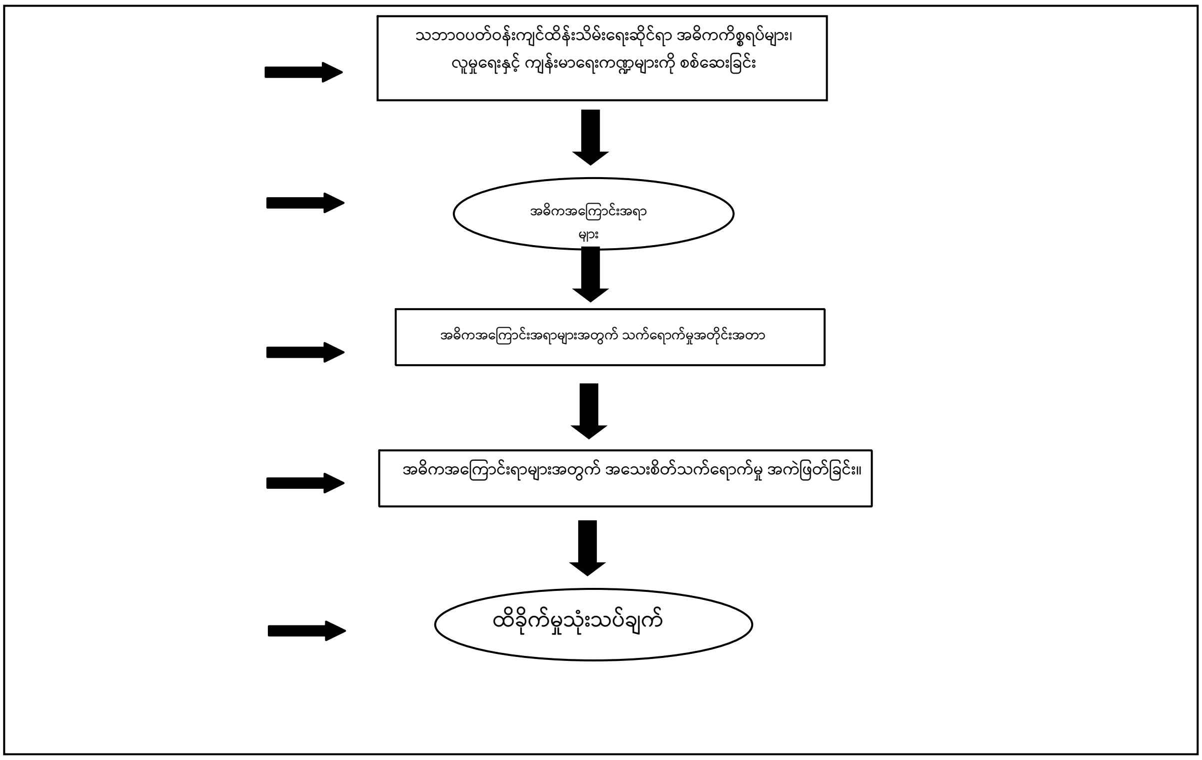
ဖြေဆိုသူအများစု၏ (၄၄) ရာခိုင်နှုန်းသည် အခြေခံ လခစား အလုပ်သမားများနှင့် မိသားစုဝင် အလုပ်သမားများ ဖြစ်ကြပါသည်။ ဝင်ငွေအဆင့်တွင် ယေဘုယျအားဖြင့် စက်ရုံအနီးဝန်းကျင်ရှိ နေထိုင်သူ အများစုသည် ဝင်ငွေနည်းပါးသူများ ဖြစ်ကြပါသည်။ အများစု (၅၁) ရာခိုင်နှုန်းသည် တစ်နှစ်လျှင် (၁၀) သိန်းမှ (၂၀) သိန်းကြား ဝင်ငွေရှိပါသည်။

Lluvia (ပရီမီယာ စားသောက်ကုန်ထုတ်လုပ်မှု စက်ရုံ) အနီးတဝိုက်ရှိ လူထုအကြား အသိပညာရှိမှုနှင့် ပတ်သက်၍ အိမ်ထောင်စု စုစုပေါင်း၏ ၁၀၀% နီးပါးသည် လှိုင်သာယာ စက်မှုဇုန် စီမံကိန်းအကြောင်း သိရှိကြသည်။ ယင်းတို့အနက် အိမ်ထောင်စု စုစုပေါင်း၏ ၃၁%သာလျှင် တို့သည် **Lluvia** (ပရီမီယာ စားသောက်ကုန်ထုတ်လုပ်မှု စက်ရုံ) သည် လှိုင်သာယာ စက်မှုဇုန်တွင်ပါဝင်ခြင်းကို ကောင်းစွာ သိရှိကြပါသည်။

Lluvia (ပရီမီယာ စားသောက်ကုန်ထုတ်လုပ်မှု စက်ရုံ)၏ ဖွံ့ဖြိုးရေးလုပ်ငန်းစဉ်များနှင့်ပက်သက်၍ အိမ်ထောင်စု စုစုပေါင်း၏

၅၉%သည် ဖွံ့ဖြိုးရေးလုပ်ငန်းစဉ်များအား သဘောတူ ထောက်ခံကြပါသည်။ ကျန်ရှိ သည့် ၄၁% သည် စက်ရုံ၏ဖွံ့ဖြိုးတိုးတက်ရေးလုပ်ငန်းစဉ်များနှင့် ပတ်သက်၍ စိတ်ဝင်စားမှု မရှိသည်ကို တွေ့ရှိရပါသည်။

တွေ့ရှိချက်များအပေါ်အခြေခံ၍ လူထု၏အမြင်သဘောထားကို လေ့လာရာတွင် စက်ရုံ၏ဆောင် ရွက်ချက် များကြောင့် အနီးပတ်ဝန်းကျင် လူမှုစီးပွားရေးကို ကောင်းကျိုးရော ဆိုးကျိုးပါ သိသာထင်ရှားသည့် သက် ရောက် မှုမရှိကြောင်း တွေ့ရှိရသည်။ အသေးစိတ်ဆွေးနွေးချက်များနှင့် ရလဒ်များကို အစီရင်ခံစာ၏ စာကိုယ်တွင် ဖော်ပြပါမည်။



ပုံ 1.1: **EIA** ၏ အဓိက အဆင့်တစ်ခုစီတွင် လူထု ပါဝင်ပတ်သက်မှု၏ အရေးပါမှုကို ဖော်ပြခြင်း

၁.၈.၁ လူထုတွေ့ဆုံပွဲ ကျင်းပပြုလုပ်ခြင်း

Lluvia Limited (Premier Factory) နှင့် **EQM** တို့သည် **ECD** အကြံပြုချက်အတိုင်း စီမံကိန်း၏ **AOI** အတွင်း ရပ်ကွက် ၅ ခုမှ ပြည်သူများ၊ ဗုန်ကော်မတီ ကိုယ်စားလှယ်နှင့် အရှေ့ဒဂုံမြို့နယ်ရှိ အစိုးရနှင့် ဒေသဆိုင်ရာ တာဝန်ရှိ သူများနှင့် လူထုညှိနှိုင်းအစည်းအဝေးများကို ပြုလုပ်ခဲ့ပါသည်။

လူထုတွေ့ဆုံပွဲအခမ်းအနားကို ၂၀၂၃ ခုနှစ်၊ ဒီဇင်ဘာလ ၂၇ ရက်နေ့တွင် ကျင်းပခဲ့ပါသည်။

Lluvia Limited (Premier Factory) နှင့် **EQM** တို့မှ ဆောင်ရွက်လျှက်ရှိသည့် စီမံကိန်းနှင့်ပတ်သက်သော လုပ်ဆောင်မှုများကို အဓိကပါဝင်ပတ်သက်သူများ သိရှိနားလည်ကြောင်း သေချာစေရန်နှင့် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းနှင့် ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှုအစီအစဉ်၏ တစ်စိတ်တစ်ပိုင်းအဖြစ် ထည့်သွင်းစဉ်းစားမည်ဖြစ်ပါသည်။

ဆွေးနွေးပွဲသို့ တက်ရောက်သော သက်ဆိုင်ရာ ကာယကံရှင်များသည် အောက်ဖော်ပြပါဇယားတွင် အသေးစိတ်ဖော်ပြထားသည့်အတိုင်း လူထုတွေ့ဆုံဆွေးနွေးညှိနှိုင်းအစည်းအဝေးများအတွင်း အောက်ပါစိုးရိမ်မှုများနှင့် မေးခွန်းများကို

မေးမြန်းခဲ့ကြပါသည်။ အစည်းအဝေးမှတ်တမ်းများကို နောက်ဆက်တွဲ **VI** တွင် ထည့်သွင်းထားသည်။

လူထုတွေ့ဆုံဆွေးနွေးပွဲ၏ လူထုမှ မေးမြန်းချက်အပေါ် ပြန်လည်ဖြေကြားခြင်းနှင့် လုပ်ငန်းဆောင် ရွက်ချက်များ

အဓိက မေးခွန်း/စိုးရိမ်မှုများ	ပြန်လည်ဖြေကြားခြင်း	လျော့ပါးသက်သာစေရေး ဆောင်ရွက်ချက်များ
Premier factory ၏ **IEE** အစီရင်ခံစာအား **ECD** ၏ သဘော ထားမှတ်ချက်များနှင့် အညီ ပြင်ဆင် ၍ တင်ပြထားပြီး ဖြစ်ပါသလား။	**ECD** နှင့် (၂၇-၈-၂၀၂၃) ရက်နေ့တွင် သဘောတူလက်မှတ်ရေးထိုးချက်အရ **Premier factory** ၏ **IEE** အစီရင်ခံစာအား ၂၀၂၄ ခုနှစ်၊ ဖေဖော်ဝါရီလကုန်တွင် ပြန်လည်တင်ပြသွားမည်ဖြစ်ပါသည်။	
Premier factory အနေဖြင့် စောင့်ကြပ်ကြည့်ရှုခြင်း အစီရင်ခံစာအား ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ဦးစီးဌာနသို့ တစ်နှစ်(၂)ကြိမ် တင်ပြရမည်ကို သိပါသလား။	**EQM Co.,ltd** အနေဖြင့် စောင့်ကြပ်ကြည့်ရှုခြင်း အစီရင်ခံစာ **(monitoring report)** အား ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ဦးစီးဌာနသို့ တစ်နှစ်(၂)ကြိမ် ပေးပို့တင်ပြသွားပါမည်။	
EQM Co.,ltd ၏ တင်ပြချက်အရ စက်ရုံ၏ လေတိုင်းတာမှု ရလာဒ် များအား (၂၄) နာရီ စဉ်ဆက်မပြတ် တိုင်းတာမှုနှင့် ပတ်သက်၍ စက်ရုံမှ အဆိုပါတိုင်းတာမှုအတွက် ကုန်ကျ စရိတ်အား တတ်နိုင်ပါသလား။	**EQM Co.,ltd** အနေဖြင့် (၂၄) နာရီ လေတိုင်းတာခြင်းအား (၁)ရက်တည်းသာ တိုင်းတာဆောင်ရွက်သွားမည်ဖြစ်ပါသည်။	
EQM Co.,ltd အနေဖြင့် **IEE report** တွင် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးအစီ အစဉ်များအား ခန့်မှန်းကုန်ကျစရိတ် များကို ထည့်သွင်းဖော်ပြထားပါ သလား။	**EQM Co.,ltd** အနေဖြင့် ပတ်ဝန်းကျင် ထိန်းသိမ်းရေးအစီအစဉ်များကို လေ/ အနံ့၊ ဆူညံသံ၊ စွန့်ပစ်အစိုင်အခဲ၊ စွန့်ပစ်ရေ၊ လုပ်ငန်းခွင်ကျန်းမာရေး ဆိုင်ရာ အစီအမံများနှင့် ဒေသခံပြည်သူ ကျန်းမာရေးဆိုင်ရာ အစီအမံများအတွက် ခန့်မှန်းကုန်ကျစရိတ်များအား **IEE report** တွင် ထည့်သွင်းဖော်ပြသွားမည် ဖြစ်ပါသည်။	

အဓိက မေးခွန်း/စိုးရိမ်မှုများ	ပြန်လည်ဖြေကြားခြင်း	လျော့ပါးသက်သာစေရေး ဆောင်ရွက်ချက်များ
စက်ရုံ၏ စွန့်ပစ်ရေထွက်ရှိသည့် နေရာသည် စက်ရုံနှင့် ကပ်လျက်ရှိသည့် ပန်းလှိုင်မြစ်အတွင်းသို့ မည်သည့် စွန့်ပစ်ရေစီမံခန့်ခွဲသည့် နည်းစနစ်ကို အသုံးပြု၍ စွန့်ပစ်ပါသနည်း။		• စက်ရုံထွက်ပေါက်ရှိ ရေနုတ်မြောင်း တွင် **Sand Filtration System** ကိုအသုံးပြုခြင်း။ • မလိုအပ်သောရေသုံးစွဲမှု နည်းပါးအောင် ပြုလုပ်ခြင်း။ • စက်ရုံပတ်လည်တွင် အပင်များကာရံ စိုက်ပျိုးခြင်း။
စက်ရုံအနောက်ဘက်တွင် ကျူးကျော်များ ဝင်ရောက်ခြင်းမှ ကာကွယ် ရန်အတွက် ရေအရင်းအမြစ်နှင့် မြစ်ချောင်းများ ဖွံ့ဖြိုးတိုးတက်ရေးဦးစီး ဌာနတွင် စက်ရုံရေနုတ်မြောင်း စွန့်ပစ်အပေါက် ထားရှိရန် မြေနေရာ အား လျှောက်ထားရန် အကြံပြုလိုပါ သည်။	ကျူးကျော်များ ဝင်ရောက်ခြင်းမှ ကာကွယ် တားဆီးရန်အတွက် စက်ရုံမှူးအား တင်ပြ အစီရင်ခံသွားမည်ဖြစ်ပါသည်။	• ကျူးကျော်ဝင်ရောက်လာပါက စက်ရုံမှူးထံ အချိန်မှီ သတင်းပို့ရန်။ • စက်ရုံဝန်းအတွင်း ကျူးကျော်မှုများ မရှိစေရန် ပုံမှန်စစ်ဆေးခြင်း။
စက်ရုံတွင် တပ်ဆင် အသုံးပြုထားသည့် စွန့်ပစ်ရေစီမံခန့်ခွဲမှုအား သိရှိလိုပါသည်၊ စက်ရုံတွင် တပ်ဆင် အသုံးပြုရန် အဆိုပြုထားသည့် သဲဖြင့်အညစ်အကြေးစွန့်ထုတ်သည့်နည်းလမ်း၏ သက်တမ်းအား သိရှိလိုပါသည်။	စက်ရုံသည် လက်ရှိ အသုံးပြုသည့် အဆီအနှစ်များ ဖမ်းယူသိုလှောင်သည့် ကန်အား တပ်ဆင်အသုံးပြုလျက်ရှိပြီး သဲဖြင့်အညစ်အကြေးစွန့်ထုတ်သည့် နည်းလမ်းသည် (၃)လအထိ အများဆုံးအသုံးပြုရန် သင့်တော်ပါသည်။	
စက်ရုံသည် ရေဆိုးထုတ်လုပ်သည့် စက်ရုံအမျိုးအစား မဟုတ်သည့် အတွက် လူသုံးစွန့်ပစ်ရေဆိုးသာ လျှင် ထွက်ရှိသဖြင့် လက်ရှိတပ်ဆင် အသုံးပြုလျက်ရှိသော စွန့်ပစ်ရေ စီမံခန့်ခွဲမှုသည် လုံလောက်ပါသည်။		

Chapter 1

Executive Summary

1. Executives summary

1.1 Introduction

The Lluvia Limited (Premier Factory) is a food processing industry which produces beverages like coffee, tea and quaker oats. It has acquired land at No. 108 (A) and 108 (B), Quarter (3), Hlaing Thar Yar Industrial Zone, Hlaing Thar Yar Township, Yangon, Myanmar. The plot is about 9.687 Acres. The Lluvia Ltd. (Premier Factory) is a joint venture between the Lluvia Limited 85% and MC Food Holdings Asia Pte Limited (Japan) 15%. The Lluvia is the leading industrial group with its operations extended in Myanmar.

The contact details of the project proponent are as follows:

- Company name – Lluvia Limited (Joint venture with Lluvia and MC Food Holdings Asia Pte Limited (Japan)
- Investor name - U Ko Ko Gyi (a) U Soe Naing
- Type of Business – food processing and distribution (Beverages: Premier Coffee, Happy, All Time, Tea Master)
- Investment location -No. 108(A0 and 108 (B), Quarter(3), Hlaing Thar Yar Industrial Zone, Hlaing Thar Yar Township, Yangon, Myanmar.
- Telephone -01 2585107, 01 2585108, 01 2585109
- Fax- 2585107, 2585108

This study consists in assessing the Initial Environmental Examination (IEE) for the project operation along with the Environmental Management Plan (EMP) of the food processing factory located in the Hlaing Thar Yar Industrial Zone.

This Report has been produced by Environmental Quality Management Co., Ltd which has been contracted by the Lluvia Ltd to carry out the Initial Environmental Examination (IEE) along with Environmental Management and Monitoring Plan (EMP).

Initial site visit to provide scoping stage and the Premier Factory project started the IEE and EMP report preparation in October 2015.

An environmental baseline survey was conducted within 2-5 km of the project area although the factory is located within the industrial zone in October 2015. Impact assessment including air, noise and water monitoring were conducted within nearby area and inside the factory. According to the baseline monitoring, public perception and public consultation meeting, it was presumed that there was neither positive nor negative impact on the environment and community.

The main objectives of this project are as follows;
1) To reveal the existing baseline environment and project activities.
2) To assess the impacts of the project on neighboring environment including air atmosphere, water bodies, soil, community, infrastructure, flora and fauna .
3) To propose the mitigation measures where adverse effects may have occurred as well as where beneficial effects from the project are detected;

5) To
set up an environmental management plan that will govern all activities of the factory for the sustainability.
The consultant team of *Environmental Quality Management Co., Ltd* had carried out IEE with EMP for the factory.
The Consultancy firm has been organized with environmental health consultants and technicians along with strong background and knowledge in the area of Environmental Assessment, and a track record of over 5 years for conducting studies of Initial Environmental (IEE) for development projects across the country. About more than 30 environmental projects were conducted (including ESIA/IEE/EP, environmental baseline monitoring projects and national and departmental projects) were carried out with better precise assessment.

Previous projects implemented by EQM for EIA/IEE/EMp coverage fall under the following categories:
1) Oil and Gas
2) Confectionery Factory
3) Building Powder Production Factory
3) Hotel project
4) Flour Mill
5) Port and Terminal
6) Detergent Factory
7) Rice Mill Factory
8) And Environmental Baseline monitoring projects

In terms of the ***government registration/approvals*** for the project is as shown below:

1	Environmental Company Registration Number	**117491021, 2023-2024**
2	Date of Recommendation from Environmental Conservation Department, Ministry of Environmental Conservation and Forestry to conduct the IE E and EMP.	26th, February, 2015

The main aim of this work is *to reduce adverse impacts* of the factory and its activities on the health and environment together with the promotion of *factory's sustainable development.*
During the project analysis for IEE and EMP implementation of The Lluvia Ltd, the following study are conducted in order to meet the objectives.
- *Literature review* on the documents related to policies, laws and regulations of both national and international level
- *Interviews* with people concerned with the factory as well as the respective government bodies (Socio-demographic of the community, Perception of community on the project, Socio-economic study in and around the project area including Effects on the human use, Effects on the quality of life, Effects on cultural heritage)
- Both *primary and secondary data* collection
- *Environmental baseline* monitoring (air, water, waste, soil and flora and fauna), Environmental Management Plan (EMP) along with mitigation measures and monitoring plan for the factory.
- *Stakeholders consultation and disclosure* through Social Impact Assessment (SIA)

s
urvey process including focus group meetings, Key Informant Interviews and door to door household surveys)

- *Reporting* back

1.2 Policy, legal and institutional framework

The IEE had reviewed the *respective laws* as such accordingly. These are the relevant guidelines, standards and regulations:

- The article 37 (a) and 45 of the Constitution of the Republic of the Union of Myanmar (2008)
- International policies, principles and standards such as IFC standards
- Relevant local Occupational Health and Safety related laws and regulations
- International conventions, treaties and agreements ratified by Environmental Conservation Department (ECD), Ministry of Natural Resource and Environmental Conservation (MONREC)
- Foreign Investment Law (2013)
- Environmental Conservation Law (2012)
- Environmental Conservation Rules (June 2014)
- Myanmar Investment Law (2016)
- Myanmar Investment Rules (2017)
- Environmental Conservation Rules (June 2014)
- Environmental Impact Assessment Procedure (2015)
- National Environmental Quality (Emission) Guideline (2015)
- National Environmental Policy (2019)
- The Ethnic Rights Protection Law, 2015
- Myanmar Insurance Law, 1993
- Private Industrial Enterprise Law, 1990
- The Myanmar Fire Brigade Law, 2015 Section 25.
- The Petroleum and Petroleum Products Law, 2017
- Petroleum Rules (1937)
- The Motor Vehicles and Safety Management Law, 2020
- The Motor Vehicles and Safety Management Rules (2022)
- The Law on Standardization, 2014
- The Protection and Preservation of Cultural Heritage Regions Law, 2019
- The Protection and Preservation of Antique Objects Law, 2015
- The Protection and Preservation of Ancient Monuments Law, 2015
- Underground Water Act, 1930
- Myanmar Engineering Council Law, 2013
- Export and Import Law, 2012
- Labor Organization Law, 2011
- Settlement of Labor Dispute Law, 2012
- Employment and Skill Development Law, 2013
- Minimums Wages Law, 2013
- Payment of Wages Law, 2016
- Social Security Law, 2012
- The Workmen Compensation Act, 1923 (Amendment 2005)
- The Factories Act, 1951 (Amendment 2016)
- Leaves and Holidays Act, 1951 (Amendment 2014)
- Public Health Law, 1972

- T

he Prevention and Control of Communicable Disease Law, 1995
- The Control of Smoking and Consumption of Tobacco Product Law, 2006
- Conservation of Water Resources and Rivers Law, 2006
- Conservation of Water resouces and Rivers Rule, 2013
- The Pesticide Law (2006)
- Industrial use Explosive Substance Act, 2018.
- Electricity Law (2014)
- Occupational Safety and Health Law, 2019
- The Prevention of Danger of Hazardous Chemical and related Substances Law, 2013

- Private Industrial Act, 1990
- Labor Organization Law, 2011
- Settlement of Labor Dispute Law, 2012
- Social Security Law, 2012
- Public Health Law, 1972
- National Food Law, 1997 (Amendment 2013)
- Explosive substances Act (1908)
- Consumer Protection Law (2014)
- Industrial Zone Law (2020)
- The Ethnic Rights Protection Rules (2019)

1.3 Project description and alternatives selection

The plot for the factory is located at No. 108, Seik Kan Thar Road, Zone (3), Hlaing Thar Yar Industrial Zone, Yangon Region. Area is 9.7 Acre.

The capacity of Lluvia factory is in excess of 26,549 tons per annum. Premier Factory gets the raw materials from foreign countries (Vietnam and Malaysia) and local sources (Ywangan and Taunggyi). They use 80 metric tons of raw material for each product every day, and they have enough raw materials to meet their needs.

1.3.1 Surrounding area of the proposed project

Industrialization and globalization significantly affected the environment, like habitats, wildlife, weather, and population growth, but not food or income sources for those relying on these areas.

There are two monasteries are located in the surrounding compound, which are Yay Oakkan’s Monastery and Taung Ka Lay’s Monastery. Yay Oakkan’s Monastery is located at the North Latitude 16 Degree 50 Minutes and 90.7 second and East Longitude 0.76 Degree 30 Minute. in the industrial zone. Monasteries are the only place which is needed to maintain the cultural heritage for this region. There is no cemetery in that area. Besides, it is also noted that there is no local archeological sites. Regarding the important cultural activities, it is noted that Sown Thein Pwal is the biggest and important festival at this areas.

In terms of the nearby factories and locations, New World mart, Newway factory and Yae Oakkan ward are located in the north of the proposed factory. Mirae C&T factory, Standard General Trading factory, Pyan Hlwar Manufacturing factory and Lobster warehouse are located in the west of the proposed factory. Ayeyarwaddy Food Industry, Perfect Bakery Accessories Shop and Pun Hlaing river are located in the south of the proposed factory. Monastery, Pioneer Special Polybag Industry and Yae Oakkan ward ware are located in the east of the proposed factory. The proposed factory is located near the Pun Hlaing River about 0.14 km.

1.3.2 Current use of the location

The main part of the proposed beverage industry is being occupied by the office buildings, production building, canteen, storage buildings, other type of buildings (roasting area, Reverse Osmosis (RO) area, generators, MME, etc.) and open spaces. Inside the factory compound, there are some plants such as mango, pterocarpus-macrocarpus, etc for the workers to consume in the canteen.

Table 1.1: Plant facilities

No.	Factory Facility	Area (m)	Percentage (%)
1	Admin office	975.1	2.48
2	Operation process building	4443.4	11.32
3	Canteen	452.9	1.15
4	Storage buildings	15026	38.28
5	Other type of buildings	15159.4	38.62
6	Open space	3197.7	8.15
	Total	**39,254.5**	**100**

The project of the establishment of a proposed factory is at the operation phase.

1.3.3 General production process of the proposed factory

This proposed factory receives the raw coffee powder and the quality control team inspects the received raw materials. The coffee powder approved by the inspection team is mixed with the required ingredients in proper proportions using mixers. The coffee powder mixed with the required ratio is packed using both manpower and machine. Packed coffee mix packets are inspected by a quality control team. The coffee milk packets approved by the quality control team are delivered to markets throughout Myanmar. Packed coffee mix packages are inspected by a quality control team. The coffee milk packages approved by the quality control team are delivered to markets throughout Myanmar.

1.3.3.1 Production process

The production process of the proposed factory is based on the product type. The main products are instant coffee mix (3in1), instant coffee mix (2 plus 1), instant milk powder and instant tea mix.

(1) Instant coffee mix (3in1) production process

The operation for the proposed Premier Factory's Instant coffee mix (3in1) coffee mix manufacturing process consists of two (2) major operations.

• Using large mixer machines, add Non-Dairy Creamer, Instant Coffee Powder and Refined Sugar according to the required proportion and mix for about 20 minutes.

• packaging and final product manufacturing.

(2) instant coffee mix (2 plus1) production process

The operation for the proposed Premier Factory's Instant coffee mix (2 plus1) coffee mix manufacturing process consists of nine (9) major operations.

• Receiving raw materials
• Quality identification of raw materials
• Separation of (black coffee beans, bad coffee beans, stones and foreign substances).
• Roasting for normal coffee color and espresso color
• One more separation of coffee beans (black coffee beans, bad coffee beans, stones and foreign substances).

- G
rinding to get Fine & Coarse & 2 Plus 1 Powder
- Sifting to obtain Fine Powder
- Mixing (Fine Powder, NDC & Sugar) using big mixers
- Packaging and final product manufacturing.

(3) Instant milk powder and instant tea mix production process

The operation of the proposed Premier factory for the instant milk powder and instant tea mix manufacturing process consists of two (2) major operations.

- Using large mixers, mix Non-Dairy Creamer, Tea Powder and Refined Sugar according to the required ratio.
- Packaging and final product manufacturing.

The list of equipment used throughout the operation process are described below,

- Coffee Grinding Machine
- Mixer Machine
- 20KG Buhler Roaster
- Sanko Packing Machine (sachets)
- Sifter Machine

1.3.4 Operation phase

(a) Power requirement

The total power required for the proposed unit is ***239,358 kWh/month***. The power requirement will be from the ***government electricity grid***. However, 3 power generators sets having capacity
of ***500 KVA*** each are used for the emergency power requirements if the electricity cut off and there are more demands from customers.

(b) Water requirement

The nature of the production operation of the proposed industry is dry process. Majority of water usage is for domestic use particularly for staff and workers. For the proposed plant, water is only required for cleaning the equipments and production machines and this is only twice a month. The water usage of production processes and drinking water for whole industry are treated with ***Reverse Osmosis (RO) treatment system***. Total water usage for whole industry is ***5,000 gallons/ day***.

(a) Workforce requirement and staff categories

There are mainly ***two categories of staff***: the group of permanent staff who is paid monthly and the group of part time staff who is on his or her daily wages. The first group of permanent staff includes factory manager, admin, security, logistics, finance, warehouse staff, QA & QC, Maintenance staff and production staffs etc. The second group (part time) staff is production staff for daily wages, etc. The types and amount of staff is presented as follows:

Table 1.2: The capacity of staff in Lluvia factory

No.	Type of staff	Number of staff
1	Factory Manager	1
2	Admin	36
3	Security	24
4	Logistics	3
5	Finance	8
6	Warehouse	27

7	QA & QC	52
8	Maintenance	23
9	Production Permanent	496
10	Production Daily Wages.	223
Total		**893**

(b) Safety measures

As ***safety measures for staff / workers*** during operation, employees will be equipped with:

- Ear plugs
- Gloves
- Boots
- Dust Masks
- Helmets
- Protective uniform

1.4 Alternatives selection

The ***no development option*** for the Lluvia beverage manufacturing and distribution factory would prevent all potential environmental and social impacts due to manufacturing and distribution.

However, if there is a ***good cooperation between the project proponent and the community***, there will be ***specific environmental and social benefits*** such as increased employment opportunities, infrastructure upgrades, and other community benefits would occur as a result of the factory operation.

It is widely recognized that ***being the food industry***, Lluvia ltd (Beverage manufacturing factory) has ***less negative impact*** on the environment compared to other factories which are significantly emitting and releasing the pollutants into the environment.

Moreover, if the project proponent recognizes and ***complies with the mitigation measures and management plan*** described in the IEE accordingly, the overall impacts become rated as ***low.***

1.5 Description of the surrounding environment, impact and risk assessment along with mitigation measures

1.5.1 Ambient air quality

The existing baseline ambient air quality along with the local climate monitoring has been conducted since October, 2015 (Rainy season) in Lluvia factory and surrounding areas.

Additionally, applicable standards have been presented and used for comparison.

The monitoring includes 24-hour average of ***Particulate Matter (PM_{10}), Particulate Matter ($PM_{2.5}$), Carbon Monoxide (CO), Volatile Organic Compounds (VOC), Sulphur Dioxide (SO_2) and Nitrogen Dioxide (NO_2), Ammonia (NH_3), Methane (CH_4), Ozone (O_3), Atomic Radiation along with meteorology*** condition at the monitoring site.

Among these parameters, the major pollutants are particulate matters ***(PM_{10} and $PM_{2.5}$)*** which are mostly emitting from the production process of factory. Generally, the total emissions of PM_{10} and $PM_{2.5}$ for averaged 24-hours were 66µg/m^3 and 22µg/m^3 respectively. The emission of ***PM_{10}* exceeded *NEQG guidelines*** (50µg/m^3 for PM_{10}) and the emission of ***$PM_{2.5}$*** was ***below*** the ***NEQG guidelines*** (25µg/m^3 for $PM_{2.5}$).

Another high emission pollutant was ***SO_2 (174ppb)*** which is assumed as the emission from the industry process and is ***higher than the NEQG guidelines*** (20µg/m^3 for SO_2).

However, it was found out that the ***impacts of all air pollutants emissions*** were rated as ***medium according to the impact assessment***. The detail information of air quality findings

are
presented in the following section.
Moreover, in order to protect the exposure of air pollutants mainly in particulates from the production process, the workers who are working at the production process area must wear *N*95 ***Respirators/masks*** *as a* ***good working practice. Air monitoring plan shall be conducted vannually*** particularly if the new machineries and the changes are installed in the factory. Mitigation measures are detailed in the respective sections.

1.5.2 Indoor air

The indoor air monitoring has conducted in the Lluvia ***(Conference room), QC laboratory and production process*** as well. The indoor air parameters included ***biological (Bacteria and Fungus) air quality, particulate matters*** and ***gases*** which are the key elements of indoor air pollution. This air monitoring also included measurement of the ***physical indoor air (Room and Wall Temperature, Air movement/flow) and the Moisture (wall)*** since these parameters can influence on not only microbial growth in the office but also employees' health. The ***indoor air quality meets the OSHA*** guideline.

1.5.3 Carbon emission

Lluvia factory is ***very highly automated*** and all parts of the process are easily adapted to the computer control. Furthermore, the Lluvia factory is utilizing the ***government electricity*** for its all process. Thus the emission from ***CO_2 from electricity is 2,123.2 metric tons.***
From transportation sector is ***91.416 metric tons per year.*** Total CO_2 emission ***2,214.616 metric ton per year*** can be ***reduced due to the practice of waste recycling in the factory (1,731.2 metric tons)*** instead of land filled.
Thus, the ***total annual CO_2 emission*** of the Lluvia factory was ***483.416 metric tons***.
Being the main use of electricity, potential gas emissions source from ***generators*** which are only ***standby*** has been considered as ***negligible.***

1.5.4 Mitigation Measures for Air Emission

1.5.4.1 Mitigation for particulates emission

Major air emissions like particulate matters (PM_{10} and $PM_{2.5}$) of the proposed factory are being emitted from the factory process particularly in the production process area and aluminum film burning area. Mitigation of air pollutants in the production process is needed to be installed the extra control systems such as installation of the fabric filter or dust collector.
Moreover, aluminum film burning is not an appropriate unit operation to destroy the packaging aluminum films which are purposely destroyed. To mitigate the emission of burning area, small scale incinerator was installed.
A small-scale waste incinerator was previously used to burn the aluminum films, but they are now shredded and disposed of at the YCDC.
The warehouse has a Roof Air Ventilation System to keep the air fresh. In the production area, they use exhaust fans and a ventilation system. Exhaust fan has been installed in the roaster room, and air con has been installed in other production rooms. Machines in production areas where they release air emissions are equipped with dust suction.
The emission of particulate matters both PM10 and PM2.5, into the atmosphere will be mitigated to levels below the specified standards of 50 µg/m³ for PM10 and 25 µg/m³ for PM2.5, as prescribed by the National Environmental Quality Emissions Guidelines.

1.5.4.2 Mitigation measure for gas emission

The emission of some gas pollutants from proposed factory exceeded NEQG standards particularly SO_2. Major gas pollutant, SO_2 is industrial related gas emission by burning fuel.

Ther
efore, one of the simplest ways to reduce the amount of SO_2 released from the combustion process can be achieved by switching to a fuel that has lower sulphur content. The proposed factory uses Battery Forklifts to Reduce Traffic Emissions.
Furthermore, the existing height of the stacks currently used in the generators, roasting process should be increased accordingly.
The emission of gas pollutants, SO_2, into the atmosphere will be mitigated to level below the specified standards of 20 µg/m³, as prescribed by the National Environmental Quality Emissions Guidelines.

1.5.5 Noise

The noise level of Lluvia factory has been measured at the ***main various locations (production place, storage place, green bean sizing place, roasting place, aluminium film burning place, generator and open space area***). The ***noise level of whole factory*** was ***below the Environmental Quality Guideline*** (NEQG) (70dB for industrial). The average noise levels of ***day time (44.15dB)*** and ***night time (44.06dB)*** which ***meets the noise standard level 70dB*** by NEQG.
However, according to the ***impact assessment of noise on surrounding***, generally it is rated as ***low***. Moreover, to protect noise from production process of Lluvia factory, the workers and a number of staff need to wear ***ear plugs as a good working practice during production process***.
Noise monitoring plans shall be conducted ***biannually*** particularly if the new machineries and changes are installed in the factory. Mitigation measures are detailed in the respective sections.

1.5.6 Soil

As shown in Figure 5.20, the project area is consists of mostly with factory buildings and the industrial zone has been developed already for 20 years. The area is ***suburban flat area*** along with rare cultivated (about ***90% of land*** is ***concrete*** in the industrial zone). The ***physical appearance*** of the remaining soil is ***Coarse sandy soil w***hich is easy to cultivate, has plenty of serration for good root growth, and is easily wetted, but it also dries rapidly and easily looses plant nutrients, which are drained away rapidly with the water.

According to the field survey, the industrial zone itself and nearby surrounding have less practice of cultivation and farming likely due to the urban developments.

1.5.7 Flora and fauna

The analysis of biodiversity is focused on the project area. It was found out that there a r e ***no protected area, area of biodiversity importance*** and ***key biodiversity areas at national*** and ***local levels*** and ***sensitive areas*** in and around the industrial zone. including the Lluvia manufacturing and distribution factory.

The Hlaing Tharyar Industrial Zone has been established since about 1996 that is around 20 years after the new urban developments have been settled down around the project area. According to the ***traditional biodiversity related knowledge survey***, it was found out that there are no both negative and positive impacts ***on the nature, local animals, plants and pasture*** etc. because of the industrial developments.

It can be assumed that there is ***less impact on the biological environment*** by the industry and its activities. Thus, there is no specific biodiversity assessment required according to IFC

guid
eline.

1.5.8 Solid Waste

As the result of human activities and industrial process, both ***domestic and industrial solid waste*** has been analysed from the ***final waste stream. Waste audit*** has been conducted using the international standard test for the beverage manufacturing factory. Regarding the ***domestic waste***, and ***annual basis*** from the domestic usage generates ***13.5 tonnes*** of solid waste and the ***generation per capital per day is (0.04) kg***. The main categories of waste were food waste, and others categories of waste were plastic, paper, electronic device, sanitary napkins, and others. ***Food waste*** was the highest composition ***(86%),*** followed by ***packaging waste (11%).***

In terms of ***industrial solid waste***, only ***584 tonnes*** were as an ***annual*** basis. Mostly there are many different items of wastes which were ***plastic bags and plastic bottle, packing plastic, paper roll, corrugated boxes which were in the rage of 27% to 36%*** of the total industrial waste generation. The others were ***electronic devices and yard wastes*** generated from the manufacturing process.

Currently, ***waste segregation*** is ***less being practiced*** in lluvia manufacturing system. All wastes were in garbage bins and temporarily stored at the material recovery facility before they were sent to municipal for final disposal.

Looking at waste recycling, up to nearly 97% of total wastes were generated from the different sources. The recycling process is being carried out within the manufacturing factory. Considering the impact assessment of the solid waste, the *impact of solid waste* generated from the manufacturing is rated as ***low*** *since* it was ***under the WHO waste generation rate*** for developing countries. However, in order to approach *waste minimization or zero waste,* there will be ***two waste management plans*** and ***minimization methods*** were recommended. These are ***segregation between wet and dry household waste*** and of ***industrial wastes***.

1.5.9 Potable water and waste water

In the beverage manufacturing process, ***water is one of the sources needed in the manufacturing process system.*** In the factory, water is being used for the ***domestic use*** particularly in the canteen activities, toilets, drinking water and for ***the industrial use*** which is being utilized for washing of coffee processing machines and manufacturing process. The water source is mainly from the ***tube well***. For the whole factory, the amount of ***water usage per day*** is ***around 25*** m^3 which is currently for the three main activities: ***manufacturing process, office*** and ***canteen***.

In terms of the potable water sources, there are two tube wells in the factory. From those wells, two samples from each well, one sample after reverse osmosis (RO) treatment and the other one from tap water and the remaining one from the overhead tank were taken for the ***potable water analysis.*** Those (5) samples have been analyzed for ***18 parameters each*** including ***chemical, physical and biological parameters*** which are significantly important for the human health and surrounding environment.

It was found out that the only source of water that has been treated with RO ***meets*** **National Drinking Water Standardss**, however, the potable water from the others sources did not meet the standards. Therefore, the significance of ***potable water*** on the product and employees was rated as ***at different level like high, medium and low*** based on the results on the different parameters. Thus, the potable water of the factory should be used after the ***appropriate water purification system such as reverse osmosis*** etc particularly for drinking and manufacturing process.

In
the ***waste water***, total ***10 parameters including (chemical and physical***) were analyzed. Among the parameters analyzed (***pH, Total Suspended Solid, Ammonia Nitrogen, Nitrate Nitrogen, Oil and Grease, Phosphorus, BOD, COD and coliform***) ***and TSS exceeded the guidelines***. Thus, the ***impact*** of ***waste water on the environment*** was generally rated as ***at different level like high, medium and low*** based on the results on the different parameters.
Therefore, some of the possible methods were recommended as mitigation measures such as ***Disposal by Grey Water Treatment System (Sand and Gravel Filtration) Method***.

1.5.10 Boiler usage

The proposed factory does not use the boiler.

1.6 Cumulative impact assessment

This section assessed the cumulative impacts of air emissions, noise, waste water discharge and solid wastes resulting from the activities of the Lluvia beverage factory on the local environment. It is the process of assessing the incremental effects of various actions of the factory.

According to the onsite surveys and interviews with the community, most of the factories around the Lluvia factory are ***food related factory and the garment factories.***.

At the ***local level,*** cumulative impacts identified were of ***medium significance.*** It was assumed that there will be ***no significant cumulative impacts*** on the environment were found at the ***national and regional levels*** as most factories are Garment factories rather than the factories producing emissions and waste water discharge.

(i) Cumulative fugitive dusts and air pollutants

Short term generation of dust around the factory area and the particulates emission from the factory process would increase when the other ***nearby factories emissions and mobile vehicles*** run the nearest surrounding areas.

(ii) Noise

The existing baseline noise level of the factory would intensify due to noise generation of the existing mobile vehicles, generators operation and **the process of operation machinery by the nearest factories.**

(iii) Waste water

Discharge of wastewater with ***not allowable BOD*** by the factory into the common drainage ***could compound*** any impacts on the nearby lakes and rivers that occur from ***other effluents*** from the other industries.

(iv) Solid Waste

The impact of solid wastes from the Lluvia factory would likely to be moderately contributing the incremental effects of various activities of the other factories running in the industrial zone.

1.7 Environmental Management Plan (EMP)

1.7.1 EMP on air quality

This IEE includes the respective EMP to ensure if the Lluvia manufacturing and distribution systems are complying with the national and international environmental rules and

regul
ations. Major environmental management plan for air pollution is needed to carry out particularly in the factory's unit operation of ***production area, aluminum film burning area, coffee green bean sizing area and generator*** which emitted higher emission of particulate matters. Numerous workers are working around production area and coffee green bean sizing area. The working activities of these area are producing a lot of pollutants especially particulates. Thus, this factory is ***proposed to install central dust collection system of fabric filter baghouse*** to control dust and other lighter impurities from the operation process.

The emission of ***aluminum film burning*** area shall be controlled by installing ***small scale incinerator***. To mitigate the ***emission of generators***, the ***high quality fuel*** shall be used for the generator operation along with the ***appropriate stake height***.

Environmental management plan of Lluvia factory mainly focuses to avoid the emission of particulate matters form operations, all workers who nearly exposed to the emissions should wear ***suitable NOISH certifited N95 respirators/masks properly*** in every working hour as ***a good working practice***. To improve the working conditions of Lluvia factory, ***ventilation system*** should be installed in all unit operations.

Either the factory staff shall be organized as the ***responsible team for the air pollution control management or the respective environmental consultant shall be awarded to implement the action plans*** so that they can implement accordingly. Details are presented in the respective section. Furthermore, a***mbient and indoor air monitoring*** shall be scheduled bi***annually.***

1.7.2 EMP on noise quality

Noise monitoring was operated at ***the whole proposed factory*** for 24hr continuously to achieve the representative data. These ***monitoring results*** met with **N*EQG*** (environmental quality guideline) by ECD.

Generally, the environmental management plan for noise indicates to ***install sound barriers on the wall of operation units if the new equipments are changed and over the limit of NEQG***. Another mitigation plan for workers working near to the operation should ***use suitable ear plugs*** for the whole working hours to prevent the effects of noise pollution. Moreover, either ***responsible person or the awarded environmental consultant team should monitor biannually and when new equipments are installed in the factory*** at all the noise sources whether comply with the prescribed limits in the work areas.

1.7.3 EMP on solid waste management

The Environmental Management Plan (EMP) for solid waste identifies the principles, approach, procedures and methods that will be used to control and minimize the environmental and social impacts of the factory process.

In order to meet the target accomplishment, it is needed to do ***waste audit once a month*** for the ***physical characteristics***, however, for the ***chemical characteristics***, it is needed to analyze ***four times per year***. The EMP shall be set out with ***a controlled document*** with the ***standard operation procedure (SOP)*** and should be ***updated annually***, following a ***reportable incident or plan update.***

In terms of the responsibility, either ***responsible team formed by the factory or the awarded environmental consultant team*** shall conduct the following action plans.

Table 1.3: Management plans for solid waste

Generated Parameter	Waste Source	Management plans and actions to be taken	Unit	Applicable Parameter
Waste Generation rate	All sources of waste, such as process manufacturing System and Domestic Solid Waste	Once a week by using weighting machine	kg/person/day	ECD/WHO Guidelines of Waste generation rate in Developing country.
Waste Auditing		Physical Composition and	Physical Composition	ECD/WHO
		if possible it is needed to do chemical composition once a month by using the standard Method of ASTM.	(%) Chemical Composition (mg/kg)	Guidelines of Waste composition in Developing country.
Bulk Density		Once a month by using the standard Method of ASTM.	kg/m^3	ECD/WHO Guidelines of Bulk Density in Developing country.

1.7.4 EMP on potable water and waste water

For the improvement of management plan of the ***potable water treatment***, ***Filtration Method, Reverse Osmosis Method, Boiling water, and Disinfection (Chlorination***) were proposed.

According to the analysis, the ***impact of waste water of TSS, Ammonia Nitrogen, Oil and Grease, BOD, COD, Total Coliforms and E-coli*** on the environment generally rated as ***high and medium accordingly based on the findings.*** Therefore, mitigation and management plan for the waste water impact were introduced to this proposed factory. Some of the possible methods were recommended as mitigation measures as such ***Disposal by Grey Water Treatment System (Sand and Gravel Filtration) Method.***

Regarding the management system, it is needed to examine all sources of water ***(both potable water and waste water) three times per year***. And then compare with potable water standard and effluent water standard by National Drinking Water Standards and NEQG guidelines respectively.

As the key component of EMP success depends on ***effective capacity building of the workers*** in the factory. These efforts will also be ***assisted by the implementation of technical assistance by outside consultants***.

The ***EMP*** shall be set out with a controlled ***document and should be updated biannually***, following ***a reportable incident or plan update***.

1.8 Health risk assessment (HRA)

1.8.1 $PM_{2.5}$ health risk assessment

Health Risk Assessment (HRA) is a useful tool to estimate human health risks posed by exposure to a given environmental pollutant. According to the literature review, $PM_{2.5}$ is identified as a major hazard as well as the kind of health risk due to its long term exposure leading to mortality from cardiovascular and respiratory diseases and from lung cancer.

$PM_{2.5}$ data monitored in and around the factory were used to estimate how the different levels of exposure to $PM_{2.5}$ can impact on the likelihood and severity of the factory workers and the community's health effects .

It was postulated that the ***staff population of 893*** was being exposed to levels meeting with the WHO guideline.

The USEPA equation was used to calculate the potential dose of PM2.5, which is the dose the population in the Lluvia beverage manufacturing factory may be exposed to when inhaling $PM_{2.5}$ concentrations.

Based on the above findings, the ***workers working at the Coffee green bean sizing area, Storage area, during Generator operation and Aluminum film burning*** area have ***more health risk*** by PM 2.5 than others.
In terms of the ***toxicological risk***, almost ***some different places in Lluvia particularly in Coffee green bean sizing area, Storage area and Aluminum film burning*** area were ***>1 .*** That means that if the ***employers who*** are ***continuously working in those work places for 30 years***, they can have ***$PM_{2.5}$ Hazards*** that cause the adverse health effects such as increased respiratory symptoms, irritation of the airways, coughing or difficulty breathing, aggravated asthma, decreased lung function

1.8.2 PM_{10}health risk assessment

The information obtained during the hazard identification and the exposure assessment was used to estimate the concentrations of PM_{10} that are likely to cause significant health risks in humans.

PM_{10} monitored data were used to estimate how the different levels of exposure to PM_{10} can impact on the likelihood and severity of the factory employers health effects.

It was postulated that the staff population of 893 was exposed to levels exceeding the WHO guideline but lower than the NAAQS. This may have a negative impact on their health. It was assumed that inhalation was the most important route of exposure and those workers were exposed for 8 hours per day.

The USEPA equation was used to calculate the Field Average Daily Dose (FADD), which is the dose the population in Lluvia may be exposed to when inhaling PM10 concentrations.

The Health Risks from ***five*** **various places *(coffee green bean sizing area, storage area, production area, generator operation and aluminum film burning* in** Lluvia were between 1.1 and 10**.** It means that **the *factory employers working above mentioned various areas*** can be at

moderate risk of negative health effects from ***exposure to PM$_{10}$***.if they are continuously working in those work places for ***30 years***.

1.9 Environmental and Social Management Plan of Lluvia (Premier Factory) during Operation Phase

The mitigation measures and specific action to reduce potential impacts due to the proposed factory have been detailed as follows:

Table 1.4: Mitigation measures and required action plan during operation phase

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
a) Physical Environment								
1. Air Quality	1.1 Cleaning of green coffee beans.	1.1.1 Deterioration of air quality due to dust.	1.1.1.1 Install pollution control devices such as cyclone dust separator and fabric filter.	Low	• Installation of separator which contain dust collection system to remove the amount of airborne dust and impurities dispersion from the raw material.	Project Management Team, Workers and/or HSE Team	Throughout the operation Phase	Monitoring Report
	1.2 Roasting to cleaned green coffee beans.	1.2.1 Deterioration of air quality due to dust.	1.2.1.1 Install pollution control devices such fabric filter.	Low	• Installation of filter bag and PCL control system to remove dust and impurities.	Project Management Team, Workers and/or HSE Team	Throughou t the operation Phase	Monitoring Report
	1.3 Grinding the roasted coffee bean.	1.3.1 Deterioration of air quality due to fine particles of coffee dust.	1.3.1.1 Installation of well-ventilated grinding system to the factory.	Low	• Installation of good ventilation in the area where coffee grinding takes place to reduce the concentration of coffee dust in the air. • Installation of exhaust fun in the roof of	Project Management Team, Workers and/or HSE Team	Throughou t the operation Phase	Monitoring Report

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
					factory compound to reduce the concentration of coffee dust in the air. • To prevent the exposure to airborne particles, workers use **Personal Protective Equipment (PPE)** in the factory. • To choose well-ventilated areas for coffee grinding, the factory use enclosed grinders to minimize the concentration of airborne particles.			
	1.4 Mixing the ingredients with suitable ratio in mixer.	1.4.1 Release of volatile organic compounds (VOCs) and other gases to the air.	1.4.1.1 Installation of properly designed and maintained ventilation systems, emission controls.	Low	• Installation of properly designed and maintained ventilation systems, emission controls.	Project Management Team, Workers and/or HSE Team.	Throughout the operation Phase.	Monitoring Report.
	1.5 Packaging with manual and machines.	1.5.1 Release of dust, particles and aroma of coffee to the air.	1.5.1.1 Installation of good ventilation system and efficient exhaust system.	Low	• Installation of roof air ventilation design system in the factory by setting exhaust fan, dust suction/ dust collector, air-con.	Project Management Team, Workers and/or HSE Team.	Throughout the operation Phase.	Monitoring Report.

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
	1.6 Operation Activities	1.6.1 Overall Impacts	• 1.6.1.1 Implement a comprehensive maintenance program	Low	• Implementation of a comprehensive maintenance program to ensure all equipment, including dust collection systems, fans, and filters, are regularly inspected, cleaned, and properly maintained. • Promoting awareness of the health risks associated with poor air quality and the importance of maintaining good indoor air quality by HSE of Lluvia. • Biannually monitoring of air quality. • Using local exhaust ventilation near dust sources to capture particles at the point of generation. (in the production, packaging, loading and unloading of the raw materials) • Regularly clean floors, surfaces, and equipment using vacuum cleaners or and encouraging employees to keep their	Project Management Team, Workers and/or HSE Team.	Throughout the operation Phase.	Monitoring Report.

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
					workstations clean and free from dust buildup.			
	1.7 Generators	1.7.1 Greenhouse gas emission	1.7.1.1 Using of low- emission generator engines	Low	• Using of low-emission generator engines	Project Management Team, Workers and/or HSE Team.	Throughout the operation Phase.	Monitoring Report.
2. Noise and vibration	2.1 Some operation liked grinding, mixing and material handling equipment	2.1.1 Increase in noise level during operation process	2.1.1.1 To use low noise equipment and machines	Low	• Using low noise equipment and machines • Scheduling work shifts and breaks to minimize employee exposure to noisy areas. • Applying noise-reducing modifications to equipment, such as adding mufflers or silencers	Project Management Team, Workers and/or HSE Team	Throughout t the operation Phase	Monitoring Report
			2.1.1.2 Using vibration isolation mounts or pads to reduce equipment noise transmission	Low	• Conducting regular training sessions on noise hazards, the proper use of HPDs, and the importance of noise management.			

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
			2.1.1.3 Carryout regular maintenance of the equipment to minimize the noise level	Low	• Conducting regular maintenance of the equipment to minimize the noise level		Throughou t the operation Phase	
			2.1.1.4 Using personal protective equipment eg, earmuff 2.1.1.5 To use soundproofing materials (Rock Wool Sandwich Panel)		• Providing hearing protection devices (HPDs) such as earplugs or earmuffs to employees and ensuring their proper use. • Establishment of a regular maintenance program to ensure equipment is in good working condition, • Identification of any new noise sources that may have emerged.		Throughou t the operation Phase	
	2.2 Generator and vehicles	2.2.1 Increase in noise level during operation process	2.2.2.1 Using enclosure for all generator sets		• Using enclosure for all generator sets		Throughou t the operation Phase	
			2.2.2.2 Strictly enforce traffic control measures		• Strictly enforce traffic control measures			

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
3. Solid Waste	3.1 Solid waste from raw materials and factory operation, packaging	3.1.1 Contaminate to the environment (surface and ground water), and may be vector for disease transmission.	3.1.1.1 Source segregation into wet waste and dry waste.	Low	• Source segregation into wet waste and dry waste • Identification the sources of waste, such as rejected products, dust, packaging materials, and other byproducts	Project Management Team, Workers and/or HSE Team	Throughou t the operation phase	Monitoring Report
			3.1.1.2 Wastes (by products) such as plastics box, paper box, etc.		• Wastes (by products) such as domestic wastes will be used as animal food. • Little amount of stone, sand and mud, wasted from the production outlets are disposed at the YCDC. • Provide clearly labeled bins or containers for different waste streams, such as organic waste, recyclables (plastics, paper, metals), and non-recyclable waste.			
			3.1.1.3 Wastes from packaging (alluminium foils) are cutted and sent to DOWA organization.		• Following the disposable method and preventative measures labeled on the container. (such as Store in original cool dry place [Locked			

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
					storage cabinet], not reusing emptied container, disposed emptied containers in designated tras/bin and offer for recycling if available)			
	3.2 Domestic waste from canteen	3.2.1 Contaminate to environment (surface, ground water may be vector disease	3.2.1.1 Food waste (organic waste) will be used as animal food.		• Food waste (organic waste) will be used as animal food.			
4. Water Quality	4.1 No industrial effluent from manufacturing process due to the operation is dry cleaning and processing. However, some fumigants and insecticides are being used for quality control.	4.1.1 Contamination to surface water	4.1.1.1 Careful inspected and sealed diesel/oil storage tank not to be leakage.	Low	Making Sure to tightly sealed diesel/oil storage tank not to be leakage			
			4.1.1.2 Arrange emergency response plan for accidental spillage of hazardous chemical		Arranging emergency response plan for accidental spillage of hazardous chemical (providing sweep with spray kit promptly)			

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
	4.2 Contamination of surface water from surface runoff from using liquid insecticides	4.2.1 Contamination to surface water and ground water	4.2.1.1 Follow Label Instructions.		Careful read and follow the label instructions for the insecticide which provides specific guidance on safe handling, mixing, application rates, and disposal to minimize the risk of runoff.			
			4.2.1.2 Check Weather Conditions		Avoid applying insecticides before heavy rain or when the soil is already saturated. Applied insecticides during periods of low wind to prevent drift.			
			4.2.1.3 Buffer Zones: Create buffer zones		Creating vegetative strips between treated areas and nearby water bodies. These buffer zones can trap and filter potential runoff, allowing time for the insecticide to degrade or bind to soil particles before reaching water.			

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
			4.2.1.4 Store insecticides safely		Stored insecticides in a secure, well-ventilated area and kept it away from water sources or storm drains. Using secondary containment systems.			
			4.2.1.5 Dispose of Rinse Water Properly		Rinsing equipment and containers over a designated area and following label instructions for disposing of rinse water.			
			4.2.1.6 Place specific designated Storage and Mixing Areas		Ensuring that storage and mixing areas for insecticides are equipped with containment measures to prevent spills and runoff.			
			4.2.1.7 Avoid Overspray		Avoiding overspray onto non-target areas, including paved surfaces and water bodies.			

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
	4.3 Discharge from drainage facilities, secondary contaminant	4.3.1 Contamination to surface water	4.3.1.1 Using filtration method at the source before the distribution. 4.3.1.2 Properly storing raw materials to prevent dumping into water courses in the rainy season.		• Properly Stored Raw materials under the roof to prevent dumping into water courses in the rainy season.			
			4.3.1.3 Treat drainage system for sediment control.		• Salvage of the sediment from the drainage regularly around the factory.			

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
			4.3.1.4 Conducting regular training, monitoring, and inspection schemes together with keeping track of water uses minimizes waste and leaks from faulty connections and faucets.		Conducting regular training, monitoring, and inspection schemes together with keeping track of water uses minimizes waste and leaks from faulty connections and faucets			
	4.4 Discharge of domestic wastewater from office use	4.4.1 Contaminate of surface water	4.4.1.1 Domestic wastes form bathing/washing are passed through the sand filtration system.		Domestic wastes form bathing/washing are passed through the sand filtration system.			
	4.5 Overall Impacts	4.5.1 Surface and ground water pollution	4.5.1.1 Carefully check to prevent drainage flooding during rainy season		Careful inspection to prevent drainage flooding during rainy season			

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
5. Occupational Health and safety	5.1 Considerable hazards like manual handling, inhalable dust, noise,	5.1.1 Adverse effect on employee's health	5.1.1.1 Providing personal protective equipment suitable for the workplace	Low	• Common PPE items for premier coffee factory are fully provided such as goggles, respirators or dust masks, gloves, hearing protection, and slip-resistant footwear.	Project Management Team, Workers and/or HSE Team	Throughou t the operation Phase	Incident Record
			5.1.1.2 Regularly checked healthof workers		• Regularly checked the health of the workers			
			5.1.1.3 Be sure that vehicles and machines are in good working order/ Careful aware of the car accidents in line with Vehicle Safety and Motor Vehicle Management Law		• Ensuring that all machinery and equipment are properly maintained, inspected, and operated in accordance with manufacturer guidelines and OHS standards. • Promoting awareness of the health risks associated with poor air quality and the importance of maintaining good indoor air quality by HSE • Utilize engineering controls such as local exhaust ventilation systems and dust collection systems.			

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
			5.1.14 Regular inspection and maintenance of pollution control systems 5.1.1.5 One room in the office building is to be used as a rest room for sick persons and for dispensaries. 5.1.1.6 First-Aid Kid provided in all the building		• Regular inspection and maintenance of pollution Control • Regularly clean floors, surfaces, and equipment using vacuum cleaners or and encouraging employees to keep their workstations clean and free from dust buildup. • Regularly inspect and clean ventilation systems, filters, and dust collection equipment to maintain their effectiveness. • Conducting drills and exercises to familiarize employees with emergency procedures and evacuation routes. Systems • Providing adequate first aid supplies and ensure employees are trained in basic first aid and CPR			

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
	5.2 Implementation Fumigation and Using Insecticides	5.2.1 Exposure to harmful chemicals (Fumigants and Insecticides) and health impacts to workers	5.2.1.1 Provide Training and Education		• Ensure that all workers handling insecticides receive thorough training on their safe use, handling, storage, and disposal.			
			5.2.1.2 Providing Personal Protective Equipment		• Providing PPE, including gloves, goggles or face shields, N95 Mask, coveralls, and boots, depending on the specific chemical and application method. • Ensuring that PPE is in good condition and is properly fitted for each worker.			
			5.2.1.3 Provide Proper Ventilation		• Only those who are certified for the use and handling of fumes are engaged in fumigation process • Providing information on the potential health hazards associated with these chemicals.			

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
			5.2.1.4 Provide Storage and Handling:		• Stored fumigants and insecticides in designated areas away from incompatible materials and heat sources. • Ensuring that containers are properly labeled and sealed. • Handling chemicals with care, avoiding spills and leaks.			
			5.2.1.5 Develop Emergency Response:		• Developing and communicating clear emergency response procedures in case of accidents, spills, or exposure incidents. • Providing access to emergency eyewash stations, safety showers, and spill cleanup kits.			
			5.2.1.6 Provide Respiratory Protection		• Using N95 respirators when working with fumigants or insecticides, and ensuring that workers are fit-tested and trained on their proper use.			

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
			5.2.17 Provide First Aid and Medical Attention		• Providing First aid Kit and a clinic. • Encouraging workers to seek immediate medical attention if they experience symptoms of chemical exposure.			
6. Socio-economic	6.1 Project operation activities	6.1.1 Job opportunitie for local people 6.1.2 Increasing government revenue	_	Positive		Community meetings	Throughou t the operation Phase	Meeting notes
7. Odor Emission	7.1 Cleaning Coffee in the bathroom	7.1.1 Sour or Fermentation-like odors	7.1.1.1 Providing proper ventilation	Low	• Setting up adequate ventilation in the bathroom where the cleaning takes place has. Good airflow will help dissipate the odor more quickly.	Project Management Team, Workers and/or HSE Team	Throughou t the operation Phase	Monitoring Report
			7.1.1.2 Using Effective Cleaning Agents		• Utilizing deodorizing cleaning agents to tackle organic odors.			

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
			7.1.1.3 Providing Personal Protective Equipment		• Providing workers with appropriate PPE, such as gloves, masks, and aprons. This can help minimize direct contact with the fermented flour and its odor.			
			7.1.1.4 Utilizing Odor Neutralizers		• Placing Odor Neutralizing products (Baking Soda) to eliminate strong odors.			
			7.1.1.5 Setting Up On-site Laundry facilities		• Setting up on-site laundry facilities for workers' uniforms. This allows for immediate cleaning of contaminated clothing, preventing odors from settling. • Regular cleaning and maintenance of the bathroom to prevent the odor from accumulating over time.			

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
			7.1.1.6 Inhibiting microbial activity		• Using antimicrobial cleaning agents to inhibit the growth and development of microorganisms such as bacteria, viruses, fungi, and algae.			

1.10 Environmental, Social, and Health Impacts and Monitoring Measures

Table 1.5: Monitoring plan for environmental, social and health impact

Factors	Index/ Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location	Responsible Person
Air Quality	• **PM-10** • **PM-2.5** • **NO2,** • **SO2** • **CO** • **Ozone**	**Method** - The air monitoring survey will use the HAZ-SCANNER EPAS Wireless Environmental Perimeter Air Monitoring Station. (EPAS). • Myanmar National Environmental Quality (Emission)	Duration: 24 hr continuously Frequency: Biannually • Biannually during operation and once decommissioning phase • In case of any complaint regarding air quality, an additional air quality measurement may be conducted in response to specific complaints (if necessary)	1. Office Compound, 16` 50’ 56.9” N, 096` 03’ 48.2” E 2.Coffee green bean sizing place 16` 50’ 54.4” N, 96` 03’ 44.4” E 3. Storage place 16` 50’ 52.3”N, 096` 03’ 44.5”E 4. Production place 16` 50’ 55.0”N	•HSE In charge of Or - 3rd party

Factors	Index/ Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location	Responsible Person
		Guidelines, Effective since 2015 in accordance with The Environmental Conservation Law, 2012		096` 03' 42.9"E 5. Coffee roasting place 16` 50' 54.8" N, 96` 03' 45.2" E 6. (i) Generator (During Operation) 16` 50' 54.1" N, 96` 03' 45.5" E (ii) Generator (After Operation) 16` 50' 54.1" N, 96` 03' 45.5" E 7. Aluminum film burning Place 16` 50' 57.1" N, 096` 03' 42.0" E	
Noise	• Leq24 hr. • Lmax • Ldn	**Method** - At each site, Baseline Sound Pressure Levels (SPLs) for (daytime (LAeq 90 D), night time (LAeq 90 N)), and 24-hour (LAeq 90) will be monitored using the Sound level Meter (Model: SL-4023SD) along with SD card real time data recorder	Duration: 24hr continuously Frequency: Biannually • Biannually during operation and decommissioning phase • In case of a complaint regarding noise from project site, an additional noise measurement may be conducted (if necessary)	1. Open space area, 16` 50' 56.9" N, 096` 03' 48.2" E 2. Storage place 16` 50' 52.3"N, 096` 03' 44.5"E 3. Production place 16` 50' 55.0"N 096` 03' 42.9"E 4. Coffee green bean sizing place 16` 50' 54.4" N,	HSE Incharge Or (3rd party)

Factors	Index/ Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location	Responsible Person
		(USB/RS232) in order to determine background ambient noise levels within the study area. This SLM meets IEC61672 class 2 with the tolerance is +/- 1.4dB. • Myanmar National Environmental Quality(Emission) Guidelines, Effective since 2015 in accordance with The Environmental Conservation Law, 2012		96` 03' 44.4" E  5. Coffee roasting place 16` 50' 54.8" N, 96` 03' 45.2" E 6. Aluminum film burning Place 16` 50' 57.1" N, 096` 03' 42.0" E 7. Generator (During Operation) 16` 50' 54.1" N, 96` 03' 45.5" E	
Effluent	Physical parameters: • pH Chemical Parameters: • Total Suspended Solid (TSS) • Ammonia Nitrogen • Nitrate Nitrogen	Method • Analytical Methods followed to Standard Methods for the Examination of Water and Wastewater, recommended by National Environmental Quality (Emission) Guideline (EQEG)	• During operation phase • Biannually for wastewater • Quarterly for potable water	• Drainage area (1) 16°50'58.98"N 96° 3'47.06"E • Drainage area(2) 16°50'58.13"N 96° 3'42.33"E • Final Pipe lines 16°50'55.77"N 96° 3'41.10"E	• HSE Incharge or 3rd party

Factors	Index/ Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location	Responsible Person
	• Oil and Grease • Phosphorus • DO • BOD • COD Biological parameters: • Total Coliform • *Escherichia coli*				
Hazardous and Nonhazardous waste	Manifest Disposal and Tracking Report	Track waste volume by type and disposal location daily	• During operation phase	• At all project locations	**• HSE Incharge** **• 3rd party**
Social	• Complaint • Monitoring and solving	• Record complaint • Monitor, investigate and implement suitable solutions	• Throughout all phases	• Project area, community around project area, and transportation route	**• HR of the factory** **• 3rd party**
Public and Occupational health and safety	• Accidental statistics (strips/falls/accidents in the processing of machines such as	• Conduct summary report for accident investigation • Regularly assessed the information of	• Throughout all phases Frequency: Monthly • During Operation Phase Frequency: Occasionally Frequency: Monthly	• Project area, community around project area	**• HSE Incharge**

Factors	Index/ Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location	Responsible Person
	injuries and other minor accidents in short term) • {Occupational respiratory diseases • And noise exposure in long run cause Noise Induced Hear Loss (NHL) and other physiological effects} • Mitigation measures	workers' health by in charge person of the team • Medical Check-up periodically • Community Consultation • Information disclosure to public altitude • Emergency response training to inform in the event of accidents and minor accidents / Health and Safety Training and Submission of accident reports • Regular trainings regarding health and safety aspects by HSE Coordinator. • Scrutinize the current environmental plan	Frequency: Occasionally • Duration – 1 Day Frequency: Annually Duration – 1 or 2 Day Frequency: Annually Duration – 1 or 2 Day Frequency: Periodically Duration: Based on the modified environmental plan.	, and transportation route • Project area and exposed area	

1.11 Public consultation and disclosure

The main objective of the SIA is to maximize public understanding of the project through information distribution and exchange between the project proponent and the communities that might be affected directly or indirectly by the proposed project activities.

This Extended Executive Summary addresses Social Impact Assessment and covers four primary aspects:

- Characterization of the ***state of the art of Social Impact Assessment***.
- ***Key Informant Interview*** with the respective community (monk, community leader, teacher etc) and key government officials
- ***Stakeholders meeting/focus group discussions*** with community
- ***(100) Socio-economic and Attitude Survey of households***

The results are analyzed using the ***SPSS version 21.***

Regarding the demographic feature, the ***common facilities*** of the community who lives around the industrial zone are ***not much improved***. In the ***education*** aspect, there is ***no school*** within that quarter areas except ***one monastic school*** in that areas. In the health facilities, ***one private clinic*** is opening daily near to the residential areas. Based on their information on the questionnaire, majority of the community has ***no major health problems*** like malaria, TB, diarrhea and dysentery etc.

In the issue of the infrastructure, the ***majority 57%*** is staying in ***one story wooden*** buildings. For the road status, the road condition ***within the quarter is unpaved*** roads though; the ***main road is concrete*** road. For the transportation issue, they only depend on ***public transportation***. Thus, it can be found that the ***infrastructure is not well improved and lack of sanitation***.

Majority (***60% of total respondents***) of the community is ***middle age.*** In the issue of Education, the ***majority group*** of total respondent has finished till ***secondary school education level*** which is nearly 43% of total respondent, but the minor group ***(3%)*** is ***Diploma level.***.

The ***majority (44%)*** group of respondent is ***service and causal workers.***

In terms of ***annual income level***, generally, the people who are residing in those surrounding areas are ***low income level*** .The ***majority (51%)*** is in the ***range of 1,000,001 - 2,000,000*** per year.

Regarding awareness of the community on the industrial zone along with the Lluvia (Premier beverage manufacturing factory) , almost nearly ***100% of the total households*** are ***aware of the Hlaing Thar Yar industrial estate***. Among them, around 31*%* of the total households ***know well*** all about the industrial estate including the Lluvia Premier Beverage Manufacturing Factory

Concerning the development issue of the industry, up to ***59%*** of the total household ***agree with the development.*** The ***remaining 41% of household*** said that they are ***not much interested i***n the issue of the development of industry.

Based on the findings, the community perceptions reveal that there are ***no significant both positive and negative socio eco impacts likely affected by the activities of the factory*** on the nearest community. The detail discussions and results are shown in the main context of this report.

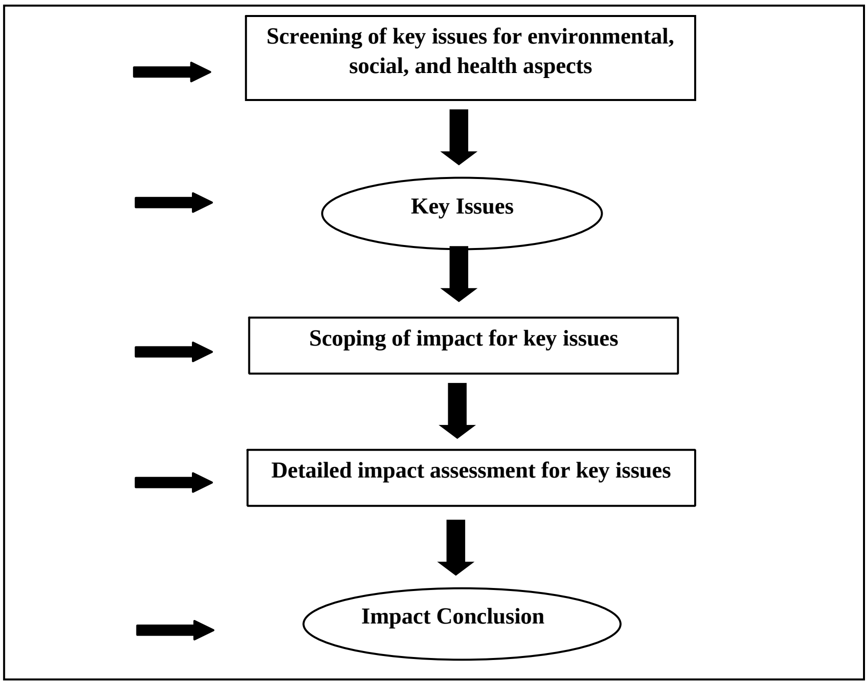


Figure 1.1 Illustrates the importance of public involvement in each key EIA step

1.11.1 Public Consultation Meeting

Lluvia Limited BEVERAGE (coffee, Tea and Milk powder) and EQM conducted the Public consultation meetings with government and local officials for Hlaing Thar Yar Township, representative of zone committee and local communities of five quarters within AOI of the project site following ECD advised protocol.

The Public Meetings were held on 27th, December, 2023.

Lluvia Limited BEVERAGE (coffee, Tea and Milk powder) and EQM completed the public consultation meetings to ensure that key stakeholders are aware of the planned project activities and any comments and concerns that have made will be considered as part of the IEE and Environmental Management Plan.

The respective stakeholders raised the following concerns and questions during Public Consultation Meetings as detailed in the following table. The meeting minutes are included in Annex VI.

Key Questions / Comment	Response	Mitigation Measures
Has your company submitted the revised IEE report in accordance with the comments from the Environmental Conservation Department?	In compliance with the agreement made with ECD on August 27, 2023, Environmental Quality Management Co., Ltd is currently in the process of preparing the IEE report in alignment with the provided comments. We assure you that we will submit the report no later than February 2024, as committed during our signing at the ECD office.	

Key Questions / Comment	Response	Mitigation Measures
Does your company know that monitoring reports need to be submitted biannually to the Environmental Conservation Department (ECD)?	Yes, we are aware of the biannual monitoring reports that will be submitted to the Environmental Conservation Department (ECD) following the receipt of the approval letter.	
Based on your presentation, the air quality results for this factory have already been continuously monitored for 24 hours. Considering this schedule requires continuous monitoring, can the factory accommodate the associated costs?	We conducted continuous monitoring for 24 hours within a single day, not as a daily occurrence. Furthermore, the air monitoring will specifically be carried out continuously for 24 hours at each selected location.	
Has your company included the estimated cost for the environmental management plan in your IEE report?	Yes, we are currently in the process of preparing the estimated costs for air/odor, noise, waste (solid and hazardous waste), portable & wastewater, occupational health & safety, and community health & safety in this IEE report.	
I wanted to know the specific location of the factory's drainage outlet, as wastewater discharge has the potential to impact Panhlaing River and lead to pollution.	Considering the process of the factory, there is no industrial wastewater effluent. However, there is some domestic wastewater generated from the canteen. The factory's drainage outlet is strategically positioned at the lower side of the factory area to facilitate an efficient water drainage system, particularly after the removal of solid waste, including oil and grease.	• Using Sand Filtration System at the factory outlet drainage. • Minimizing unnecessary water usage • Planting around a factory.
To avoid encroachment in the space behind the factory, it is advisable for the factory to seek a permit from the Department of Water Resources and Rivers Development for extending the construction of the factory drainage outlet.	To address the encroachment issue in the back side of the factory, we will submit a report to the Head of the factory.	• Inform to the Head of factory if the encroachment issue in the back side of the factory occur. • Need regular check about the encroachment issue in the factory area.

Key Questions / Comment	Response	Mitigation Measures
I am interested to know about the wastewater treatment system employed by the factory, and I would also like to inquire about the expected lifespan of the sand filter in the proposed treatment system.	The factory is in the process of implementing a wastewater treatment system, utilizing either Sink Filter or Kitchen Wastewater Oil and Grease Trap, Rice Husk Ash Filtration (Phwepyar), Sand Filtration, Gravel Filtration, and Chlorination. For the sand filter, its usage is recommended for up to 3 months, depending on the volume of waste generated, in alignment with the factory's characteristics.	
Considering the factory's nature, there is no industrial wastewater generated; however, there is a discharge of certain types of domestic wastewater. I would like to suggest that the current wastewater treatment system in your factory is adequate, given the process of the facility, which does not align with an extensive wastewater treatment system.	-	

Chapter 2

Introduction

2. Introduction
2.1 Background

The Lluvia Limited is a food processing industry which produces beverages like coffee, tea and quaker oats. It has acquired land at No. 108 (A) and 108 (B), Quarter (3), Hlaing Thar Yar Industrial Zone, Hlaing Thar Yar Township, Yangon, Myanmar. The plot is about 9.687 Acres. The Lluvia Ltd. is a joint venture between the Lluvia Limited 85% and MC Food Holdings Asia Pte Limited (Japan) 15%. The Lluvia is the leading industrial group with its operations extended in Myanmar.

It could be observed that the investors have long and rich experience in establishing and running similar projects with the international partnerships having the necessary equipments and skills needed for production of high quality product.

The contact details of the project proponent are as follows:

- Company name – Lluvia Limited (Joint venture with Lluvia and MC Food Holdings Asia Pte Limited (Japan)
- Investor name - U Ko Ko Gyi (a) U Soe Naing
- Type of Business – food processing and distribution (Beverages: Premier Coffee, Happy, All Time, Tea Master)
- Investment location -No. 108(A0 and 108 (B), Quarter(3), Hlaing Thar Yar Industrial Zone, Hlaing Thar Yar Township, Yangon, Myanmar.
- Telephone -01 2585107, 01 2585108, 01 2585109
- Fax- 2585107, 2585108

This study consists in assessing the Environmental and Social Impacts (ESIA) for the project operation along with the Environmental Management Plan (EMP) of the food processing factory located in the Hlaing Thar Yar Industrial Zone.

This Report has been produced by Environmental Quality Management Co., Ltd which has been contracted by the Lluvia Ltd to carry out the Environmental and Social Impact Assessment (ESIA) along with Environmental Management and Monitoring Plan (EMP).

The Consultancy firm is based in Yangon, Myanmar and has got strong background and knowledge in the area of Environmental Assessment, and a track record of over 5 years for conducting studies of Environmental, Social and Health Impact Assessment (ESHIA) for development projects across the country.

The contact details of the ESIA survey team is as follows:

- Environmental Quality Management Co.Ltd
- Dr. Ohnmar May Tin Hlaing, Managing Director & Environmental Consultant
- Ph: (951) 560291, (951) 561417, (951) 562182, (959) 50 16606
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- No 233, Block 23, Sayee Pin Lane, Thuwunna, Thingungyun, Yangon, Myanmar
- Company registration no: 2690 Expiry date:2017

2.2 Declaration of IEE team

The Consultancy firm is based in Yangon, Myanmar and has got strong background and knowledge in the area of Environmental Assessment, and a track record of over 5 years for conducting studies of Environmental, Social and Health Impact Assessment (ESHIA) for development projects across the country.

The contact details of the ESIA survey team is as follows:

- Environmental Quality Management Co.Ltd
- Dr. Ohnmar May Tin Hlaing, Managing Director & Environmental Consultant
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- www.eqmmyanmar.com
- No 233, Block 23, Sayee Pin Lane, Thuwunna, Thingungyun, Yangon, Myanmar
- Company registration no: 2690 Expiry date:2017

The impact assessment was conducted by Myanmar registered consultant company Environmental Quality Management Co. Ltd. (EQM). The EIA team consisted of the individuals described in Table (2.1).

Table 2.1: IEE Assessment Team

Name (Sir name, Given name)	**Registration/ License No.by ECD (if applied)**	**Designation**	**Area of expertise**
Dr.Ohnmar May Tin Hlaing	EIA-C 044/2023	Senior Environmental Expert	**1)Air pollution Prevention to Potential Impacts and Management** **2) Socio-Economy** **3) Health** **4) Hazard Identification and Risk Assessment** **5) General Environmental Management**
Soe Moe Nwe	EIA-C 030/2023	Environmetnal Consultant	**1) Socio-Economy** **2) Solid Waste and Hazardous Waste Management** **3) Ecology and Biodiversity**
Win Thida Khine	Processing	Environmetnal Consultant	**1) Water Pollution Prevention, Control, Monitoring and Impact Assessment** **2) Meteorology, Surface and Ground Water Control** **3) Land Use** **4) General Environmental Management**
Ye Naung Tun	Processing	Environmetnal Consultant	**1) Air Quality Monitoring** **2) Noise**

Name (Sir name, Given name)	Registration/ License No.by ECD (if applied)	Designation	Area of expertise
			3) Soil
Hein Htet Aung	Processing	Environmetnal Consultant	**1) General Environmental Management** **2) Hazard Indentification and Risk Assessment**
Zaw Myo Htet	Processing	Legal Expert	**Chapter (3) Policy and Legal Framework**

Table 2.2: Supportive Member of the IEE Study Team

Sr.	Name (Sir name, Given name)	Education/Degree	Scope of Work
1	Daw Nwe Nwe Tun	B.Sc. Chemistry	Socio-Economics Study Team
2	U Than Kyaw Moe	B.Sc. Forestry	Air, Water, Noise, Soil, Vibration Baseline Study and Environmental Quality Monitoring, Biodiversity
3	U Kyaw Ko Ko	Math, Dagon University	Air, Water, Noise, Soil, Vibration Baseline Study and Environmental Quality Monitoring
4	U Zay Zay Ko	Myanmar, Dagon	Air, Water, Noise, Soil, Vibration Baseline Study and Environmental Quality Monitoring
5	U Kyaw Zin Hein	Undergraduate in Industrial Chemistry (Second Year)	Air, Water, Noise, Soil, Vibration Baseline Study and Environmental Quality Monitoring
6	U Kyaw Aung Htet	Undergraduate in B.Sc. Zoology	Air, Water, Noise, Soil, Vibration Baseline Study and Environmental Quality Monitoring, Biodiversity
7	U Soe Moe Aung	B.Sc. Forestry	Air, Water, Noise, Soil, Vibration Baseline Study and Environmental Quality Monitoring, Biodiversity
8	U Thet Naing Htwe	B.Sc. Forestry	Air, Water, Noise, Soil, Vibration Baseline Study and Environmental Quality Monitoring, Biodiversity
9	U Wai Hein Aung	B.Sc. Zoology	Air, Water, Noise, Soil, Vibration Baseline Study and Environmental Quality Monitoring, Biodiversity

Table2.3: Summary of experiences of EQM team

Sr	Project name	Year	Client	Remark
(i) EIA, IEE and EMP projects				
1	Block IOR 2 and IOR 7	2018	Gold Petrol Oil and gas company	EIA, EMP as local consultant and partner for IEM
2	Llivia (Confectionery Factory)	2018	Llivia Limited	IEE&EMP
3	MOGE-3	2018	PTTEP Oil and gas company	EIA, EMP as local consultant and partner for IEM
4	Block – IOR 7	2018	Petronas Oil and gas company	EIA, EMP as local consultant and partner for IEM
5	Block EP-1	2018	Petro Brunei Oil and gas company	EIA, EMP as local consultant and partner for IEM
6	The building powder production of Mega Strength Co., Ltd.	2017	Mega Strength Co., Ltd.	EMP
7	Victoria Palace Hotel project in Mandalay	2016-2017	Laminthar Co., Ltd	EMP
8	Rocket Flour Mill	2016	Mitsubishi and Diamond Star Company	IEE & EIA
9	Bo Aung Kyaw Port/Terminal	2016		IEE & EMP
10	Myanmar Consumer Enterprise, Rainbow detergent factory	2016	The Myanmar Consumer Enterprise GREENLAND,Ltd	EIA & EMP
11	Onshore Oil and Gas Exploration Project (RSF-5)		ENI Oil and gas company	EIA & EMP
12	LLUVIA, Premier Beverage Manufacturing factory	(Jan-2016)	Lluvia Ltd and MC Food Holdings Asia Pte., Ltd	IEE & EMP

Sr	Project name	Year	Client	Remark
13	LLUVIA, Wheat Flour Mailing factory	(Oct - 2015)	Lluvia Ltd and MC Food Holdings Asia Pte., Ltd	EIA & EMP
14	Green Land International Wheat Flour Mailing factory	(Oct -2015)	Lluvia Ltd and MC Food Holdings Asia Pte., Ltd	EIA & EMP
15	Petroleum Brunei Onshore Oil and Gas ESHIA EP-1	2015	Petro Brunei Oil and gas company	as local consultant and partner for IEM
16	Shell Offshore Oil and Gas Exploration ESHIA AD-9, AD-11, AD-05	(2015)	Shell Oil and Gas company	(as local consultant and partner for IEM)
17	Petronas ESHIA IOR5 and IOR7	(2014)	Petronas Oil and gas company	(as local consultant and partner for IEM)
18	Rice Mill project in Tawntae	(2014)	MAPCO	(Air and Health Impact)
19	PTTEP Onshore gas exploration project	(2013)	PTTEP Oil and gas company	(as local consultant and partner for IEM)
20	Petronas ESHIA Onshore gas exploration project	(2013)	Petronas Oil and gas company	(as local consultant and partner for IEM)
21	The Myanma Natural Gas Pipeline project	2009-2010	CNPC Oil and gas company	(as local consultant and partner for IEM)

2.3 Government registrations/approvals for the project status

In terms of the government registration/approvals for the project is as shown below:

Table 2.4: Company Registration Details

1	Company Registration Number	2690/2012-2013
2	Date of Recommendation from Environmental Conservation Department, Ministry of Environmental Conservation and Forestry to conduct the EIA and EMP.	26th, February, 2015

2.4 Objectives of the project

In order to become sustainable development, the environmental and social impacts (ESIA) shall be necessarily reduced accordingly. Moreover, resources become limited and polluted, ESIA has become of ever increasing importance as a tool for development and decision making. This role is formally recognized in principle 17 of the Rio Declaration on Environment and Development (UNCED 1992).

As a national instrument, the factory needs “Environmental and Social Impact Assessment “as that the project is likely to have adverse impact on the environment and is subject to a decision of a competent national authority”. This ESIA can be applied not only to prevent or minimize the adverse effects of major development project but also used as a planning tool to promote sustainable development by integrating environmental considerations.

There are two categories in this ESIA objective.

1. To identify the potentially significant environmental impacts likely affected by the grain milling factory operation and risks of the proposed project. (Immediate aim)
2. To promote sustainable development by ensuring that the project activities do not undermine critical resource and ecological functions or the well being, lifestyle and livelihood of the communities and people who depend on them. (long-term aim)

The main objectives of this project are the following:

1) To reveal the **existing environment and activities** in the area of the project;
2) To detect the **impacts of the project on neighbouring environment** such as the air atmosphere, the water bodies, the soil, people, the infrastructure, the fauna, the flora
3) To enable the **proposed mitigation measures** where adverse effects may have occurred;
4) To propose **mitigation measures** where beneficial effects from the project are detected;
5) To set up **an environmental management plan** that will govern all activities of the project for the better protection of the environment.

2.5 Methodology used for the study

Based on the ESIA procedures issued by the Environmental Conservation Department (ECD), Ministry of Environmental Conservation and Forestry (MOECAF), the methodology used by the consultants consisted in the following:

a) **Literature review**: Documentation on policies, laws, regulations and guidelines related to environmental impact assessment process and management, industry sector, waste management, land use etc, at the national level as well as the international level have been done.
b) **Interviews**: The consultants have interviewed people in the area of the factory as well as in the Ministries and other governmental institutions related to this project.
c) **Data collection**: Through site visit, required qualitative and quantitative data have been collected
d) **Stakeholders' consultation**: the consultants conducted stakeholder meetings and focus group meetings and door to door household questionnaire surveys on the neighbouring communities, to find out their perception on this project.
e) **Environmental baseline monitoring** on air, water, waste soil and flora and fauna
f) **Reporting**: the data and information collected were organized and compiled in a report.

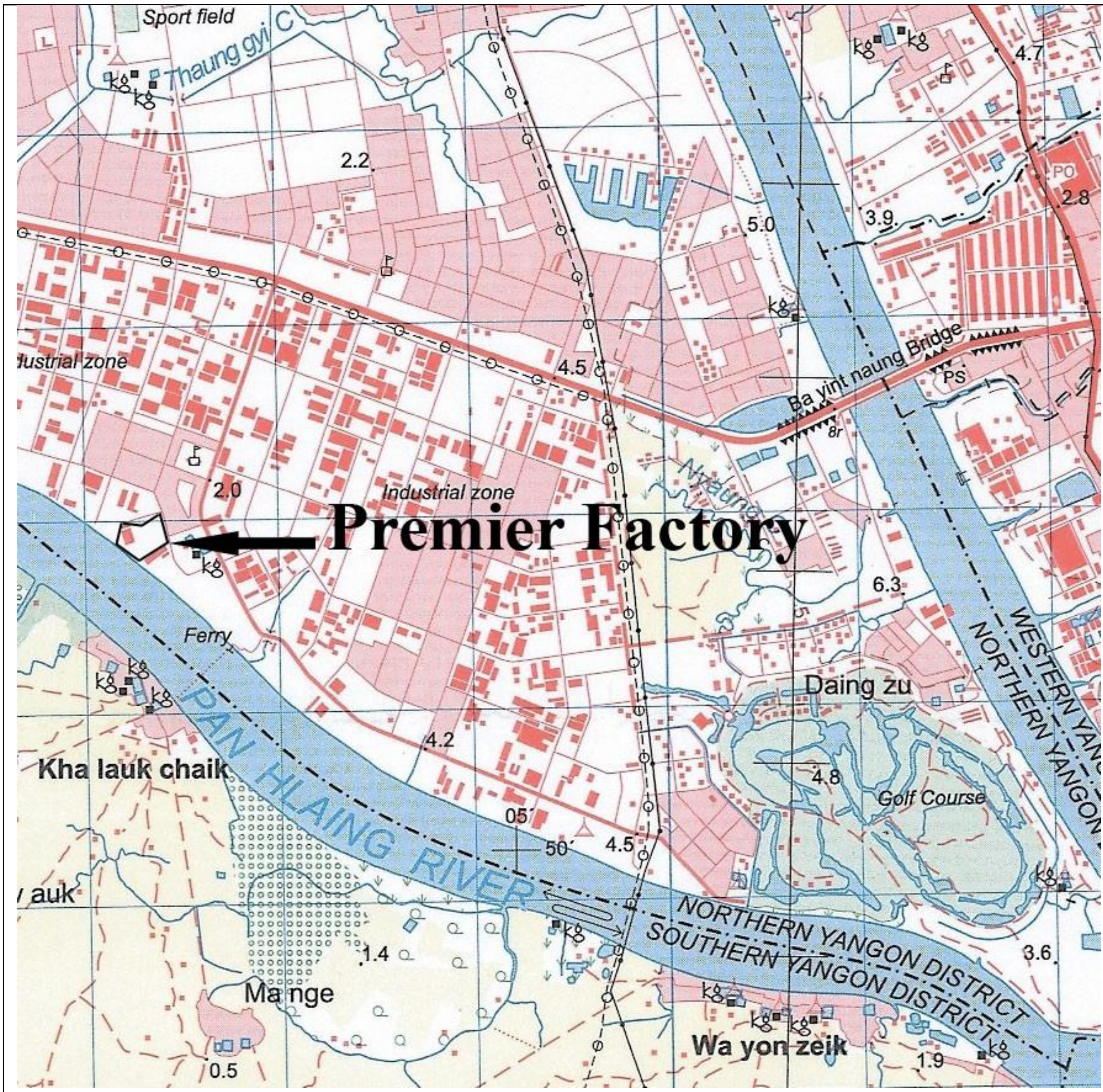


Figure 2.1 The Topo map of the Lluvia Factory (Hlaing Thar Yar Industrial Zone)

Chapter 3

Policy, Legal and Institutional Framework

3. Policy, legal and institutional framework

3.1 Introduction

This chapter provides the key information of national and international environmental legislations, regulations, conventions and standards applicable to the project of Lluvia Ltd (Joint Venture with Lluvia Limited 85% and MC Food Holdings Asia Pte Limited (Japan) 15%.

3.2 Objectives

- Adheres to the requirements of national environmental laws and regulations, international standards and industry guidelines at all times
- Preserves biodiversity, especially in its areas of operation
- Engages with the local communities to constantly work towards sustainable social, economic and institutional development of the region where it operates

3.2.1 Constitution of the Republic of the Union of Myanmar (2008)

The project proponent will protect and conserve natural environment and adhere the following sections.

In consideration of The Constitution of the Republic of the Union of Myanmar (September, 2008) as amendment to date, the article 37 (a) and 45 states that The Union is the ultimate owner of all lands and all natural resources above and below the ground, above and beneath the water and in the atmosphere in the Union and The Union shall protect and conserve natural environment respectively.

In addition, according to SCHEDULE ONE, Union Legislative List (Refer to Section 96), it states the basic standardization and specification for manufactured products in the Industrial Sector.

3.2.2The National Environmental Policy (1994)

In 1994, the National Environment Policy was adopted stating the commit to sustainable development. This served as a precursor to the drafting of the Myanmar Agenda 21 in 1997.

3.2.3 The Myanmar Agenda 21 (2007)

It was endorsed by the administration in 2007 and formulated in collaboration with the United Nations (UN). The Myanmar Agenda 21 included four program areas in Environmental Quality Management and Enhancement. It detailed the social, economic, institutional and infrastructural strengthening programs that will promote environmental protection in Myanmar.

3.2.4 The Environmental Conservation Law (2012)

The project proponent will follow the prescribed mentioned law realting to pollution control and penalties:

The Republic of the Union of Myanmar has enacted 61 legislations concerning of environmental conservation and protection and then in the time of New Government, the
Pyidaungsu Hluttaw passed the Environmental Conservation Law on 30th March, 2012. Moreover, the Cabinet passed Environmental Conservation Rules of Law on 13 June 2013.
This Law recognizes the responsibility of the Environmental Conservation Committee with the Union Minister for the Union Ministry assigned by the Union Government as the Chairman and with suitable members to conserve the environment of the Republic of the Union of Myanmar.
This environmental conservation committee will advise the government on environmental matters.

The committee is also made responsible for making rules for industry and for setting various environmental quality standards.
Among the statements contained in the law, this report extracts only those which concern with the scope of work of the project.

3.2.5 Environmental Impact Assessment Procedure (2015)

The project proponent shall shall identify and assess all adverse impacts and risks for environment, social issue and, if relevant, health that potentially arise from the Project.

Environmental Impact Assessment Procedures have been prepared by MONREC under the Environmental Conservation Law, 2012. It requires that the Project proponent shall include in its evaluation environmental, social and health aspects of the environment, and shall identify and assess all adverse impacts and risks for environment, social issues and, if relevant, health that potentially could arise from the Project. Therefore, this law shall be effectively considered an ESHIA procedure framework and the project proponent commits to comply with the stipulations.
The key sections are articles 102-110, 113, 115, and 117.

Responsibility for all Adverse Impacts

Article 102. The Project Proponent shall bear full legal and financial responsibility for:

a) all of the Project Proponent's actions and omissions and those of its contractors, subcontractors, officers, employees, agents, representatives, and consultants employed, hired, or authorized by the Project acting for or on behalf of the Project, in carrying out work on the Project; and

b) PAPs until they have achieved socio-economic stability at a level not lower than that in effect prior to the commencement of the Project, and shall support programs for livelihood restoration and resettlement in consultation with the PAPs, related government agencies, and organizations and other concerned persons for all Adverse Impacts.

Article 103. The Project Proponent shall fully implement the EMP, all Project commitments, and conditions, and is liable to ensure that all contractors and subcontractors of the Project comply fully with all applicable Laws, the Rules, this Procedure, the EMP, Project commitments and conditions when providing services to the Project.

Article 104. The Project Proponent shall be responsible for, and shall fully and effectively implement, all requirements set forth in the ECC, applicable Laws, the Rules, this Procedure and standards.

Article 105. The Project Proponent shall timely notify and identify in writing to the Ministry, providing detailed information as to the proposed Project's potential Adverse Impacts.

Article 106. The Project Proponent shall, during all phases of the Project (pre-construction, construction, operation, decommissioning, closure and post-closure), engage in continuous, proactive and comprehensive self-monitoring of the Project and activities related thereto, all Adverse Impacts, and compliance with applicable laws, the Rules, this Procedure, standards, the ECC, and the EMP.

Article 107. The Project Proponent shall notify and identify in writing to the Ministry any

breaches of its obligations or other performance failures or violations of the ECC and the EMP as soon as reasonably possible and in any event, in respect of any breach which would have a serious impact or where the urgent attention of the Ministry is or may be required, within not later than twenty-four (24) hours, and in all other cases within seven (7) days of the Project Proponent becoming aware of such incident.

Article 108. The Project Proponent shall submit monitoring reports to the Ministry not less frequently than every six (6) months, as provided in a schedule in the EMP, or periodically as prescribed by the Ministry.

Article 109. The monitoring reports shall include:

a) documentation of compliance with all conditions;

b) progress made to date on implementation of the EMP against the submitted implementation schedule;

c) difficulties encountered in implementing the EMP and recommendations for remedying those difficulties and steps proposed to prevent or avoid similar future difficulties;

d) number and type of non-compliance with the EMP and proposed remedial measures and timelines for completion of remediation;

e) accidents or incidents relating to the occupational and community health and safety, and the environment; and

f) monitoring data of environmental parameters and conditions as committed in the EMP or otherwise required.

Article 110. Within ten (10) days of completing a monitoring report as contemplated in Article 108 and Article 109 in accordance with the EMP schedule, the Project Proponent shall make such report (except as may relate to National Security concerns) publicly available on the Project's website, at public meeting places (e.g. libraries, community halls) and at the Project offices. Any organization or person may request a digital copy of a monitoring report and the Project shall, within ten (10) days of receiving such request, submit a digital copy via email or as may otherwise be agreed upon with the requestor.

Article 113. For purposes of monitoring and inspection, the Project Proponent:

a) shall grant to the Ministry and/or its representatives, at any time during normal working hours, access to the Project's offices and to the Project site and any other location at which the Project activities or activities related to the Project are performed; and

b) from time to time as and when the Ministry may reasonably require, shall grant the Ministry access to the Project's offices and to the Project site and any other location at which the Project activities or activities related to the Project are performed.

Article 115. In the event of an emergency, or where, in the opinion of the Ministry, there is or may exist a violation or risk of violation of the compliance by the Project with all applicable environmental and social requirements, the Project shall grant full and immediate access to the Ministry at any time as may be required by the Ministry.

Article 117. The Project Proponent shall further ensure that the Ministry's rights of access hereunder shall extend to access by the Ministry to the Project's contractors and subcontractors.

3.2.6 National Environmental Quality (Emission) Guideline (2015)

The project proponent will adhere NEQG for the emission of air, water and noise pollution.

MONREC has established environmental quality standards, the National Environmental Quality Standard [Legal Reference: ECL 2012 (Article 2c) and EQS 2016].

Section 1. These national Environmental Quality (Emission) Guidelines (hereafter referred to as Guidelines) 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.

Section 4. Unless otherwise indicated, these Guidelines refer to emission sources, and are intended to prevent or minimize adverse impacts to environmental quality or human health by ensuring that pollutant concentrations do not reach or exceed ambient guidelines and standards. The

Guidelines apply to projects that generate noise or air emissions, and / or that have either direct or indirect discharge of process water, wastewater from utility operations or storm water to the environment.

Section 5. General and industry-specific Guidelines as set out in Annex 1 – Emissions Guidelines shall apply to any project subject to IEE Procedure, as adopted by the Ministry, in order to protect the environment and to control pollution in the Republic of the Union of Myanmar. These Guidelines specifically apply to all project types listed in the IEE Procedure under 'Categorization of Economic Activities for Assessment Purposes' which sets out projects that are subject to initial environmental examination. h

Section 6. Provisions of the general and applicable industry-specific Guidelines shall be reflected in project environmental management plan (EMP) and environmental compliance certificate (ECC) and together constitute a project's commitment to take necessary measures to avoid, minimize and control adverse impacts to human health and safety, and the environment through reducing the total amount of emissions generation; to adopting process modifications, including waste minimization to lower the load of pollutants requiring treatment; and as necessary, to apply treatment techniques to further reduce the load of contaminants prior to release or discharge.

Section 7. Recognizing that these Guidelines are intended to prevent pollution through reducing the mass of pollutants emitted to the environment, dilution of air emissions and effluents to achieve maximum permitted values is not acceptable. Specified guideline values should be achieved, without dilution, at least 95 percent of the time that a project is operating, to be calculated as a proportion of annual operating hours.

Section 9. As specified in the IEE Procedure, all projects are obliged to use, comply with and refer to applicable national guidelines or standards or international standards adopted by the Ministry. These Guidelines will henceforth be applied by the Ministry in satisfying this requirement until otherwise modified or succeeded by other guidelines or standards.

As specified in the IEE Procedure, following project approval a project shall commence implementation strictly in accordance with the project EMP and any additional requirements set out in the project ECC, which will encompass conditions relating to emissions. In this regard, the Ministry will require that projects adhere to general and applicable industry guidelines as set out in Annex 1.

Section 11. As specified in the IEE Procedure, projects shall engage in continuous, proactive and comprehensive self-monitoring of the project and comply with applicable guidelines and standards. For purposes of these Guidelines, projects shall be responsible for the monitoring of their compliance with general and applicable industry-specific Guidelines as specified in the project EMP and ECC.

Section 12. 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.

3.2.7 Myanmar National Land Use Policy (2016)

The Myanmar National Land Use Policy (2016) has been prepared and established as follows and the project proponent will commit to adhere Myanmar National Land Use Policy (2016).

Article 17 Land Information Management

The following shall be carried out in timely manner to successfully accomplish the preparatory process for issuing land tenure rights and land information management:

(a) Establishing transparent, accountable, affordable, clear and easy process to enable recognition and registration of rights for all stakeholders including ethnic nationalities and smallholder farmers, when their rights have not previously been recognized and registered;

Article 29 Changing Land Use by Individual Application

To protect existing land users in the local communities from negative impacts of proposed individual land use changes, the following shall be done:
(d) Protecting lands that are under rotating and shifting cultivation and customary cultivation practices;

Article 38 Procedures related to Land Acquisition, Relocation, Compensation, Rehabilitation and Restitution

When managing the relocation, compensation, rehabilitation and restitution related activities that result from land acquisition and allocation, unfair land confiscation or displacement due to the civil war, clear international best practices and human rights standards shall be applied, and participation by township, ward or village tract level stakeholders, civil society, representatives of ethnic nationalities and experts shall be ensured.

Article 41 Land Disputes Resolution

In order to hear and decide land disputes through the use of impartial land dispute resolution mechanisms across the whole country, the following shall be defined:
(b) Allowing local farmers organizations to resolve land disputes arising between their members, using local customary dispute resolution mechanisms, if they choose to do so;

Article 53 Assessment and Collection of Land Tax, Land Transfer Fee and Stamp Duties
Rotating and shifting cultivation shall be considered as subsistence agriculture, and the rate of land tax shall not be more than the maximum rate collected for ordinary smallholder farmer or smallholder household.

3.2.8 Project- related laws

The Myanmar Environmental Conservation Law, Environmental Conservation Rules, Environmental Quality (Emission) Standards are the first step to address all the complex environmental and social management issues faced by Myanmar. A number of other laws exist which, either directly or indirectly, relate to environmental and social management of the project. The other relevant Myanmar government agencies/ requirements applicable to the Project are summarized below:

- **Constitution of the Republic of the Union of Myanmar (2008)**
- **The National Environmental Policy (1994)**
- **The Myanmar Agenda 21 (2007)**
- **The Environmental Conservation Law (2012)**
- **Environmental Impact Assessment Procedure (2015)**
- **National Environmental Quality (Emission) Guideline (2015)**
- **Myanmar National Land Use Policy (2016)**
- **The Prevention of Danger of Hazardous Chemical and related Substances Law, 2013**
- **Import and Export Law, 2012**
- **Myanmar Fire Brigade Law (2015)**
- **The Social Security Law (2012)**
- **Minimum Wages Law (2013)**
- **Payment of Wages Law, 2016**
- **Leaves and Holidays Act, 1951**
- **Settlement of Labor Dispute Law, 2012**
- **Myanmar Insurance Law, 1993**
- **Public Health law, 1972**
- **The Consumer Protection Law, 2014**
- **The Factories Act, 1951**
- **Natural Disaster Management Law, 2013**

- **National Food Law, 1997 (Amendment 2013)**
- **The Yangon Police Act, 1899**
- **The Police Act, 1945**
- **The City of Yangon Municipal Act, 1922**
- **The City of Yangon Development Law, 1990**

3.2.8.1 The Prevention of Danger of Hazardous Chemical and related Substances Law, 2013

The project proponent will comply with this related law which, either directly or indirectly, relate to environmental and social management of the project as the following section 16, 17, 23, 27.

(Section 16, 17, 23, 27)

The Prevention of Hazard from Chemicals and Related Substances Law was enacted on 26th August 2013. The objectives of this Law include: protecting natural resources from decrease and loss, and safeguarding living things from endangerment caused by chemical and chemical related substances; and systematically controlling safety in carrying out approved chemical and associated materials businesses. The Law requires continuous development of worksite safety, health and environmental conservation.

The Prevention of Hazard from Chemicals and Related Substances Law (2013) defines Chemical as: imposing danger to the health or life of man or animal or chemical element, chemical compound and chemical mixture which cause bad consequences to the environment naturally or appearing after created by man. This definition includes the vapor, liquid, waste materials of oily and solid which act chemically and technically.

Section 16. A person who has obtained a license: -

(a) shall abide the license regulations;

(b) shall perform to abide strictly the instructions for being safety in using the chemical and related substances by himself and also the persons who serve the work;

(c) shall keep the required safety equipment enough in the chemical and related substances businesses, furthermore shall grant the personal protection equipment and dresses free of charge to the working persons;

(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;

(f) shall make medical checkup the working persons who will work in the chemical and related substances business and shall permit to serve in that work after obtaining the recommendation that his health is suitable for that work. This medical checkup records shall be kept systematically;

(g) shall send the copy of informative letter of the permission to the respective Department of Township Administration, if the hazardous chemical or related substances are permitted to store;

(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;

(i) shall transport only the permitted amount of the chemical and related substances in accordance with the prescriptive stipulations, if they are transported in local;

(j) shall take the permission from the Central Supervisory Board if the chemical and related substance is altered and transferred from one place to any other place which contained in the license;

(k) shall abide and perform in accordance with the related environmental laws not to impact and damage to the environment in operating the chemical and related substances business.

Section 17. A person who has obtained a license, shall put the insurance in accordance with the prescriptive stipulations to be able to pay the compensation, if the impact and damage is occurred on the Human Being and Animals or the environment in respect of the chemical and related substances businesses.

Section 23. A person who has obtained the registration certificate: -

(a) shall apply to register again, to the Central Supervisory Board if the chemical and related substances, which are not contained in the registered list, are used;

(b) shall inform and submit the unused chemical and related substances list to the Central Supervisory Board, although which are contained in the registered list.

Section 27. A person who has obtained the license to be complied the following matters to control and decrease the hazard of the chemical and related substances: -

(a) classifying the hazard level to protect in advance the hazard according to the properties of the chemical and related substances;

(b) expressing the Material Safety Data Sheet and Pictogram;

(c) providing the safety equipment, the personal protection equipment to protect and decrease the accident and attending to the training to be used systematically;

(d) performing in accordance with the stipulations in respect of transporting, possessing, storing, using, discharging the chemical and related substances;

(e) not being imported or exported the chemical and related substances banned by the Central Supervisory Board and the machinery and equipment which are used them.

3.2.8.2 Import and Export Law, 2012

The project proponent has to comply with section 7.

Section 7. A person who obtained any license shall not violate the conditions contained in the license.

3.2.8.3 Myanmar Fire Brigade Law (2015)

The project proponent has to comply with section 25(a,b).

Industry, factory, bus station, airport, port, hotel, motel, guest house, community infrastructure, market, office, organization or business which has fire hazard or anyone-No absence for organizing separate fire force

a) No absence to set ready for fire safety equipment

3.2.8.4 The Social Security Law (2012)

The project proponent has to comply with section 11, 15, 16, 48, 50, 51, 54.

The objectives of the Social Welfare Law (2012) and accompanying Social Welfare Rules (2014) include providing workers with the right to draw back some of the contributions paid by employers and workers as savings in accordance with the stipulations, and to obtain the right to continue medical treatment, family assistance benefit, superannuation benefit, survivors' benefit, unemployment benefit, the right to residency and ownership of housing after retirement in addition to health care and pecuniary benefit for sickness, maternity, death, employment injury of the workers.

Section 11 of the Social Welfare Law (2012) requires the following establishments to comply with the provisions for compulsory registration with the social security system and benefits (indicated in the Social Welfare Law) if they employ a minimum number of workers as determined by the Ministry of Labor in co-ordination with the Social Security Board: Industries which carry out business whether or not they utilize mechanical power or a certain kind of power; businesses of manufacturing, repairing and servicing; or engineering businesses, factories, warehouses and establishments.

Section 16. (a) The following employers shall affect insurance for the workers working at their establishments by compulsorily registering at the relevant township social security office and contribute to the social security fund contained in clauses (1), (3), (4), and (5) of sub-section (a) of section 15 in accord with the stipulations to enable to enjoy social security benefits:
1.employers of establishments;
2.employers of establishments employing the number of workers, including the relatives of the employers except at least one worker and their wife, husband, children and parents depending upon them, under sub-section(a) of section 11;
3.employers of unpaid apprentices and trainees.

Section 48 (a) The employer shall affect insurance by registering for employment injury benefit insurance system contained in section 45 at the relevant township social security office and pay contribution to employment injury benefit fund in accord with stipulations in order that workers applied to provisions of compulsory registration may obtain the employment injury benefits

Section 51. The employer:
(a) shall pay contribution monthly to Employment Injury Benefit Fund at the rates stipulated under section 50. Moreover, he shall also bear the expenses for paying as such;
(b) shall pay defaulting fee stipulated under section 88, in addition to the contribution if fails to contribute after effecting insurance for employment injury benefit.

Section 54
(a) The employer shall report to the relevant township social security office immediately if a serious employment accident occurs to his insured worker. There shall not be any delay without sufficient cause to report as such.
(b) A team of officers and other staff who inspect the establishments, if it is found out the employment injury, death, and contracting disease, shall report to the relevant township social security office in accord with the stipulations.

Section 75. The project proponent commits to follow Section 75.
(a)The following records and lists must be properly compiled and submitted to the relevant social security office in accordance with the requirements:
(b) Workers' daily attendance records and lists;
(c)Hiring new workers; Make the worker change his job and work; termination of employment; records of dismissals and resignations;
(d) Employee promotion and salary records;
(e) employer; records and accounts of managers and administrators; Records of these changes.
(f) If the following issues arise, the relevant township social security office must be notified:
(g) changes in the number of employees and changes in the address of the business department;
(h) change of employer; business changes; Work stoppages and closures;
(i) Injured due to injury at work; Causes of death and disease.
(j) Work records and lists shall be submitted when requested by the inspection team or officer assigned by the Social Security Headquarters and Regional Social Security Office levels under this law.

3.2.8.5 Minimum Wages Law (2013)

The project proponent will comply with this related law which, either directly or indirectly, relate to environmental and social management of the project as the following section 12, 13, 22, 24,

The Minimum Wages Law, No. 07/2013 was enacted on 22nd March 2013 (The Minimum Wages

Rules, 2013). Section 12 (d) of the law provides that the employer shall pay the minimum wage to the workers working in the commercial, production business and service in cash.

Section 12.

(a) The project proponet has to pay wage to the worker less than the minimum wage stipulated under this Law;

(b) The project proponet has to pay more than the minimum wage stipulated under this Law;

(c) The project proponet has not to have the right to deduct any other wage except the wage for which it has the right to deduct as stipulated in the notification issued under this Law;

(d) The project proponet has to pay the minimum wage to the workers working in the commercial, production and service business in cash. Moreover, if the specific benefits, interests or opportunities are to be paid, it may be paid in cash or partly in cash and partly in property, with prevailing regional price, jointly according to the desire of the worker;

Section 13.

(a) The project proponet has to inform the workers the rates of minimum wage relating to the business among the rates of minimum wage stipulated under this Law and advertise it at the workplace to enable to be seen by the relevant workers;

(b) The project proponet has to prepare and maintain the lists, schedules, documents and wages of the workers correctly;

(c) The project proponet has to report the lists, schedules and documents prepared and maintained under sub- section(b) to the relevant department in accord with the stipulations;

(d) The project proponet has to accept the inspection when summoned by the inspection officer. Moreover, he shall produce the said lists and documents upon asking to submit;

(e) The project proponet has to allow the entry and inspection of the inspection officer to the commercial, production and service businesses, agricultural and livestock breeding workplaces and give necessary assistances;

(f) if the workers cannot work due to sickness, shall give them holiday for medical treatment in accord with the stipulations;

(g) if the funeral matter of the member of the family of worker or his parent occurs, shall give holiday without deducting from the minimum wage, in accord with the stipulations.

Section 22.

(a) The project proponent has not to fail to pay the workers the minimum wage stipulated under this Law;

(b) The project proponet has not to pay to the workers less than the minimum wages and other benefits which is entitled by the worker under section 14;

(c) relating to the accounts, schedules, documents and lists of wage of the workers: (i) The project proponent has not to make false entry, deceitful recording or false and deceitful reporting; (ii) shall not fail to report to the relevant department in accord with the stipulations; (iii) shall not fail to produce when required by the inspection officer;

(d) The project proponent has not to fail to go and accept inspection when summoned by the inspection officer;

(e) The project proponent has not to obstruct or interfere with the inspection officer who comes and inspects on duty.

Section 24. Any employer:

(a) The project proponent has not to violate any term and condition contained in the minimum wage notification;

(b) The project proponent has not to fail to inform the workers relating to the rates of minimum wage concerning to his workers among the rates of minimum wage stipulated under this Law and announce at the place where the workers are able to see it in the work center and workplace;

3.2.8.6 Payment of Wages Law, 2016

The project proponent will commit to adhere with the followings-

Table 3.1: Payment of Wages Law (No 17/2016) covers the following requirements:

Chapter (2)	Section (3-a), Section (4-a, b, Cc-i, c-ii, d, e, f, g) Section (5), (6)	It is covered all the issue of strategies for payment and timeline between Employer and Employee.
Chapter (3)	Section (7-a, b, c, d) Section (8) Section (9), Section (10-a, b, c, d, e, f, g, h, i, j,), Section (11- a, b), Section (12-a, b) Section (13)	It is covered all the issue of deducted salary based on different categories.
Chapter (4)	Section (14)	Wages issue related with Overtime
Chapter (6)	Section (19-a, b, c), Section (20-a, b, c), Section (21-a, b, c)	Prosecutions policy issue based on salary and wages
Chapte (7)	Section (22), Section (23)	Prohibitions
Chapter (8)	Section (24), (25), (26), (27), (28), (29), (30)	General Information to protect laws regulations and penalties

3.2.8.7 Leaves and Holidays Act, 1951

The project proponent has to comply with section 3,4.
The Leave and Public Holiday Act, 1951 Amended by Law No. 06/2006 and No. 30/2014 include:
Section 3 (1) Every employee shall be granted by his employer the following public holidays with full wages or pay (as the case may be); namely:

- Independence Day – one day
- Full Moon of TaBuang – one day
- Thingyan – three days
- Burmese New Year – one day
- May Day – one day
- Full Moon of Kason – one day
- Resistance Day – one day
- Beginning of Buddhist lent – one day
- Full Moon of TanSaunMom – one day
- National Day – one day

Section 4 (1) Every employee who has completed a period of twelve months continuous service shall be granted earned leave with average wages or average pay for a period of ten consecutive days by his employer during the subsequent period of twelve months.

3.2.8.8 Settlement of Labor Dispute Law, 2012

The project proponent has to comply with 38,39,40,51.
Settlement of Labor Dispute Law (No. 05/2012) Amended by Law No. 40/2014 was enacted for the settlement of labor disputes:

Section 38. Th project proponent must not be sent for negotiation and coordination in respect of the complaint within the prescribed period without sufficient cause.

Section 39. The project proponent must not change the existing stipulations for employees within conducting period before tribunal,

Section 40. The project proponent must not close the work without negotiation, discussion on dispute in accord with this law, decision by tribunal,

Section 51. The project proponent must pay the compensation decided by Tribunal if violates any act or any omission to damage the interest of labor by reducing of product without efficient cause, under section 51 of said Law.

3.2.8.9 Myanmar Insurance Law, 1993

The project proponent has to comply with Myanmar Insuracne Law, 1993.
Require any business which may pollute the environment to effect compulsory general liability insurance.
The project proponent has to comply with section 15,16.
Section 15. Owners of motor vehicles shall effect compulsory Third Party Liability Insurance with the Myanma Insurance.
Section 16. An entrepreneur or an organization operating an enterprise which may cause loss to State-owned property or which may cause damage to the life and property of the public or which may pollution to the environment shall effect compulsory General Liability Insurance with the Myanma Insurance.

3.2.8.10 Public Health law, 1972

Project Proponent has to comply with Section 3 of the Law on Public Health of the Union of Myanmar that empowers the Government of the Union of Myanmar to carry out measures relating to environmental health, such as garbage disposal, use of water for drinking and other purposes, radioactivity, protection of air from pollution, sanitation works and food and drug safety. Provisions to promote and safeguard public health including measures and prohibitions regarding environmental health.

Project proponent has to comply with Section 5 of the Law on Public Health of the Union of Myanmar: The right to enter and inspect the building anytime by the person who have been assigned by these groups, or Government departments and organizations subordinate to the government assigned under this law.

3.2.8.11 The Consumer Protection Law, 2014

The consumer protection law has been prepared and established as follows and the project proponent will commit to adhere with the followings-

Chapter (5), Section 6, Rights and Duties of the Consumer
6. (a) The rights of the consumer are as follows:
(i) enabling to use safety of the goods or services;
(ii) enabling to choose the goods or services and enabling to obtain the promised value, terms and conditions and warranty;
(iii) having right to obtain completely and correctly of information relating to the condition and warranty of the goods or services;
(iv)claiming to hear and settle on dispute related to goods or services used by the consumer, enabling to obtain consumer protection and enabling to obtain correct settlement.
(ii) receiving fair relationship that is non-discriminatory treatment and service.

6.(b) The duties of the consumer are as follows:

(i) complying with the information and guideline related to goods or services intended and expressed to cause safety;

(ii) complying with the decisions of the Consumer Dispute Settlement which settle properly in consumer disputes;

(iii) avoiding false accusation intended to detriment on entrepreneurs; 6

(iv) avoiding the saying, writing and acting in order to detriment on relevant entrepreneurs by mean of media or by other mean while relevant persons is settling the consumer dispute.

Chapter (6), Section 7, Rights and Duties of the Entrepreneurs

7.(a) The rights of the entrepreneur are as follows:

(i) receiving payment in accord with agreements, value in sale of goods or services;

(ii) having right of defence under law in consumer dispute;

(iii) enabling to make regain of goodwill if the injury and loss of the consumer is not because of his goods or services;

(iv) enabling to regain goodwill if it is provable in accord with the law that the injury and loss of the consumer is not because of goods or services that he has purchased;

7.(b) The duties of the entrepreneurs are as follows:

(i) acting the business accord with business ethics;

(ii) giving clear and proper information on goods or services;

(iii) treating honestly and properly with non-discrimination to the consumers;

(iv) guaranteeing the goods or services traded or produced based on stipulated standard and quality;

(v) providing opportunity to test on goods or services which require to test quality before purchasing;

(vi) taking responsibility as guaranteed in respect of damage due to consuming goods or using services during the warranty period;

(vii)taking responsibility as agreed terms and conditions if received or used goods by consumer are inconsistent with the agreement;

(viii)complying exactly with the agreed agreement or promise in the agreement in doing service business;

(ix) avoiding the saying, writing and acting to cause detriment on the relevant consumer by means of media or by other means while relevant person is settling the consumer dispute.

Chapter (8), Section 16 and 17, Formation of the Consumer Dispute Settlement Body and Functions and Duties thereof

16. The Central Committee shall, in order to carry out systematically the functions of consumer protection and to settle the disputes of consumers, form the Consumer Dispute Settlement Bodies in Regions or States, Districts, Townships with suitable persons.

17. The functions and duties of the Consumer Dispute Settlement Bodies are as follows:

(a) mediating and conciliating consumer disputes;

(b) distributing knowledge to consumer relating to consumer protection;

(c) accepting and examining the complaint in writing or oral of consumer relating to the goods or services;

(d) carrying out duties conferred by the Central Body from time to time.

Chapter (9), Section 18, Settlement of Consumer Dispute

18. The Consumer Dispute Settlement Body shall, in settling the consumer disputes, carry out the followings:

(a) examining the entrepreneur who is accused of violation;

(b) examining the person who knows the consumer dispute, eye-witnesses and expert;
(c) examining and assessing the documents required in inquiry and other exhibits;
(d) examining and deciding whether or not there is loss at consumer's side;
(e) notifying the decision related to consumer protection to the entrepreneur who has violated against it in dispute;
(f) taking action if violates the provisions in section 8.

Chapter (10), Section 19,20,21 and 22, Right To Take Action of The Consumer Dispute Settlement Body

19. The Consumer Dispute Settlement Body may, if finds out that the entrepreneur fails to comply any duty mentioned in sub-section (b) or section 7 or violates any mentioned in section 8, pass decision and take any one or more of the following actions:
(a) warning;
(b) severe warning;
(c) remedy;
(d) prohibiting the sale and distribution of goods that are disputing in limited period;
(e) causing to recall the goods in market;
(f) destroying the goods that are enable to cause danger to consumers;
(g)coordinating with the relevant Ministries if required to revoke license temporarily or permanently of business permit.

20. The person who is not satisfied with the decision passed relating to taking actions contained in section 19 may appeal to the Central Committee within 60 days from the date of passing decision.
21. The Central Committee may confirm, amend or cancel the decision passed by the Consumer Dispute Settlement Body. The decision of the Central Committee shall be final and conclusive.
22. The Department, shall have the right to collect as arrears of revenue on the person who fails to pay compensation under the order passed in accord with the provisions contained in this chapter. In collecting so, any suitable official may be assigned duty as the collector.

3.2.8.12 The Factories Act, 1951

The Factories Act, 1951 and Law Amending the 1951 Factories Act -Pyidaungsu Hluttaw Law No. 12/2016 contains provisions for the proper disposal of waste and effluents in factories; treatment of waste water; regulations for health and cleanliness in factories, and the prevention of hazards.
The project proponent has to comply with section 23, 30, 32, 33, 35, 37, 39, 40,

Section 23: Fencing of Machinery
(1) In every factory the following shall be securely fenced by safe-guards of substantial construction which shall be constantly maintained and kept in position while the machinery is in operation: -

Section 30: Hoists and Lifts
(1) Every hoist or lift shall be of good mechanical construction, sound material and strength and shall be properly maintained.
(2) Every hoist or lift shall be thoroughly examined by an authorized examiner at least once in every period of six months and a register shall be kept containing the prescribed particulars for every such examination.
(3) Every hoist-way or lift-way shall be sufficiently protected by an enclosure fitted with gates. The hoist or lift and every such enclosure shall be so constructed as to prevent any person or thing from being trapped between any part of the hoist or lift and any fixed structure or moving part.
(4) The maximum safe working load shall be clearly marked on every hoist or lift and no load greater than that shall be carried thereon.
(5) The cage of every hoist and lift used for carrying persons shall be fitted with a gate on each

side which provides access to a landing.

Section 32: Revolving Machinery

(1) In every factory in which the process of grinding and abrading is carried on there shall be permanently affixed to or placed near each machine in use a notice indicating the maximum safe working peripheral speed of every grinding of abrading wheel. The speed of the shaft or spindle upon which the wheel is mounted, and the diameter of the pulley necessary to secure such safe working peripheral speed.

(2) The speeds indicated in notice under sub section (1) shall not be exceeded.

(3) Effective measures shall be taken in the factory to ensure that the safe working peripheral speed of every revolving vessel, cage, basket fly wheel, pulley, discs or similar appliance driven by power is not exceeded.

Section 33 (1): Pressure Plant

(1) If in any factory, any part of the machinery or plant used in a manufacturing process is operated at a pressure above atmospheric pressure, effective measures shall be taken to ensure that safe working pressure of such parts is not exceeded.

(2) The President may make rules providing for the examination and testing of any plant or machinery refer to in sub section (1) and prescribing such other safety measures in relation thereto as may in his opinion be necessary in any factory or class of factories.

Section 35: Heavy Lifting

(1) No woman adolescent or child shall be employed in any factory to lid or carry or move any load so heavy as to be likely to cause injury.

(2) The President may make rules prescribing the maximum weights that may be lifted, carried or moved ordinarily by persons employed in factories or in any class or description of factories or in carrying on specified process.

Section 37: Protection of Eyes

In respect of any such manufacturing process carried on in any factory as may be prescribed, being a process, which involves-

(a) risks of injury to the eyes from particles or fragments thrown off in the course

(b) of the process; or

(c) risk to the eyes of exposure to excessive light, the President may make rules that require that effective screens or suitable goggles shall provide for the protection of persons employed on, or in the immediate vicinity of the process.

Section 37: Protection from Fumes

(1) In any factory no person shall enter or be permitted to enter any chamber, tank, vat, pit, pipe, flue or other confined space in which dangerous fumes are liable to be present to such an extent as to asphyxiate persons, unless it is provided with a man-hole of adequate size, or other effective means of egress.

(2) No portable electric light of voltage exceeding 24 volts shall be permitted in any factory for use inside any confined space referred to in sub-section (1), and where the dangerous fumes present are likely to be inflammable, no lamp or light other than that of flame-proof construction shall be permitted to be used in such confined space.

(3) No person in any factory shall enter or be permitted to enter any such confined space referred to in sub-section (1) unless all possible measures have been taken to remove any fumes which may be present and to prevent any ingress of fumes and unless either,

(a) a certificate in writing has been given by an authorized examiner, based on a test carried out by himself, that the space is free from dangerous fumes and fit for persons to enter; or

(b) the person entering is wearing a suitable breathing apparatus and a belt securely attached to a rope the free end of which is held by a person standing outside the confined space.

(4) In every factory suitable breathing apparatus, reviving apparatus and belts and ropes shall be

kept ready for immediate use in the vicinity of any such confined space which any person has entered. All such apparatus shall be examined at regular intervals and certified by an authorized examiner to be fit for use; and a sufficient number of the persons from amongst the employed in every factory shall be trained in the use of all such apparatus and in artificial respiration.

(5) In any factory no person shall be permitted to enter any boiler, boiler furnace, boiler flue, chamber, tank, vat, pipe, or other confined space for the purpose of working or making any of examination therein until it has been sufficiently cooled by ventilation or otherwise so as to be safe for persons to enter.

(6) The President may make rules prescribing the minimum dimensions of the manholes referred to in sub-section (1), and may by order in writing exempt or subject to such conditions as he may think fit, any factory or class or description of factories from compliance with any of the provisions of this section.

Section 39: Explosive or Inflammable Dust, Fume, Etc.

(1) Where in any factory any manufacturing process produces dust, fume or vapor of such nature and to such an extent as to be liable to explode on ignition. All possible measures shall be taken to prevent any such explosion by –

(a) effective enclosure of the plant or machinery used in the manufacturing process;

(b) removal or prevention of accumulation of dust, fume or vapor;

(c) isolation or effective enclosure of all possible sources of ignition

(2) Where in any factory the plant or machinery used in a process referred to in sub-section (1) is not so constructed as to withstand the force of such an explosion, all possible measures shall be taken to prevent the spread of the explosion and to minimize the damage caused thereby, by providing chokes, baffles, vents or other effective appliances in the plant or machine.

(3) Where in any factory any part of a plant or machinery that contains any explosive or inflammable fumes and vapor under pressure greater than atmospheric pressure, such part shall not be opened except in accordance with the following provisions, namely: -

a) before the fastening of any joint of any pipe connected with such part is loosened, any flow of gas or vapor into the part or into any such pipe shall be effectively stopped by a stop-valve or other means;

b) before any such fastening of any joint or any pipe or the firmly fastened cover is removed, all measures shall be taken to reduce the pressure of the fume or vapor in the part or pipe to atmospheric pressure;

c) where any such fastening has been loosened or removed effective measures shall be taken to prevent any explosive or inflammable fume or vapor from escaping from the pipe plant or parts of machinery until such cover or joint has been firmly re-fastened or firmly refaxed.

(4) No plant, tank or vessel which contains, or has contained any explosive or inflammable substance, shall be subjected in any factory to any welding, brazing, soldering or cutting operation involving the application of heat, unless adequate measures have been taken to remove such substance and fumes arising therefrom, or to render such substance and fumes non- explosive or non-flammable, and unless a certificate in writing has been given by a competent examiner after a test carried out by himself that the plant, tank, or vessel is free from explosive or flammable vapor. No such substance shall be allowed to enter such plant, tank or vessel after any such operation, until the metal has cooled sufficiently to prevent any risk of igniting the substance.

Section 40: Arrangements to be Made in Case of Fire

(1) Every factory shall be provided with such means of escape in case of fire as may be prescribed, and if it appears to the Inspector that any factory is not so provided, he may serve on the manager of the factory an order in writing specifying the arrangements which, in his opinion, should be carried out to bring the factory into conformity with the provisions of this section and any rules

made thereunder, and requiring them to be carried out before a date specified in the order.
(2) In every factory the doors affording egress from any room shall not be locked or fastened so that they cannot be easily and immediately opened from the inside while any person is within the room, and all such doors, unless they are of the sliding type, shall be constructed to open outwards.
(3) In every factory, every window, door or other exit affording a means of escape in case of fire, other than the means of exit in ordinary use, shall be distinctively marked in a language understood by the majority of workers and in red letters or by some other effective and clearly understood sign.
(4) In every factory there shall be installed apparatus to give warning in case of fire clearly audible to every person employed in the factory.
(5) A passage - way giving access to such means of escape in case of fire shall be kept clear for the use of all workers in every room of the factory.
(6) Effective measures shall be taken to ensure that in every factory-
(a) where more than twenty workers are ordinarily employed in any place on the lowest floor, or
(b) where explosive or highly flammable materials are stored or used, all the workers are familiar with the means of escape in case of fire and have been adequately trained in the procedure to be followed in such case.

3.2.8.13 Natural Disaster Management Law, 2013

The project proponent will commit to adhere with the followings-

Chapter (6), Section 13,14,15,16,17 and 18, Natural Disaster Management

Section 13, The department, organization or person that has been assigned responsibility under this Law:
(a) shall undertake the following functions after laying down the plan in accord with the natural disaster management plans in order to reduce damage and losses that are likely to be caused by natural disaster;
(i) preparatory and preventive measures for natural disaster risk reduction in pre-disaster period;
(ii) emergency responses including search and rescue during natural disaster;
(iii) rehabilitation and reconstruction activities for improving better living standard in post disaster period and conservation of the environment that has been affected by natural disaster;

(b) shall give priority and protect infants, the elderly, the disabled and women (especially pregnant women or mothers and suckling mother) in carrying out the functions contained in sub-section (a);
(c) shall refrain from the act that causes injuring human dignity in supporting the victims.

Section 14, Preparatory measures for natural disaster risk reduction before natural disaster include the following:
(a) prioritization of the natural disaster risk reduction by the National Committee and the Local Body respectively;
(b) carrying out better improvement on early warning system of natural disaster;
(c) applying knowledge and innovation to be a habit of safety and resilience at every level from the National Level to the ward or village tract level;
(d) carrying out together with the measures of natural disaster risk reduction in development plans of the State;
(e) establishing sound preparations to resolve the natural disaster at every level from the National Level to the ward or village tract level.

Section 15, Preparatory measures to be organized before natural disaster in the area where is likely to strike natural disaster include the following:

(a) identifying the area where is likely to strike natural disaster and preparing the natural disaster risk assessment and planning emergency management;
(b) giving pubilc awareness of knowledge of the natural disaster, keeping the early warning systems, training for search and rescue and making rehearsal;
(c) enhancement of the capacity of the public for emergence of a disaster resilient community in compatible with climate change for reduction of damage and losses due to unforeseen disaster risk caused by climate change;
(d) guidance, motivation and implementation of active participation from the community including volunteers in the community-based natural disaster management activities and disaster reduction activities by the National Committee and Local Body;
(e) issuing early warning information to the public to enable to evacuate in time and move their properties and cattle to the safety area;
(f) stockpiling to enable ready to provide the minimum requirement of food and relief items and rehabilitation materials according to the type of natural disaster;
(g) taking measures to enable to get assistance of the Defence Services, the Myanmar Police Force, the Fire Brigade, the Red Cross, volunteers organizations, civil societies and other non-government organizations for search, rescue and support functions expeditiously;
(h) communications network for giving necessary assistance by foreign countries, international organizations and external regional organizations in case of serious damage and heavy losses caused by natural disaster;
(i) taking preparatory measures for rehabilitation and reconstruction activities of health, education, social and other sectors for improving better living standard after disaster;
(j) performing other duties assigned by this Law in respect of the preparatory measure

Section 16, Preventive measures to be carried out in the area where is likely to strike natural disaster before the natural disaster include the followings:
(a) building cyclone shelters and life-saving hillock-sanctuaries in the area where is not easy to evacuate;
(b) constructing embankments along the coast and in the flooded area;
(c) preservation of mangroves along the coast and planting fast-growing trees;
(d) taking preventive measures according to the type of natural disaster;
(e) performing other duties assigned by this Law in respect of the preventive measures

Section 17, When the natural disaster strikes, emergency responses including search and rescue include the following:
(a) emergency search and rescue of missing persons due to natural disaster;
(b) evacuation of the victims to the safety area and providing accommodation in temporary shelters;
(c) emergency supporting of food and relief items;
(d) clearance of damage and collecting preliminary data on losses and making examinations for necessaries to provide;
(e) opening an emergency management centre and closely supervised the natural disaster;
(f) providing emergency health care to the local people and prevention of the outbreak of contagious diseases by forming mobile healthcare teams;
(g) providing medical treatment to the injured and the sick by opening temporary clinics and hospitals;
(h) conducting emergency responses including search and rescue according to the type of natural disaster;
(i) performing other duties assigned by this Law in respect of emergency responses including search and rescue.

Section 18, Rehabilitation and reconstruction activities to be carried out after disaster include the following:
(a) data collection and confirmation of damage and losses due to natural disaster;
(b) providing the continuation of sufficient food, relief and rehabilitation items, appropriate and financial assistance from the alloted funds to the victims;
(c) laying down the plan for rehabilitation and reconstruction on the situation of damage and losses;
(d) reconstruction of buildings and houses damaged by the natural disaster in an appropriate area as disaster-resilient buildings;
(e) rehabilitation in order to restore agriculture, livestock breedings and other vocations required for victims;
(f) establishment of reintegration into society by uplifting to the mental affected person due to natural disaster;
(g) providing medical treatment to the victims and taking preventive measures against the contagious disease that is likely to cause as supplementary;
(h) taking measures for the continuation of students' studies out of the victims and reconstruction of schools;
(i) taking measures for the safety of the victims and rule of law in the disaster affected area;
(j) coordination with the relevant body of the prevention against human trafficking for the prevention against human trafficking to the victims;
(k) performing other duties assigned by this Law in respect of rehabilitation and reconstruction activities.

Chapter (7), Section 19,20,21,22,23 and 24, Natural Disaster Management Fund

Section 19, The National Committee shall establish the Natural Disaster Management Fund with the following receipts to carry out natural disaster management activities:
(a) allocation from the Union budget fund;
(b) contribution and donation from foreign countries, international organizations and external regional organizations, loans from local and foreign and other official receipts;
(c) contributions and donations of local bodies, well-wishers in local and foreign, civil societies and other non-government organizations;
(d) official accrued money received from fund.

Section 20, The Region or State Natural Disaster Management Bodies shall establish the Region or State Natural Disaster Management Fund with the following receipts under the permission of the National Committee:
(a) allocation from the Region or State Government's budget fund;
(b) contributions and donations from foreign countries, international organizations and external regional organizations and other official receipts;
(c) contributions and donations of well-wishers in local and foreign, civil societies and other non-government organizations.
(d) official accrued money received from fund.

Section 21, The National Committee shall draft the Financial Regulations on Natural Disaster Management in coordination with the Union Auditor General's Office.

Section 22, The Region or State Natural Disaster Management Bodies shall draft the Financial Regulations on Natural Disaster Management in accord with the guidance of the National Committee.

Section 23, The National Committee may, if necessary, allocate funds from the National Natural Disaster Management fund to the Region or State Natural Disaster Management fund.

Section 24, The National Committee shall submit an audit report in respect of spending and management of the National Natural Disaster Management fund and the Region or State Natural Disaster Management fund in accord with the financial regulations.

3.2.8.14 National Food Law, 1997 (Amendment 2013)

The project proponent will comply with this related law as the following section18, 22, 25.

Section 18:

The project proponent will not produce, import, export, store, distribute or sell food strictly abide by the order, directive and conditions issued by the relevant Government department or rganization or Board of Authority in respect of quality assurance of food, labelling and advertisement.

Section 22:

The project proponent will not produce import, export, store, distribute or sell food which are under the types of food mentioned in this law, section 22.

Section 25:

The project proponent will not produce, import, export, store, distribute or sell food abide by the order, directive and conditions issued by the relevant Government department or rganization or the Board of Authority in respect of the following:-

(a) quality assurance;

(b) labelling;

Environmental Consevation Law (2012)
Chapter I

Title and Definition

The following expression contained in this law shall have the meaning given here under;

2 (b) Environmental Quality means the balance of nature including man made objects wand also animals, plants, natural resources for the benefit of sustainability of nature and human begins;

(c) Environmental Quality Standard means the parameters of general quality for enhancement and conservation situations

(d) Environmental Audit means periodic, systematically documented and objective evaluation to determine the followings;

I. Correspond with regulatory requirements on environmental conservation;
II. Environmental management system;
III. Various possible environmental risks to the building, plots and premises.

(e) Pollution means any direct or indirect alteration, effect of the physical, thermal, chemical or biological properties of any part of the environment including land, water and atmosphere by discharging, emitting or depositing environment hazardous substances, pollutants or wastes so as to affect beneficial use of environment, or to affect public health, safety or welfare, or animals and plants or to contravene any condition, limitation or prohibition contained in the prior permission issued under this Law;

(f) Noise Pollution means the occurrence of sound unit which cause annoyance, fatigue, loss of hearing or interference with the perception of other sounds;

(g) Pollutant means solid, liquid, or vapour which directly or indirectly alters the quality so as to affect beneficial us of any segment or element of the environment or is hazardous or potentially hazardous to health or causes pollution;

(h) Waste includes solid, liquid, or vapour and also includes anything which is classified as waste in accord with this Law including radioactive substance which is discharged, emitted or

deposited in the environment in such volume, constituency or any manner which causes environmental pollution;

(i) Hazardous Substance means a substance or object which may affect health including explosive substance, substance which may be created and used as a biological weapon, substance which may be used as a nuclear weapon, inflammable substance, oxidizing and peroxidizing substance, toxic substance, pathogenic substance, radioactive substance, genetic transforming substance, corrosive substance, irritating objects, whether chemical or not, which can be harmful to human being, animal, plant, property or environment;

(j) Beneficial Use means the use of the environment or any element or segment of the environment after making required protections from the adverse effects of waste, discharges, emissions and deposits so as to cause public health, safety or welfare;

(k) Cleaner Production means the continuous application of multi-strategy on environmental conservation to processes, products and services to improve the use of resource efficiently minimize waste, polluted water and emissions and converse and conserve the healthy nature and human environment

(l) Control Equipment includes the followings:

(i) any apparatus for collecting waste;
(ii) any automatic device which can be used for more effective operation of any equipment
(iii) any devices for indicating or recording pollution or warning of excessive pollution;
(iv) any other device or facility used for the purpose of limitation of pollution;

(p) Environmental Emergency means the situation which may affect the safety and health of the public or the environment and ecosystem if nature or man-made disaster or pollution is not taken action immediately;

The following facts relating to air pollution are extracted as follows:

Chapter II
Objectives
The objectives of this Law are as follows;

3 (c) To enable emerge a healthy and clean environment and to enable to conserve natural and cultural heritage for the benefit of present and future generations;

(f) To enable to implement for promoting public awareness and cooperation in educational programmes for dissemination of environmental perception;

Chapter III

Formation of the Environment Conservation Committee –

The powers of the committee are as follow:

6(c) Accepting donations, grants, materials, and technological acids from local and foreign and managing and using such money, materials and technologies as may necessary in environmental conservation works;

6(f) Prohibiting the relevant Government department and organization if the environmental damages arise or situations for damage arise and , if necessary, asking policy to the Union Government;

Chapter IV

Duties and Power relating to the Environmental Conservation of the Ministry are as follows;
7 (a) Implementing the environmental conservation policies;
(b) Planning and laying down national or regional work plans relating to environmental management;

(c) Laying down, carrying out and monitoring programmes for conservation and enhancement of the environment, and for conservation, control and abatement not to cause environmental pollution;

(d) Prescribing environmental quality standards including standards on emissions, effluents, solid wastes, production procedures, processes and products for conversation and enhancement of environmental quality;

(e) Submitting proposals to the Committee for economic incentive mechanisms and terms and conditions which may not affect the environment or cause least environmental affect for sustainable development in addition to legal affairs and guidelines relating to environment;

(i) Promoting and carrying out the establishment of necessary factories and stations for the treatment of solid wastes, effluents and emission which contain toxic and hazardous substance;

(j) Prescribing the terms and conditions relating to effluent treatment in industrial estates and other necessary places and buildings and emissions of machines, vehicles and mechanisms;

(l) Implementing the international, regional and bilateral agreements accepted by Myanmar for environmental quality in accord with the guidance adopted by the Union Government or the Committee;
(m) Causing to lay down and carry out a system of environmental impact assessment and social impact assessment as to whether or not a project or activity to be undertaken by any Government department, organization or may cause a significant impact on the environment;

(n) Laying down guidance relating to the management, conservation and enhancement of environment for the matters of protection of ozone layer, conservation of biological diversity, conservation of coastal environment, mitigation and adaption of global warming and climate change, combating desertification and management of non-depleting substance and management of other environmental matters;

(o) Managing to cause the polluter to compensate for environmental impact, cause to contribute fund by the organizations which obtain benefit from the natural environmental service system, cause to contribute a part of the benefit from the businesses which explore, trade and use the natural resources in environmental conversation works;

Chapter V

Environmental Emergency

9(a) If the Committee is aware that an event of environmental emergency has occurred or may occur in the entire Myanmar or any Region or state or any area, it shall immediately report to the Union Government so as to declare the occurrence of such event;

Chapter VI

Environmental Quality Standards

10 The Ministry may, with the approval of the Union of the Government and the Committee, stipulate the following environmental quality standards:

(a) Suitable surface water quality standards in the usage in rivers, streams, canals, springs, swamps, lakes, reservoirs, and other inland water sources of the public;

(c) Underground water quality standards;

(d) Atmospheric quality standards;

(e) Noise and vibration standards;

(f) Emission standards;

(g) Effluents standards;
(h)Solid wastes standards;

Chapter VII

Environmental Conservation

13. 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 department and organizations in the following matters:

(b) Transport, storage, use, treatment and disposal of pollutants and hazardous substances in industries;

(c) Disposal of wastes come out from exploration, production and treatment of minerals, industrial mineral raw material and gems;

(d) Carrying out waste disposal and sanitation works;

(f) Carrying out other necessary matters relating to environmental pollution.

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.

15 The owner or occupier of any business, material pr 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.

16 (a) is responsible to carry out by contributing the stipulated cash or kind in the releavant 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, special economic zone and business organization;

(c) shall comply with directives issued for environmental conservation according to the releavant industrial estate, special economic zone or business.

Chapter VIII

Management of Urban Environment

17 The Ministry shall, for the management of urban environment, advise as may be necessary to the relevant Government departments and Government organizations, private organizations and individuals in carrying out the following matters in accord with the guidance laid down by the Committee:

(a) Land use planning and management including zoning;

(d) Management of wastes;

(e) Pollution control including land, water, air and noise pollution;

(f) Other necessary environmental management

Chapter IX

Conservation of Natural Resources and Cultural Heritages

18. The relevant Government departments and Government organization shall, in accord with the guidance of the Union Government and the Committee, carry out the conservation, management, beneficial use, sustainable use and enhancement of regional cooperation of the following environmental natural resources;

(c) Fresh water resource including underground water;

Chapter X

Prior Permission

21 The Ministry may, with the approval of the Union Government, stipulate the categories of business, work-site or factory, work-shop which may cause impact on the environmental quality that requires to obtain the prior permission.

22 The owner or occupier of the category of business, work-site or factory, workshop stipulated by the Ministry under section 21 shall apply for the prior permission to the Ministry in accord with the stipulations.

23 The Ministry may, after scrutinizing whether or not the application mad under section 22 is in conformity with the stipulations, grant or refuse to issue the prior permission by stipulating terms and conditions.

24 The Ministry may, in issuing the prior permission, stipulate terms and conditions relating to environmental conversation. It may conduct inspection whether or not it is performed in conformity with such terms and conditions or inform the relevant Government department, Government organizations to carry out inspections.

25 The Ministry may, if it is found that a holder of the prior permission fails to comply with any of the terms and conditions relating to environmental conversation contained in the prior permission, pass any of the following administrative penalties:

a. Causing to comply with in accord with the terms and conditions after warning, causing to sign the bond;
b. Causing to comply with in accord with the terms and conditions after paying a fine.

Chapter XI
Insurance
26 The holder of the prior permission shall effect insurance according to the category of his business, work-site or factory, workshop for any accident that may cause impact on the environment, in accord with the existing Law.

27. The Ministry shall give the remark if it is requested by the Myanmar Insurance on the extent and potential environmental impact in respect of the business, department or organization which carries out the business to be insured under section 26.

Chapter XII
Prohibitions
30. No one shall, without permission of the Ministry, import, export, produce, store, carry or trade any material which causes impact on the environment prohibited by the Ministry.

Chapter XIII Offences
and Penalties
34. Whoever imports, exports, produce, store, carry or trade any material prohibited by the Ministry due to its impact on environment shall, on conviction, be punished with imprisonment for a term from a minimum of three years to a maximum of five years, or with fine from a minimum of kyats, or with both. Moreover, he shall incur the expenditure for the treatment and disposal of such material until the process that has no impact on the environment.

Chapter XII
Prohibitions
28 No one shall, without the prior permission, operate business, work-site or factory, workshop which is required to obtain the prior permission under this Law.

29 No one shall, without violate contained in the rules, notification, orders, directives and procedures issued under this Law.

Chapter XIII

Offences and Penalties

31 Whoever, without the prior permission, operates business, work-site or factory, workshop which is required to obtain the prior permission under this Law shall, on conviction, be punished with imprisonment for a term not exceeding three year, or with fine from a minimum of one hundred thousand kyats to a maximum of one million kyats, or with both.

32 Whoever violates any prohibition contained in the rules, notifications, orders, directives and procedures issued under this Law shall, on conviction, be punished with imprisonment for a term not exceeding one year, or with fine, or with both.

33 Whoever shall:

(a) If convicted under section 32, be passed an order to compensate for damage due to such act or omission;
(b) If ordered under sub-section (a), and fails to pay the compensation to be paid , be recovered in accord with the existing revenue laws.

Chapter XIV
Miscellaneous
35 In prosecuting an offender under this Law, prior sanction of the Ministry shall be obtained.

36 The Ministry may, with the approval of the Union Government, exempt or private business from complying with any provision contained in this Law for the interests of the Union and its people

37 If any Government department, organization or individual incurs the expenditures for any action due to the declaration of environmental emergency, such expenditures are entitled to claim from the environmental management fund.

38 The relevant Government department, Government organization authorized to issue licence, permit or register or factory, workshop which is required to obtain the prior to the business , work-sitre or factory, workshop which has obtained the prior permission under this Law.

39. (a) The Ministry shall, if the person obtained the prior permission who was imposed with administrative penalty under-section 25fails to comply with the terms and condition, inform the relavant Government department, Government organization authorized to issue licence, permit or register for the relevant business, work-site or factory, workshop to enable to take action as may necessary.

(b) The Government department, Government organization received information under sub-section (a) may, after making necessary inquiries if is found that any terms and conditions of environmental conservation contained in the prior permission is not complied with, cancel the issued licence, permit or register or suspend it for a limited period.

40 The offence contained in section 32 is determined as the cognizable offence.

41 The provisions relating to environmental conservation contained in the laws, rules, orders, directives and procedures issued before the enactment of this Law shall remain in force unless it is contrary to the provisions contained in this Law.

42 In implementing the provisions contained in this Law:

(a) The Ministry may issue necessary rules, regulations and by-laws with the approval of the Union Government
(b) The Committee and the Ministry may issue necessary notifications, orders, directives and procedures.

Environmental management in the country has been traditionally undertaken by line agencies within their respective mandates. In addition, the Private Industrial Enterprise Law of 1990 and the Myanmar Insurance Law of 1993 regulate any construction, business, mill or factory which can cause pollution to environment on whether there is compliance with required sanitary conditions. These laws also recognize the nature of the factory, location and population density of the neighbourhood.

3.2.9International Environmental Conventions/Protocols/Agreements Signed/Ratified by Myanmar

Table 3.2: International environmental conventions/protocols/agreements signed/ratified by Myanmar

International Environmental Conventions/Protocols/Agreement	Date of Signature	Date of Ratification	Date of Member	Cabinet Approval Date
1.Kyoto Protocol to the Convention on Climate Change, Kyoto, 1997		13-8-2003 (Accession)		26/2003 (16-7-2003)
2.ASEAN Agreement on Transboundary Haze Pollution	10-6-2002	13-3-2003 (Ratification)		7/2003 (27-2-2003)
3.The International Tropical Timber Agreement, Geneva, 1994		31.1.1996 (Ratification)		
4.United Nations Framework Convention on Climate Change, New York, 1992(UNFCCC)	11-6-1992	25-11-1994 (Ratification)		41/94 9-11-1994
5. London Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer, London, 1990		24-11-1993 (Ratification)	22-9-1994	46/93
6.Montreal Protocol on Substances that Deplete the Ozone Layer, Montreal, 1987		24-11-1993 (Ratification)	22-9-1994	46/93
7.Vienna Convention for the Protection of the Ozone Layer, Vienna, 1985		24-11-1993 (Ratification)	22-9-1994	46/93
8.International Convention for the Prevention of Pollution from Ships, London, 1973 and its Protocol of 1978		(Accession)		

9.ICAO ANNEX 16 to the Convention on International Civil Aviation Environmental Protection Vol. II Aircraft Engine Emission		(Accession)		

3.2.10Myanmar laws and regulations related to air pollution and climate change control

Myanmar laws addressing the control of air pollution are as follows:

3.2.10.1The penal code

The Project Proponent will adhere with the following section;

The Penal Code was enacted in 1860 in India and adapted it when Myanmar regained her independence in 1948.

Section 278 of the Penal Code provides for the offence of making atmosphere noxious to health. It provides that whoever voluntarily vitiates the atmosphere in any place, so as to make it noxious to the health of persons in general dwelling or carrying on business in the neighbourhood or passing along a public way, shall be punished with fine which may extend to five hundred kyat.

Moreover, section 285 of the Penal Code provides for the offence of negligent conduct with respect to fire or combustible matter. It provides that whoever does with fire or any combustible matter any act so rashly or negligently as to endanger human life, or to be likely to cause hurt or injury to any other person., or knowingly or negligently omits to take such order with any fire or any combustible matter in his possession as is sufficient to guard against any probable danger to human life from such fire or combustible matter, shall be punished with imprisonment of either description for a term which may extend to three years, and shall also be liable to fine. Though offence under section 278 is non-cognizable, offence under section 285 is cognizable by police according to the Code of Criminal Procedure.

3.2.10.2 The Yangon Police Act, 1899

The Project Proponent will adhere with the following section;

Section 16 (d) of the Yangon Police Act provides that it shall be the duty of every police officer promptly to obey and execute all orders and warrants lawfully issued to him by any competent authority, and to take lawful measures for, inter alia, assisting in the protection of life and property at fires.

3.2.10.3 The Police Act, 1945

The Project Proponent will adhere with the following section;

The Police Act also has similar provisions in its section 18. It provides that the duty of every police officer shall be promptly to obey and execute all orders and warrants lawfully issued to him by any competent authority, and to, take lawful measures to assist in the protection of life and property at fires. Though those provisions of the Yangon Police Act and the Police Act originally intended for public order, they also effect for prevention of air pollution.

3.2.10.4 The City of Yangon Municipal Act, 1922

The Project Proponent will adhere with the following section;

The Yangon City Development Committee (YCDC) is required, under clause (xvi) of section 25 of the City of Yangon Municipal Act, to make adequate provision for the maintenance of a fire brigade and of suitable appliances for the extinction of fires and the protection of life and property against fire.

Under section 123 of the Act, YCDC may refuse to give permission to establish new factory, workshop or bakery or remove from one place to another of them or reopen or renew after discontinuance for a period of not less than two years or enlarge the area or dimension of them, if it is of opinion that the establishment of such factory, workshop or bakery in the proposed position is objectionable by reason of the nature of the site thereof or the density of the population in the neighbourhood thereof or will be a nuisance to the inhabitants of the neighbourhood.

Under clause (xxxii) of section 235 the Act, rules made under the Act may provide for or regulate the prevention and regulation of the discharge of smoke, steam, fumes and noxious vapours.

3.2.10.5 The City of Yangon Development Law, 1990

The Project Proponent will adhere with the following section;

Section 7(p) of the City of Yangon Development Law provides that YCDC shall in respect of duties and responsibilities, lay down policy, give guidance, supervise or implement, inter alia, carrying out precautionary measures against fire in the territory of the City of Yangon.

The main provision of section 33(a) of the City of Yangon Development Law is concerned to manage pollution from motor vehicles, industries, and area sources are discussed in the following paragraph.

In exercise of power conferred by section 33(a) of the City of Yangon Development Law, the City of Yangon Development Committee (Committee) made the Rules Relating to Conservation of Environment and Sanitation by its Notification No. 10/99 dated 24 December 1999.

Its rule 27 provides that the Committee may, after consulting with relevant departments and organizations, direct the responsible persons of mill and factory to make necessary management not to affect the environment due to emissions from the mill and factory.

Rule 30 also empowered the Committee to direct the owner or user of any vehicle to make necessary arrangements concerning his vehicle not to emit excessive smoke and loud noise for which the environment cannot tolerate. Rule 31 provides that the Committee may notify to relevant Government department or organization to enable to make necessary arrangements by owner or operator or user of any construction, business, mill or factory which caused pollution to environment. Rule 42 provides that the Committee shall arrange to be free from bad odours, smokes and ashes, in conducting funeral by incineration.

The City of Yangon Development Law of 1990 gives YCDC the mandate to employ the necessary orders, directions, and procedures in order to carry out its duties and responsibilities.

Pertinent sections of the law with regard to pollution management are:

Section 33(a), prescribes proper management of pollution from motor vehicles, industries, and area sources. Rule 27 recognizes the responsibility of the Committee to regulate pollution

emitted from any construction, business, mill or factory. Rule 30 empowers the Committee to control vehicle emissions such as excessive smoke;

Order No. 3/96, stipulates that any kind of waste (solid/liquid/gas) generated from construction, business, factory and gardening is not allowed to dispose of discharge to public places such as roads, drains, lakes, streams, creeks and valleys;

Section 5(10) of Order No. 10/99 requires making pollution control arrangements prior to the establishment of any business. The person, who intends to establish any business and/or factory, needs to propose the environmental pollution control plan to YCDC.

At present, **Yangon Municipal Development Law, 2018** including the environmental pollution control and management (air water, waste, etc.) for the Yangon region has been approved by Yangon Region Parliament, the Republic of the Union of Myanmar. The Yangon Municipal Development Law, 2018 prescribes proper management of sewage and waste water collection and disposal activities in Section (19), public health and safety management in Section (20), environmental protection and cleaning activities in Section (23), conducting administrative activities in Section (24), conducting regulatory services in Section (27) and prohibitions in Section (29).

3.3 Institutional framework for environmental management

Ministry of Environmental Conservation and Forestry (MOECAF) is mandated to draft the regulations to enact the law, including regulations and standards on environmental safeguards on environmental pollution abatement (i.e., for industrial or urban pollution discharge standards and procedures) and on environmental quality standards for air, water, heavy metals, and toxic substances.

There shall be established a system of environmental impact assessment which shall require any proposed project or business or activity or undertaking in Myanmar by any ministry, government department, corporation, board, development committee, local authority, company, cooperative, institution, enterprise, firm or individual likely to have a significant impact on the environment to obtain approval for its implementation in accordance with these rules (EIA, 2012).

Environmental Conservation Department (ECD) under MOECAF is responsible for the review of the environmental impact proposal and reports concerning investment and development projects. Environmental Impact Assessment Committee (EIAC) under MOECAF has to oversee the application and approval process. Without the written environmental approval of EIAC, any project which requires an Initial Environmental Examination (IEE) or EIA shall not be issued a permit to commence operation by the Myanmar Investment Commission or any relevant authority.

At the local level, the city development committees have a critical role. The **Urban Environmental Conservation and Cleansing Department (UECC), Yangon City Development Committee (YCDC)**, for instance, is responsible for planning, development, and general management of the city and is the authorized body for urban environmental management of

Yangon. It has responsibilities for the provision of municipal services to the 33 townships making up the city area. The UECC (YCDC) used to conduct environmental inspections on the factories operating in the industrial zones in Yangon region and evaluate the industries' adherence to the regulations regarding disposal of waste water and other waste products in Yangon's 18 industrial zones.

In addition, **Directorate of Industrial Supervision and Inspection (DISI), Ministry of Industry** undertakes the development of the private industries, registration in accord with the existing laws and regulations and inspection on the environmental impacts likely affected by the factories.

3.4 Environmental standards for the project

Although Myanmar does not yet have specific laws on environmental standards related to industrial operation. Nevertheless, the following are some of the environmental standards related to Environmental, Health and Safety guidelines generally accepted in Myanmar.

3.4.1 Air emissions

Projects with significant sources of air emissions, and potential for significant impacts to ambient air quality, should prevent or minimize impacts by ensuring that: (i) emissions do not result in pollutant concentrations that reach or exceed ambient quality guidelines and standards, or in their absence the current NEQG Guidelines; and emissions do not contribute a significant portion to the attainment of relevant ambient air quality guidelines or standards (i.e. not exceeding 25 percent of the applicable air quality standards to allow additional, future sustainable development in the same airshed.

Table 3.3: International ambient air quality standards/guidelines

Pollutant	Averaging Period	NEQG guideline
NO_2 (ppb)	1 year	40
	1 hour	200
SO_2(ppb)	24 hours	20
	10 minutes	500
$PM_{2.5}$ (µg/m^3)	1 year	10
	24 hour	25
PM_{10} (µg/m^3)	1 year	20
	24 hour	50
Ozone	8hr daily maximum	100

3.4.2 Wastewater

This guideline applies to projects that have either direct or indirect discharge of process wastewater, wastewater from utility operations or storm water to the environment. It is also applicable to industrial discharges to sanitary sewers that discharge to the environment without any treatment. Process wastewater may include contaminated wastewater from utility operations, storm water, and sanitary sewage. Projects with the potential to generate process wastewater, sanitary (domestic) sewage, or storm water should incorporate the necessary precautions to avoid, minimize, and control adverse impacts to human health, safety or the environment.

Table 3.4: Indicative guideline for treated sanitary sewage discharges

Parameter	Unit	Maximum Concentration
Biological oxygen demand	mg/L	30
Chemical oxygen demand	mg/L	125
Oil and grease	mg/L	10
pH	S.U.	6-9
Total coliform bacteria	MPN[a]/100 ml	400[b]
Total nitrogen	mg/L	10
Total phosphorus	mg/L	2
Total suspended solids	mg/L	50

[a] MPN = Most Probable Number

[b] Not applicable to centralized, municipal wastewater treatment systems

3.4.3 Dairy processing

Table 3.5: Effluent Levels

Parameter	Unit	NEQG Guideline Values
5-day Biochemical oxygen demand	mg/L	50
Active ingredients / Antibiotics	To be determined on a case specific basis	
Chemical oxygen demand	mg/L	250
Oil and grease	mg/L	10
pH	S.U.	6-9
Temperature increase	°C	<3[b]
Total coliform bacteria	100 ml	400
Total nitrogen	mg/L	10
Total phosphorus	mg/L	2
Total suspended solids	mg/L	50

[a] Standard unit

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

3.4.4 Food and Beverage Processing

Table 3.6: Effluent Levels

Parameter	Unit	NEQG Guideline Values
5-day Biochemical oxygen demand	mg/L	50
Active ingredients / Antibiotics	To be determined on a case specific basis	
Chemical oxygen demand	mg/L	250
Oil and grease	mg/L	10
pH	S.U.	6-9
Temperature increase	°C	<3[b]
Total coliform bacteria	100 ml	400
Total nitrogen	mg/L	10
Total phosphorus	mg/L	2
Total suspended solids	mg/L	50

[a] Standard unit

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

3.4.5 Air emissions

Emissions from food processing activities are principally associated with particulate matter and odor. Particulate matter and odor emissions from point sources such as ventilation exhaust systems and smoking units should be released through good engineering practice-designed stacks. Smoking unit emissions of particulate matter should typically not exceed 50 mg/Nm^3.

3.4.6 Noise

Conformance with the provisions of the national Environmental Quality (Emission) Guidelines provide the basis for regulation and control of noise and vibration, air emissions, and effluent discharges of the Environmental Conservation Law —from various sources in order to prevent pollution for purposes of protection of human and ecosystem health.

Table 3.7: Noise standard value of Environmental Quality Guideline (EQEG)

Receptor	One Hour LAeq (dBA)	
	Daytime 07:00 – 22:00	Nighttime 22:00 – 07:00
Residential, institutional, educational	55	45
Industrial, commercial	70	70

Chapter (4)

Description of the project and alternatives selection

4 Description of the project and alternatives selection

4.1 Introduction

This section presents the overview of the current operation and production activities of Lluvia Co.Ltd along with its existing technologies.

4.2 Plot description and geographic localization of the project

Area: 9.7 Acres

Location: No. 108, Seik Kan Thar Road, Zone (3), Hlaing Thar Yar Industrial Zone, Yangon Region.

Figure 4.1: The Lluvia manufacturing and distribution factory

Figure 4.2: The overview of the Lluvia beverage factory

Figure 4.3: The location and area of the factory

4.3 Surrounding area of the proposed project

In terms of the nearby factories and locations, New World mart, Newway factory and Yae Oakkan ward are located in the north of the proposed factory. Mirae C&T factory, Standard General Trading factory, Pyan Hlwar Manufacturing factory and Lobster warehouse are located in the west of the proposed factory. Ayeyarwaddy Food Industry, Perfect Bakery Accessories Shop and Pun Hlaing river are located in the south of the proposed factory. Monastery, Pioneer Special Polybag Industry and Yae Oakkan ware are located in the east of the proposed factory. The proposed factory is located near the Pun Hlaing River about 0.14 km.

Figure 4.4: Nearest locations on the north side of the factory

Figure 4.5: Nearest locations on the west side of the factory

Figure 4.6: Nearest locations on the south side of the factory

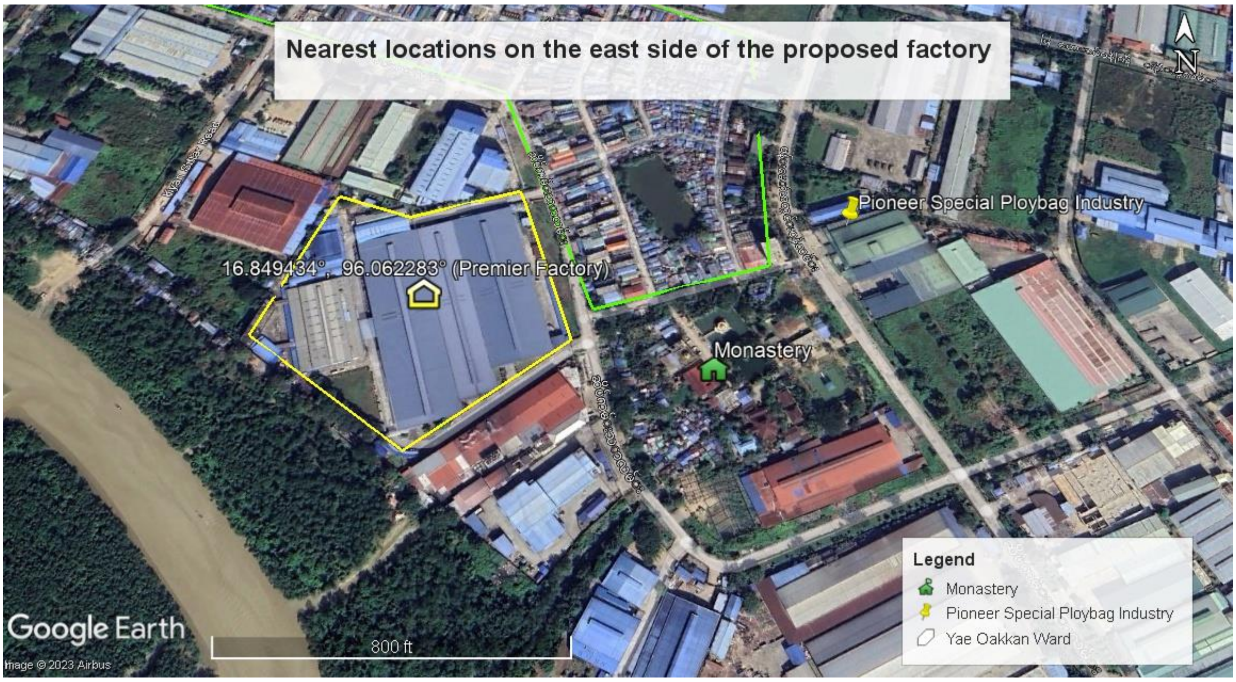


Figure 4.7: Nearest locations on the east side of the factory

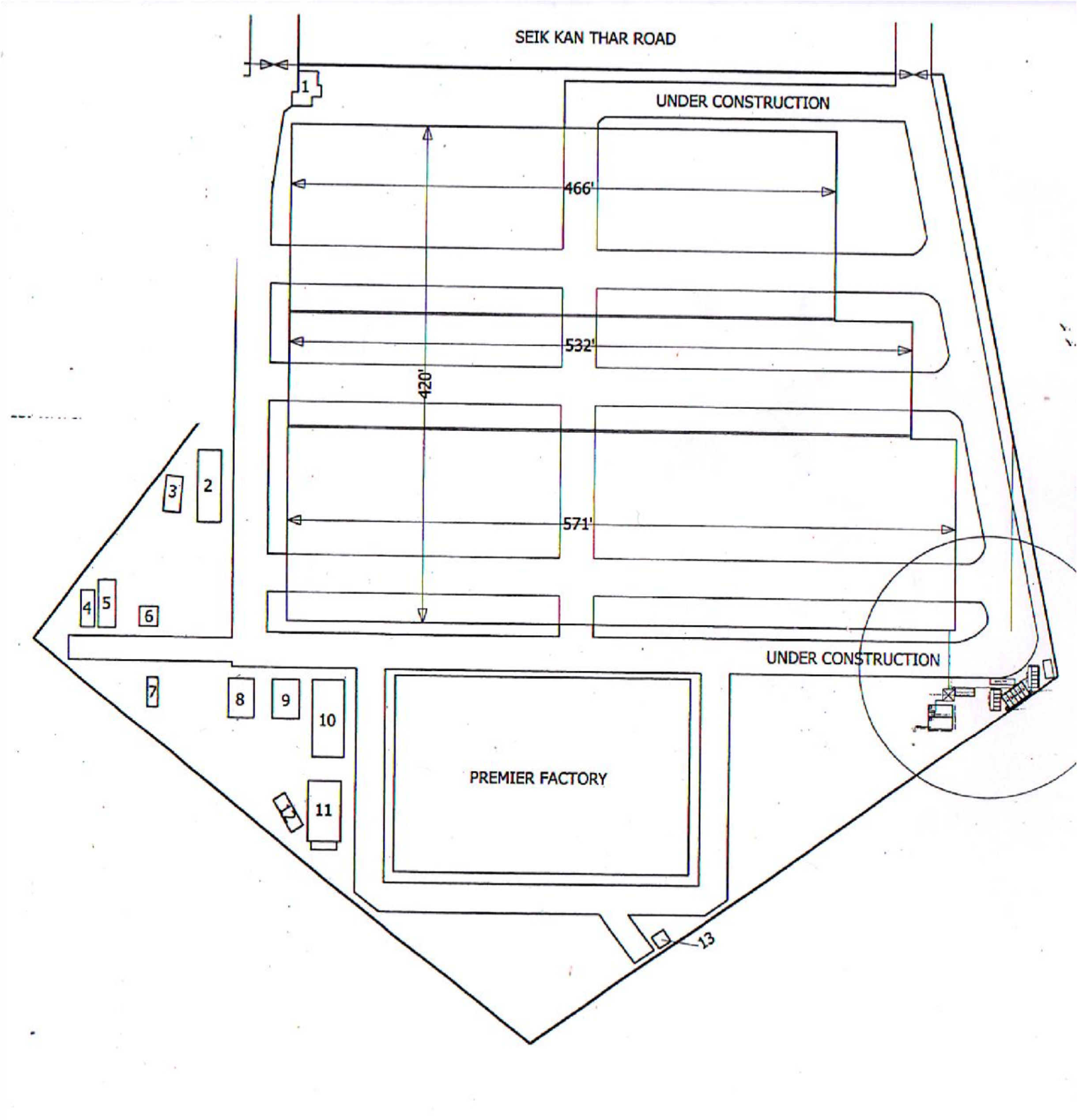
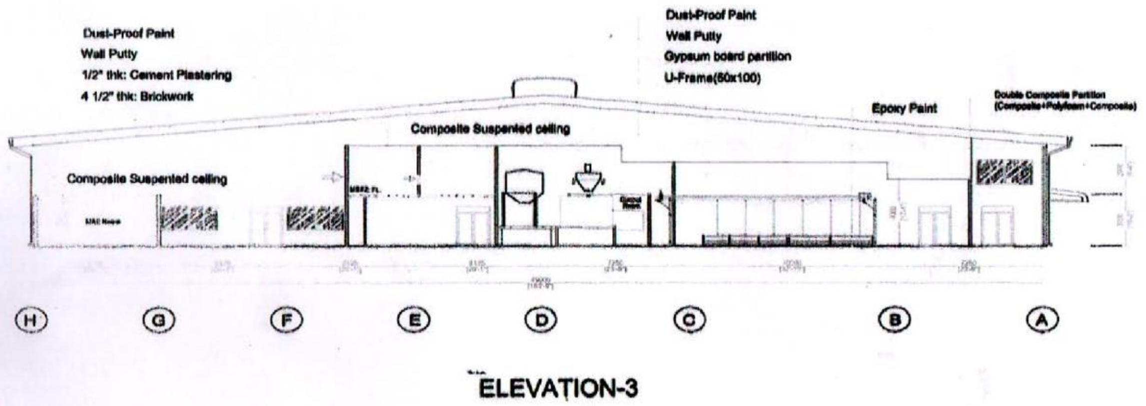


Figure 4.8: The Layout plan of Lluvia beverage factory

New Factory Machine Layout Plan



New Factory Layout Plan

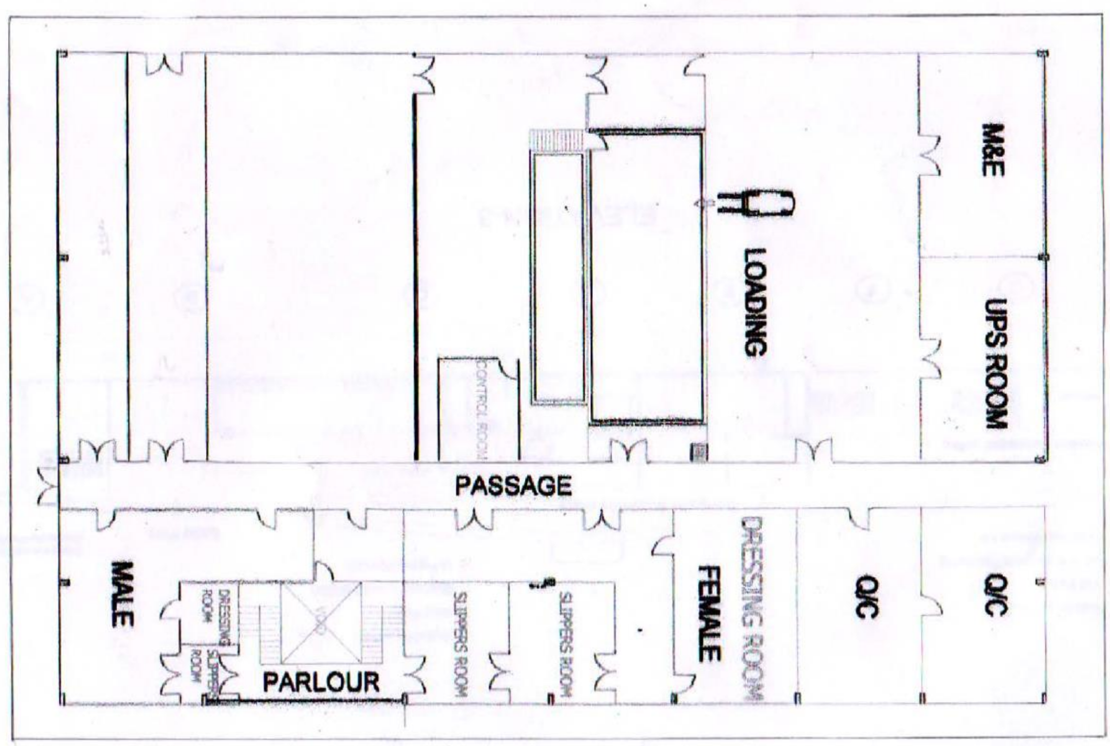


Figure 4.9: The layout plan of Lluvia factory

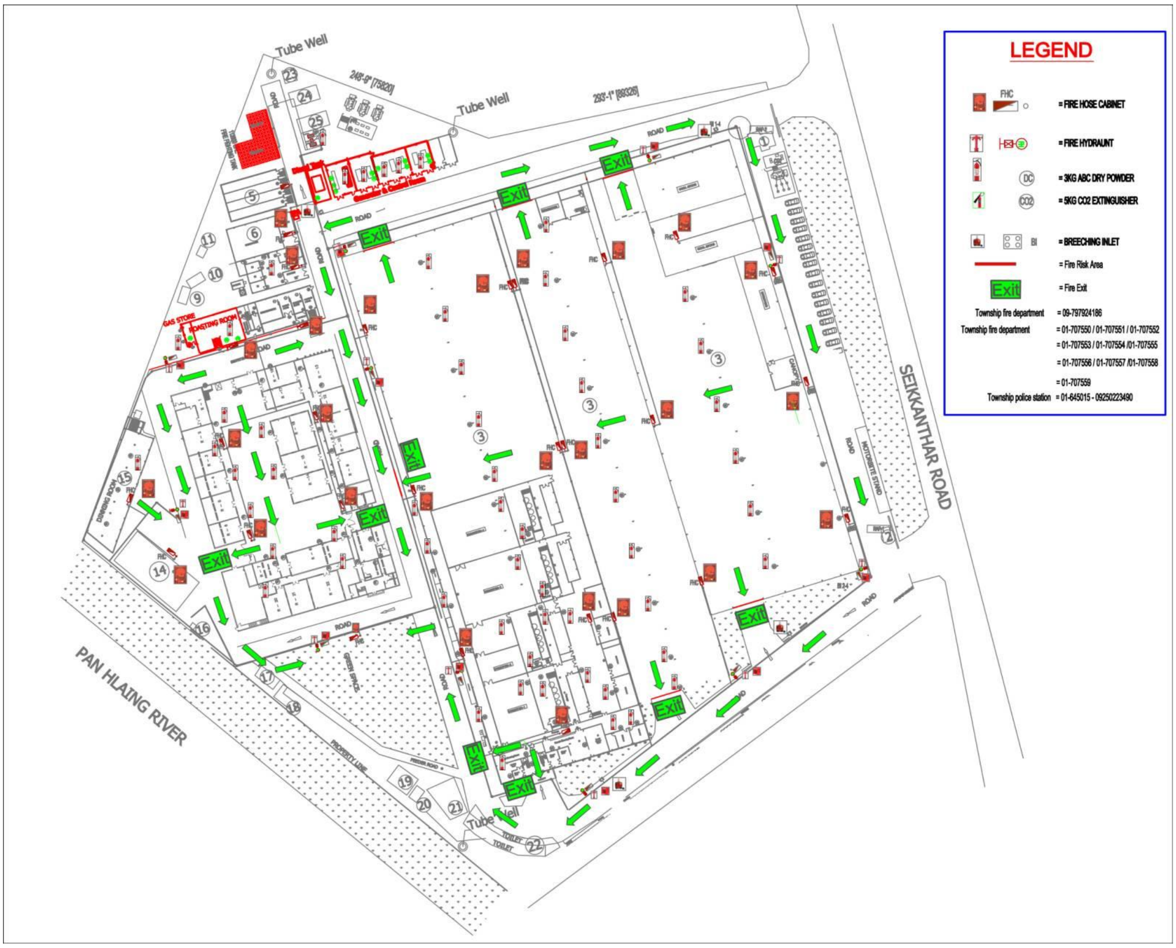


Figure 4.10: Evacuation Lay Out Plan of the proposed factory

4.4 Current use of location

The main part of the proposed beverage industry is being occupied by the office buildings, production building, canteen, storage buildings, other type of buildings (roasting area, Reverse Osmosis (RO) area, generators, MME, etc.) and open spaces. Inside the factory compound, there are some plants such as mango, pterocarpus-macrocarpus, etc for the workers to consume in the canteen.

Table 4.1 Area size of the plant's different units

No.	Factory Facility	Area (m)	Percentage (%)
1	Admin office	975.1	2.48
2	Operation process building	4443.4	11.32
3	Canteen	452.9	1.15
4	Storage buildings	15026	38.28
5	Other type of buildings	15159.4	38.62
6	Open space	3197.7	8.15
	Total	**39,254.5**	**100**

4.4.1 Previous initial environmental examination in Lluvia factory

Lluvia factory got ***ISO 9001:2008***. For systematic preventive approach to food safety from biological, chemical, and physical hazards in production processes, Lluvia factory got ***HACCP (Hazard Analysis Critical Control Point)***. **There has been no previous IEE/EIA/SIA conducted in**

Lluvia factory.

4.4.2 Project Timeline

The project has been operating as follows;

Project Name	Construction Start Date-End Date	Operation Running Date	Decommission Phase
Lluvia Limited BEVERAE (coffee, tea and milk powder)	2001-2002	2005-Current 2024 (19 Years)	2005-2055 Total Expected years cover about 50 years period of Myanmar Investment Commission.

4.5 Production product and stages of operation

Total production product of proposed beverage factory is 10 types. The product types of Lluvia factory is presented as follows:

Table 4.2 Types of various products of Lluvia (Premier) factory

No.	Product Name	Net Weight per Piece	Net Weight per packing	Production amount (tons/month)
1	Premier Instant Coffee (3in1)	20 Grms	600 Grms	953.88 Tons
2	Premier Instant Coffee (2plus1)	22 Grms	220 Grms	58.35 Tons
3	Premier Milk Powder	20 Grms	400 Grms	347.18 Tons
4	Premier Espresso	20 Grms	600 Grms	66.42 Tons
5	Premier Mocha	20 Grms	600 Grms	1.03 Tons
6	Happy Instant Coffee	30 Grms	600 Grms	40.32 Tons
7	Happy Instant Creamy	30 Grms	600 Grms	182.92 Tons
8	All Time Instant Creamy	18 Grms	540 Grms	489.85 Tons
9	All Time Instant Tea	18 Grms	540 Grms	64.41 Tons
10	Tea Master	20 Grms	600 Grms	8.05 Tons
Total				2,212.41 Tons

The combined production capacity of the group is in excess of 26,549 tons per annum. The instant coffee (2plus1) production involves manual sizing and cleaning of the green coffee beans to separate the dust and stone before mechanical breakdown of roasting and then grinding the roasted coffee bean to produce good quality products. The raw materials of instant coffee (3in1), milk powder and instant tea mix are imported from the foreign country and directly are used in the production processes.

4.5.1 General production process of Lluvia factory

The production processes of proposed factory are step by step based on the products. The general production processes are presented as follows;

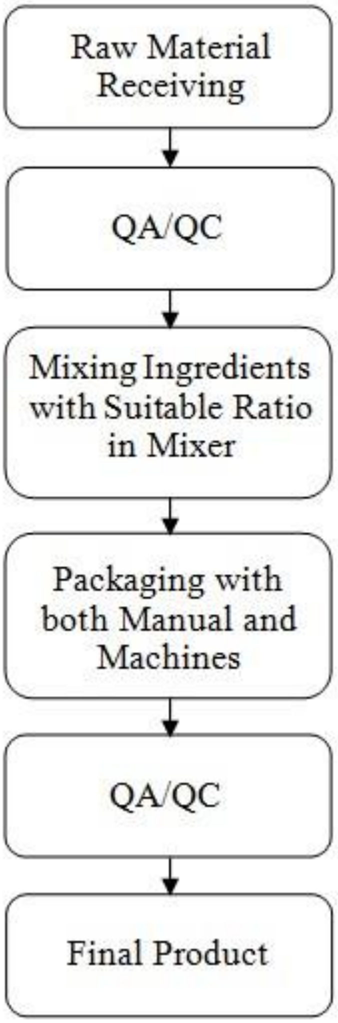


Figure 4.11: The flow diagram of general process of Lluvia factory

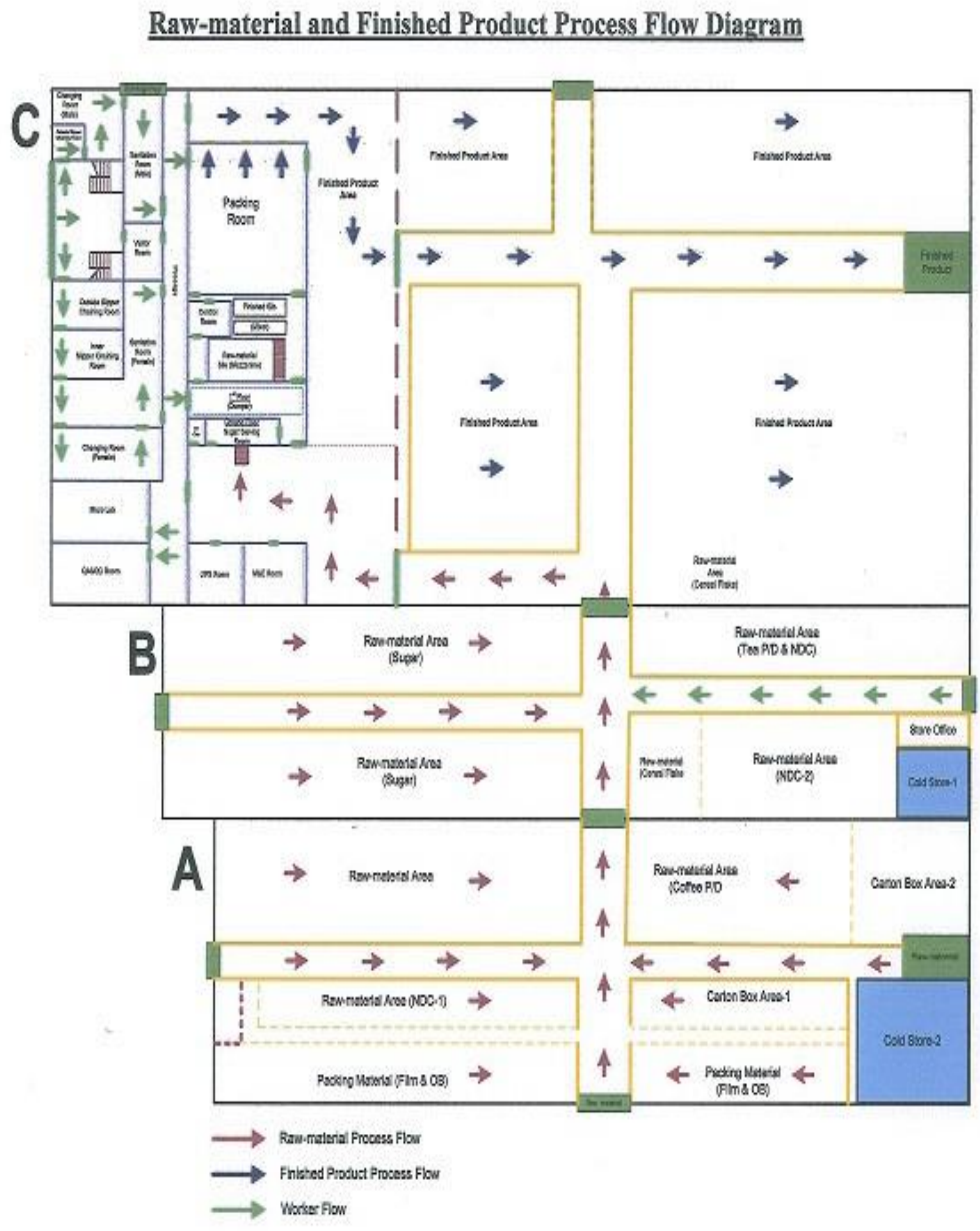


Figure 4.12: The process flow diagram of raw material and finished product

4.5.2 Production process

4.5.2.1 Grinding process

At the present, the grinding process is not being operated. It is just the plan for the future operation. Therefore, when this process initiate, the detail process flow will be updated and monitored in accordance with Chapter (8). The management plan for grinding process is already presented in Chapter (8), Table (8.3).

4.5.2.2 Production process of Instant coffee mix (3in1), Instant coffee mix (2 plus1), Instant milk powder and Instant tea mix.

The production process is based on the types of the products. The major products are instant coffee mix (3in1), instant coffee mix (2 plus1), instant milk powder and instant tea mix.

(a) The production process of 3in1 instant coffee mix

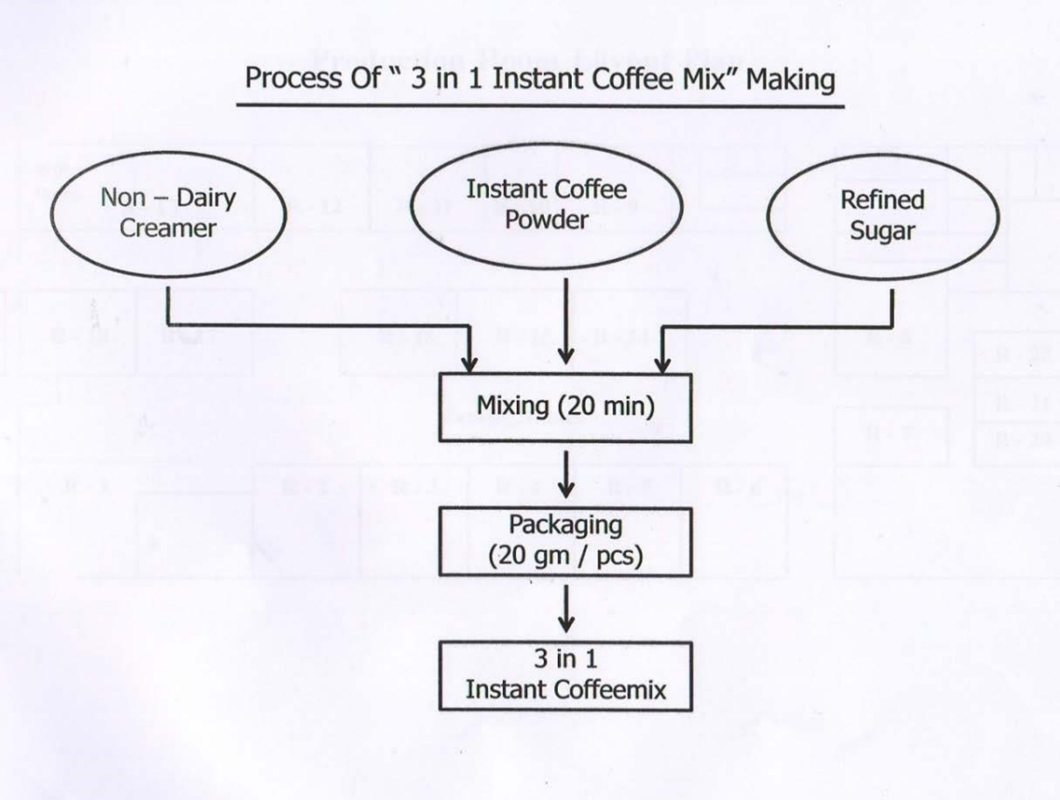


Figure 4.13: Process of 3 in1 instant coffee mix

(b) The production process of 2plus1 instant coffee mix

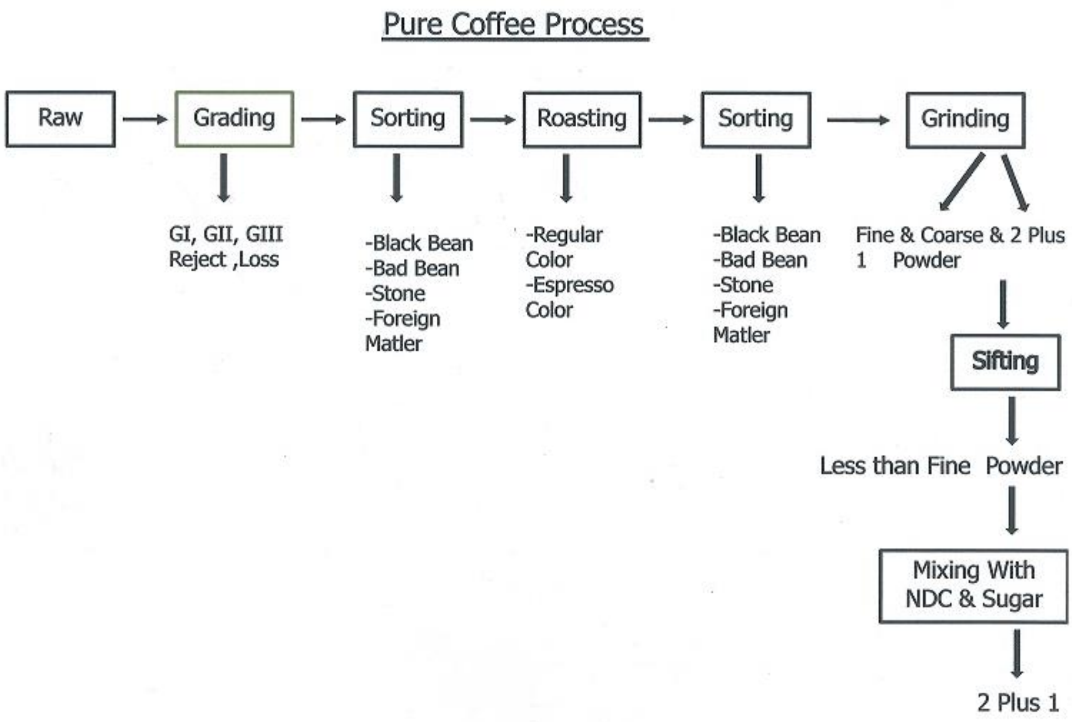


Figure 4.14: Process of 2 plus1 instant coffee mix

(c) The production process of instant tea mix

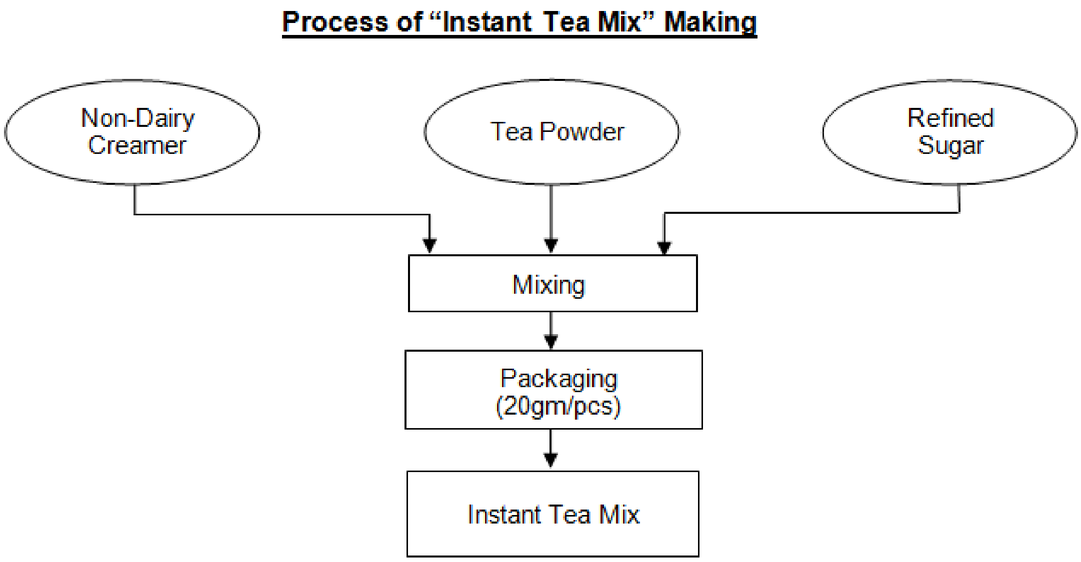


Figure 4.15: Process of instant tea mix

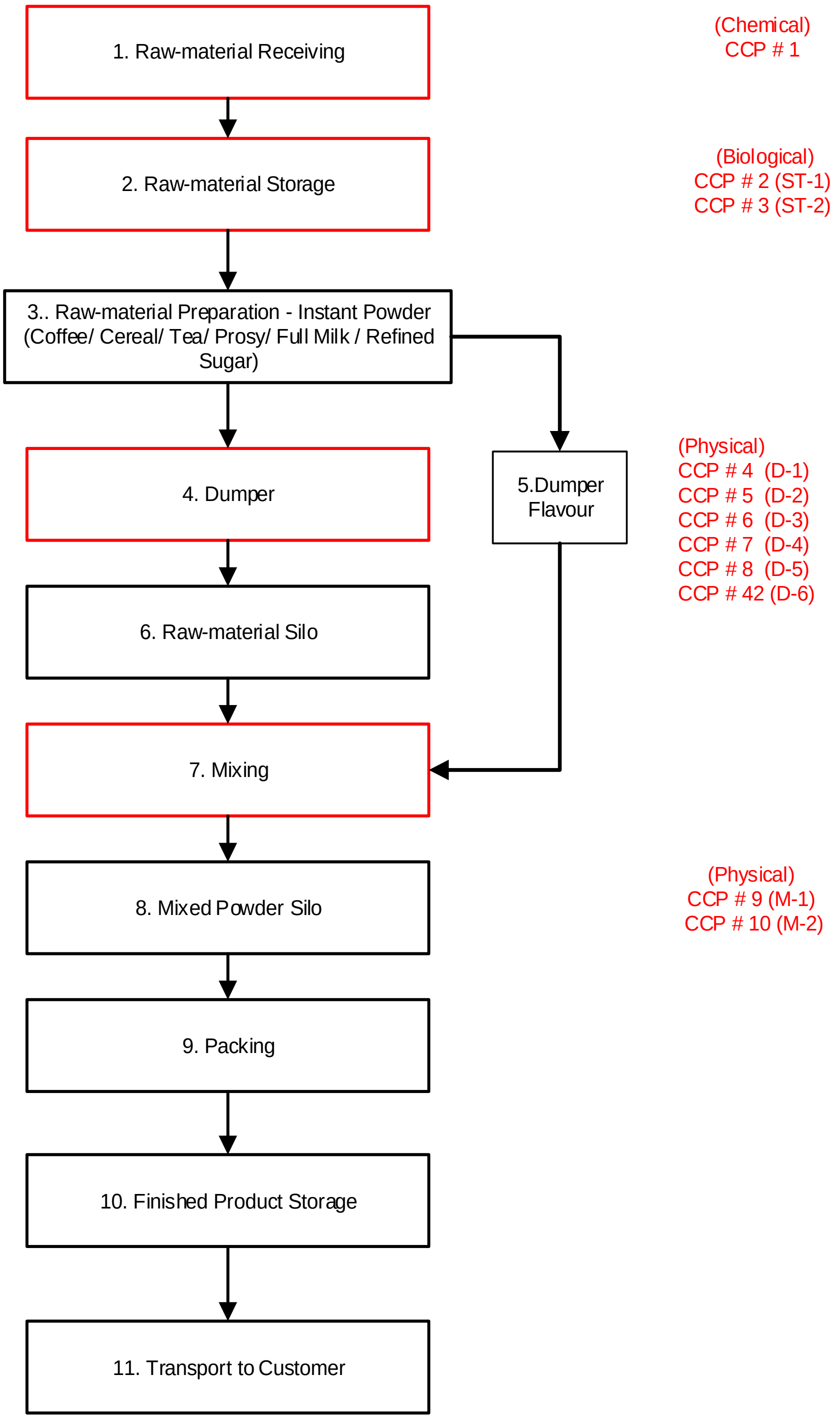
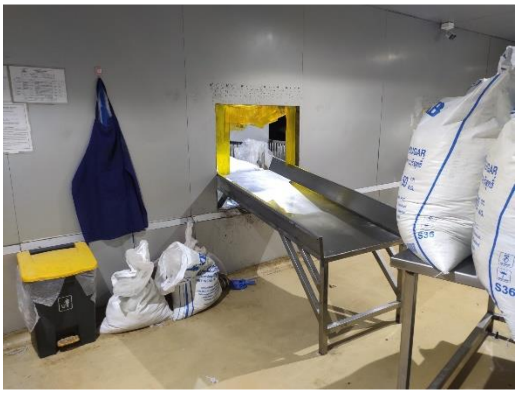


Figure 4.16: Process Flow Diagram

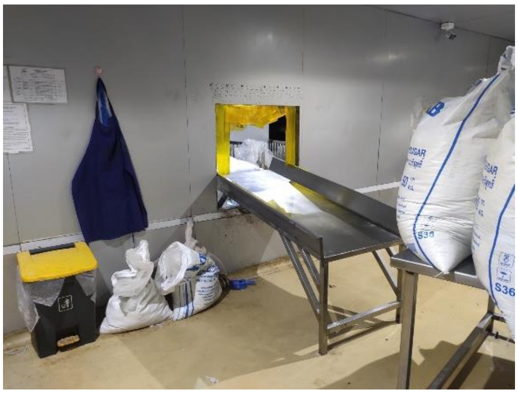


Non-Dairy Creamer, Instant Coffee Powder and Refined Sugar

Mixing (20 min)

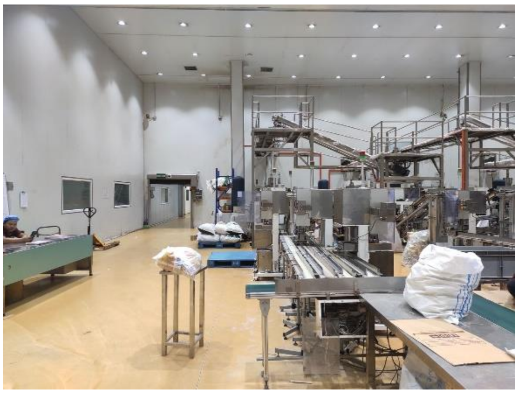
Packaging (20 gm/ pcs) **3 in 1 Instant Coffee mix**

Figure 4.17: The production process of 3in1 instant coffee mix with pictures

Non-Dairy Creamer, Tea Powder and Refined Sugar


Mixing




Packaging (20 gm/ pcs) **Instant Tea mix**

Figure 4.18: The production process of instant tea mix with pictures

4.5.2.3 Types of equipment used in the production process

Types of equipment used in the production process are Roaster machine, Grinder Machine, Mixers, Sifter Machine and Sanko (Packing Machines). Sanko (packing Machines) can produce 80 pcs per minute. Mixer machine can produce 800 kg per hour, Grinder machine can produce 48 kg per hour and Roaster machine can produce 80 kg and 20 kg per hour.

17. Coffee Grinding Machine

SPECIFICATION	
Machine Name	Coffee Grinding Machine
Model No	CGM - 60
Product	Coffee Powder
Product Capacity	60 Kg / Shift
Power Consumption	AC 380 V – 3 Phase 4 wire 50/60 Hz / 3.75kw
Machine Demension	Length - 863 mm
	Width - 508 mm

Figure 4.19: Coffee Grinding Machine

13. Mixer Machine

SPECIFICATION	
Machine Name	Ribbon Mixer
Model No	RM - 1000
Product	Powder
Packing Form	Powder Mixing
Product Capacity	Max: 1000 Kg
Power Consumption	AC 380 V – 3 Phase 4 wire 50/60 Hz / 15kw
Machine Demension	Length - 4470 mm
	Width - 1955 mm

Figure 4.20: Mixer Machine

Figure 4.21: 20KG Buhler Roaster

Figure 4.22: Sanko Packing Machine (sachets)

19 . Sifter Machine

SPECIFICATION	
Machine Name	Sifter Machine
Model No	SM - 120
Product	Coffee Powder divide Sifter
Product Capacity	120 Kg / Shift
Power Consumption	AC 220 V – 3 Phase 2 wire 50/60 Hz / 3hp
Machine Demension	Length - 1854 mm
	Width - 381 mm
	Height - 1854 mm
Website @ Email	E-Mail : [illegible] @ Myanmar.mm

Figure 4.23: Sifter Machine

Figure 4.24: Temporary Garbage Tank

4.5.3 Existing situation of solid waste generation

4.5.3.1 Introduction

Coffee is one of the most important consuming goods all over the world. To become coffee, there are many different steps to across such as agricultures process and industrial process. Currently, about 25 types of coffee trees exist, the variation stemming from environmental factors such as soil, weather, and altitude. The two main species are ***coffee robusta* and *coffee arabica***. The ***robusta*** strain produces less expensive beans, largely because it can be grown under less ideal conditions than the ***arabica*** strain. Coffee beans contain more than 100 chemicals including aromatic molecules, proteins, starches, oils, and bitter phenols (acidic compounds), each contributing a different characteristic to the unique flavor of coffee. To complete coffee process, the industrial process is the most essential parts.

In this changing time, every country all over the world is trying to become industrialized countries. One of the major environmental problems come across in the country's big cities in Municipal, industrial, healthcare and hazardous solid wastes management, as the consequence of industrialization, urbanization, and globalization. Thus, Municipal Solid Waste Management (MSWM) is a major responsibility of local governments which characteristically consuming between 20 and 50 percent of municipal budgets in developing countries (Peter et al., 1996).

Industrial and hazardous waste management is one of the greatest important issues as the result of improper planning, and management among all of the different kinds of waste. In the process of sustainable urbanization and globalization, solid waste is one of the greatest barriers (de Vega et al., 2008). Therefore, solid waste management is become a major issue not only at government and state levels but also at the institutional level. In Asia, the problem of solid waste management is increasing as the continent is urbanizing. Currently, waste generation in Asia is around 3.5 million tons per day, however, it is estimated to almost double by 2025 (World Bank, 2012).

To be sustainable, there are three different sectors. These sectors are social, environmental and economic. If these factors are not fully addressed the program it will not sustainable. The social sector seeks public participation, the public good, the population, the condition of

slums and productivities. From the environmental sectors, include scarcity, pollution, climate change and life cycle assessment. In the economic sectors, water cost, environmental demand cost and supply and demand policies are included. If all of these three main factors are combined, sustainability will be achieved.

As far as it is concerned, the importance of this issue and the overall approach to archive a proper comprehensive waste management, industrial waste management is one of the main axes of the comprehensive waste management that requires special attention and consequently systems for management and control of any pollution sources. As the result of improper waste management system, there are many different kinds of impact on our surrounding areas. Excavated materials and residual wastes may give rise to impacts during their handling, temporary stockpiling or storage on site, transportation and final disposal. A key task of this MSWM assessment is to determine the types and where possible estimate the quantities of all solid waste arising.

Moreover, in order to determine the most appropriate methods of treatment, handling and disposal, it will also be important to understand the nature and composition of the waste; in particular whether the waste materials are inert or contaminated. Wastes generated during the operational phase have also been considered within this assessment. According to the UN- HABITANT (2010), in most developing and transitional economies municipal solid waste management (MSWM) is considered to be one of the most immediate and serious problems confronting urban government.

4.5.4 Objectives of the study

The objectives of this research are indicated as follows:

1. To analyze waste audit
1.1 In the process of waste composition analysis and characteristics which includes both domestic and industrial solid waste generated from the Premier Coffee Process Factory
1.2 Determine the type, nature and where possible, estimate the volume of waste
1.3 Waste generation per day and waste generation per capital
2. To evaluate existing waste management systems and identify both good and unsustainable practices of waste handling within manufacturing process
3. To classify and recognize any potential environmental impacts from the generation of waste associated with the works and handling system
4. To propose some of demonstration activities for sustainable solid waste management plan as the issue of improving minimization system

In the following section, it is presented the condition of existing situation of waste generation, physical composition of solid waste and waste handling system, and from both manufacturing process and domestic waste from the premier coffee factory.

4.5.5 Current waste generation in Lluvia factory

(a) Domestic solid waste (DSW) generation from the Premier Coffee manufacturing

compound

Estimation of solid waste generation is one of the critical information for solid waste management planning and implementation (Dyson and Chang, 2005). Municipal solid waste (MSW) generation models not only estimate current status but also projection of waste generation in future. Therefore, solid waste generation is the one of the important character in waste management in every country. MSW generation rate and composition are different in different country because of countries lifestyle, economic situation, industrial structure and waste management system (IPCC, 2006).

Domestic Solid waste generation from the Lluvia Company Ltd., Premier Coffee process was measured by both automatically and manually weighing the waste from entire compound for a day at the final stage which are at dumping station.

According to the manual weighting analysis, domestic solid waste generation from Lluvia Company L.td, Premier Coffee Manufacturing is 37 kg/day which is approximately 13.5 tonnes per year which come from the office areas, and kitchen units such as dining room. Thus, from the total population nearly 800 total from two shift staff, waste generation per capital per day is (0.04) kg per person per day. When it is compared with the waste generation per capital in the developing countries which is 0.5 to 1.5 kg per person per day, this indicated that it was significantly less than the national rate of waste generation from developing country. Therefore, it is noted that in the manufacturing system, there has some systematic waste generation.

(b) Industrial solid waste generation from the Premier Coffee Production

Industrial waste generation from the Diamond Star Coffee Mill is 1650 kg per day which is proximately 584 tonnes per year, which is being sent to the waste recycler. According the analysis, all the amounts of waste are ended in the recycling action. Thus, there is no situation for the waste collection system from the Municipal. Mostly, all the waste from the manufacturing are being recycled, when it is analyzed, it is the result of recycling within the Manufacturing Compound.

4.5.6 Physical composition of solid waste from Lluvia factory

(a) Physical composition of domestic solid waste from the manufacturing compound

Physical composition analysis of solid waste in from the Premier Coffee Factory was carried out randomly. Individual components that typically make up most of the municipal solid wastes were categorized into 5 categories: food waste, plastic, paper, sanitary napkins, and others. The following figure 4.1 shows the physical composition of domestic solid waste that produce from the compound.

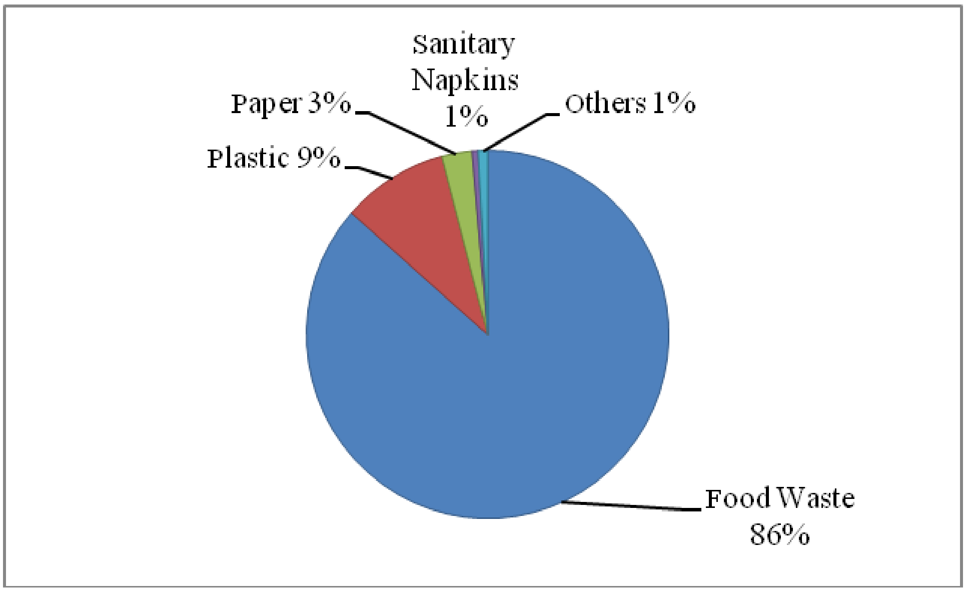


Figure 4.25: Percentage (%) of domestic solid waste from the manufacturing compound weight basis

The top waste components is identified as; Food waste (86%) and the combination of others waste are only 14% of the total domestic waste. Among 14%, plastic is up to 9% and followed by the paper which is 3%. However, the sanitary napkins and other mixed waste is only 1% each from the total domestic waste generation. As the result of without accommodation resident for the staff and workers within the compound, the others different types of waste did not see in this manufacturing compound.

Figure 4.26: Leftover food wastes from the manufacturing compound (Domestic Solid Waste)

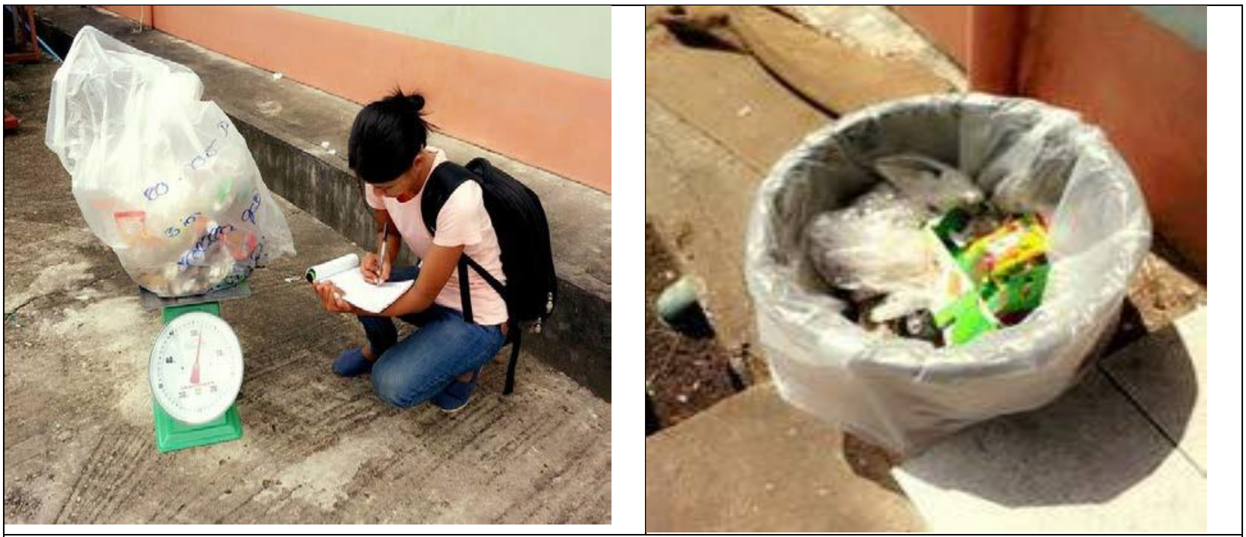


Figure 4.27: Domestic solid waste from the manufacturing compound (source 1)

Figure5.28: Domestic solid waste from the manufacturing compound (source 2)

(b) Physical composition of industrial solid waste from Lluvia

Like the domestic solid waste, physical composition of industrial solid waste was also assessed randomly. According to the experiment result, there are many different types of waste are generated from the part of factory. All the categories of the waste are based on paper and plastic with highest percent. The details categories of the waste generation from the industrial process are in the types of plastic, it is generated plastic bags and plastic bottle, packaging plastic, then, in the types of paper, it is generated corrugated box, and paper roll and in others sections, it is generated yard waste and others electronic devices. In the following figure 5.25 shows the percentage of dust and stone generate from the factory.

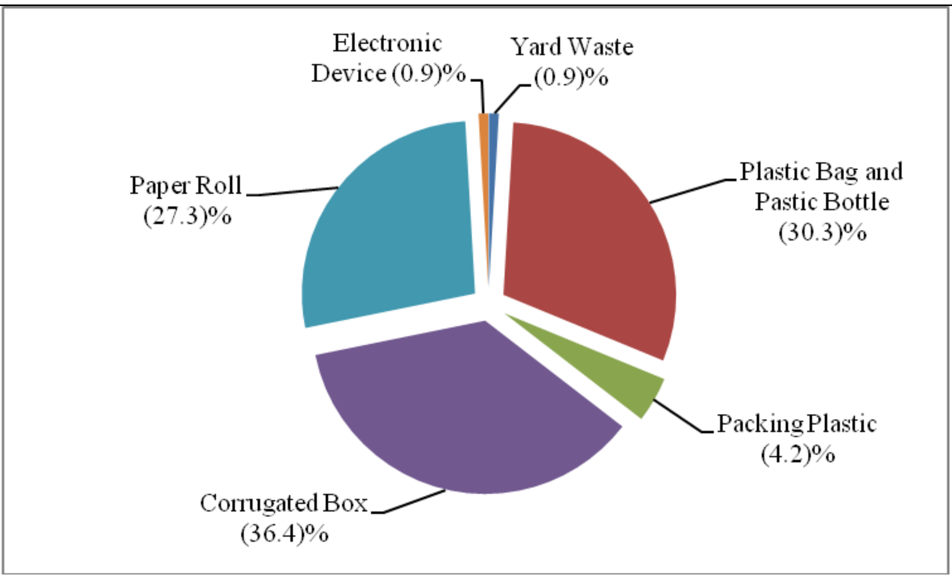


Figure 4.29: Percentage (%) of industrial solid waste from the Premier coffee manufacturing

As the result of weight basis result, the amount of corrugated box which come from the packing waste generation was the highest which was 36.4% of the total waste generation from the manufacturing system and it was followed by the plastic bags and plastic bottle which was 30.3%. Then, the paper roll that comes from the thread is 27.3% and it was in the third position. Besides, the packing plastic which means for packing the coffee was around 4.2% of the total waste. But, sometimes, it is also produced yard waste from the gardening and electronic device from the lighting and others sources from the factory. The, total amount of waste from the manufacturing, both yard waste and electronic device waste generation were 0.9% and total 1.8% of the total waste generation from the industrialization.

Figure 4.30: Industrial solid waste from the manufacturing compound (1)

Figure 4.31: Industrial solid waste from the Premier Coffee (2)

Figure 4.32: Industrial solid waste from the Premier Coffee (3)

Figure 4.33: Industrial solid waste from the Premier Coffee (4)

Figure 4.34: Industrial solid waste from the Premier Coffee (5)

4.5.7 Existing situation waste handling in the manufacturing process

The heterogeneous mixture of MSW is collected from common collection points and open dumps at residential areas, and industrial areas for analysis. There are many factors affecting waste generation rates such as standard of living, geographic and physical factors, seasons, waste collection frequency, source reduction/reuse/recycling, public attitudes, and legislation.

Lluvia, Premier Coffee Factory Company Ltd is combined with two sections which is industrial and residential parts, however, in the residential parts, the factory only provides rice for the staff. Thus, from this factory, both industrial and domestic solid wastes are generated every day. Within the factory, all the waste that generated is cleaned everyday by the workers. Mostly, the workers are clean for three times per day.

Figure 4.35: Waste colleting site in the manufacturing compound

According to observation within the factory, all the waste generating from the factory has been taken responsible by waste recycler which is one of the group works for waste recycling of solid waste. All the waste form the factory is being cleaned by every day. Before collected by the waste recycler, all of the domestic waste such as left-over food waste and others items are being mixed in one packaged. The processes of waste disposal are lack of segregation and all of mixed waste is being put in all bins. This practice is due to only one bin system which is currently practiced in the factory. However, in the factory, plastic bag for the packing of coffee are being burned before recycling.

4.5.8 Good practice and unsustainable practice in the Lluvia manufacturing

(a) Good Practice

According to the observation, the recycling activity in the Premier Coffee Factory Manufacturing has been practiced for a long time. Significantly, all the types of waste that released from the factory are recycled by the group of waste recycler. Every single types of waste recycling are plastic bottle, plastic bags, and packing plastic, paper roll, corrugated box and others electronic devices. All the each categories of waste are collected by the waste recycler even wet waste such as left-over food waste. Up to 1.6 tonnes/day of the waste are recycled as well.

Table 4.3: Weight of waste recycling rate and sent to municipal

No	Types	Amount by Weight (tonnes/day)	% by Weight
1	Total amount of Recycling Waste	1.6	97
2	Total amount of waste residual	0.05	3
3	Total waste generated from Manufacturing	1.65	100

As the total, the total amount of waste that generate from the recycling nearly 97% of the total waste and only 3% of the total waste from the residual from burning. As the regarding result, it is significantly seen that the recycling activities in this factory is happened.

Figure 4.36: Temporary Garbage Tank

Figure 4.37: Recycling activities in the manufacturing compound

(b) Unsustainable Activities

In the Manufacturing Compound, the waste collector who collected the waste from the manufacturing collected without systematically. They do not used gloves and mask during collecting. But it is seen that they do not ware even sandal during that times.

Besides, it is only utilized only one bin system as the observation result. Thus, it is noted that bin system in the Manufacturing is needed to be improved. According to the observation, the wastes from the dining room are segregated wet and dry day. Because it is significantly, leftover food waste is collected in one bins and others waste are in one bin. However, during collecting to keep the waste, all of wet and dry wastes are mixed together.

Figure 4.38: Unsystematic waste handling and open burning from the manufacturing compound

Moreover, it is seen that the packing plastic for the coffee is end at the **Open Burning**. There are some related problems with open burning. To point out, honestly it is unlawful. Besides, open burning is the main force for toxics and pollute for food supply. In additions, it is also pointed out that open burning wastes resources and can cause fire. Thus, unsustainable practice, open burning is the main issue.

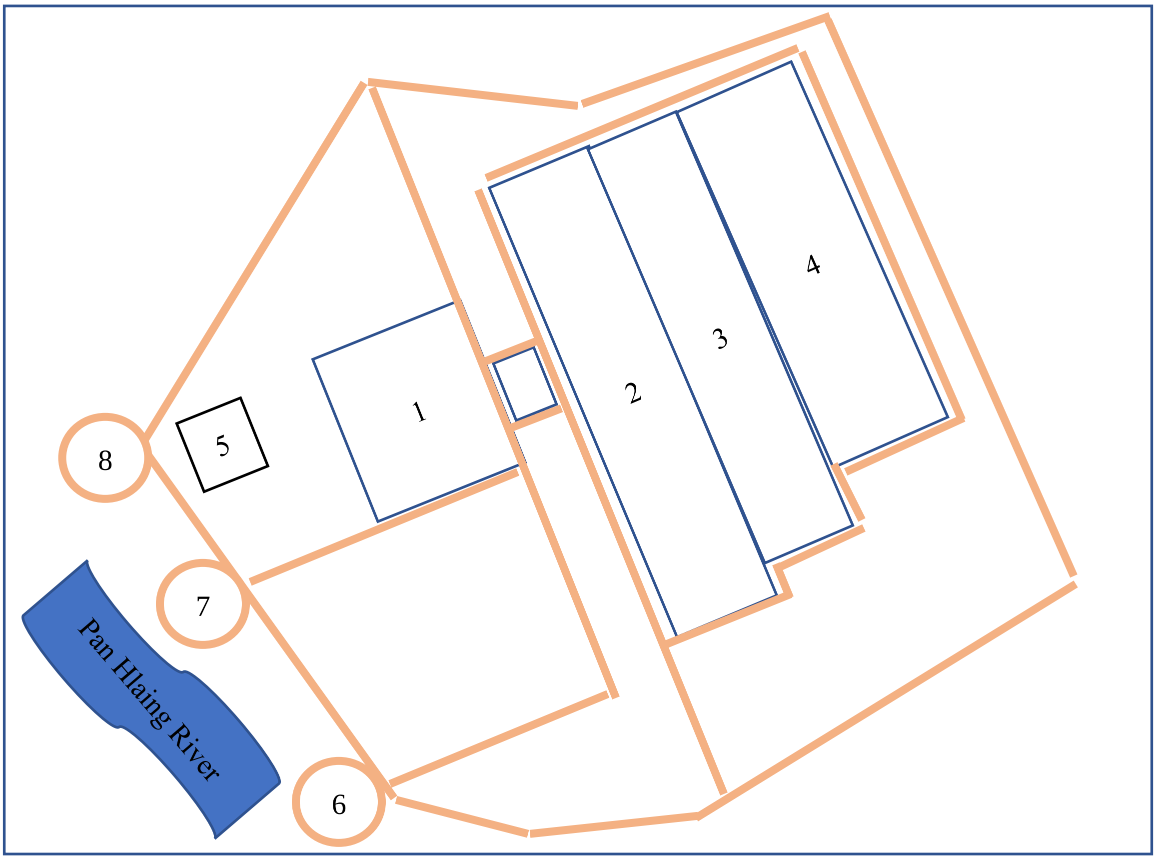
4.6 Wastewater Management

The hazards of the wastewater discharged from the Beverage factory (Premier) can be minimal due to the fact that no chemical is used in the manufacturing process and only dry cleaning is mostly practiced in the operation process. Therefore, there is no wastewater treatment plant is necessary for the factory operation.

There are three drainage systems which are set up in the factory and all the wastewater from the different sources are discharging through these drains. All combination of wastewater from the different sources finally disposed into the Pan Hlaing River without any treatment method.

Therefore, the drainage domestic wastewater should be treated with Sand and Gravel filtration process which is used to improve the efficiency of removing impurities and particles from water. All grey water and storm water are filtered through the two-sand layer and gravel layer alternatively located at the factory’s drainage.

Figure 4.39: Drainage System of the proposed factory



- The orange color is Drainage system of the Premier Factory
- (1)Office building, (2) Production, (3) Production, (4) Warehouse, (5) Canteen, (6) Outlet (1), (7) Outlet (2), (8) Outlet (3)

Figure 4.40: Layout map of Premier Factory's effluent discharge

4.7 Operation phase

4.7.1 Power requirement

The total power required for the proposed unit is 239,358 kWh/month. The power requirement will be from the government electricity grid. However, 3 power generators sets having capacity of 500 KVA each are used for the emergency power requirements if the electricity cut off and there are more demands from customers.

4.7.2 Water requirement

In the manufacturing process, the main source of potable water comes from the tube well. The water condition is as contaminated with river water. Before using for drinking, Reverse Osmosis method as a treatment is utilized before distribution to industrial use and domestic use as well.
The nature of the production operation of the proposed industry is dry process. Majority of water usage is for domestic use particularly for staff and workers. For the proposed plant, water is only required for cleaning the equipment and production machines and this is only twice a month. The water usage of production processes and drinking water for whole industry are treated with Reverse Osmosis (RO) treatment system. Total water usage for whole industry is 5,000 gallons/ day.

4.7.3 Workforce requirement and staff categories

The proposed factory operates 270 days per year. The Working hours are 16 hours per day and rotates with 2 shifts. There are mainly two categories of staff: the group of permanent staff who is paid monthly and the group of part time staff who is on his or her daily wages. The first group of permanent staff includes factory manager, admin, security, logistics, finance, warehouse staff, QA & QC, Maintenance staff and production staffs etc. The second group (part time) staff is production staff for daily wages, etc. The types and amount of staff is presented as follows:

Table 4.4: The capacity of staff in Lluvia (Premier) factory

No.	Type of staff	Number of staff
1	Factory Manager	1
2	Admin	36
3	Security	24
4	Logistics	3
5	Finance	8
6	Warehouse	27
7	QA & QC	52
8	Maintenance	23
9	Production Permanent	496
10	Production Daily Wages	223
Total		**893**

There are no dormitories for the factory employees.

4.7.4 Production process cleaning operation

The production process machines are cleaning twice a month. Cleaning process operate with two steps. The first step is clean with treated Reverse Osmosis (RO) water and second step is cleaning with air compressor.

Figure 4.41: Air compressing machines

4.7.5 Safety measures

As safety measures for staff / workers during operation, employees will be equipped with:

- Ear plugs
- Gloves
- Boots
- Dust Masks
- Helmets
- Protective uniform

4.7.6 Fuel storage

Lluvia factory has fuel storage system which is around 1,500 gallons storage in the fuel storage tank.

Figure 4.42: Fuel storage tank

4.7.7 Raw Material Specifications and Sourcing for Manufacturing

The type of raw materials used in the manufacturing process are instant coffee, creamer, sugar and tea powder. Method of acquiring the required types of raw materials are both import from Vietnam and Malaysia and local form Ywar Ngan and Taunggyi cities. The amount of raw materials used per day for each type of product is about 80 MT (daily row consumption). It is possible to fully meet the demand for raw materials.

4.7.7.1 Transportation Logistics for Raw Materials and Finished Products

Container vehicles are being used to transport the raw material from Thilawar harbor to Lluvia factory. These container cars were estimated as 1,068 in numbers for annual.
The finished products are currently delivered as per ordered by customers (all around the country) with rent trucks and sell them via the land route only.

Figure 4.43: Raw Materials of the proposed factory

Figure 4.44: Finished Products of the proposed factory

4.7.8 Chemical usage

The proposed plant uses solvent and ink in the packaging process. IPA chemical is used for cleaning equipment and According to customer demand, IPA chemical is used to disinfect some of the equipment needed in the production process to change the products.

	
Figure 4.45: Storage of Solvent and Ink before use	**Figure 4.46: Storage of Solvent and Ink after used**

Figure 4.47 : Storage of Isopropyl Alcohol

4.8 Alternatives selection

The ***no development option*** for the proposed factory would prevent all potential environmental and social impacts due to construction and operation.

However, if there is a ***good cooperation between the project proponent and the community***, there will be ***specific environmental and social benefits*** such as increased employment opportunities, infrastructure upgrades, and other community benefits would occur as a result of the factory development.

It is widely recognized that ***being the food industry***, Lluvia factory has ***less negative impact*** on the environment compared to other factories which significantly emit and release the pollutants into the environment.

Moreover, if the project proponent recognizes and ***complies with the mitigation measures and management plan*** described in the ESIA accordingly, the overall impacts become rated as ***low.***

Chapter (5)

Description of the Surrounding Environment

5 Description of the surrounding environment

This chapter reports a description of the project surrounding environment based on a review of the valuable data. The more detailed and in-depth analysis will be provided in a future step of the productions, though specific environmental, social and health surveys, contacts and interviews with public and local stakeholders.

5.1 Existing air quality

5.1.1 Introduction

Both ambient air and indoor air sampling were carried out at the Lluvia (Hlaing Thar Yar Office) in October, 2015 in order to reveal the existing air quality status in and around the factory. Air pollutants (particulates and gases), air velocity/flow, room temperature, relative humidity and indoor air microbiological contaminants (bacteria and fungus/mold) influencing employees' health, physical condition and foodstuff were monitored.
Ambient air quality monitoring was carried out at the seven locations within the proposed factory during its operational phase.

5.1.2 Objective

The objectives of the assessment are:

- To reveal the existing baseline ambient air quality and indoor air status of the proposed factory
- To assess the possible air impact of the proposed project activities
- To recommend appropriate mitigating measures which could assist the company to comply with the ambient air quality standards.

5.1.3 Ambient air monitoring locations

Locations of air sampling stations are listed in **Table 5-1.** The air quality sampling methodology used for this project is described in the subsection which follows.

Table 5.1 Air sampling locations for baseline survey

Points	Locations	Coordinates		Start Date	End Date
		N	E		
1	Office compound (Location-1)	16` 50’ 56.9”	096` 03’ 48.2”	21.10.2015	22.10.2015
2	Coffeegreen bean sizing place (Location-2)	16` 50’ 54.4”	096` 03’ 44.4”	22.10.2015	23.10.2015
3	Storage place (Location-3)	16` 50’ 52.3”	096` 03’ 44.5”	23.10.2015	24.10.2015
4	Production place (Location-4)	16` 50’ 55.0”	096` 03’ 42.9”	24.10.2015	25.10.2015
5	Coffee roasting place er (Location-5)	16` 50’ 54.8”	096` 03’ 45.2”	25.10.2015	26.10.2015
6	Generator (Location-6)	16` 50’ 54.1”	096` 03’ 45.5”	27.10.2015	27.10.2105
7	Aluminum film burning place (Location-7)	16` 50’ 57.1”	096` 03’ 42.0”	29.10.2015	30.10.2015

5.1.4 Existing baseline ambient air quality

The table 5.2 presents the findings which are averaged for all measurements carried out at the different places of the Lluvia (Premier) factory.

Table 5.2 The 24hr average air parameters around the factory

Air Monitoring Location	**CO (ppm)**	**VOC (ppm)**	**NO_2 (ppb)**	**SO_2 (ppb)**	**NH_3 (ppm)**	**CH_4 (ppm)**	**O_3 (ppm)**	**PM_{10} (ug/m^3)**	**PM2.5 (ug/m^3)**
Lluvia factory	**8**^{a}**± 7.4**^{b} **1**^{c}(0.1^d-52^e)	**0.4**^{a}**± 0.2**^{b} **0.4**^{c}(0.001^d-1.2^e)	**48**^{a} **±5**^{b} **49**^{c}(31^d-73^e)	**174**^{a} **±92**^{b} **79**^{c}(45^d-717^e)	**0.4**^{a}**±0.2**^{b} **3**^{c}(0.05^d-1.2^e)	**9,507**^{a}**±263**^{b} **9834**^{c}(7999^d-10023^e)	**0.006**^{a}**±0.001**^{b} 0.006^c(0.004^d-0.011^e)	**66**^{a}**± 10**^{d} 70^e(19^b-99^c)	**22**^{a} **±5**^{d} 18^e(6^b-47^c)
NEQG	**NA**	**NA**	40µg/m3 (annual)/200 µg/m3(one hour)	20 µg/m3	**NA**	**NA**	100ug/m3(8hr)	50[2]	25[2]

[1] Annual mean,[2] 24hr average, NA – not available [a] Average [b] SE [c] Median [d] Min [e] Max

The existing baseline levels of NO_2 and SO_2 gases exceeded the EQEG guideline. Dust (PM_{10}) is higher than of the EQEG guideline In general, the results of the air pollutants monitored over 24hr at the different places of the Lluvia project factory *did not meet the EQEG guidelines*. According to the observations, these air pollutants mainly come from the production process and local activities.

(a) Point (1) The compound of Lluvia factory (Location-1) (16` 50’ 56.9” N, 096` 03’ 48.2” E)

In order to reveal the baseline data of the project site, one representative location was selected and monitored while the project process was not operating. The coordinates map, monitoring methods, photo records of the monitoring site are fully described in the following and annex (II).
The coordinate point is 16` 50’ 56.9” N, 096` 03’ 48.2” E.

The baseline NO_2 concentration met the National Emission Quality Guideline (air quality) The baseline SO_2 concentrations did not meet the NEQG.
(**Table 5-3**).

Table 5.3: Baseline air monitoring in the compound of the factory (Location-1)

Parameters	**Concentration** (24hr average) except some	**National Environmental Quality Emission (Air Quality) Guideline (24hr average)**
NO2*	**49**[a](17[b]-102[c])ppb / **92**[a](32[b]-192[c]) µg/m^3(24 hr) **59** ppb / **110**µg/m^3(one hr)	40 µg/m3 (annual) /200 µg/m3 (one hour)
SO2	**163**a(1b-1862c)ppb/ **427**a(2.6b-4877c) µg/m3	20 µg/m3
CO *	**0.11**[a](0.001[b]-2.1[c]) ppm/ **126**[a](1[b]-2405[c]) µg/m3 (24hr) **210** ppb/ **240** µg/m3 (one hr) **160** ppb/ **183** µg/m3 (8 hr)	30,000 µg/m3 (one hr) 10,000 µg/m3 (8 hr)
O3*	**0.01**[a](0.001[b]-0.014[c]) ppm /**20**[a](2[b]-14[c])µg/m3 (24hr) **40** ppb/ **78** µg/m3 (8 hr)	100 µg/m3 (8hr)
VOC	**0.001**[a](0.001[b]-0.213[c])ppm	NA
NH3	**0.1**[a](0[b]-2.9[c]) ppm	NA
CH4	**10,023**[a](1426[b]-7665[c])ppm	NA
Remark: No significant traffic around the monitoring site, the significant emission from the factory nearby. The weather is fine.		

NA – not available,[a] Average [b] Min [c] Max

Figure 5.1: Baseline ambient air monitoring in the compound Lluvia factory (Location-1)

(b) Point (2) Coffee green bean sizing area (Location-2) (16` 50' 54.4" N, 096` 03' 44.4"E)

The existing NO_2 concentration met National Emission Quality Guideline. Baseline SO_2 concentration did not meet te NEQG guideline. (**Table 5-4**).

Table 5.4: The existing air monitoring in the coffee green bean sizing area (Location-2)

Parameters	**Concentration** **(24hr average) except some**	**National Environmental Quality Emission (Air Quality) Guideline (24hr average)**
NO2*****	**31**^{a}(1^b-67^c) ppb / **58**^{a}(1.8^b-126^c) µg/m^3(24 hr) **41** ppb/ **77** µg/m3 (one hr)	40 µg/m3 (annual) /200 µg/m3 (one hour)
SO2	**45**^{a}(1^b-211^c) ppb/ **118**a(2.6b-553c) µg/m3	20 µg/m3
CO *****	**0.3**^{a}(0.001^b-2.3^c) ppm/ 344^a(1.1^b-2634^c) µg/m3 (24hr) **400** ppb/ **458** µg/m3 (one hr) **350** ppb/ **401** µg/m3 (8 hr)	30,000 µg/m3 (one hr) 10,000 µg/m3 (8 hr)
O3*****	**0.01**^{a}(0.001^b-0.014^c) ppm /**20**^{a}(2^b-27^c)µg/m3 (24hr) **40** ppb/ **78** µg/m3 (8 hr)	100 µg/m3 (8hr)
VOC	**0.4**^{a}(0.001^b-1^c) ppm	NA
NH3	**0.3**^{a}(0^b-3.8^c) ppm	NA
CH4	**9,515**^{a}(1016^b-8498^c) ppm	NA
Remark: No significance. The weather is fine.		

NA – not available, ^{a} Average ^{b} Min ^{c} Max

Figure 5.2: Air monitoring in the coffee green bean sizing area (Location-2)

(c) Point (3) Lluvia storage area (16` 50’ 52.3” N, 096` 03’ 44.5” E)

The existing NO_2 gas concentration met the NEQG guideline. The existing SO_2 concentration did not meet the NEQG. (**Table 5-5**).

Table 5.5: The existing air monitoring in the Lluvia storage area (Location 3)

Parameters	**Concentration** **(24hr average) except some**	**National Environmental Quality Emission (Air Quality) Guideline (24hr average)**
NO2*****	**50**^{a}(24^{b}-305^{c}) ppb / **94**^{a}(45^{b}-574^{c}) µg/m^{3}(24 hr) 60 ppb/ 113 µg/m3 (one hr)	40 µg/m3 (annual) /200 µg/m3 (one hour)
SO2	**76**^{a}(1^{b}-359^{c}) ppb/ **199**a(3b-940c) µg/m3	20 µg/m3
CO *****	**1**^{a}(0.001^{b}-3.3^{c}) ppm/ 1145^{a}(1^{b}-3778^{c}) µg/m3 (24hr) **11000** ppb/ **12596** µg/m3 (1 hr)	30,000 µg/m3 (one hr) 10,000 µg/m3 (8 hr)

O3*	**0.01**[a](0.002[b]-0.013[c]) ppm /**20**[a](4[b]-26[c])µg/m3 (24hr) **78** ppb/ µg/m3 (8 hr)	100 µg/m3 (8hr)
VOC	**1**[a](0.001[b]-1.2[c]) ppm	NA
NH3	**0.3**[a](0[b]-3.3[c]) ppm	NA
CH4	**9834**[a](1042[b]-9323[c]) ppm	NA
Remark: No significance. The weather is fine.		

NA – not available, [a] Average [b] Min [c] Max

Figure 5.3: The air monitoring station in the Lluvia storage area (Location-3)

(d) Point (4) Production area (16` 50' 55.0" N, 096` 03' 42.9" E)

In the report, the air monitoring methods used to measure the emission sources that may occur during the production process of the project in the production room and photo records, are described in the following and annex (II).

The existing NO_2 concentration met the NEQG guideline (updated 2005). The existing SO_2 concentration did not meet the NEQG. (**Table 5-6**).

Table 5.6: The existing air monitoring in the production area (Location 4)

Parameters	**Concentration** **(24hr average) except some**	**National Environmental Quality Emission (Air Quality) Guideline (24hr average)**
NO_2*	**41**^{a}(10^{b}-66^{c}) ppb / **77**^{a}(19^{b}-124^{c}) µg/m^{3}(24 hr) 51 ppb/ 96 µg/m3 (one hr)	40 µg/m3 (annual) /200 µg/m3 (one hour)
SO_2	**90**^{a}(1^{b}-231^{c}) ppb/ **236**a(3b-605c) µg/m3	20 µg/m3
CO *	**1**^{a}(0.044^{b}-3^{c}) ppm/ 1145^{a}(50^{b}-3435^{c}) µg/m3 (24hr) **11000** ppb/ **12596** µg/m3 (1 hr)	30,000 µg/m3 (one hr) 10,000 µg/m3 (8 hr)
O_3*	**0.01^{a}**(0.002^{b}-0.013^{c}) ppm /**20^{a}**(4^{b}-26^{c})µg/m3 (24hr) **30** ppb/ **59** µg/m3 (8 hr)	100 µg/m3 (8hr)
VOC	**1.2**^{a}(0.001^{b}-9^{c}) ppm	NA
NH_3	**1^{a}**(0^{b}-45^{c}) ppm	NA
CH_4	**9897^{a}**(1016^{b}-9325^{c}) ppm	NA

Remark: The monitoring station was near the production area. Increased SO2 level was likely due to operation activities of trucks, forklifts, machines and human activities at and around the production area. SO2 comes from burning fuel in industries Therefore, one of the simplest ways to reduce the amount of SO2 released from the combustion process can be achieved by switching to a fuel that has lower sulphur content. The proposed factory is using battery forklifts to reduce air emission and noise pollutions.

NA – not available,^{a} Average ^{b} Min ^{c} Max

Figure 5.4: Air monitoring in the production area (Location-4)

(e) Point (5) Coffee roasting area (16` 50’ 54.8” N, 096` 03’ 45.2”E)

The existing NO_2 concentration met the NEQG. The existing SO_2 concentration did not meet the NEQG (**Table 5-7**).

Table 5.7: Baseline air monitoring in the coffee roasting area (Location 5)

Parameters	**Concentration** **(24hr average) except some**	**National Environmental Quality Emission (Air Quality) Guideline (24hr average)**
NO2*****	**42**[a](1[b]-87[c]) ppb / **79**[a](1.8[b]-164[c]) µg/m³(24 hr) 52 ppb/ 98 µg/m3 (one hr)	40 µg/m3 (annual) /200 µg/m3 (one hour)
SO2	**79**[a](1[b]-757[c]) ppb/ **207**a(2.6b-1983c) µg/m3	20 µg/m3
CO *****	**5.2**[a](0.001[b]-7.4[c]) ppm/ 5954[a](1[b]-8473[c]) µg/m3 (24hr) **15000** ppb/ **17176** µg/m3 (1 hr)	30,000 µg/m3 (one hr) 10,000 µg/m3 (8 hr)
O3*****	**0.01[a]**(0.001[b]-0.012[c]) ppm /**20[a]**(2[b]-24[c])µg/m3 (24hr) **30** ppb/ **59** µg/m3 (8 hr)	100 µg/m3 (8hr)
VOC	**0.1**[a](0.001[b]-5[c]) ppm	NA
NH3	**0.1[a]**(0[b]-3[c]) ppm	NA
CH4	**9836[a]**(43[b]-6960[c]) ppm	NA
Remark: No significance. The weather is fine.		

NA – not available,[a] Average [b] Min [c] Max

Figure 5.5 Air monitoring in the coffee roasting area (Location-5)

(f)Point (6) Near generator (16` 50' 54.1" N, 096` 03' 45.5"E)

(i) Generator running operation

The existing NO_2 concentration met the NEQG. The existing SO_2 concentration did not meet the NEQG. (**Table 5-8**).

Table 5.8: Ambient air monitoring downwind to the generator during operation (Location 6)

Parameters	**Concentration** **(24hr average) except some**	**National Environmental Quality Emission (Air Quality) Guideline (24hr average)**
NO2*****	**68**[a](26[b]-252[c]) ppb / **128**[a](49[b]-474[c]) µg/m³(24 hr) 78 ppb/ 147 µg/m3 (one hr)	40 µg/m3 (annual) /200 µg/m3 (one hour)
SO2	**900**[a](1[b]-3426[c]) ppb/ 2357a(2.6b-8974c) µg/m3	20 µg/m3
CO *****	**1**[a](0.001[b]-3[c]) ppm/ 1145[a](1[b]-3435[c]) µg/m3 (24hr) 10000 ppb/ 11450 µg/m3 (1 hr)	30,000 µg/m3 (one hr) 10,000 µg/m3 (8 hr)

O3*	**0.004^{a}**(0.002^{b}-0.1^{c}) ppm /**8^{a}**(4^{b}-196^{c})µg/m3 (24hr) 34 ppb/ 67 µg/m3 (8 hr)	100 µg/m3 (8hr)
VOC	**0.002**^{a}(0.001^{b}-0.2^{c}) ppm	NA
NH3	**0^{a}**(0^{b}-0^{c}) ppm	NA
CH4	**7953^{a}**(7669^{b}-8509^{c}) ppm	NA
Remark: No significance. The weather is rainy.		

NA – not available,^{a} Average ^{b} Min ^{c} Max

(ii) After generator operation

The existing NO_2 concentration met the NEQG. The existing SO_2 concentration did not meet the NEQG. (**Table 5-9**).

Table 5.9: Ambient air monitoring downwind to the generator after operation (Location 6)

Parameters	**Concentration** **(24hr average) except some**	**National Environmental Quality Emission (Air Quality) Guideline (24hr average)**
NO2*	**73**^{a}(18^{b}-410^{c}) ppb / **137**^{a}(34^{b}-771^{c}) µg/m^{3}(24 hr) 82 ppb/ 156 µg/m3 (one hr)	40 µg/m3 (annual) /200 µg/m3 (one hour)
SO2	**717**^{a}(1^{b}-3426^{c}) ppb/ 1**878**a(2.6b-8973c) µg/m3	20 µg/m3
CO *	**1**^{a}(0.001^{b}-3^{c}) ppm/ 1145^{a}(1^{b}-3435^{c}) µg/m3 (24hr) 10000 ppb/ 11450 µg/m3 (1 hr)	30,000 µg/m3 (one hr) 10,000 µg/m3 (8 hr)
O3*	**0.004^{a}**(0.002^{b}-0.007^{c}) ppm /**8^{a}**(4^{b}-14^{c})µg/m3 (24hr) 34 ppb/ 67 µg/m3 (8 hr)	100 µg/m3 (8hr)
VOC	**0.003**^{a}(0.001^{b}-0.3^{c}) ppm	NA
NH3	**0.1^{a}**(0^{b}-1.4^{c}) ppm	NA
CH4	**7999^{a}**(7669^{b}-8509^{c}) ppm	NA
Remark: No significance. The weather is fine.		

NA – not available, [a] Average [b] Min [c] Max


5m

Figure 5.6: Air monitoring downwind to the generator (Location-6)

(g) Point (7) Aluminum film burning area (16` 50' 57.1" N, 096` 03' 42.0"E)

The existing NO_2 concentration met the NEQG. The existing SO_2 concentration did not meet the NEQG. (**Table 5-10**).

Table 5.10: Air monitoring downwind to the aluminum film burning area (Location 7)

Parameters	**Concentration** **(24hr average) except some**	**National Environmental Quality Emission (Air Quality) Guideline (24hr average)**
NO2*	**51**[a](1[b]-116[c]) ppb / **96**[a](1.8[b]-218[c]) µg/m^3(24 hr) **61** ppb/ **115** µg/m3 (one hr)	40 µg/m3 (annual) /200 µg/m3 (one hour)
SO2	**48**[a](1[b]-304[c]) ppb/ 1**26**a(2.6b-796c) µg/m3	20 µg/m3
CO *	**0.4**[a](0.001[b]-2[c]) ppm/ 458[a](1[b]-2290[c]) µg/m3 (24hr) 500 ppb/ 573 µg/m3 (1 hr) 450 ppb/ 515µg/m3 (8 hr)	30,000 µg/m3 (one hr) 10,000 µg/m3 (8 hr)

O3*	**0.011**^{a}(0.005^{b}-0.02^{c}) ppm /**22**^{a}(10^{b}-39^{c})µg/m3 (24hr) 21 ppb/ 41 µg/m3 (8 hr)	100 µg/m3 (8hr)
VOC	**1**^{a}(0.001^{b}-2^{c}) ppm	NA
NH3	**1.2**^{a}(0^{b}-120^{c}) ppm	NA
CH4	**9444**^{a}(1070^{b}-7676^{c}) ppm	NA
Remark: No significance. The weather is fine.		

NA – not available,^{a} Average ^{b} Min ^{c} Max

Figure 5.7 Ambient air monitoring downwind to the aluminum film burning area (downwind) (Location-7)

5.1.5 Baseline gas quality in Lluvia factory

The table 5.11 presents the gases levels which are averaged for all measurements carried out at the different places of the Lluvia factory.

Among the parameters focused, SO_2 level did not meet the NEQG. It is probably due to the cumulative emissions from the Lluvia factory itself and the surrounding industries emission.

Table 5.11: Baseline gas quality in Lluvia factory

Substance ($\mu g/m^3$)	**Lluvia factory**	**NEQG Guideline**
NO_2 (ppb)	**48**[a] ±**5**[b] **49**[c](31[d]-73[e])	40[1]
SO_2(ppb)	**174**[a] ±**92**[b] **79**[c](45[d]-717[e])	20[2]
CO (ppm)	**8**[a]± **7.4**[b] **1**[c](0.1[d]-52[e])	NA
VOC (ppm)	**0.4**[a]± **0.2**[b] **0.4**[c](0.001[d]-1.2[e])	NA
NH_3 (ppm)	**0.4**[a]±**0.2**[b] **3**[c](0.05[d]-1.2[e])	NA
CH_4 (ppm)	**9507**[a]±**263**[b] **9834**[c](7999[d]-10023[e])	NA
O_3 (ppm)	**0.006**[a]±**0.001**[b] 0.006[c](0.004[d]-0.011[e])	100ug/m^3(8hr)

[1] Annual mean,[2] 24hr average, NA – not available,[a] Average [b] Min [c] Max

5.1.6 Air pollutants (particulates)

Table 5.12 presents the results of dust concentrations with the EPAS air monitoring station over a 24hr period.

Baseline levels of PM_{10} did not meet the NEQG while $PM_{2.5}$ level met the NEQG guideline.

Table 5.12: Baseline PM_{10} and $PM_{2.5}$concentrations at Lluvia factory

Sr	**Location**	**PM_{10} 24-hr avg (range) $\mu g/m^3$**	**$PM_{2.5}$ 24-hr avg (range) $\mu g/m^3$**
1	In compound of the office area (Location-1)	**51**[a](2[b]-187[c])	14[a]**(1[b]-177[c])**
2	Coffee green bean sizing area (Location-2)	**70**[a](13[b]-458[c])	**47**[a](1[b]-327[c])
3	Storage area (Location-3)	**77**[a](17[b]-622[c])	25[a](1[b]-172[c])
4	Production area (Location-4)	**99**[a](34[b]-245[c])	14[a](1[b]-102[c])

5	Coffee roasting area (Location-5)	19[a](18[b]-3160[c])	6[a](1[b]-197[c])
6	Generator during operation (Location-6)	65[a](2[b]-202[c])	10[a](0[b]-51[c])
7	Generator after operation (Location-6)	**66[a](2[b]-265[c])**	8[a](0[b]-104[c])
8	Aluminum film burning area (Location-7)	**78**[a](3[b]-1426[c])	**29**[a](1[b]-506[c])
	Average	**66[a]± 10[d]** 70[e](19[b]-99[c])	**22[a] ±5[d]** 18[e](6[b]-47[c])
	NEQG	50	25

[a] Average [d] SE [b] Min [c] Max [e] Median

5.1.7 Local climate

The onsite meteorology data measured by the EPAS monitoring station indicates temperature, relative humidity, wind speed and wind direction. Table 5.13 shows the average temperature was around 42°C, wind speed was 1.1 and relative humidity was 49%. These parameters do affect on the air quality status.

Table 5.13: Meteorology data obtained from air quality sampling stations at Lluvia factory

Location	**Temperature (Degree C)**	**Wind Speed (kph)**	**Wind Direction (Degree from North)**	**Relative Humidity (%)**
In compound of the office(Location-1)	**42**[a](31[b]-67[c])	**1.5**[a](0[b]-11[c])	**SSE**	**53**[a](25[b]-73[c])
Coffee green bean sizing area (Location-2)	**40**[a](37[b]-45[c])	**0.02**[a](0[b]-5[c])	**ENE**	**50**[a](43[b]-56[c])
Storage area (Location-3)	**39**[a](37[b]-43[c])	**0**[a](0[b]-0[c])	**SSE**	**51**[a](44[b]-56[c])
Production area (Location-4)	**38**[a](37[b]-43[c])	**0**[a](0[b]-0[c])	**SWS**	51[a](42[b]-56[c])
Coffeeroasting area (Location-5)	**40**[a](1[b]-45[c])	**0.4**[a](0[b]-11[c])	**SSE**	**48**[a](40[b]-96[c])
Generator (Location-6)	**56**[a](44[b]-64[c])	**4**[a](0[b]-8[c])	**SSE**	**31**[a](26[b]-46[c])
Aluminum film burning area (Location-7)	**39**[a](29[b]-64[c])	**2**[a](0[b]-11[c])	**SES**	**56**[a](26[b]-90[c])
Average	**42[a]± 2[d]** 40e(38[b]-56[c])	**1.1[a] ±1[d]** 0.4[e](0[b]-4[c])		**49[a] ±3[d]** 51[e](31[b]-56[c])

[a]Average[d]SE[b] Min [c] Max [e]Median

The table 5.14 presents the atomic radiation at and around the factory which meets the international standards.

Table 5.14 Atomic radiation at the Lluvia factory

Location	Arad (CPM)	
In front of the office(Location-1)	11	25-75 CPM (USEPA)
Coffee green bean sizing area (Location-2)	12	
Storage area (Location-3)	13	
Production area (Location-4)	14	
Coffee roasting area (Location-5)	13	
Generator (Location-6)	14	
Aluminum film burning (Location-7)	14	
	13[a] ± 0.4[b] 13c(11[d]-14[e])	

[a] Average [d] SE [b] Min [c] Max [e] Median

5.2 Existing indoor air status of working places

5.2.1 Introduction

Indoor air quality is a major concern to employees because it can impact the health, comfort, well being, and productivity of building occupants. Air sampling in the indoor environment of the Lluvia (Hlaing Thar Yar office) was conducted in November, 2015 in order to determine the existing indoor air quality of the workspaces where people are spending several hours working in enclosed spaces every weekday.

Air velocity/flow, room temperature, relative humidity and microbiological quality (bacteria and fungus/mold) influencing employees' healt, physical conditions and the foodstuffs were monitored. Furthermore, correction of the conditions via natural ventilation (i.e. opening a window) is no longer possible as the reason of energy saving and contribute to the buildup of indoor air contaminants (OSHA, n.d.). In terms of indoor air contaminants, biological aerosols have been the predominant cause of complaints in 1-5% of problem office building investigated by the US. National Institute of Occupation Safety and Health (NIOSH).

Therefore, the survey will focus on the biological indoor air monitoring along with the moisture, air movement and temperature conditions of the rooms.

Microbial pollution of indoor air comes from hundreds of species of bacteria, fungi and moulds that grow indoors when sufficient moisture is available. Exposure to microbial contaminants is clinically associated with respiratory symptoms, allergies and asthma, and can affect the immunological system and affect on the foodstuffs contamination as well. Preventing or minimizing persistent damp and microbial growth on interior surfaces and building structures is the most important means of avoiding harmful effects of indoor air on health.(WHO, n.d.)

Step 1. Site Visits and Identification of Sampling Sites

↓

Step 2. Air Sampling Points (2 samples)

1) Laboratory QC Room
2) Meeting Room

↓

Step 3. Indoor Air Quality Monitoring

I.Physical Air Monitoing: Room Moisture (Roof & Walls)
Indoor Air Velocity
Room Temperature

↓

Step 4. Laboratory analysis (samples for Bacteria and Fungus) **and data interpretation**

↓

Step 5. Provision of the necessary recommendations

Physical Air Monitoring in both the laboratory and the meeting room

Moisture

Figure 5.8: Meeting room temperature & moisture

Figure 5.9: Indoor air biological monitoring in the food QA/QC lab room

Figure 5.10: Indoor air velocity monitoring in the QC laboratory

5.2.2 Indoor air monitoring in the laboratory room of the Lluvia factory

Table 5.15 presents the summary of the indoor air physical parameters of the Lluvia ground floor (laboratory for coffee samples).

Table 5.15: the indoor air physical parameters of the Lluvia factory

Indoor Air Parameters	**Laboratory (QC room)**	**Guideline** **OSHA**
Room Temperature	22	20-24.4°C
Air Velocity (at vent) m/s	0.2	<0.25 m/s
Relative Humidity (*wall*) %	59	20-60 %
Total Bacteria Count	268	1,000 CFU/m^3
Total Fungus Count	48	l Growth <250 cfu/m^3 Moderate mold growth - 250-1,000 cfu/m^3 Active mold growth >1,000 cfu/m^3

In terms of the physical parameters of both the meeting room and the laboratory, room temperature, air velocity and relative humidity of wall and ceiling meet the OSHA guidelines.

(a) Biological indoor air quality measurement in the laboratory room (QC room)

The table 5.16 presents that Bacteria counts and Fungal counts in the laboratory (QC room) meets the OSHA guideline of 1,000 CFU/m^3.

Table 5.16: Biological indoor air quality measurement (QC room)

Bacteria			Fungus		Guideline (OSHA)
Microscopy	Culture	Total CFU/m^3	Fungal species	Total CFU/m^3	
Measured on 29.7.2015 QC Room					
Gram positive cocci in pairs & group, Gram positive bacilli.	Coagulase negative Staphylococcus (2 type) Bacillus (1 types)	268	Aspergillus flavus, Aspergillus fumigates, Mycelia sterile, Penicillium species and Cladosporium species	48	1,000 CFU/m^3

Coagulase-negative staphylococci are normal flora on skin, respiratory & gastrointestinal system of human & animals, also in food.

Bacilli cause from ear infections to meningitis & urinary tract infections to septicemia. Mostly they occur as secondary infections in immunodeficient hosts, & may exacerbate previous infection by producing tissue-damaging toxins that interfere with treatment

Cladosporium : grow at relative humidy 80-90% & is found in soil, on decaying plant & as plant pathogens. It is not human pathogens except in immuno-compromised patients. It can trigger allergic to sensitive individuals. It can cause allergy and asthma.

Penicillium : grow humidity <80% and found in soil, decaying plant debris, compost piles and fruit rot. In indoors, they are on water damaged building materials & on food items. It can cause hay fever, asthma, hypersensitivity pneumonitis

Aspergillus flavus: grow at relative humidy 80-90%. It produces aflatoxin, a contaminant in foods (eg nuts)

Aspergillus fumigatus is tertiary colonizers which grow at relative humidity >90%& in decomposing organic material & causes allergic reactions.

Based on the findings, the ***indoor microbial air quality status*** of the laboratory room was recognized as clean air quality.

Thus, ***no serious threat***s to ***employees' health*** and foodstuffs were found regarding the indoor air quality as these air contaminations meet ***the acceptable limits***.

5.2.3 Indoor air monitoring in the production process rooms and meeting room of the Lluvia factory

Regarding the indoor air monitoring, besides the laboratory room, the production room and the meeting room were selected for air quality measurement as the reasons of significant emission area and the representative of the office staff rooms respectively.

Table 5.17: presents indoor air at Lluvia factory (production room 12 & meeting room)

Location	Temperature (Degree C)	Wind Speed (kph)	Relative Humidity (%)
Production(room12) (Location-1)	$30^a(29^b-33^c)$	$0^a(0^b-0^c)$	$34^a(29^b-46^c)$
Meeting room (Location-2)	$37^a(30^b-39^c)$	$0^a(0^b-0^c)$	$48^a(47^b-61^c)$
OSHA Guideline	$20-24.4^0C$	<0.25 m/s	20-60 %

Based on the findings, the temperature of the above two rooms (production room and the meeting room) were higher than the acceptable limit and there was lack of air flow as well.

(a) Point (1) Production room (Room12) (Location-1)

A NO_2 baseline gas concentration meets the NEQG guideline (updated 2005) and the National Ambient Air Quality Standards (NAAQS, set by USEPA 1990) and the World Bank guideline. SO_2 Baseline gas concentrations was found to be above the NEQG guideline (updated 2005) and the National Ambient Air Quality Standards (NAAQS, set by USEPA 1990) and below the World Bank guideline (**Table 5-18**).

Table 5.18: Baseline air monitoring in at production room (room-12) (Location-1)

Substance ($\mu g/m^3$)	Date	Production room (Location-1)	NEQG Guideline
NO_2 (ppb)	Start-2.11.2015 End-	$43^a(32^b-52^c)$	$40^{1/}200$/one hr
SO_2(ppb)		**$119^a(52^b-185^c)$**	**20^2**
CO (ppm)		$0.2^a(0.001^b-1^c)$	NA
VOC(ppm)		$1^a(0.001^b-5^c)$	NA
NH_3(ppm)		$0^a(0^b-0^c)$	

CH_4(ppm)	3.11.2015	9408[a](9050[b]-9871[c])	
O_3(ppm)		0.002[a](0[b]-0.005[c])	100ug/m^3m (8hr)

[1] Annual mean,[2] 24hr average, NA – not available,[a] Average [b] Min [c] Max

Figure 5.11: Indoor air monitoring in the production room (12) (Location-1)

(b) Point (2) Meeting room (Location-2)

NO_2 Baseline gas concentration meets the NEQG guideline .(**Table 5-19**).

Table 5.19: Baseline air monitoring in meeting room (Location-2)

Substance ($\mu g/m^3$)	Date	In the meeting room (Location-2)	NEQG Guideline
NO_2 (ppb)	Start-3.11.2015 End-4.11.2015	$35^a(26^b-45^c)$	40^1
SO_2(ppb)		**$130^a(35^b-304^c)$**	**20^2**
CO (ppm)		$0.4^a(0.2^b-0.8^c)$	NA
VOC(ppm)		$1.2^a(0.001^b-9^c)$	NA
NH_3(ppm)		$0^a(0^b-0^c)$	
CH_4(ppm)		$9887^a(1043^b-9603^c)$	
O_3(ppm)		$0.009^a(0.006^b-0.01^c)$	100ug/m^3m (8hr)

[1] Annual mean,[2] 24hr average,NA – not available,[a] Average[b] Min [c] Max

Figure 5.12: Indoor air monitoring in the meeting room (Location-2)

Table 5.20: Baseline PM_{10} and $PM_{2.5}$ in the production and meeting room

Location	PM_{10} 24-hr avg (range) µg/m³	$PM_{2.5}$ 24-hr avg (range) µg/m³	Remarks
Production (room12) (Location-1)	**56**[a](30[b]-81[c])	10[a](1[b]-49[c])	Fine weather
Meeting room(Location-2)	37[a](16[b]-56[c])	18[a](1[b]-52[c])	Fine weather
NEQG guideline[1]	50	25	

Bold Higher than NEQG air quality guidelines
[a] Average [d] SE [b] Min [c] Max [e] Median

The results of the gas parameters monitored over 8hr in both the production room and the meeting room meet the international guidelines except SO_2 level. Particulate matters were found to be below the standards. SO_2 source of the production room comes from the room itself and from the outside source as well. In the meeting room, the source most probably from the outdoor source.

The following table presents the atomic radiation of each room. **Both findings meet the guideline.**

Table 5.21: Atomic Radiation in Lluvia factory (production room (room 12) & meeting room)

Location	Arad (CPM)	
Production(room 12) (Location-1)	15	25-75 CPM (USEPA)
Meeting room (Location-2)	14	

5.3 Existing noise quality

5.3.1 Introduction

Industrial noise refers to noise that is created in the factories which is jarring and unbearable. Sound becomes noise only when it becomes unwanted and if it becomes more than that it is referred to as "noise pollution". The problem has been viewed and analyzed from all the perspectives but the solution probably is not so easy to achieve since there is a lot of contradiction between legislation, guidance and documents. Industrial Noise resulting to noise pollution has many reasons such as industries being close to human habitats which prevent the noise from decaying before it reaches human ear. The purpose of this project was to ascertain industrial noise pollution and its impact on the immediate workers and nearby local community.

5.3.2 Noise Levels

The following table 5.22 shows the overall noise level from open space area, production process area, storage area, green bean sizing area, coffee roasting area, aluminum film burning area and generators. The vibration of proposed factory is assumed as acceptable level.

Table 5.22: Baseline average noise data of the proposed factory (both day and night)

Area	Day Time Noise Level (dB)	Night Time Noise Level (dB)	Noise standard value of EQG
Lluvia Factory	44.15[a]±0.27[b] 42.7[c](26.7[d]-114.3[e])	44.06[a]±0.31[b] 43.35[c](27.7[d]-88.6[e])	70

[a]Average[b] Standard Error [c]Median [d]Min [e]Max

(a) Point (1) Open space area of Lluvia factory

In order to reveal the baseline data of the project site, before the start of the project activities, at the time of the start of the IEE Project within the Project Site, a representative coverage area of the entire project has been measured as (24-hour) Baseline Data.

The coordinates map, monitoring methods, photo records of the monitoring site are fully described in the following and annex (II).

The coordinate point is 16°50'55.94"N, 96° 3'42.43"E.

The noise monitoring at the open space area of Lluvia is near to packing area. The level of noise is mainly captured from vehicles' noise and it is acceptable for both day and night.

Table 5.23: 24hr average noise level of the open space area

Area	Day Time Noise Level (dB)	Night Time Noise Level (dB)	Noise standard value of EQG
Open space area of Lluvia factory	$48.89^{a} \pm 0.54^{b}$ $48.7^{c}(35.3^{d}-67.1^{e})$	$50.13^{a} \pm 0.73^{b}$ $50.05^{c}(35.3^{d}-67.1^{e})$	70

[a]Average[b] Standard Error [c]Median [d]Min [e]Max

Figure 5.13: Noise monitoring in the open space area of Lluvia factory

(b) Point (2) Storage area of Lluvia factory

The major noise source of storage area is raw material receiving from container trucks and arrangement of raw materials. Noise monitoring level at storage warehouse area of Lluvia factory is found as acceptable for day and night time.

Table 5.24: 24hr average noise level of the storage area

Area	Day Time Noise Level (dB)	Night Time Noise Level (dB)	Noise standard value of EQG
Storage area of Lluvia factory	$41.25^{a}\pm0.44^{b}$ $40.7^{c}(26.7^{d}-67.9^{e})$	$41.35^{a}\pm0.44^{b}$ $42.7^{c}(27.7^{d}-49.7^{e})$	70

^{a}Average^{b} Standard Error ^{c}Median ^{d}Min ^{e}Max

Figure 5.14: Noise monitoring in the storage area of Lluvia factory

(c) Point (3) Production area of Lluvia factory

Major noise source of production area are noise of production machine and the activities of the staff who are working for the production. Noise monitoring level at the production area of Lluvia factory is measured as acceptable for day and night time.

Table 5.25: 24hr average noise level of the production area

Area	Day Time Noise Level (dB)	Night Time Noise Level (dB)	Noise standard value of EQG
Production area of Lluvia factory	40.25[a]±0.37[b] 40.3[c](29.7[d]-58.1[e])	44.04[a]±0.52[b] 45.8[c](30.3[d]-53.4[e])	70

[a]Average[b] Standard Error [c]Median [d]Min [e]Max

Figure 5.15: Noise monitoring at production area of Lluvia factory

(d) Point (4) Green bean sizing area of Lluvia factory

There are a number of staff who are working at green bean sizing area of Lluvia factory. The major noise sources of green bean sizing area come from sizing machine and the activities of green bean sizing employers. The noise level of green bean sizing area is under the standard of EQG for both day and night.

Table 5.26: 24hr average noise level of the Green bean sizing area

Area	Day Time Noise Level (dB)	Night Time Noise Level (dB)	Noise standard value of EQG
Green bean sizing area of Lluvia factory	44.16[a]±0.56[b] 43.35[c](33.6[d]-78.8[e])	43.46[a]±0.61[b] 42.55[c](33.6[d]-66.2[e])	70

[a]Average[b] Standard Error [c]Median [d]Min [e]Max

Figure 5.16: Noise monitoring at green bean sizing area of Lluvia factory

(e) Point (5) Roasting area of Lluvia factory

Roasting area of Lluvia factory only operates for few hours per day. The major noise source comes from coffee roaster and ventilator. The noise monitoring level of roasting area is found as acceptable under the standard of EQG.

Table 5.27: 24hr average noise level of the roasting area

Area	Day Time Noise Level (dB)	Night Time Noise Level (dB)	Noise standard value of EQG
Roasting area of Lluvia factory	47.25[a]±1.09[b] 41.2[c](28.2[d]-114.3[e])	47.04[a]±1.11[b] 45.25[c](31.6[d]-88.6[e])	70

[a]Average[b] Standard Error [c]Median [d]Min [e]Max

Figure 5.17: Noise monitoring at roasting area of Lluvia factory

(f) Point (6) Aluminum film burning area of Lluvia factory

Aluminium films burning process operates few hours per day. Major noise pollution of aluminium films burning area comes from the burning process of aluminium films. The noise pollution level of aluminium films burning process is found as acceptable.

Table 5.28: 24hr average noise level of the film burning area

Area	Day Time Noise Level (dB)	Night Time Noise Level (dB)	Noise standard value of EQG
Aluminum film burning area of Lluvia factory	$40.35^a \pm 0.50^b$ $38.1^c (27.7^d - 61.6^e)$	$38.37^a \pm 0.34^b$ $38.3^c (31.1^d - 44.1^e)$	70

^{a}Average^b Standard Error ^{c}Median ^{d}Min ^{e}Max

Figure 5.18: Noise monitoring at aluminium film burning area of Lluvia factory

(g) Point (7) Generator of Lluvia factory

The Lluvia factory has to use the generators when the electricity is cut off. The amount of generator used hour depends on lack of electricity generation by government. The noise level of generator is under the standard level of EQG.

Table 5.29: Avergae noise level during the generator operation (6hrs)

Area	Day Time Noise Level (dB)	Noise standard value of EQG
Generators of Lluvia factory	52.01[a]±0.94[b] 50.8[c](39.7[d]-68.1[e])	70

[a]Average[b] Standard Error [c]Median [d]Min [e]Max

Figure 5.19: Noise monitoring during the generator running in Lluvia factory

5.4 Installation of Ventilation System

In the production room, it is made with Exhaust fan and Ventilation system. Exhaust fan has been installed in the roaster room, and air con has been installed in other production rooms. Machines in production areas with air emissions are equipped with dust suction. The warehouse is designed with Roof Air ventilation.

Figure 5.20 : Exhaust Fans in the production rooms

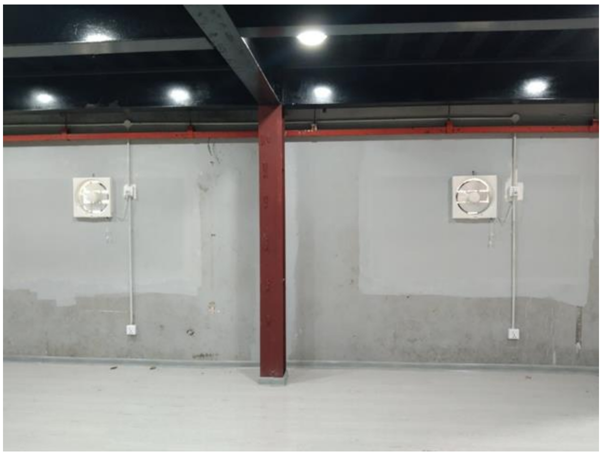


Figure 5.21 : Air Conditioners in the production rooms

Figure 5.22 : Dust Suction/Dust Collector for the machines

5.5 Soil quality

As shown in Figure 5.23 and 5.24, the project area mostly comprises of the factory buildings and the industrial zone which has been developed already for 20 years. The area is ***suburban flat area*** along with rare cultivated (about ***90% of land*** is ***concrete*** in the industrial zone).

According to the field survey, the industrial zone itself and nearby surrounding have less practice of cultivation and farming likely due to the urban developments.

The location of factory compound area 16°50'57.21"N, 96° 3'45.03"E.

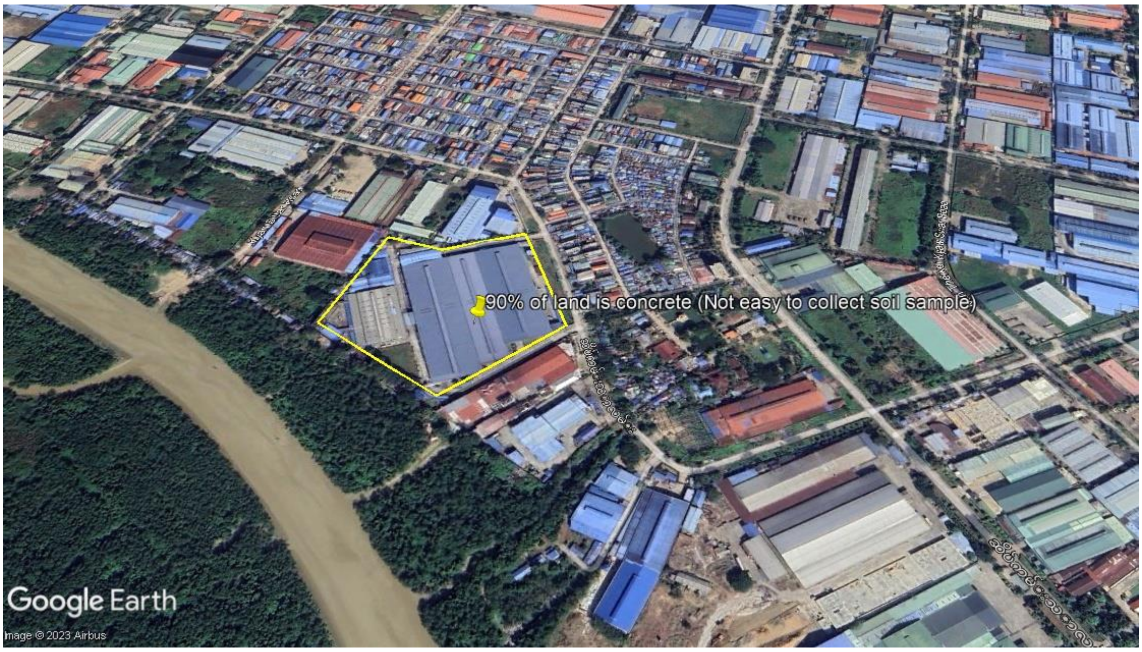


Figure 5.23: The location of the factory compound area (about *90% of land* is *concrete)*

Figure 5.24 Current situation of Lluvia premise (90% of land is concrete)

5.6 Flora and fauna

The analysis of biodiversity is focused on the project area. It was found out that there ***is no protected area, area of biodiversity importance and key biodiversity areas at national and local levels and sensitive areas*** in and around the industrial zone including the Lluvia manufacturing and distribution factory.

The Hlaing Tharyar Industrial Zone has established since about 1996 that is around 20 years after the new urban developments have been settled down around the project area. According to the traditional biodiversity related knowledge survey, there is ***no both negative and positive impact on the nature, local animals, plants and pasture*** etc. because of the industrial developments.

Thus, it can be assumed that there is ***less impact on the biological environment*** by the industry and its activities. Based on screening and scoping results, there is no specific biodiversity assessment required according to IFC guideline.

5.7Carbon emission

5.7.1 Introduction

Carbon dioxide (CO_2) is the primary greenhouse gas emitted through human activities. Many industrial processes emit CO_2 through fossil fuel combustion. Several processes also produce CO_2 emissions through chemical reactions that do not involve combustion, for example, the production and consumption of mineral products such as cement, the production of metals such as iron and steel, and the production of chemicals. The main human activity that emits CO_2 is the combustion of fossil fuels (coal, natural gas, and oil) for energy and transportation, although certain industrial processes and land-use changes also emit CO_2.

In terms of the CO_2 emission from the Lluvia factory, the electricity sector of Lluvia factory does not directly produce the emission of CO_2 and GHG. The proposed factory is directly consuming electricity from government. However, when the electricity is cut off, proposed factory has to use generators to generate electricity. This generation of electricity produces CO_2 and GHG by using diesel fuel. Transportation sector is one of the major sources of emission of CO_2 and GHG by using diesel fuel for transportation trucks which carry raw materials to proposed factory and distribute products to consumers. Waste recycling practice instead of landfill is to reduce the CO_2 emission from the proposed factory.

The main sources of CO_2 emissions are described below.

5.7.2 Emission from electricity

Electricity is a significant source of energy and is used to power homes, business, and industry. The combustion of fossil fuels to generate electricity is the largest single source of CO_2 emissions. The type of fossil fuel used to generate electricity by using generator which will emit different amounts of CO_2. This Lluvia factory is based on the government electricity and therefore indirectly causes the greenhouse gas emissions (GHG) emissions from the electricity production. Emissions from the proposed factory increase substantially when emissions from electricity are included, due to their relatively large share of electricity consumption (e.g., production, lighting and air conditioning). Total annual electricity usages of the proposed factory are 2872.3 MWh.

Carbon dioxide (CO_2) makes up the vast majority of greenhouse gas emissions from the sector, but smaller amounts of methane (CH_4) and nitrous oxide (N_2O) are also emitted. These gases are released during the combustion of fossil fuels, such as coal, oil, and natural gas, to produce electricity. The proposed factory uses the diesel generators as standby when the current is cut off.

(a) Plant and equipment power requirement

Carbon emissions from the proposed factory would be predominantly associated with the electrical energy required for the operation of the production and equipment. The proposed factory would also not utilize steam (boiler) during the process, and would not directly combust gas or any other fuels. Electricity would be mainly used on site to operate processing and equipment.

The electrical energy is required to operate the production, conveyers, machinery and air conditioning in the proposed factory. Values of electrical energy usage were estimated form the electrical bills of government sector and the usage of generator to produce the electric when power source was not available from government support. The power required for production and equipment was based on the following assumptions.

- All plant and equipment would operate 24 hours per day (except every Sunday, during maintenance and cleaning shut downs).
- Maintenance would be scheduled twice a month, for the whole day.
- The plant would operate for 7,440 hours per year with a corresponding annual electricity consumption of approximately ***1,418.2 MWh.***

(b) Lighting power requirements Lighting systems:
The electricity required for lighting was calculated based on the following assumptions:

- The typical lighting requirement for industrial or factory buildings, of 2 W/m^2 of floor area.
- Total floor area of proposed factory is approximately 39,254.51 m^2 which consists of training building of admin office, production building, green bean sizing building, roasting building, canteen area, storage warehouse and open space.
- That lighting would be required during maintenance shut downs.

The operation of lighting on one floor for 24 hours per day, 310 days per year equates to a total of 7,440 hours annually, with an electricity requirement of close to ***584.1 MWh*** calculated as:

Lighting Power (MWh) = (Floor area x lighting requirement x hours/year) / 1,000,000

= (39,254.51 m^2 x 2 W/m^2 x 7,440 hrs/year) / 1,000,000

= 584.1 MWh

Another major electricity annual usage for proposed factory is air conditioning. The production processes and some raw material storage are being processed under 24 hour air conditioning system. The amount of air conditioning system usage for proposed factory is assumed as ***870 MWh.***

(c) Carbon emission of electricity energy usage from plant and equipment power requirement and lighting and air-condition power requirement

To convert reductions of kilowatt-hours into avoided units of carbon dioxide emissions, the Greenhouse Gas Equivalencies Calculator uses the Emissions & Generation Resource Integrated Database (eGRID) U.S. annual non-baseload CO_2 output emission rate.

Total electricity usage = 1,418.2 MWh + 584.1 MWh + 870 MWh

= 2,872.3 MWh (2,872,300 kWh)

kWh = 6.89551×10^{-4} metric tons CO_2 ---------------------------- eq (1)
(eGRID, U.S. annual non-baseload CO_2 output emission rate, year 2010 data)

CO_2 emission (metric tons) = 2,872,300 kWh x (6.89551×10^{-4})
= 1,980.6 metric tons of CO_2

The annual emission of CO_2 from electricity usage of lighting system, other usage of proposed factory and plant equipments are 1,980.6 metric tons of CO_2.

(d) Generator usage

The proposed factory would use generators when the electricity generation is cut off. The Lluvia factory has three generators using diesel fuel to generate electricity. Power generators set with three generators having capacity of 500 KVA each with acoustic enclosure which have been envisaged to meet the emergency power requirements. In case of main power failure these generators will automatically start and supply power to the emergency loads using Cooling circuit. The amount of fuel (diesel) usage for generators is 14,054.64 gallons (53,202.6 liters) per year.

1 Liters of Diesel = 2.68 kg of CO_2 ---------------------- eq (2)

CO_2 emission (kg) = 53,202.6 Liters x 2.68

= 142,583 kg of CO_2 (142.583 metric tons of CO_2)

Total amount of CO_2 emission from generator is 142,583 kg of CO_2/ year (142.583 metric tons of CO_2/ year).

Total emission from electricity sector = (Electricity energy usage from plant and equipment power requirement and lighting and air-condition power requirement) + (Generator usage)

= 1,980.6 metric tons + 142.583 metric tons

= 2,123.183 metric tons

Total emission of CO_2 from electricity sector is 2,123.2 metric tons of CO_2.

5.7.3 Emission from transportation

Regarding the combustion of fossil fuels from this proposed factory, fuel (gasoline and diesel) is mainly utilized by passenger cars and light-duty trucks, pickup trucks, and minivans which are for transportation of employees and goods of the proposed factory. These are the largest sources of transportation-related greenhouse gas emissions of the factory. Transportation and distribution systems of the proposed factory are maximized in a given geographic area – private cars for usage of staff, trucks which deliver raw materials to a plant, pick up finished product and then transport the products to either the distribution center or directly to the customers. This strategy optimizes network efficiency and allows trucks to run in a continuous loop with a high level of fuel utilization. Types and amounts of fuel usage (gasoline, diesel and CNG) are based on the type of the car.

(a) Fuel usage for employees' car

There are only 5 vehicles are running as an employee's car in this proposed factory. Two vehicles used diesel and three vehicles use gasoline as a fuel for vehicle. The amount of fuel consumption was based on the following assumptions. The total amount of fuel (diesel) consumption for office vehicles are **1,535 gallons** per annual and total amount of fuel (gasoline) consumption for office vehicles are **2,438 gallons.**

(b) Fuel usage of raw material transportation container vehicle

The container cars transporting the numbers of raw material also use diesel fuel. These container cars were estimated as 1,068 in numbers for annual. Container vehicles are being use to transport the raw material from Thilawar harbour to Lluvia factory and the amount of fuel consumption is 5 gallons for one container vehicle.

Amount of fuel (diesel) consumption = 1,068 vehicles x 5 gallons

= 5,340 gallons

The amount of fuel consumption for raw material transportation is 5,340 gallons per annual.

Total amount of fuel consumption = Amount of fuel consumption in employee's car + Amount of fuel consumptionin raw material transportation container vehicles

= 1,535 gallons + 5,340 gallons

= 6,875 gallons (26,024.706 liters)

Total amount of fuel consumption from transportation sector is ***6,875 gallons (26,024.706 liter)*** of diesel fuel per year.

To obtain the number of grams of CO_2 emitted per gallon of gasoline combusted, the heat content of the fuel per gallon is multiplied by the kg CO_2 per heat content of the fuel.

Gallon of gasoline = 8.887 × 10^{-3} metric tons CO_2
This value assumes that all the carbon in the gasoline is converted to CO_2 (IPCC 2006).
1Litre of Diesel = 2.68 kg of CO_2
A few percentages of vehicles used natural gas instead of gasoline or diesel as a fuel.

Therm = 0.005302 metric tons CO_2

1 Therm = 0.1 mmbtu
1mmbtu = 14.46 kg carbon
CO_2 emission (diesel usage) = 26,024.706 liters x 2.68

= 69,746 kg of CO_2 (69.746 metric tons of CO_2)

CO_2 emission (gasoline usage) = 2,438 gallons x 8.887 × 10^{-3}
= 21.67 metric tons of CO_2 Total CO_2 emission
= 69.746 metric tons + 21.67 metric tons
= 91.416 metric tons

The ***total emission of CO_2 from transportation sector is 91.416metric tons of CO_2.***

5.7.4 Emission from waste

Currently, wastes released from the factory are being recycled instead of landfill.

To develop the conversion factor for recycling rather than landfill waste, emission factors from EPA's Waste Reduction Model (WARM) were used (EPA 2012). These emission factors were developed following a life-cycle assessment methodology using estimation techniques developed for national inventories of greenhouse gas emissions.

According to WARM, the net emission reduction from recycling mixed recyclables (e.g., paper, metals, plastics), compared with a baseline in which the materials are landfilled, is 0.73 metric tons of carbon equivalent per short ton. This factor was then converted to metric tons of carbon dioxide equivalent by multiplying by 44/12, the molecular weight ratio of carbon dioxide to carbon. Total tons of waste instead of landfill from the proposed factory is 620.5 ton/year.

Ton of waste recycled instead of landfill = 0.76 metric tons of **CO_2 E** × 44 kg CO_2/12 kg C
Ton of waste recycled instead of landfill= 2.79 metric tons CO_2 equivalent
The equivalent of CO2 from waste recycled = 620.5 x 2.79 metric tons CO2
Instead of landfill
= 1,731.2 metric tons

The equivalent of CO_2 (waste reduction) from waste recycled instead of landfill is 1,731.2 metric ton per year.

5.7.5 Total CO_2 emission from all sectors

Total emission of CO2 from proposed factory = (Total emission of CO2 from electricity sector + Total emission of CO2 from transportation sector) - The equivalent of CO2 from waste recycled instead of landfill
= 2,214.61 (2,123.2 metric tons + 91.416 metric tons) - 1,731.2 metric tons

= 483.416 metric tons

Total emission of CO_2 from proposed factory of all of the sectors (electricity, transportation) are metric tons of CO2 before deduction of CO2 after recycle = 2,214.61 metric ton

The total CO2 emission after deduction of the equivalent of CO_2 (waste reduction) from waste recycled instead of landfill was = 483.416 metric tons

5.8 Existing situation of potable water and waste water quality

5.8.1 Introduction

Water is one of the essential needs for the industrialization process and human health. Industrialization has become an important factor to the development of a country's economy, through the establishment of plants and factories. However, the waste or by-products discharged from them are severely disastrous to the environment consists various kinds of contaminants which contaminate the surface water, ground water and soil.

Coffee is one of the most essential products around the world. In this factory, from the process of coffee production, both solid wastes, waste water and others environmental problems can happen on the nearest environment. The wastewater from the beverage manufacturing factory (such as coffee) has high concentration of organic pollutants. So it can impact on for the surrounding water bodies, human health and aquatic life if discharged directly into the surface waters.

5.8.2 Objectives of the study

a. To reveal the baseline situation of water usage and wastewater production rate in the factory
b. To recommend suitable management plan both potable water and effluent waste water to reduce environment impact

5.8.3 Potable water analysis

According to the observation, water is one of the essential raw materials for the process. It is used in both industrial process and domestic usage. In the process of Premier Coffee, according to the information provided by the factory, the water usage in this manufacturing process is around **25m^3**/day. It is from the three different main sources such as manufacturing process, canteen and others activities. Based on the analysis, 65% of water usage is for the domestic use and cleaning of machineries and floors and 35% of the water usage is for drinking water.

In the manufacturing process, the main sources of potable water come from the tube well. The water condition is as contaminated with river water. Before using for drinking, Reverse Osmosis method as a treatment is utilized before distribution to industrial use and domestic use as well.

In terms of the potable water sources, there are two tube wells in the factory. From those wells, one sample from each well, the next one sample from the source after RO treatment and the other source from tap water and the remaining one is from the overhead tank water were taken for the ***potable water analysis.*** Those (5) samples were analyzed for ***18 parameters each including chemical, physical and biological parameters*** which are significantly important for the human health and surrounding environment

In the following table 5.31 shows the amount of water usage from the Coffee Beverage Manufacturing System. In the potable water analysis, there are total 18 parameters which are vital for the human health and surrounding environment were analyzed in the above mentioned five samples.

In order to reveal the baseline water data, the representative sited were selected and monitored the water quality. The coordinates, location map, monitoring methods, photo records of the Tube well water (1 and 2) are fully described in the following and annex (II).
The coordinate points of tube well (1 and 2) are 16°51'0.95"N, 96° 3'41.80"E and 16°50'54.71"N, 96° 3'43.33"E.

Figure 5.25: The location map of the Tube Well (1 and 2)

Table 5.30 Amount of water usage from three different sources

No	Water Usage	Water source	Amount (m^3/day)
1	Manufacturing process (first cleaning of the machines)	Tube well (without Reverse Osmosis Treatment)	11.3
2	Canteen and Other Activities	Tube well (without Reverse Osmosis Treatment)	5.4
3	Manufacturing process (Second cleaning of the machines)	Tube well (Water pass Reverse Osmosis Treatment)	5.0
4	Drinking Water	Tube well (Water pass Reverse Osmosis Treatment)	3.3
Total			**25**

In terms of water usage, the two tube wells water is purified with Reverse Osmosis (RO) before it is used for drinking water and machine final washing. Without treating Reverse Osmosis water is used for canteen and other activities (car washing and floor washing etc) and manufacturing process (cleaning of the machines).

Figure 5.26: Potable water sampling

Table 5.31: The results along with the permissible limits of the factory's potable water

No	Test Parameters	Unit	Well Source (1)	Well Source (2)	RO Water	Tap Water (1)	Tank Water (1)	National Drinking Water Standard (NDWS)	Remarks
1	pH	S.U	8	8.7	6.9	8.3	8.2	6.5~8.5	Drinking water contaminant is considered aesthetic. Then, it is also affected on the human health. (NDWS)
2	Color	Pt.Co	10	Nil	Nil	12	10	15 cu	
3	Turbidity	FTU	2	Nil	Nil	2	2	<5	
4	Conductivity	mg/l	**13,564**	196	144	**10,708**	**10,640**	N/A	Conductivity is a measurement used to determine a number of applications related to water quality. (NDWS)
5	Dissolved Oxygen (DO)	mg/l	4.6	5	4.8	3.7	4.1	N/A	If DO level is less than the standard, it is really problem in the aquatic organisms, especially in river water. Besides DO concentrations of less than 1.0 mg/L to be anoxic.
6	Total Dissolved Solid (TDS)	mg/l	**6,782**	98	72	**5,354**	**5,320**	1000	High Total Dissolved Solid may affect the taste of water. If TDS was high in the water, it can be health problem (NDWS).

7	Total Alkalinity	mg/l as $CaCO_3$	240	255	126	234	261	N/A	????
8	Total Hardness	mg/l as $CaCO_3$	**846**	45	20	**790**	**825**	N/A	Hard water is mainly an aesthetic concern because of the unpleasant taste.
9	Iron	mg/l	0.2	0.1	0.1	0.25	0.25	<0.3	
10	Magnesium	mg/l	**>150**	4.2	3.6	**173.6**	**168**	150	Hard water is mainly an aesthetic concern because of the unpleasant taste
11	Chloride	mg/l	**2,490**	36	40	**2,150**	**2,130**	250	Chloride is mainly an aesthetic concern because of the unpleasant taste
12	Calcium	mg/l	72	12	2.8	68	88	200	
13	Sulphate	mg/l	**>400**	22	9.6	**393**	**403**	250	Sulphate is mainly an aesthetic concern because of the unpleasant taste
14	Zinc	mg/l	0.006	0.008	0.012	0.011	0.01	3	
15	Arsenic	mg/l	0	0	0	0	0	0.01	
16	Copper	mg/l	0.02	0.009	0.01	0.01	0.01	1-2	
17	Total Coliform	MPN/100 ml	>16	>16	>16	>16	>16	0	Bacteriological Unsatisfactory
18	*Escherichia*	MPN/1	**0**	**16**	**0**	**9.2**	**9.2**	0	Bacteriological unsatisfactory *E. coli.* most

	coli	00 ml							severe is *E. coli* O157:H7, which makes strong toxin and can cause severe illness.

All the analytical results were compared with different guidelines such as National Drinking Water standard (2019).
According to the drinking water guidelines, there are around 18 parameters of potable water was analyzed for the factory potable water. All of parameters are the important parameters such as both physical and chemical parameter which can affect on not only human health but also environment.. These are pH, colour, turbidity, Conductivity, Dissolved Oxygen (DO), Total Dissolved Solid, Total Alkalinity, Total Hardness, Iron, Magnesium, Chloride, Calcium, Sulfate, Zinc, Arsenic, Copper, Total Coliforms and *Esherichia coli*.

According to the results, except the potable water parameters that have been passed from the reverse osmosis treatment method, the potable water parameters from the others sources did not meet with the standards guidelines. Especially, the significant parameters, such as pH, Conductivity, Total Dissolved Solid, Total Hardness, Magnesium, Chloride, Sulphate, and *Esherichia coli* are higher than the standards. But the remaining parameters are within the standard guidelines. Because of those water conditions, the potable water without RO treatment can negatively affectnot only on the environmental but also the factory community (employees).

Regarding the biological parameter, total Coliform which is an indicator of the presence of the potentially harmful bacteria were being found in the potable water. Thus, the potable water of the factory should be used after the appropriate water purification system as such reverse osmosis etc particularly in drinking and the manufacturing process.

5.8.4 Wastewater analysis

In the Premier manufacturing system, the main sources of waste water come from the domestic usage and the rest comes from the other industrial activities. According to the existing system, there are three drain systems in the whole compound and all the waste water from different sources are flowing through those drains. All the combination of waste water from different sources finally flows into the Pan Hlaing River without any treatment method. The coordinate points of wastewater sampling from different drains are 16°50'59.34"N, 96° 3'47.06"E (Drainage area 1), 16°50'56.03"N, 96° 3'43.07"E (Drainage area 2) and 16°50'56.10"N, 96° 3'41.00"E (final effluent pipeline).

The following figures show sampling technique of waste water sampling from the different drains. The aim of the analysis was to assess the effect of wastewater produced from the coffee manufacturing factory on nearby water bodies and human health.

Figure 5.27: The location map of the effluent water samplings (Drainage 1,2 and final effluent pipeline)

Figure 5.28: Wastewater sample collection from drainage area 1

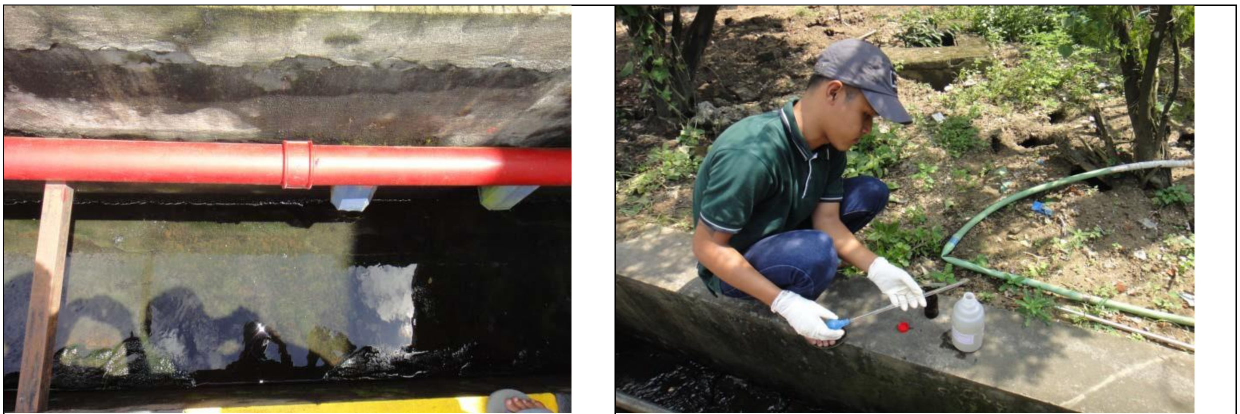


Figure 5.29: Wastewater sample collection from drainage 2

Figure 5.30: Wastewater sample collection from the final effluent pipe lines

The hazards of the waste water discharged from the Beverage factory (Premier) can be minimal due to the fact that no chemical is used in the manufacturing process and dry cleaning is mostly and usually employed in the process. However, i was found from literature that the wastewater from such type of industries has high concentration of organic pollutants.

In terms of the sewage water, there is only waste water effluent from bathing, canteen and run-off water which flow into the public drainage.

Concerning the industrial waste water, there is no any treatment for the wastewater discharge in the factory. Looking at waste water analysis, both physical and chemical characteristics are analyzed. The parameters were selected mainly based on National Environmental Quality Guidelines by Environmental Conservation Department (ECD). These are pH, Total Suspended Solid, Ammonia Nitrogen, Nitrate Nitrogen, Oil and Grease, Phosphorus, BOD, COD, Total coliform and *Escherichia coli* (E-coli). The following table shows the results and the permissible limits for water discharges. As the conditions of the level of water from all the drainages, the samples was taken from three sources at Drainage area (1), Drainage area (2) and final Pipe lines which drains into to the Pan Hlaing River.

Table 5.32: Environmental requirements for industrial wastewater effluent

No.	Test Parameter	Unit	Drainage 1	Drainage 2	Final Pipe Line	NEQG Guideline	Remark
1	pH	S.U.	6.87	6.51	6.83	6-9	
2	**Total Suspended Solid (TSS)**	**mg/l**	**197.33**	**736.67**	**92.67**	**50**	High TSS leads to increase water turbidity.
3	**Ammonia Nitrogen**	**mg/l**	**4.97**	**ND**	**3.85**	**N/A**	Influence on reproductive toxicity and genotoxicity and also affect on waste water disinfection
4	Nitrate Nitrogen	mg/l	ND	ND	ND	N/A	
5	**Oil and Grease**	**mg/l**	**7.4**	**12.19**	**1.2**	**10**	Leading to environmental degradation, can reduce human health risks and decrease wastewater treatment efficiency.
6	Phosphorus	mg/l	0.401	0.384	0.312	2	Phosphates can contribute to high BOD levels and high nutrient in the river body and force to **Eutrophication**
7	DO	ppm or mg/l	1.0	0.2	0.7	N/A	If DO level is less than the standard, it is really problem in the

							aquatic organisms, especially???
8	**BOD**	**mg/l**	**37**	**168**	**94**	**50**	Coffee waste leads to high BOD. High BOD can cause lower oxygen which is needed for the aquatic organisms to survive
9	**COD**	**mg/l**	**101**	**219**	**371**	**250**	Coffee waste leads to high COD. High COD can cause lower oxygen which is needed for the aquatic organisms to survive
10	**Total Coliform**	**MPN/100 ml**	**>16**	**>16**	**>16**	**400**	**Bacteriological unsatisfactory** • Coliforms are naturally present in the environment • Total Coliform is used as an indicator that other potentially harmful bacteria may be presented
11	***Escherichia coli***	**MPN/100 ml**	**9.2**	**16**	**9.2**	**N/A**	**Bacteriological unsatisfactory** *E. coli*. most severe is *E. coli* O157:H7, which makes strong toxin and can cause severe illness.

ND=Non Detected

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Based on the findings, the effluent pH from the drainage 1 and drainage 2 and final pipe are in the range of 6.51 and 6.83, when it is compared with effluent guidelines, pH was in the range of from 6-9. Thus, it is considered that effluent pH from all source of waste water are within the range and meet the Effluent Standard level. Besides, the analytical result of nitrite nitrogen and phosphorous from all drainages meet the guidelines.
However, the remaining important parameters such as total suspended solid, Ammonia Nitrogen, Oil and Grease, BOD and COD, Total Coliform and E-coli did not meet the guidelines. These impacts can affect on concrete drainage systems, river water body and aquatic organisms.

According to the findings, Total Suspended Solid from different Drainages is much higher than in the standard guidelines significantly in the drainage area (2) which is the water come from the industrial process. These effects are leading to the Turbidity of the water quality. Furthermore, TSS and Ammonia Nitrogen in the waste water are also quite higher than the standard guidelines due to high organic pollutants in the waste water. As the effect of high Ammonia Nitrogen, it can really affect on the waste water treatment process. Besides, there can be really affect negatively both human and aquatic organisms. It is really influence on reproductive toxicity, embryo toxicity, teratogenicity and genotoxicity.
Then, Oil and Grease were also higher than the standard guidelines. These contaminants were found in both industrial wastewater and domestic wastewater. This can cause problems during treatment and for ultimate disposal. Oil and Grease in water can cause surface films and shoreline deposits leading to environmental degradation, and can induce human health risks when discharged in surface or ground waters. Additionally, Oil and Grease may interfere with aerobic and anaerobic biological processes and lead to decreased wastewater treatment efficiency.

At the same time BOD and COD from the wastewater from the drainages are quite higher than the standard guidelines. This will affect both directly and indirectly on community who rely on the nearby water bodies like surface water. Moreover, High BOD and COD can cause lower oxygen which affects on the aquatic organisms to survive.
Besides, Total Coliform and E-coli are significantly higher than the guidelines expect from IFC Effluent Guidelines. These parameters directly affect on the human health impact.

5.8.5 Social and environmental conditions around the factory

A comprehensive overview of the socio-demographic profile of the community was detailed in the chapter 10 providing the social and demographic composition.

The ***detailed information is a brief and clearly summarized*** as follows:
The key informant interview found that the land changed from farms to factories, so people migrate for job opportunities. After 1990, the economy grew, and that's when farms

became factories and houses.

Health care information

There aren't enough good hospitals, just small ones with not enough stuff. Almost everyone, about 99%, and their families are healthy with no disabilities, accidents, or injuries reported. Only 1% have the flu during the survey. Everyone knows about healthcare. Only 2% dealt with diarrhea, and 16% occasionally have health issues, while 84% are mostly healthy. The most common problem is the flu, affecting about 33%. Other issues like malaria, colds, hypertension, digestive or skin problems, muscle pain, and tooth issues range from 1% to 7%. Around 33% never get sick. Living near industries doesn't seem to cause major diseases, as per the health analysis of the community.

Ninety-seven percent of households visit a doctor when they're sick; only 3% use self-medicine. There's a clinic nearby that's open every day. Four percent saw health improvements, 3% noticed limitations, and 92% are happy with the clinic. Malaria isn't a problem, probably because 99% use mosquito nets; only 1% don't use them.

Water usage

People use wells and clean water, but sometimes it's not safe to drink, which can make people sick. About 52% of households rely on public municipal water. Another 45% buy water from tube wells, while 3% use rainwater from unprotected tanks. Some households use rainwater from unprotected dug wells without any protective measures. The public water sources are contaminated with river water, observed by the unclear and unsatisfactory quality, although people have adapted to water cleaning and treatment methods.

Over 90% of households buy drinking water. To treat water, 67% use filtration, 22% use boiling, and 11% drink untreated water. Despite this, there's no evidence of diseases transmitted through water, according to interviews.

Electricity

Electricity is there, but it's not enough for homes, so some use other things like charcoal. About 80% of households use public electricity, showing improvement in its usage. Among the remaining 20%, 16% use batteries for lighting, while 4% rely on community hydropower for their electricity needs.

Waste disposal

There aren't enough places to dispose the wastes, so the environment gets worse. The way water goes away when it rains is bad, making water problems worse. Overall, despite development, essential services and environmental upkeep remain lacking in these areas. There are multiple open dumping sites for solid waste despite the municipal warning against it. This leads to an unhygienic environment in the community.

Air quality

Interview findings highlight changing air quality over the decade, notably during summer due to stronger odors from Premier Coffee Beverage Factory, discomforting the nearby community. Besides, they pointed out that air quality becomes changed because of the activities of industrial estate in the surrounding.

Income

Most people, about 70%, work for income. Almost half of them have service jobs or temporary work. Some help with livestock or at home for free. Others work in sales, forestry, skilled jobs, or different roles. Most people, about 51%, earn between 1,000,001 and 2,000,000 annually. Around 19% earn between 500,001 and 1,000,000. About 9% earn less than 500,000. Fewer households, around 8%, make between 2,000,001 and 3,000,000. Very few, rare ones, earn between 3,000,001 and 5,000,000, while about 12% earn more than 5,000,000. People in the area mostly work in services, though some used to be farmers or fishermen. About 80% moved from elsewhere seeking a better life and work after the industrial zone was established.

Education

Most people, about 43%, finished secondary school. Around 34% completed high school. Even though primary and secondary education are free, only 3% went to basic kindergarten and 10% stopped at primary school. Very few reached graduate level. Overall, education in the area is low. Currently, 67% send their kids to government schools, but 33% can't afford it, so their children don't attend school because they need to work.

Living style

Most houses, around 57%, are one-story wooden homes, with 27% being huts. Only 15% are two-story buildings made of a mix of bricks and wood, and 1% have different structures. Some have official land documents, but others don't.

Fuel for cooking

Fifty-one percent of people use electricity for cooking, while 31% use firewood, followed by 15% using charcoal, 2% using gas, and 1% using other sources. Only 50% have enough electricity for cooking; others rely on firewood because they don't have access to electricity for cooking in those areas.

Wastewater drainage system

The community has an unsystematic drainage system that likely affects underground water quality.

Environmental condition

The sixty percent of households noticed a decrease in natural habitats and wildlife within ten years. Around 51% noted an increase in the total population due to migration. Local climate changes, experienced by 51%, included heavier rains and hotter summers. However, 10% felt there wasn't much change in weather. The sixty-two percent said local wildlife isn't a significant food source, and the same percentage noted it doesn't significantly contribute to their income. Industrialization and globalization significantly affected the environment, like habitats, wildlife, weather, and population growth, but not food or income sources for those relying on these areas.

The water underground is getting dirtier because of bad drains and places where people throw trash. The weather is getting hotter every year, showing there's a climate change problem in the area. A teacher said this issue isn't just from local factories, but from all human actions worldwide. There are lots of snakes around, especially near rivers and their banks.

Cultural heritage

There are two monasteries are located in the surrounding compound, which are Yay Oakkan’s Monastery and Taung Ka Lay’s Monastery. Yay Oakkan’s Monastery is located at the North Latitude 16 Degree 50 Minutes and 90.7 second and East Longitude 0.76 Degree 30 Minute. in the industrial zone. Monasteries are the only place which is needed to maintain the cultural heritage for this region. There is no cemetery in that area. Besides, it is also noted that there are no local archeological sites. Regarding the important cultural activities, it is noted that Sown Thein Pwal is the biggest and important festival at this area.

Chapter 6

Impact and Risk Assessment and Mitigation Measures

6 Assessment of impact and health risk along with mitigation measures

6.1 Introduction

The identification and assessment of the environmental and social impacts of the Premier factory have been conducted in a phased approach applied through all the different phases of the proposed Premier factory as follows:

- Overview
- Impact identification and assessment
- Mitigation measures analysis
- Conclusion

The impact assessment has been performed for the following components:

- Environmental
- Air
- Noise and vibration emission
- Solid waste
- Water and wastewater
- Social
- Cultural heritage

6.2 Impact, risk assessment and mitigation measures in construction phase

6.2.1 Impact, risk assessment and mitigation measures for air quality

6.2.1.1 Scope of assessment

Resource/ Receptor	Project Phase	Activity	Impact
Air Quality	Construction	Excavation, earth work and vehicle	Air quality degradation

6.2.1.2 Impact on air quality

Air quality impacts associated with construction of the proposed project would include fugitive dust and emissions from fossil-fuel-fired construction equipment, open burning and temporary fuel transfer systems and associated storage tanks. There may also be gaseous emissions including PM10, PM 2.5, NO_2, CO_2, SO_2, VOC, Methane, O_3 etc. from diesel generators and combustion of fuel for vehicle movements. Generally, this will adversely affect localized air quality for a short period and may lead to health risks associated with air pollution. Criteria pollutant and air emissions that would arise from the construction of the proposed project are quantified and summarized below.

6.2.1.2.1 Land clearing, excavation, leveling and earth

- Work Heavy construction equipment/vehicles such as diesel-powered bulldozers and loaders would be used throughout the entire construction phase
- Vehicle traffic on paved and unpaved roads
- Construction activities, concrete work
- Burning of slash materials such as hay, grass, trees, etc.
- Temporary fuel transfer systems and storage tanks have the potential to release VOC emissions
- Worker accommodation, including cooking operations

Adjacent to the construction site and along the transportation route, natural habitat, residents, and construction crew will be potentially affected.

6.2.1.3 Impact significance on air quality

a) Impact significance on air quality by particulates

The construction activities may lead to abundant of particulate matters such as the dusts from the transportation of materials and concrete particles used in construction. The magnitude of impact on air quality by particulates was “High”.

The area of impact will be not only within the area of construction activities but also in the vicinity area according to wind direction. Therefore, the extent of the air quality impact from particulates was “Medium”.

The period of impact occurrence will be within the construction period and the duration of the impact by particulate matters through construction was considered as “Low”.

According to magnitude, extent and duration of the impact, the impact characteristics will be “Medium”. Particulate matter is directly linked to the potential for causing health problems. The importance of the impact on air was considered as “Medium”.

Therefore, the impact from particulate matters by the Premier factory construction will be a little high and the significance of the impact would be “Medium”.

Table 6.1: Impact significance on particulates during construction period

<table>
<tr><td colspan="3">Characteristic</td><td></td><td></td><td></td></tr>
<tr><td>Magnitude</td><td>Extent</td><td>Duration</td><td></td><td></td><td></td></tr>
<tr><td>3 (High)</td><td>2 (Medium)</td><td>1 (Low)</td><td>Equivalent Characteristics</td><td>Importance</td><td></td></tr>
<tr><td colspan="3">Characteristics = 3+2+1 = 6</td><td>2 (Medium)</td><td>2 (Medium)</td><td>Significance</td></tr>
<tr><td colspan="3"></td><td colspan="2">Significance = Characteristics x Importance</td><td>4 (Medium)</td></tr>
</table>

b) Impact significance on air quality by gas emission

Emission from machines and equipment, generator and emission from vehicles transporting construction materials will be occurred and they will affect ambient air quality during construction of Premier factory. Air quality degradation can be the main source of health effect on people.

The magnitude of impact on air quality by gas emission was “Medium”.

The area of impact will be within the area of factory compound and vicinity area. Therefore, the extent of the impact on air quality was "Medium".

The period of impact occurrence will be within the project period and this impact will affect along the working hours. The duration of the impact of gas emission was considered as "Low".

According to magnitude, extent and duration of the impact, the impact characteristics will be "Medium".

Air quality degradation can have adverse effect on human health and can also have damage to animal life and vegetation depending on volume of emission. Therefore, the importance of the impact on air quality by gas emission was considered as "Medium".

Therefore, the impact of gas emission by the Premier factory will be less and the significance of the impact would be "Medium.

Table 6.2: Impact significance on gas emission during construction period

Characteristics					
Magnitude	Extent	Duration			
2 (Medium)	2 (Medium)	1 (Low)	Equivalent Characteristics	Importance	
Characteristics = 2+2+1 = 5			2 (Medium)	2 (Medium)	Significance
			Significance = Characteristics x Importance		4 (Medium)

6.2.1.4 Mitigation measures for air quality

During the construction phase, the following mitigation measures are recommended to minimize ambient air quality impacts.

- Wind breaks should be constructed around the main construction activities and in the locality of potentially dusty works.
- Avoid excavation works in extremely dry weathers.
- Prohibit open burning of any waste at project site.
- Soil erosion and dust control management measures also assist in the management of air pollution from construction operations.
- Air pollution from vehicles will be minimized by using low emission equipment and vehicles.
- Ensure that all construction equipment and vehicles are maintained in accordance with the manufacture's recommendations.
- Minimizing the movement of vehicles and construction machineries particularly outside the premise of the project site to avoid further destruction.
- Fuel efficient stoves and cooking equipment will be provided to reduce emission from food processing at the site during construction activities.
- Turn equipment off when not in use.
- Vehicle idling time shall be minimized.
- Alternatively, fueled construction equipment shall be used where feasible.
- Sprinkle water on graded access routes when necessary to reduce dust generation by construction vehicles.
- Construction materials on site to be covered to prevent to be blown off by wind.
- Stockpiling of material, for example, rocks, sand and soils should be minimized.
- Stockpiles should be located as far away from receptors as possible.
- Vegetation of stockpiles should be used where a stockpile is not to be used for a month to stabilize the

surface and prevent dust generation.
- Pave, apply water when necessary, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas and staging areas at construction sites.
- Visual monitoring of dust deposition onto surfaces on and off-site should be regularly conducted.
- Ensure strict enforcement of on-site speed limit regulations.

After mitigation measure, the impact on air quality will become less significant.

after mitigation measures, impact significance on air quality during construction period

Characteristics					
Magnitude	Extent	Duration			
1 (Low)	1 (Low)	1 (Low)	Equivalent Characteristics	Importance	
Characteristics = 1+1+1 = 3			1 (Low)	2 (Medium)	Significance
			Significance = Characteristics x Importance		2(Low)

6.2.2 Mitigation measure to reduce carbon emission

The equivalent (reduction) of Carbon emission from waste recycled instead of landfill from the proposed factory is 1,731.2 metric ton per year. The combination of total emission of CO_2 from electricity sector and the total emission of CO_2 from transportation sector of the proposed factory is 2,214.616. After extraction of the equivalent (reduction) of CO_2 from waste recycled instead of landfill is 483.416 metric tons per year (the total emission of CO_2 from proposed factory).

Thus, it highlighted that the recycle of the wastes is one of significant mitigation measures to reduce carbon emission.

6.2.3 Impact, risk assessment and mitigation measures for noise quality

6.2.3.1Scope of assessment

Resource/ Receptor	Project Phase	Activity	Impact
Noise Quality	Construction Phase	• Mobilization and operation of construction machines	Increasing noise level

6.2.3.2 Impact on noise quality

The construction works on site will most likely result in noise nuisance due to mobilization and operation of construction machines (mixers, tippers, cranes, backhoe), incoming vehicles to deliver construction materials, and communicating workers.

Construction noise levels are rarely steady in nature, but instead fluctuate depending on the number and type of equipment in use at any given time. There would be times when no large equipment is operating and noise would be at or near ambient levels.

Earthworks, pounding and impacting, shouting, loud radios, foundation and other normal construction activities all cause noise and vibration. Construction noise impact is short term pollution to local ambient noise quality. Noise and vibration would affect natural vegetation, animals, workforce, and communities in the areas.

Noise impacts would be considered significant if the project would result in the following: -

- Exposure of person to, or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.
- Exposure of person to, or generation of, excessive ground-borne vibration or ground-borne noise levels.
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

6.2.3.3 Impact significance on noise quality

Noisy activities on construction sites include use of jackhammers, dump trucks, cement mixers, cement cutters, electric saws, tamping machines and welding machines, as well as noise generated from hand tools such as sledgehammers and drills. The magnitude of impact from noise was “Medium”

The area of impact will be not only within the factory but also in the vicinity area. Therefore, the extent of the impact on noise and vibration was “Medium”.

The period of impact occurrence will be within the construction period. The construction workers and people in the vicinity area will have impact from noise and vibration of the proposed project and the duration of the impact from noise and vibration were considered as “Low”.

According to magnitude, extent and duration of the impact, the impact characteristics will be “Medium”. The importance of the impact was “Medium”.

Therefore, the impact noise and vibration by Premier factory will be a little high during the construction and the significance of the impact would be “Medium”.

Table 6.3: Impact significance on noise level during construction period

<table>
<tr><td colspan="3">Characteristics</td><td></td><td></td><td></td></tr>
<tr><td>Magnitude</td><td>Extent</td><td>Duration</td><td></td><td></td><td></td></tr>
<tr><td>2 (Medium)</td><td>2 (Medium)</td><td>1 (Low)</td><td>Equivalent Characteristics</td><td>Importance</td><td></td></tr>
<tr><td colspan="3">Characteristics = 2+2+1 = 5</td><td>2 (Medium)</td><td>2 (Medium)</td><td>Significance</td></tr>
<tr><td colspan="3"></td><td colspan="2">Significance = Characteristics x Importance</td><td>4(Medium)</td></tr>
</table>

6.2.3.4 Mitigation measures on noise quality

During proposed project construction, the following mitigation measures are recommended to minimize noise impact on individuals, sensitive areas and livestock.

a. Use quiet equipment (i.e. equipment designed with noise control elements)
b. Limit pickup trucks and other small equipment to an idling time of five minutes, observe a common-sense approach to vehicle use, and encourage workers to shut off vehicle engines whenever possible.
c. Careful handling of material loading and unloading.
d. Ensure use of silencers or mufflers on heavy construction equipment engines.
e. Construction machinery and vehicles will undergo periodic maintenance to keep them in good working condition.
f. Perform regular inspection and maintenance of preparation vehicles and equipment.
g. Turn equipment off when not in use.
h. Taking consideration to be careful sequencing and scheduling times.
i. Schedule noisy construction activities and transportation during day-time hours.
j. Combine noisy operations at the same time, but avoid combination of vibration
k. Provide PPE particularly hearing protection devices for those working in noisy areas.

l. Locate noisy plant as far away from receptors as practicable.
m. Orientate equipment known to emit noise strongly in one direction so that the noise is directed away from receptors as far as practicable.
n. Avoid institutions sensitive to noise such as settlement, schools, health institution or other offices close to the project site.

After mitigation measure, the impact on noise quality will become less significant.

after mitigation measures, impact significance on noise quality during construction period

Characteristics					
Magnitude	Extent	Duration			
1 (Low)	1 (Low)	1 (Low)	Equivalent Characteristics	Importance	
Characteristics = 1+1+1=3			1 (Low)	2 (Medium)	Significance
			Significance = Characteristics x Importance		2(Low)

6.2.4 Impact, risk assessment and mitigation measures for water quality
6.2.4.1Scope of assessment

Resource/ Receptor	Project Phase	Activity	Impact
Water Quality	Construction phase	• Erosion and leakage	Qualitydegradation for groundwater and surface water

6.2.4.2 Impact of wastewater quality

In the Construction phase, removal of vegetation, top soil level and ground surface for the proposed factory facilities and staff houses can cause sedimentation, and erosion to the nearby water courses. Sedimentation as a result of the erosion will reduce to water clarity and quality. In addition, potential sources of impacts to water during the construction phase include:

- Constructing landforms that change water flow paths
- Chemicals/Oil spills from the storage, use of diesel and hazardous materials that lead to contamination of water resources
- Release of suspended soil to the water flows
- Leaks from on-site power generation facilities
- Improper solid waste and wastewater management in the construction site
- Improper wastewater disposal from cleaning vehicles and equipment and
- Poor sanitation facilities that may result into surface water pollution through improper sewage management.

The proposed project will create increased water demand during construction phase for site preparation, dust spraying, construction activities, curing, domestic and other water requirements for labor and staff onsite. Increase in site runoff may also be ensued.

6.2.4.3 Impact significance on water quality

a) Impact significance on surface water quality

According to the result, the magnitude of the impact of physical, chemical and biological result of the surface water was considered as “Low”.

The area of the potential impact will be within the immediate area of project activities and factory community however the result was not much higher than the standard guidelines except hardness.

The extent of all parameters for physical, chemical and biological results are noted as “Low” level.

The period of potential impact duration can be long term duration. The duration of the impact for surface water was set as “Low”.

Therefore, the characteristic of surface water impact by the proposed project was rated as “Low”.

The impact is expected to cause some disturbances potentially affecting communities locally and surrounding water bodies. The importance of the impact on surface water was set as “Medium”.

The significant rating of impact was set as “Low”.

Table 6.4: Impact significance on surface water during construction phase

Characteristics					
Magnitude	Extent	Duration			
1 (Low)	1 (Low)	1 (Low)	Equivalent Characteristics	Importance	
Characteristics = 1+1+1 = 3			1 (Low	2 (Medium)	Significance
			Significance = Characteristics x Importance		2 (Low)

b) Impact significance on ground water quality

According to the result, the magnitude of the impact of physical, chemical and biological result of the ground water was considered as “Low”.

The area of the potential impact will be within the immediate area of project activities and factory community however the result was not much higher than the standard guidelines except hardness.

As the analytical result, the extent of all parameters for physical, chemical (except hardness) and biological results are noted as “Low” level.

The period of potential impact duration can be long term duration. The duration of the impact for ground water was set as “Low”.

Therefore, the characteristic of ground water impact by the proposed project was rated as “Low. The impact is expected to cause some disturbances potentially affecting communities locally and surrounding water bodies. The importance of the impact on ground water was set as “Low”.

The significant rating of impact was set as “Low””.

Table 6.5: Impact significance on ground water during construction phase

Characteristics					
Magnitude	Extent	Duration			
1 (Low)	1 (Low)	1 (Low)	Equivalent Characteristics	Importance	
Characteristics = 1+1+1 = 3			1 (Low)	1 (Low)	Significance
			Significance = Characteristics x Importance		1 (Low)

6.2.4.4 Mitigation measures on water quality and wastewater

The foods processing and production does generate insignificant amount of wastewater that bring damage to the surface and ground water sources and soils.

The following mitigation measures should be practiced and used to reduce potential impacts for water resources from each specification.

a. Limit water withdrawal to the amount that will not adversely affect the groundwater balance and the demand of the local community, by developing and conserving own source of water.
b. Promote recycling and reuse of water as much as possible.
c. Implement road drainage system and smooth road to limit erosion.
d. Promptly detect and repair of water pipe and tank leaks.
e. Ensure taps are not running when not in use.
f. Proper recycling of water from other uses for sprinkling dusty pavements.
g. Soil erosion and sediment control mechanisms will add positive effects on mitigation matters for water pollution.
h. All chemicals, paint, and fuel containers will be properly sealed and rigorous spill prevention mechanisms will be employed. Spills will be immediately treated to stop subsequent water pollution.
i. Conducting regular training, monitoring, and inspection schemes together with keeping track of water uses minimizes waste and leaks from faulty connections and faucets.
j. Open stockpiles of construction materials or construction wastes on-site should be covered with tarpaulin or similar fabric during rainstorms.
k. Provide measures to prevent the washing away of construction materials, soil, silt or debris into any drainage system of open stockpiles of construction materials.
l. Hazardous-materials handling procedures to reduce the potential for a spill during construction, and will include an emergency response program to ensure quick and safe cleanup of accidental spills.

6.2.5 Impact, risk assessment and mitigation measures for waste disposal

6.2.5.1Scope of assessment

Resource/ Receptor	**Project Phase**	**Activity**	**Impact**
Waste	Construction phase	• Substantial amounts of wastes from waste disposal	Negative impact on health and environment

6.2.5.2 Impact by waste disposal

The construction activities generate substantial amounts of solid wastes including excavated materials from the earth work, bricks, concrete and other masonry materials, rock, wood, paints, treated and coated wood and wood products, land clearing debris and plaster.

In addition, lubricants and petroleum wastes, containers, cement paper bags and other packaging materials, scrap metal, glass, plastic containers and food remains will be created due to the construction activities. Filth generation can occur if waste/garbage generated during construction period is not handling.

6.2.5.3 Impact significance by waste disposal

In construction phase of Premier factory, the magnitude of waste during construction phase was “Medium”. The area of impact will be only within the area of factory compound. Therefore, the extent of the impact by waste during construction phase set as “Low”.

The period of impact occurrence will be within the premier coffee factory construction period and the duration of the impact by waste was considered as “low”.

According to magnitude, extent and duration of the impact, the impact characteristics will be “Medium”. The importance of the impact was considered as “Medium”.
Therefore, waste impact by Premier factory during construction phase was less and the significance of the impact was considered as “Medium”

Table 6.6: Impact significance on waste disposal during construction period

<table>
<tr><td colspan="3">Characteristics</td><td></td><td></td><td></td></tr>
<tr><td>Magnitude</td><td>Extent</td><td>Duration</td><td></td><td></td><td></td></tr>
<tr><td>2 (Medium)</td><td>1 (Low)</td><td>1 (Low)</td><td>Equivalent Characteristics</td><td>Importance</td><td></td></tr>
<tr><td colspan="3">Characteristics = 2+1+1 = 4</td><td>2 (Medium)</td><td>2 (Medium)</td><td>Significance</td></tr>
<tr><td colspan="3"></td><td colspan="2">Significance = Characteristics x Importance</td><td>4 (Medium)</td></tr>
</table>

6.2.5.4 Mitigation measures for waste disposal

Mitigation measures should be applied to reduce hazardous materials and waste management impacts of a project depending upon site and project-specific conditions. Many impacts can be reduced or avoided when considered during the design and construction phase. The following mitigation measures should be used for proper waste disposal.

a. Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of construction waste generated over time.
b. Construction materials will be managed in a way to avoid over-ordering, poor storage and maintenance, mishandling as well as improper operation procedures.
c. Construction wastes will be separated into reusable items and materials to be disposed of or recycled whenever possible.
d. Waste suitable for reuse will be stored on site and reintroduced to the construction process as and when required.
e. Provision of facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage or exposure to the elements.
f. A hazardous waste management system covering waste classification, separation, collection, storage, transfer and disposal should be set up and operated. The waste management system will comply with applicable regulation of the government, if any, or in its absence, good international practice.
g. The waste management plan will identify disposal routes (including transport options and disposal sites) for all wastes generated during the construction phase.

h. Hazardous waste will be stored in such a way as to prevent and control accidental release to the environment (e.g. secondary containment, sealed containers).
i. Carefully select less hazardous materials and use the necessary amount only.
j. Establish a designated hazardous waste collection site and make it secure.
k. Do not clean the used hazardous material containers and mix wastes.
l. Recyclables such as scrap steel, metals, plastics, and paper items will be collected for recycling wherever possible.
m. Packaging materials, cans, and containers would be hauled back to manufactures for reuse in next shipments where economically feasible. Or sell back in local in which these will be recycled or reused for other commercial use.
n. Use of building materials that have minimal packaging to avoid the generation of excessive packaging waste.
o. Use of plastic bags will be discouraged and explained to the workforce and local communities.
p. Disposal of construction waste in or off the construction site should be prohibited.
q. Prohibit open burning of any waste at project site.
r. Regular collection times will be arranged to prevent overflow in waste collection bins.
s. Chain of custody documents should be used for construction waste to monitor disposal.
t. Waste segregation should be practiced at the workers camps with an emphasis placed on reducing, reusing and recycling of waste streams as appropriate.

After mitigation measure, the impact on waste disposal will become less significant.

after mitigation measures, impact significance on waste disposal during construction period

Characteristics					
Magnitude	Extent	Duration			
1 (Low)	1 (Low)	1 (Low)	Equivalent Characteristics	Importance	
Characteristics = 1+1+1 = 3			1 (Low)	2 (Medium)	Significance
			Significance = Characteristics x Importance		2(Low)

6.2.6 Impact, risk assessment and mitigation measures on human environment

6.2.6.1 Scope of assessment

Resource/ Receptor	Project Phase	Activity	Impact
Human environment	Construction phase	• Construction phase activities	Accidents and negative impacts on human health

6.2.6.2 Impact on human environment

a) Impacts on occupational health and safety

During construction of the proposed project, it is expected that construction workers are likely to have accidental injuries and hazards as a result of accidental occurrences, handling of hazardous waste, lack or negligence of the use of protective wear etc.

Significant hazards can be occurred due to the potential fall of materials or tools as well as temporary hazards such as physical hazards, dust emission and noise pollution. Moreover, accidents and injuries to workers can be caused by the heavy vehicle movement for the transport of construction materials and equipment. Workers are also likely to be exposed to diseases from contact with potentially harmful building materials.

The proposed project will appoint a lot of construction workers in construction phase. A potential social impact both during construction and operation of the project will be on the occupational health and Safety of the staff.

Mitigation measures are described in the next sections and on their working conditions. Before the construction activities, there is need for the materials to be well inspected and harmonized to the occupational health and safety standards.

b) Impacts on Socio- economic

One of the main positive impacts during projects construction phase is the availability of employment opportunities especially to casual workers and several other specialized workers. Employment opportunities are of benefit both economically and in a social sense. In the economic sense it means abundant unskilled labors will be used in construction hence economic production.

Several workers including casual laborers, masons, carpenters, joiners, electricians and plumbers are expected to work on the site from start to the end. Apart from casual labor, semi-skilled and unskilled labor and formal employees are also expected to obtain gainful employment during the period of construction. There may not have several informal businesses which come up during the construction periods of such projects, because the proposed project is located in the industrial zone.

Through the use of locally available materials during the construction phase of the project including cement, concrete and ceramic tiles, timber, sand, ballast electrical cables etc., the project will contribute towards growth of the economy by contributing to the gross domestic product.

6.2.6.3 Impact significance on human environment

a) Impact significance on occupational health and safety

There will be impact on health and safety and the magnitude of impact during construction phase of the factory was “Medium”.
The impact of the project can affect health and safety of the workers and people in the vicinity area, but the factory is located inside the industrial zone. Therefore, the extent of the impact was “Low”.
The period of impact occurrence will be within the construction period and the duration of the impact on residential area was considered as “Low”.
According to magnitude, extent and duration of the impact, the impact characteristics will be “Medium”. The importance of the impact was considered as “Medium”.
Therefore, the impact on residential area by the Premier factory will be less and the significance of the impact would be “Medium”.

Table 6.7: Impact significance on occupational health and safety during construction period

<table>
<tr><td colspan="3">Characteristics</td><td colspan="3"></td></tr>
<tr><td>Magnitude</td><td>Extent</td><td>Duration</td><td colspan="3"></td></tr>
<tr><td>2 (Medium)</td><td>1 (Low)</td><td>1 (Low)</td><td>Equivalent Characteristics</td><td>Importance</td><td></td></tr>
<tr><td colspan="3">Characteristics = 2+1+1 = 4</td><td>2 (Medium)</td><td>2 (Medium)</td><td>Significance</td></tr>
<tr><td colspan="3"></td><td colspan="2">Significance = Characteristics x Importance</td><td>4 (Medium)</td></tr>
</table>

b) Impact significance on socio- economic

Premier factory is located at No. 108 (A) and 108 (B), Quarter (3), Hlaing Thar Yar Industrial Zone, Hlaing Thar Yar Township, Yangon, Myanmar. The local people can get job opportunities as construction workers and skilled labour, therefore the impact by the proposed project on socio- economic may be positive impact.

6.2.6.4 Mitigation measures for human environment

The project will implement the following mitigation measures for Occupational Health and Safety:

- Suitable overalls, safety footwear, dust masks, gas masks, respirators, gloves, ear protection equipment etc. should be made available and construction personnel must be trained to use the equipment.
- Necessary health and safety rules shall be enforced by the site foreman to ensure that all staff members adhere to the standards and are thus safe.
- All workers will be provided with personal protection equipment (PPE) and will be obliged to wear them in work zones.
- Training to personnel will be imparted to generate awareness about effects of noise and importance of using PPEs.
- Adequate collection and storage of waste on site and safe transportation to the disposal sites and disposal methods at designated areas shall be provided.
- Particular works shall strictly follow work permit scheme.
- Promote safe and healthy working environment, health, and well-being of all employees.
- Implement all necessary measures to ensure health and safety of workers.
- Well stocked first aid box which is easily available and accessible should be provided.

After mitigation measure, the impact on occupational health and safety will become less significant.

after mitigation measures, impact significance on occupational health and safety during construction period

Characteristics					
Magnitude	Extent	Duration			
1 (Low)	1 (Low)	1 (Low)	Equivalent Characteristics	Importance	
Characteristics = 1+1+1 = 3			1 (Low)	2 (Medium)	Significance
			Significance = Characteristics x Importance		2 (Low)

6.3 Impact, risk assessment and mitigation measures in operation phase

6.3.1 Impact, risk assessment and mitigation measures for air quality

6.3.1.1 Scope of Assessment

Resource/ Receptor	**Project Phase**	**Activity**	**Impact**
Air quality	Operation Phase	- Particulate matters from Milling process - Gas emission from machines and vehicles	Deterioration of air quality and human health

6.3.1.2 Impact of particulates on air quality

Particulate matters emitted from the Lluvia factory was measured in terms of volume of dust particulates emitted. The adverse effects of ambient air pollutants are primarily concerned on human health. Other potential adverse impacts of air pollution include damage to animal life, vegetation, buildings, and the degradation of visibility.

Generally, the employers working for the processing operations of the Lluvia factory were expected to be affected by emissions from the production process.

Similarly, the air particulates generated from the storage area, aluminum film burning area, Coffee green bean sizing area and the generators of Lluvia factory could give rise to the potential impact to workers working around there.

The magnitude of the impact from air to the immediate workers and local community was "High".

The area of potential impact will be within the area of production activities. The extent of the impact from air was considered as "Medium".

The period of potential impact covers the operation period which is running for nearly 24 hours a day, 6 days a week.

Thus, the duration of the impact from air was considered as "Medium".

Therefore, based on the above findings, the air impact characteristic on workers is expected to be "High". The importance of the impact on air was considered as "***Medium*".**

Table 6.8: Impact significance of air pollutants

Characteristics					
Magnitude	Extent	Duration			
3 (High)	2 (Medium)	2 (Medium)	Equivalent Characteristics	Importance	
Characteristics = 3+2+2 = 7			3 (High)	2 (Medium)	Significance
			Significance = Characteristics x Importance		6(Medium)

6.3.1.3 Mitigation for particulates emission

The major pollutants emission of proposed factory process consists of five major areas:

- Production area,
- Aluminum film burning area,
- Storage area,
- Coffee green bean sizing area and
- Generator

Major air emissions like particulate matters (PM_{10} and $PM_{2.5}$) of the proposed factory are being emitted from the factory process particularly in the production process area and aluminum film burning area. Mitigation of air pollutants in the production process is needed to be installed the extra control systems such as installation of the fabric filter or dust collector.

Moreover, aluminum film burning is not an appropriate unit operation to destroy the packaging aluminum films which are purposely destroyed. To mitigate the emission of burning area, small scale incinerator should be installed.

A small-scale waste incinerator was previously used to burn the aluminum films, but they are now shredded and disposed of at the YCDC.

The warehouse has a Roof Air Ventilation System to keep the air fresh. In the production area, they use

exhaust fans and a ventilation system. Exhaust fan has been installed in the roaster room, and air con has been installed in other production rooms. Machines in production areas where they release air emissions are equipped with dust suction.
The emission of particulate matters both PM10 and PM2.5, into the atmosphere will be mitigated to levels below the specified standards of 50 µg/m³ for PM10 and 25 µg/m³ for PM2.5, as prescribed by the National Environmental Quality Emissions Guidelines.

Characteristics					
Magnitude	Extent	Duration			
2 (Medium)	2 (Medium)	2 (Medium)	Equivalent Characteristics	Importance	
Characteristics = 2+2+2 = 6			2 (Medium)	1 (Low)	Significance
			Significance = Characteristics x Importance		2 (Low)

After the above mitigation measures, the significance of the pollutant emission level generated by the production process area and aluminum film burning area of proposed factory to workers can be rated as ***"Low".***

6.3.1.4 Impact of gases on air quality

Gases pollutants are emitted from some operation of the Lluvia factory, generators, storage area, aluminum film burning area, production area and roasting area. These pollutants in the atmosphere lead the potential adverse affects on human health. Other potential adverse impacts of gas emission include damage to animal life, vegetation and buildings, and the degradation of visibility.

The workers working around near generators, storage area, aluminum film burning area, production area and roasting area are expected to be affected by multi-gases pollutants.

The magnitude of the impact from gas to the immediate workers and local community was "High".

The area of potential impact will be within the area of production activities. The extent of the impact from gas emission was considered as "Medium".

The period of potential impact covers the operation period which is running for nearly 24 hours a day, 6 days a week. Thus, the duration of the impact from air was considered as "Medium".

Therefore based on the above findings, the air impact characteristic on workers is expected to be "High". The importance of the impact on air was considered as "Medium".

Generally, the gas emission level generated by proposed factory could give rise to the potential impact to workers and rated as *Medium*.

Table 6.9: Impact significance of gas emission

Characteristics					
Magnitude	Extent	Duration			
3 (High)	2 (Medium)	2 (Medium)	Equivalent Characteristics	Importance	
Characteristics = 3+2+2 = 7			3 (High)	2 (Medium)	Significance
			Significance = Characteristics x Importance		6(Medium)

6.3.1.5 Mitigation measure for gas emission

The emission of some gas pollutants from proposed factory exceeded NEQG standards particularly SO_2. Major gas pollutant, SO_2 is industrial related gas emission by burning fuel. Therefore, one of the simplest ways to reduce the amount of SO_2 released from the combustion process can be achieved by switching to a fuel that has lower sulphur content.

Furthermore, the existing height of the stacks currently used in the generators, roasting process should be increased accordingly. The proposed factory uses Battery Forklifts to Reduce Traffic Emissions.

The emission of gas pollutants, SO_2, into the atmosphere will be mitigated to level below the specified standards of 20 µg/m^3, as prescribed by the National Environmental Quality Emissions Guidelines.

Characteristics					
Magnitude	Extent	Duration			
2 (Medium)	2 (Medium)	2 (Medium)	Equivalent Characteristics	Importance	
Characteristics = 2+2+2 = 6			2 (Medium)	1 (Low)	Significance
			Significance = Characteristics x Importance		2 (Low)

After the above mitigation measure, the impact of gases level generated by the generators and the roasting process to the workers can be rated as ***"Low".***

6.3.1.6 Health risk assessment on particulate emission

6.3.1.6.1 Health risk assessment (PM 2.5)

Health Risk Assessment (HRA) is a useful tool to estimate human health risks posed by exposure to a given environmental pollutant. According to the literature review, $PM_{2.5}$ is identified as a hazard as well as the kind of health risk due to its exposure. The measured levels of $PM_{2.5}$ were compared with NEQG guidelines.

The hazard identification and the exposure assessment were used to estimate the concentrations of $PM_{2.5}$ that are likely to cause significant health risks in humans. $PM_{2.5}$ monitored data were used to estimate how the different levels of exposure to $PM_{2.5}$ can impact on the likelihood and severity of health effects.

It was postulated that the staff population of 893 was exposed to levels lower than NEQG. This may have a negative impact on their health. It was assumed that inhalation was the most important route of exposure and those workers were exposed for 8 hours per day.

The USEPA equation was used to calculate the potential dose of $PM_{2.5}$, which is the dose the population in Lluvia may be exposed to when inhaling $PM_{2.5}$ concentrations.

(a) Potential dose of $PM_{2.5}$

$$I = C_A \times \frac{IP \times FR \times FA \times ET \times EF \times ED}{BW} \times \frac{1}{AT}$$ Where,

I = Potential Dose (µg/kg.day)
CA = Concentration of $PM_{2.5}$ (µg/m^3)
IP= Inhalation Rate (m^3/day) = 21.4 m^3/day (It was assumed that the 95th percentile inhalation rates for long-term exposures for adults)
FR=Factor of Retention =1 (This value was assumed as 1 representing the worst-case scenario and potential impact on people's health)
FA= Factor of Absorption This value was assumed as 1 representing the worst-cases cenario and potential impact on people's health
ET= Exposure Time=8 hrs/day
EF = Exposure Frequency (days/year) = 269 days (365 days- 96 days (2 holidays per week x 4 weeks x 12 months)
ED = Exposure Duration (years) = 30 years (national upper-bound time (90th percentile) at one residence; EPA 1989d)
AT: Pathway-specific period of exposure for noncarcinogenic effects (i.e., ED x 365 days/year).
Body weight – Being Asian, 50kg was assumed.

Table 6.10: Potential dose of $PM_{2.5}$

Locations	CA ($\mu g/m^3$)	IP (m^3/day)	FR	FA	ET (hrs/day)	EF (days/year)	ED (years)	BW (kg)	AT (EDx365)	Potential Dose (μg/kg.day)
The office compound (Location 1)	14	21.4	1	1	8	269	30	50	10,950	35
Coffee green bean sizing area (Location 2)	**47**	**21.4**	**1**	**1**	**8**	**269**	**30**	**50**	**10,950**	**119**
Storage area (Location 3)	**25**	**21.4**	**1**	**1**	**8**	**269**	**30**	**50**	**10,950**	**63**
Production area (Location 4)	14	21.4	1	1	8	269	30	50	10,950	35
Roasting area (Location 5)	6	21.4	1	1	8	269	30	50	10,950	15
Generator (Location 6)	**18**	**21.4**	**1**	**1**	**8**	**269**	**30**	**50**	**10,950**	**45**
Aluminum film burning area (Location 7)	**29**	**21.4**	**1**	**1**	**8**	**269**	**30**	**50**	**10,950**	**73**
Average	**22**	**21.4**	**1**	**1**	**8**	**269**	**30**	**50**	**10,950**	**56**

Based on the above findings, the workers working at the Coffee green bean sizing area, Storage area, during Generator operation and Aluminum film burning area have more health risk by $PM_{2.5}$ than others.

(a) Toxicological risk

$$RQ = \frac{I}{RfD}$$

Where,
RQ= The Risk Quotient
I= Potential Dose (µg/kg.day) RfD= Reference Dose (µg/kg.day)

Table 6.11: Reference dose of $PM_{2.5}$

	CA(µg/m^3)	IP(m^3/day)	FR	FA	ET(hrs/day)	EF(days/year)	ED(years)	BW(kg)	AT(EDx365)	RfD (µg/kg.day)
RfD	25	21.4	1	1	8	269	30	50	10,950	63

(RQ) estimated was appointed as
RQ<1 – Hazards that are not considered a threat to public health
RQ>1 – Hazards that cause the adverse health effects and are a detriment to Public health.

Table 6.12: Intake and risk significance of Lluvia

	Intake(µg/kg.day)	RfD(µg/kg.day)	RQ	Risk Significance
Front area of office (Location 1)	35	63	0.6	Hazards don't cause adverse health effects
Coffee green bean sizing area (Location 2)	**119**	**63**	**1.9**	**Hazards cause adverse health effects**
Storage area (Location 3)	**63**	**63**	**1**	**Hazards cause adverse health effects**
Production area (Location 4)	35	63	0.6	Hazards don't cause adverse health effects
Roasting area (Location 5)	15	63	0.2	Hazards don't cause adverse health effects
Generator (Location 6)	45	63	0.7	Hazards don't cause adverse health effects
Aluminum film burning area (Location 7)	73	63	1.2	Hazards cause adverse health effects

Average	56	63	0.9	Hazards don't cause adverse health effects

The Health Risks from almost ***all different places in Lluvia (except the compound of the office area, production area, roasting area and generator) were >1 mean that $PM_{2.5}$ Hazards*** that cause the adverse health effects such as increased respiratory symptoms, such as irritation of the airways, coughing or difficulty breathing, aggravated asthma, decreased lung function if they are continuously working in that works place for 30 years.

6.3.1.7 Health risk assessment (PM_{10})

Health Risk Assessment (HRA) is a useful tool to estimate human health risks posed by exposure to a given environmental pollutant. The formal identification of PM10 is as a hazard as well as the types of health risks that may occur as a result of exposure to PM10.

The measured levels of PM10 were compared with WHO and NAAQS. The information obtained during the hazard identification and the exposure assessment was used to estimate the concentrations of PM10 that are likely to cause significant health risks in humans.

PM10 monitored data were used to estimate how the different levels of exposure to PM10 can impact on the likelihood and severity of health effects.

It was postulated that the staff population of 893 was exposed to levels exceeding the WHO guideline but lower than the NAAQS. This may have a negative impact on their health. It was assumed that inhalation was the most important route of exposure and those workers were exposed for 8 hours per day.

The USEPA equation was used to calculate the Field Average Daily Dose (FADD), which is the dose the population in Lluvia may be exposed to when inhaling PM10 concentrations.

FADD = C × IR × EF x ED/ BW × AT= µg/kg/day.

Where,

C = µg/m3 = the average concentrations (C) of P PM10 monitored in Lluvia company

IR = the Inhalation Rate = 21.4 m3/day (It was assumed that the 95th percentile inhalation rates for long-term exposures for adults)

EF =Exposure Frequency = 269 days (365 days- 96 days (2 holidays per week x 4 weeks x 12 months)

ED = Exposure Duration (years) = 30 years (national upper-bound time (90th percentile) at one residence; EPA 1989d)

BW = Body weight= 50 kg

AT: Pathway-specific period of exposure for noncarcinogenic effects (i.e., ED x 365 days/year)

Table 6.13: Potential dose of PM_{10}

Location	C ($\mu g/m^3$)	IR (m^3/day)	EF (days)	ED (years)	BW (kg)	AT (days/year)	FADD (µg/kg/day)
The compound area of office (Location 1)	**51**	21.4	269	30	50	10,950	16
Coffee green bean sizing area (Location 2)	**70**	21.4	269	30	50	10,950	22
Storage area (Location 3)	**77**	21.4	269	30	50	10,950	24
Production area (Location 4)	**99**	21.4	269	30	50	10,950	31
Roasting area (Location 5)	**19**	21.4	269	30	50	10,950	6
Generator (Location 6)	**70**	21.4	269	30	50	10,950	22
Aluminum film burning area (Location 7)	**78**	21.4	269	30	50	10,950	25
Average	**66**	21.4	269	30	50	10,950	21

Based on the above findings, the workers working at all the factory operation areas have no significant health risk by PM_{10}.

The Safe Average Daily Dose (SADD) is the dose that the population of Lluvia may be exposed to without suffering negative health risks, expressed in µg/kg/day. In this case the concentration C represents the 24-h standard in WHO guideline for PM_{10} expressed in 50 $\mu g/m^3$.

SADD = C × IR × EF x ED/ BW × AT =16 µg/kg/day

The risks caused by exposure to PM_{10} were characterized in terms of the potential risk to illness or symptoms in the exposed population. The potential health risks in the exposed population, expressed as a Hazard Quotient (HQ).

HQ = FADD / SADD
HQ <0.1: no hazard exists; HQ 0.1-1.0: the hazard is low;
HQ 1.1-10: the hazard is moderate; and
HQ >10: hazard is high

Table 6.14: Health risk significance of Lluvia

Location	FADD (µg/kg/day)	SADD (µg/kg/day)	HQ	Risk Significant
Front area of office (Location 1)	16	16	1	low
Coffee green bean sizing area (Location 2)	22	16	1.4	moderate
Storage area (Location 3)	24	16	1.5	moderate
Production area(Location 4)	31	16	1.9	moderate
Roasting area (Location 5)	6	16	0.4	low
Generator (Location 6)	22	16	1.4	moderate
Aluminum film burning area (Location 7)	25	16	1.6	moderate
Average	21	16	1.3	moderate

The Health Risks from **5 different places in Lluvia were between 1.1 and 10** and it means that the population inside Lluvia was at **moderate risk of negative health** effects from exposure to PM_{10}.if they are continuously working in that works place for 30 years.

6.3.2 Impact on noise quality

6.3.2.1 The noise from the whole factory area

The impact assessment on noise quality likely affected by the whole process project was assessed as follows:

The impact of noise and vibration of proposed factory will depend on the production processes consisting of coffee roasting, grinding and packaging etc.. The magnitude of the impact from noise was "Low".

The area of potential impact will be within the area of production activities. The extent of the impact from noise was considered "Low".

The period of potential impact duration covers the production period which will be 24 hour. The duration of the impact from noise was considered "medium".

The noise impact characteristic on workers is expected to be "Low". The importance of the impact on noise was considered "Low".

The noise level generated by proposed factory could give rise to the potential impact to workers and rated as ***"Low".***

Table 6.15: Impact significance of noise from the whole proposed factory

Characteristics					
Magnitude	Extent	Duration			
1 (Low)	1 (Low)	2 (Medium)	Equivalent Characteristics	Importance	
Characteristics = 1+1+2 = 4			2 (Medium)	1 (Low)	Significance
			Significance = Characteristics x Importance		2 (Low)

6.3.2.2 The noise impact by the production process of proposed factory

The employers working at the production processes are expected to be affected by the noise from the production processes as because they are the closest to the noise sources. The magnitude of the impact from noise was "Low".

The area of potential impact will be within the area of production activities. The extent of the impact from noise was considered "Low".

The period of potential impact duration covers the operation period. The duration of the impact from noise was considered "Medium".

The noise impact characteristic on workers is expected to be "Low". The importance of the impact on noise was considered as "Low".

The noise level generated by the production activities could give rise to the potential impact to workers and rated as ***"Low".***

Table 6.16 Impact significance of noise from the production process

Characteristics					
Magnitude	Extent	Duration			
1 (Low)	1 (Low)	2 (Medium)	Equivalent Characteristics	Importance	
Characteristics = 1+1+2 = 4			2 (Medium)	1 (Low)	Significance
			Significance = Characteristics x Importance		2 (Low)

6.3.3 Impact on solid waste

Impact prediction calculated based on the analyzing results is the most important issue for the future environment management plan. According to the impact analysis, it is needed to know impact significance. As the result of the solid waste generation rate from the Premier Coffee Factory, it has been predicted the impact for this issue. The impact significance was evaluated based on the methodology described. The area of potential impact will be within the immediate area of project activities.

a. Group of risk due to solid waste

The groups at risk from the unscientific waste disposal include:

- Populations in areas where there is no proper waste treatment method.
- Waste workers
- Populations living close to waste dump
- Animals

b. Sources of human exposure

Exposures occurs through

- Ingestion of contaminated water or food
- Contact with disease vectors
- Inhalation
- Dermal

c. Impact of solid waste on human health

According to the result of waste generated from the Manufacturing, there are only some simple help impacts can be happened. Because of smell and leachate from the waste during handling

- Chemical poisoning through chemical inhalation
- Nausea and vomiting
- Increase in hospitalization of diabetic residents living near hazard waste sites.
- From the issue of open burning, the release pollutants have been linked to several other health problems including nervous system damage, kidney and liver damage, and reproductive and developmental disorders and carcinogenic issue.

d. Effects of solid waste on animals and aquatic life

In the surrounding areas, there is river, lakes and ponds. The total amount of waste generated from this Manufacturing is too less to become pollution at river stream. However, the as the issue of open burning and the waste water from the factory directly send to the Hlaing River, and all the residue after burning are going to the water body. Because of this unsystematic action, there are really get negative effect river system. In additions, negative impact on animals and aquatic life are crucial.

e. Impact of solid waste on the environment

According to the UNEP,

- Waste breaks down in landfills to form methane, a potent greenhouse gas
- Change in climate and destruction of ozone layer due to waste biodegradable
- Littering, due to waste pollutions, illegal dumping, Leaching: is a process by which solid waste enter soil and ground water and contaminating them.

6.3.3.1 Impact of solid waste

Impact prediction calculated based on the analyzing results is the most important issue for the future environment management plan. According to the impact analysis, it is needed to know impact significance. As the result of the solid waste generation rate from the Premier Coffee Manufacturing, it has been predicted the impact for this issue. The impact significance was evaluated based on the methodology described. The area of potential impact will be within the immediate area of project activities.

6.3.3.1.1 The impact significance of solid waste

The equation of impact significant is

Equation 1- Impact Significant= Characteristic x Important

To get the Characteristic, it is needed to combine magnitude, extent and duration according to the

Equation 2 - Characteristic = magnitude+ extent+ duration

a) Impact significance of domestic solid waste

Table 6.17: Impact significance of domestic solid waste from the manufacturing compound

Characteristics					
Magnitude	Extent	Duration			
1 (Low)	1 (Low)	1 (Low)	Equivalent Characteristics	Importance	
Characteristics = 1+1+1 = 3			1 (Low)	2 (Medium)	Significance
			Significance = Characteristics x Importance		2 (Low)

According to the result monitored, the magnitude of the impact from domestic solid waste was considered as low. The area of potential impact will be within the immediate area of project activities. The extent of the impact for solid waste impact is noted as low level.

The period of potential impact was the short duration. Thus, the duration of the impact from solid waste was set as low. Therefore, the characteristic of solid waste impact was rated as low.

The impact is expected to cause some potential disturbances on communities locally and regionally. The importance of the impact on solid waste was set as medium.

The impact of solid waste would likely to be less impact on residences and the potential impact was rated as low. It has been seen that the impact from solid waste is less significance and less effect on the environment.

b) Impact significance of industrial solid waste

Table 6.18: Impact significance of industrial solid waste from manufacturing system

Characteristics					
Magnitude	Extent	Duration			
2 (Medium)	2 (Medium)	2 (Medium)	Equivalent Characteristics	Importance	
Characteristics = 2+2+2 = 6			2 (Medium)	2 (Medium)	Significance
			Significance = Characteristics x Importance		4(Medium)

According to the result monitored, the magnitude of the impact from industrial solid waste was considered as medium. The area of potential impact will be within the immediate area of project activities and surrounding environment. The extent of the impact for solid waste impact is noted as medium level.

The period of potential impact was the quite long duration. Thus, the duration of the impact from solid waste was set as medium. Therefore, the characteristic of solid waste impact was also rated as medium.

The impact is expected to cause some potential disturbances on communities locally and regionally. The importance of the impact on solid waste was set as *medium.*

The impact of solid waste would likely to be moderately impact on residences and the potential impact was rated as medium. It has been seen that the impact from solid waste is significance and effect on the environment.

6.3.3.1.2 Mitigation measure for the solid waste

The proposed factory does not generate hazardous waste. They apply source segregation system, especially Dry & Wet waste. They have a waste container for temporary waste storage and also have YCDC waste bins. Recyclable wastes are resold and reused and non-recyclable wet/dry waste is disposed of at YCDC. The aluminum films from the process are shredded with a cutter and disposed of at YCDC.

According to the analysis, the waste generation rate is extremely less than the rate of the developing country. But, in the mitigation measure, it is needed to manage natural topography as the impact to damage natural soil from the surrounding areas.

- According to the waste management and raw material storage system, it is needed to use insect-killer. When using, it is better to use systematically.
- If there is no waste management system, there has been problem in the waste handling, storage system before final disposal.
- For the preventing of transmitted disease from the waste, it is needed to take care for these gloves and mask during the process of collection and transferring.
- Avoid from open burning and use systematic way of burning such as incinerator as a small scale.

6.3.4 Impact of artesian well (Tube well) on the environment and health

6.3.4.1 Impact of wastewater on tube well water

I. Impact of high pH

The effects of drinking water contaminants are considered aesthetic. Then, it also affects on the human health. If pH is more acid condition and more alkalinity condition, there can be skin problem and eye diseases. In this factory, PH levels of all water sources more or less meet the standards.

II. Impact of high conductivity

Conductivity is a measurement used to determine a number of applications related to water quality. All water samples except RO have higher turbidity.

III. Impact of total dissolved solid (TDS)

In the tube well water source (1), Tap water and Tank water, TDS content was very high leading to affect on the taste and odor of water. This leads to Aesthetic Problem in drinking water and to excessive scaling in water pipes, heaters, boilers, and household appliances as well.

IV. Impact of Total Hardness, Magnesium, Chloride and Sulphate

In the tube well water source (1), Tap water and Tank water has high Total Hardness, Magnesium, Chloride and Sulphate. Chloride is mainly an aesthetic concern because of the unpleasant taste. Moreover, a high concentration of calcium and other ions can give to unpleasant taste in water. Soft water can cause pipe corrosion and may increase the solubility of heavy metals such as copper, zinc, lead and cadmium in water. Excessive hardness may indicate the presence of other chemicals such as nitrate.

V. Impact of total Coliforms

Moreover, total Coliforms were found out in the all water source including RO water, leading to waterborne diseases with the following signs and symptoms such as nausea, vomiting, and diarrhea.

VI. Impact of *Escherichia coli*

In the tube well water source (2), overhead tank water and tap water are being contaminated with *E. coli*. most severe is *E. coli* O157:H7, which makes strong toxin and can cause severe illness. The presence of *E. coli is used as an indicator* to monitor the possible presence of other more harmful microbes, such as Cryptosporidium, Giardia, Shigella, and norovirus. In the RO water and tube well water, there is no E coli contamination.

The distance between the tube well sources and the septic tank (sewage) is approximate

VII. Environmental impact prediction

Impact prediction is one of most important issues for the future sustainable environment. The impact significance was evaluated based on the methodology described. The area of potential impact will be within the immediate area of project activities.

The equation of impact significant is
Equation 1- Impact Significant= Characteristic x Important

To get the Characteristic, it is needed to combine magnitude, extent and duration according to the
Equation 2 - Characteristic = magnitude+ extent+ duration

In the following tables show impact significant of pH, Conductivity, TDS, Total Hardness, Magesium, Chloride, Sulphate, and Total Coliforms and E-coli

(i) The impact significance of pH of the tube well water

According to the result, the magnitude of the impact of pH of the tube well water was considered as low. The area of potential impact will be within the immediate area of project activities and factory community however the result was not much higher than the standard guidelines. As the analytical result, the extent of the impact for pH is noted as low level. The period of potential impact duration can be long term duration. The duration of the impact from pH was set as medium. Therefore, the characteristic of the pH impact was rated as medium.
The impact is expected to cause some disturbances potentially affecting communities locally and surrounding water bodies. The importance of the impact on pH was set as low. Thus, the significant rating of impact was set as ***Medium***.

Table 6.19: Impact significance of pH from the potable water

<table>
<tr><td colspan="3">Characteristics</td><td></td><td></td><td></td></tr>
<tr><td>Magnitude</td><td>Extent</td><td>Duration</td><td></td><td></td><td></td></tr>
<tr><td>1 (Low)</td><td>1 (Low)</td><td>2 (Medium)</td><td>Equivalent Characteristics</td><td>Importance</td><td></td></tr>
<tr><td colspan="3">Characteristics = 1+1+2 = 4</td><td>2 (Medium)</td><td>1 (Low)</td><td>Significance</td></tr>
<tr><td colspan="3"></td><td colspan="2">Significance = Characteristics x Importance</td><td>2(Medium)</td></tr>
</table>

(ii) The impact significance of conductivity

According to the result, the magnitude of the impact from Conductivity was considered as High. The area of potential impact will be within the immediate area of project activities and significantly impact on factory community. The extent of the impact for conductivity is noted as high level. The period of potential impact duration can be long-term duration. The duration of the impact from conductivity was set as High. Therefore, the characteristic of the Conductivity impact was rated as High.
The impact is expected to cause some disturbances potentially affecting communities locally and surrounding water bodies and esthetic condition. The importance of the impact on Conductivity was set high. Thus, the significant rating of impact was set as *High.*

Table 6.20 Impact significance of conductivity in potable water

Characteristics					
Magnitude	Extent	Duration			
3 (High)	1 (Low)	3 (High)	Equivalent Characteristics	Importance	
Characteristics = 3+1+3 = 7			3 (High)	3(Medium)	Significance
			Significance = Characteristics x Importance		9 (High)

(iii) The impact significance of total dissolved solid

According to the result, the magnitude of the impact of TDS was considered as high. The area of potential impact will be within the immediate area of project activities and factory community. The extent of the impact for TDS is noted as medium level. The period of potential impact duration can be long-term duration. The duration of the impact from TDS was set as High. Therefore, the characteristic of the TDS impact was rated as high.

The impact is expected to cause some disturbances potentially affecting communities locally and surrounding water bodies. The importance of the impact on TDS was set as *medium.*

Table 6.21: Impact significance of total dissolved solid in potable water

Characteristics					
Magnitude	Extent	Duration			
3 (High)	1 (Low)	3 (High)	Equivalent Characteristics	Importance	
Characteristics = 3+1+3 = 7			3 (High)	2(Medium)	Significance
			Significance = Characteristics x Importance		6(Medium)

(iv) The impact significance of total hardness, magnesium, chloride, and sulphate

According to the result, the magnitude of the impact from total hardness, magnesium, chloride and sulphate were considered as high. The area of potential impact will be within the immediate area of project activities and factory community. The extent of the impact for total hardness, magnesium, chloride, and sulphate were noted as medium level. The period of potential impact duration can be long-term duration as a significance.. The duration of the impact from total hardness, magnesium, chloride and sulphate were set as High. Therefore, the characteristic of the impact from total hardness, magnesium, chloride and sulphate were rated as high.

The impact is expected to cause some disturbances potentially affecting communities locally and surrounding water bodies and human health extensively. The importance of the impact on total hardness, magnesium, chloride and sulphate were set medium.

Table 6.22: Impact significance of total hardness, magnesium, chloride and sulphate in potable water

Characteristics					
Magnitude	Extent	Duration			
3 (High)	1 (Low)	3 (High)	Equivalent Characteristics	Importance	
Characteristics = 3+1+3 = 7			3 (High)	2(Medium)	Significance
			Significance = Characteristics x Importance		6(Medium)

(v) The impact significance of total Coliforms

According to the result monitored, the magnitude of the impact from total Coliforms was considered as medium. The area of potential impact will be within the project site and factory community. The extent of the impact of total Coliforms is noted as medium. The period of potential impact duration can be long-term duration. The duration of the impact from total Coliforms was set as High. Therefore, the characteristic of the total Coliforms impact was rated as high.

The impact is expected to cause some disturbances potentially affecting communities occasionally. The importance of the impact on total Coliforms was set as *medium*.

Table 6.23: Impact significance of total Coliforms in potable water

Characteristics					
Magnitude	Extent	Duration			
2(Medium)	2(Medium)	3 (High)	Equivalent Characteristics	Importance	
Characteristics = 2+2+3 = 7			3 (High)	2(Medium)	Significance
			Significance = Characteristics x Importance		6(Medium)

(vi) The impact significance of *Escherichia coli*

According to the result, the magnitude of the impact from *Escherichia coli* was considered as medium. The area of potential impact will be within the project site and the factory community. The extent of the impact of *Escherichia coli* is noted as medium. The period of potential impact duration can be both long term and short term due to its chronic and acute toxicity respectively. The duration of the impact from *Escherichia coli* was set as High. Therefore, the characteristic of the *Escherichia coli* impact was rated as high.

The impact is expected to cause some disturbances potentially affecting communities occasionally. The importance of the impact on *Escherichia coli* was set as medium. Therefore, the significance rating of *Escherichia coli* was noted as *Medium.*

Table 6.24: Impact significance of *Escherichia coli* in potable water

Characteristics					
Magnitude	Extent	Duration			
2(Medium)	2(Medium)	3 (High)	Equivalent Characteristics	Importance	
Characteristics = 2+2+3 = 7			3 (High)	2(Medium)	Significance
			Significance = Characteristics x Importance		6(Medium)

6.3.4.2 Mitigation measure for potable water

6.3.4.2.1 To reduce the amount of total Coliform in the potable water, it is needed to boil with high temperature before drinking. Total Coliform will be killed with high temperature and the magnitude of Total Coliforms in the water will be decreased. Other disinfection methods like prorper chlorination, filtration and RO can both reduce and kill the total Coliforms. As this action, impact significance also will become low.

6.3.4.2.2 Water treatment methods such as reverse osmosis, ion exchange or oxidizing filters can be used to reduce other types of water hardness.

6.3.4.2.3 Another treatment method is disinfection like proper chlorination method. If it is used, the amount of TDS in water is significantly less and the impact will be decreased.

6.3.4.2.4 To reduce the amount of TDS impact from the potable water, it is needed to use filtration method at the source before the distribution. Therefore, the magnitude for the possible impact significance will become low and also the risk of impact will be decreased.

6.3.4.2.5 Another treatment method is using either reverse osmosis membrane treatment system or coagulation (lime or lime soda ash) and resulting in the amount of pH in water is significantly less and the impact will be decreased.

Characteristics					
Magnitude	Extent	Duration			
1 (Low)	1 (Low)	3 (High)	Equivalent Characteristics	Importance	
Characteristics = 1+1+3 = 5			2 (Medium)	1 (Low)	Significance
			Significance = Characteristics x Importance		2(Low)

6.3.5 Impact of waste water

Environmental impact of wastewater discharge from the beverage factory

Regarding the environmental impact of the waste water on the environment, the significant parameters were analyzed as the indicators of the negative effects on the surrounding water bodies:

pH, Total Suspended Solid (TSS), Nitrate Nitrogen, Phosphorus, DO, Ammonia Nitrogen, Oil and Grease, BOD, COD, Total Coliforms and E-coli

Among those parameters, (TSS), Ammonia Nitrogen, Oil and Grease, BOD, COD, Total Coliforms and E-coli did not meet the standards and guidelines. This can lead to the following impacts on the environment:

- Taste and odor of water,
- Aesthetic problem in drinking water
- High TSS leads to increase water turbidity
- Microbial
- contamination in drinking water leading to health effects High eutrophication condition in water
- High BOD can cause lower oxygen which is needed for the aquatic organisms to survive
- High COD can cause lower oxygen which is needed for the aquatic organisms to survive
- Health impact to the human and aquatic organisms
- Cause waterborne disease to the environment

If the volume and organic contents of the wastewater are small compared to the volume of the receiving water, the dissolved oxygen which is present in the receiving water is adequate to provide for aerobic decomposition of the organic solids in the wastewater so that nuisance conditions will not develop.

In spite of the continued aerobic status of the receiving water, microbial pollution remains a health menace and floating solids in the wastewater, if not removed, these can be visible as evidence of the pollution.

Impact prediction is one of the most important issues for the future factory sustainable environment. Impact prediction is calculated based on the result. According to the impact analytical methodology, it is needed to know impact significance. According to the result of effluent waste water analysis, the parameters which are already higher than the effluent guidelines are needed to be estimated. The impact significance was evaluated on the methodology described.

The Impact Significance of BOD, COD, E-coli and Total Suspended Solid, The equation of impact significance is

Equation 1- Impact Significant= Characteristic x Important

To get the Characteristic, it is needed to combine magnitude, extent and duration according to the

Equation 2 - Characteristic = magnitude+ extent+ duration

In the following section shows the significant impact level of the wastewater parameters such as Total Suspended Solid, Ammonia Nitrogen, Oil and Grease, BOD, COD, and E coli.

(i) Total Suspended Solid

According to the result, the magnitude of the impact of TSS was considered as High. The area of potential impacts can be the immediate area and significantly impact on the surrounding water bodies and aesthetic problem. The extent of the impact of TSS is noted as high level. The period of potential impact duration can be long term duration. The duration of the impact from TSS was set as Medium. Therefore, the characteristic of the TSS impact was rated as high. The impact is expected to cause some disturbances potentially affecting communities frequently. The importance of the impact on TSS was set as medium. Therefore, the impact significant rating for TSS in this beverage factory is set as ***High***.

Table 6.25: Impact significance of TSS in effluent waste water

Characteristics					
Magnitude	Extent	Duration			
3(Medium)	2 (Medium)	2(Medium)	Equivalent Characteristics Score	Importance	
Characteristics = 3+ 2+ 2 = 7			3 (High)	2 (Medium)	Significance Rating
			Significance = Characteristics x Importance		*6 (Medium)*

(ii) Ammonia Nitrogen

According to the result, the magnitude of the impact from Ammonia Nitrogen was considered as High. The area of potential impacts can be the immediate area and significantly impact on the surrounding water bodies as high organic compound and also impact on the water treatment issue. The extent of the impact for Ammonia Nitrogen is noted as high level. The period of potential impact duration can be long-term duration. The duration of the impact of Ammonia Nitrogen was set as Medium. Therefore, the characteristic of the Ammonia Nitrogen impact was rated as high. The impact is expected to cause some disturbances potentially affecting communities frequently. The importance of the impact on Ammonia Nitrogen was set as ***High***.

Therefore, the impact significant rating for Ammonia Nitrogen in this beverage factory is set as High.

Table 6.26: Impact significance of Ammonia Nitrogen in effluent waste water

Characteristics					
Magnitude	Extent	Duration			
3(Medium)	2 (Medium)	2(Medium)	Equivalent Characteristics Score	Importance	
Characteristics = 3+ 2+ 2 = 7			3 (High)	3 (High)	Significance Rating
			Significance = Characteristics x Importance		9 ***(High)***

(iii) Oil and grease

According to the chemical analysis, the magnitude of the impact from Oil and Grease was considered as Low. The area of potential impact will be certain on the surrounding water bodies and slightly effect on the treatment system. The extent of the impact for Oil and Grease is noted as medium. The period of potential impact can be long-term as long as the effluent is being released. However, in this effluent, Oil and Grease amount is not much higher. Therefore, the duration of the impact of Oil and Grease was set as medium. Thus, the characteristic of the oil and grease impact was rated as Medium.

The impact is expected to cause some disturbances potentially affecting communities occasionally. The importance of the impact on Oil and Grease was set as low. Therefore, the impact significance of oil and grease is in the effluent waste water from the Manufacturing process system was set as ***Low.***

Table 6.27: Impact significance of oil and grease in effluent wastewater

Characteristics					
Magnitude	**Extent**	**Duration**			
2(Medium)	2 (Medium)	2(Medium)	**Equivalent Characteristics Score**	**Importance**	
Characteristics = 2 + 2 + 2 = 6			2 (Medium)	1 (Low)	**Significance Rating**
			Significance = Characteristics x Importance		2 ***(Low)***

(iv) BOD

According to the result monitored, the magnitude of the impact of BOD was considered as high. The area of potential impact will be in the immediate area of project activities and can also impact on the surrounding water bodies. The extent of the impact for BOD is noted as High. The period of potential impact can be long-term duration as long as the effluent is being released. The duration of the impact from BOD was set as High. Therefore, the characteristic of the BOD impact was rated as high.
The importance of the impact on BOD was set as high. Therefore, the impact significance of BOD in the effluent waste water from the Manufacturing process system was set as ***High***.

Table 6.28: Impact significance of BOD in effluent waste water

Characteristics					
Magnitude	**Extent**	**Duration**			
3(High)	3(High)	3(High)	**Equivalent Characteristics Score**	**Importance**	
Characteristics = 3 + 3 + 3 = 9			3(High)	3(High)	**Significance Rating**
			Significance = Characteristics x Importance		9(High)

(v) COD

According to the result monitored, the magnitude of the impact from COD was considered as medium. The area of potential impact will be in the immediate area of project activities and can also impact on the surrounding water bodies.
The extent of the impact for COD is noted as medium. The period of potential impact duration will be long-term duration as long as the effluent is being released into the drainage without treatment. Thus, the duration for the impact is set as high. As the analytical result, the impact characteristic was set as high.
The importance of the impact on COD was set as medium. Therefore, the impact significance of COD in the effluent waste water from the Manufacturing process system was set as *medium*.

Table 6.29: Impact significance of COD in effluent wastewater

Characteristics					
Magnitude	**Extent**	**Duration**			
2 (Medium)	2 (Medium)	3(High)	**Equivalent Characteristics Score**	**Importance**	
Characteristics = 2 + 2 + 3 = 7			3(High)	2 (Medium)	**Significance Rating**
			Significance = Characteristics x Importance		***5*** (Medium)

(vi) Ecoli

According to the bacteriological analysis, the magnitude of the impact of Ecoli was considered as medium. The area of potential impact will be within the immediate area, certain impact on the surrounding water bodies and health impact to the community. The extent of the impact of Ecoli is noted as medium. The period of potential impact can be long-term as long as the effluent is being released. However, in this effluent, Ecoli amount is much higher. Therefore, the duration of the impact from Ecoli was set as high. Thus, the characteristic of the Ecoli impact was rated as High.

The impact is expected to cause some health effects frequently in the nearby communities. The importance of the impact on Ecoli was set as High. Therefore, the impact significance of Ecoli in the effluent waste water from the manufacturing process system was set as *High* level.

Table 6.30: Impact significance of Ecoli in effluent waste water

Characteristics					
Magnitude	**Extent**	**Duration**			
2 (Medium)	2 (Medium)	3(High)	**Equivalent Characteristics Score**	**Importance**	
Characteristics = 2 + 2 + 3 = 7			3(High)	3(High)	**Significance Rating**
			Significance = Characteristics x Importance		9(High)

6.3.5.1 Mitigation measure for waste water polluted with TSS, Ammonia Nitrogen, Oil and Grease, BOD, COD, Ecoli

To reduce the significant impacts, the following mitigation measures are needed to conduct:

The primary treatment and secondary treatment will be initiated and reduced by the following methods.

Primary treatment: Screening and Filtration method will remove large debris and particles through screens and filters. It is proposed to purify Domestic Wastewater by Sink Filter, Oil & Grease Separators, Sand Filtration and Gravel Filtration, Chlorination.

Secondary treatment: And then, it is needed to grow wet land plant which is called wet-land constructed near the drainage. The purpose of wet-land is the roots of wet-land will surely absorb the pollutants from the waste water and it will also provide the aesthetic effect.

Impact after mitigation measure for TSS, Ammonia Nitrogen, Oil and Grease BOD, COD, Ecoli

Characteristics					
Magnitude	**Extent**	**Duration**			
1 (Low)	1 (Low)	1 (Low)	**Equivalent Characteristics Score**	**Importance**	
Characteristics = 1 + 1 + 1 = 3			1 (Low)	2(Medium)	**Significance Rating**
			Significance = Characteristics x Importance		2 (Low)

6.3.6 Impact on human environment

a) Potential impact on occupational health and safety

Workers at Lluvia limited BEVERAGE (coffee, Tea and Milk powder) are exposed to considerable hazards like manual handling, inhalable dust, noise, shift work and accident. Most of the workers involved in loading and offloading can experience occupational health and safety problems. Therfore, employees' health hazard is high if the personal protective equipments are not provided to them.

Air Impact: Inhalation of contaminated air, absorption of floating particulates in the surrounding air, and ingestion of pollutants during eating, smoking and drinking are significantly high in the factory.

Noise Impact: The noise impact released from machinery operations, human activities etc

Accidents and Injury: Unguarded machinery used in the manufacturing process can lead to worker injuries. Improper lifting, awkward postures and repetitive motions can lead to sprains and other musculoskeletal disorders. Poorly maintained or improperly handled vehicles can lead to crushing injuries at the plant site.

A potential social impact both during operation of the project will be on the occupational health and Safety of the staff.

b) Potential impact on social benefits

During the operation phase, maintenance of the facility, employment opportunities created by the project will have social benefit besides the expected economic benefit. Employment income from the project will have a substantial role for social livelihood improvement in the project area. These will involve other sources of employment such as direct service provision to the domestic sector. e.g. traders, office operators, engineers, security personnel etc.

There will be positive gain for the revenue system arising from the tax being paid by the proponent to the government and other lead agencies. The local people can get job opportunities as factory workers as well as skilled labour. Therefore, the impact by the proposed project on socio- economic may be positive impact. There will be no negative impacts such as removing existing vendors (or) influx of vendors near the project area because the proposed project is located in the Hlaing Thar Yar industrial zone.

Impact significance on human environment

a) Impact significance on occupational health and safety

There will be impact on health and safety and the magnitude of impact during operation phase of the factory was "Medium".

The impact of the project can affect health and safety of the workers. Therefore, the extent of the impact was "Low".

The period of impact occurrence will be within the operation period and the duration of the impact on working area was considered as "High".

According to magnitude, extent and duration of the impact, the impact characteristics will be "Medium".

The importance of the impact was considered as "Medium".

Table 6.31: Impact significance on occupational health and safety during operation period

Characteristics					
Magnitude	**Extent**	**duration**			
2(Medium)	1 (Low)	3(High)	**Equivalent Characteristics Score**	**Importance**	
Characteristics = 2 + 1 + 3= 6			2 (Medium)	2 (Medium)	**Significance Rating**
			Significance = Characteristicsx Importance		4 ***(Medium)***

Mitigation measures are described in the next sections and on their working conditions.

6.3.6.1 Mitigation measures for human environment impact

Following measures should be adopted in the plant for three phases:

- All measures related to safety including safety appliances, training safety posters, Slogans, pictures should be posted readable clearly at the factory.
- The workers exposed to noisy sources should be provided with ear muffs/plugs.
- Adequate facilities for drinking water and toilets should be provided to the employees.
- The health of the workers should be regularly checked by a well-qualified doctor and proper records will be kept for each worker.
- Rinse eyes with water if they come into contact with dust and consult a physician.
- Use soap and water to wash off dust to avoid skin damage.
- Eat and drink only in dust-free areas to avoid ingesting particulate matters.
- Wear alkali-resistant gloves, coveralls with long sleeves and full-length pants, waterproof boots

and eye protection.

- Avoid working beneath conveyor belts and stacker machinery.
- Provide PPEs (Personal Protective Equipment), particularly masks to protect dust and air particulate matters from the atmosphere.
- Be sure that trucks and other vehicles are in good working order.
- Regular inspection and maintenance of pollution control systems.
- The fire and safety equipment should be properly utilized and maintained regularly.
- Well stocked first aid box which is easily available and accessible should be provided within the building.

Well-designed waste management system and storm water drainage systems have to be put in place so as to ensure that breeding grounds of disease carrying vectors such as rats, flies, mosquitoes, cockroaches, etc are effectively controlled in work area

Therefore, the impact on working area by Lluvia limited BEVERAGE (coffee,Tea and Milk powder) will be less and the significance of the impact would be “Low”.

Characteristics					
Magnitude	Extent	Duration			
2 (Medium)	1 (Low)	1 (Low)	Equivalent Characteristics	Importance	
Characteristics = 2+1+1 = 4			2 (Medium)	1 (Low)	Significance
			Significance = Characteristics x Importance		2 (Low)

6.4 Impact, risk assessment and mitigation measures in decommissioning phase

6.4.1 Impact, risk assessment and mitigation measures for air quality

6.4.1.1Scope of assessment

Resource/ Receptor	Project Phase	Activity	Impact
Air quality	Decommissioning Phase	• Particulate matters from demolition activities • Gas emission from machines and vehicles	Deterioration of air quality and human health

6.4.2 Impact on air quality

During this phase, the operation of vehicles for facilities and decommissioning activities can also release dust particles and gaseous emissions which can affect the ambient air quality for the short periods. There may also be gaseous emissions from diesel generators and combustion of fuel for vehicle movements. Generally, this will adversely affect localized air quality for a short period.

Criteria air pollutant and air emissions that would arise from the demolition of the proposed project are quantified and summarized below.

- Heavy machinery /vehicles such as diesel-powered bulldozers and loaders would be used throughout the entire decommissioning phase
- Vehicle traffic on paved and unpaved roads
- Demolition activities, earth work
- Worker accommodation

Adjacent to the demolition site and along the transportation route, natural habitat, residents, and construction crew will be potentially affected by the air pollution.

6.4.2.1 Impact significance on air quality

In demolition phase, there may have temporary impacts on air quality. The breaking down of the building can emit large amount of dusts but can vary depending on activities. There may also have gaseous emissions from diesel generators and fuel combustion.

The magnitude of impact on air quality will be "Medium".

The area of impact will be not only within the area but also in the vicinity area according to wind direction. Therefore, the extent of the air quality impact from particulates was "Medium".

The period of impact occurrence will be within the demolition phase and the duration of the impact by demolition activities will be considered as "Low".

According to magnitude, extent and duration of the impact, the impact characteristics will be "Medium". The importance of the impact on air will be considered as "Medium".

Therefore, the impact from particulate matters and gaseous emission by the proposed project demolition will be a little high and the significance of the impact would be "Medium".

Table 6.32: Impact significance on air quality during decommissioning phase

Characteristics					
Magnitude	**Extent**	**Duration**			
2 (Medium)	2 (Medium)	1 (Low)	**Equivalent Characteristics Score**	**Importance**	
Characteristics = 1 + 1+ 1 = 3			2 (Medium)	2 (Medium)	**Significance Rating**
			Significance = Characteristics x Importance		4(Medium

6.4.2.2 Mitigation measures for air quality

The following mitigation measures should be practiced to reduce potential dust and gaseous emissions into the environment.

a. Ensure strict enforcement of on-site speed limit regulations.
b. Avoid demolitions works in extremely dry weathers.
c. Sprinkle water on graded access routes when necessary to reduce dust generation by machines.
d. Demolished materials on site to be covered to prevent to be blown off by wind
e. Minimization of exhaust emissions.
f. Air pollution from vehicles will be minimized by using low emission equipment and vehicles.
g. Vehicle idling time shall be minimized.
h. Alternatively, fueled construction equipment shall be used where feasible equipment shall be properly maintained
i. Truck drivers should avoid unnecessary running of vehicle engines at loading/ offloading points and parking areas, and to switch off or keep vehicle engines at these points.
j. Minimizing dust from material handling sources by using covers.

k. Optimize vehicle movements to eliminate unnecessary vehicle movements.
l. Spraying water to minimize dust from vehicle movements.
m. Prohibit burning of domestic waste on site.
n. Ensure strict enforcement of on-site speed limit regulations.
o. Avoid excavation works in extremely dry weathers.
p. Sprinkle water on graded access routes when necessary to reduce dust generation by construction vehicles.
q. Decommissioning waste on site to be covered to prevent to be blown off by wind.

After mitigation measure, the impact on air quality will become less significant.

After mitigation measures, impact significance on air quality

Characteristics					
Magnitude	**Extent**	**Duration**			
1 (Low)	1 (Low)	1 (Low)	**Equivalent Characteristics Score**	**Importance**	
Characteristics = 1 + 1+ 1 = 3			1 (Low)	2 (Medium)	**Significance Rating**
			Significance = Characteristics x Importance		2(Low)

6.4.3 Impact, risk assessment and mitigation measures for noise and vibration

6.4.3.1 Scope of assessment

Resource/ Receptor	Project Phase	Activity	Impact
Noise and vibration	Decommissioning Phase	• Noise and vibration buildingfrom demolition activities and vehicles	Impact to human health and surrounding environment.

6.4.3.2 Potential impacts on noise and vibration level

The demolition works will lead to significant deterioration of the acoustic environment within the project site and the surrounding areas. It will involve less noise generation due to the absence of operational equipment. But there will be some noise generated from heavy machineries running for dismantling activities. The decommissioning noise impact is the short term pollution to local ambient noise quality. Noise and vibration affect natural vegetation, animals, workforce, and communities from the areas. This will be as a result of the noise and vibration that will be experienced as a result of demolishing the proposed project.

6.4.3.3 Impact significance on noise and vibration

In decommissioning phase, noise and vibration will be experienced as a result of demolishing the proposed project. The demolition works will lead to significant deterioration of the acoustic environment within the project site and the surrounding area.

The magnitude of impact from noise will be “Medium”.

The area of impact will be not only within the milling factory but also in the vicinity area. Therefore, the extent of the impact noise and vibration will be "Medium".

The period of impact occurrence will be within the demolition period. The construction workers and people in the vicinity area will have impact from noise and vibration of the demolition processes and so the duration of the impact from noise and vibration was considered as "Low".

According to magnitude, extent and duration of the impact, the impact characteristics will be "Medium".

The importance of the impact will be considered as "Medium".

Therefore, the impact noise and vibration by demolition of the proposed project will be a little high and the significance of the impact would be "Medium".

Table 6.33: Impact significance on noise and vibration

Characteristics					
Magnitude	**Extent**	**Duration**			
2 (Medium)	2 (Medium)	1 (Low)	**Equivalent Characteristics Score**	**Importance**	
Characteristics = 2 +2+ 1 = 5			2 (Medium)	2 (Medium)	**Significance Rating**
			Significance = Characteristics x Importance		4(Medium

6.4.3.4 Mitigation Measures on noise and vibration

The following mitigation measures should be used to reduce noise pollution.

a. Machinery drivers and machinery operators should switch off engines of vehicles or machinery not being used.
b. Schedule noisy decommission activities and transportation during day-time hours.
c. Used good condition and insulated demolition machineries and other equipment should be used in good condition and insulated.
d. Combine noisy operations at the same time, but avoid combinations of vibration
e. Turn equipment off when not in use.
f. Provide PPE, particularly hearing protection devices for those working in noisy areas. After mitigation measure, the impact on noise and vibration will become less significant.

After mitigation measure, impact significance on noise and vibration

Characteristics					
Magnitude	**Extent**	**Duration**			
1 (Low)	1 (Low)	1 (Low)	**Equivalent Characteristics**	**Importance**	
Characteristics = 1 + 1+ 1 = 3			1 (Low)	2 (Medium)	**Significance Rating**
			Significance = Characteristics x Importance		2(Low)

6.4.4 Impact, risk assessment and mitigation measures on water quality

6.4.4.1Scope of assessment

Resource/ Receptor	Project Phase	Activity	Impact
Water quality	Decommissioning Phase	• Runoff and drainage	Deterioration of water quality nearby area

Potential impact on water quality

In the decommissioning phase, the materials generated by the decommissioning activities such as clay, plaster, limestone, concrete, mercury containing light bulbs, old batteries can be accumulated in nearby water courses due to runoff of these materials during the rainy season. It may lead to degradation of groundwater quality.

6.4.4.2 Impact significance on water quality

In decommissioning phase, the magnitude of the impact on water will be considered as "Low". The area of the potential impact will be within the immediate area of decommissioning activities, and the extent of the impact would be "Low".

The period of potential impact duration can be short term duration. The duration of the impact for water quality during decommissioning will be set as "Low".

Therefore, the characteristic of water quality impact by the proposed project decommissioning phase is rated as "Low".

The impact is expected to cause some minor disturbances potentially affecting communities locally and surrounding water bodies. The importance of the impact on water quality was set as "Low".

The significant rating of impact was set as "Low".

Table 6.34: Impact significance on water quality

Characteristics					
Magnitude	Extent	Duration			
1 (Low)	1 (Low)	1 (Low)	Equivalent Characteristics	Importance	
Characteristics = 1 + 1+ 1 = 3			1 (Low)	1 (Low)	Significance Rating
			Significance = Characteristics x Importance		1 (Low)

6.4.4.3 Mitigation measures for impact on water quality

The following mitigation measures should be practiced and used to reduce potential impacts for water resources.

a. Water should be used efficiently at the site by the workers carrying out decommissioning activities in order to avoid irresponsible water use.
b. Soil erosion and sediment control mechanisms will add positive effects on mitigation matters for water pollution.
c. Use leak proof containers for storage and transportation of oil and grease.
d. Collect solid wastes in containers and disposed of properly.

6.4.5 Impact, risk assessment and mitigation measures for waste disposal

6.4.5.1Scope of assessment

Resource/ Receptor	Project Phase	Activity	Impact
Waste	Decommissioning Phase	• Disposing waste	Large amount of solid waste from demolition of the buildings

6.4.5.2 Potential impact by waste disposal

Demolition of the proposed project and related infrastructure will result in large quantities of solid waste. The waste will contain the various materials including concrete, drywall, wood, glass, paints, pipe and metals, garbage, containers, fluorescent light, carpeting, furniture, tires, drums, and any containers with residues remaining on the bottom and fuel tanks.

In addition to solid waste, lubricants and fuel from vehicles and machines and liquid wastes can cause contamination into the surrounding environment particularly air, water and soil. The generation of sanitary wastewater discharges has no significant adverse impacts on surrounding environment.

6.4.5.3 Impact significance on waste disposal

Solid Wastes from demolition include concrete, brick and clay tile, steel, drywall and wood products. But, some of these wastes have the potential to recycle in other construction. However, solid waste from demolition waste may still remain as large amount than other phases, construction and operation phase.

The magnitude of impact from solid waste during demolition phase will be “High”.

The area of impact will be only within the area of milling factory compound. Therefore, the extent of the impact by solid waste during demolition will be “Low”.

The period of impact occurrence will be within the proposed mill demolition period and the duration of the impact by solid waste will be considered as “low”.

According to magnitude, extent and duration of the impact, the impact characteristics will be “Medium”. The importance of the impact was considered as “Medium”.

Therefore, solid waste impact by the proposed project demolition will be less and the significance of the impact would be “Medium”.

Table 6.35: Impact significance of solid waste during decommissioning phase

Characteristics					
Magnitude	Extent	Duration			
3 (High)	1 (Low)	1 (Low)	Equivalent Characteristics	Importance	
Characteristics = 3+1+1 = 5			2 (Medium)	2 (Medium)	Significance
			Significance = Characteristics x Importance		4(Medium)

6.4.5.4 Mitigation measures on waste disposal

The following mitigation measures should be used to reduce potential impacts for waste disposal:

e. Solid wastes should not be dumped into the drain.
f. Encourage waste sorting by the facility users.
g. Develop a hazardous materials management plan addressing storage, use, transportation and disposal for each item.
h. Provide separate bins for food waste, metal and other waste at the temporary camp and other

facilities on site.

i. Fuel storage facilities should be removed immediately upon completion of the decommissioning phase.
j. Wastes can be recycled or disposed at the landfill.
k. The hazardous wastes should be disposed with proper disposal method and caution.
l. Train employees to promptly clean up any oil or hazardous material spill.

After mitigation measure, the impact on waste disposal will become less significant.

After mitigation measure, impact significance on waste disposal

Characteristics					
Magnitude	Extent	Duration			
1 (Low)	1 (Low)	1 (Low)	Equivalent Characteristics	Importance	
Characteristics = 1+1+1 = 3			1 (Low)	2 (Medium	Significance
			Significance = Characteristics x Importance		2 (Low)

6.4.6 Impact, risk assessment and mitigation measures for human environment

6.4.6.1 Scope of assessment

Resource/ Receptor	**Project Phase**	**Activity**	**Impact**
Human environment	Decommissioning Phase	• Demolition activities	Potential of accidental case and health affect from pollution

6.4.6.2 Potential impact on human environment

a) Potential impacts on occupational health and safety

Significant hazards can be occurred due to potential fall of materials or tools as well as temporary hazards such as physical hazards, dust emission and noise pollution. Moreover, accidents and injuries to workers can be caused by heavy vehicle movement for transport of materials and equipment in the demolition phase.

The proposed project will appoint some workers in decommissioning phase. A potential social impact during the decommissioning phase of the project will be on the occupational health and Safety of the staff. Mitigation measures are described in the next sections and on their working conditions.

b) Potential impacts on social benefits

For demolition to take place properly and in good time, several people will be involved. As a result, several employment opportunities will be created for the workers who will work for demolition during the demolition phase of the proposed project.

6.4.6.3 Impact significance on human environment

a) Impact significance on occupational health and safety

During decommissioning phase, there may have impact on occupational health and safety for breaking down the infrastructure or some other decommissioning activities. The magnitude of the impact will be “Medium”.

The area of impact will be only within the decommissioning area and therefore, the extent of the impact on occupational health and safety will be “Low”.

The period of impact occurrence will be within the demolition process and the duration of the impact will be considered as “Low”.

According to magnitude, extent and duration of the impact, the impact characteristics will be “Medium”. The importance of the impact will be considered as “Medium”.

Therefore, the impact on occupational health and safety by Premier factorying factory demolition would be “Medium”.

Table 6.36: Impact significance on occupational health and safety during decommissioning phase

<table>
<tr><td colspan="3">Characteristics</td><td></td><td></td><td></td></tr>
<tr><td>Magnitude</td><td>Extent</td><td>Duration</td><td></td><td></td><td></td></tr>
<tr><td>2 (Medium)</td><td>1 (Low)</td><td>1 (Low)</td><td>Equivalent Characteristics</td><td>Importance</td><td></td></tr>
<tr><td colspan="3">Characteristics = 2+1+1 = 4</td><td>2 (Medium)</td><td>2 (Medium)</td><td>Significance</td></tr>
<tr><td colspan="3"></td><td colspan="2">Significance = Characteristics x Importance</td><td>4(Medium)</td></tr>
</table>

6.4.6.4 Mitigation measures for occupational health and safety

The project will implement the following mitigation measures for Occupational Health and Safety:

a. Initial job trainings relevant to the assignments should be offered for the relevant staff
b. All workers will be provided with personal protection equipment (PPE) and will be obliged to wear them in work zones
c. Particular works shall strictly follow work permit scheme
d. Promote safe and healthy working environment, health, and well-being of all employees.
e. Rinse eyes with water if they come into contact with dust and consult a physician.
f. Use soap and water to wash off dust to avoid skin damage.
g. The fire and safety equipment should be properly utilized and maintained regularly.
h. Well stocked first aid box which is easily available and accessible should be provided.

After mitigation measure, the impact on occupational health and safety will become less significant.

After mitigation measure, impact significance on occupational health and safety during decommissioning period

<table>
<tr><td colspan="3">Characteristics</td><td></td><td></td><td></td></tr>
<tr><td>Magnitude</td><td>Extent</td><td>Duration</td><td></td><td></td><td></td></tr>
<tr><td>1 (Low)</td><td>1 (Low)</td><td>1 (Low)</td><td>Equivalent Characteristics</td><td>Importance</td><td></td></tr>
<tr><td colspan="3">Characteristics = 1+1+1 = 3</td><td>1 (Low)</td><td>2 (Medium)</td><td>Significance</td></tr>
<tr><td colspan="3"></td><td colspan="2">Significance = Characteristics x Importance</td><td>2 (Low)</td></tr>
</table>

6.4.7 Impact, risk assessment and mitigation measures for unplanned event (Fire/Explosion, Transportation accidents/Chemical Spillage)

Given the nature of the event, these unplanned events can manifest at any stage, including construction, operation, and decommissioning phases.

6.4.7.1 Scope of assessment

Resource/ Receptor	Project Phase	Activity	Impact
Human environment	Construction/Operation/ Decommissioning Phase	• Earthwork, Excavation, vehicle • Factory Process • Demolition activities	Fire/Explosion, Transportation accidents/Fuel Chemical Spillage

6.4.7.1.1 Fire/Explosion

Activity and Potential Risk

The activities of Fuel storage and ignition sources can result in potential impacts including possible explosion of fuel storage area or fire of the factory.

Table 6.37: Impact significance on fire and explosion during construction/operation and decommissioning period

Characteristics					
Magnitude	Extent	Duration			
2 (Medium)	1 (Low)	1 (Low)	Equivalent Characteristics	Importance	
Characteristics = 2+1+1 = 4			2 (Medium)	2 (Medium)	Significance
			Significance = Characteristics x Importance		4 (Medium)

Mitigation measures for fire and explosion

- Installing and maintenance in good condition for fire alarm and fire-fighting equipment
- Developing Emergency fire/ explosion response plan
- Ensuring the availability of adequate information on the emergency situations through a good communication system. The details are presented chapter 9.

After mitigation measures, impact significance on fire and explosions during construction/operation and decommissioning period

Characteristics					
Magnitude	Extent	Duration			
1 (Low)	1 (Low)	1 (Low)	Equivalent Characteristics	Importance	
Characteristics = 1+1+1 = 3			1 (Low)	2 (Medium)	Significance
			Significance = Characteristics x Importance		**2 (Low)**

6.4.7.1.2 Transportation accidents

Activity and Potential Risk

The activities of Transportation Accidents can result in potential impacts including possible injury or death to personnel likely affected by the activities.

Table 6.38 Impact significance on Transportation Accidents during construction/operation and decommissioning period

Characteristics					
Magnitude	Extent	Duration			
2 (Medium)	1 (Low)	1 (Low)	Equivalent Characteristics	Importance	
Characteristics = 2+1+1 = 4			2 (Medium)	2 (Medium)	Significance
			Significance = Characteristics x Importance		4 (Medium)

Mitigation measures for Transportation Accidents

- Ensure all vehicles and machines used in the operation are in good condition.
- Drivers must be healthy, have valid licenses and by no means allowed to drink alcohol or take forms of medicine or illicit drugs that can affect performance.
- Strictly follow limit.
- The details are presented chapter 6. (Occupational Health and Safety of all phases)

After mitigation measures, impact significance on Transportation Accidents during construction /operation and decommissioning period

Characteristics					
Magnitude	Extent	Duration			
1 (Low)	1 (Low)	1 (Low)	Equivalent Characteristics	Importance	
Characteristics = 1+1+1 = 3			1 (Low)	2 (Medium)	Significance
			Significance = Characteristics x Importance		**2 (Low)**

6.4.7.1.3 Fuel/ Chemical Spill

Activity and Potential Risk

The activities of Fuel/ Chemical Spill can result in potential impacts including potential risk of spills to the environment affecting physically, biologically and community likely affected by the activities.

Table 6.39 Impact significance on Fuel/ Chemical Spill during construction/operation and decommissioning period

Characteristics					
Magnitude	Extent	Duration			
2 (Medium)	1 (Low)	1 (Low)	Equivalent Characteristics	Importance	
Characteristics = 2+1+1 = 4			2 (Medium)	2 (Medium)	Significance
			Significance = Characteristics x Importance		4(Medium)

Mitigation measures for Fuel/ Chemical Spill

- Check for oil leak from vehicles and machines regularly and fix them promptly
- The secondary contaminants shall be placed in each and every storage sites
- The details are presented chapter 6. (Occupational Health and Safety of all phases) and chapter (9) accordingly.

After mitigation measures, impact significance on Fuel/ Chemical Spill during construction /operation and decommissioning period

Characteristics					
Magnitude	Extent	Duration			
1 (Low)	1 (Low)	1 (Low)	Equivalent Characteristics	Importance	
Characteristics = 1+1+1 = 3			1 (Low)	2 (Medium)	Significance
			Significance = Characteristics x Importance		**2 (Low)**

6.5 Summary of residual significance/ risk ranking

6.5.1 Summary of residual significance/ risk ranking during construction phase

Table 6.40: Residual significance/ risk ranking during construction

Environmental Factors/ Events	Activity	Potential Impacts	Potential Risk	Mitigation Measures	Residual Risk
a) Physical Environment					
1. Air Quality	Construction activities	Increasing particulate matter and lead to air quality degradation	Medium	Construct wind breaks around the main construction activities and in the locality of potentially dusty works Sprinkle water on graded access routes when necessary to reduce dust generation by construction vehicles.	Low
	Open burning and temporary fuel transfer	Gaseous emission and air quality degradation		Minimize air pollution from vehicles by using low emission equipment and vehicles. Prohibit open burning of any waste at project site	
	Diesel generators and combustion of fuel for vehicles	Gaseous emission and air quality degradation		Ensure that all construction equipment and vehicles are maintained in accordance with the manufacture's recommendations	
2. Noise and vibration	Noise nuisance due to mobilization and construction machines	A substantial permanent increase in ambient noise levels in the project vicinity	Medium	Use quiet equipment (i.e. equipment designed with noise control elements)	Low
				Construction machinery and vehicles will undergo periodic maintenance to keep them in good working condition.	

Environmental Factors/ Events	Activity	Potential Impacts	Potential Risk	Mitigation Measures	Residual Risk
				Turn equipment off when not in use.	
3. Water Quality	removal of vegetation, top soil level and ground surface for the Constructing landforms that change water flow paths	Release of suspended soil to the water flows Improper wastewater disposal from cleaning vehicles and equipment Poor sanitation facilities that may result into surface water pollution through improper sewage management.	Medium	Soil erosion and sediment control mechanisms will add positive effects on mitigation matters for water pollution.	Low
				Cover open stockpiles of construction materials or construction wastes on-site with tarpaulin or similar fabric during rainstorms	
				Provide measures to prevent the washing away of construction materials, soil, silt or debris into any drainage system of open stockpiles of construction materials.	
4. Waste disposal	Solid waste generated from construction activities	Contaminate to the environment (surface and ground water), and may be vector for disease	Low	• Managed construction materials in a way to avoid over-ordering, poor storage and maintenance, mishandling as well as improper operation procedures	Low
				• Separate construction wastes into reusable items and materials to be disposed of or recycled whenever possible.	
b) Human environment					

Environmental Factors/ Events	Activity	Potential Impacts	Potential Risk	Mitigation Measures	Residual Risk
5. Occupational Health and safety	Considerable hazards like manual handling, inhalable dust, noise, working confined spaces as slip, trip and falls	Adverse effect on employee's health	Medium	• Providing personal protective equipment suitable for the workplace • Be sure that vehiclesand machines are in good working order • Regular inspection and maintenance of pollution control systems	Low
6. Socio- economic	Project operation activities	Job opportunities for local people Increasing government revenue	Positive	•	Positive

6.5.2Summary of residual significance/ risk ranking during operation phase

Table 6.41: Summary of residual significance/ risk ranking during operation phase

Environmental Factors/ Events	Activity	Potential Impacts	Potential Risk	Mitigation Measures	Residual Risk
a) Physical Environment					
1. Air Quality	Coffee Intake and Pre-Cleaning,	Deterioration of air quality due to particulate matter	Medium		Low Low
	Coffee Cleaning and preparation,	Deterioration of air quality due to particulate matter			
	Milling, Packing and Dispatching.	Deterioration of air quality due to particulate matter		• Install pollution control devices such as cyclone dust separator and fabric filter • Implement a comprehensive maintenance program • Designation and maintaining a well-ventilated facility with proper air exchange rates. • Establishing strict housekeeping practices to minimize the accumulation of flour dust. Conducting regular training sessions for employees on the importance of air quality management, proper use of equipment, and adherence to safety protocols	

Environmental Factors/ Events	Activity	Potential Impacts	Potential Risk	Mitigation Measures	Residual Risk
a) Physical Environment					
				• Consideration on the implementing process modifications, such as improved equipment design, better sealing of machinery, or the use of additives to minimize dust emissions.	

	Generators	Greenhouse gas emission		Using of low-emission generator engines	
	Machines and vehicle use	Greenhouse gas emission		Ensure all vehicles and machines used in milling operation are in	
2. Noise and vibration	Some operation liked grinding, mixing and	Increase in noise level during operation	Low	Using low noise equipment and machines	Low
				Carryout regular maintenance of the equipment to minimize the noise	
Environmental Factors/ Events	**Activity**	**Potential Impacts**	**Potential Risk**	**Mitigation Measures**	**Residual Risk**
				Strictly enforce traffic control measures	
3. Solid Waste	Solid waste from raw materials and factory operation, packaging	Contaminate to the environment (surface and ground water), and may be vector for disease	Low	Source segregation into wet waste and dry waste	Low
				Wastes (by products) such as bran will be used as animal food or used in composting.	
	Domestic waste from canteen	Contaminate to the environment (surface and ground water), and may be vector for disease		Food waste (organic waste) will be used as animal food or used in composting.	
4. Water Quality	Runoff and drainage	Contamination of surface water	Medium	Using filtration method at the source before the distribution.	Low
				Properly storing raw materials under the roof to prevent dumping into water courses in the rainy season.	
				Treat drainage system for sediment control	

				Conducting regular training, monitoring, and inspection schemes together with keeping track of water uses minimizes waste and leaks from faulty connections and faucets	
				Comply EQEG guideline for effluent water	
b) Human environment					
Environmental Factors/ Events	**Activity**	**Potential Impacts**	**Potential Risk**	**Mitigation Measures**	**Residual Risk**
5. Occupational Health and safety	Considerable hazards like manual handling, inhalable dust, noise, working confined spaces mainly silos as well as slip, trip and falls	Adverse effect on employee's health	Low	• Providing personal protective equipment suitable for the workplace	Low
				• Regularly checked the health of the workers	
				• Be sure that vehicles and machines are in good working order	
				• Regular inspection and maintenance of pollution control systems	
6. Socio- economic	Project operation activities	Job opportunities for local people Increasing government revenue	Positive		Positive

6.5.3Summary of residual significance/ risk ranking decommissioning phase

Table 6.42: Summary of residual significance/ risk ranking during decommissioning phase

Environmental Factors/ Events	Activity	Potential Impacts	Potential Risk	Mitigation Measures	Residual Risk
a) Physical environment					
1. Air Quality	Demolition activities	Deterioration of air quality due to particulate matter	Medium	Avoid demolitions works in extremely dry weathers	Low
				Demolished materials on site to be covered to prevent to be blown off by wind	
				Minimizing dust from material handling sources by using covers	
	Heavy machinery/ vehicles such as bulldozers and loaders	Deterioration of air quality due to greenhouse gas emission		Using low emission equipment and vehicles.	
				Optimize vehicle movements to eliminate unnecessary vehicle movements.	
				Ensure strict enforcement of on- site speed limit regulations	
2. Noise and Vibration	Demolition activities	Pollution to local ambient noise and vibration level	Medium	switching off engines of vehicles or machinery not being used	Low
				Schedule noisy decommission activities and transportation during day-time hours	
				Used good condition and insulated demolition	

Environmental Factors/ Events	Activity	Potential Impacts	Potential Risk	Mitigation Measures	Residual Risk
				machineries and equipment	
				Providing PPE, particularly hearing protection devices for those working in noisy areas	
3. Water Quality	Demolition activities	Accumulating the demolition materials which cause deterioration of water quality (such as clay, plaster, limestone, concrete, mercury in the nearby water course)	Low	Efficiently using water at the site for carrying out decommissioning activities in order to avoid irresponsible water use	Low
				Developing Soil erosion and sediment control mechanisms	
				Properly management for solid wastes	
4. Waste Disposal	Resulting demolition materials such as concrete, drywall, wood, glass, paints, pipe and metals and garbage, etc.	Contaminate to the surrounding environment	Medium	Strictlyavoid dumping the wastes into the drain	Low
				Providing separate bins for food waste, metal and other waste at the temporary camp and other facilities on site	
				Removing fuel storage facilities immediately upon completion of decommissioning phase.	
				Recycling or disposing at the landfill	
				Dispose the hazardous wastes with proper disposal method and caution	
b) Human environment					

Environmental Factors/ Events	Activity	Potential Impacts	Potential Risk	Mitigation Measures	Residual Risk
5. Occupational Health and safety	Demolition activities	Injuries by potential fall of materials or tools Accidents and injuries to workers by heavy vehicle movement for transport of materials and equipment	Low	• Offering relevant job trainings for the workers • Providing personal protective equipment suitable for the workplace • Providing first aid box and medicines	Low
6. Socio- economic	Project demolition activities	Job opportunities for local people	Positive	_	Positive

6.5.4 Unplanned events residual risk ranking during construction/operation and decommissioning phase

Table 6.43 Unplanned events residual risk ranking table

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Schedule	Residual Risk
1. Fire	• Fuel storage and ignition sources	• Possible explosion of fuel storage area or fire of the milling factory	• Installing and maintenance in good condition for fire alarm and fire-fighting equipment • Developing Emergency fire/ explosion response plan • Ensuring the availability of adequate information on the emergency situations through a good communication system	All project phases (Construction, Operation and Decommissioning)	Medium
2. Transportation Accidents	• Vehicle, equipment and machines use	• Possible injury or death to personnel	Ensure all vehicles and machines used in milling operation are in good condition. Drivers must be healthy, have vilid licenses and by no means allowed to drink alcohol or take forms of medicine or illicit drugs that can affect performance. Establish clear traffic flow patterns within the factory premises to minimize the risk of collisions.	All project phases (Construction, Operation and Decommissioning)	Medium
3. Fuel/ chemical Spill	• Storage of fuel	• Potential risk of spills to the environment affecting physically, biologically and people	• Check for oil leak from vehicles and machines regularly and fix them promptly • Control measures for fuel/chemical storage area	All project phases (Construction, Operation and Decommissioning)	Medium

4. Occupational hazard	• Workplace accidents	• Possible injury or death to personnel	• Providing first aid training for the worker • Providing medicines and materials needed in case of emergency • Collecting the information of the hospitals near the proposed project for serious case • Developing and implementing medical emergency response plan • Providing personal protective equipment suitable for the workplace	All project phases (Construction, Operation and Decommissioning)	Medium
5. Earthquake	• Physical shifting of earth's surface	• Potential physical disruption cause building collapse, fire or spills	• Providing personal protective equipment to evacuate during an emergency • Be ready for appropriate controls and protective equipment for natural hazard • Developing emergency evacuation plan	All project phases (Construction, Operation and Decommissioning)	Low

Chapter 7

Cumulative Impact Assessment

7 Cumulative Impact Assessments

According to the onsite surveys and interviews with public, most of the factories around the Lluvia (Premier beverage manufacturing factory) are ***food related factories*** as such noodle, bakery, drinking water and some of them are garment factories.

The following table 7.1 shows the factories including Lluvia (premier beverage factory)located in the Hlaing Tharyar industrial zone

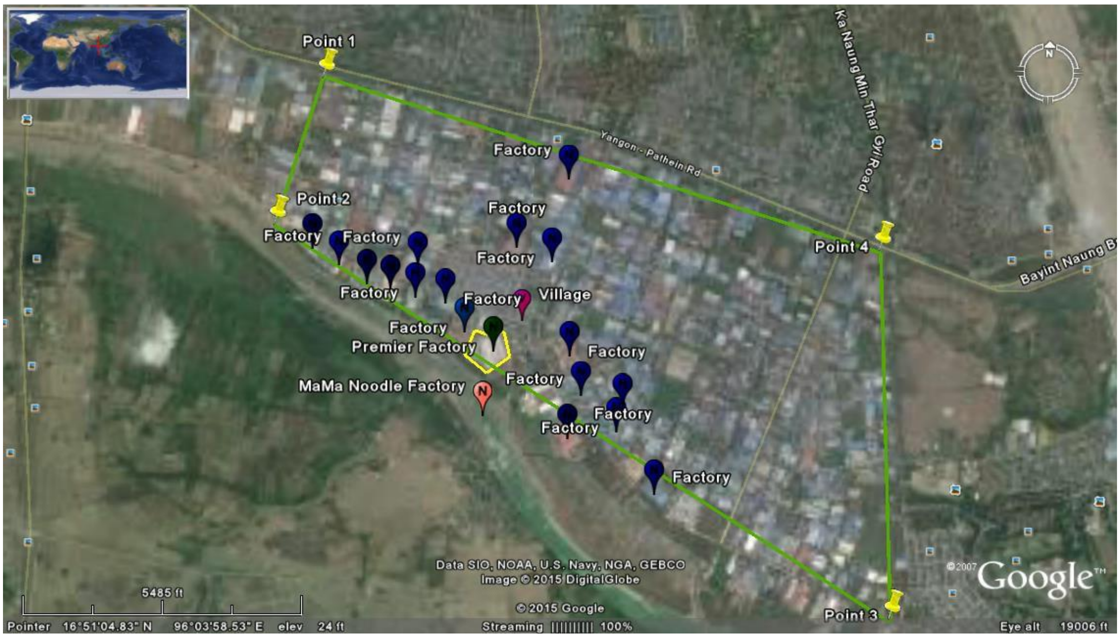


Figure 7.1: The Lluvia (Premier beverage factory) with nearby factories located in Hlaing Thar Yar industrial zone

Hlaing Tharyar industrial zone

Premier Factory **Mama Noodle factory**

Nearest community **Factories**

The cumulative impacts resulting from the combined activities along with the Lluvia (Premier Beverage factory) on the environment at the local level were reviewed and assessed for significance.

At the ***local level,*** cumulative impacts identified were of ***medium significance*** and are summarized below. It was assumed that there will be ***no significant cumulative impacts*** on the environment were found at the ***national and regional levels*** as most factories are Garment factory rather than the factories producing emissions and waste water discharge.

7.1Cumulative fugitive dusts and air pollutants

Short term generation of dust around the factory area and the particulates emission from the factory process would increase when the other ***nearby factories emissions and mobile vehicles*** run the nearest surrounding areas.

(ii) Noise

The existing baseline noise level of the factory would intensify due to noise generation of the existing mobile vehicles, generators operation and **the process of operation machinery by the nearest factories.**

(iii) Waste water

Discharge of wastewater with ***not allowable BOD*** by the factory into the common drainage ***could compound*** any impacts on the nearby lakes and rivers that occur from ***other effluents*** from the other industries.

(iv) Solid Waste

The impact of solid waste from the would likely to be moderately impact on the nearby community.

Chapter 8

Environmental Management Plan

8 Environmental Management Plan (EMP)

8.1 Introduction

This chapter provides Environmental Monitoring, actions to be taken and management plan to reveal the negative environmental impacts of the flour beverage manufacturing factory during its operation, to improve the factory benefits, and to introduce standards of good practice to be practiced for all factory activities and process as well.

The EMP is prepared focusing on international and Myanmar environmental regulations and standards for the food industry projects and HSE policy.

It also sets out the necessity emergency response requirements required to minimize potential for pollution in the event of an emergency arising during the operation.

8.2 Organizational structure and responsibilities

The Lluvia (Beverage Manufacturing Factory) Co., Ltd has to assign HSE team to accomplish environmental controls, mitigation measures and monitoring process throughout the entire project. The LLUVIA Co., Ltd will use 2 % of the total investment cost for the environmental management plan. This section also defines the roles and responsibilities of various entities for the Lluvia (Premier) beverage manufacturing factory.

The essential features of the organizational responsibilities are described as follows:

(i) Main responsibility

The factory owner shall arrange the responsibility of the environmental performance of the factory by awarding either contractor or manager who can manage the HSE plans.

The HSE contractor or manager shall be accountable the responsibilities of all environmental issues related to the factory process and activities and define the HSE policy and plans for the factory.

The factory owner shall communicate with the respective government departments like Environmental Conservation Department (ECD), Ministry of Natural Resources and Environmental Conservation (MONREC) etc and other stakeholders through the HSE contractor and environmental engineer.

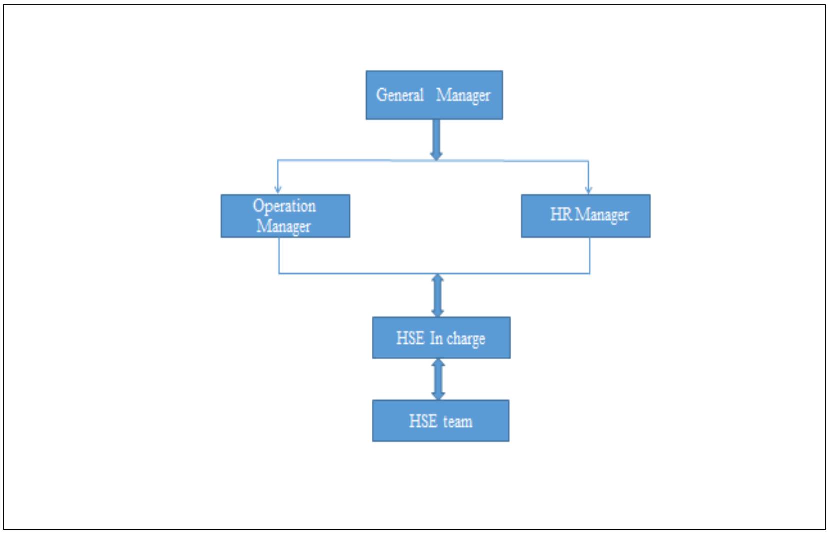


Figure 8.1: Organizational Structure of HSE team

Table 8.1: Responsibilities of HSE members

Roles	Responsibilities
General Manager	The General Manager will be assisted by the Operations Manager and also the HR and HSE Officer. In terms of environmental protection commitments, the Operation Manager will be the key driving force and will be responsible for: • Establishing overall environmental direction and policy • Ensuring the implementation of the EMP • Ensuring investigation of all environmental incidents are reviewed and that reports are submitted on time • Ensuring an effective system of internal and external communication is in place • Providing advice regarding the environmental program
Operation Manager	The Operation Manager will assist the General Manager in looking into the overall environmental matters during the operational phase of the Project. The Operation Engineer will also be responsible for: • Adherence to the overall environmental direction and policy • Ensuring the implementation of the recommended actions in the investigation of all environmental incidents • Managing resources for operation wastes
HR Manager	The HR Manager will carry out the day-to-day management of workers and social issues in the factory. The HR Manager will be responsible for: • Assisting the management in publicising and implementing corporate and local policies, objectives and programs • Maintaining key environmental-related documents and information • Communicating/ liaising with the local authorities on environmental issues
HSE incharge	The HSE incharge will be the key person in charge of all environmental matters pertaining to the site. The HSE Officer will be responsible for: • Coordinating the implementation of environmental programs, including monitoring of the project site environmental performance • Performing periodic internal environmental audits and inspections to ensure compliance with the legal environmental requirements • Ensure a monitoring system is in place to track and report all health, safety and environmental incidents; • Carry out a thorough initial site inspection of environmental controls prior to work commencement; • Record and provide a written report to the General Manager and production team of non-conformances with the EMP and require the HR Manager to undertake mitigation measures to avoid or minimize any adverse impacts on environment or report required changes to the EMP.

(ii) Onsite monitoring

HSE contractor or manager shall implement all environmental issues in accordance with the actions needed to be taken defined in the EMP.

HSE contractor or manager should coordinate whenever the inspection team from Government sides or NGOs comes and inspects the factory process and activities along with the HSE plans.

The workers should be aware of the respective responsibilities and work in accordance with HSE policy and plans.

Table 8.2: Environmental and Social Management Plan of the Project (Construction Phase)

Environmental Factors/Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
a) Physical Environment								
1. Air Quality	1.1Construction activities	1.1.1 Increasing particulate matter and lead to air quality degradation	1.1.1.1 Construct wind breaks around the main construction activities and in the locality of potentially dusty works	Low	Establishing wind barriers (long tall trees) around the main construction activities especially in dusty works	Construction team and/or HSE team	Throughout the construction phase	Monitoring Report
			1.1.1.2 Sprinkle water on graded access routes when necessary to reduce dust generation by construction vehicles.		Spraying water on graded access routes which can restore underground recharging			
	1.2 Open burning and temporary fuel transfer	1.2.1 Gaseous emission and air quality degradation	1.2.1.1 Minimize air pollution from vehicles by using low emission equipment and vehicles.		Limit and inspect the number of vehicles to be done effectively with the use of least number of vehicles			

Environmental Factors/Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
			1.2.1.2 Prohibit open burning of any waste at project site		• Issuing safety instruction not to conduct open burning of any waste at project site			
	1.3 Diesel generators and combustion of fuel for vehicles	1.3.1 Gaseous emission and air quality degradation	1.3.1.1 Ensure that all construction equipment and vehicles are maintained in accordance with the manufactur's recommendation		• Following manufacturer's instruction of using equipment and vehicles			
2. Noise and vibration	2.1 Noise nuisance due to mobilization and construction machines	2.1.1 A substantial permanent increase in ambient noise levels in the project vicinity	2.1.1.1 Use quiet equipment (i.e. equipment designed with noise control elements)	Low	• Using Noise control equipments	Construction team and/or HSE team	Throughout t construction phase	Monitoring Report
			2.1.1.2 Construction machinery and vehicles will undergo periodic maintenance to		• Construction machinery and vehicles will undergo periodic			

Environmental Factors/Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
			keep them in good working condition.		maintenance to keep them in good working condition.			
			2.1.1.3 Turn equipment off when not in use.		• Turn equipment off when not in use.			
3. Water Quality	3.1 Removal of vegetation, top soil level and ground surface	3.1.1 Release of suspended soil to the water flows	3.1.1.1 Soil erosion and sediment control mechanisms will add positive effects on mitigation matters for water pollution.	Low	• Soil erosion and sediment controlling	Construction team and/or HSE team	Throughout construction phase	Monitoring Report
	3.2 Constructing landforms that change water flow paths	3.2.1 Improper wastewater disposal from cleaning vehicles and equipment	3.2.1.1 Cover open stockpiles of construction materials or construction wastes on-site with tarpaulin or similar fabric during rainstorms.		• Covering open stockpiles of construction materials or construction wastes on-site with tarpaulin during	Construction team and/or HSE team	Throughout the construction phase	Monitoring Report

Environmental Factors/Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
					rainstorms			
		3.2.2 Poor sanitation facilities that may result into surface water pollution through improper sewage management	3.2.2.1 Provide measures to prevent the washing away of construction materials, soil, silt or debris into any drainage system of open stockpiles of construction materials.		Providing measures and working instruction to prevent the washing away of construction materials, soil, silt or debris into any drainage system			
4.Waste disposal	4.1 Solid waste generated from construction activities	4.1.1 Contaminate to the environment (surface and ground water), and may be vector for disease	4.1.1.1 Managed construction materials in a way to avoid over-ordering, poor storage and maintenance, mishandling as well as improper operation	Low	• Managed construction materials in a way to avoid over-ordering, poor storage and maintenance and improper operation	Construction team and/or HSE team	Throughout construction phase	Monitoring Report
			4.1.1.2 Separate construction wastes into reusable items and materials to be disposed of or recycled		• Separate construction wastes into reusable items and materials to be disposed			

Environmental Factors/Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
			whenever possible.		of or recycled whenever possible.			
5.Occupational Health and safety	5.1 Considerable hazards like manual handling, inhalable dust, noise, working confined spaces as slip, trip and falls	5.1.1 Adverse effect on employee's health	5.1.1.1 Providing personal protective equipment suitable for the workplace	Low	• Providing personal protective equipment suitable for the workplace	Construction team and/or HSE team	Throughout construction pl	Incident Record
			5.1.1.2 Be sure that vehicles and machines are in good working order		• Make the incharge inspect vehicles and machines are in good working order			
			5.1.1.3 Regular inspection and maintenance of pollution control		• Regular inspection and maintenance of pollution control			
6.Socio-economic	6.1 Project operation activities	6.1.1 Job opportunities for local people		Positive	• Community meetings	Construction team and/or HSE team	Throughout the construction phase	Meeting notes

Environmental Factors/Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
		6.1.2 Increasing government revenue						

Table 8.3: Environmental and Social Management Plan of the Project (Operation Phase)

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
a) Physical Environment								
1. Air Quality	1.1 Cleaning of green coffee beans.	1.1.1 Deterioration of air quality due to dust.	1.1.1.1 Install pollution control devices such as cyclone dust separator and fabric filter.	Low	• Installation of separator which contain dust collection system to remove the amount of airborne dust and impurities dispersion from the raw material.	Project Management Team, Workers and/or HSE Team	Throughout the operation Phase	Monitoring Report
	1.2 Roasting to cleaned green coffee beans.	1.2.1 Deterioration of air quality due to dust.	1.2.1.1 Install pollution control devices such fabric filter.	Low	• Installation of filter bag and PCL control system to remove dust and impurities.	Project Management Team, Workers and/or HSE Team	Throughout the operation Phase	Monitoring Report

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
	1.3 Grinding the roasted coffee bean.	1.3.1 Deterioration of air quality due to fine particles of coffee dust.	1.3.1.1 Installation of well-ventilated grinding system to the factory.	Low	• Installation of good ventilation in the area where coffee grinding takes place to reduce the concentration of coffee dust in the air. • Installation of exhaust fun in the roof of factory compound to reduce the concentration of coffee dust in the air. • To prevent the exposure to airborne particles, workers use **Personal Protective Equipment (PPE)** in the factory. • To choose well-ventilated areas for coffee grinding, the factory use enclosed grinders to minimize the concentration of airborne particles.	Project Management Team, Workers and/or HSE Team	Throughou t the operation Phase	Monitoring Report
	1.4 Mixing the ingredients with suitable ratio in mixer.	1.4.1 Release of volatile organic compounds (VOCs) and other gases to	1.4.1.1 Installation of properly designed and maintained ventilation	Low	•Installation of properly designed and maintained ventilation systems, emission controls.	Project Management Team, Workers and/or HSE Team.	Throughout the operation Phase.	Monitoring Report.

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
		the air.	systems, emission controls.					
	1.5 Packaging with manual and machines.	1.5.1 Release of dust, particles and aroma of coffee to the air.	1.5.1.1 Installation of good ventilation system and efficient exhaust system.	Low	•Installation of roof air ventilation design system in the factory by setting exhaust fun, dust suction/ dust collector, air-con.	Project Management Team, Workers and/or HSE Team.	Throughout the operation Phase.	Monitoring Report.
	1.5 Operation Activities	1.4.1 Overall Impacts	• 1.4.1.1 Implement a comprehensive maintenance program	Low	• Implementation of a comprehensive maintenance program to ensure all equipment, including dust collection systems, fans, and filters, are regularly inspected, cleaned, and properly maintained. • Promoting awareness of the health risks associated with poor air quality and the importance of maintaining good indoor air quality by HSE of Lluvia.	Project Management Team, Workers and/or HSE Team.	Throughout the operation Phase.	Monitoring Report.

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
					• Biannually monitoring of air quality. • Using local exhaust ventilation near dust sources to capture particles at the point of generation. (in the production, packaging, loading and unloading of the raw materials) • Regularly clean floors, surfaces, and equipment using vacuum cleaners or and encouraging employees to keep their workstations clean and free from dust buildup.			
	1.5 Generators	1.5.1 Greenhouse gas emission	1.5.1.1 Using of low- emission generator engines	Low	• Using of low- emission generator engines	Project Management Team, Workers and/or HSE Team.	Throughout the operation Phase.	Monitoring Report.
2. Noise and vibration	2.1 Some operation liked grinding, mixing and material handling equipment	2.1.1 Increase in noise level during operation process	2.1.1.1 To use low noise equipment and machines	Low	• Using low noise equipment and machines • Scheduling work shifts and breaks to minimize employee exposure to noisy areas. • Applying noise-reducing modifications to	Project Management Team, Workers and/or HSE Team	Throughout the operation Phase	Monitoring Report

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
					equipment, such as adding mufflers or silencers			
			2.1.1.2 Using vibration isolation mounts or pads to reduce equipment noise transmission	Low	• Conducting regular training sessions on noise hazards, the proper use of HPDs, and the importance of noise management.			
			2.1.1.3 Carry out regular maintenance of the equipment to minimize the noise level	Low	• Conducting regular maintenance of the equipment to minimize the noise level		Throughout the operation Phase	
			2.1.1.4 Using personal protective equipment eg, earmuff 2.1.1.5 To use soundproofing materials (Rock Wool Sandwich Panel)		• Providing hearing protection devices (HPDs) such as earplugs or earmuffs to employees and ensuring their proper use. • Establishment of a regular maintenance program to ensure equipment is in good working condition,		Throughout the operation Phase	

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
					• Identification of any new noise sources that may have emerged.			
	2.2 Generator and vehicles	2.2.1 Increase in noise level during operation process	2.2.2.1 Using enclosure for all generator sets		• Using enclosure for all generator sets		Throughout the operation Phase	
			2.2.2.2 Strictly enforce traffic control measures		• Strictly enforce traffic control measures			
3. Solid Waste	3.1 Solid waste from raw materials and factory operation, packaging	3.1.1 Contaminate to the environment (surface and ground water), and	3.1.1.1 Source segregation into wet waste and dry waste.	Low	• Source segregation into wet waste and dry waste • Identification the sources of waste, such as rejected products, dust, packaging materials, and other byproducts	Project Management Team, Workers and/or HSE Team	Throughout the operation phase	Monitoring Report

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
		may be vector for disease transmission.	3.1.1.2 Wastes (by products) such as plastics box, paper box, etc.		• Wastes (by products) such as domestic wastes will be used as animal food. • Little amount of stone, sand and mud, wasted from the production outlets are disposed at the YCDC. • Provide clearly labeled bins or containers for different waste streams, such as organic waste, recyclables (plastics, paper, metals), and non-recyclable waste.			
			3.1.1.3 Wastes from packaging (alluminium foils) are cutted and sent to DOWA organization.		• Following the disposable method and preventative measures labeled on the container. (such as Store in original cool dry place [Locked storage cabinet], not reusing emptied container, disposed emptied containers in designated tras/bin and offer for recycling if available)			

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
	3.2 Domestic waste from canteen	3.2.1 Contaminate to environment (surface, ground water may be vector disease	3.2.1.1 Food waste (organic waste) will be used as animal food.		• Food waste (organic waste) will be used as animal food.			
4. Water Quality	4.1 No industrial effluent from manufacturing process due to the operation is dry cleaning and processing.	4.1.1 Contamination to surface water	4.1.1.1 Careful inspected and sealed diesel/oil storage tank not to be leakage.	Low	Making Sure to tightly sealed diesel/oil storage tank not to be leakage			
			4.1.1.2 Arrange emergency response plan for accidental spillage of hazardous chemical		Arranging emergency response plan for accidental spillage of hazardous chemical (providing sweep with spray kit promptly)			

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
	4.2 Discharge from drainage facilities, secondary contaminant	4.2.1 Contamination to surface water	4.2.1.1 Using filtration method at the source before the distribution. 4.2.1.2 Properly storing raw materials to prevent dumping into water courses in the rainy season.		• Properly Stored Raw materials under the roof to prevent dumping into water courses in the rainy season.			
			4.2.1.3 Treat drainage system for sediment control.		• Salvage of the sediment from the drainage regularly around the factory.			
			4.2.1.4 Conducting regular training, monitoring, and inspection schemes together with keeping track of water uses minimizes waste and leaks from		Conducting regular training, monitoring, and inspection schemes together with keeping track of water uses minimizes waste and leaks from faulty connections and faucets			

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
			faulty connections and faucets.					
	4.3 Discharge of domestic wastewater from office use	4.4.1 Contaminate of surface water	4.4.1.1Domestic wastes form bathing/washing are passed through the sand filtration system. 4.4.1.2 Installation of Sink Filter, Oil & Grease Separators, Sand Filtration, Gravel Filtration & Chlorination.	Low	Domestic wastes form bathing/washing are passed through the sand filtration system.			
	4.4 Overall Impacts	4.5.1 Surface and ground water pollution	4.5.1.1Carefully check to prevent drainage flooding during rainy season.		Careful inspection to prevent drainage flooding during rainy season.			
5.Occupational Health and safety	5.1Considerable hazards like manual handling,	5.1.1Adverse effect on employee's health	5.1.1.1Providing personal protective equipment	Low	• Common PPE items for premier coffee factory are fully provided such as goggles, respirators or	Project Management Team, Workers and/or HSE Team	Throughout the operation Phase	Incident Record

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
	inhalable dust, noise,		(PPE) suitable for the workplace.		dust masks, gloves, hearing protection, and slip-resistant footwear.			
			5.1.1.2 Regularly checked healthof workers		• Regularly checked the health of the workers			
			5.1.1.3 Be sure that vehicles and machines are in good working order/ Careful aware of the car accidents in line with Vehicle Safety and Motor Vehicle Management Law		• Ensuring that all machinery and equipment are properly maintained, inspected, and operated in accordance with manufacturer guidelines and OHS standards. • Promoting awareness of the health risks associated with poor air quality and the importance of maintaining good indoor air quality by HSE • Utilize engineering controls such as local exhaust ventilation systems and dust collection systems.			

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
			5.1.1.4 Regular inspection and maintenance of pollution control systems. 5.1.1.5 One room in the office building is to be used as a rest room for sick persons and for dispensaries. 5.1.1.6 First-Aid Kid provided in all the building		• Regular inspection and maintenance of pollution Control • Regularly clean floors, surfaces, and equipment using vacuum cleaners or and encouraging employees to keep their workstations clean and free from dust buildup. • Regularly inspect and clean ventilation systems, filters, and dust collection equipment to maintain their effectiveness. • Conducting drills and exercises to familiarize employees with emergency procedures and evacuation routes. Systems • Providing adequate first aid supplies and ensure employees are trained in basic first aid and CPR			

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
6. Socio-economic	6.1 Project operation activities	6.1.1 Job opportunitie for local people 6.1.2 Increasing government revenue	_	Positive		Community meetings	Throughout the operation Phase	Meeting notes
7. Odor Emission	7.1 Cleaning coffee bean dust in the bathroom	7.1.1 Gas from roasting of cleaned coffee bean to the workers.	7.1.1.1 Providing proper ventilation	Low	• Setting up adequate ventilation in the bathroom where the cleaning takes place has. Good airflow will help dissipate the odor more quickly.	Project Management Team, Workers and/or HSE Team	Throughout the operation Phase	Monitoring Report
			7.1.1.2 Using Effective Cleaning Agents		• Utilizing deodorizing cleaning agents to tackle organic odors.			
			7.1.1.3 Providing Personal Protective Equipment.		• Providing workers with appropriate PPE, such as gloves, masks, and aprons. This can help minimize direct contact with the fermented flour and its odor.			
			7.1.1.4 Utilizing Odor Neutralizers		• Placing Odor Neutralizing products (Baking Soda) to eliminate strong odors.			

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
			7.1.1.5 Setting Up On-site Laundry facilities		• Setting up on-site laundry facilities for workers' uniforms. This allows for immediate cleaning of contaminated clothing, preventing odors from settling. • Regular cleaning and maintenance of the bathroom to prevent the odor from accumulating over time.			

Table 8.4 Environmental and Social Management Plan of the Project (Decommissioning Phase)

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Record
a) Physical environment								
1. Air Quality	1.1 Demolition activities	1.1.1 Deterioration of air quality due to particulate matter	1.1.1.1 Avoid demolitions works in extremely dry weathers	Low	• Avoiding demolitions works in extremely dry weathers	Construction team and/or HSE team	Throughout project duration	Monitoring report
			1.1.1.2 Demolished materials on site to be covered to prevent to be blown off by wind		• Demolishing materials on site to be covered to prevent to be blown off by wind			
			1.1.1.3 Minimizing dust from material handling sources by using covers		• Minimizing dust from material handling sources by using covers			
	1.2 Heavy machinery/ vehicles such as bulldozers and loaders	1.2.1 Deterioration of air quality due to greenhouse gas emission	1.2.1.1 Use low emission equipment and vehicles.		• Using low emission equipment and vehicles.		Throughout project duration	
			1.2.1.2 Optimize vehicle movements to eliminate unnecessary vehicle movements.		• Optimizing vehicle movements to eliminate unnecessary vehicle movements.			

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Record
			1.2.1.3 Ensure strict enforcement of on-site speed limit regulations		• Strictly enforced of on-site speed limit regulations.			
2. Noise and Vibration	2.1 activities	2.1.1 Pollution to local ambient noise and vibration level	2.1.1.1Switching off engines of vehicles or machinery not being used	Low	• Switching off engines of vehicles or machinery not being used	Construction team and/or HSE team	Through out project duration	Monitoring report
			2.1.1.2 Schedule noisy decommission activities and transportation		• Scheduling noisy decommission activities and transportation during day-time hours			
			2.1.1.3 Used good condition and insulated demolition machineries and equipment					
			2.1.1.4 Providing PPE		• Providing PPE, particularly hearing protection devices for those working in noisy areas			
3. Water Quality	3.1Demolition activities	3.1.1Accumulating the demolition materials which	3.1.1.1Efficiently using water at the site for carrying	Low	• Efficiently using water at the site for carrying out decommissioning	Construction team and/or HSE team	Throughout project duration	Monitoring report

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Record
		cause deterioration of water quality (such as clay, plaster, limestone, concrete, mercury in the nearby water course)	out decommissioning activities		activities in order to avoid irresponsible water use.			
			3.1.1.2 Develop Soil erosion and sediment control mechanisms					
			3.1.1.3 Properly management for solid wastes		• Properly management for solid wastes			
4. Waste Disposal	4.1Resulting demolition materials such as concrete, drywall, wood, glass, paints, pipe and metals and garbage, etc.	4.1.1Contaminate to the surrounding environment.	4.1.1.1 Strictly avoid dumping the wastes into the drain	Low	• Employing MRF and strictly prohibit dumping the wastes into the drain	Construction team and/or HSE team	Through out project duration	Monitoring report
			4.1.1.2 Providing separate bins for food waste, metal and other waste at the temporary camp and other facilities on site		• Providing separate bins for food waste, metal and other waste at the temporary camp and other facilities on site			
			4.1.1.3Removing fuel storage facilities immediately upon completion of decommissioning phase.		• Removing fuel storage facilities immediately upon completion of decommissioning phase.			
			4.1.1.4 Recycling or disposing at the		• Recycling or disposing at the final disposal			

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Record
			landfill		site.			
			4.1.1.5 Dispose the hazardous wastes with proper disposal method and caution		• Dispose the hazardous wastes with proper disposal method and caution with MSDS			
b) Social Environment								
5. Occupational Health and safety	5.1 Demolition activities	5.1.1Injuries by potential fall of materials or tools And	5.1.1.1 Offer relevant job trainings for the workers	Low	• Offering relevant job trainings for the workers	Construction team and/or HSE team	Through out project duration	Incident Record
		5.1.2 Accidents and injuries to workers by heavy vehicle movement for transport of materials and equipment	5.1.1.2 Providing personal protective equipment suitable for the workplace		• Providing personal protective equipment suitable for the workplace			
			5.1.1.3 Providing first aid box and medicines		• Providing first aid box and medicines			
6. Socio-economic	6.1Project demolition activities	6.1.1 Job opportunities for local people		Positive		Community meetings	Throughout project duration	Meeting note

8.3 Environmental management and monitoring plan for air quality

The potential impacts on air quality and mitigation measures are described in section 6.2.

8.3.1 Air pollution protection measures and actions to be taken

The major industrial gas pollutant of Lluvia factory is sulfur dioxide (SO_2) which exceeds the limit of NEQG standards. Emission source of sulfur dioxide (SO_2) mostly comes from the production activities and the generator operation of this Lluvia factory. Furthermore, the emission of SO_2 can be from motor vehicle emission of the vehicles which are running in and out of the Lluvia factory as well.

In terms of the air pollution control of gases and particulates, generally, the gases emission is difficult to control. However, particulate emission can be controlled with suitable control systems. In this factory, the major sources/units of pollutant emission are generator, storage area, aluminum film burning area, production area and roasting area.

The sources of major particulate matters from the production process are as follows:

- Production area,
- Aluminum film burning area,
- Coffee green bean sizing area and
- Generator

8.3.1.1Production area

Firstly, PM_{10} concentration (99µg/m^3) of production area was found to be above the NEQG guideline which is operated by many factory workers. The production process is being operated with both automatic machinery and manually. The major pollutants are emitted from production area of packaging process.

The automatic packaging machines (high volume) contain dust collectors. However, there is no dust collection system in the manual packaging machines. Therefore, it is needed to o control dust emissions. The manual packaging machines are located at the separated small rooms. The production room layout plan is presented as follows:

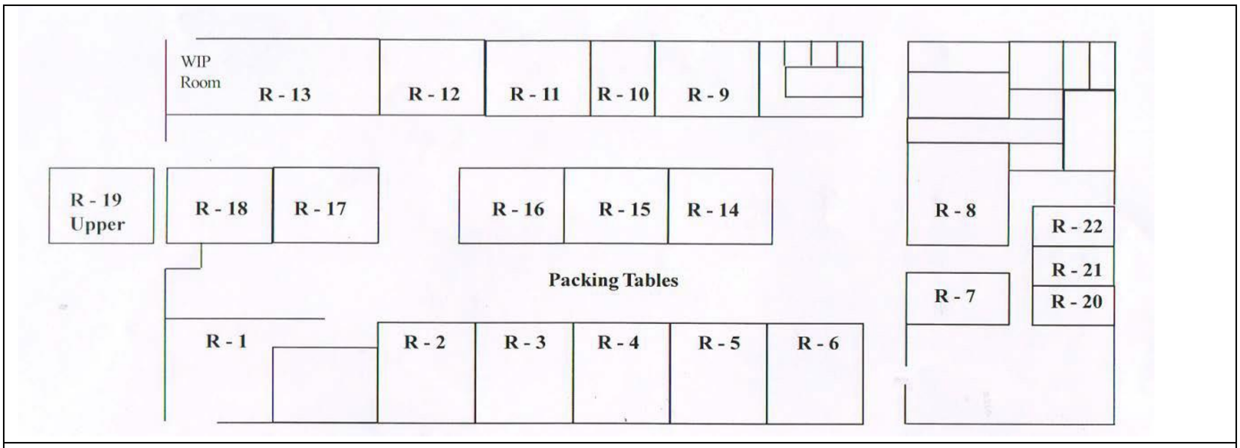


Figure 8.2: Production room layout plan

There are 22 total numbers of manual packaging rooms in the factory. To control the dust emissions from the manual packaging area, central dust collector should be installed.

Designing a central dust-collection system for industry is simple and easy to set up. Complex calculations involving cubic feet per minute, air velocity and static pressure are important parameters for large industrial systems with long run to big machines which are all running at the same time.

The central dust-collection system can be different based on filtration area, blower performance, blower power, air to cloths ratio, number of bags and bag length. The example layout plan of central dust-collection system is shown in the following figure.

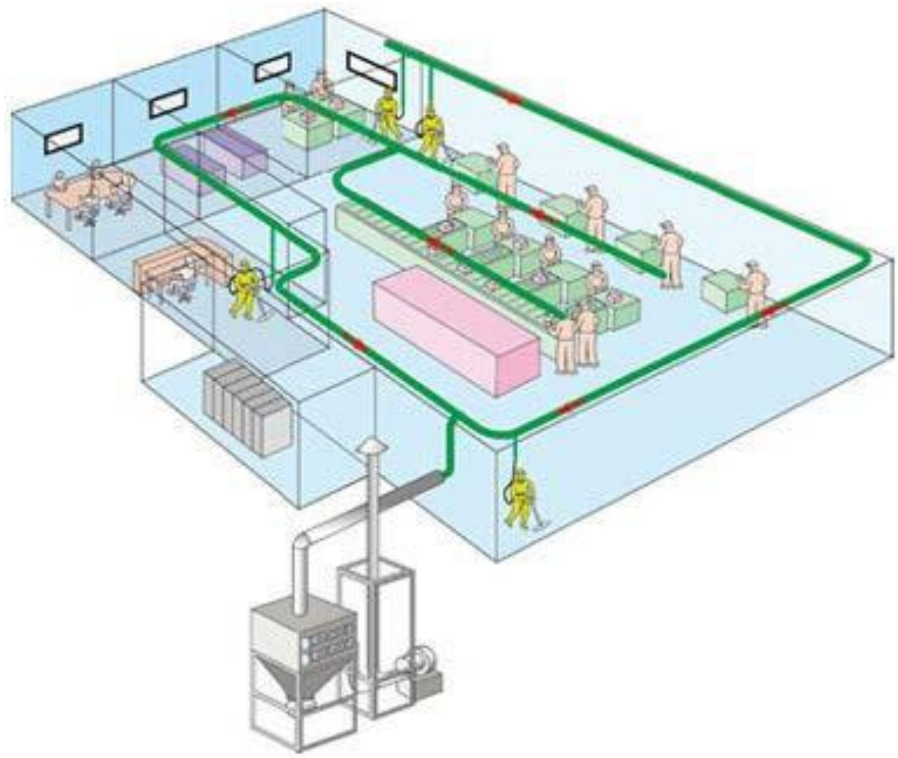


Figure 8.3: Example layout plan for central dust collection system

There is a wide range of dust collection processes and equipments to choose. Depending on the volume and composition of potential dust, cyclones and fabric filters can be used as the pollutant controllers.

According to the monitoring result of proposed factory, dust control process for the proposed Lluvia factory should use the fabric filter. The reasons are detailed as follows:

The following typical collection efficiency curves figure 8.1 shows the various types of particulate collectors for the type of appropriate PM controller.

Based on the results of typical collection efficiency curves, fabric filter should be chosen to control emission of particulate matters and other dust pollutants emitted from the factory.

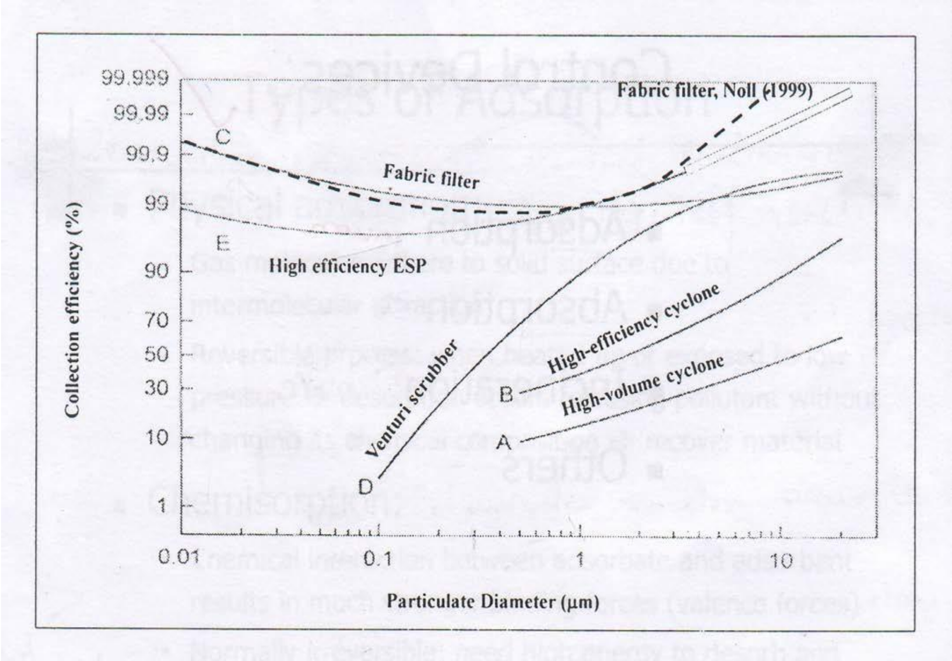


Figure 8.4: Typical collection efficiency curves for various types of particulate collectors

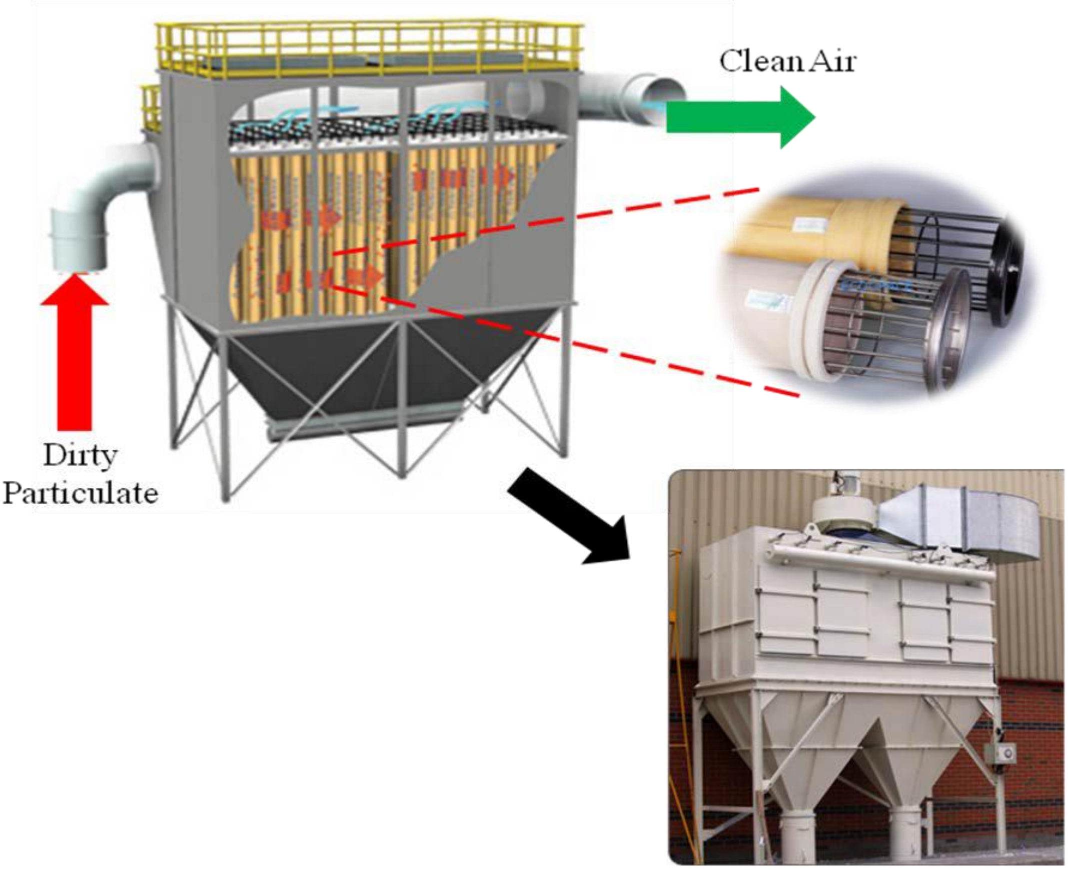


Figure 8.5: Installation of fabric filter baghouse

8.3.1.2 Coffee green bean sizing area

PM_{10} concentration (70µg/m^3) of coffee bean sizing area was found to be above the NEQG guideline. ($PM_{2.5}$ concentration (47µg/m^3) of coffee green bean sizing area was found to be above the NEQG guideline.To mitigate the emission of particulate matters of coffee green bean sizing area, appropriate capacity of filter baghouse should be installed at the coffee green bean sizing area.

8.3.1.3 Aluminum film burning area

Another pollutants emission area is the packaging aluminum film burning area. The major purpose of aluminum film burning is to purposely destroy the aluminum film packaging materials which are not suitable for use. However, this is not an appropriate way to destroy even though if current burning situation is upgraded. Furthermore, ***particulate bounded air toxicants (Dioxin, PAH etc)*** can be emitted along with the air emission during the burning operations.

Thus, to mitigate the emission from this area, appropriate small scale incinerator should be installed.

Description of small scale incinerator

- Burning capacity – 30-50 kg/hour
- Chimney external diameter – 280mm
- Draught fan – 0.37w
- Combustion improver device – 0.11kw, oil consumption: 4-10 kg/h
- Re-burning device - 0.11kw, oil consumption: 4-10 kg/h
- Voltage – 380v/220v
- Weight – 4000 kg

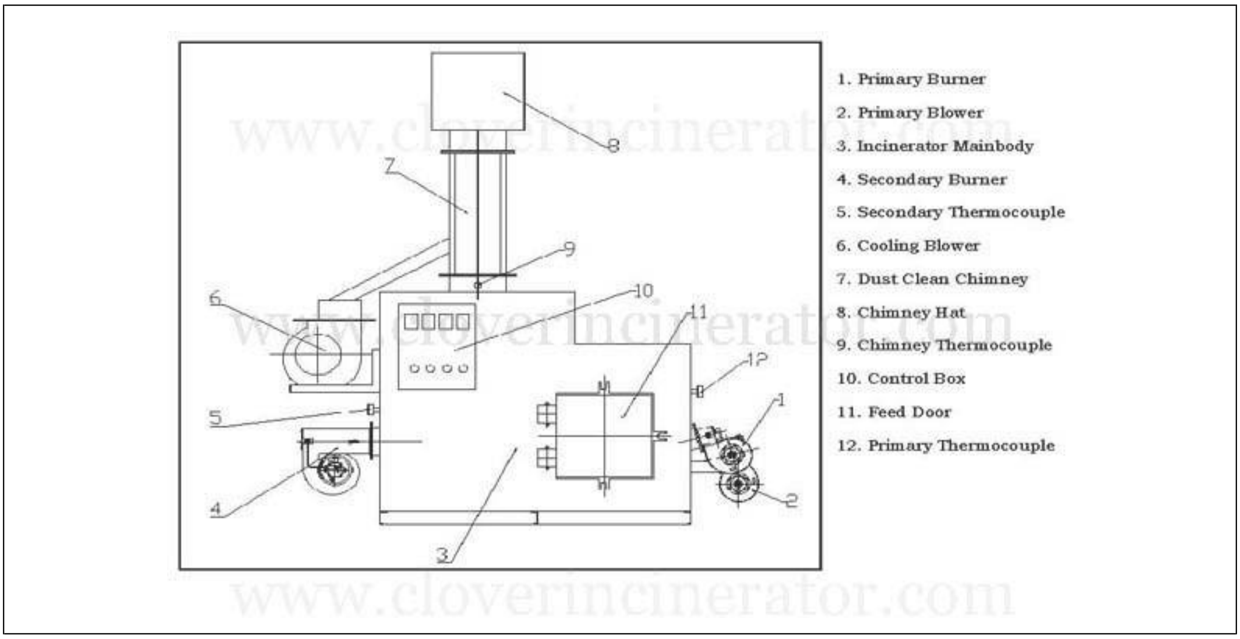


Figure 8.6: Example of small scale incinerator

8.3.1.4The generator operation

The emission of generator also exceeds NEQG guidelines. However, the amount of generator usage is very small hours per month. Therefore, the emission of generator becomes few percent when compared with other sectors. To mitigate the emission from generator, clean fuel should be used as a raw material for generator. The generator stake height should be increased accordingly. The workers who are running the generator and the employers who are working around there should use appropriate masks during operation.

8.3.2 Air quality monitoring program

The highest pollutant emission level of the proposed factory was assessed at the production area, coffee green bean sizing area, aluminum film burning area and generator. To mitigate the air pollutants emission level from those areas, appropriate treatment system should be installed at each suitable activity.

(a) Air monitoring program

Source maintenance and operation monitoring are important parameters which can significantly reduce the pollutant emissions. Moreover, the type and the quality of the raw materials used are intimately related to the types and the quantities of pollutants emitted. Therefore, air monitoring should be conducted all the production processes area for 24 hours so as to reveal the existing air quality status which can represent the workers' exposure.

Annually air monitoring should be conducted regularly. Furthermore, when either the process system or the machineries are changed or the raw materials are changed, air monitoring should be conducted in order to reveal the impact of the changes on the surrounding environment.

Responsibility

Company shall assign and train a team of company staff to implement the following action plans.

(OR)

Company shall award the environment consultants to implement the following action plans.

Table 8.5: Air quality indicators mainly monitored in the Lluvia factory

Pollutant	Averaging Period	NEQG guideline (μgm^{-3})	Monitoring Frequency
NO_2 (ppb)	1 year	40	- Annual (24 hour) - Preferable period (dry weather)
	1 hour	200	
SO_2(ppb)	1 year	50	
	24 hours	20	
CO (ppm)	8 hour	10,000	
	1 hour	30,000	
$PM_{2.5}$($\mu g/m^3$)	1 year	10	
	24 hour	25	
PM_{10}	24 hour	50	
TSPM	24 hour	100	
CO (ppm)	8hr	9 ppm (8hr)	
Ozone	8hr	100 $ug.m^3$ (8hr)	
	8hr	0.075ppm (8hr)	

Figure 8.7: Air monitoring station at the factory

(b) Good working practice

All workers must wear suitable masks properly at their working activities.

All workers and staff particularly the immediate workers working around the exposed area should wear the suitable respirator masks to prevent both particulates and gases.

Figure 8.8: Masks

(c) Good working environment

In order to improve the industrial hygiene of workers and staffs, appropriate ventilation systems should be installed at the production process area and the office rooms accordingly.

Figure 8.9: Roof exhaust fan and axial fan for ventilation systems

8.3.3 Responsibilities

Day to day supervision will be done by relevant supervisors of the production lines and warehouses and over all supervision will be done by LLUVIA Co., Ltd's Management and HSE Department.

Roles and responsibilities are as follows:

- Factory Manager review and take action for any issues in relation to the report from supervisor, manager through HSE in-charge.
- The LLUVIA Co., Ltd's HSE Committee will be in charge of monitoring the compliance of these air quality management, sub-management and monitoring plan in accordance with NEQG guideline and submit monitoring report to ECD biannually. Any non-compliance and its recommended corrective action will be recorded by the HSE Committee in their meeting's minutes.
- The HSE Supervisor will be tasked with biannually reporting on air quality monitoring results to the HSE Manager or on an ad-hoc basis in case of major or repetitive minor issues. The HSE Manager will ensure these are reported to and discussed within the HSE Department within the regular HSE Committee meetings.
- LLUVIA Co., Ltd's Management and HSE officer has to report, as soon as possible, the failures of his or her responsibility. If dangerous impact caused by this failure or failure should be known by the Ministry, the project proponent has to submit within 24 hours and other than this situation has to submit within 7 days from knowing it.
- On an annual basis, The Premier factory will keep relevant authorities (MONREC/ECD) informed of the LLUVIA Co., Ltd's Project HSE performance with respect to air quality management. In addition, Premier is considering preparing an annual Sustainability/HSE report at Group-level (using Global Reporting Initiative/G-4 Guidelines).

8.3.4 Budget allocation for air quality management plan

The LLUVIA Co., Ltd will use 2% of the total investment for EMP cost. The total investment of factory is 6,409,200,000 MMK (MMK 3.052 USD million). Then the estimated cost for the management plan is 128,184,000 MMK. Among the total management plan, the budget allocation for the mitigation measures and monitoring plan will include for air pollution management, noise pollution management, waste (solid and hazardous waste), potable & wastewater, Occupational Health & Safety and Community Health & Safety. Thus, the budget is allocated for Air/Odor management plan would be around 21,364,000 MMK while 8,545,600 MMK for monitoring plan and 12,818,400 MMK for mitigation measures.

Environmental Factors	Activities	Responsibility	Estimated Budget
Operation phase			
Air Quality + Odor	Air/ Quality +Odor Management (Air monitoring plan + Mitigation measure)	HSE Team	21,364,000 MMK
	Air/Odor Monitoring plan		8,545,600 MMK
	Air/Odor Mitigation measure		12,818,400 MMK

8.4 Environmental management and monitoring plan for noise quality

The potential impacts on noise quality and mitigation measures are described in section 6.4.

8.4.1 Noise pollution protection measures and actions to be taken

(a) Governing parameter

Governing parameter of noise is mostly common at open space area, production process area (both equipment and processes), storage area, green bean sizing area, coffee roasting area, aluminum film burning area and generators based on the results measured with noise meter.

Thus, the following measures will be needed:

- Appropriate sitting of production related equipment, compound, and machineries to minimize noise impacts, and
- Noise monitoring to monitor whether comply with the noise limits.

The main sources of noise emission are

- At ***the storage place*** where the raw materials from the receiving container are being conveyed by fork clip trucks. The noise level of storage place is under the standard of Environmental Quality Guideline (EQG).
- ***Production process area and green bean sizing area*** where the numerous staffs are working. Noise sources of these areas are lower than the level of guideline for both day and night time.

- ***Coffee roasting area and aluminum film burning area*** where operations are taking place for few hours per day. Therefore, the noise emissions from these areas are not considered as the high emission area and the values of existing noise emission levels are under the level of standard guideline.

Regardless of the other noise source coming from three generators having 500 KVA, these noise levels were lower than the Environmental Quality Guideline (EQG) stated by Environmental Conservation Department (ECD).

The noise levels of whole factory were under the level of EQG guideline for both day time and night time.

(b) Noise monitoring plan

To estimate the noise exposure in the proposed factory by using a sound level meter with several measurements at different locations within the workplace.

Therefore,

- open space area,
- production process area,
- storage area,
- green bean sizing area,
- coffee roasting area,
- aluminum film burning area and
- generators of proposed factory

Above areas shall be measured by using noise meter per annum. The monitoring program should be as follows:

- Noise level at the site boundary collected in decibels during the hours of 07:00 to 22:00 (day time) and 22:00 to 07:00 (night time).
- Noise level measured at identified sensitive areas of the whole factory areas.
- Noise monitoring should be conducted all operational phases (e.g., normal operation, start-up, shutdown, abnormal operation, commissioning).
- When the new instruments and machineries are introduced into the factory whether to detect the existing situation is change or not

After appropriate sound level meter readings are obtained, keep in an excel file of the sound levels within different areas of the workplace. This measurement method is generally referred to as "area" noise monitoring.

Responsibility

Company shall assign and train a team of company staff to implement the following action plans.

(OR)

Company shall award the environment consultant to implement the following action plans.

This following table presents the monitoring plan of noise pollution.

Table 8.6: The monitored plan of noise pollution

Monitoring places	One Hour LAeq (dBA)		Monitoring Frequency
	Daytime 07:00 – 22:00	Nighttime 22:00 – 07:00	
Open space area,	$48.89^{a}\pm0.54^{b}$ $48.7^{c}(35.3^{d}-67.1^{e})$	$50.13^{a}\pm0.73^{b}$ $50.05^{c}(35.3^{d}-67.1^{e})$	Once per year annual
Production process area	$40.25^{a}\pm0.37^{b}$ $40.3^{c}(29.7^{d}-58.1^{e})$	$44.04^{a}\pm0.52^{b}$ $45.8^{c}(30.3^{d}-53.4^{e})$	
Storage area	$41.25^{a}\pm0.44^{b}$ $40.7^{c}(26.7^{d}-67.9^{e})$	$41.35^{a}\pm0.44^{b}$ $42.7^{c}(27.7^{d}-49.7^{e})$	
Green bean sizing area	$44.16^{a}\pm0.56^{b}$ $43.35^{c}(33.6^{d}-78.8^{e})$	$43.46^{a}\pm0.61^{b}$ $42.55^{c}(33.6^{d}-66.2^{e})$	
Coffee roasting area	$47.25^{a}\pm1.09^{b}$ $41.2^{c}(28.2^{d}-114.3^{e})$	$47.04^{a}\pm1.11^{b}$ $45.25^{c}(31.6^{d}-88.6^{e})$	
Aluminum film burning area	$40.35^{a}\pm0.50^{b}$ $38.1^{c}(27.7^{d}-61.6^{e})$	$38.37^{a}\pm0.34^{b}$ $38.3^{c}(31.1^{d}-44.1^{e})$	
Generators	$52.01^{a}\pm0.94^{b}$ $50.8^{c}(39.7^{d}-68.1^{e})$	$52.01^{a}\pm0.94^{b}$ $50.8^{c}(39.7^{d}-68.1^{e})$	
Industrial Day time	70 (dBA)		
Industrial Night time	70(dBA)		
Remark	When new equipment installation occur, noise monitoring should be conducted		

Figure 8.10: Noise data monitoring with noise meter

(b) Good working practice

Basically, the noise levels of the current working situation meet the EQG by ECD. Thus, all staffs on site does not need the heavy ear protection; however, they should be equipped with suitable hearing protection like at least ear plug while they are working for long time at the working places which are producing continuous noise.

(c) Capacity development and training

The staff of proposed factory should be trained and educated the importance of the ear protection. Moreover, responsible person should monitor one time per annual of total noise emissions from all the noise sources below the prescribed limits in the work area.

(d) Noise quality mitigation measure

The noise control procedures are outlined in order to protect noise produced during operation activities. These measures should be practiced at the working areas which are producing the continuous noise or higher noise level so that the long term exposure of the noise on the workers affected around those areas can be reduced and prevented.

This plan should include, but is not limited to, as discussed below.

- Identify procedures of both area for monitoring noise emissions and vibrations.
- Maintaining the spacing between noise sources and operators.
- Regulating the noise sources by a sound reducing structure that resents air- borne transmission.

- Damping of the vibrating metal structures or by replacement with material such as the wood.
- Reducing reflected noise by use of the absorbent materials on surfaces such as floors, roofs, and walls.

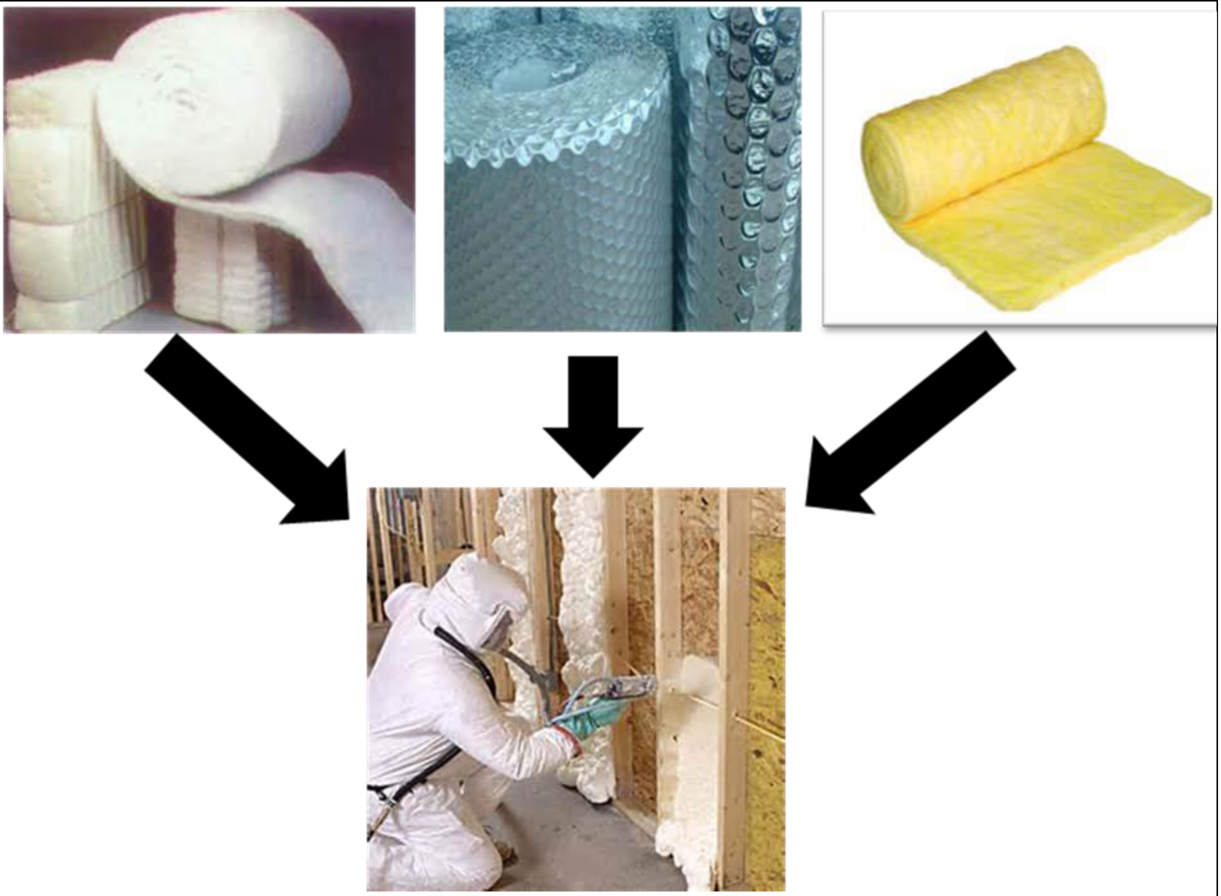


Figure 8.11: Insulation barriers of sound control

8.4.2 Responsibilities

Day to day supervision will be done by relevant supervisors of the production lines and warehouses and over all supervision will be done by LLUVIA Co., Ltd's Management and HSE Department. Roles and responsibilities are as follows:

- Factory Manager review and take action for any issues in relation to the report from supervisor, manager through HSE in-charge.
- The LLUVIA Co., Ltd's HSE Committee will be in charge of monitoring the compliance of these air quality management, sub-management and monitoring plan in accordance with NEQG guideline and submit monitoring report to ECD biannually. Any non-compliance and its recommended corrective action will be recorded by the HSE Committee in their meeting's minutes.
- The HSE Supervisor will be tasked with biannually reporting on noise quality monitoring results to the HSE Manager or on an ad-hoc basis in case of major or repetitive minor issues. The HSE Manager will ensure these are reported to and discussed within the HSE Department within the regular HSE Committee meetings.

- LLUVIA Co., Ltd's Management and HSE officer has to report, as soon as possible, the failures of his or her responsibility. If dangerous impact caused by this failure or failure should be known by the Ministry, the project proponent has to submit within 24 hours and other than this situation has to submit within 7 days from knowing it.
- On an annual basis, premier factory will keep relevant authorities (MONREC/ECD) informed of the LLUVIA Co., Ltd's Project HSE performance with respect to air quality management. In addition, Premier is considering preparing an annual Sustainability/HSE report at Group-level (using Global Reporting Initiative/G-4 Guidelines).

8.4.3 Budget allocation for noise quality management plan

The LLUVIA Co., Ltd will use 2% of the total investment for EMP cost. The total investment of factory is 6,409,200,000 MMK (MMK 3.052 USD million). Then the estimated cost for the management plan is 128,184,000 MMK. Among the total management plan, the budget allocation for the mitigation measures and monitoring plan will include for air pollution management, noise pollution management, waste (solid and hazardous waste), potable & wastewater, Occupational Health & Safety and Community Health & Safety. Thus, the budget is allocated for Noise quality management plan would be around 21,364,000 MMK while 8,545,600 MMK for monitoring plan and 12,818,400 MMK for mitigation measures.

Environmental Factors	Activities	Responsibility	Estimated Budget
Operation phase			
Noise Pollution	Noise Management Plan	HSE Team	21,364,000 MMK
	Noise Monitoring plan		8,545,600 MMK
	Noise Mitigation measure		12,818,400 MMK

8.5 Environmental management and monitoring plan for solid waste management

The main purpose of the environmental management plan is to reduce the adverse effects which are caused by the different activities in solid waste management on the environment. In the management plan, there are some of the preventative measures needed to be adapted for the period of waste collection and disposal... Those measures are 1) closed containers and bins should be used in order to prevent the exposure of waste and the spread diseases 19 through insects such as flies and mosquitoes. 2) The disposal site is also important. To prevent the breeding of disease vectors and the escape of gases of decomposition, minimize leaching, the suppression of foul odours, and provision of better aesthetics and the proper covering of the land site. 3) The emission of climate forcer gases such as Carbon dioxide, methane, and hydrogen sulphide are regularly monitored and checked. Moreover, open burning is strictly prohibited. 4) Provision the needed facilities to the worker is one of measures. If the workers do not have the appropriate clothes or others facilities, the rate of infection is increased. Before all these measures can come about, government, stakeholder and public environmental management groups have to collaborate at all levels (Ministry of Urban Development Government of India, 2012).

The potential impacts of waste and mitigation measures are described in section 6.5.

8.5.1 Environmental management plan for Lluvia, Premier beverage manufacturing factory

(a) Source segregation

According to the observation and analysis, the most suitable management system is wet and dry waste segregation which is source segregation. Source segregation is the most significant feature of any waste handling, management, and recovery strategies. Source separation comprises of separating waste components, and this can happen in many ways. One of the simplest source segregation practices is to segregate waste into dry waste and wet waste.

Wet wastes
Generally they include organic wastes which are wet, such as leftover food waste, food processing waste etc.

Dry wastes

On the other hand, these wastes include reusable packaging waste plastic bottle, glass bottle, metal can, dry paper, dry plastic etc.

Such waste segregation activity is also useful in making the consumers aware of the quantity and types of waste they produce.

Dry Waste at Yellow Bin **Wet Waste at Green Bin**

Figure 8.12: Action plan for sources segregation

(b) Packaging waste segregation

Packaging waste is one of the most common waste types in today's modern lifestyle. As the result of auditing result, all recyclable packaging wastes including glass, metal, paper and cardboard, and plastics are high % of the total waste composition and mixed with the others waste. Along with organic waste, packaging waste is other waste types of concern in the manufacturing compound. In the packaging waste, it is included plastic bottles, glass bottle, metal cans (Aluminum and Tins).

To segregate plastic bottles, glass bottles and metal cans, it is needed to provide cage bin to the community. In the issue to segregate these dry recyclables, which are then emptied once a week by cleaning staffs are sold to local junk dealer. This activity is promoting self-sustainability by supporting to the cleaning staffs to easily keeping the waste and less work load and less chance from transmitting disease.

Figure 8.13: Sample of cage bins for the packaging waste segregation

(c) Applying incinerator as a small scale (Trash Disposal)

In the issue of the burning waste, it is recommended that the burning process for the coffee packing plastic bags must be burned in the incinerator.

Incinerators for trash disposal are a great alternative to open burn pits. Designed to control emissions and reduce waste, these units are perfect for construction sites, mining camps, job sites, oil drilling operations; islands trash disposal, truck stops, military installations, and more.

Figure 8.14: Small Scale Incinerators

8.5.2 EMP on solid waste management

The Environmental Management Plan (EMP) for solid waste from coffee manufacturing project identifies the principles, approach, procedures and methods that will be used to control and minimize the environmental and social impacts of all construction and operational activities associated with the project. It is proposed to complement the project Supplementary Environmental and Social Impact Assessment (SESIA).

Besides, to meet the target accomplishment, it is needed to do ***waste audit, once a month*** for the ***physical characteristics***, however, for the ***chemical characteristics***, it is needed to analyze ***four times per year***. The EMP shall be set out with ***a controlled document*** with the ***standard operation procedure (SOP)*** and should be ***updated annually***, following a ***reportable incident or plan update.***

<u>Responsibility</u>

Company shall assign and train a team of company staff to implement the following action plans.

(OR)

Company shall award the environment consultant to implement the following action plans

Table 8.7: Management plan for solid waste

Sr	Generated Parameter	Waste Source	Management plans and actions to be taken	Unit	Applicable Parameter
1	Waste Generation rate	All sources of waste, such as Manufacturing System and Domestic Solid Waste	Once a week by using weighting machine	kg/person/day	ECD/WHO Guidelines of Waste generation rate in Developing country.
2	Waste Auditing		Physical Composition and if possible it is needed to do chemical composition once a month by using the standard Method of ASTM.	Physical Composition (%) Chemical Composition (mg/kg)	ECD/WHO Guidelines of Waste composition in Developing country.
3	Bulk Density		Once a month by using the standard Method of ASTM.	kg/m^3	ECD/WHO Guidelines of Bulk Density in Developing country.

a) Bins System is needed to improved
b) To become zero waste, waste segregation must be utilized.
c) Must use incinerator for burning of unnecessary plastic bag

8.5.3 Responsibilities

LLUVIA Co., Ltd has a duty of care to ensure that appropriate disposal of hazardous waste streams takes place. HSE staff will retain copies of all records of disposal at LLUVIA Co., Ltd's premises (manifests) for the purpose of internal and external audits. Any regulatory reporting to the relevant authorities must be delivered in the form and at intervals stipulated by the relevant authorities, as applicable.

Operation Department maintains inventory records of waste streams and associated quantities of waste generated, recycled, reused, disposed of at the locations under their responsibility. This is reviewed by the HSE Department. The inventory shall comprise of:

- Type of waste;
- Generation source;
- Quantity (kg);
- Disposal method; and
- Disposal destination and manifest.

The waste generation data is generated on a monthly basis. The HSE Director ensures these data and records are discussed within the HSE Committee meetings.

8.5.4 Budget allocation for solid waste management plan

The LLUVIA Co., Ltd will use 2% of the total investment for EMP cost. The total investment of factory is 6,409,200,000 MMK (MMK 3.052 USD million). Then the estimated cost for the management plan is 128,184,000 MMK. Among the total management plan, the budget allocation for the mitigation measures and monitoring plan will include for air pollution management, noise pollution management, waste (solid and hazardous waste), potable & wastewater, Occupational Health & Safety and Community Health & Safety. Thus, the budget is allocated for Solid waste management plan would be around 21,364,000 MMK while 8,545,600 MMK for monitoring plan and 12,818,400 MMK for mitigation measures.

Environmental Factors	Activities	Responsibility	Estimated Budget
Operation phase			
Solid Waste	Solid Waste Management Plan (Solid waste monitoring plan + Mitigation measure)	HSE Team	21,364,000 MMK
	Solid Waste Monitoring plan		8,545,600 MMK
	Solid Waste Mitigation measure		12,818,400 MMK

8.6 Environmental management plans and actions to be taken for potable water system and waste water discharge

The potential impacts of waste and mitigation measures are described in section 6.6.

Figure 8.15 :The potable water sources, septic tank and the waste water drainage system of the factory

8.6.1 Reviewing on the sites of the factory well sources and the sewage system

Based on the WHO Guideline, to protect the drinking water quality, new septic tanks or human-waste lagoons shall be installed at least 50 feet from a well. Septic tank drain fields must be at least 100 feet from a well.

As a general guidance, personal drinking water wells should have a minimum horizontal distance of 50 to 100 feet from such potential sources of groundwater contamination.

The distances between the tube wells and the septic tanks as follows;

(1) The distance between Main Source 1 and Septic Tank is 812 feet.
(2) The distance between Tube well (2) and Septic Tank is 51 feet.
(3) The distance between Tab Water and Septic Tank is 566 feet.

According to the respective locations of the septic tank and water sources of the factory more or less meet the guideline.

8.6.2 Reviewing on the EMP on the factory

Environmental management plan is one of the main purposes for sustainable environment of the surrounding areas of the industries. There are three main important issues for the waste water management plan.

- ✓ **Improve efficiency and profitability** by promoting reuse, recycling and recovery of waste, rather than disposal.
- ✓ **Reduce fly-tipping** by keeping a full audit trail of waste removed from sites and complying with waste duty of care regulations
- ✓ **Increase environmental awareness of the workforce and management** – The beverage manufacturing factory's, if not only the workers but also the factory manufacturing process, the more care on the environmental management performance, the better condition surrounding environment and the better the quality of lives.
- ✓ **Give education along with training on the workers** about Site Waste Management Plan information and induction training as the part of environmental awareness campaign.

In this propose manufacturing factory (Premier), the five techniques of water management plans are recommended to improve both potable water quality and effluent water conditions.

Those are Filtration Method, Boiling Waste Treatment Method and Disinfection (Chlorination) for potable water and drinking water and Disposal by Dilution Method and Constructed Wet-Land Method are especially for waste water pretreatment technique before dispose to the river.

8.6.3 Action plans needed for the potable water

(i) Filtration at the source of potable water

If all the potable water has been passed through filter before using, it leads to reduce the amount of Total Suspended Solid (TSS), Total Dissolved Solid (TDS) and to neutralize PH as well in the water. Therefore, using filters not only at the main sources but also at all taps can reduce the amount TSS and neutralize PH.

The following figure shows the Filtration machine. . Generally, filtration is a combination between physical and chemical processes. Mechanical straining removes some particles by trapping them between the grains of the filter medium (such as sand). These filters form a filter skin containing microorganisms that trap and break down algae, bacteria, and other organic matter before the water reaches the filter medium itself

Figure 8.16: The Filtration system

(ii) Boiling Water before Using

Boiling is the most certain way of killing all microorganisms. These result come form according to the analysis and experiments resulting from Wilderness Medical Society.

Water temperature at 160° F (70° C) kills all pathogens within 30 minutes.
Water temperature above 185° F (85° C) kills all pathogens within a few minutes.

So at the boiling point (212° F or 100° C), all pathogens will be killed, even at high altitude.

(iii) Disinfection Method for Safe Potable Water

There are many different types of disinfection method to safe from the waterborne disease and water-wash disease. In this beverage factory (Premier) , it is recommended that Chlorination along with proper dose and timing is the best suitable method among the others.

Water chlorination is the process of adding chlorine (Cl_2) or hypochlorite to water. This method is used to kill certain bacteria and other microbes in tap water as chlorine can kill the microorganisms; however; it should be proper dose and timing are very essential not to cause harm on human beings. In particular, chlorination is used to prevent the spread of waterborne disease such as cholera, dysentery, typhoid etc.

8.6.4 Action plans needed for the waste water

(i) Chlorination

This is also a method of treatment which has been employed for many purposes in all stages in wastewater treatment, and even prior to preliminary treatment. It involves the application of chlorine to the wastewater for the following purposes:
- Disinfection or destruction of pathogenic organisms.

- Prevention of wastewater decomposition: (a) odor control, and (b) protection of plant structures.

- Aid in plant operation: (a) sedimentation, (b) trickling filters, (c) activated sludge bulking.

- Reduction or delay of biochemical oxygen demand (BOD).

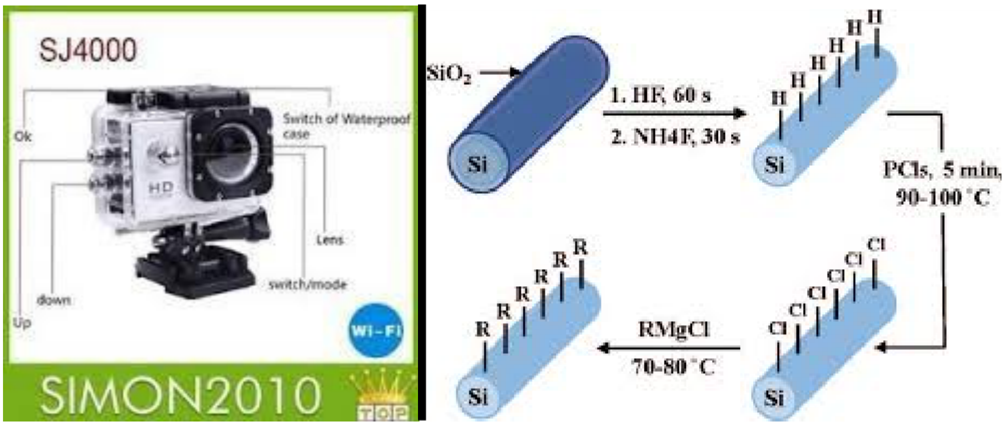


Figure 8.17: The method of Chlorination

(ii) Using Dilution Method to reuse the amount of pollution

According to the laboratory analysis, and waste water auditing, the amount of waste water discharge is not as high as to build waste water treatment plant. Thus, in this situation, it must be recommended that Disposal by dilution method is one of the preferable methods for this factory.

Disposal by Dilution method is one of the former methods that had been used in the past both developed and developing country. As the amount of waste water produced from this industry is not much higher, thus, there is no need to carry out other sophisticated methods. However, it is recommended that before waste water is discharged to the common public drainage, firstly it should be needed to add pure water into waste water. By doing this, the amount of waste pollution will be reduced.

This is the simple method of discharging wastewater into surface water such as a river, lake, ocean, estuaries or wetlands.

The degree of pollution depends on the volume and composition of the wastewater compared to the volume and quality of the water which is mixed with.

(ii) **Constructed Wetland**

Constructed wetland is one of the techniques to reduce pathogens and bacteria from the waste water. This is a very effective method for the environmental health and sanitation system. Constructed wetlands have only recently been developed for storm water and wastewater treatment. Wetlands, either constructed or natural, offer a cheaper and low-cost alternative technology for wastewater treatment. A constructed wetland system that is specifically engineered for water quality improvement as a primary purpose is termed as a ‘Constructed Wetland Treatment System’ (CWTS).

It is one of the environmental sound waste management systems. When it is compared with others treatment system, it is a cheaper alternative for wastewater treatment system by using local resources. Aesthetically, it is a more landscaped looking wetland site compared to the conventional wastewater treatment plants. This system promotes sustainable use of local resources, which is a more environment friendly biological wastewater treatment system.

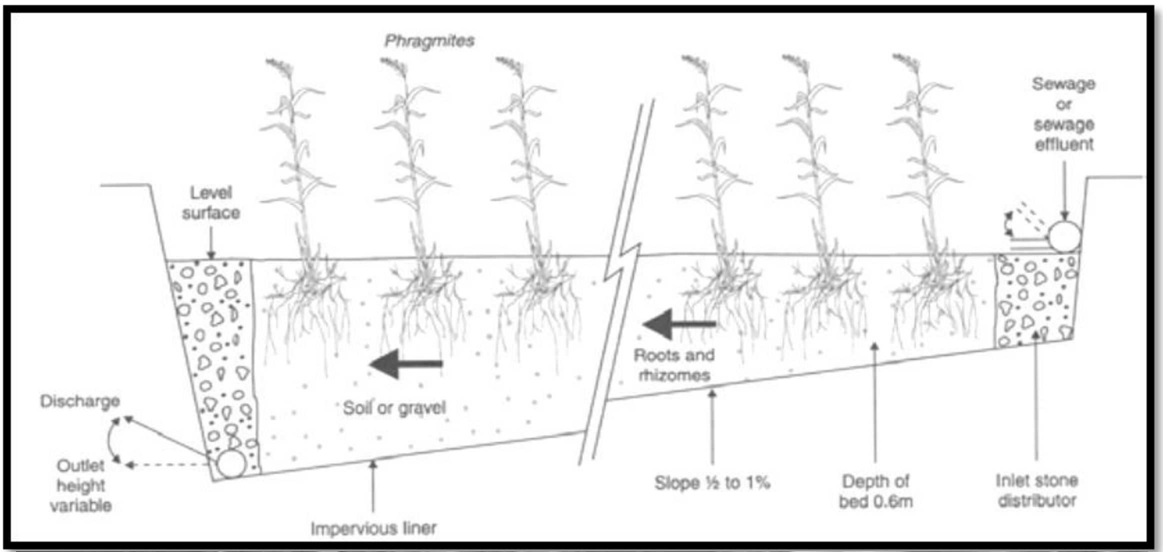


Figure 8.18: Schematic of a constructed wetland system.

Wastewater flows through the soil. Plants growing on the soil assimilate the nutrients of the wastewater and soil bacteria mineralize nutrients.

Disadvantages _ High space requirements
- ✓ _ Costly (gravel)
- ✓ _ Great care required during construction (pervious liner, etc.)
- ✓ _ Intensive maintenance during the first 2 years

Advantages _ High treatment efficiency, up to 95 % COD removal
- ✓ _ No wastewater aboveground
- ✓ _ No nuisance of odour
- ✓ _ Good nutrient removal

(iii) Existing Wastewater Treatment used in The Premier Factory

Due to the factory is expected to discharge only greywater, physical treatment is used for water treatment. In this regard, Sand and Gravel filtration process is used to improve the efficiency of removing impurities and particles from water. All grey water and storm water are filtered through the two-sand layer and gravel layer alternatively located at the factory's drainage. The water first passes through sand filtration, then gravel filtration and finally sand filtration again. This treated water is disinfected with chlorine.

Process Description

Greywater from various sources (sinks, basin, bathroom, showers) within the factory is collected and directed to a treatment system (Sand-Gravel-Sand Filtration System) which is located at the factory's drainage outlet. Sand-Gravel-sand filtration is a common and effective method used in water treatment processes. This type of filtration involves passing water through a combination of gravel and sand to remove impurities and particles.

Physical Treatment

The layers of gravel and sand serve as a physical barrier, with each layer having specific functions in the filtration process.

Sand Filtration - Sand filters consist of a bed of specially graded sand through which the water is allowed to pass. The sand acts as a physical barrier to remove suspended solids and other impurities from the greywater.

Gravel Filtration - The gravel layer is usually the course of the two media. It acts as a support for the sand layer and helps to prevent clogging by providing space for larger particles to be trapped. The gravel layer allows water to flow more evenly through the filter bed.

The combined action of the gravel and sand layers in a gravel-sand filter provides effective mechanical filtration. This process is particularly useful for removing suspended solids, sediment, and other impurities from water.

Chlorination - In applications where microbial contamination is a significant concern, additional disinfection, chlorination are employed.

Recommendation for Grey Water Treatment System of the Premier Factory

1) The filter bed may become clogged with trapped particles overtime. To maintain the filter's effectiveness, periodic backwashing will be conducted.

Figure 8.19: Sand and Gravel Filtration of the Premier Factory

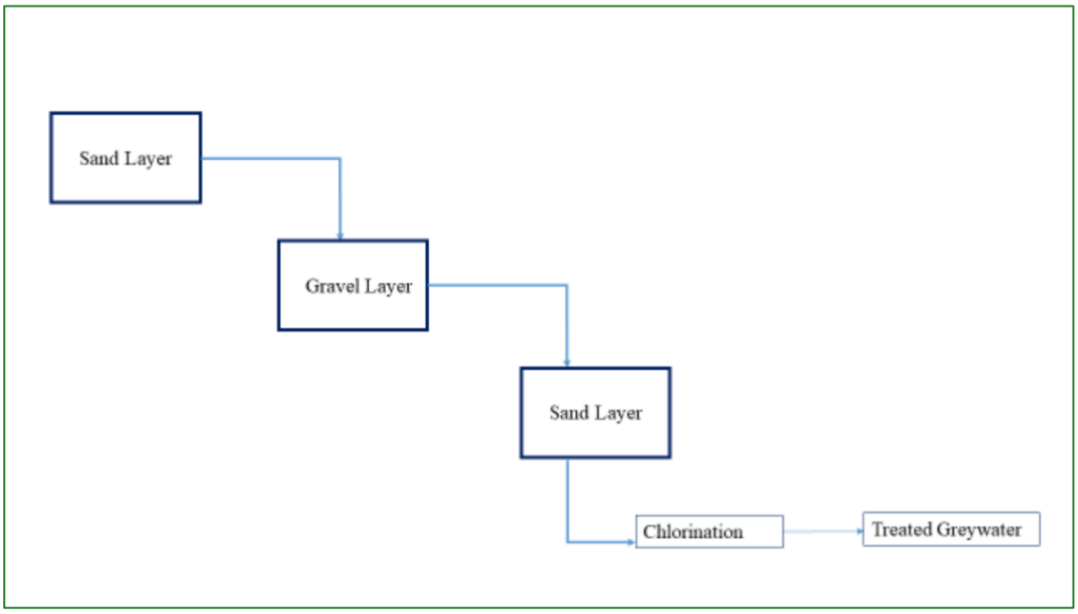


Figure 8.20 : Flow Diagram of Greywater treatment system

8.6.5 Responsibility

Company shall assign and train a team of company staff to implement the above mentioned action plans along with the monitoring plans.

(OR)

Company shall award the environment consultant to implement the above mentioned action plans along with the monitoring plans.

This following table presents the monitoring plan of potable water.

Table 8.8: The monitoring plan of potable water

No.	Test Parameter	Unit	National Drinking Water Standard (NDWS)	Sampling Sources	Legislation limit
1.	Total Coliforms	MPN/ 100 ml	0	**Water Sources, Water from Reverse Osmosis Treatment,**	**Three times per Year**
2.	Faecal Coliforms	MPN/ 100 ml			
3.	Taste	-			
4.	Odor	TON			
5.	Colour	Pt-Co	15 cu		
6.	Turbidity	FTU	<5		
7.	Arsenic	mg/l	0.01		
8.	Lead	ppb			

No.	Test Parameter	Unit	National Drinking Water Standard (NDWS)	Sampling Sources	Legislation limit
9.	Nitrate	ppb		**Tap,and Water tank from the whole factory**	
10.	Manganese	mg/l	0.1		
11.	Chloride	mg/l	250		
12.	Total Hardness	mg/l as CaCO3	N/A		
13.	Iron	mg/l	<0.3		
14.	pH	-	6.5~8.5		
15.	Sulfate	mg/l	250		
16.	Total Dissolved Solid (TDS)	mg/l	1000		

This following table presents the wastewater management plan for the beverage manufacturing factory (Premier).

Table 8.9: The management plan for wastewater discharge from Lluvia factory

No.	Test Parameter	Unit	NEQG guidelines	Sampling Sources	Legislation limit
1	pH	S.U.	6-9	**Effluent Drainage, and final drainage pipeline sent to Pan Hlaing River from the factory**	**Biannually**
2	Total Suspended Solid (TSS)	mg/ l	50		
3	Ammonia	mg/ l	NA		
4	Nitrate Nitrogen	mg/ l	NA		
5	Oil and Grease	mg/ l	10		
6	Phosphorus	mg/ l	2		
7	DO	ppm			
8	BOD	mg/l	50		
9	COD	mg/ l	250		

8.6.6 Responsibilities

The supervision on water quality monitoring process shall be done by the third parties or LLUVIA Co., Ltd's HSE laboratory staff.

Over all supervision will be done by LLUVIA Co., Ltd's management and HSE officer.

Roles and responsibilities are as follows:

- LLUVIA Co., Ltd's HSE officer oversees the collecting the water sample, tube well and pumping well, wastewater discharge point from lagoon 1 and provides coordination of well operations and planning, technical support and emergency support.
- The third party will supply operators, and all related sampling equipment to complete the sampling procedures.
- The third party will supply all sampling equipment, collect water sampling, test for required parameters to complete the water quality monitoring.

8.6.7 Budget allocation for Wastewater management plan

The LLUVIA Co., Ltd will use 2% of the total investment for EMP cost. The total investment of factory is 6,409,200,000 MMK (MMK 3.052 USD million). Then the estimated cost for the management plan is 128,184,000 MMK. Among the total management plan, the budget allocation for the mitigation measures and monitoring plan will include for air pollution management, noise pollution management, waste (solid and hazardous waste), potable & wastewater, Occupational Health & Safety and Community Health & Safety. Thus, the budget is allocated for waste water management plan would be around 21,364,000 MMK while 8,545,600 MMK for monitoring plan and 12,818,400 MMK for mitigation measures.

Environmental Factors	Activities	Responsibility	Estimated Budget
Operation phase			
Surface Water/Ground Water	Water/ Quality (Surface water and ground water) (Water quality monitoring plan + Mitigation measure)	HSE Team	21,364,000 MMK
	Water Quality monitoring plan		8,545,600 MMK
	Water Quality Mitigation measure		12,818,400 MMK

8.7 Occupational Health and Safety Management Plan

Developing an occupational health and safety (OHS) plan for LLUVIA Co., Ltd involves identifying potential hazards (including flour dust, noise, unplanned events/ incidents and injuries, shift works), assessing risks, and implementing measures and monitoring to protect the health and safety of workers. LLUVIA Co., Ltd has to assign HSE team to accomplish environmental controls, mitigation, measures and monitoring process and workplace health and safety throughout the entire project.

8.7.1 Objectives

Setting an occupational health and safety plan is undertaken with the following objectives:

1. To describe the occupational health and safety measures, taken, in a LLUVIA Co., Ltd's

2. To create sound health and safety measures that aims at reducing harm to workers and the environment.

8.7.2 Legal Requirements

The Project's Environmental and Social Policies, Legal Requirements and Institutional requirements have been detailed in Chapter 3.

8.7.3 Myanmar Laws and regulations

The LLUVIA Co., Ltd commit to compliance to all applicable legal & other requirements; sustainable development; prevention of pollution, injury and ill health apart from other aspects of HSE. These would include –

1) Occupational Safety and Health Law, 2019 (Section 12,14, 16, 17, 18, 26, 27, 34, 36)
2) Public Health Law (1972)
3) Factories Act, 1951 (Amendment 2016), Section 47 _sub section 1,2,3
3) Myanmar Fire Bridage Law (2017)
4) Labour Organization Law (2011)
5) Settlement of Labour Dispute Law (2012)
6) Employment and Skill Development Law (2013)
7) Social Security Law (2012)
8) The Prevention and Control of Communicable Disease Law, 1995
9) The Control of Smoking and Consumption of Tobacco Product Law, 2006
10) The Pesticide Law (2016)

8.7.4 Internaitonal Finance Cooperation (IFC) Guidelines

LLUVIA Co., Ltd commit to adopt Occupational Health and Safety Management as described in IFC Occupational Health and Safety Section 2.0 including.

- Identify job safety analysis to specific potential occupational hazards and industrial hygiene surveys, and as appropriate, to monitor and verify chemical exposure levels, and compare with applicable occupational exposure standards.
- Prepare hazard communication and training programs for employee to recognize and response to workplace chemical hazards
- Programs should include aspects of hazard identifications, safe operation and materials handling procedures, safe work practices, basic emergency procedures, and special hazards unique to their jobs.
- Instruct and train all employees to use control measures properly and tell about the health risk
- Replace the hazardous substance with a less hazardous substitute
- Implement of engineering and administrative control measure to avoid or minimize the release of hazardous substance to the working area to keep the level of exposure below recognized limits
- Plant shall be implementing the safety and health program designed to identify, evaluate, monitor and control safety and health hazards
- Ensure all rooms are well ventilated and Lighting
- Provide and wear of full PPE for handing of hazardous waste

8.7.5 Medical check up plan on Lluvia limited BEVERAGE (coffee, Tea and Milk powder) as Occupational Health Measures

Lluvia limited BEVERAGE (coffee, Tea and Milk powder) plans to use the occupational health measures in the budget of occupational health and safety for workers medical examination. At present, Premier factory employed a total of 650 as permanent and 400 as day workers.

LLUVIA Co., Ltd provides health care services for the workers in the workplace clinic during working hours and also provides medical examinations to the workers (pre-employment medical checkups and annaual medical examinations.) All workers in the factory are medically examined at the time of appointment and thereafter every six months by a registered medical practitioner.

The medical examinations on factory workers

Figure 8.21: Provision of Medical Check-up in the factory

Figure 8.22: Medical clinic in the factory

Figure 8.23: Personal Protective Equipment

PREMIER COFFEE

PREMIER COFFEE Lluvia Ltd.,

WORK HEALTH AND SAFETY POLICY

policy:

- The Company's primary objectives are to ensure the safety and health of our Employees, to provide safe and healthful working conditions for all Employees.
- Safety Rules have been developed by the work of Employees. While held to a minimum, the rules address behaviors and work practices that can lead to accidents and injuries.
- Each Employees should become familiar with and follow General and Departmental Safety Rules. Manager and Supervisors must enforce Safe Work practices through strict adherence to Safety Rules.
- Measuring and monitoring Health & Safety performance.

ရည်ရွယ်ချက်

- ကုမ္ပဏီ၏ အဓိကရည်ရွယ်ချက်သည် ဝန်ထမ်းများ ကျန်းမာရေးနှင့်ဘေးကင်းလုံခြုံရေး သေချာစေရန်၊ ဝန်ထမ်းများအားလုံးအတွက် လိုအပ်သော လုပ်ငန်းခွင်ဘေးကင်းလုံခြုံရေး၊ ကျန်းမာရေးနှင့်. ညီညွတ်သော အခြေ အနေများ ပံ့ပိုးပေးရန်။
- လုပ်ငန်းခွင်ဘေးကင်းလုံခြုံရေးစည်းမျဉ်းများအား ဝန်ထမ်းများ၏ လုပ်ဆောင်မှုဖြင့် ပိုမိုတိုးတက်ရန်၊ ထိခိုက်မှု မတော်တဆမှုများ ဖြစ်ပေါ်စေနိုင်သည့် အပြုအမူများအား လျော့နည်းစေရန်နှင့် ထိန်းသိမ်းဖြေရှင်းပေးရန်။
- ဝန်ထမ်းများအားလုံး ဌာနဆိုင်ရာ ဘေးကင်းလုံခြုံရေး စည်းကမ်းများကို ရင်းနှီးကျွမ်းဝင်ပြီး လိုက်နာရန်။ မန်နေဂျာများနှင့် ကြီးကြပ်ရေးမှူးများသည် ဘေးကင်းလုံခြုံရေး စည်းမျဉ်းများကို တင်းကျပ်စွာ လုပ်ဆောင်ခြင်းဖြင့် ဘေးကင်းသော အလေ့အထများကို လိုက်နာကျင့်သုံး ရပါမည်။
- ကျန်းမာရေးနှင့် ဘေးကင်းလုံခြုံရေး စွမ်းဆောင်ရည်ကို တိုင်းတာခြင်းနှင့် စောင့်ကြည့်စစ်ဆေးပေးခြင်း။

Daw Zin Mar Aung
Authorize Person (Factory Manager)

Figure 8.24: Work Health and Safety Policy

8.7.6 Responsibilities

Day to day supervision will be done by operation team and maintenance team and HSE team. Over all supervision will be done by Factory Manager. Roles and responsibilities are as follows:

• Factory Manager and HR manager review and take action for any issues in relation to the report from Operation manager, maintenance manager and HSE in charge.

• HSE Department including but not limited to the representatives of ERT, Medical Team, Area Wardens, First Aiders and LLUVIA Co., Ltd's security team have to report, as soon as possible, the failures of their, incidents and abnormality, occurred in their respective workplace according to their responsibilities and other implementation of EMP. If dangerous impact caused by this failure or failure should be known by the Ministry the project proponent has to submit within 24 hours and other than this situation has to submit within 7 days from knowing it.

• HSE team leader is providing relevant operation activities according to their relevant section on a daily basis and reported to Factory manager.

• HSE is conducting environmental quality monitoring through Third Party and submit the monitoring report biannually to ECD.

8.7.7 Budget allocation for Occupational Health and Safety Management Plan

The LLUVIA Co., Ltd will use 2% of the total investment for EMP cost. The total investment of factory is 6,409,200,000 MMK (MMK 3.052 USD million). Then the estimated cost for the management plan is 128,184,000 MMK. Among the total management plan, the budget allocation for the mitigation measures and monitoring plan will include for air pollution management, noise pollution management, waste (solid and hazardous waste), potable & wastewater, Occupational Health & Safety and Community Health & Safety. Thus, the budget is allocated for waste water management plan would be around 21,364,000 MMK while 8,545,600 MMK for monitoring plan and 12,818,400 MMK for mitigation measures.

Environmental Factors	Activities	Responsibility	Estimated Budget
Operation phase			
Occupational Health and Safety	Occupational Health and Safety Plan	HSE Team	21,364,000 MMK

Table 8.10: Occupational Health and Safety Management Plan (Operation Phase)

Activities	Activity/Aspects of the risks	Positive/Negative Impacts	Specific Action	Responsibility
1. Setting up HSE Policy to tailor to specific requirements of the factory	1.1 Occupational Health and Safety management	1.1.1 Safe and Healthy Work Environment	1.1.1.1 HSE Policy are detailed in 8.8.1.3 Health and Safety Policy	Factory Manager and HSE Team
2. Operation Activities	2.1 Dispersion of particles from mixing, packaging and storing rejected products.	2.1.1 Respiratory and Occupational Lung Diseases	2.1.1.1 Engineering Control - Installation of Separator, Pneumatic Air System (Air Lock and Pneumatic Fan and Jet Filter) and local exhaust ventilation. 2.1.1.2 Administrative Controls - Implementation of dust-reducing work practices, (vacuum cleaning), to minimize dust dispersion during cleaning activities. -Rotate workers with 3 shifts to reduce prolonged exposure to dust-generating activities. 2.1.1.3 • **Personal Protective Equipment (PPE):** - Provision to workers with N95 respirator mask	

Activities	Activity/Aspects of the risks	Positive/Negative Impacts	Specific Action	Responsibility
			- Provision of protective clothing to prevent skin contact with flour dust. 2.1.1.4 **Health Surveillance:** - Establishing a health surveillance program to monitor the health of workers exposed to dispersed particles annually. - Encouraging workers to report any respiratory or skin symptoms promptly. - Pre-employment and periodic medical checkup (per minimum health requirements for Project) to the workers including local workers. (* Sputum Culture, Blood Test, Swab Test annually) - Provide information for the training of workers in infectious diseases such as Covid 19 awareness so they can take knowledge back to communities.	

Activities	Activity/Aspects of the risks	Positive/Negative Impacts	Specific Action	Responsibility
			- Offer immunisation program (including Covid 19 vaccinations) for Premier factory's workers focused on higher risk profiles (the immediate workers in the packing sections) - Implementation an infectious disease outbreak management measures for workers to reduce the potential for outbreaks and if they occur contain them and reduce the risk of migration out to local communities.	
	2.2 Machinery Related Risks	2.2.1 Accidents and injuries	2.2.1.1 Implementing safety measures (machine guarding, interlocks, and emergency stop buttons) to prevent access to hazardous areas during operation. 2.2.1.2 Developing and enforcing lockout/tagout procedures to ensure machinery is properly shut down and isolated during maintenance or repair.	Maintainence Team and HSE incharge

Activities	Activity/Aspects of the risks	Positive/Negative Impacts	Specific Action	Responsibility
			2.2.1.3 Providing comprehensive training to operators on the safe operation of machinery, including specific procedures, safety controls, and emergency response protocols.	
			2.2.1.4 Regularly inspecting and maintaining machinery to ensure proper functioning and address any identified issues promptly.	
	2.3 Slips, Trips, and Falls (including slip and falls due to particles)	2.3.1 Accidents and Injuries	2.3.1.1 - Establishing good housekeeping practices to maintain clean, organized, and clutter-free work areas. - Installation of flooring with anti-slip properties in areas prone to particles exposure. - Provision of employees with non-slip footwear to enhance traction on floors contaminated with particles. - Displaying clear signage to indicate areas where particles may present slip hazards. - Placing Spill Kit Tools for Immediate clean up any	HR & HSE Team

Activities	Activity/Aspects of the risks	Positive/Negative Impacts	Specific Action	Responsibility
			particles to prevent the formation of slippery surfaces.	
			2.3.1.2 Regularly inspection and maintaining floors, walkways, and stairs to identify and repair any hazards such as spills, loose flooring, or damaged surfaces. 2.3.1.3 Implementing appropriate signage, non-slip mats, and handrails where necessary.	
	2.4 Noise	2.4.1 Noise Nuisance to Workers	2.4.1.1 Engineering Controls - Installation of soundproofing structures and barriers made of acoustic panels (Rock Wool Sandwich Panel) - Maintainence and lubrication machinery to reduce friction and minimize noise generated during operation. 2.4.1.2 Administrative Controls: - Implementation staggered work schedules to reduce the number of workers exposed to noise simultaneously,	Premier & HSE in charge

Activities	Activity/Aspects of the risks	Positive/Negative Impacts	Specific Action	Responsibility
			allowing for breaks in noisy operations. - Rotate workers with 3 shifts to minimize prolonged exposure to high-noise areas. 2.4.1.3 Personal Protective Equipment (PPE): - Provision of Earmuffs to immediate workers.	
	2.5 Shift Works	2.5.1 Physical and Psychological health impacts to workers	2.5.1.1 - Providing workers with more predictable and stable shift schedules. - Let employees involve in the scheduling process increase a sense of control and improve overall job satisfaction. - Having sufficient breaks and rest periods during their shifts. - Providing Periodic Medical Check Up.	HR Team

8.8 Environmental, Social, and Health Impacts and Monitoring Measures

Table 8.11: Monitoring plan for environmental, social and health impact

Factors	Index/ Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location	Responsible Person
Air Quality	• **PM-10** • **PM-2.5** • **NO2,** • **SO2** • **CO** • **Ozone**	**Method** - The air monitoring survey will use the HAZ-SCANNER EPAS Wireless Environmental Perimeter Air Monitoring Station. (EPAS). • Myanmar National Environmental Quality (Emission) Guidelines, Effective since 2015 in accordance with The Environmental Conservation Law, 2012	Duration: 24 hr continuously Frequency: Biannually • Once during operation and decommissioning phase • In case of any complaint regarding air quality, an additional air quality measurement may be conducted in response to specific complaints (if necessary)	1. Office Compound, 16` 50' 56.9" N, 096` 03' 48.2" E 2.Coffee green bean sizing place 16` 50' 54.4" N, 96` 03' 44.4" E 3. Storage place 16` 50' 52.3"N, 096` 03' 44.5"E 4. Production place 16` 50' 55.0"N 096` 03' 42.9"E 5. Coffee roasting place 16` 50' 54.8" N, 96` 03' 45.2" E 6. (i) Generator (During Operation) 16` 50' 54.1" N, 96` 03' 45.5" E (ii) Generator (After Operation) 16` 50' 54.1" N, 96` 03' 45.5" E 7. Aluminum film burning Place	•HSE In charge of Or 3rd party

Factors	Index/ Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location	Responsible Person
				16` 50’ 57.1” N, 096` 03’ 42.0” E	
Noise	• Leq24 hr. • Lmax • Ldn	**Method** - At each site, Baseline Sound Pressure Levels (SPLs) for (daytime (LAeq 90 D), night time (LAeq 90 N)), and 24-hour (LAeq 90) will be monitored using the Sound level Meter (Model: SL-4023SD) along with SD card real time data recorder (USB/RS232) in order to determine background ambient noise levels within the study area. This SLM meets IEC61672 class 2 with the tolerance is +/- 1.4dB. • Myanmar National Environmental Quality(Emission) Guidelines, Effective since 2015 in accordance with The Environmental	Duration: 24hr continuously Frequency: Biannually • Once during operation and decommissioning phase • In case of a complaint regarding noise from project site, an additional noise measurement may be conducted (if necessary)	1. Open space area, 16` 50’ 56.9” N, 096` 03’ 48.2” E 2. Storage place 16` 50’ 52.3”N, 096` 03’ 44.5”E 3. Production place 16` 50’ 55.0”N 096` 03’ 42.9”E 4. Coffee green bean sizing place 16` 50’ 54.4” N, 96` 03’ 44.4” E 5. Coffee roasting place 16` 50’ 54.8” N, 96` 03’ 45.2” E 6. Aluminum film burning Place 16` 50’ 57.1” N, 096` 03’ 42.0” E 7. Generator (During Operation) 16` 50’ 54.1” N, 96` 03’ 45.5” E	HSE Incharge Or (3rd party)

Factors	Index/ Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location	Responsible Person
		Conservation Law, 2012			
Effluent	Physical parameters: • pH Chemical Parameters: • Total Suspended Solid (TSS) • Ammonia Nitrogen • Nitrate Nitrogen • Oil and Grease • Phosphorus • DO • BOD • COD Biological parameters: • Total Coliform • *Escherichia coli*	Method • Analytical Methods followed to Standard Methods for the Examination of Water and Wastewater, recommended by National Environmental Quality (Emission) Guideline (EQEG)	• During operation phase • Biannually for wastewater • Quarterly for potable water	• Drainage area (1) 16°50'58.98"N 96° 3'47.06"E • Drainage area(2) 16°50'58.13"N 96° 3'42.33"E • Final Pipe lines 16°50'55.77"N 96° 3'41.10"E	• HSE Incharge or 3rd party
Hazardous and Nonhazardous waste	Manifest Disposal and Tracking Report	Track waste volume by type and disposal location daily	• During operation phase	• At all project locations	• **HSE Incharge** • **3rd party**
Social	• Complaint • Monitoring and solving	• Record complaint • Monitor, investigate and implement suitable	• Throughout all phases	• Project area, community around project area,	• **HR of the factory** • **3rd party**

Factors	Index/ Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location	Responsible Person
		solutions		and transportation route	
Public and Occupational health and safety	• Accidental statistics (strips/falls/accidents in the processing of machines such as injuries and other minor accidents in short term) • {Occupational respiratory diseases • And noise exposure in long run cause Noise Induced Hear Loss (NHL) and other physiological effects} • Mitigation measures	• Conduct summary report for accident investigation • Regularly assessed the information of workers' health by in charge person of the team • Medical Check-up periodically • Community Consultation • Information disclosure to public altitude • Emergency response training to inform in the event of accidents and minor accidents / Health and Safety Training and Submission of accident reports • Regular trainings regarding health and safety aspects	• Throughout all phases Frequency: Monthly • During Operation Phase Frequency: Occasionally Frequency: Monthly Frequency: Occasionally • Duration – 1 Day Frequency: Annually Duration – 1 or 2 Day Frequency: Annually Duration – 1 or 2 Day Frequency: Periodically Duration: Based on the modified environmental plan.	• Project area, community around project area , and transportation route • Project area and exposed area	• **HSE Incharge**

Factors	Index/ Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location	Responsible Person
		by HSE Coordinator. • Scrutinize the current environmental plan			

8.9 Budgets and responsibilities for monitoring

Table 8.12: Budgets and responsibilities for environmental monitoring

Environmental Factors	Index/ Parameters	Responsibility	Estimated Budget (MMK)
Operation phase			
Air Quality	• PM-10 • PM-2.5 • NO_2, • SO_2 • CO • Ozone	3rd party Environmental Consultant	**8,545,600 MMK air monitoring**
Noise	• Leq24 hr. • Lmax • Ldn	3rd party Environmental Consultant	**8,545,600 MMK noise monitoring**
Effluent	Physical parameters: • pH Chemical Parameters: • Total Suspended Solid (TSS) • Ammonia Nitrogen • Nitrate Nitrogen • Oil and Grease • Phosphorus • DO • BOD • COD Biological parameters: • Total Coliform • *Escherichia coli*	3rd party Environmental Consultant	**8,545,600 MMK effluent monitoring**
Hazardous and Non- hazardous waste	• Manifest Disposal and Tracking Report	3rd party Environmental Consultant	**8,545,600 MMK**
Community	• Complaint • Monitoring and solving	3rd party Environmental Consultant	**8,545,600 MMK**

Public and Occupational health and safety	• Accidental statistics • cause of accidents • Mitigation measures	3rd party Environmental Consultant	**8,545,600 MMK**

8.10 EMP Budget for the mitigation measures

The management plan will use the 2% of the total investment (MMK 3.052 USD million). Among the budget plan, the estimated costs for the Mitigation measure will be (60%) of the total. These include the following costs:

a) Supervision on environment
b) Engineering supervision cost
c) Institutional Strengthening, Training and Capacity Building
d) Development of Manual of functions and procedures including HSE procedures
e) Equipment and logistics
f) The social welfare programs for the employees and the nearby community who needs

Additionally, (40%) will be for the monitoring plan accordingly.

Chapter 9

Emergency Plan

9 Emergency plan

9.1 Introduction of emergency plan

This chapter describes the strategy how to manage all possible emergencies along with actions required, written procedures to be carried out in order to respond the major hazards.

Thus, an Emergency Response Plan (ERP) will be established for emergency situations that may arise during the factory's activities. Moreover, it will give guidance on actions and lines of communication in the event of an emergency and outline the respective responsibilities of Lluvia (Premier beverage factory) and Health and Safety (HSE) contractor/Manager.

The objective is to prepare the resources (personnel and equipments) available to respond accidents and emergency situations which can be come out from the factory process and activities as well. This will lead to identification of potential accidents along with limitation of its consequences as well as high level of prevention of the potential negative consequences on humans and environment.

In the Lluvia (Premier beverage factory), there should be the Emergency Response Team for the emergencies and the team is prepared as follows:

- Training of the team members along with their responsibility and equipped with the emergency materials
- Establishment and provision of the written emergency procedures
- Description and Availability of the Emergency Response Plan (ERP) in all employees and site workers and there should be documented and posted
- Identification of the locations of the emergency evacuation muster points
- Provision of alarm system and fire fighting equipments
- Supporting of first aid equipments
- Minimizing that should be reasonably practicable the risk to human life, the environment, assets and business in the event of an accident or emergency situation by ensuring effective and efficient intervention
- Ensuring the availability of adequate information on the emergency situations through a good communication system
- Ensuring efficient management of the emergency through the effective and efficient response of all dedicated resources
- Identification of the governmental authorities, media and other relevant stakeholders to be notified and production of a description of the procedures for communicating with them

9.2 Emergency fire response plan

The possibility of fire occurrence is mostly associated with "Negligence". However, the probability of a fire cannot be ruled out completely. For fire safety plan in one of emergency plan of include providing of firefighting training, fire drills, sufficient numbers of fire extinguishers, and iron hook and water storage tank, fire alarm systems, signs, and posters for directions for evacuation routes and emergency contact numbers are well placed in case of fire according to their emergency respondence plan.

9.2.1 Fire extinguishers and fire drills

Fire extinguishers: The factory provides firefighting training to the employee on how to properly use a fire extinguisher.

Fire drills: Fire drills are held at least once per year to determine effectiveness of this emergency procedure. A written record of the drill is kept on file at the facility by human resources.

The fire fighting equipments should be available at all workshops and warehouses of the factory and should be kept in good working state. The use of these fire-fighting equipments should be one of the key points during the training of the ERP team, workers and staff. The personnel technician in charge of the maintenance and plant management should regularly check these equipments and ensure that they are always ready to be used.

Moreover, the fire alarm system should be installed both in the factory and admin office. Floor plan along with the emergency exits should be allocated.

Figure 9.1: Fire fighting equipments and fire alarm system

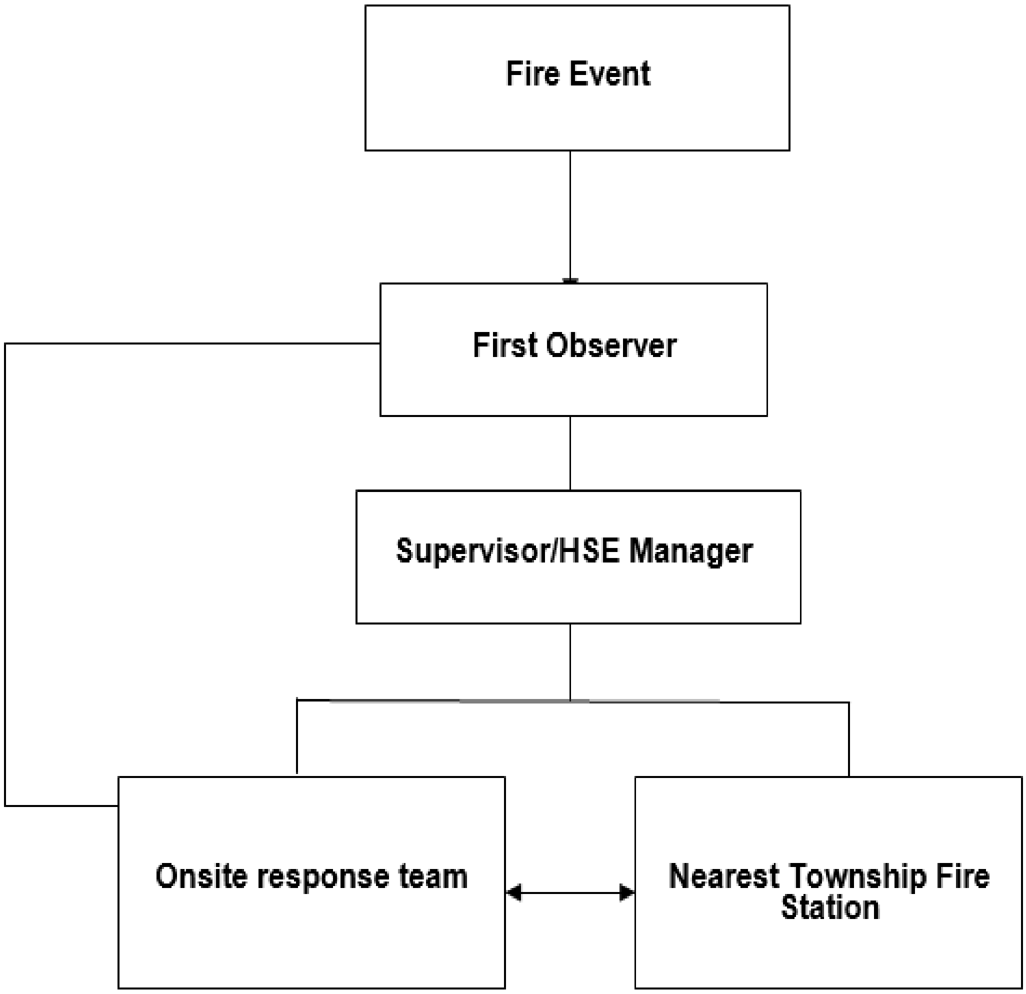


Figure 9.2: Fire response communication plan

9.2.2 Preventive Measures for Fire /Explosion

Responsible Person	Preventive Measures
Anyone who notices fire	**The factory give awareness to all the employees for the event of fire as follows:** **Someone who firstly notice** must immediately inform factory manager available in shift and/or trained or experienced with environmental management issues along with the details of the information: fire source, the nature of fire etc. OR Inform directly to relevant department, such as Police Station or Fire Force near Hlaing Thar Yar Industrial Zone. **Nearest police station** Hlaing Thar Yar Police Station Address: Nyaung Tone Rd., Ward (2), (Hlaing Thar Yar),Yangon Region Phone: 01-6450292. **Nearest Fire Station**

	1. Fire station, Hlaing Thar Yar Township, 01-70550, 09-797924186 2. Central Fire Brigade, 09 252011, 09 252022 3. North Dagon Fire Station, 01-584060 South Dagon Fire Station, 01-590071 South Okkalar Fire Station, 01- 577041, 01-562655
Emergency in charge person	**For the event of fire, the emergency in charge person are given training under the following:** On receiving the information of an emergency, the Factory Manager immediately proceed to the scene of the incident to assess the seriousness of the emergency. If an emergency is confirmed, he shall: ➢ Immediately raise the alarm and inform all employees as follows: • Location of fire • Type of fire • Seriousness of fire Immediately inform emergency service in charge
Onsite emergency response team & Nearest township fire station	**Onsite emergency response team of factory are undertaken the following duties in the event of fire.** • Start the actions and activate Emergency Action Plan in consultation with Emergency response in charge and use proper personnel protective equipment. • Carry out the required firefighting emergency action as directed by Emergency Response Team leader/ in charge person. • Water borne firefighting equipment such as firefighting tugs with fire monitors, lifesaving equipment and medical equipment shall be available. • Based on the type of factory area involved initiate relevant response • Use proper personal protection and extinguishing media • Assess the situation from time to time and use appropriate strategy • Remove unaffected containers/goods from the area if possible • Medical rescue team must be stand by for personal injury in case. **For substances, which becomes dangerous when wet/ violently react with water** • Use dry chemical for small fire. use smother with dry inert material and dispose them off using relevant safety precautions for large fire

Figure 9.3: Office Fire Alarm System

Figure 9.4: Production Fire Alarm System

Figure 9.5: Installation of fire extinguishers Warehouse

Figure 9.6: Installation of fire extinguishers Production & Office

Figure 9.7: Installation of Fire Safety Pipeline

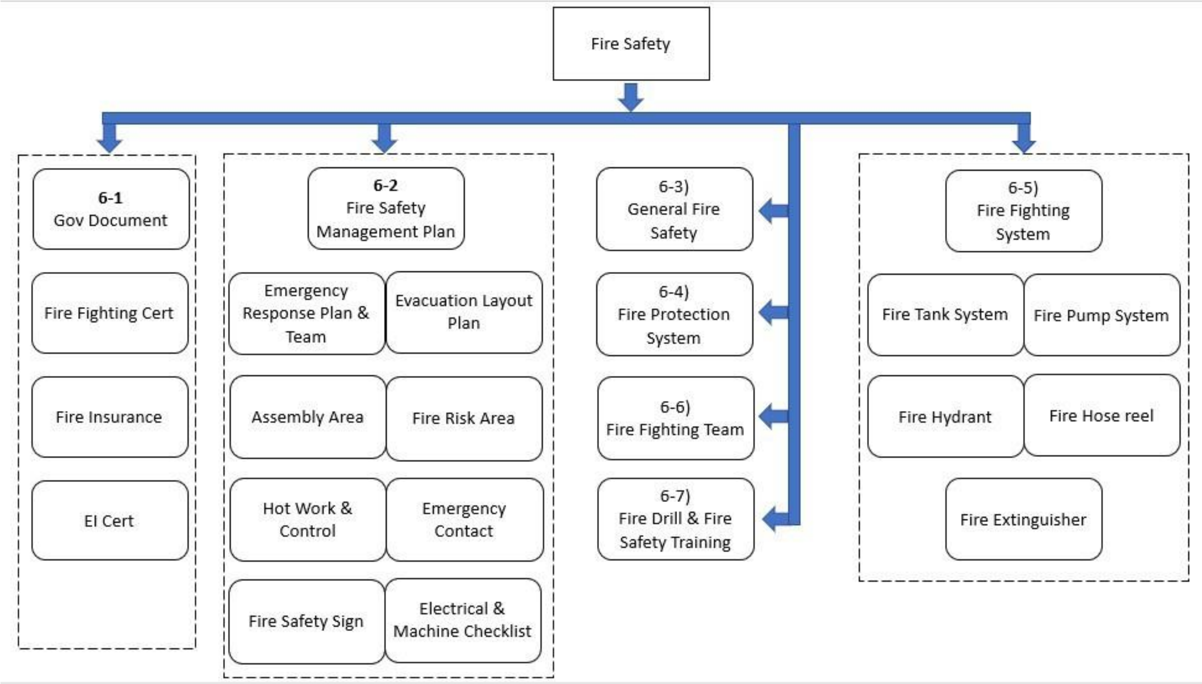


Figure 9.8: Emergency Fire Response Plan

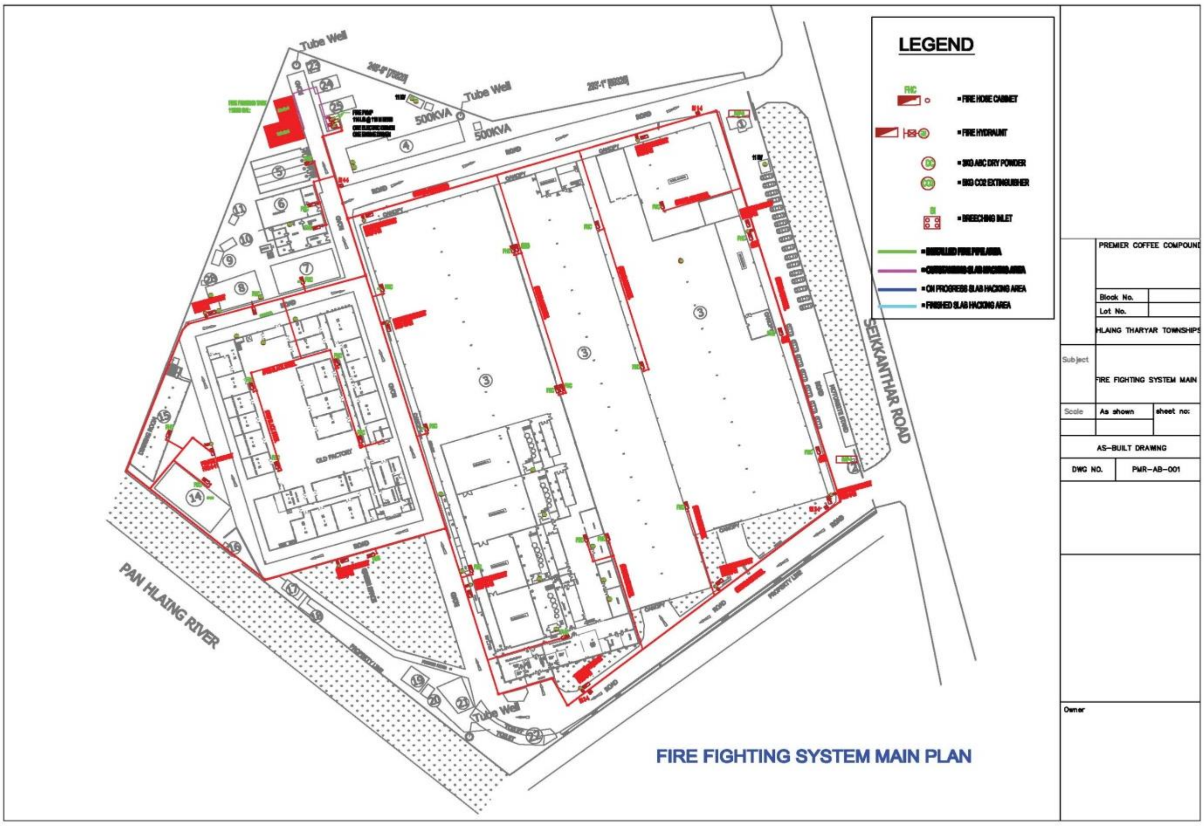


Figure 9.9: Emergency Fire Safety Layout Plan

Figure 9.10: Fire Drilling

9.3 Natural disasters response plan

9.3.1 Disaster Risk Assessment (DRA) likely affect around the project area

A DRA identifies and analyzes the types, intensities, and probabilities of natural hazard events and the resulting impact on people, communities, and assets with a defined spatial location.

1) The types of disaster for (10) years

Myanmar has been facing the following types of natural hazard including:

1) Storm,
2) Earthquake,
3) Drought,
4) Flood and Landslide.

This figure presents the key natural hazard statistics (1980-2020) in Myanmar.

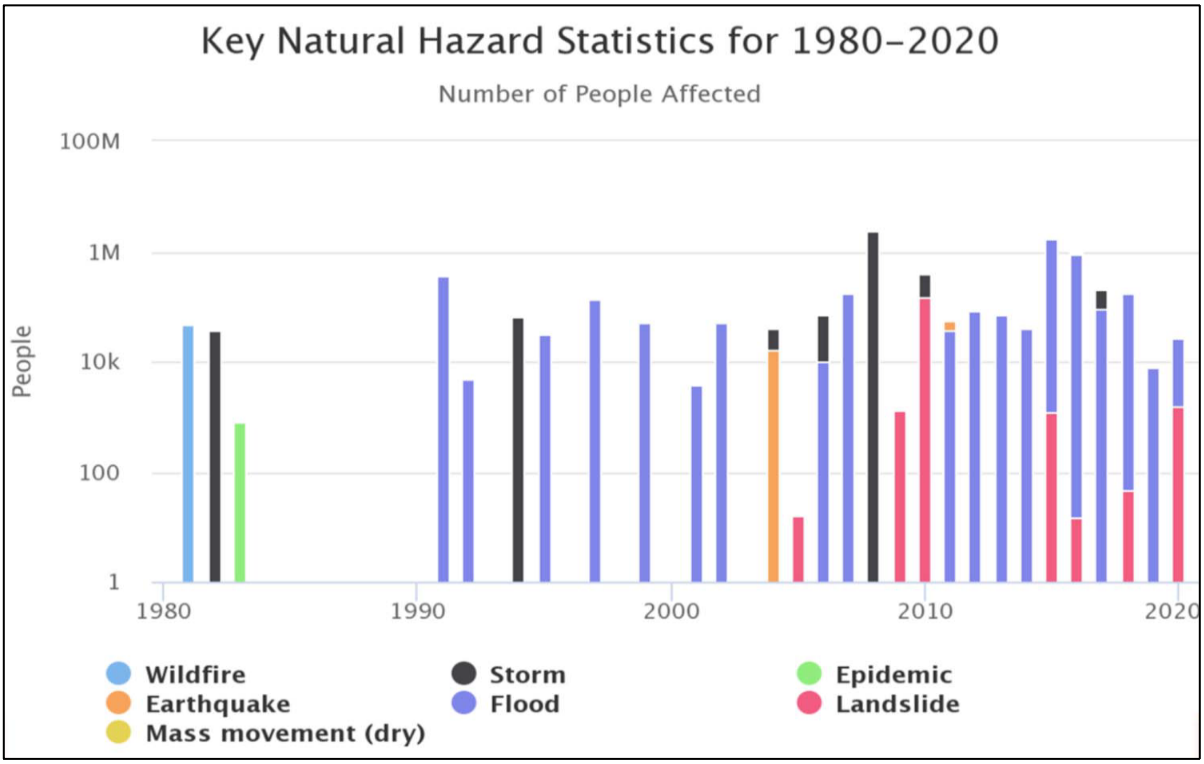
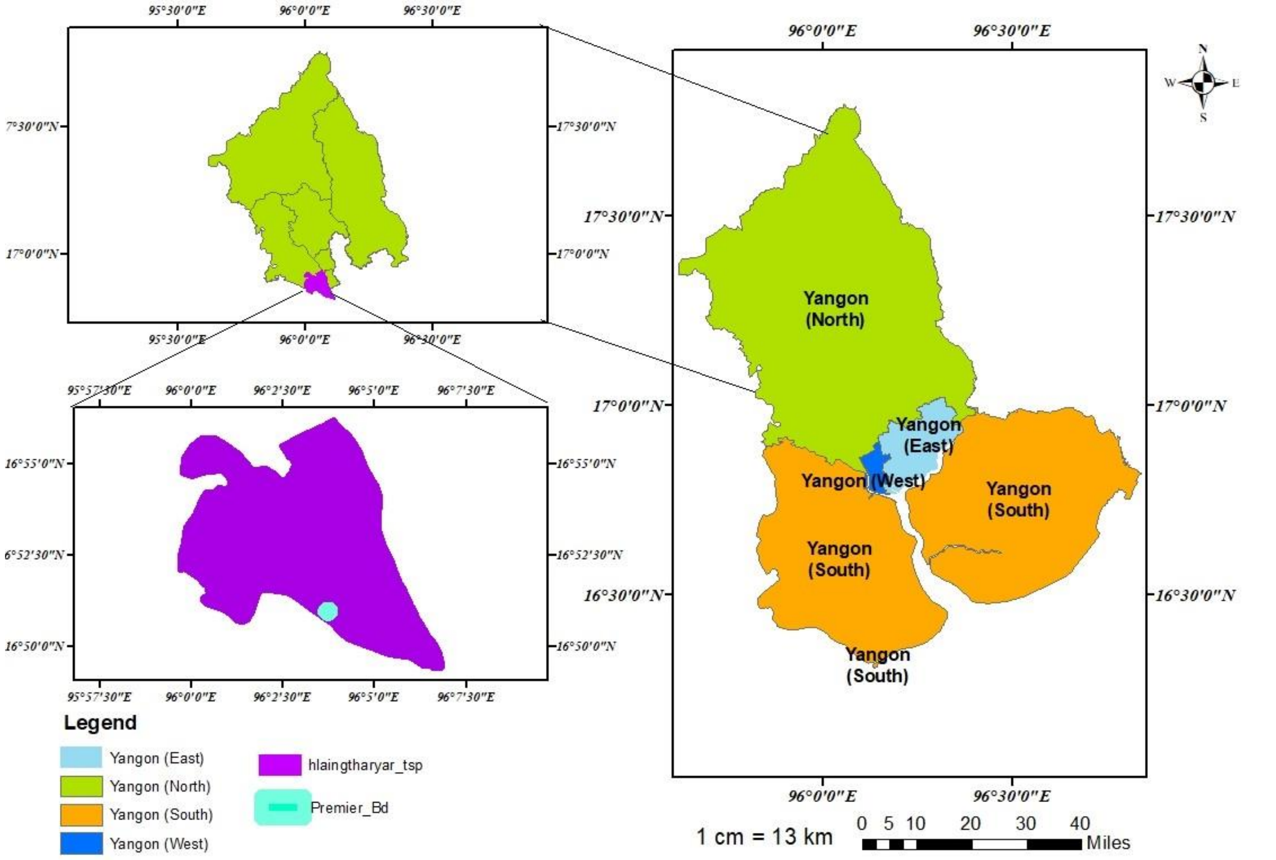


Figure 9.11: Key Natural Hazard Statistics for 1980-2020

Source: Myanmar Information Management Unit (MIMU)



Environmental Quality Management

Esri, Global Mapper, Google Earth

Figure 9.12: Location Map of The Premier Factory, North Yangon Region

9.3.2 Hazard Assessment

(I) Flooding:

Flooding is a common occurrence for the city. It can be caused by natural events, including (i) heavy rainfalls and tropical storms during monsoon seasons, (ii) flooding rivers (the city is surrounded by a number of rivers), and (iii) high tides—or by man-made factors such as the city's antiquated drainage system, which can become clogged and unable to properly drain rainwater. In addditon, Yangon is surrounded by three rivers and creeks, where flooding occurs from either high tide or heavy rainfalls during the monsoon season or tropical storms in the pre- and post-monsoon seasons. Annual floods have resulted in damage to both buildings and agriculture. During the 2018 monsoon season, flooding occurred in many residential townships within the city due to heavy rain, high tides, and high river levels, causing fatalities and damage to buildings.

Reviewing the historical hazard records and master plan of the Yangon region, the major disaster is flooding. Particularly, the Projects Area may suffer flooding due to the nearest to Nga Moe Yeik Creek. Flood Risk Index at North Yangon Region is 0.2-0.54. (Figure 9.11)

In addition, Figure 9.14 shows the spatial distribution of flood vulnerability of the region. The red color shows more vulnerable areas, while the blue color indicates less vulnerable areas (e.g., hillside areas with a higher altitude). According to the Figure 9.12, the project area is high risk of Flooidng. According to Flood Hazard Map of ADB, 2016d, the water depth can be between 0.1 to 0.5 mm in 100 years.

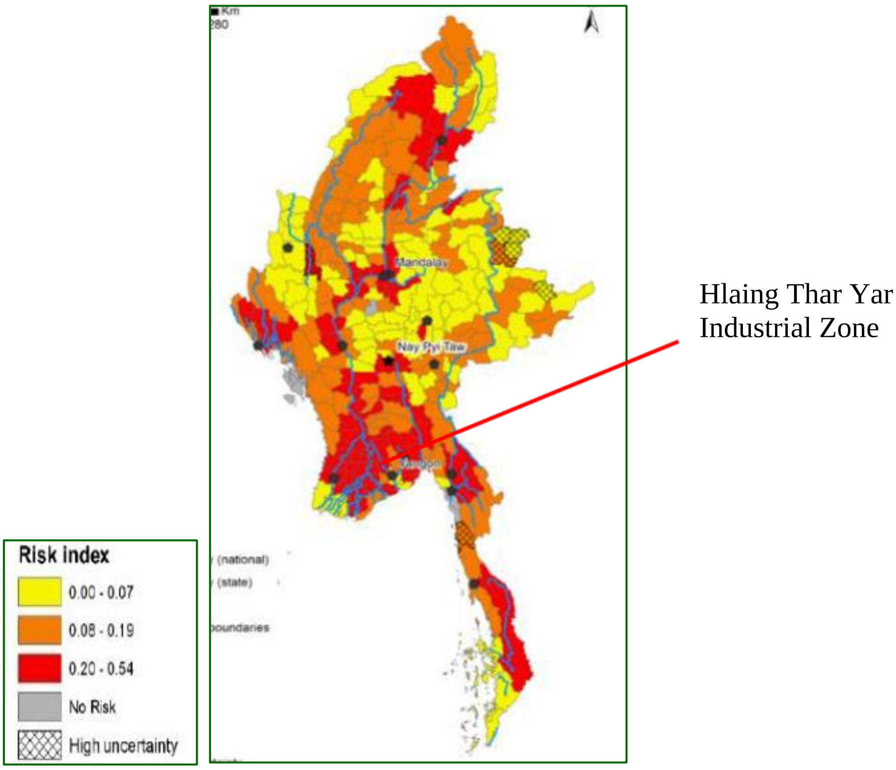


Figure 9.13: Flood Risk at Yangon 2010-2020
Source: (Hnin Wuit Yee Kyaw, Alexandra Dudley, 2023)

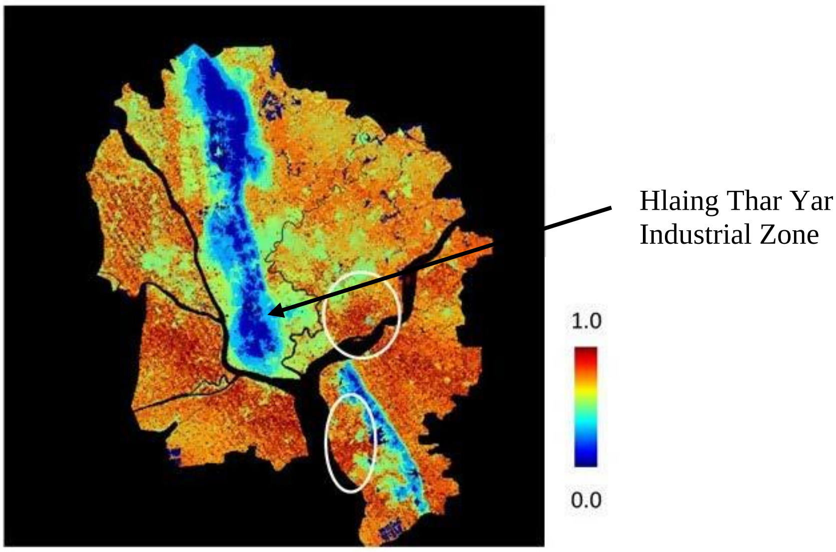


Figure 9.14: Spatial Distribution of Flood Risk at North Yangon Region

Figure 9.15: Flood Hazard Map (Yangon), Flood scale: 100-year flood (7th Version)
Source : (ADB, 2016d)

(II) Cyclones and Storms and Vulnerability:

Myanmar is located in the western part of Southeast Asia and has 2,400 km of west coastline facing the Bay of Bengal and the Andaman Sea. Based on historical records of cyclone activities between 1981 and 2015 (Kyaw,2017), cyclones occur about six times per year in the area around the Bay of Bengal. The seasons of cyclones in Myanmar are generally April/May and October/November—the pre-monsoon and post-monsoon periods, respectively (DoM and DFID, 2009; DMH, 2018). (Figure 9.14) According to the historical record of Cyclones in Yangon region, the winds can reach 120 mph, storm surges can exceed 10 feet, and rainfall of more than 5 inches can accumulate in 24 hours (DoM and DFID, 2009).

Cyclones and Storms are less frequent than floods, but major damage, resulted in 1,640 fatalities in the city and 140,000 countrywide, mainly in the delta region, causing over $10 billion in damages. The Yangon Region, among four others, was declared a disaster area -284 temples were destroyed in this region alone. The cyclone damage was caused by high wind speeds, heavy rain, and storm surge, resulting in widespread flooding. (World Bank_Myanmar Country Report). Districts with moderate to high risk of cyclones - 8.9 million people, including 4 million vulnerable people in Ayeyarwady and Yangon region during Cyclone Nargis. The damage assessment map in Figure 9.15 is overlaid with the track of Cyclone Nargis, highlighting the areas along the track that suffered severe damage. The project had suffered the risk of Cyclone Nargis due to the nearest water body within Yangon region.

Hazards	J	F	M	A	M	J	J	A	S	O	N	D
Cyclone				Apr-May						Oct-Nov		
High Temperature			Mar-May									
Low Temperature	Jan-Feb										Nov-Dec	
Drought			Mar-Sept									
Squalls			Mar-Oct									
Thunderstorm			Mar-Oct									
Heavy Rain					May-Sep							
Monsoon Depression					May-Sep							
Hail			Mar-May									

Figure 9.16: (1) Cyclone and Tsunami disaster area, (2) Meterological Hazard Calendar

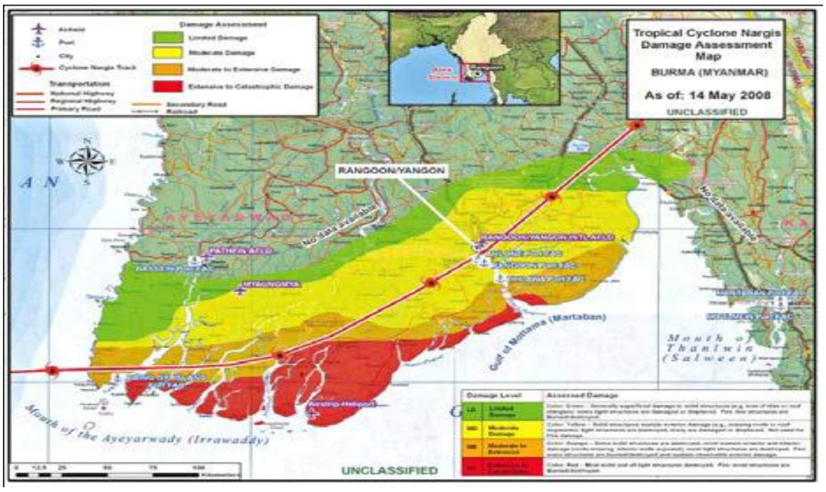


Figure 9.17: Damage Distribution Track of Cyclone Nargis
Source: (UNEP, 2009; MES, 2017)

(III) Earthquakes

The Sagaing fault, running north-south through the country, is located approximately 35km east of the Yangon. In 1930, a magnitude 7.3 earthquake struck Myanmar—the largest earthquake to impact Yangon to date. With the epicenter 75km from the city, the earthquake resulted in an estimated 50 fatalities in Yangon.

In this regard, although the project area is not as seismically active as some other regions, is in a seismically active zone. This is because it is located in the eastern part of Yangon city, which is near to the western part of the Sagaing Fault (Figure 9.16). The right-lateral strike-slip Sagaing Fault is located 40km from eastern Yangon. Moreover, if this nature disaster could happen in the project area, the project site has severe impacts of sesmic hazards. This is due to the earthquake hazard is particularly acute for a number of townships in Yangon including East Dagon where numerous buildings and factories are constructed on soft landfills near the Yangon River.

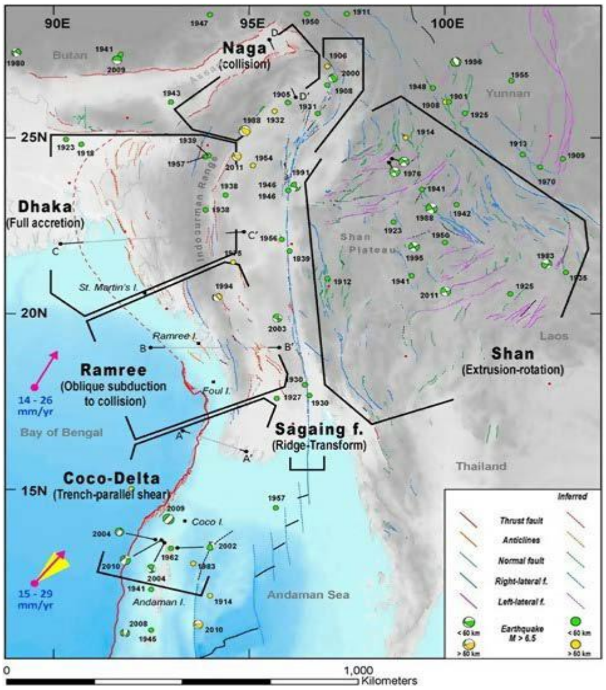


Figure 9.18: Sagaing fault and historic destructive earthquakes
(Source: Wangetal.,2014)

9.3.3 Methodology of DRA

Disaster risk assessment (DRA) is a qualitative approach to determine the nature and extent of disaster risk by analyzing potential hazards and evaluating existing conditions of exposure and vulnerability that together could harm people, property, services, livelihoods and the environment on which they depend. A DRA was conducted using the qualitative DRA methods adapted from Australian Geomechanics Society (2000).
(ADB, 2017).
VH= Very High, H =High, M =Medium, L=Low, VL= Very Low risk

Likelihood	Consequences				
	Catastrophic	Major	Medium	Minor	Insignificant
Almost certain	-	-	-	-	-
Likely	**-**	**H**	**-**	**-**	**-**
Possible	-	-	-	-	-
Unlikely	-	-	-	-	-
Rare	-	-	-		-
Not credible	-	-	-	-	-

Source: Australian Geomechanics Society (2000)

The potential hazards of the project area are **cyclones/Storms, floods and earthquakes** according to the existing data. Regarding likelihood, the flood events used to occur once a year at the moderate to sever rate. Therefore**, disaster risk for flood** could be defined as ***a high***

degree of likelihood durig the next 10 years.

9.3.4 Natural Disaster Response Procedures

(I) Disaster preparedness activities

In general, the activities are intended to meet the requirements for the flooding emergency.

1 Develop a plan. Emergency preparedness plans should be tailored to address the specific needs of the factory and the workers and nearby community. The plan should be updated accordingly every year.

2. **Conduct an emergency exercise** to identify deficiencies in the existing plan and update it accordingly.

3. **Utilize emergency warning systems.** Learn what information is available to help the factory predict flooding conditions.

4. Document existing infrastructure. The existing storm sewer system should be cleared ahead of the recent rainfall events.

5. Provide proper maintenance. Make sure drainage structures are cleared to allow water to be intercepted and conveyed as intended.

Table 9.1: The preparedness activities for flood and Storms/Cyclones

Potential Impacts	Scope of Work	Preparedness activities
Flooding	Industrial Operation	- Install watertight barriers called flood shields to prevent the passage of water through doors, windows, ventilation shafts, or other openings. Install permanent watertight doors and pumps to remove flood waters and construct movable floodwalls. - High Leveling to Warehouse Area not to suffer Flooding - Stocking Up on more additional Pallets to store the products (Raw materials and Finished Coffee) in case for Flooding - High Leveling to project premise than the outside main road - Regular salvage of the drainage inside and outside of the factory premise - Elevating critical machinery and electrical systems to prevent damage. - Implementing measures to prevent environmental contamination during flooding, such as securing chemicals and pollutants.
	Occupational	- Maintaining a list of

Potential Impacts	Scope of Work	Preparedness activities
	Safety and Health	emergency contacts, including local authorities, emergency services, and utility companies. - Ensuring employees know whom to contact in case of a flood. - Establishing a communication protocol to alert employees, suppliers, and customers of the situation and provide updates. - Developing evacuation routes and assembly points. - Training employees on evacuation procedures -
Storms/Cyclones	Industrial Operation	- Implementing buffer zones (6'×6') Spacing of hardwood species and gardening trees to mitigate the intensity of storms/cyclones. - Maintaining vegetative cover and landscaping around the facility to prevent soil erosion. - Establishing clear protocols for safely shutting down milling operations in the event of an impending storm. - Ensuring that all processing equipment is shut down in a systematic and secure manner to prevent damage - Continuous monitoring weather Forecast by government officials to receive early warnings about approaching storms or cyclones. - Designation personnel responsible for monitoring weather updates and communicating alerts to relevant staff. - Prioritizing the restoration of key processing functions based on the assessment. -
	Occupational Health and Safety	- Establishing an emergency response team (HSE Team) with designated roles and

Potential Impacts	Scope of Work	Preparedness activities
		responsibilities. - Training team members in first aid, emergency communication, and evacuation procedures. - Developing clear and well-communicated evacuation procedures for various areas of the facility. - Provision of PPE to protect employees during storm response activities. - Desination Muster Points where employees can gather during emergencies. - Provision of First Aid Kits and Medical Facilities in case of disasters.
Earthquake	Occupational Health and Safety	- Keeping an updated list of emergency contacts, including local authorities, emergency services, and key personnel and access contact numbers to workers. (Emergency Contacts have been detailed in **Section 9.5.2.** - Providing regular training on earthquake preparedness (Drop, Cover, and Hold On), response, and evacuation procedures. - Designation of safe zones in the project premise which are away from windows, heavy equipment, and other potential hazards. - Desingation of Muster Points with the factory campus where employees should gather after evacuating. - Provision first aid and a medical assistance (Full Time Employees) for injuries and Incidents.

9.3.5 The response plan/ Actions

Site Evacuation Procedures & Routes

- Emergency response team should identify in advance of flooding which employees can be sent home / evacuated, if safe to do so.
- Allow time for this to occur before any routes become affected by the flooding.
- Evacuation procedures should be developed which identify when and how evacuation takes place, if necessary signed routes may be required, (including the maintenance of signs and keeping evacuation routes clear). Consideration should be given to the road network around the factory site, especially if these are more likely to flood first and therefore affect evacuation time.

Deploying Flood Barriers / Flood Protection

- The assigned emergency response team and factory workers should prepare any temporary flood barriers or flood protection actions that need to be performed in advance of flooding to minimise the impact on the factory site.
- Include details of exactly what actions need to be done, who is responsible for carrying out these actions, their deputises, and what training is required, etc.

Safe Refuge

- Any no notice flooding events following breaches in defences or surface water flooding will require a safe refuge such that all employees can take immediate action to keep themselves safe without relying on intervention from outside.
- The factory provides safe, dry shelter until the employees can return home
- [If the decision is made that nominated individuals / critical workers remain safe on site, have risk assessments been made?
- Include details of how many people can be accommodated and the resources / equipment available to sustain them and for how long. Depending on the cause of flooding, people may need to stay here for at least 8 hours. How will they communicate with management or emergency services, who will inform their families?
- **Do not assume that the emergency services will rescue from this location. The focus of any emergency response will be to those who are immediately vulnerable**

Reoccupation of The Site

- There may well be environmental hazards, loss of utilities and other such issues, which may have to be rectified and planned for the recovery before the employees are allowed back to the factory premises.

Training & Exercising

- All personnel who work on site should be given training and exercise accordingly.
- This Plan will form part of the Health & Safety at Work Register maintained by the company.

Document Control

- The plan will be reviewed every year resulting in lessons identified after an activation event or exercise, following major changes of personnel or policy, or following any change to the flood risk or warning process.

The flood warnings should be available at the factory premies.

<u>Flood Alert</u>

Key Message: Flooding is possible. Be prepared
Timing: 2 hours to 2 days in advance of flooding
Actions: Be prepared for flooding
Prepare a flood kit of essential items
Monitor local water levels and flood forecasts

Flood Alerts are to warn people of the possibility of flooding and encourage them to be alert, stay vigilant and to make early preparations for flooding.

<u>Flood Warning</u>

Key Message: Flooding is expected. Immediate Action Required
Timing: Half an hour to 1 day in advance of flooding
Actions: Act now to protect your property
Block doors with flood boards or sandbags and cover airbricks and other ventilation holes
Move family, pets and valuables to a safe place
Turn off gas, electricity and water supplies if safe to do so
Keep a flood kit ready
Move cars, pets, food, valuables and important documents to safety

Flood Warnings are to warn people flooding is expected and encourage them to take immediate action to protect themselves and their property.

<u>Severe Flood Warning</u>

Key Message: Severe flooding. Danger to life
Timing: When flooding poses a significant threat to life and different actions are required
Actions: Stay in a safe place with a means of escape
Be ready should you need to evacuate from your home
Co-operate with the emergency services
Call 999 if you are in immediate danger

Severe Flood Warnings are to warn people of a significant risk to life or significant disruption to communities caused by widespread or prolonged flooding, and encourage them to take immediate action to protect themselves and follow the advice of the emergency services.

Chapter 10

Public Consultation and Disclosure

10 Socio-eco impact assessment (SIA) survey process

Starting in October 2015, a SIA survey program was conducted by EQM SIA consultant team including (13) team members leaded by as follows:

- One Senior Socio-economic expert,
- Two Environmental consultants,
- One trained Biodiversity technician
- One trained Cultural surveyor
- Seven socio-economic teams trained by EQM.

Focus group meetings were held in the Yay Oakkan Village, Hlaing Thar Yar which is peri-urban and nearest to the Hlaing Thar Yar industrial area where Lluvia Premier Beverage Manufacturing factory located. It included Key Informant Interviews, Socio-economic surveys and Traditional Ecological Knowledge surveys.

Moreover, a detailed door to door socio-economic survey was completed 100 households across the household block area in the Hlaing Thar Yar Township nearest to the Industrial zone. In this way they could be considered typical and representative of the community which may potentially affected by the industrial activities. .

Six Key Informant Interviews were conducted with two Monks, Head of household tract, and a respective Teacher, Nurse, Fire Fighter with the objective of obtaining relevant information on local community.

10.1 Introduction of public consultation and disclosure

Chapter 10 provides the stakeholder engagement program undertaken as the part of ESHIA process for the Premier Coffee beverage factory. The key elements of the program consisted of providing relevant information to local regulatory authorities and communities about the activities of Premier beverage factory along with industrial zone, and engaging with them on the potential impacts and associated mitigation measures.

The key elements of the impact assessment related consultation are concentrated around ensuring that stakeholders are fully informed of the beverage manufacturing factory activities and that their views are taken into account where relevant.

The overall objective is to ensure the assessment is robust, transparent and has considered the full range of issues or perceptions, and to an appropriate level of detail.

The specific targets and objectives of the stakeholder consultation program included the following:

- Identification of potential communities likely affected by the factory’s activities;
- Seeking input in the identification of key environmental, social, health and economic issues which need to be considered;
- Gaining an understanding of local communities, their assets, rights, priorities, concerns, needs, expectations and perceptions; and

- Where relevant, identifying and considering potential environmental and social performance indicators, which have relevance for both communities and the factory owner

The stakeholder engagement for this IEE study consisted of four key activities, namely focus group meetings, key informant interviews, household socio-economic and attitude surveys, and traditional ecological knowledge surveys. This section outlines how the consultation process was conducted and presents the key findings.

To reveal peoples' knowledge, attitude, on the Premier Beverage manufacturing factory, Industrial Estate, a set of socio eco survey was conducted. The survey areas are the surrounding areas nearest to the Hlaing Thar Yar industrial estate, zone 3, where the Premier beverage factory located.

10.2 Objectives of the study

The main objectives of the Socio Economic study for this IEE is shown as follow:

- To investigate people perception on the beverage manufacturing System and how it can effect for their lifestyles
- To investigate and study the general social health and lifestyles condition of surrounding areas
- To assess the condition of the positive and negative impact on the socio economic status
- To propose better suggestions and minimize the negative effects

10.3 Key informant interviews

Key informant interviews were conducted with five persons who are the monk, 100 household leader, Fire fighter, Nurse and Community leader/ Teacher. Targeted subsets of the socio-economic and attitude survey questions were used as a basis for Key Informant Interviews.

The analysis of the information gathered has shown the data collection from key informants was consistent with the socio economic and attitude collected from the districted areas. The key informant interviews (50%) had previously been made aware of the planned beverage factory process survey activities and acknowledged that this project would be important to the community. On the basis of the information received, the key informants expressed support for the projects.

The majority of key informants considered road transport (25%), education (25%), health (25%) and the remaining 25% are natural environment in the survey question.

It should be noted that the development of beverage factory system have been carried out in this areas for a long time, it has been nearly for 2 decades. Because of this action plans, some of the local communities have been subjected to direct and or indirect impacts associated with this.

Figure 10.1: Interview with Monk

Figure 10.2: Interview with household leader's wife

Figure 10.3: Interview with Teacher

Figure 10.4: Interview with fire-fighter and nurse

Figure 10.5: Interview with the respective factory admin personnel

10.3.1 Current situation of infrastructure, resources and services based on the key informant interview

According to the interview findings, it is noted that before the industrial zones were g built, all the lands were farm lands and most of the people who lived in these areas used to work farming and fishing.. After 1990, the condition of the economic and industrialization were developed in these areas. Thus, most of the people migrated from another place to that industrial area to get the better life and get more chance for jobs opportunities. Because of these actions, the cultivation lands are being replaced with the industrial zones and housing areas.

In terms of the basic needs such as water, electricity and ***health care***. Almost all of the key informants said that there is a simple clinic center near their household unit; however, there are not enough facilities. From that time till now, the health care condition has not improved yet. .

In the issue of ***water resources***, the entire household unit is using tube wells for domestic usage and for the drinking water; they are depending on the purified water. . It is said that distance between the water sources areas and the community areas is not much far. It is said that ground water is already contaminated with river water. There is no water treatment before drinking.

Regarding the issue of ***electricity***, it is said that the entire household gets public electricity; however, it cannot cover the whole domestic use.. They are relying on charcoal or firewood for cooking.

For the ***waste disposal***, improper waste damping sites are being found most of the surrounding areas. Besides, the drainage system in their surrounding is not proper arranged.

Thus, it is pointed out that the resource of water is being damaged by the unsystematic surrounding environments.

10.3.2 Issue of the environment

Concerning on the issue of air, water and climate. According to the interview findings, it is noted that ***the air quality*** is being changed within these decade. During the summer, the smell from the Premier Coffee Beverage Factory becomes stronger and it is not comfortable for the nearby community around the factory.. Besides, they pointed out that air quality becomes changed because of the activities of industrial estate in the surrounding.

In the issue of water quality, the ground water quality is contaminated day by day because of the unsystematic drainage system and solid waste dumping site in the surroundings.

For the climate issue, the weather is being warmer and warmer year by year in these days. Thus, it is said that there is climate change issue in this areas. This issue is not directly linked to industrial but it is linked all the human activities all over the world said by school teacher who is one of the key informants.

Looking at the biodervisity (Flora and Fauna) around this area, especially, in those areas, snakes are significantly seen. In the issue of snakes, mostly they have seen snakes near the river banks and in the flow of river.

10.3.3 Perceptions of the key informants on impacts of the projects

Regarding the human perceptions, five different factors are investigated. These are the effect on physical resources, effect on biological resources, effects on human use, effect on the quality of life and effect on the cultural heritage.

On the issue of effect on the ***physical resources***, it is included five different parameters such as soil quality, surface water quality, ground water quality, air quality and noise. According to the findings, when it is compared the current soil quality with the past,, the soil quality become worsen due to the changes in land use.. Besides, the others parameters such as surface water, and ground water quality, air and noise are also affected negatively. Thus, it is assumed that most of the physical resources are being affected by the industrial activities.

Looking at the Biological Resources, it is focused on forestry and conservation areas, agriculture and farming areas, local animals, and pasture and aquatic animals. Since land use pattern changes due to local industrialization in Hlaing Thar Yar, the biological resources and their lifestyles have been changing for 20 years.

Human use like local industry, local transportation, local price, recreation, and local economy become moving positively in this industrial zone. At the same time, local fisheries, local livestock, local vegetation and the local livelihood have been affected negatively.

Concerning on the issue of the effect on the ***quality of life***, there are many different parameters are analyzed.

In the community, housing, health, education, household and house building structure, job opportunities, income, scenery, and local culture become improved. However, religion, safety, and crime are affected negatively over day by day.

Finally, regarding the issue the cultural heritage, three important issues: religious building, cemetery and historic buildings are analyzed. The religious buildings have seen as much improvement. There is no cemetery and historic buildings around the industrial zone

10.3.4 Culture heritage

According to the findings,, two monasteries are located in the surrounding compound, which are Yay Oakkan's Monastery and Taung Ka Lay's Monastery. Yay Oakkan's Monastery is located at the North Latitude 16 Degree 50 Minutes and 90.7 second and East Longitude 0.76 Degree 30 Minute. in the industrial zone.

According to the findings, , Monasteries are the only place which is needed to maintain the cultural heritage for this region. There is no cemetery in that area. , Besides, it is also noted that there is no local archeological sites. Regarding the important cultural activities, it is noted that Sown Thein Pwal is the biggest and important festival at this areas.


Figure 10.6: Hnit Pnoe Monestary in the industrial zone

Figure 10.7: Thone Pnoe Monastery seen in the industrial zone

10.4 Socio- demographic of the community

To know peoples' attitude, behaviors, and views on the Hlaing Tahr Yar Industrial zone along with the Premier manufacturing factory, a set of survey which is called socio economic survey was conducted. The survey conducted areas are the surrounding areas nearby that industrial estate. Based on the analysis, , around 100 respondents were interviewed randomly in this survey. Among the 100 respondents, the number of male respondents was 40 and the remaining 60 were female. These respondents were approached with a structured questionnaire for door-to-door survey. Mostly, the respondents are heads of household and wives, but a few is sons/daughters. Almost all the households residing in the surrounding areas are Buddhism. Besides, almost 98% of the total households are Bamar Tribes and around 2% are others ethnicity. Their family size is in the range of 4 to 12 members. The figure below shows the condition of household status in the community.

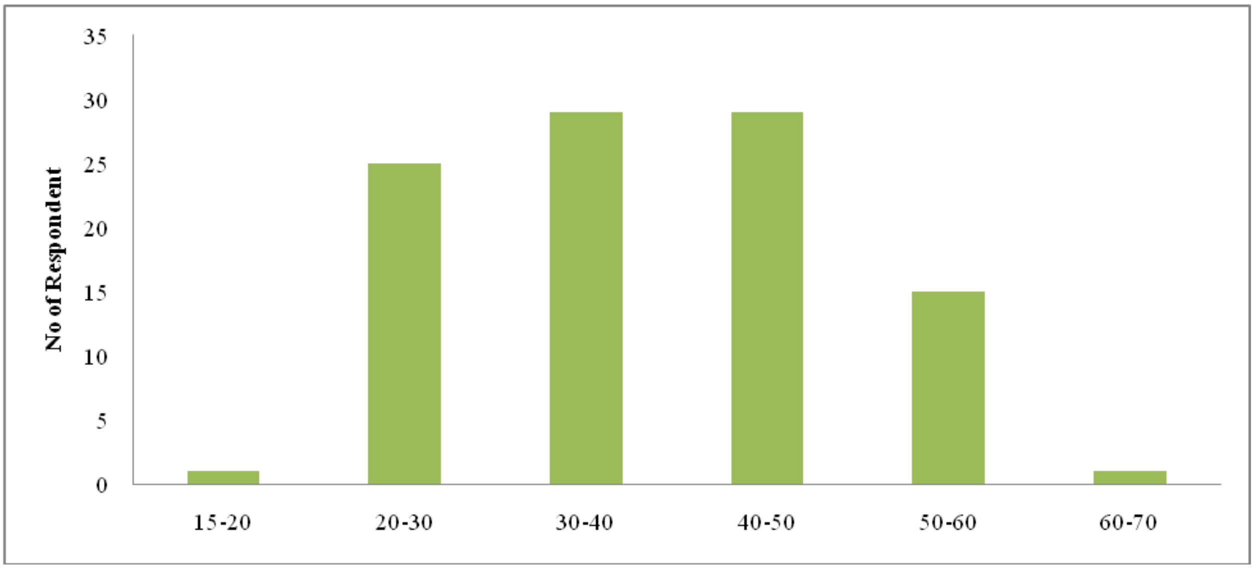


Figure 10.8: Respondents' age level

According to the analysis, the age of the respondent was grouped into 6 levels. It is noted that the highest % of age level are in the middle age from 30-40 and 40-50 and followed by the range of 20-30. It is rare seen the age which is over 70.

10.4.1 Occupation

There are 68% of the respondents is working for income, 24 % is doing housework, 2% is helping the household business, 3% is still searching for work, 3% is pensions people and only one person is without working. Thus, it is noted that more than 70% of total population is working for annual income. Among the working people, around 48% of respondents are service workers and causal workers. Around 2% are livestock workers and around 13% are unpaid and helping for their home.. The remaining respondents are sale worker r17%, and forestry worker are 12%, skill workers are 3%, and others are 5%. The data is presented in the figures below.

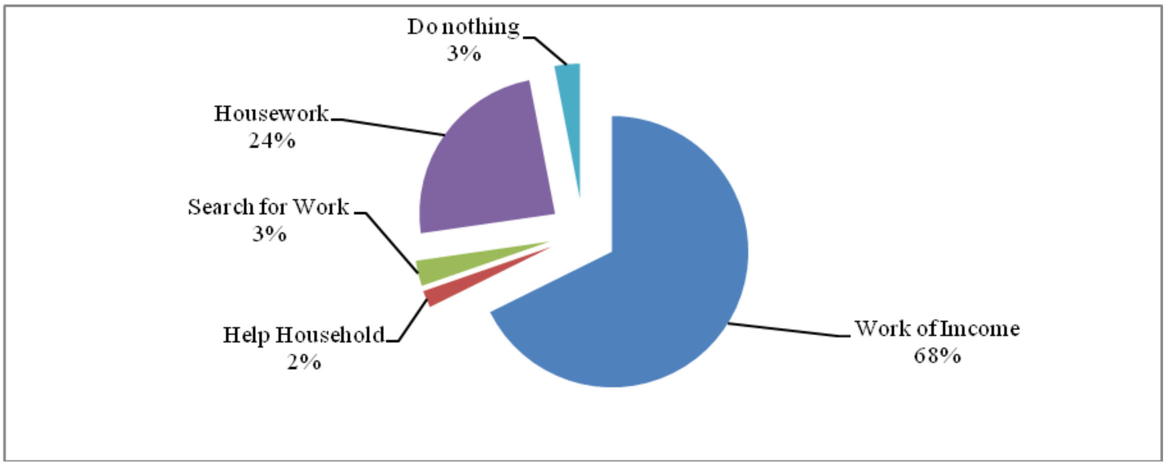


Figure 10.9: No. of respondents in different types of occupation

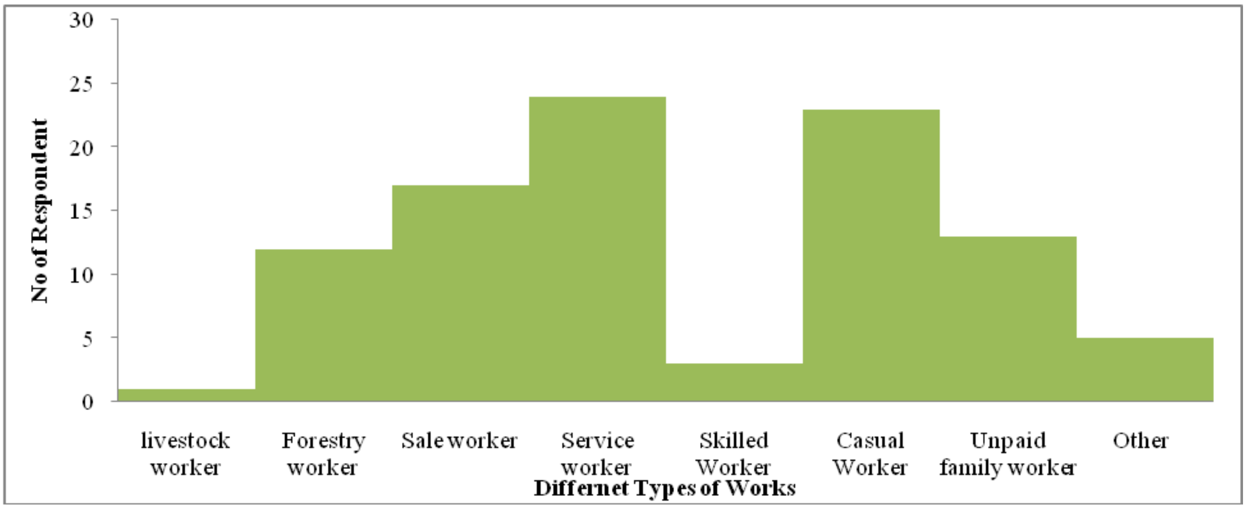


Figure 10.10: Number of respondents in different types of works

10.4.2 Income

The highest annual income is in the range of 1,000,001 - 2,000,000 by 51% of respondents. The second largest is in the range of 500,001 -1,000,000 which is around 19% of respondents. Around 9% only gets below 500,000. Besides, the percentage of the household which can earn in the range of 2,000,001-3,000,000 is around 8% and it is rare household which has in the range of income level 3,000,001-5,000,000 however the number of household that can earn above 5,000,000 is seen that around 12% of the total respondents.. In the figure below, it is shown that the percentage of income level in the community level.

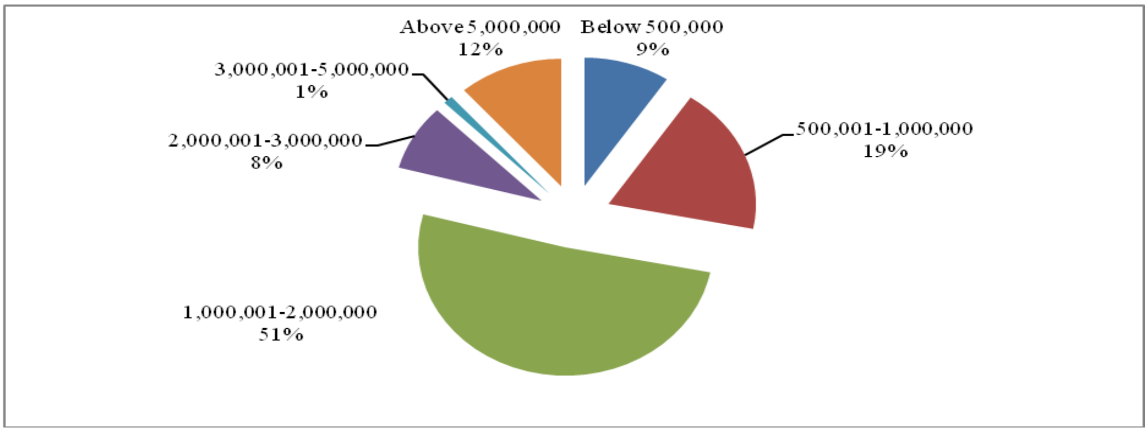


Figure 10.11: Percentage of annual income level in the surrounding community

10.4.3 Education

In terms of the education of the community, not only respondents but also the household members, majority up to 43% of people completed secondary level education. Then, around 34% of the total household received up to high school education, which is at second highest level. Even though the Government gives the opportunities for free education for primary and secondary level of education, around 3% of the population can get only basic education (Kindergarten) and around 10% of the total populations completed only primary education level. It is rare that the people who received the graduate level. It is to be noted that the education level in those areas is quite low. Currently, 67% of total household members send their children to government school. But 33% of household do not have the children going to school. 33% is without attending school due to some of the families who are not able to afford to send to school because they need to work.

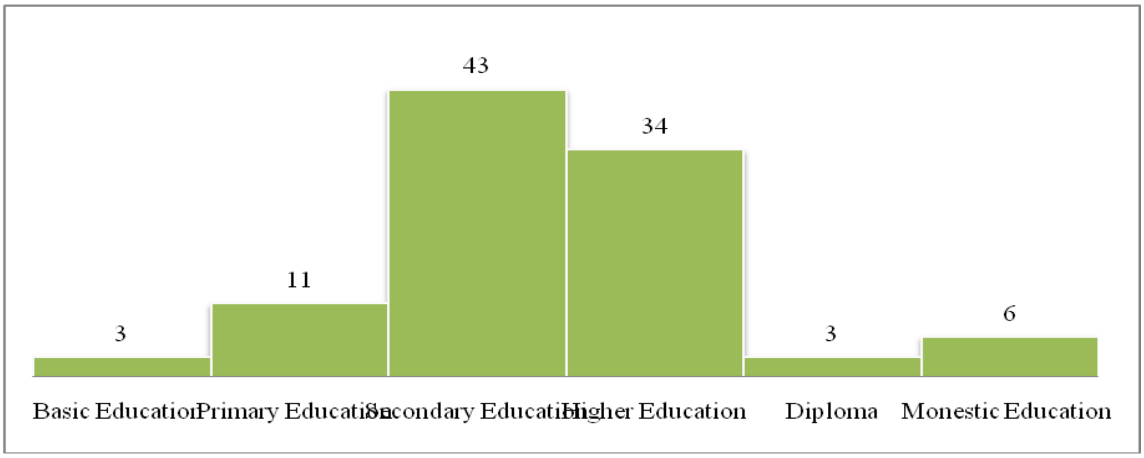


Figure 10.12: Different education levels of the community

10.4.4 General health, infectious and communicable disease problem in the community

To reveal general health and the issue of transmitted disease in the residents, the residents have been requested to the pre determined questionnaires.. Currently, up to 99% of the total respondents and family members as well are good in health. There is no disable person found among the family and no accidents and injuries happened in their family.. Only 1% of the households are having flu on the survey time... Up to 100% of total populations are aware of health care information.

Generally it seems that the heath condition of the community is quite satisfactory. For the infectious disease such as diarrhea, only 2% of the household have been exposed with diarrhea. Besides, among the 100% of the household, only 16% of the household occasionally gets health problem within their family. The other 84% of the household is in good in health.

Among the family, the highest condition of health issue is flu and around 33% of the total population was exposed. Then, the other health problem such as malaria, catch a cold, hypertension, disease of digestive system, disease of the skin, Muscle pain, eyes and tooth disease are in the range of from 1% to 7%. Up to 33% of the total population never suffers from any kinds of diseases. Thus, it is pointed out that population who live in the surrounding industrial area do not happen the major diseases. In the figure below, it presents the analytical result of health problem in the surrounding community of the industrial zone.

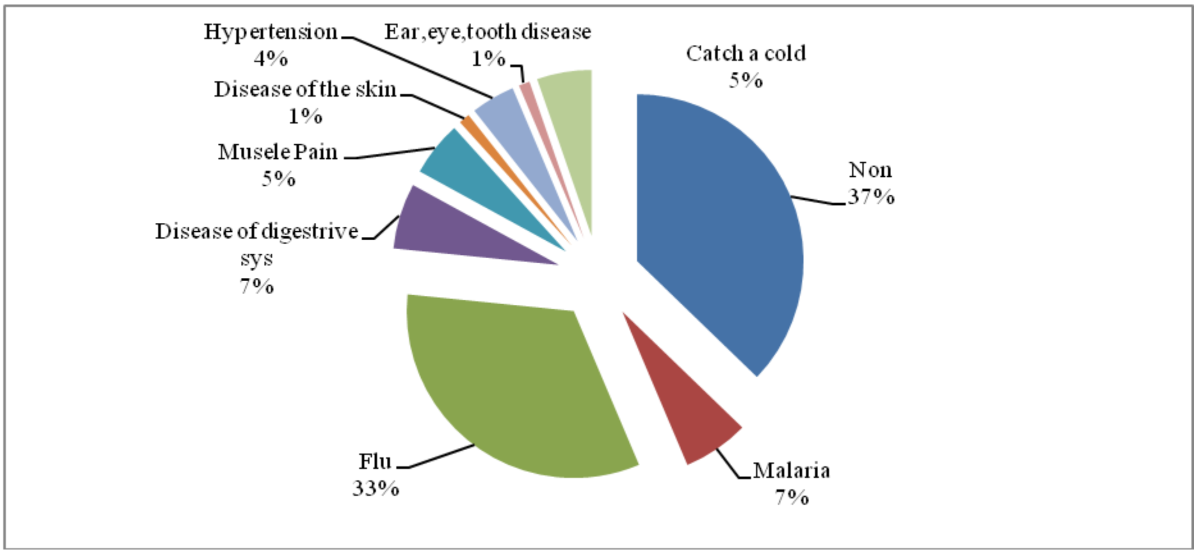


Figure 10.13: Different health problems of the community

10.4.5 Health care

For the health care, up to 97% of total household used to see the doctor if they have health problem, the remaining 3% of the population uses self-medicine. According to observation, there is a clinic near surrounding areas and opens daily. 4% of the household said that health care condition becomes improved; however 3% said that there are still some limitations. Others 92% of household said that they are satisfactory with the clinic.. For the Malaria disease, there is no incidence and likely due to using mosquitoes net. 99% of the total household uses mosquitoes net and only 1% do not use it.

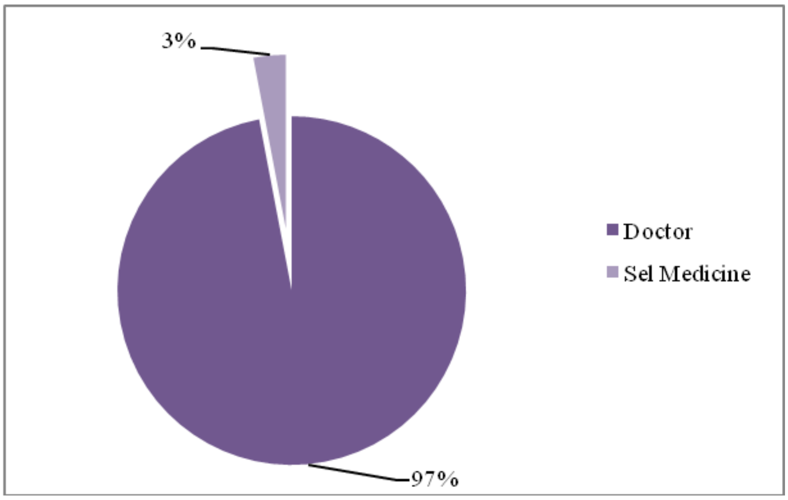


Figure 10.14: Usage of health care facility

10.5 Livelihood, infrastructure and resources

10.5.1 Household structure

In terms of the household structure, water sources, waste, and others infrastructures, 57% of the houses are one storey wooden house and 27% is a kind of hut. Only 15% is two storey mixed brick and wooden house and 1% is others structure. Some household have the approved documents of land but others are without official approved documents. All of the people who live in those areas are especially service worker. But, previously, some of the people used to be farmers and fishermen. Around 80% of total population are migrants from others places for livelihood and to get better life after the industry zone was developed.

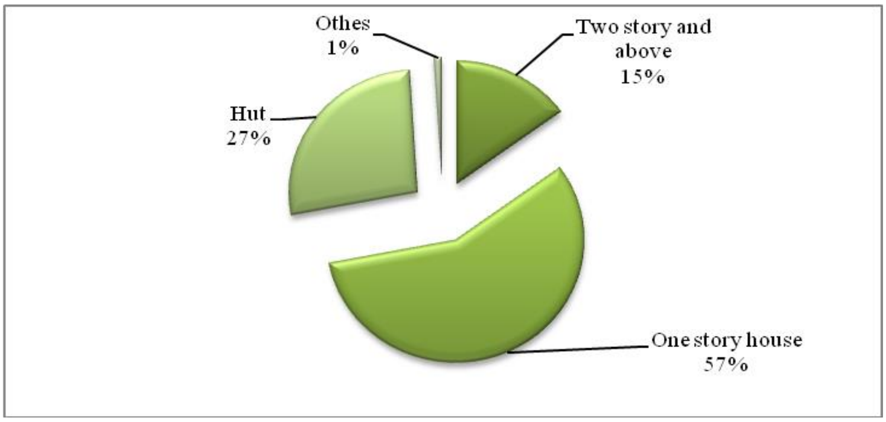


Figure 10.15: Types of housing structure

10.5.2 Infrastructures and resources

Looking at the infrastructures and resources, the findings are shown in the following section. Firstly, regarding the sources of electricity usage, the following figure shows the percentage of usage of electricity in the community areas.

10.5.3 Electricity, energy and usage

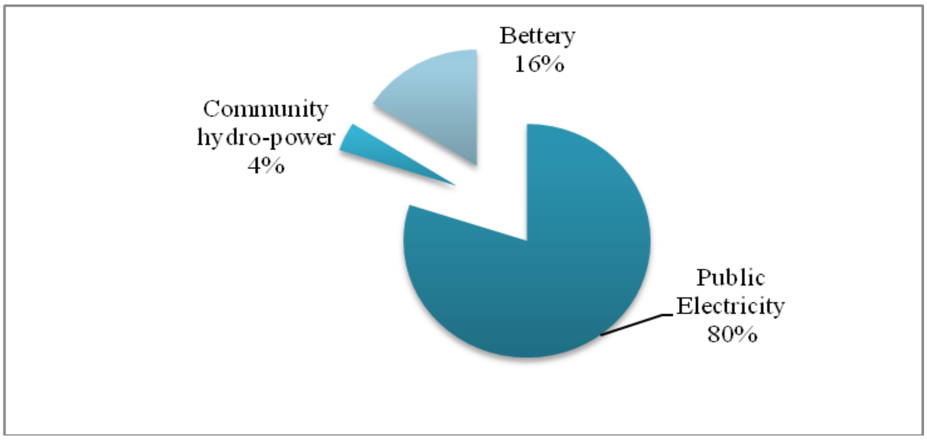


Figure 10.16: Percentage of the usage of electricity

According to the results, 80% of total household are using public electricity. Thus, it is noted that the usage of public electricity is quite improving in those areas. Then, among the rest of 20%, 16% of the household is using Battery for lighting, , 4% is using community hydro- power to get enough electricity.

After that, it is analyzed the issue of energy for cooking. In the following figure, it presents the percentage of energy usage in cooking of the community.

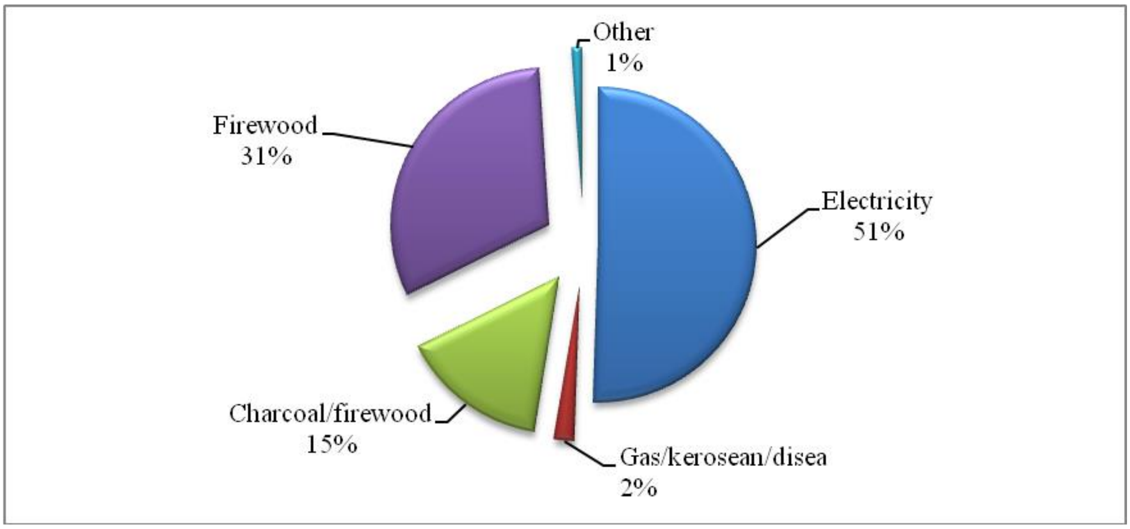


Figure 10.17: Different types of energy usage for cooking

According to the findings, the highest % of energy usage for cooking is electricity which is 51% and followed by firewood is 31% of the total usage of electricity. Then, followed by charcoal for cooking 15%, gas usage is 2% and others are only 1%. Thus, it was noted that only 50% of the total population gets enough electricity but the others residents who live in those areas cannot use electricity for cooking. They have to use especially firewood as energy for cooking.

10.5.4 Water usage

The following figure presents water usage of the surrounding areas.

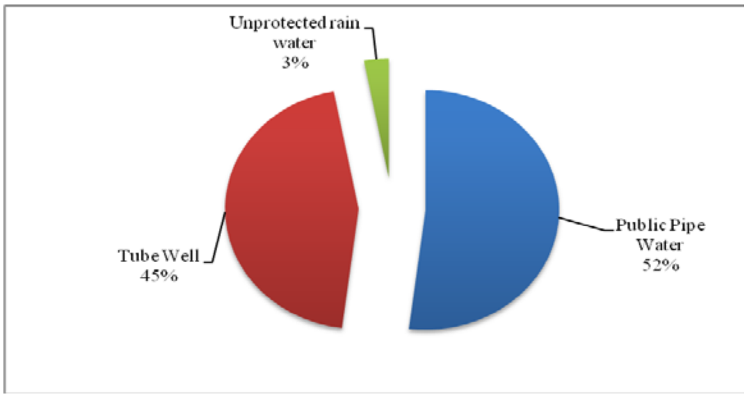


Figure 10.18: Different sources of water for the community

More than half of the population which is 52% of the total households depends on public municipal water. Then, it is noted that 45% of total population said they have to buy water from the tube well however, 3% of the total household said that they use unprotected rain water from the tank. They, the household said that they use protected dug well with rain water without any protect technique. According to the observation, , the water from the public water sources are not good in quality and it is contaminated with river water. Not only observation but also analysis, the color of the water is not much clear and not satisfactory as the potable water. However, they get used to do water cleaning and treatment system.

According to the analysis, , more than 90% of the household has to buy drinking water. For the issue of water treatment technique, there are 67% of the total population uses filtration method and 22% of the population uses boiling method. However, for the remaining 11%, they do not carry out any treatment before drinking. According to the interviews, until now, there is no evidence of transmitted diseases from water.

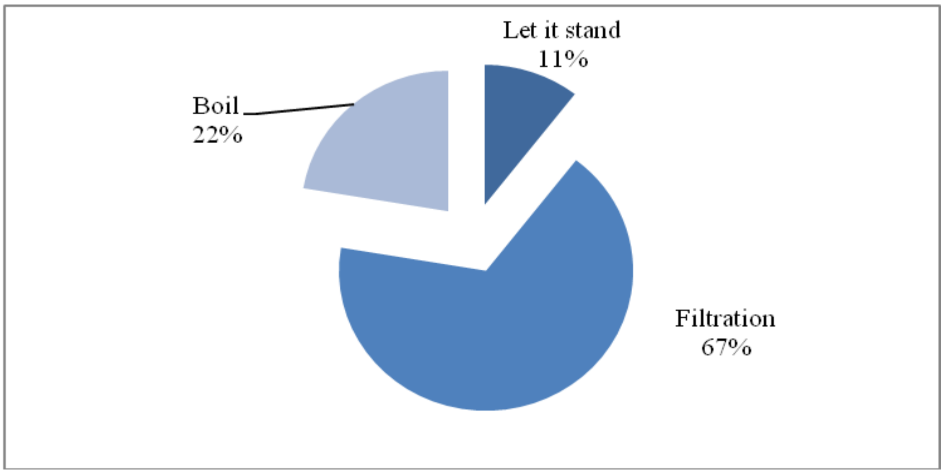


Figure 10.19: Different water treatments currently practiced by the community

10.5.6 Drainage system

Looking at of the drainage system in the community, it is found out the unsystematic drainage e system in the community. They said that this condition must affect on the underground sources of water quality. Besides, it is seen that there are lots of open dumping sites of the solid waste in the community areas. Even though, the municipal (YCDC) announced not to throw the waste surrounding areas, the community is not aware of that issue. Thus, it can be found out that their surrounding environment is quite unhygienic condition.

10.6 General environment of the surrounding community

To reveal the existing situation of the surrounding environment of the industrial zone,, the questions related to the natural habitats, wildlife decreased, population status, weather condition, food and income were analyzed. The following figure presents the general issues related to the environment.

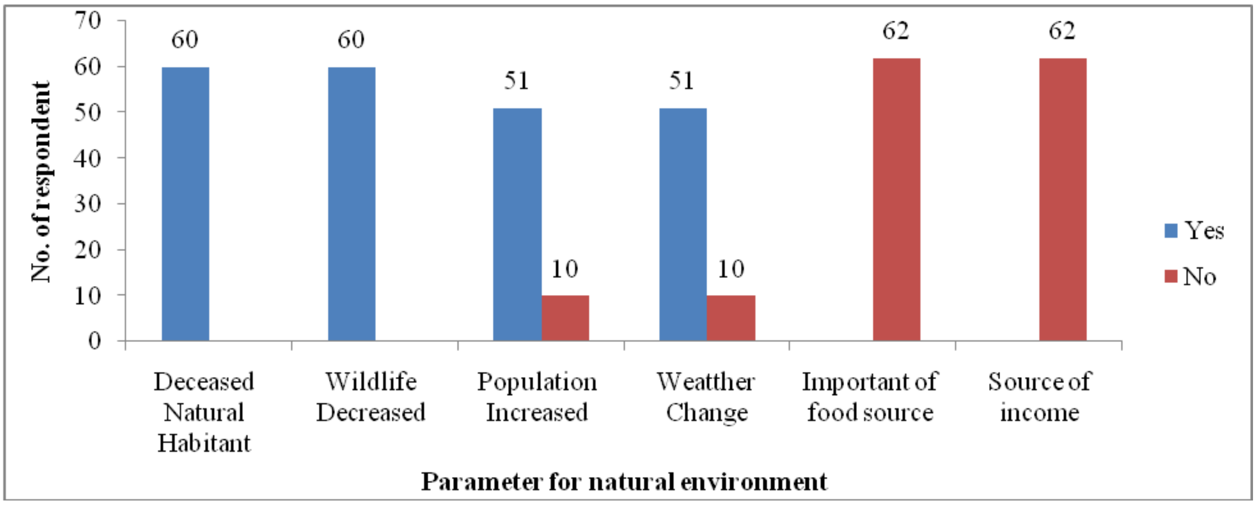


Figure 10.20: Industrial impacts on the general environment of the community

The entire questions related to the general environment have been answered by around 65% of the total respondents. 60% of total household said that the natural habitants become decreased within ten years. However, the remaining 40% of the household did not answer. As more than 50% population said yes, it seems that the natural habitants were changed significantly. For, the issue of wildlife, similarly, 60 % said that the wildlife decreased and the remaining 40% answered neither changed nor unchanged. Thus, it is pointed out that wildlife condition was changed and decreased. Therefore, it appears that there are certain impacts of the industrial zone on the wildlife of the surroundings.

In terms of population status the number of total people population are not significantly increased within ten years by nearly 51% of household, the only 10% of the household said that the number of total population are significantly increased within ten years. But according to the data, the number of total population becomes increased as the migrants from the other parts of the country..

Considering on the local climate in that region, around 51% of the total household said that within these years, they become experienced with heavy rain in the rainy season and extremely hot in the summer. However, the 10 % of the total households said that the weather condition in this region does not significantly change in the past up to now and the remaining 39% of the total population did not answer anything. Thus, it is assumed that the local climate has been significantly changed within these years.

Reviewing the wild plant and animals related to the food source in this local environment, up to 62% of the total household said that local wild life and animals are not related to the importance of sources of food. The others 38% of the household did not answer for this issue. According to this result, it can be concluded that local wildlife is not significantly related to the food sources.

Reviewing on the relationship between the wild plant and animals in this local environment and income, up to 62% of the total household said that their income does not come from the local wildlife and animals. Thus, it is noted that there is no significant relationship between local wildlife, animals and income.

Based on the findings of within 10 years, the condition of the general environment, such as natural habitat, wildlife, weather and population are significantly affected by the result of industrialization and globalization. But the others parameter such as food sources and income sources are not significantly affected by the activities of the industry zone and the people who rely on those areas.

10.7 Community perception on Premier beverage factory

In this section, various questions which reveal community’s perception, knowledge and awareness on the Premier beverage factory situated in the industrial zone are used for interviews on the selected household areas.

10.7.1 Awareness on the Premier Coffee beverage factory

There are four different levels regarding the awareness on the Premier beverage manufacturing factory. More than 50% of the total households do not know about each and different individual of all the industry from the industry zones but they know the coffee beverage factory. 19% of the total households know a little about the factory. But 30% of the household knows about some detail of the Premier Coffee beverage factory.

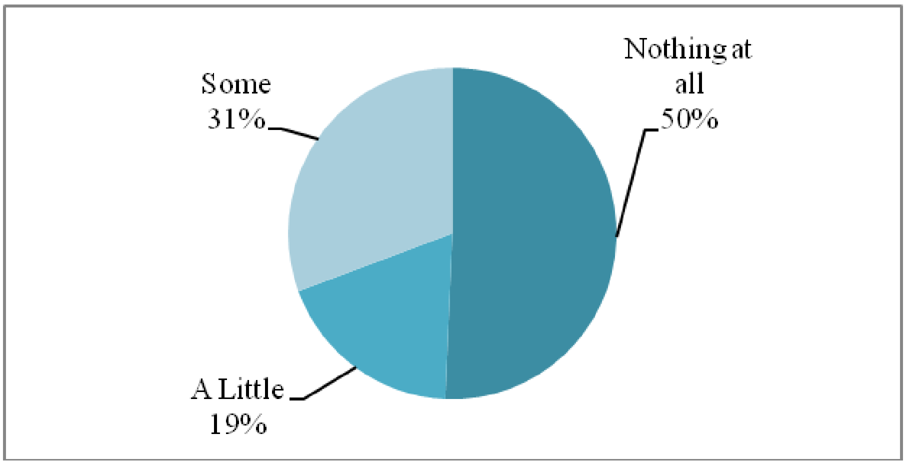


Figure 10.21: Awareness of the community on the Premier Coffee beverage factory

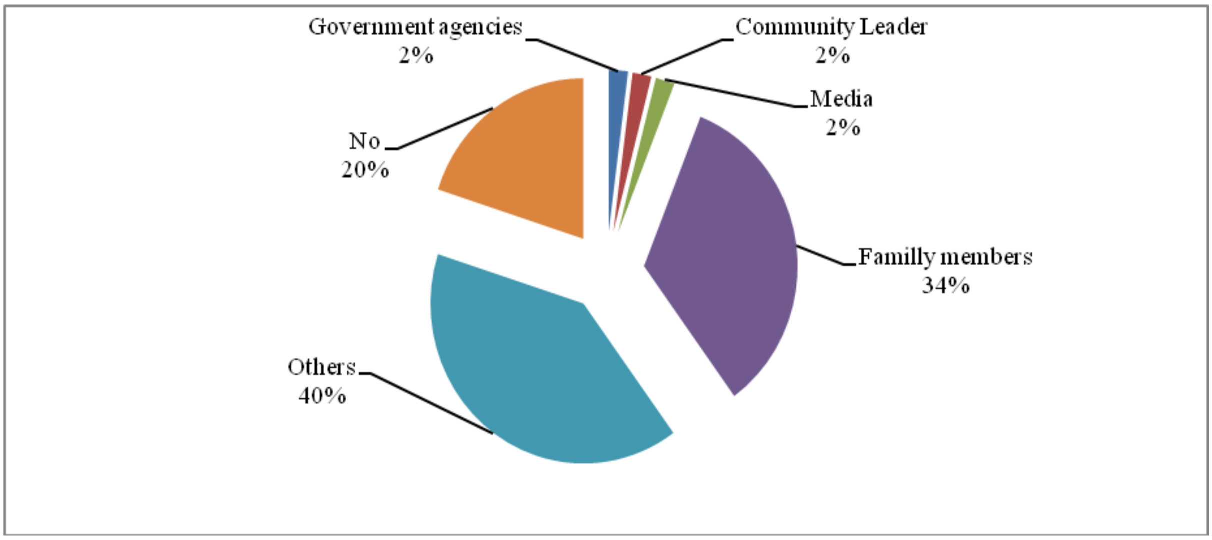


Figure 10.22: Information sources about the Premier beverage factory

The majority (40% of the population) are working in this industrial zone. Thus the highest percentage knows well themselves, 34% from the family members, 2% from media, another 2% from government agencies and the others 2% is from community leaders. The remaining 20% knows nothing about the premier factory..

10.7.2 Perception on importance of the beverage factory

The figure shows that the percentage of the level of importance of the industry on the community.

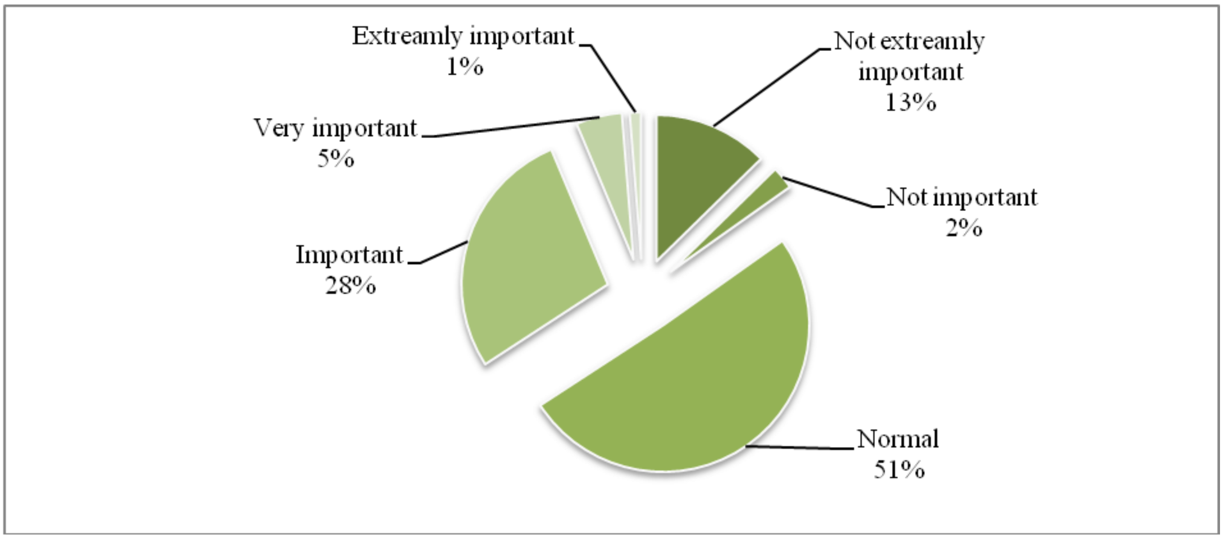


Figure 10.23: Community perceptions on the level of importance of the industry on the community

Based on the findings, among the households, about 51% said that they have no specific impact of the industry on their livelihood.. However, 24% of the total households relies on the industry zone and they said that this factory is significantly important for their livelihood. The rest 15% said this factory is not extremely important for them. However, according to the findings, almost 80% of the total population income is depending on the industrial estate.

10.7.3 Impact of the industry on the community's livelihood

For the issue of effect on the natural environment by the industry, the figure mention below shows community's perceptions of the impact on the environment by the industry zone.

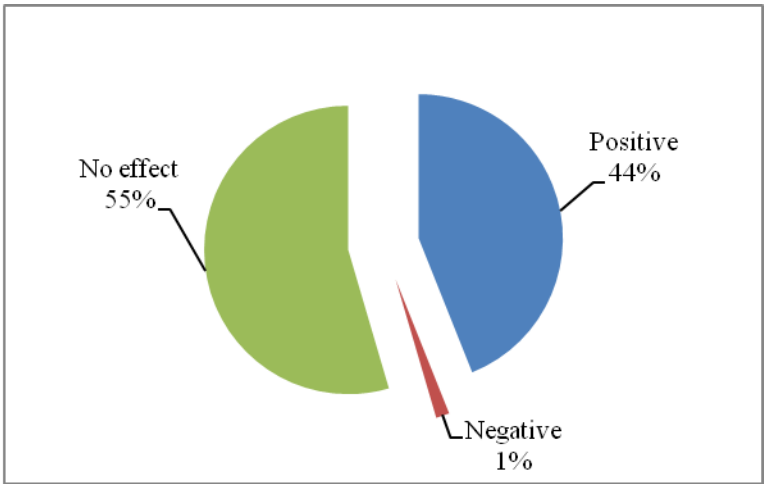


Figure 10.24: Impact of the industry on the community livelihood

Among the total household, 44% of the household said that there is the positive impact on the environment by the industry. However, 1% of the household said that it has negative impact on the environment. Then, up to 55% of the total household said that there is neither positive nor negative impact on the environment because of this industry project.

And then, analyzing of the issue of good factors due to the improvement of industry to the community is discussed. The following figure presents the community perception on the improvements by the industry.

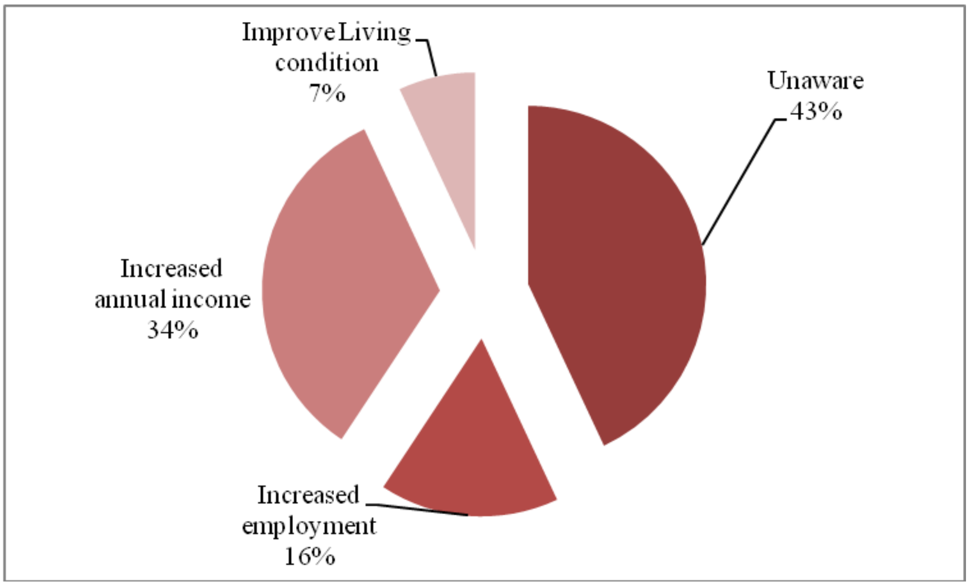


Figure 10.25: Community perceptions on the improvements due to the industry

In the issue of improvements by the development of the industry, above figure shows the percentage of positive impact on the community. The total 57% of the total household said that there are some of the positive impacts in different sectors. Among 57% of respondents, , it showed that 16% pointed out the increasing employment, 34% pointed out the increased annual income,7% shows living condition. However, 43% of the household are not aware of the industry how much it gives any improvement for their lives and their income.

10.7.4 Perception on the development of the project

Finally it is needed to know community's perceptions on the development of the industries. The figure below shows the perceptions of the respondents on the development of the industry.

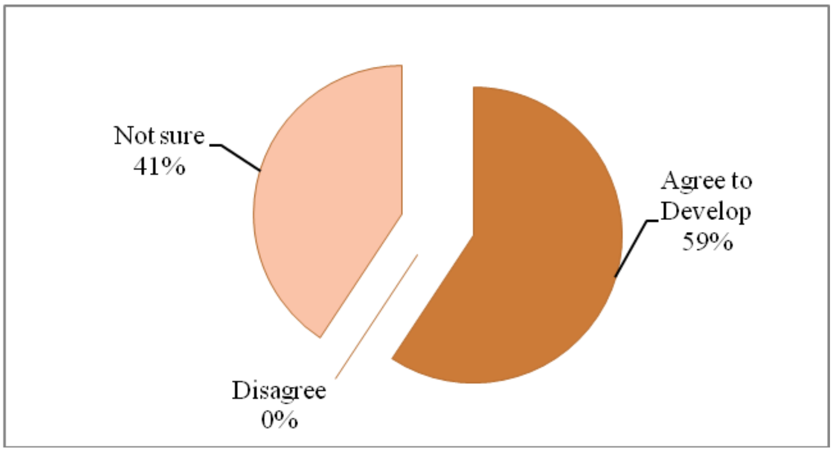


Figure 10.26: Community perceptions on the industrial development

More than 59% of the total households said that they agree with the new development of the industrial zone because of the good opportunities of more income and more job opportunities. But 41% of the household said that they are not sure in the development issue of the industry because this issue is much affected on their lifestyle and agreement is depended on the stakeholders the organization community. No one said that they do not agree in the project of develop issue on the industrial process.

In terms of the impact of the industry on the community, most of the residents explore the positive perception.

10.8 Perception on the industrial impact on the socio-economic status

It can be found out that there are five different categories such as the effects of physical resources, biological resources, human use, quality of life and cultural heritage. All the data will be analyzed by seven levels such as very negative, negative, slightly negative, no effect, slightly positive, positive and very positive.

10.8.1 Physical resource

Physical resource is one of the main important factors for all living organisms. It is included five main different categories which are soil quality, surface water quality, ground water quality, air quality, and noise level. For all these different categories, the following figure shows the outcomes.

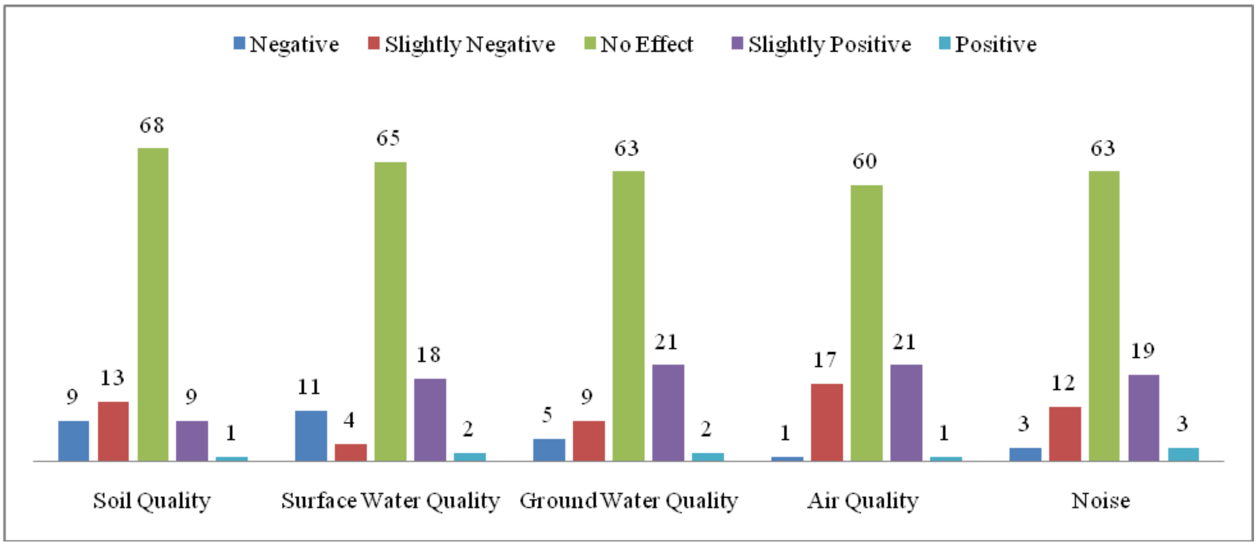


Figure 10.27: Perception on the industrial impact on physical resources

10.8.1.1 Soil quality

Firstly, soil quality is discussed based on people perception and attitude. There are only five levels of response. Only 9% of the total households said that soil quality was negatively affected. 13% of the total household said that there is a slight negative impact by the development projects but 10% of the total household said that soil quality becomes slight positive However, up to 68% of the household mentioned there is no effect on the soil quality by the industry.

10.8.1.2 Surface water quality

Secondly the issue of surface water quality was analyzed. There are five levels of response. Around 11% of the total households said that surface water quality was negatively affected. The only 4% of the total household said that a slight negative impact because of the action of development projects but 4% of the total household said that surface water quality becomes slightly positive. However, up to 75% of the household mentioned there is no effect on the surface water quality by the industrial activities.

10.8.1.3 Ground water quality

There are four types of response. Only 1% of the households said that the ground water quality was very negatively affected by industrial activities and another 1% of the total household said that ground water quality was negatively affected and 17% of the total household said that slightly negative impact by the development projects. However, 8% of the total households said that ground water quality becomes slight positive and then, up to 73% of the household mentioned responded that there is no effect on the ground water quality by the industry.

10.8.1.4 Air quality

In the air quality, there are four different levels of response. Only, 2% of the total households said that air quality was negatively affected and 24% of the total households said that a slight negative impact. But 8% of the total households said that air quality becomes slight positive. However, up to 66% of the households mentioned that there is no effect on the air quality by the industry.

10.8.1.5 Noise quality

There are only four levels of response. Only, 3% of the total households said that noise level was negatively affected and 18% of the total households said that a slight negative impact by the development projects but 5% of the total households said that noise level becomes slight positive. However, up to 74% of the households mentioned that there is no effect on the noise quality by the industry.

Therefore, according to the above findings, it was assumed that all the environmental parameters as such soil, surface water, ground water, air and noise qualities were not being significantly affected. However, these findings are resulted maybe from the community's lack of environmental awareness on their surrounding resources.

10.8.2 The effects biological resources

Biological Factors are one of the main important factors in the planet. It is composed of five main different categories which are Forestry, Agriculture, Local animals, Pasture and Aquatic animals. For all these different categories, the following figure shows the findings.

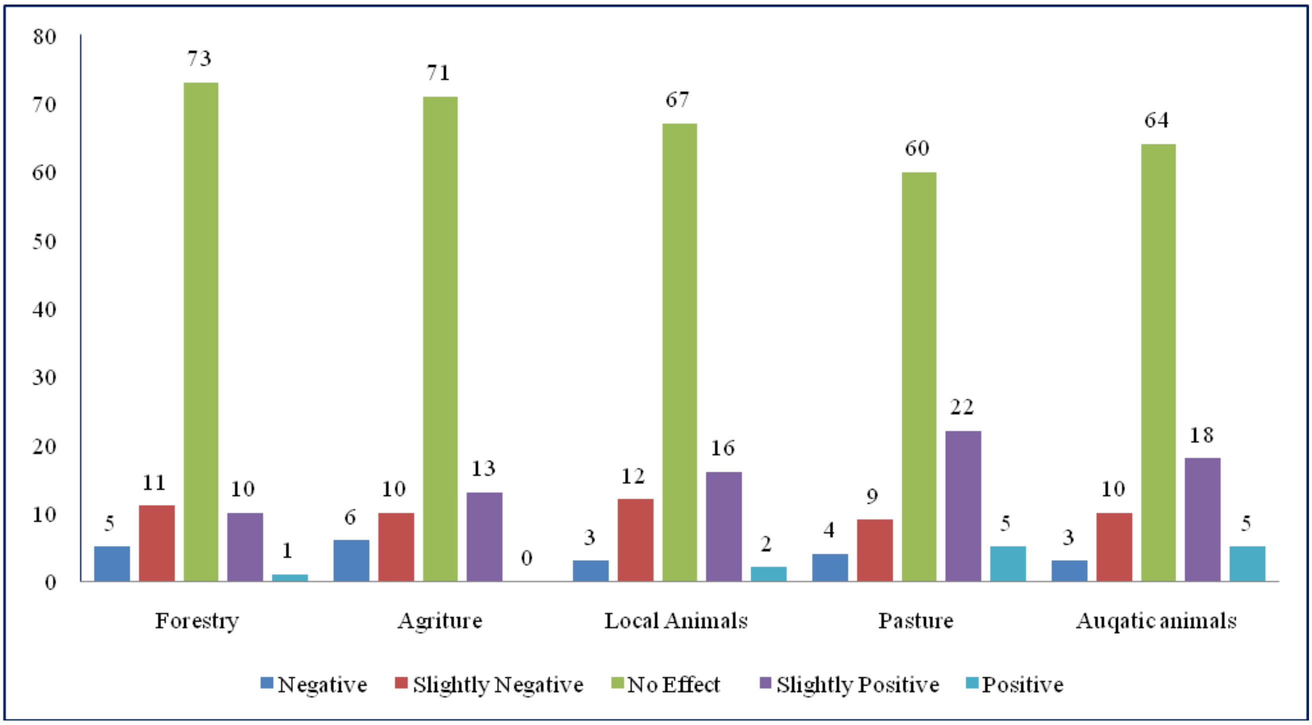


Figure 10.28: Community's perception on the industrial impacts on biological resources

10.8.2.1 Natural forest

First and foremost, natural forest condition is discussed based on people perception and attitude. In the natural forest, according to the findings, , there are only five levels., 5 % of the households said that natural forest was negatively affected and 11% of the total households said that it has a slight negative impact by the development projects. However, up to 73 % of the households mentioned that there is no effect on the natural forest by the industry but 10% of the total household said that natural forest move to as a slight positive and 1% said it was moved to positive. Therefore, majority thought that there is no effect on their surrounding natural forest areas by the industry developments.

10.8.2.2 Agriculture

According to the findings for n the issue of agriculture system, land and land use, there are only four levels of responses. According to the findings, around 6% of the total households said that agriculture land and land use was negatively affected and around 10% of the total households said that slight negative impact because of the action of development projects but 13% of the total households said that agriculture land and land used become slight positive. On the other hand, up to 71% which is the highest number of the household mentioned there is no effect on the agriculture land of their community by the industrial process.

10.8.2.3 Local animals

According to the findings for the issue of local animals, there are five types of responses. Only 3% of the total household said that local animals were negatively affected. 12 % of the total household said that a slight negative impact by the development projects. However, 16% and 2% of the total household said that local animals become slight positive and positive changes respectively, then, up to 67% of the household mentioned that there is no effect on the local animals by the industry. Thus, the highest % of the household said that because of the industrial process there is neither negative nor positive impact on local animals.

10.8.2.4 Pasture

Another biological parameter is pasture which is significantly important for the lives of the community. There are also five different levels of response in the findings. Only, 4% of the total household said that pasture was negatively affected and 9 % of the total household said that a slight negative impact. On the other hand, the total % of respondent who answer Pasture condition is moved to slightly positive and positive are 22% and 5% respectively.. However, up to 60% of the household mentioned that there is no effect on the pasture by the industrial process. Thus, it can be pointed out that pasture condition in the local community has no much deviation.

10.8.2.5 Aquatic animals

The findings for the issue of aquatic animals, there are also five different levels of responses. Only , 3% of the total households said that aquatic animals was negatively affected and 10% of the total households said that a slight negative impact by the development projects but total 18% and 5% of the total households said that aquatic animals becomes slight positive and positive condition respectively. However, up to 64% of the household mentioned that there is no effect on the aquatic animals by the industry.

Therefore, according to the people perception, less than 20% of total household said that biological conditions are negatively affected by the industrial developments ; however, above 60 % of the total household said that there is no effects on the natural environment. Thus, it can be assumed that there is less impact on the biological environment by the industry and its activities.

However, these findings are resulted maybe from the community's lack of environmental awareness on their surrounding resources.

10.9 Effects of the human use

Human factor is the main issue of the social impact assessment. In terms of human use based on people perception, the main eight different categories which are local fisheries, local livestock, local vegetation, local industry, local transportation, local price, recreation and local economy were focused. The following figure shows the outcome from the people.

10.9.1 Local fisheries

Firstly, it was discussed that the issues of local fisheries based on people perception and attitude. Based on the findings, livelihood on fisheries is rare in the surrounding of the industry. There are only five different levels of responses. 1 % and 13% of the household said that local fisheries are negatively and slight negatively impacted by the development projects. As the contrast, around 19% and 8% of the total households said that local fisheries become slightly positive and positive level respectively. However, up to 59% of the household mentioned that there is no effect on the local fisheries by the industry. Thus, it can be said that there is neither negative nor positive impact by the industry.

10.9.2 Local livestock

In local livestock issue, there are six different levels of responses were found out. Total 10% of the total households said that there is slight negative and negatively impact because of the action of development projects but 28% of the total households said that local livestock becomes slight positive, positive and very positive. On the other hand, up to 62% which is the highest number of the household mentioned that there is no effect on the local livestock by the industrial process.

10.9.3 Local vegetation

In local vegetation, there are five different types of responses. 12 % of the total households said that local livestock is slight negative and negatively impacted by the development projects however, 27% of the total household said that local livestock becomes slight positive and positive condition. On the other hand, up to 61% of the household mentioned there is no effect on the local livestock by the industry. If it is compared with all levels of the results, the highest percentage of the household responded that there is neither negative nor positive impact on local livestock.

10.9.4 Local Industry

In the issue of local industry, only 3% of the total household said that local industry was negatively affected and 15% of the total household said that there is a slight negative impact. But 23% of the total household said that local industry becomes slight positive and 3% of total household said that the condition of local industry was positively improved. However, up to 56% of the household mentioned that there is no negative impact by the industrial process.

10.9.5 Local transportation

Most of the people who live in the nearby area of the industry are depending on public transportation for the longer distance. Generally, they used to walk and cycle within their quarter. Regarding of the perception on local transportation related to the industry, there are four different responses. Only, 4% of household said that local transportation was negatively affected and 8% said that there is a slight negative impact by the industry. But 18% of the total household said that local transportation becomes slight positive and 8% of the total population said that it was moved to positive. However, up to 62% of the household mentioned that there is no effect on local transportation by the industry.

10.9.6 Local price

Being importance for local human and economic status, the issue of local price was analyzed. There are six different responses. The total 16% of the total households said that local price is slight negatively impacted and negatively impacted by the industry. However, up to 36% of the total household said that local price has a slight positive, positive and very positive condition. However, the remaining majority 48 % of the households mentioned that there is no effect on the local price by the industry.

10.9.7 Recreation

Recreation factor is also discussed as one of the important factors. The overall 12% of the total households said that it is slight negatively and negatively impacted by the industry. On the other hand 36% of the total household said that recreation condition becomes slight positive, positive and very positive. Majority 52% of the households mentioned that there is no effect on the recreation for the local community by the industry.

10.9.8 Local economy

Local economy factor is also discussed as one of the important factors. 14% of the total household said that it is both slight negatively and negatively impacted by the industry. Besides, total 21% of the total household said that local economy condition becomes slight positive, positive and very positive. Majority 65% of the household mentioned that there is no effect on the recreation for the local community by the industry.

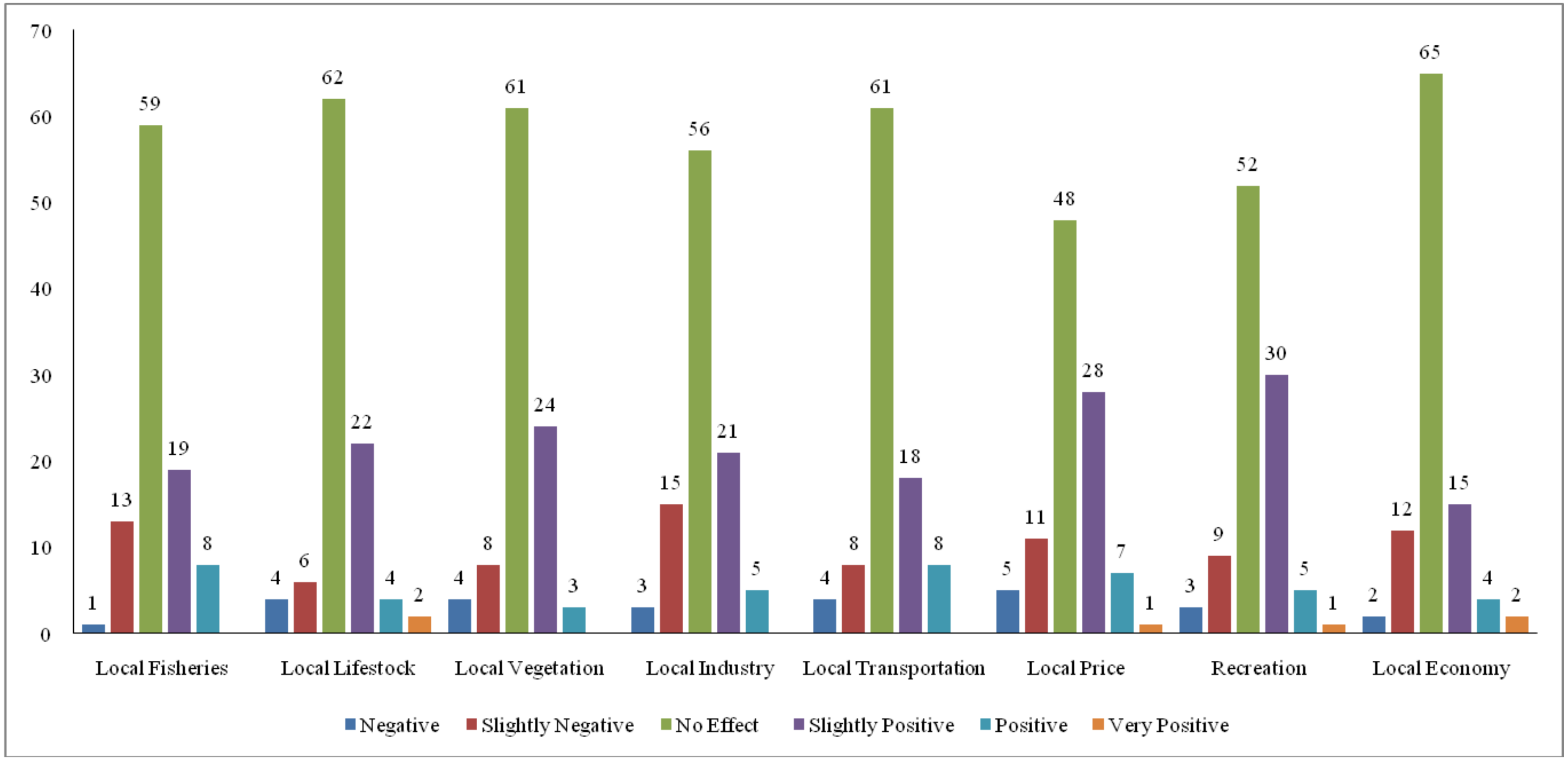


Figure 10.29: Perception on impact of human use by the industry

10.10 The Effect on the quality of life

In the perception of the industrial impact on the quality of life, there are 11 different parameters in this section. These are housing, health, education, spiritual, safety, crime, family structure, job opportunities, income, scenery and local culture. The following figure shows the all findings that received from the public perception and attitude survey.

10.10.1 Housing condition

In the condition of housing of the community, around 12% of the households responded that their housing condition is slightly worse. However, 21% of the households said that they get better condition of housing and better life. Besides, the remaining 67% of the households said that there is neither negative nor positive effect doe to the industry. Thus, it is assumed that industry does not have both negative and positive impact on the housing condition of the nearby community.

10.10.2 Health impact

People perception on health impact is analyzed. Around 13% of the household responded that their health care condition becomes worse which means that it becomes negative and slightly negative. However, 23% of the household said that they get better health care during these years. Besides, the remaining 63% of the household said that there is neither negative nor positive impact due to the industry. According to the above findings, it can be found out that there is no significant relationship between the healthcare of the nearby community and the industry.

10.10.3 Education status

According to the analysis, 64% of the total household said that there is neither negative nor positive impact on Education by the industry. But 24% of household said that they can more provide the education from the income from the industry. 12 % of the household said that their education condition becomes slightly negative. Based on the findings, the industry does not significantly affect on the community’s education.

10.10.4 Spiritual condition

In the spiritual condition of the household, it is said that around 15% of the household responded their spiritual become is slightly moved to negatively impact. However, 58% of the household said that there is no both negative and positive effect because of the industry. Besides, the remaining 27% of the household said that their spiritual condition is moved to slightly positive, positive and very positive. Thus, it is mentioned that industrial process has neither negative nor positive impact in spiritual life for the people.

10.10.5 Safety

Safety is also one of the main parameters of the social impact. Around 11% of the household responded that their safety condition is slight negatively affected but another 41% of the household said that safety becomes slightly positive and positive. The remaining 48% of the household said that there is no change due to the industry. Thus, it appears that there is no significant impact on safety issue of the residents due to the industry.

10.10.6 Crime

Moreover, the crime problem is one of the issues of the quality of life. Around 14% of households replied that some of the crime problems used to happen among their community. Thus, they said that crime problem becomes slightly worse. Then, another 32% of the households said that there is no crime within these days. However, the total 54% of household said that there is no change and effect on crime because of the industry. Thus, it appears that the industry has no impact on their lifestyle related to crime.

10.10.7 Family structure

According to the public attitude analysis, more than half of the total population which is 52% of the total households said that there is neither negative nor positive effect on family structure due to the industry. And it was followed by 35% of household who said that their family structures become slightly improved and move to positive and very positive because of the effect of industry. However, 13 % of the household said their family structure is slightly negative. Due to the mentioned above, the industry does not significantly change on the family structure of the nearby community.

10.10.8 Job opportunity

Job opportunity is one of the main important factors to change the quality of life. 55% of the total household said that there is neither negative nor positive effect on job opportunities by industry. But 35% of household said that they have more chance for job opportunities because of the industry. However, 10 % of the household said that their job opportunities become less. Based on the above findings, generally, the industry cannot give more chances of job opportunities for the all nearby community.

10.10.9 Income

In the issue of income, 59% of the total household said that there is neither positive nor negative effect on income level by the industry. But 35% of household said that they are very happy because they can earn more income because of the effect of industry. However, the only 6 % of the household said their income level becomes slightly negative. Based on the mentioned above, the industry does not significant change on the income of all local people but it has a slight deviation.

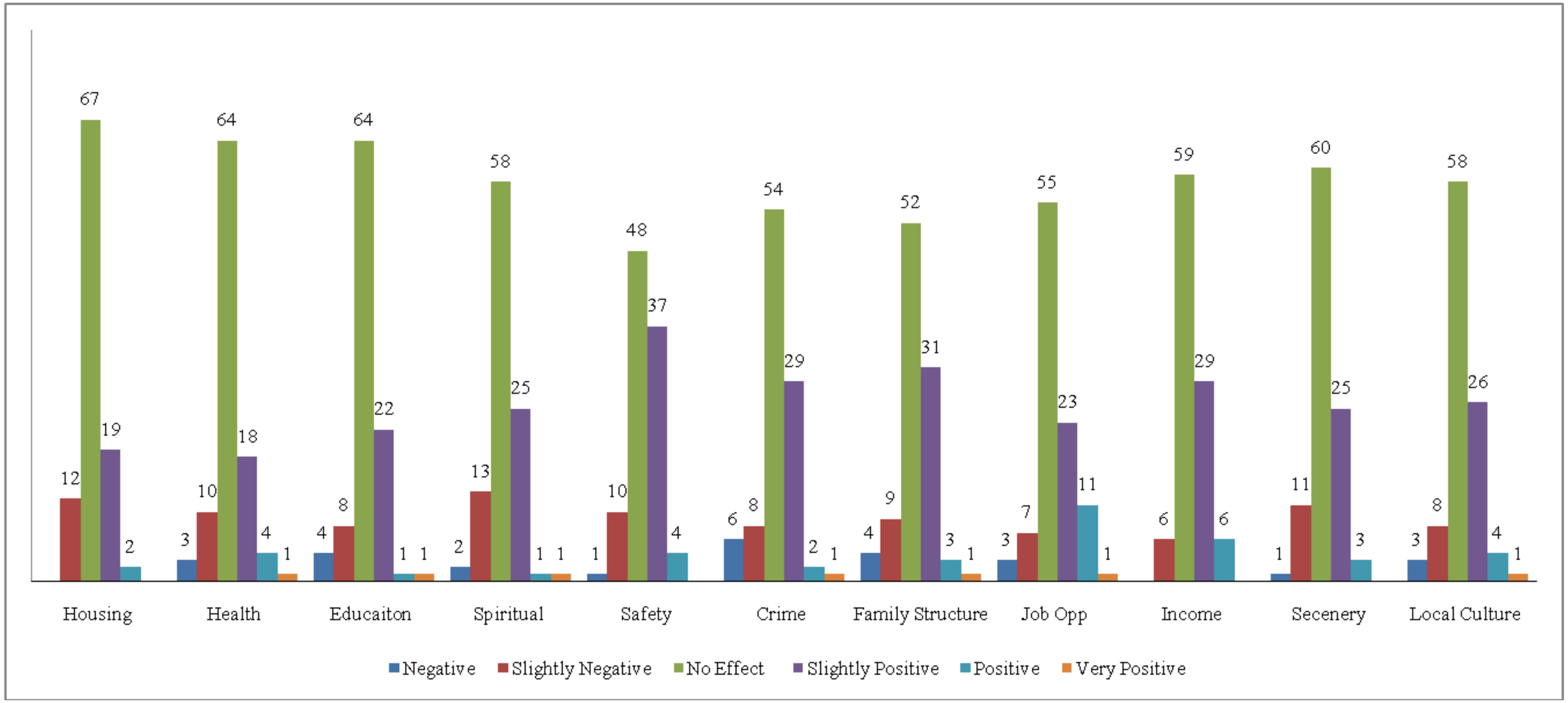


Figure 10.30: Perception of the industrial impact on the quality of life

10.10.10 Scenery

In this issue, the highest percentage f households which are 60% said that their surrounding areas have neither positive nor negative impact by the industry. Around 12% of household said that their surrounding areas become bad situation within these years. However, 28 % of the household said their scenery quite becomes very nice situation. According to the analysis, it shows that there is no significant relationship between and the industry and the effect of the scenery.

10.10.11 Local culture

According to the data, 11% of the total households said that industry has slight negative effect but 31 % of the total households said that local culture changed to slight positive, positive and very positive condition. Up to 58% of the household mentioned that there is no effect on the local culture by the industry.

Reviewing back all findings for the quality of life, the range of household from 10-13% said that there is no improvement and there are some of the negative impacts as well on their quality of life. However, in the range of 20% to40% of the total household said that their quality of life becomes slightly improved as the result of the industry. But, the largest amount of the household said that there is no effect by the industry. Thus, it appears that the industry has neither positive nor negative impact on the community’s quality of life.

10.11 The effect on cultural heritage

The effect on cultural heritage is also included as a common factor for the impact by the industry. In the issue of the cultural heritage, the main three different parameters such as Religious Building, Cemetery, and Historic Building were analyzed. The following figure shows the community perception on the cultural heritage and impact by the industry.

10.11.1 Religious building

Religious buildings are very important for all religions of the people. Thus, its issue was included a part of the cultural heritage. Only, 11 % of the total households said that religious building becomes slightly negative and negatively affected by the industry. As a contrasts, 20 % of the total households said that religious building becomes slight positive, positive and very positive condition. However, the large population which is 69% of the household mentioned that there is no effect on religious building by the industry. Thus, it appears that the religious buildings do not significantly change because of the industry.

10.11.2 Cemetery

Cemetery is also discussed in one of the important factors as a part of cultural heritage although 13% of the total household said that it has slight negative impact by the industry because the entire local cemetery has been moved to only one area, around 20% of the total household said that the situation of cemetery becomes slight positive. Up to 67% of the household mentioned that there is no effect on the Cemetery of the local community by the industry. Therefore, it can be assumed that there is no significantly change on cemetery due to the effect of industry.

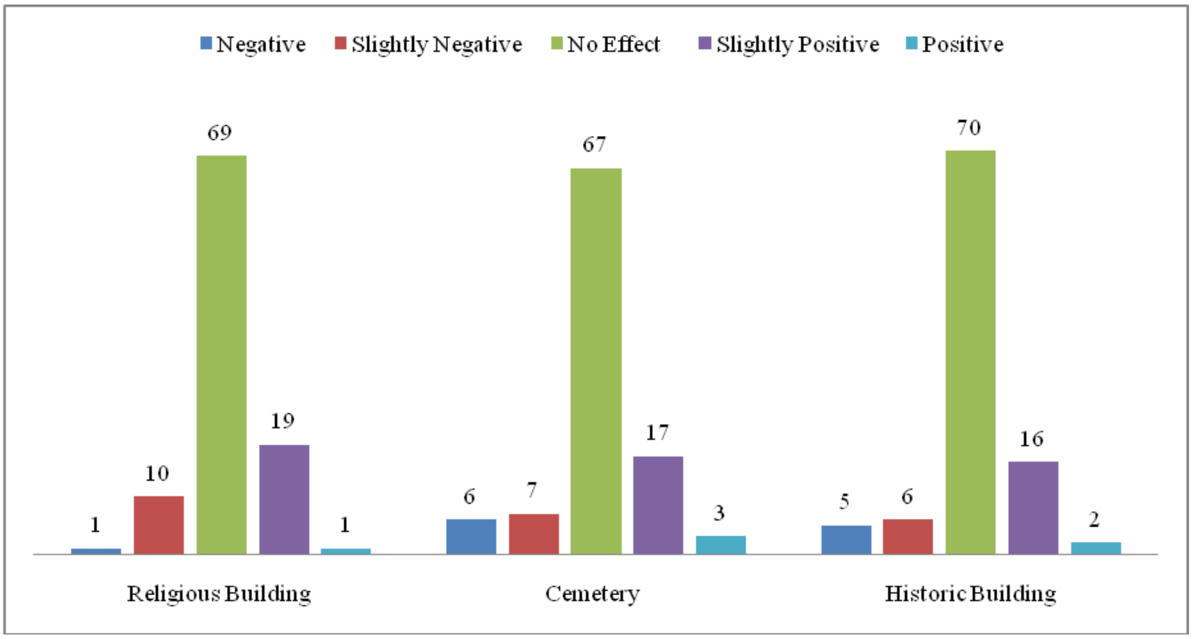


Figure 10.31: Community's perception on the industrial impact on cultural heritage

10.11.3 Historic building

In the issue of Historic Building, only 11% of the household said that the industry has slight negative and negative impact on historic building however, 18% of the total household said that historic buildings become improved a slight positive. Up to 70% of the household mentioned that there is no effect on historic building for the local community by the industrial process. Thus, it can be said that historic buildings around have no impact by the industry.

Looking back to all findings related to cultural heritage, , less than 13% of household said that there are some of the negative impacts on the cultural heritage for community however, nearly 20% of the total household said that their cultural heritage becomes slightly improved as the result of the industry. But, the largest amount of the household said that there is no effect on that. Thus, it can be concluded that the industry has neither positive nor negative impact on the cultural heritage of the nearby community.

10.12 IEE Stage Public Consultation

Lluvia Limited BEVERAGE (coffee,Tea and Milk powder) and EQM conducted the Public consultation meetings with government and local officials for Hlaing Thar Yar Township, representative of zone committee and local communities of five quarters within AOI of the project site following ECD advised protocol.

The Public Meetings were held on 27th, December, 2023.

Lluvia Limited BEVERAGE (coffee, Tea and Milk powder) and EQM completed the public consultation meetings to ensure that key stakeholders are aware of the planned project activities and any comments and concerns that have made will be considered as part of the IEE

and Environmental Management Plan.
The public consultation meeting was conducted as per the following schedule.

Date : (27.12.2023, Thursday)
Time : 10:00- 11:30
Venue: Meeting Room of Lluvia Co., Ltd, No. 108 (A)၊ 108 (B), Quarter (3), Hlaingtharyar Industrial Zone, Hlaingtharyar Township, Yangon, Myanmar.

Table 10.1: Meeting Agenda

Date	Time	Meeting	Stakeholders Covered/Township	Number of Attendees
12th Dec, 2023	10:00 – 11:30	Lluvia Co.,Ltd, Meeting Room	• Hlaing Thar Yar Township Administration • Heads of Township • ECD • Health Dept. • Fire Services Dept. • Head and Representative from Zone Committee • Neighbor Factories • Other Interested Factories • Local Communities of five quarters • EQM	27

The meetings included the following agenda:
1. Opening of Public Consultation meeting
2. Introductory and presentation by Lluvia Co.,Ltd representative Daw Zin Mar Aung, Factory Manager
3. Presentation about **"Summary of Initial Environmental Examination on Lluvia Limited BEVERAGE (coffee, Tea and Milk powder)"** by Daw Win Thida Khine (EQM)
4. Questions and Answers
5. Closing Comment by Staff Officer, ECD, Hlaing Thar Yar Township, Western Yangon District

The respective stakeholders raised the following concerns and questions during Public Consultation Meetings as detailed in the following table. The meeting minutes are included in Annex III.

Table 10.2: Key Points from Public Consultation Meetings

Key Questions / Comment	Response	Mitigation Measures
Has your company submitted the revised IEE report in accordance with the comments from the Environmental Conservation Department?	In compliance with the agreement made with ECD on August 27, 2023, Environmental Quality Management Co., Ltd is currently in the process of preparing the IEE report in alignment with the provided comments. We assure you that we will submit the report no later than February 2024, as committed during our signing at the ECD office.	•
Does your company know that monitoring reports need to be submitted biannually to the Environmental Conservation Department (ECD)?	Yes, we are aware of the biannual monitoring reports that will be submitted to the Environmental Conservation Department (ECD) following the receipt of the approval letter.	•
Based on your presentation, the air quality results for this factory have already been continuously monitored for 24 hours. Considering this schedule requires continuous monitoring, can the factory accommodate the associated costs?	We conducted continuous monitoring for 24 hours within a single day, not as a daily occurrence. Furthermore, the air monitoring will specifically be carried out continuously for 24 hours at each selected location.	•
Has your company included the estimated cost for the environmental management plan in your IEE report?	Yes, we are currently in the process of preparing the estimated costs for air/odor, noise, waste (solid and hazardous waste), portable & wastewater, occupational health & safety, and community health & safety in this IEE report.	•
I wanted to know the specific location of the factory's drainage outlet, as wastewater discharge has the potential to impact Panhlaing River and lead to pollution.	Considering the process of the factory, there is no industrial wastewater effluent. However, there is some domestic wastewater generated from the canteen. The factory's drainage outlet is strategically positioned at the lower side of the factory area to facilitate	• Using Sand Filtration System at the factory outlet drainage. • Minimizing unnecessary water usage • Planting around a factory.

Key Questions / Comment	Response	Mitigation Measures
	an efficient water drainage system, particularly after the removal of solid waste, including oil and grease.	
To avoid encroachment in the space behind the factory, it is advisable for the factory to seek a permit from the Department of Water Resources and Rivers Development for extending the construction of the factory drainage outlet.	To address the encroachment issue in the back side of the factory, we will submit a report to the Head of the factory.	• Inform to the Head of factory if the encroachment issue in the back side of the factory occur. • Need regular check about the encroachment issue in the factory area.
I am interested to know about the wastewater treatment system employed by the factory, and I would also like to inquire about the expected lifespan of the sand filter in the proposed treatment system.	The factory is in the process of implementing a wastewater treatment system, utilizing either Sink Filter or Kitchen Wastewater Oil and Grease Trap, Rice Husk Ash Filtration (Phwepyar), Sand Filtration, Gravel Filtration, and Chlorination. For the sand filter, its usage is recommended for up to 3 months, depending on the volume of waste generated, in alignment with the factory's characteristics.	
Considering the factory's nature, there is no industrial wastewater generated; however, there is a discharge of certain types of domestic wastewater. I would like to suggest that the current wastewater treatment system in your factory is adequate, given the process of the facility, which does not align with an extensive wastewater treatment system.	-	

Table 10.3: Attendance List for officials of government organizations, Hlaing Thar Yar Township, Yangon

Attendance List for officials of government organizations, Hlaing Thar Yar Township, Yangon			
No	**Contact Person**	**Organization**	**Phone Contact**
1	Daw Shwe Yi Aung	Staff Officer, Environmental Conservation Department	09-962637055
2	Daw Yamone	Deputy Assistant Officer, Environmental Conservation Department	09-670446105
Attendance List for company/factory and CSO, Hlaing Thar Yar Township, Yangon			
No	**Contact Person**	**Organization**	**Phone Contact**
3	U Patric	Mama Noodle Factory, HR Manager	09429341143
4	U Aung Kyaw Oo	Zone Committee, Executive Officer	095056360
5	Daw Yadanar Min Oo	New World Mart, Admin Manager	09797005241
6	U Kyaw Kyaw Aung	Hundred Household Head, Okan Thaung Gyar (10)	09261848528
7	U Myint Tun Naing	Hundred Household Head , Yae Okan	09787052320
8	U Than Kywe	Hundred Household Head, Okan Thaung Gyar	
9	U Win Tun	Hundred Household Head , Yae Okan	
10	U Than Oo	Hundred Household Head, Yae Okan	
11	U Yan Naing Soe	Community, Okan Thaung Gyar (10)	09-752975988
12	Daw Khin Myo Thu	Community, Okan Thaung Gyar	09 423850733
13	U Thet Ko Ko Zaw	Community	09-420293438
14	U Nyi Nyi Aung	Community, Yae Okan	09-252640630
15	U Wine Aung	Community	09-264893890
16	Daw Nan Ngwe	Community	09-979424036

17	Daw Hla Hla Khine	Community, Yae Okan	09-421795049
18	Daw Sandar Win	Community, Okan Thaung Gyar	09-252870098
19	Daw Thida Oo	Community, Yae Okan	
20	Daw Poe Oo	Community, Yae Okan	
21	Daw Chaw Su Khaing	Community, Yae Okan	
22	Daw Ei Ei Khine	Community, Yae Okan	
23	Daw Myat Su Mon	Community, Yae Okan	09-782859639
24	Daw Aye Aye Kyu	Community, Yae Okan	
25	Daw Thin Thin Khine	Community, Yae Okan	
26	Daw Win Win Kyu	Community, Yae Okan	
27.	Daw Aye Mya Sann	Community, Yae Okan	

	
Presented by Daw Zin Mar Aung, Lluvia Co.,Ltd)	**Presented by Daw Win Thida Khine, EQM**

	
Question from Daw Shwe Yi Aung, Environmental Conservation Department, Western Yangon District (Staff Officer)	**Question from U Patric (HR – Manager, Mama Noodle Factory)**
	
Question from U Aung Kyaw Oo (Zone Committee, Executive Officer)	**Comment Response by U Ngwe Thein (Lluvia Co.,Ltd, HSE Officer)**

Figure 10.32: Photos Section for Lluvia Limited BEVERAGE (coffee,Tea and Milk powder)'s PC Meeting

10.13 Corporate Social Responsibility (CSR) of Lluvia limited BEVERAGE (coffee, Tea and Milk powder)

Corporate Social Responsibility (CSR) are formulated and to be implemented by Lluvia limited BEVERAGE (coffee,Tea and Milk powder) during the existence of the industrial zone because the project is the long-term development project and the impacts affected to the people are also the long term exposures. Implementing CSR program can solve the social problems and reduce the tensions and negative attitude on the industrial zone. The aim of CSR is to ensure social well-being of the factory workers, their family members, and all of the people in the target area, better community living, transparent and friendly relationship. Due to the factory is located within the industrial zone, there are less social impacts and more positive effects on the community for job opportunities. Lluvia limited BEVERAGE (coffee, Tea and Milk powder) appointed to the nearest community as a first prioritize for employment. Lluvia limited BEVERAGE (coffee, Tea and Milk powder) use **(2)%** of the net profits of the company.

Table 10.4: CSR plan of Lluvia limited BEVERAGE (coffee, tea and milk powder)

Area	Activities	Contribution (%)	Plans
Health	Healthcare for employees and their family	0.5 %	- Medical checkup for the employees. - Provide health education program to the workers.
Education	Raising awareness education level and human right	0.5%	- Donate money to the schools near the factory. - Donate the basic needs to the schools.
Community development	Donation to local community	1 %	- Donate money to the local communities near the factory.

Table 10.5: Detailed plans for CSR activities in Lluvia limited BEVERAGE (coffee, tea and milk powder)

Sr	Activity	Timing
1	Donation to Orphanges	Annually
2	Donation for Natural Diasters	Occasionally
3	Blood Donation at Local General Hospital	Annually
4	Cleaning Activites at the Local Area	Occasionally
5	Donation to COVID-19 fund and Social Security Hospital	Occasionally

10.13.1 Additional actions taken to support Corporate Social Responsibility (CSR)

Lluvia limited BEVERAGE (coffee, tea and milk powder) donates money to the cyclone Mocha affected areas and earthquake affected areas in Bagan. The factory participates in water donation to the fire fighting vehicle annually and also supports the basic needs to the zone committee.

Chapter 11

Conclusion

11 Conclusions and recommendations

The IEE and EMP for Lluvia beverage manufacturing and distribution factory was carried out based on the extensive literature surveys, field monitoring surveys and consultation with the community and the respective factory personnel.

This project has defined all environmental and social impacts associated with the existing factory. The characteristics of the factory, particularly its location which is located in the industrial zone and the medium significance of the potential environmental impacts (air, noise, waste and waste water discharge) on the working community and the nearest environment can be reduced and prevented by complying with the mitigation measures.

For those aspects defined as significant appropriate mitigation measures and environmental monitoring plans were developed. All other aspects are managed through standard operating procedures.

In conclusion, EQM has considered that:

- The prevention and mitigation measures outlined in this IEE are capable of providing the appropriate management measures to ensure that environmental and social impacts are prevented or minimized

- The appropriate monitoring measures outlined in this EMP are capable of detecting and solving significant environmental impacts

In terms of recommendations, EQM has suggested the Environmental Management Plan that is designed to:

- Provide the framework for the compliance auditing and monitoring programmes that will lead the Lluvia beverage manufacturing and distribution factory to carry out its factory process in accordance with the Myanmar environmental rules and regulations International practices and Health, safety and Environmental policies.

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ANNEX (I)
Location Map

Location Map of Lluvia (Hlaing Thar Yar) Factory

ANNEX (II)
Methodology

(1) Environmental and Social Impact Assessment

1. Impact Assessment Methodology

1.1 Introduction

An Environmental Impact Assessment (EIA) seeks to identify and, to the extent possible, quantify the potential negative impacts and positive benefits of a proposed project with respect to the environment (physical, ecological, human use, quality of life, and health values). Once these impacts have been identified, prevention, mitigation, and monitoring measures are proposed to prevent and/or mitigate possible negative impacts, and enhance positive impacts.

The assessment process constitutes a systematic approach to the evaluation of the proposed project in the context of the natural, regulatory and socio-economic environments in which development is proposed **(Figure 1-1**). In this regard, it is imperative to fully understand and consider the interaction among the following:

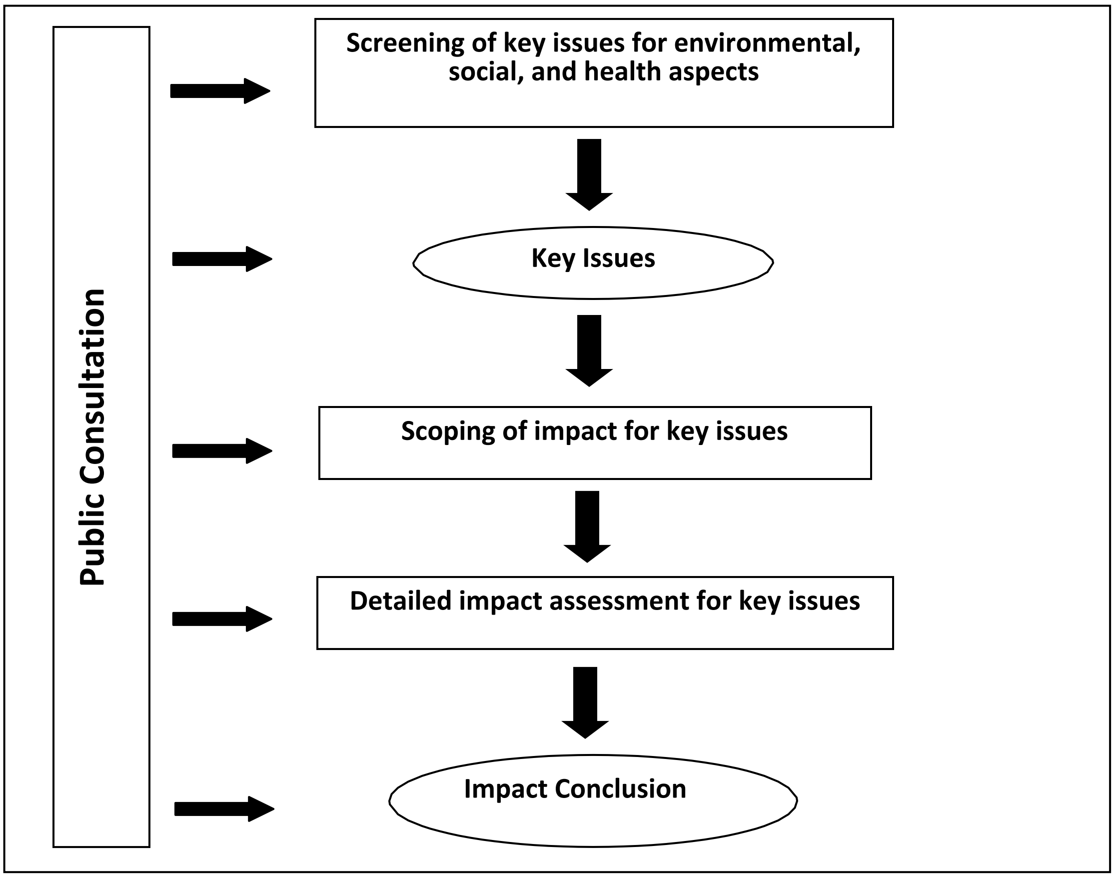
1) Understanding and developing a strategy for the regulatory process;
2) Developing a serious and effective public/stakeholders dialogue and consultation program to minimize potential conflicts that might arise during construction and operations;
3) Providing high-quality technical components such as the process followed for route selection and the EIA report that are scientifically defensible; and
4) Recognising and minimising long term liabilities from construction and operation.

Figure 1-1: Major components of EIA process

In essence, the purpose of the EIA process and report can be summarized as follows:

1) To support the goals of environmental protection and sustainable development;
2) To integrate environmental protection and economic decisions at the earliest stages of the planning process;
3) To identify issues of concern according to local and regional/national categories as a basis for subsequent public input;

4) To identify routing options and evaluate the proposed routes;
5) To assess environmental, social, health, economic and cultural consequences of the project and to assess plans to mitigate any adverse impacts resulting from that activity; and
6) To provide for the involvement of the public, proponents, and government departments in the review of the proposed activities.
   To achieve this objective, EIA process incorporates a number of key steps as summarized below.



Public consultation and participation are essential components of the EIA process and incorporated throughout the EIA development process.

1.2 Detailed Legislative Review

The Legislation and Policy Framework review addresses environmental, social, and health policies and requirements at the following levels:

- Government Agreement
- National Legislation
- International legislation and guidelines relevant to the project
- Client corporate policy and management systems
- Archaeology and Cultural Heritage
- Biodiversity and Sensitive Areas
- Social Regulations
-

The definition of relevant national and international standards and requirements will ensure that the project development is assessed against all relevant existing environmental and social regulations and guidelines as well as the environmental, social, health, ethical and business policies and standards.

1.3 Screening

Project screening is the first step of the impact assessment process and involves considering each activity of the planned project in the context of the environmental, health, and socio-economic setting within which it will take place. Project alternatives identified will be initially assessed, and issues screened and scoped, on the basis of existing available information. Identifying key issues early in the EIA process allows the emphasis to be placed on them throughout the remainder of the assessment.

Table 1 2: Impact Screening Matrix

- No Impact
- Cause Impact
- Might Cause Impact

				Project Activity																								
				Construction									Operations							Decommi-ssioning					Emergency Situation			
				Transport of Equipment, Materials and Labour	Construction and Site Clearing for Access Roads, Camp & Storage Yards, Associated Facilities	Pipeline Construction (Digging, Trenching, Stringing, Welding)	Fuel Storage and Handling	Energy Use	Water Usage	Discharge of Wastewater and Contaminated Water	Non-Hazardous and Hazardous Waste Management	Labour & Accommodation	Pipeline Surveillance and Maintenance Activities	Fuel Storage and Handling	Energy Use	Water Usage	Labour & Accommodation	Discharge of wastewater and contaminated water	Non-Hazardous and Hazardous Waste Management	Site Restoration	Equipment Transport	Energy Use	Discharge of wastewater and contaminated water	Non-Hazardous and Hazardous Waste Management	Oil and Chemical Spills	Fire and Explosion	Earthquake	Pipeline Leakage and Rupture
Environmental, Social, and Health Aspects	Environment	Physical Resources	Air quality/Climate																									
			Topography																									
			Noise																									
			Light																									
			Soil																									
			Surface Water Quality																									
			Surface Water Hydrology																									
			Groundwater Quality																									
			Groundwater Hydrology																									
		Biological Resources	Terrestrial flora																									
			Terrestrial fauna																									
			Aquatic flora																									
			Aquatic fauna																									
			Rare/Endangered Species																									

	Social	Human Use Values	Fisheries/ Aquaculture																									
			Agriculture																									
			Land Use																									
			Transportation																									
			Water Supply																									
			Power Supply																									
			Drainage and Flooding																									
			Waste Management																									
		Quality of Life Values	Socio-Economic																									
			Historical/Cultural Sites																									
			Attractions and Recreational areas																									
	Health		Community Health																									
			Occupational Health and Safety																									
			Health Service																									
			Psychological Impacts																									

1.4 Scoping

Following the screening process, scoping was undertaken to identify key issues and develop the terms of reference for the EIA. An early identification of issues can assist in identifying data gaps and focus on areas requiring further field work studies. Scoping effectively shapes the environmental and social impact assessment.

More specifically, scoping considered the following aspects:

- Characteristics and distance of impacts from the project activity
- Project site and adjacent area affected by project activity

Scoping process was carried out via stakeholder meetings and consultations with communities, non-governmental organizations, interest groups, and local authorities along the proposed pipeline route. Project information was disseminated at the stakeholder meetings and their concerns were noted so that impact assessment and mitigation measures can effectively address these concerns.

Discussions were also conducted with academicians and social experts on potential key areas of concern. Such consultations further assisted in focusing on major issues and concerns, and identifying major data gaps.

1.5 Consultation, participation, and disclosure

Public involvement, in the form of stakeholder consultation and disclosure, is a critical component of an EIA. Its primary objective is to maximize public understanding of the project through information distribution and exchange between the project proponent and the communities that might be affected directly or indirectly by the proposed project activities. The public involvement for this EIA consisted of two parts: an attitude survey and focus group discussions. The results of this work provide direction to the company on what type of further information and communication is needed with stakeholders.

1.5.1.1 Criteria for Environmental Impact Assessment

Identify criteria to specify the impact significance level (high, medium, and low) by considering magnitude, extent, duration, reversibility/irreversibility, and likelihood of impact.

1.5.1.2 Method for Environmental Impact Assessment

The assessment of environmental impacts for key issues consists of 3 main stages as shown below:

1. Identification of impact source and receptor
2. Impact prediction
3. Assessment of the impact significance level

<u>Stage 1</u>: Identification of Impact Source and Receptor

1. Identify project activities that are impact sources and explain details of these activities.
2. Identify the impact receptors and explain environmental settings of impact receptors.
3.

<u>Stage 2</u>: Impact prediction

Impact prediction is the assessment of the characteristics and magnitude of expected impacts. There are many methods used for impact assessment, and the selection of a method for impact assessment for each project depends on the type of environment and resources, time, existing technology, and experience of the assessor.

<u>Stage 3</u>: Assessment of impact significance level

Once project impacts have been predicted it is important to assess the potential significance of the impact. Impact significance is rated as insignificant, low, medium, or high. The rating of impact significance is based on both objective and subjective criteria. The following criteria in **Table 6-9** will be considered when rating impact significance:

Table 1-3: Impact Significance criteria

Criteria	Significance
Extent	This is the extent to which the potential impact may eventually extend (e.g., local, regional, national, global), as well as to geographical location. Regional impacts, those impacts that extend beyond the project area, are generally considered more significant than local impacts that are limited to the project area. Extent should also consider the people affected, such as how pervasive will the impact be across the population? This criterion should be used to assess both the percentage of the population affected and the extent to which it will affect different social or demographic groups, particularly the vulnerable groups (e.g. children, elderly, pregnant women, indigenous population, etc.).
Local sensitivity	To what extent is the local population aware of the impact? Is it perceived to be significant? Has it been a source of previous concern in the community? Are there any organized interest groups likely to be mobilized by the impact?
Expense	Costs and expenses required to reduce or clean up impacts, the responsible person or entity who has to bear the expenses, and whether the expense has to be paid immediately or not.
Potential of related organizations	Current potential of related organizations to manage impacts, whether supporting laws and regulations exist, and whether local governmental organizations can handle the impacts.
Risk	The probability/predictability of an impact occurring. For many environmental impacts, qualitative assessments would be appropriate (high, medium, low).
Duration and Frequency	The length of time (day, year, decade) for which an impact may be discernible, and the nature of that impact over time (is it intermittent and/or repetitive?). Long-term impacts, those impacts that may last for an extended period of time are considered more significant than short-term impacts that are limited to a few days or months.
Reversibility	How long will it take to mitigate the impact by natural or man-induced means? Reversible impacts, those impacts that will be fully reversed after the activity that causes the impact ceases, are considered less significant than irreversible impacts.
Magnitude	The probable severity of each potential adverse impact, in the sense of degree, extensiveness or scale. Magnitude takes into account numerous factors related to the environmental resource and socio-cultural values. This is largely subjective based upon values of society. Another important factor in determining the magnitude of an impact is the degree of variation from baseline conditions.

Criteria	Significance
Uncertainty	In addition, the level of confidence of impact predictions reflects the quality and quantity of available site-specific data, experience from implementation of similar projects, and the expertise of the EIA project team. Where all else is similar, assessments that are more speculative in nature for any particular project activity are generally given a higher impact rating than ones based on a higher level of confidence.
Cumulative Impacts	Whether occurring impacts will be added on existing impacts or not, which will be used to consider whether the cumulative impacts exceed the maximum acceptable level or not.
Overall Impacts	Based on the above, each impact is rated as low, medium or high. Medium or high impacts are ones that require specific mitigation and/or monitoring measures.
Residual Impact	Impacts that remain after mitigation measures have been applied.
Mitigation Measure	An action that prevents, eliminates, reduces or compensates for a negative impact.

The significance of an impact is evaluated using Scaling and Matrix methods. Each impact is assessed based on its "characteristics" and "importance".

Significance = Characteristics x Importance

Characteristic is determined using magnitude, extent, and duration of impacts. Importance of impact is determined using the values of resources and environment that are lost or decreased as a result of the project activities.

There are three stages for evaluation of impact significance level.

Stage 1: Analysis of impact characteristics

Analysis of impact characteristics is determined using the sum of magnitude, extent, and duration of the impact. The criteria for impact assessment are shown in **Table 6-10**.

Impact Characteristics = Magnitude + Extent + Duration

Table 1-4 : General Criteria and Scoring for Environmental Impact Characteristics (1)

Level	Definition	Score
Magnitude		
High	Exceed the standard values Major change in the original structure of environmental system, ecosystem or baseline.	3
Medium	Less than the standard values Change some factors in environmental system, ecosystem or baseline, but does not change the structure.	2
Low	Less than the standard values Small change in some factors of the environmental system, ecosystem, or baseline but does not change the structure.	1
Insignificant	Less than the standard values No change in the environmental system, ecosystem, from baseline.	0

Extent		
High	Area of impact is beyond the 4-km pipeline corridor and 2-km radius of associated facilities/stations. Impact extends to regional and national level.	3
Medium	Area of impact is beyond the project area but is in a limited area, for example the area of impact is outside a safety zone but within the 4-km pipeline corridor or 2-km radius of associated facilities.	2
Low	Area of impact is in the immediate area of the project activity or within a safety zone	1
Insignificant	Area of impact is not discernible	0
Duration		
High (long-term duration)	Permanent impact Impact will remain after well abandonment. Impact occurs in long-term duration	3
Medium	Impact can be reversible overtime. Period of impact occurrence is within the project period. Impact occurs over mid-term duration	2
Low (short-term duration)	Impact can be quickly reversible. Period of impact occurrence is less than the project period. Impact occurs in short-term duration	1
Total Score for Impact Characteristics = Magnitude + Extent + Duration		

Source: Adapted from Nigel Rossouw (2003); Sippe (1999); and United Nations University (2007)

Total score for impact characteristics (Magnitude + Extent + Duration) will be compared with the criteria and scoring as shown in **Table 1-5**.

Table 1-5: Example of Criteria and Scoring for Environmental Impact Characteristics (2)

Total Score for Impact Characteristics[1]	**Impact Level**	**Definition**	**Score**
7-9	High	Have impact or cause large changes.	3
4-6	Medium	Have impact or cause medium changes.	2
1-3	Low	Have impact or cause small changes.	1
0	Insignificant	No impact	0

Stage 2: Analysis of Importance of Impact

Importance of impact is determined from the values of resources and environment that are lost or decreased from the project activities by comparison with criteria and scoring for importance of impact as shown in **Table 6-12.**

Table 1-6: Example of Criteria and Scoring for Importance of Impact

Impact Level	Definition	Score
High	Impact disturbs pristine area which has conservation value. Impact damages rare/endangered species. Impact is significant on a national or international level.	3
Medium	Impact disturbs the area which has a value for conservation. Impact causes a significant change in species and diversity. Impact is important at a local or regional level.	2
Low	Impact disturbs degraded area or causes a small disturbance in the area which has a value for conservation. Impact causes a small change in species and diversity.	1

Stage 3: Impact Significance Evaluation

The significance of environmental impact will be evaluated by using Matrix Method as shown in **Table 1-7**. The calculation of impact significance is shown below:

Significance = Characteristics x Importance

Table 1-7: Evaluation of Significance Level of Environmental Impact

Significance Level of Environmental Impact			Characteristic		
			Low	Medium	High
			1	2	3
Importance	Low	1	Low (1)	Low (2)	Low (3)
	Medium	2	Low (2)	Medium (4)	Medium (6)
	High	3	Low (2)	Medium (6)	High (9)

The results from the evaluation of impact significance will be further used to specify mitigation measures. Examples of definition of impact significance level are shown in **Table 1-8**.

Table 1-8: Example for Definition of Impact Significance Level

Significance Level	Score	Definition
High	7-9	Impact is classified as severe and can cause other effects. Impact cannot be protected and resolved by any mitigation measures or scarcely protected or resolved.
Medium	4-6	Impact causes a change that affects values of resources and environment. It needs to have mitigation measures for protecting or decreasing the impacts and include monitoring measures.
Low	1-3	Impact causes a change in resources and environment but this change does not decrease values of these resources and environment. Impact can be protected and resolved by implementation of general measures.

Source: Adapted from Nigel Rossouw (2003) and Sippe (1999)

1.5.2 Social Impact Assessment

The evaluation of socio-economic impacts is based on quantitative and qualitative data, and the use of professional judgment. Factors used to analyze for scale of social impacts are similar to the criteria used for environmental impact analysis such as likelihood of impact, direct/indirect impact, duration, reversibility, and magnitude of impact which also takes into consideration threats perceived as significant by the affected communities.

Additional criteria factors include consideration for changes to the assets that households depend upon for their livelihoods, manageability of the change and potential for it to lead to further changes beyond the control of the project, and whether the effects are acute or chronic.

1.5.2.1 Social impact significance

Significance of social impact is ranked Beneficial, Low, Medium or High using criteria below (**Table 1-9**).

Table 1-9: Social Impact Category

Impact Category	Social Impact
Beneficial	Improvement in the ability of household or settlement to maintain or improve its livelihood/store of assets Enhancement in quality or availability of resource leading to improvement in quality of life. For example: Enhancement in physical capital including availability of infrastructure Enhancement in social capital, including skills for future employment Enhancement of relationship between Luvia factory/ contractor and communities Enhancement in health and safety of local population
Low	Possible short term decrease in availability of resource or access to infrastructure not affecting livelihood Possible short term decrease in quality of life of household or settlement not affecting long term outcomes No effect on human health No discernable long term effect of the local economy Impacts which are long lasting but to which the community is able to adapt, such as increased access to information/possible slow cultural change/changes in economic structure
Medium	Potential effect or perceived effect on ability of household to maintain livelihood/store of assets in short term Potential reduction in quality of life in short term Potential disruption to lifestyle in short term Perception of missed opportunity to improve Possible decrease or perceived decrease in access to infrastructure to which community is unable to adapt in the short term Negative effect on human health which can be contained and is therefore short term with no increased mortality Impacts which may result in high levels of complaint in the short term

Impact Category	Social Impact
High	Negative effect on safety of humans or animals Negative effect on human health which cannot be contained or results in increased mortality Effect or perceived effect on ability of household to maintain livelihood/store of assets to an extent not acceptable to affected people Permanent or perceived permanent reduction in quality of life Permanent cultural change to which the communities are unable to adapt Widespread perception of missed opportunity to improve quality of life, resulting in frustration and disappointment Result in tensions with communities which lead to sabotage by local communities, or outbreaks of violence between workers and communities

1.6 Management and monitoring

To assist in the management and implementation of the measures designed through the ESIA, and the monitoring of their effectiveness, an environmental management and monitoring plan has been developed in accordance with the IFC and the World Bank guidelines on management plan.

In accordance with Principal 4 of the Equator Principals, the managing and monitoring plan provides action plans, policies, management programs, procedures, performance indicators, responsibilities, training and periodic audits and inspections with respect to environmental or social matters designed to identify, assess and manage project’s risk and impacts on an ongoing basis.

Additionally, the plan will also follow the World Bank operational policy, OP 4.01, which has outlined specific components that must be incorporated into a management plan as follows:

- Mitigation measures including type of impact which it aims to eliminate or reduce, conditions of its implementation, designs, equipment description and operating procedures, as appropriate;
- Monitoring activities including parameters to be measured, methods to be used, sampling locations, frequency of measurements, detection limits (where appropriate), and definition of thresholds that will signal the need for corrective actions; and (b) monitoring and reporting procedures;
- Institutional arrangements, roles and responsibilities of those responsible for implementing the environmental management plan and their capacity development opportunities; and
- Opportunities for integration of environmental management and monitoring plan within a project's overall planning, design, budget, and implementation.

  The environmental management and monitoring plan for the project has incorporated the necessary components and requirements as outlined under the international standards.

  IEM will also consider the plan’s requirements as defined by the Equator Principle “Best Practices” working group which include the following elements for consideration:

- Design and implement a Public Consultation and Disclosure Plan or Community Engagement Plan to ensure a) consultation and disclosure of EIA and Management Plan documentation, and b) ongoing community engagement during Construction and Operation phases

- Establish, and report on progress, related to the Project's Grievance Mechanism system during both Construction, Operation and Decommissioning phases
- Incorporate the requirements of the performance standard on Labor and Working conditions into Human Resources Policy.
- Prepare a site-specific Emergency Preparedness and Response Plan, specifically dealing with accidents involving management and transportation of explosive materials, landslides and other accidents potentially affecting third parties, including workers and local communities
- Prepare a Resettlement Action Plan to manage land acquisition-related impacts for (a) the local road upgrade to the plant site, and (b) the corridor for the high-tension transmission line.
- Preparation of a Biodiversity Action Plan in accordance with Performance Standard 6
- Develop an Indigenous Peoples Development Plan to provide a structured approach to implementation of community development projects.
- Develop a 'chance find' procedure to be provided to all contractors and included in the terms of their contracts to ensure proper handling of any such discoveries.
- Submit monitoring reports relating to compliance with applicable standards and monitoring requirements including air emissions, ambient air quality, noise and vibrations, effluent quality, groundwater quality and level in community wells and dedicated monitoring wells, and solid wastes.

(2) Base Line Data Monitoring Methodology

2. Base Line Data Monitoring Methodology

2.1 Ambient air monitoring instrument

The air monitoring survey will use the HAZ-SCANNER EPAS Wireless Environmental Perimeter Air Monitoring System (EPAS).

(i) Principles

The EPAS, manufactured by EDC/SKC (USA), is a light scattering photometer equipped with a filter sampling system. This dual capability allows for simultaneous real-time and filter measurement. Single-jet impactors are used for particulate size selection and the TSPM, PM_{10} impactor would be used for this air quality survey.

The highly sensitive EPAS provides real-time determinations and data recordings of airborne particle concentration in $\mu g/m^3$. It provides the minimum, maximum and time-weighted average (TWA) monitoring of gases as well.

This instrument is factory calibrated with the appropriate USEPA certified target gas and correlated with USEPA methods. (Ref: Code of Federal Regulation 40CFR part 53).

The EPAS does not require laboratory analysis to determine concentrations. It operates maximum automation of data collection, uses the optional data logger including Dust Comm Pro Software for PC that provides statistical analysis, graphs, and detailed reports that can be printed for record keeping.

(ii) System check

Prior to the survey, calibration span and system checks (system flow rate, sensor baseline levels for all parameters, etc.) will be performed on the EPAS to ensure it is operational and ready for monitoring.

The air monitoring instrument will be operated in accordance with the manufacture's guidelines.

2.2 Ambient air monitoring

(i) The sensor intakes

The survey would deploy the sensor intakes based on the sitting criteria as specified in the U.S. Code of Federal Regulations (40 CFR 58 Appendix E - Probe Siting Criteria for Ambient Air Quality Monitoring).The survey will comply with the following guidelines as follows;

- Particulates and gas sensor intakes will be located between 2-3 meters above the ground level
- Keep unrestricted airflow located away from obstacles so that the distance from the sensor intake is at least twice the height that the obstacle protrudes above the probe
- Keep unrestricted airflow in an arc of at least 270 degrees around the inlet probe, or 180 degrees if the probe is on the side of a building
- Would be clear of optical obstructions, including potential obstructions that may move due to wind, human activity, growth of vegetation, etc.
  - Spacing from trees (10-20 m)
  - Spacing from roadways (10-250 m) depending on the traffic

- Observe temporary optical obstructions, such as rain, particles, fog, or snow

(ii) Location of the monitoring sites
The monitoring sites were selected based on their being broadly distributed within the project area and in proximity to the most sensitive receptors i.e. communities.
Operating activities of the project would impact local air quality. Air pollution both on site and in the surrounding locality may result from release of dust to the atmosphere from handling or processing of its by-products.

(iii) Sampling time and frequency of measurements
The survey will monitor 24hr continuously.

(iv) Ambient air parameters to be measured
1) Particulates: PM_{10}, $PM_{2.5}$ } USEPA Criteria air pollutants
2) Gases: NO_2, SO_2, CO, VOC, NH_3, CH_4, O_3
3) Meteorology: Temperature, Relative Humidity, Wind Speed, Wind Direction which can have the influence on both local and regional air quality

Particulates (sensor: 90 degree Infra Red Light Scattering)
Calibration: Gravimetric reference NIST Traceable - SAE fine dust- ISO12103-1 Accuracy (± 10% to filter gravimetric SAE fine test dust which falls under the ACGIH/ ISO/CEN criteria.
Detection limit – 1- 20,000ug/m^3
Gases (sensor: electrochemical)
Calibration: ppm equivalent change/year in lab air (24month warranted)
NO_2, Detection limit – (0-5000) ppb
SO_2, Detection limit – (0-5000)ppb
CO, Detection limit – (0-100)ppm
VOC (sensor: photoionisation), Detection limit: – (0-100)ppm
Meteorology (EPAS Meters)
Temperature, Detection limit - (-4°C to 140°F)/ (-20°C - 60°C)
Relative Humidity, Detection limit – 90-100%
Wind Speed (sensor: 3-cup anemometer), Detection limit - (0 – 125 mph)
Wind Direction (sensor: continuous rotation on potentiometric wind direction vane), Detection limit - (5 – 355degrees)

Otherwise the presence of microbial growths in the indoor environment will continue to sufficient numbers or kinds that can affect in employees' health or comfort problems.

In general, the main sources that can trigger the ***microbial growths*** would be from the centrally controlled ventilation system (HVAC system); therefore, the ***remediation options mainly concerned on the HVAC system as follows;***

Table 2.1 The remediation options mainly concerned on the HVAC system

Source	Possible Causes	Action needed
High moisture-laden air in contact with the ceilings	***uncontrolled moisture*** inside of HVAC system's air ducts	***HVAC system*** must be ***checked and maintained*** if it properly functions the building's interior, pressurizes the building

		with dehumidified air.
High Air Velocity at HVAC Vent **in 3rd floor**	As airflow is influenced by controlled **mechanical systems**	***Air flow at HVAC system*** should be ***checked***
High Temperature in **2nd floor**	Thermal environment can also be influenced by such factors as ***radiant temperature, air velocity***.	***Temperature setting*** at the centrally controlled system should be checked
High Bacteria Growth **Moderate Fungal Growth**	***uncontrolled moisture*** inside of air ducts ***that can*** trigger condensation and the subsequent growth of moulds and fungi ***Air filters*** contaminated with dirt ***Outdoor air intakes and air inlet area ways*** liable accumulation places for fungi, bacteria, dust The ***occupants' behaviors***	***Maintain indoor air relative humidity below 60%***, if possible 50% ***Kitchens, bathrooms and washers*** need to be independently ***vented outdoors***. .Regular either ***cleaning or replacing of air filters and duct liners***, ***HVAC cooling coils, drain pans, humidifiers*** containing reservoirs of stagnant water, ***air washers and fan coil units*** ***Clean and check*** ***Clean*** and ***maintain floors, ceilings*** ***Avoid excessive indoor plants***

2.3 Air velocity, air flow and ambient air temperature using by anemomaster

Measurement of air velocity in the room prior to bio-aerosol sampling was performed in order to avoid air flow disturbances.

Figure 2.1 Anemomaster

Both the air coming out from the AC vent and at breathing zone was detected along with measurement of duct shape and size settings.

2.4 Ceiling and wall's moisture using by TRAMEX moisture meter

Moisture measurement was performed by sliding across the wall surface through at each point of the wall and average value was calculated after measuring for 10 minutes at 10 places on the surface of the wall and 5 minutes measurement was performed for the ceiling.

Figure 2.2 Tramex moisture meter

2.5 Biological indoor air monitoring using by biostage along with impactors

Prior to bioaerosol air sampling, several precautions were taken such arrangements: preparing culture media for sampling, handling of all parts of instruments with care not to be contaminated and sending the impactors which collected air samples to the National Health Laboratory (NHL) within the same sampling day.

Figure 2.3 Single-stage viable cascade impactor

Figure 2.4 Biostage pump

Figure 2.5 Mounting biostage impactor

2.6 Procedure for measurement of air sampling (Colony culture)

The air monitoring instrument, BioStage, was placed at the site which is one meter from the ground level and one meter away from the side wall in order to represent the occupant breathing zone. Air samples were drawn over a petridish beneath a 400 pin-holed cap (0.25 mm hole diameter) with agar collection medium through standard BioStage single-stage, multiple-hole, agar impactors (which meets ACGIH recommendations for bio-aerosol sampling and meets NIOSH method 0800 and 0801 requirements, performance equivalent to Andersen N-6 an Aerotech A6) for **5 minutes at 20 L/min**.

Common types of growth media are Potato Dextrose Agar (PDA), Malt Extract Agar (MEA), Dichloran Glycerol 18 Agar for fungi and Tryptic Soy Agar (TSA) or Blood Agar Plates (BAP) for bacteria. Bottom of agar plate was labeled and the lid was secured with tape. The agar plate containing samples and blank unexposed agar plate were sent to laboratory.

After that, the petridishes were incubated and visually inspected so that the number of colony forming units (CFUs) of different types of microbes are identified and counted.

The results were obtained as bacteria-carrying particles and also called as CFU, Colony Forming Units (Avidicare, 2013) and as a consequence, results are reported as the number of colony-forming units (CFUs) of each viable microorganisms group per plate and further adjusted by the volume of air sampled to obtain concentrations (CFU/m^3).

Converting the number of colonies counted on a plate on c.f.u/m3 (VWR, n.d.) Volume of sampled air:100 litres (20L per min for 5 minutes)
Example: Counted colonies in a plate = 15
If 100 L contain 15 C.F.U = 1000 L contain 150 C.F.U = 150 C.F.U/m^3

2.7 Awareness for measurement of air sampling (Colony culture)

-Hands are sanitized and BioStage impactor was cleaned in between samples.
-All impactors must be be autoclaved, leaned with ethyl alcohol and dried in the air.
-Clean BioStage before first use and between each monitoring.
-Don’t touch holes in jet classification stage.
-Never use expired agar, cracks or contaminated.
-When sampling indoors, all doors and windows were closed.
-Too long or too short sampling can cause overgrowth and false negatives respectively.
-Outdoor samples should be collected for comparison to indoor samples. Indoor control sample should be taken for non-complaint areas. Each sample was clearly marked.
-O-ring was ensured to fit in the channel in the inlet cone.
-The battery was charged completely approximately 5 hours and pump was not running at that time for maximum charge.

According to the predicting result, the magnitude of the impact from industrial solid waste was considered as low. The area of potential impact will be within the immediate area of project activities. Area of impact is beyond the project area but is in a safety zone. The extent of the impact for solid waste impact is noted that low level. The period of potential impact duration covers permanent situation and it can be affected on less than project duration level. The duration of the impact from solid waste was set as low. Therefore, the characteristic of solid waste impact was rated as low.

The impact is expected to cause some disturbances potentially affecting communities locally and regionally. The importance of the impact on solid waste was set medium.
In the condition of mitigation measures, the impact of Solid Waste would likely be audible in residences and the potential impact was rated as low. It has been seen that the impact from solid waste is no significant and no effect much on the environment.

(3) Air Monitoring Raw Data

(4) Laboratory Results Data

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Lab Code No. : 218/2015

No.	Test Parameter	Unit	Result	Method
6.	Phosphorus	mg/l	0.384	Laboratory Manual For the Physico-Chemical Analysis of Soil, Water and Plant ; Phototmetric (Ascorbic) Method
7.	BOD	mg/l	168	In-house method based on Standard methods for the examination of water & waste water, APHA ,AWWA & WEF,22nd ed, 2012 ;**5210 D** (Respirometric) and manual of BOD System Ox direct (Lovibond)
8.	COD	mg/l	219	In-house method based on Standard methods for the examination of water & waste water APHA ,AWWA & WEF,22nd ed, 2012; **5220 D**(Closed Reflux ,Colorimetric) and manual of Photometer-system MD 100 and RD 125 Reactor(Lovibond)

***************End of Report***************

SGS (Myanmar) Limited

(Nu Nu Yi)
Manager

SGS

ORIGINAL

ANALYSIS REPORT

Job Ref: 6370/2015
Date : 02.11.2015

Sample Described as	:	**WASTE WATER**
Client Name	:	**ENVIRONMENT QUANTITY MANAGEMENT CO., LTD.** NO. 233, 23 QUARTER, SAYAY PIN STREET, THUWANA, YANGON, MYANMAR
Sample Received Date	:	21.10.2015
Sample Brought By	:	Client
Sample Marking	:	Sample 4 (Drainage 2)
Analysed Date	:	22.10.2015
Lab Code No.	:	218/2015

No.	Test Parameter	Unit	Result	Method
1.	pH	-	6.51	Laboratory Manual For the Physico-Chemical Analysis of Soil, Water and Plant (pH meter)
2.	Total Suspended Solid	mg/l	736.67	Based on Standard methods for the examination of water & waste water APHA ,AWWA & WEF,22nd ed, 2012; 2540 D
3.	Ammonia Nitrogen	mg/l	ND	Based on Standard methods for the examination of water & waste water APHA ,AWWA & WEF,22nd ed, 2012; 4500-NH_3 B , C
4.	Nitrate Nitrogen	mg/l	ND	Based on Standard methods for the examination of water & waste water APHA ,AWWA & WEF,22nd ed, 2012 ; 4500-NO_3^- B
5.	Oil & Grease	mg/l	12.19	Based on Standard methods for the examination of water & waste water APHA ,AWWA & WEF ,22nd ed, 2012 ; 5520 B

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ORIGINAL

Lab Code No. : 217/2015

No.	Test Parameter	Unit	Result	Method
6.	Phosphorus	mg/l	0.401	Laboratory Manual For the Physico-Chemical Analysis of Soil, Water and Plant ; Phototmetric (Ascorbic) Method
7.	BOD	mg/l	37	In-house method based on Standard methods for the examination of water & waste water, APHA ,AWWA & WEF,22nd ed, 2012 ;**5210 D** (Respirometric) and manual of BOD System Ox direct (Lovibond)
8.	COD	mg/l	101	In-house method based on Standard methods for the examination of water & waste water APHA ,AWWA & WEF,22nd ed, 2012; **5220 D**(Closed Reflux ,Colorimetric) and manual of Photometer-system MD 100 and RD 125 Reactor(Lovibond)

***************End of Report***************

SGS (Myanmar) Limited

(Nu Nu Yi)
Manager

SGS

ORIGINAL

ANALYSIS REPORT

Job Ref: 6370/2015
Date : 02.11.2015

Sample Described as	:	**WASTE WATER**
Client Name	:	**ENVIRONMENT QUANTITY MANAGEMENT CO., LTD.** NO. 233, 23 QUARTER, SAYAY PIN STREET, THUWANA, YANGON, MYANMAR
Sample Received Date	:	21.10.2015
Sample Brought By	:	Client
Sample Marking	:	Sample 5 (Drainage 1)
Analysed Date	:	22.10.2015
Lab Code No.	:	217/2015

No.	Test Parameter	Unit	Result	Method
1.	pH	-	6.87	Laboratory Manual For the Physico-Chemical Analysis of Soil, Water and Plant (pH meter)
2.	Total Suspended Solid	mg/l	197.33	Based on Standard methods for the examination of water & waste water APHA ,AWWA & WEF,22nd ed, 2012; 2540 D
3.	Ammonia Nitrogen	mg/l	4.97	Based on Standard methods for the examination of water & waste water APHA ,AWWA & WEF,22nd ed, 2012; 4500-NH_3 B , C
4.	Nitrate Nitrogen	mg/l	ND	Based on Standard methods for the examination of water & waste water APHA ,AWWA & WEF,22nd ed, 2012 ; 4500-NO_3^- B
5.	Oil & Grease	mg/l	7.4	Based on Standard methods for the examination of water & waste water APHA ,AWWA & WEF ,22nd ed, 2012 ; 5520 B

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Lab Code No. : 216/2015

No.	Test Parameter	Unit	Result	Method
6.	Phosphorus	mg/l	0.312	Laboratory Manual For the Physico-Chemical Analysis of Soil, Water and Plant ; Phototmetric (Ascorbic) Method
7.	BOD	mg/l	94	In-house method based on Standard methods for the examination of water & waste water, APHA ,AWWA & WEF,22nd ed, 2012 ;**5210 D** (Respirometric) and manual of BOD System Ox direct (Lovibond)
8.	COD	mg/l	371	In-house method based on Standard methods for the examination of water & waste water APHA ,AWWA & WEF,22nd ed, 2012; **5220 D**(Closed Reflux ,Colorimetric) and manual of Photometer-system MD 100 and RD 125 Reactor(Lovibond)

***************End of Report***************

SGS (Myanmar) Limited

(Nu Nu Yi)
Manager

SGS

ORIGINAL

ANALYSIS REPORT

Job Ref: 6370/2015
Date : 02.11.2015

Sample Described as	**:**	**WASTE WATER**
Client Name	:	**ENVIRONMENT QUANTITY MANAGEMENT CO., LTD.** NO. 233, 23 QUARTER, SAYAY PIN STREET, THUWANA, YANGON, MYANMAR
Sample Received Date	:	21.10.2015
Sample Brought By	:	Client
Sample Marking	:	Sample 4 (Final Pipe)
Analysed Date	:	22.10.2015
Lab Code No.	:	216/2015

No.	Test Parameter	Unit	Result	Method
1.	pH	-	6.83	Laboratory Manual For the Physico-Chemical Analysis of Soil, Water and Plant (pH meter)
2.	Total Suspended Solid	mg/l	92.67	Based on Standard methods for the examination of water & waste water APHA ,AWWA & WEF,22nd ed, 2012; 2540 D
3.	Ammonia Nitrogen	mg/l	3.85	Based on Standard methods for the examination of water & waste water APHA ,AWWA & WEF,22nd ed, 2012; 4500-NH_3 B , C
4.	Nitrate Nitrogen	mg/l	ND	Based on Standard methods for the examination of water & waste water APHA ,AWWA & WEF,22nd ed, 2012 ; 4500-NO_3^- B
5.	Oil & Grease	mg/l	1.2	Based on Standard methods for the examination of water & waste water APHA ,AWWA & WEF ,22nd ed, 2012 ; 5520 B

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BACTERIOLOGY SECTION

WATER BACTERIOLOGY REPORT

Laboratory No: B – 13057

Date of report: 26.10.15

Sender: EQM

Address : No. 233, Block 23, Sayeepin St., Thuwana

Voucher No: 03293

Source (Description) : Waste Water (Sample-5) Main Source-2

Date and Time of collection : 12:30 Pm/ 21.10.2015

Date and Time of receipt : 3:30 Pm / 21.10.2015

Result of Analysis:

Total coliforms in MPN/ 100ml	>16
Escherichia coli in MPN/ 100ml	16

(MPN= Most Probable Number)

Report: Water sample of B – 13057 is **bacteriologically unsatisfactory.**

Microbiologist:

Head/ Consultant Microbiologist
Bacteriology Section

Reference: 1. *Guidelines for Drinking-Water Quality, WHO, Geneva 1985 (Volume 3)*
2. *Dialysis water pre-treatment for In-Centre and Satellite Haemodialysis Units in NSW: A Set of Guidelines, June, 2008*
3. *Myer'sand Koshi's Manual of Diagnostic procedures in Medical Microbiology and Immunology/ Serology, 2001 (Christian Medical College and Hospital Vellore 632004, Tamil Nadu, India)*

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NATIONAL HEALTH LABORATORY
35, HMAW KUN DAIK STREET, YANGON

Public Health laboratory Division

Mycology Section

Laboratory Report

Ref: No……………

Date; 16-11-2015

Name…Environmental Quality Management Co. Ltd

Referred by…………………………Hosp. Reg. No………………………………

Contact address…………………………………………………………………………

Type of Specimen - Air Sample(Premier Factory, QC room)

Date and Time of Collection……………………Date of Receipt-16.11.2015

EXAMINATION REQUIRED:- FUNGAL STUDY

CULTURE REPORT

Aspergillus niger, Mycelia sterila,Penicilliun species isolated.

(Total Count=48 CFU/m3)

Lab.No; M-1357-2015

Date; 30-11-2015

KCL 30-11-15

Dr. Khin Khin Mu
M.B.,B.S,M.Med.Sc (Microbiology)
Consultant Microbiologist
Head of Mycology Section
National Health Laboratory,Yangon

30/11/2015
Technician

Consultant Microbiologist

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BACTERIOLOGY SECTION

WATER BACTERIOLOGY REPORT

Laboratory No: B – 13061 Date of report: 26.10.15

Sender: EQM

Address : No. 233, Block 23, Sayeepin St., Thuwana

Voucher No: 03293

Source (Description) : Potable Water (Sample-4) (Tent-1)

Date and Time of collection : 12:30 Pm/ 21.10.2015

Date and Time of receipt : 3:30 Pm / 21.10.2015

Result of Analysis:

Total coliforms in MPN/ 100ml	>16
Escherichia coli in MPN/ 100ml	9.2

(MPN= Most Probable Number)

Report: Water sample of B – 13061 is **bacteriologically unsatisfactory.**

Microbiologist:

Head/ Consultant Microbiologist
Bacteriology Section

Reference: 1. *Guidelines for Drinking-Water Quality, WHO, Geneva 1985 (Volume 3)*
2. *Dialysis water pre-treatment for In-Centre and Satellite Haemodialysis Units in NSW: A Set of Guidelines, June, 2008*
3. *Myer'sand Koshi's Manual of Diagnostic procedures in Medical Microbiology and Immunology/ Serology, 2001 (Christian Medical College and Hospital Vellore 632004, Tamil Nadu, India)*

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WATER BACTERIOLOGY REPORT

Laboratory No: B – 13060 Date of report: 26.10.15

Sender: EQM

Address : No. 233, Block 23, Sayeepin St., Thuwana

Voucher No: 03293

Source (Description) : Potable Water (Sample-3) (Tap Water-1)

Date and Time of collection : 12:30 Pm/ 21.10.2015

Date and Time of receipt : 3:30 Pm / 21.10.2015

Result of Analysis:

Total coliforms in MPN/ 100ml	>16
Escherichia coli in MPN/ 100ml	9.2

(MPN= Most Probable Number)

Report: Water sample of B – 13060 is **bacteriologically unsatisfactory.**

Microbiologist:

Fr Head/ Consultant Microbiologist

Bacteriology Section

Reference: 1. *Guidelines for Drinking-Water Quality, WHO, Geneva 1985 (Volume 3)*
2. *Dialysis water pre-treatment for In-Centre and Satellite Haemodialysis Units in NSW: A Set of Guidelines, June, 2008*
3. *Myer'sand Koshi's Manual of Diagnostic procedures in Medical Microbiology and Immunology/ Serology, 2001 (Christian Medical College and Hospital Vellore 632004, Tamil Nadu, India)*

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BACTERIOLOGY SECTION

WATER BACTERIOLOGY REPORT

Laboratory No: B – 13059 Date of report: 26.10.15

Sender: EQM

Address : No. 233, Block 23, Sayeepin St., Thuwana

Voucher No: 03293

Source (Description) : Potable Water (Sample-2) RO

Date and Time of collection : 12:30 Pm/ 21.10.2015

Date and Time of receipt : 3:30 Pm / 21.10.2015

Result of Analysis:

Total coliforms in MPN/ 100ml	>16
Escherichia coli in MPN/ 100ml	0

(MPN= Most Probable Number)

Report: Water sample of B – 13059 is **bacteriologically unsatisfactory.**

Microbiologist:

Head/ Consultant Microbiologist
Bacteriology Section

Reference: 1. *Guidelines for Drinking-Water Quality, WHO, Geneva 1985 (Volume 3)*
2. *Dialysis water pre-treatment for In-Centre and Satellite Haemodialysis Units in NSW: A Set of Guidelines, June, 2008*
3. *Myer'sand Koshi's Manual of Diagnostic procedures in Medical Microbiology and Immunology/ Serology, 2001 (Christian Medical College and Hospital Vellore 632004, Tamil Nadu, India)*

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BACTERIOLOGY SECTION

WATER BACTERIOLOGY REPORT

Laboratory No: B – 13055 Date of report: 27.10.15

Sender: EQM

Address : No. 233, Block 23, Sayeepin St., Thuwana

Voucher No: 03293

Source (Description) : Potable Water (Sample-1) Main Source-1

Date and Time of collection : 12:30 Pm/ 21.10.2015

Date and Time of receipt : 3:30 Pm / 21.10.2015

Result of Analysis:

Total coliforms in MPN/ 100ml	>16
Escherichia coli in MPN/ 100ml	0

(MPN= Most Probable Number)

Report: Water sample of B – 13055 is **bacteriologically unsatisfactory.**

Microbiologist:

ꟳ Head/ Consultant Microbiologist

Bacteriology Section

Reference: 1. *Guidelines for Drinking-Water Quality, WHO, Geneva 1985 (Volume 3)*
2. *Dialysis water pre-treatment for In-Centre and Satellite Haemodialysis Units in NSW: A Set of Guidelines, June, 2008*
3. *Myer'sand Koshi's Manual of Diagnostic procedures in Medical Microbiology and Immunology/ Serology, 2001 (Christian Medical College and Hospital Vellore 632004, Tamil Nadu, India)*

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WATER BACTERIOLOGY REPORT

Laboratory No: B – 13058 Date of report: 26.10.15

Sender: EQM

Address : No. 233, Block 23, Sayeepin St., Thuwana

Voucher No: 03293

Source (Description) : Waste Water (Sample-4) Final Step

Date and Time of collection : 12:30 Pm/ 21.10.2015

Date and Time of receipt : 3:30 Pm / 21.10.2015

Result of Analysis:

Total coliforms in MPN/ 100ml	>16
Escherichia coli in MPN/ 100ml	9.2

(MPN= Most Probable Number)

Report: Water sample of B – 13058 is **bacteriologically unsatisfactory.**

Microbiologist:

Head/ Consultant Microbiologist

Bacteriology Section

Reference: 1. *Guidelines for Drinking-Water Quality, WHO, Geneva 1985 (Volume 3)*
2. *Dialysis water pre-treatment for In-Centre and Satellite Haemodialysis Units in NSW: A Set of Guidelines, June, 2008*
3. *Myer'sand Koshi's Manual of Diagnostic procedures in Medical Microbiology and Immunology/ Serology, 2001 (Christian Medical College and Hospital Vellore 632004, Tamil Nadu, India)*

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BACTERIOLOGY SECTION

WATER BACTERIOLOGY REPORT

Laboratory No: B – 13062 Date of report: 26.10.15

Sender: EQM

Address : No. 233, Block 23, Sayeepin St., Thuwana

Voucher No: 03293

Source (Description) : Waste Water (Sample-3) Drainage-1

Date and Time of collection : 12:30 Pm/ 21.10.2015

Date and Time of receipt : 3:30 Pm / 21.10.2015

Result of Analysis:

Total coliforms in MPN/ 100ml	>16
Escherichia coli in MPN/ 100ml	9.2

(MPN= Most Probable Number)

Report: Water sample of B – 13062 is **bacteriologically unsatisfactory.**

Microbiologist:

Head/ Consultant Microbiologist
Bacteriology Section

Reference: 1. *Guidelines for Drinking-Water Quality, WHO, Geneva 1985 (Volume 3)*
2. *Dialysis water pre-treatment for In-Centre and Satellite Haemodialysis Units in NSW: A Set of Guidelines, June, 2008*
3. *Myer'sand Koshi's Manual of Diagnostic procedures in Medical Microbiology and Immunology/ Serology, 2001 (Christian Medical College and Hospital Vellore 632004, Tamil Nadu, India)*

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BACTERIOLOGY SECTION

WATER BACTERIOLOGY REPORT

Laboratory No: B – 13056 Date of report: 26.10.15

Sender: EQM

Address : No. 233, Block 23, Sayeepin St., Thuwana

Voucher No: 03293

Source (Description) : Waste Water (Sample-6) Drainage-2

Date and Time of collection : 12:30 Pm/ 21.10.2015

Date and Time of receipt : 3:30 Pm / 21.10.2015

Result of Analysis:

Total coliforms in MPN/ 100ml	>16
Escherichia coli in MPN/ 100ml	16

(MPN= Most Probable Number)

Report: Water sample of B – 13056 is **bacteriologically unsatisfactory.**

Microbiologist: Head/ Consultant Microbiologist

Bacteriology Section

Reference: 1. *Guidelines for Drinking-Water Quality, WHO, Geneva 1985 (Volume 3)*
2. *Dialysis water pre-treatment for In-Centre and Satellite Haemodialysis Units in NSW: A Set of Guidelines, June, 2008*
3. *Myer'sand Koshi's Manual of Diagnostic procedures in Medical Microbiology and Immunology/ Serology, 2001 (Christian Medical College and Hospital Vellore 632004, Tamil Nadu, India)*

Advanced Medical & Diagnostics Trading Ltd
No.20(A),Ywar Lae Lane, Za-North Ward , Thingungyun Township, Yangon
The Republic of The Union of Myanmar.
Tel : 01-571656 / 01-565797 / 09-73112672 / 09-73176248
Fax : 01-8551095
E-mail : amd@yangon.net.mm
Website : www.amdmyanmar.com

WATER & WASTE WATER TREATMENT DIVISION

Attention To	Ma Jue Jue EQM Co.,Ltd Thuwana T/S Ph:01-560291

Source Water	: Waste Water
Analysis	: Chemical Test
Date Attended to Lab	: 23.10.2015

Sr.	Location	Dissolved oxygen (DO)	YCDC Target range
1.	Sample 2(Drainage 2)	0.7	> 1 ppm
2.	Sample 4 (Final state)	0.2	
3.	Sample 5 (Drainage 1)	1.0	

Remark: : Dissolved Oxygen result of Sample 2 & 4 are low in target range.

Advanced Medical & Diagnostics Amd

Lwin Lwin Oo
Manager
Water Treatment Department
Amd Co.,Ltd

Advanced Medical & Diagnostics Trading Ltd
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Tel : 01-571656 / 01-565797 / 09-73112672 / 09-73176248
Fax : 01-8551095
E-mail : amd@yangon.net.mm
Website : www.amdmyanmar.com

Water and Waste water Treatment Division

ANALYTICAL RESULTS

Client: EQM Co.,Ltd
Location: Thingangyaun T/S
Type of Sample: Sample-2 (RO)
Date of Analysis: 23.10.2015

Chemical Tests

Sr.	Item	Result	Unit	WHO Standard
1.	pH	6.90	-	6.5 ~ 8.5
2.	Colour	Nil	Pt-Co	15 cu
3.	Turbidity	Nil	FTU	< 5 FTU
4.	Conductivity	144	mg/l	N/A
5.	Dissolved Oxygen	4.8	mg/l	>1 ppm
6.	Total Dissolved Solids	72	mg/l	1000 mg/l
7.	Total Alkalinity	126	mg/l CaCo3	N/A
8.	Total Hardness	20	mg/l as CaCo3	N/A
9.	Iron	0.10	mg/l	<0.3 mg/l
10.	Magnesium	3.60	mg/l	150
11.	Chloride	40	mg/l	250 mg/l
12.	Calcium	2.80	mg/l	200
13.	Sulphate	9.60	mg/l	250 mg/l
14.	Zinc	0.012	mg/l	3.0 mg/l
15.	Arsenic	0.000	mg/l	0.01mg/l
16.	Copper	0.010	mg/l	1-2mg/l

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....
Signature

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Water Treatment Manager
Amd Co.,Ltd

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Water and Waste water Treatment Division

ANALYTICAL RESULTS

Client: EQM Co.,Ltd

Location: Thingangyaun T/S-1

Type of Sample: Sample 4 (Potable water (tent-1)

Date of Analysis: 23.10.2015 (overhead Tank water)

Chemical Tests

Sr.	Item	Result	Unit	WHO Standard
1.	pH	8.20	-	6.5 ~ 8.5
2.	Colour	10	Pt-Co	15 cu
3.	Turbidity	2	FTU	< 5 FTU
4.	Conductivity	10640	mg/l	N/A
5.	Dissolved Oxygen	4.1	mg/l	>1 ppm
6.	Total Dissolved Solids	5320	mg/l	1000 mg/l
7.	Total Alkalinity	261	mg/l CaCo3	N/A
8.	Total Hardness	825	mg/l as CaCo3	N/A
9.	Iron	0.25	mg/l	<0.3 mg/l
10.	Magnesium	168	mg/l	150
11.	Chloride	2130	mg/l	250 mg/l
12.	Calcium	88	mg/l	200
13.	Sulphate	403	mg/l	250 mg/l
14.	Zinc	0.010	mg/l	3.0 mg/l
15.	Arsenic	0.000	mg/l	0.01mg/l
16.	Copper	0.010	mg/l	1-2mg/l

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Water and Waste water Treatment Division
ANALYTICAL RESULTS

Client: EQM Co.,Ltd
Location: Thingangyaun T/S
Type of Sample: Sample-3 Potable water (Tank-1) (Tap water).
Date of Analysis: 23.10.2015

Chemical Tests

Sr.	Item	Result	Unit	WHO Standard
1.	pH	8.30	-	6.5 ~ 8.5
2.	Colour	12	Pt-Co	15 cu
3.	Turbidity	2	FTU	< 5 FTU
4.	Conductivity	10708	mg/l	N/A
5.	Dissolved Oxygen	3.7	mg/l	>1 ppm
6.	Total Dissolved Solids	5354	mg/l	1000 mg/l
7.	Total Alkalinity	234	mg/l CaCo3	N/A
8.	Total Hardness	790	mg/l as CaCo3	N/A
9.	Iron	0.25	mg/l	<0.3 mg/l
10.	Magnesium	173.60	mg/l	150
11.	Chloride	2150	mg/l	250 mg/l
12.	Calcium	68	mg/l	200
13.	Sulphate	393	mg/l	250 mg/l
14.	Zinc	0.011	mg/l	3.0 mg/l
15.	Arsenic	0.000	mg/l	0.01mg/l
16.	Copper	0.010	mg/l	1-2mg/l

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Lwin Lwin Oo
Water Treatment Manager
Amd Co.,Ltd

THE REPUBLIC OF THE UNION OF MYANMAR
MINISTRY OF HEALTH
DEPARTMENT OF MEDICAL SERVICES
NATIONAL HEALTH LABORATORY
35, MAW KUN DAIK STREET, YANGON
BACTERIOLOGY SECTION

CULTURE AND SENSITIVITY REPORT

Laboratory No: B- 14385/13 Date of Report: 30.11.15

Patient's Name: EQM

Address:

Referred by:

Reg. No: Voucher No: 04387

Type of Specimen: Slit sample Test Required: Culture

Date & Time of Collection:

Date &Time of Receipt :

Condition of Specimen:

MICROSCOPY

Gram stain: Gram positive cocci in pairs & group , Gram positive bacilli

CULTURE

Result: Bacteria carrying particles - 268

Organism isolated*:* (1) type of *Coagulase negative Staphylococcus* species, (1) type of *Micrococci* &(1) type of *Bacillus* species isolated.

Microbiologist

Head/ Consultant Microbiologist
Bacteriology Section

Refference: Medical Microbiology, The Practice Of Medical Micro biology, Robert Cruickshank,*et.al*, Twelfth Edition Vol II.

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Water and Waste water Treatment Division

ANALYTICAL RESULTS

Client: EQM Co.,Ltd
Location: Thingangyaun T/S
Type of Sample: Sample 1 (potable water) Main Source (Tube well water (1))
Date of Analysis: 23.10.2015
Date of Report: 17.11.2015

Chemical Tests

Sr.	Item	Result	Unit	WHO Standard
1.	pH	8.0	-	6.5 ~ 8.5
2.	Colour	10.00	Pt-Co	15 cu
3.	Turbidity	2.0	FTU	< 5 FTU
4.	Conductivity	13564	mg/l	N/A
5.	Dissolved Oxygen	4.6	mg/l	>1 ppm
6.	Total Dissolved Solids	6782	mg/l	1000 mg/l
7.	Total Alkalinity	240	mg/l CaCo3	N/A
8.	Total Hardness	846	mg/l as CaCo3	N/A
9.	Iron	0.20	mg/l	<0.3 mg/l
10.	Magnesium	>150	mg/l	150
11.	Chloride	2490	mg/l	250 mg/l
12.	Calcium	72	mg/l	200
13.	Sulphate	>400	mg/l	250 mg/l
14.	Zinc	0.006	mg/l	3.0 mg/l
15.	Arsenic	0.000	mg/l	0.01mg/l
16.	Copper	0.020	mg/l	1-2mg/l

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Water and Waste water Treatment Division
ANALYTICAL RESULTS

Client: EQM Co.,Ltd

Location: Thingangyaun T/S-1

Type of Sample: Sample 5 potable water ([illegible]) main source 2 (Tubewell water 2)

Date of Analysis: 23.10.2015

Chemical Tests

Sr.	Item	Result	Unit	WHO Standard
1.	pH	8.70	-	6.5 ~ 8.5
2.	Colour	Nil	Pt-Co	15 cu
3.	Turbidity	Nil	FTU	< 5 FTU
4.	Conductivity	196	mg/l	N/A
5.	Dissolved Oxygen	5.0	mg/l	>1 ppm
6.	Total Dissolved Solids	98	mg/l	1000 mg/l
7.	Total Alkalinity	255	mg/l CaCo3	N/A
8.	Total Hardness	45	mg/l as CaCo3	N/A
9.	Iron	0.10	mg/l	<0.3 mg/l
10.	Magnesium	4.20	mg/l	150
11.	Chloride	36	mg/l	250 mg/l
12.	Calcium	12	mg/l	200
13.	Sulphate	22	mg/l	250 mg/l
14.	Zinc	0.008	mg/l	3.0 mg/l
15.	Arsenic	0.000	mg/l	0.01mg/l
16.	Copper	0.009	mg/l	1-2mg/l

Remark:

Signature

Advanced Medical & Diagnostics Amd

Lwin Lwin Oo
Water Treatment Manager
Amd Co.,Ltd

ANNEX (III)
Public Consultation Questionnaires

Socio Economic, Health and Environment Key Informant Data Baseline and Attitude Survey

The purpose of this questionnaire is to collect general socio economic information and to obtain your perception and understanding of Proposed Project.

The main objective of the project is to review the community perception in the existing premier coffee factory. The survey will be carried out in the households, which are located approximately 2 km from Premier Coffee factory.

The Survey will focus on gaining Key Informant information and attitudes including:

- Information on the culture, natural environment and human use of the environment and infrastructure
- Attitudes on the prospective impacts of project during and after construction

I. KEY INFORMANT IDENTIFICATION

I1	STATE/ DIVISION	| |
I2	**Village** 1 2 3 4 5 6 7 8	|__|__|
I3	KEY INFORMANT SAMPLE NUMBER ____________________________	| | | | |
I4	NAME OF KEY INFORMANT_____________________________________	
I5	NAME OF RESPONDENT _____________________________________	

I6	DATE OF VISITS:	| |__/ |_/**1**|**3**|
I7	ENUMERATOR:__________________________	SUPERVISOR ______________________________

Enumerator's Remark: :..

Supervisor's Remark :..

****** indicates the question has skip (>>).

Module F: Infrastructure, Resource and Services

Question		Response categories	Skip	Response
Health and Education				
f1	Is Health care available for members of your Community? ကျန်းမာရေးစောင့်ရှောက်မှုဆေးရုံဆေးခန်း၊ ဆေးပေးခန်း ရှိပါသလား။	Yes........1 No 2		|__|__|
f2	Has health care availability changed in your community? ကျန်းမာရေး စောင့်ရှောက်မှုပုံစံ ပြောင်းလဲသွားခြင်း ရှိပါသလား။	Yes – Limited health Care ....1 No – No problems........ 2 Better – Improved 3		|__|__|
f3	Do you have access to education for members of your Community? အိမ်ထောင်စုအတွင်း ကျောင်းတက်နိုင်သူ ရှိပါသလား။	Yes........1 No 2		| |__________|
Energy				
f4	What <u>source of lighting</u> does your Community<u>primarily</u> use? လျှပ်စစ် (အလင်းစွမ်းအင်) ဘယ်ကရရှိပါသလဲ။	Public electricity........ 1 Community hydro-power .... 2 Battery .... 3 Kerosene .... 4 Candle .... 5 Other (Specify) 6		| |__________|
f6	What is the <u>main fuel source</u> used by your Community for cooking? ဟင်းချက်ရာတွင် မည်သည့်(အဓိက)လောင်စာကအသုံး ပြုသနည်း။	Electricity........ 1 Gas/ kerosene/ diesel .... 2 Charcoal/ firewood substitute .... 3 Firewood........ 4 Other (Specify) 5		|__|__|

Question		*Response categories*	*Skip*	*Response*
Water, Sanitation and Hygiene				
f7	What is the <u>main source</u> of <u>drinking</u>water used by your Community for in the past 12 months? သင့်၏မိသားစုအတွက် (အဓိက) သောက်ရေ ရရန် မည်သည့် အရင်းအမြစ်ကို သုံးပါသနည်း။ (လွန်ခဲ့သော ၁၂လ အတွင်း)	Public piped water .... 1 Tube well........ 2 Protected dug well/ pond/ spring/ rain water........ 3 Unprotected dug well/ pond/ spring/ rain water........ 4 River/ stream........ 5		||_|
f8	What is the distance to this source of Drinking Water? ရေရရှိဖို့ အတွက် အကြာအဝေး မည်မျှ ရှိပါသနည်း။	¼ mile .... 1 1 mile........2 More than one mile........ 3		| |_|. |
f9	Is yourdrinking water treated? ရေကို ပြုပြင်၍သောက်သုံးပါသလား။	Yes........1 No 2	**>>f11**	| |__________|
f10	If yes, what do you usually do to make it safe to drink? ရေသောက်သုံး ရာတွင် သန့်ရှင်းစေရန် မည်သကဲ့သို့ ဆောင်ရွက်ပါသနည်း။	Let it stand (sedimentation) .... 1 Filtration (ceramic, sand) .... 2 Boil ....3 Chlorine ....4 Other (specify)........ 5		|_|_|

** indicates the question has skip (>>).

f11	Has water quality changed over time? အချိန်နှင့်အမျှ ရေ၏အရည်အသွေး ပြောင်းလဲမှုရှိပါသလား။	Yes...1 No 2		| |___________|
f12	Has water quantity changed over time? ရေ ပမာဏ ပြောင်းလဲမှု ရှိ ပါသလား။	Yes...1 No 2		| |___________|
f13	Is domestic waste water treated?	Yes...1 No 2		| |___________|

	ေနအိမ္မွ ထြက္ရွိသည့္ေရဆိုး၊ေရညစ္၊မိုးဖို ေခ်ာင္းသံုးစြန္ ္ ပစ္ေရမ်ားအားျပိဳျပင္၍ (ဥပမာေဆးခပ္သန္႔စင္ျခင္း) စြန္႔ပစ္ ပါသလား။			
f14	Do you take your solid waste to a community disposal area? အမိႈက္ပံုတြင္ ္ အမိွက္ပံုပါသလား။	Yes..1 No 2		|_|

Question		***Response categories***	***Skip***	***Response***
Transportation				
f17	သယ္ယူပို႕ေဆာင္ေရးအတြက္ (အဓိက) အသံုးျပဳေသာအရာ	Walking ....1 Taxi/ Bus..2 Motorcycle ....3 Bicycle/Trishaw ....4 Bullock cart ....5 Horse/pony cart ....6 Ship/Boat..7		|__|__|

Module G: Cultural Aspect

Question		Response categories	Skip	Response
Cultural Heritage				
g1	အေရးပါေသာ ဆံုးျဖတ္ခ်က္မ်ားအား မည္သူကခ်မွတ္ပါသနည္း။	Village Leader.....1 Religious Leader.....2 Elder People.....3 Small Group Leader.....4 Others(Specify) 5		|__|__|
g2	အေရးအပါဆံုး ယဥ္ေက်းမႈ ထံုးတမ္းစဥ္လာ ေလ့စရိုက္ ကို ေဖၚျပပါ။	Language/ Literature .....1 Custom .....2 Taboo.....3 Festival .....4 Temples/archaeological sites-----.5 Others (Specify) .-- 6		|__|__|
g3	Do you know of important historic sites around your community? ပတ္ဝန္းက်င္တြင္ ေရွးေဟာင္း အေမြအႏွစ္ယဥ္ေျမ မ်ားရွိပါသလား။	Yes .....1 No 2		|__|__|
g4	Are those historic sites adequately protected? ၄င္းေနရာကိုလံုေလာက္ေသာကာကြယ္ေစာင့္ေရွာက္မႈ၊ ျပဳျပင္ထိန္းသိမ္းမႈမ်ား ရွိပါသလား။	Yes .....1 No 2		| |__________|

Module H: Air, Water and Climate

Question		Response categories	Skip	Response
Air, Water and Soil				
h1	Have you noticed any changes to Air Quality as long as you have been in the Community? ေလအရည္အေသြးေျပာင္းလဲမႈရွိပါသလား။	Improved .....1 Declined .....2 No Change.....3		| |
h2	Cause of change in air quality: အရည္အေသြးေျပာင္းလဲမႈရွိခဲ့လွ်င္ မည္သည့္ကိစၥေၾကာင့္ ျဖစ္ခဲ့ရပါသနည္း။	Industry.....4 Livestock Industry .....5 Brush-burning/ Forest fire 6		| |
h3	Have you noticed any changes to Water Quality as long as you have been in the Community? ေရအရည္အေသြး ေျပာင္းလဲမႈ ရွိပါသလား။	Improved .....1 Declined .....2 No Change.....3		| |
h4	Cause of change in water quality: အရည္အေသြးေျပာင္းလဲမႈရွိခဲ့လွ်င္ မည္သည့္ကိစၥေၾကာင့္ ျဖစ္ခဲ့ရပါသနည္း။	Industry.....4 Livestock Industry .....5 Brush-burning/ Forest fire 6		|__|
h5	Has the climate changed since you have been living in this area? အရင္ကႏွင့္ယွဥ္ရင္ ရာသီဥတု ေျပာင္းလဲခဲ့ပါသလား	Warmer. .....1 Cooler.......2 Unchanged 3		__|

** indicates the question has skip (>>)."

h6	ရှိပါသလား။ Is the local climate changed to be? မည်သည့်ပုံ ပြောင်းလဲ ကြ းပါသနည်း။	Wetter…...................................4 Drier… 5		__|

Module I: Flora and Fauna

	Questions	Response	
1.Crops	a. What crops do you plant? မည္သည့္ေကာက္ပဲသီးႏွံမ်ားစိုက္ပ်ိဳးပါသနည္း။	List Crops 1.rice ဆန္ 2.sugar cane ၾကံ 3.eans ပဲ 4.sesame ႏွမ္း 5.round nut ေျမပဲ	
	b. Which is the most valuable crop that you grow? မည္သည့္သီးႏွံက ေစ်းေကာင္းအရဆံုး ျဖစ္သနည္း။	List Crops 1.rice ဆန္ 2.sugar cane ၾကံ 3.eans ပဲ 4.sesame ႏွမ္း 5.round nut ေျမပဲ	
	c. Do you use fertilizer? အသီးအပင္ အားတိုးေဆး သံုးပါသလား။	1.Yes 2.No	
	d. Do you use pesticide? ပိုးသတ္ေဆး သံုးပါသလား။	1.Yes 2.No	

****** indicates the question has skip (>>).

	e. Over the last 10 years has crops yield? ၁၀ နှစ်အတွင်း အထွက်နှုန်း မည်သို့ရှိ သနည်း။	A. Increased, တက်သွားလား B. Decreased or ကျသွားသလား C. Remained stable နဂိုအတိုင်းမပြောင်းမလဲရှိသလား	

	f. What is the cause of change? အဘယ့္ေၾကာင့္ ထို႔သို႔ ေျပာင္းလဲမွဳ ရွိသနည္း။	List Causes of possible change 1 not enough water ေရမလံုေလာက္ျခင္း 2 too much water ေရမ်ားလြန္းျခင္း 3 too hot ပူလြန္းျခင္း 4 Change in ecosystem ေဂဟစနစ္ ေျပာင္းလဲမွဳ ျဖစ္ေပၚျခင္း	
	g. Are you crops an important food source? i.e. or are they sold စိုက္ပ်ိဳးထားေသာ ေကာက္ပဲသီးႏွံမ်ားကို ေရာင္းခ်ပါသလား။	1.Yes 2.No	
4. Wild Plants ေတာရိုင္းပင္မ်ား	a. Over the past 10 years has the abundance or distribution of wild plants? ၁၀ ႏွစ္အတြင္း အပင္ရုိင္း မ်ား ေပါမ်ားမွဳ မွာ မည္သို႔ရွိသနည္း။	A. Increased, တက္သလား B. Decreased or က်သြားသလား C. Remained stable နဂိုအတိုင္းမေျပာင္းမလဲရွိသလား	
	b. Over the past 10 years has the diversity/type of wild plants? လြန္ခဲ့ေသာ ၁၀ ႏွစ္အတြင္း ေတာရုိင္းအပင္ အမ်ိဳးအစားမ်ား မည္သို႔ ေျပာင္းလဲသနည္း။	A. Increased, တက္သလား B. Decreased or က်သြားသလား C. Remained the same နဂိုအတိုင္းမေျပာင္းမလဲရွိသလား	
	c. If there has been a change in number and or diversity of wild plants, why do you think this change has occurred? ေတာရုိင္းအပင္ အေရအတြက္ / အမ်ိဳးအစား ေျပာင္းလဲလွ်င္ မည္သည့္ အခ်က္ေၾကာင့္ ေျပာင္းလဲသနည္း။	1. Less Harvesting စိုက္ပ်ိဳးျခင္း ေလွ်ာ့နည္းလာျခင္း 2. More Harvesting ပိုစိုက္ပ်ိဳးျခင္း 3. Change in habits/ecosystem ေဂဟစနစ္ ေျပာင္းလဲလာျခင္း 4. Climate change ရာသီဥတု ေျပာင္းလဲျခင္း	
	d. Over the past 10 years has the timing of flowering changed in any plants ၁၀ ႏွစ္အတြင္း အပင္မ်ား၏ ပန္းပြင့္ေသာ အခ်ိန္ ေျပာင္းလဲပါသလား	1.Yes 2.No	

	e. Are these wild plants an important source of food/medicine? တောရိုင်းပင်များသည် အစားနှင့်ဆေး အတွက် အရေးပါ ပါသလား။	1.Yes 2.No	
5. Birds General ငှက်	a. Over the past 10 years has the number of wild birds?	A. Increased, တက်လား B. Decreased or ကျသွားသလား	

	၁၀ ႏွစ္အတြင္း ငွက္အေရအတြက္ ေျပာင္းလဲပါသလား။	C. Remained the same နဂိုအတိုင္းမေျပာင္းမလဲရွိသလား	
	b. Over the past 10 years has the diversity/type of wild birds? ၁၀ ႏွစ္အတြင္း ငွက္မ်ိဳးစိတ္ ေျပာင္းလဲပါသလား။	A. Increased, တက္သလား B. Decreased or က်သြားသလား C. Remained the same နဂိုအတိုင္းမေျပာင္းမလဲရွိသလား	
	c. If there has been a change in number and or diversity of wild birds, why do you think this change has occurred? ငွက္အမ်ိဳးမ်ိဳးအစားႏွင့္အေရအတြက္ ေျပာင္းလဲမွဳျဖစ္ေပၚပါလွ်င္ မည့္သည့္အခ်က္ေၾကာင့္ ေျပာင္းလဲပါသနည္း။	1. Less Hunting အမဲလိုက္ျခင္း 2. More Hunting ေလွ်ာ့နည္းလာျခင္း ပို အမဲလိုက္ျခင္း 3. Change in habits/ecosystem ေဂဟစနစ္ ေျပာင္းလဲလာျခင္း 4. Climate change ရာသီဥတု ေျပာင္းလဲျခင္း	
	d. Are wild birds and important source food/medicine? ငွက္မ်ားသည္ အစာနွင့္ေဆး အတြက္ အေရးပါပါသလား။	1.Yes 2.No	
11. Rats and Mice ၾကြက္	a. Have you ever seen a Rats and Mice in this area? ဤေဒသတြင္ ၾကြက္ကို ျမင္ဖူးပါ သလား။	1.Yes 2.No	
	b. Are Rats and Mice common? ဤေဒသတြင္ ၾကြက္ ေပါမ်ားပါသလား။	1.Yes 2.No	
	c. Has the number of Rats and Mice increased, decreased or remain stable over the past 10 years? ၁၀ ႏွစ္အတြင္း ၾကြက္ အေရအတြက္ ေျပာင္းလဲပါသလား။	A. Increased, တက္သလား B. Decreased or က်သြားသလား C. Remained the same နဂိုအတိုင္းမေျပာင္းမလဲရွိသလား	

	d. Has the diversity/type of Rats and Mice increased, decreased or remain stable over the past 10 years? ၁၀ ႏွစ္အတြင္း ၾကြက္မ်ိဳးစိတ္ ေျပာင္းလဲပါသလား။	A. Increased, တက္လား B. Decreased or က်သြားသလား C. Remained the same နဂိုအတိုင္းမေျပာင္းမလဲရွိသလား	
	e.If there has been a change in number and or diversity of wild Rats and Mice, why do you think this change has occurred? ၾကြက္ အမ်ိဳးအစားႏွင့္အေရအတြက္ ေျပာင္းလဲမႈျဖစ္ ေပၚပါလွ်င္ မည့္သည့္အခ်က္ေၾကာင့္ ေျပာင္းလဲပါသနည္း။	1. Less Hunting အမဲလိုက္ျခင္း 2. More Hunting ေလွ်ာ့တနည္းလာျခင္း ပို အမဲလိုက္ျခင္း 3. Change in habits က်က္စားရာေဒသ ေျပာင္းလဲျခင္း 4. Climate change ရာသီဥတု ေျပာင္းလဲျခင္း	

	f. Are Rats and Mice a source of foods/medicine? ၾကြက္မ်ားသည္ အစာနွဲေဆး အတြက္ အေရးပါ ပါသလား။	1.Yes 2.No	
15. Bees ပ်ား	a. Have you ever seen a Bees in this area? ဤေဒသတြင္ ပ်ားမ်ားကို ျမင္ဖူးပါ သလား။	1.Yes 2.No	
	b. Are Bees common? ဤေဒသတြင္ ပ်ားမ်ား ေပါမ်ားပါသလား။	1.Yes 2.No	
	c. Has the number of Bees increased, decreased or remain stable over the past 10 years? ၁၀ ႏွစ္အတြင္း ပ်ားအေရအတြက္ ေျပာင္းလဲပါသလား။	A. Increased, တက္လာသလား B. Decreased or က်သြားသလား C. Remained the same နဂိုအတိုင္းမေျပာင္းမလဲရွိသလား	
	d. Has the diversity/type of Bees increased, decreased or remain stable over the past 10 years? ၁၀ ႏွစ္အတြင္း ပ်ားမ်ိဳးစိတ္ ေျပာင္းလဲပါသလား။	A. Increased, တက္လာသလား B. Decreased or က်သြားသလား C. Remained the same နဂိုအတိုင္းမေျပာင္းမလဲရွိသလား	
	e.If there has been a change in number and or diversity of wild Bees, why do you think this change has occurred? ပ်ားအမ်ိဳးအစားႏွင့္အေရအတြက္ ေျပာင္းလဲမွုျဖစ္ေပၚပါလွ်င္ မည့္သည့္အခ်က္ေၾကာင့္ ေျပာင္းလဲပါသနည္း။	1. Less Hunting အမဲလိုက္ျခင္း ေလွ်ာ့နည္းလာျခင္း 2. More Hunting ပို အမဲလိုက္ျခင္း 3. Change in habits က်က္စားရာေဒသ ေျပာင္းလဲျခင္း 4. Climate change ရာသီဥတု ေျပာင္းလဲျခင္း	
	f. Are Bees a source of foods/medicine? ပ်ားမ်ားသည္ အစာနွဲေဆး အတြက္ အေရးပါ ပါသလား။	1.Yes 2.No	
16. Butterflies လိပ္ျပာ	a. Have you ever seen a Butterflies in this area? ဤေဒသတြင္ လိပ္ျပာမ်ားကို ျမင္ဖူးပါ သလား။	1.Yes 2.No	
	b. Are Butterflies common? ဤေဒသတြင္ လိပ္ျပာမ်ား ေပါမ်ားပါသလား။	1.Yes 2.No	
	c. Has the number of Butterflies increased, decreased or remain stable over the past 10 years?	A. Increased, တက္လာသလား B. Decreased or က်သြားသလား	

** indicates the question has skip (>>).

	၁၀ ႏွစ္အတြင္း လိပ္ျပာအေရအတြက္ ေျပာင္းလဲပါသလား။	C. Remained the same နဂိုအတိုင္းမေျပာင္းမလဲရွိသလား	
	d. Has the diversity/type of Butterflies increased, decreased	A. Increased, တက္သလား	

	or remain stable over the past 10 years? ၁၀ ႏွစ္အတြင္း လိပ္ျပာမ်ိဳးစိတ္ ေျပာင္းလဲပါသလား။	B. Decreased or က်သြားသလား C. Remained the same နဂိုအတိုင္းမေျပာင္းမလဲရွိသလား	
	e.If there has been a change in number and or diversity of wild Butterflies, why do you think this change has occurred? လိပ္ျပာအမ်ိဳးအစားႏွင့္အေရအတြက္ ေျပာင္းလဲမႈျဖစ္ေပၚပါလွ်င္ မည္သည့္အခ်က္ေၾကာင့္ ေျပာင္းလဲပါသနည္း။	1. Less Hunting အမဲလိုက္ျခင္း ေလ်ာ့နည္းလာျခင္း 2. More Hunting ပို အမဲလိုက္ျခင္း 3. Change in habits က်က္စားရာေဒသ ေျပာင္းလဲျခင္း 4. Climate change ရာသီဥတု ေျပာင္းလဲျခင္း	
	f. Are Butterflies a source of foods/medicine? လိပ္ျပာမ်ားသည္ အစာႏွင့္ေဆး အတြက္ အေရးပါ ပါသလား။	1.Yes 2.No	
17. Mosquitoes ျခင္	a. Have you ever seen a Mosquitoes in this area? ဤေဒသတြင္ ျခင္မ်ားကို ျမင္ဖူးပါ သလား။	1.Yes 2.No	
	b. Are Mosquitoes common? ဤေဒသတြင္ ျခင္မ်ား ေပါမ်ားပါသလား။	1.Yes 2.No	
	c. Has the number of Mosquitoes increased, decreased or remain stable over the past 10 years? ၁၀ ႏွစ္အတြင္း ျခင္အေရအတြက္ ေျပာင္းလဲပါသလား။	A. Increased, တက္လာသလား B. Decreased or က်သြားသလား C. Remained the same နဂိုအတိုင္းမေျပာင္းမလဲရွိသလား	
	d. Has the diversity/type of Mosquitoes increased, decreased or remain stable over the past 10 years? ၁၀ ႏွစ္အတြင္း ျခင္မ်ိဳးစိတ္ ေျပာင္းလဲပါသလား။	A. Increased, တက္လာသလား B. Decreased or က်သြားသလား C. Remained the same နဂိုအတိုင္းမေျပာင္းမလဲရွိသလား	
	e.If there has been a change in number and or diversity of wild Mosquitoes, why do you think this change has occurred? ျခင္အမ်ိဳးအစားႏွင့္အေရအတြက္ ေျပာင္းလဲမႈျဖစ္ေပၚပါလွ်င္ မည္သည့္အခ်က္ေၾကာင့္ ေျပာင္းလဲပါသနည္း။	1. Less Hunting အမဲလိုက္ျခင္း ေလ်ာ့နည္းလာျခင္း 2. More Hunting ပို အမဲလိုက္ျခင္း 3. Change in habits က်က္စားရာေဒသ ေျပာင္းလဲျခင္း 4. Climate change ရာသီဥတု ေျပာင္းလဲျခင္း	

	f. Are Mosquitoes a source of foods/medicine? ျခင္မ်ားသည္ အစာႏွင့္ေဆး အတြက္ အေရးပါပါသလား။	1.Yes 2.No	

** indicates the question has skip (>>).

18. Snakes ေျမြ	a. Have you ever seen a Snakes in this area? ဤေဒသတြင္ ေျမြမ်ားကို ျမင္ဖူးပါ သလား။	1.Yes 2.No	
	b. Are Snakes common? ဤေဒသတြင္ ေျမြမ်ား ေပါမ်ားပါသလား။	1.Yes 2.No	
	c. Has the number of Snakes increased, decreased or remain stable over the past 10 years? ၁၀ ႏွစ္အတြင္း ေျမြအေရအတြက္ ေျပာင္းလဲပါသလား။	A. Increased, တက္သလား B. Decreased or က်သြားသလား C. Remained the same နဂိုအတိုင္းမေျပာင္းမလဲရွိသလား	
	d. Has the diversity/type of Snakes increased, decreased or remain stable over the past 10 years? ၁၀ ႏွစ္အတြင္း ေျမြမ်ိဳးစိတ္ ေျပာင္းလဲပါသလား။	A. Increased, တက္သလား B. Decreased or က်သြားသလား C. Remained the same နဂိုအတိုင္းမေျပာင္းမလဲရွိသလား	
	e.If there has been a change in number and or diversity of wild Snakes, why do you think this change has occurred? ေျမြအမ်ိဳးအစားႏွင့္အေရအတြက္ ေျပာင္းလဲမႈျဖစ္ေပၚပါလွ်င္ မည္သည့္အခ်က္ေၾကာင့္ ေျပာင္းလဲပါသနည္း။	1. Less Hunting အမဲလိုက္ျခင္း ေလ်ာ့နည္းလာျခင္း 2. More Hunting ပို အမဲလိုက္ျခင္း 3. Change in habits က်က္စားရာေဒသ ေျပာင္းလဲျခင္း 4. Climate change ရာသီဥတု ေျပာင္းလဲျခင္း	
	f. Are Snakes a source of foods/medicine? ေျမြမ်ားသည္ အစားနဲ႔ေဆး အတြက္ အေရးပါ ပါသလား။	1.Yes 2.No	
19. General Environment	a. Over the past 10 years has natural habitat decreased by over25% ၁၀ ႏွစ္အတြင္း က်က္စားရာ ေဒသ ၂၅% ထက္ပိုၿပီ	1.Yes 2.No	

	b. Over the past 10 years has the amountof wildlife decreased significantly? ၁၀နှစ်အတွင်း တောရိုင်းတိရစ္ဆာန်များ သိသိသာသာ လျော့နည်းပါသလား။	1.Yes 2.No	
	c. Over the past 10 years are there significantly more people in this area?	1.Yes 2.No	

	၁၀နှစ်အတွင်း ဤဒေသတွင် သိသိသာသာ လူပိုများလာ ပါသလား။		
	d. Over the past 10 years has the weather changed significantly? ၁၀နှစ်အတွင်း ရာသီဥတု သိသိသာသာ ပြောင်းလဲလာပါသလား။	1.Yes 2.No	
	e. Are the wild plant and animals in this local environment a significant important source of food or medicine? တောရိုင်းအပင် နှင့် တိရစ္ဆာန်များ သည် ဤဒေသတွင် အစားအစာနှင့်ဆေး အတွက် အရေးပါ ပါသလား။	1.Yes 2.No	
	f. Are the wild plant and animals in this local environment a significant important source of income? တောရိုင်းအပင် နှင့် တိရစ္ဆာန်များ သည် ဤဒေသတွင် အရေးပါသော ဝင်ငွေရနိုင်သည့် အလုပ်ဖြစ်ပါသလား။	1.Yes 2.No	

Module J: Key InformantAttitudes

Question		Response categories	Skip	Response
Awareness and Attitude about the project				
j1	ယခုစက်ရုံ အကြောင်းကို သင်မည်မျှ သိပါသနည်း။	Nothing at all .... 1 A little .... 2 Some .... 3 A lot........ 4	**>>j3**	|__|__________|
j2	ယခုစက်ရုံ ကို မည်သူ့ဆီမှ သင်သိရှိပါသနည်း။	Government agencies........ 1 Community Leader........ 2 Media........ 3 Family members/Friends........ 4 Surveyors/ Interviewers .... 5 Other(Specify)........ 6 No........ 2		|__|__________|
J3	ယခုစက်ရုံ သည် လူမှု ပတ်ဝန်းကျင် အတွက် မည်မျှအရေးကြီးပါသနည်း။	Not extremely important........ 1 Not very important........ 2 Not important........ 3 Normal .... 4 important........ 5 Very important........ 6 Extremely important .... 7 Unaware........ 8		|__|__________|
J4	ယခင်က မည်သို့သော စက်ရုံ (သို့) စီမံကိန်း များ တွေ့ကြုံဖူးပါသနည်း။	Please mention		
J5	ထို စက်ရုံ (သို့) စီမံကိန်း ကြောင့်လူမှုပတ်ဝန်းကျင် အကျိုးသက်ရောက်မှု(ကောင်းကျိုး/ဆိုးကျိုး)ရှိခဲ့ပါသလား။	Positive .... 1 Negative........ 2 No effect 3		|__|__________|
J6	ထို စက်ရုံ (သို့) စီမံကိန်း များမနစ်နာကြေးကိစ္စများဆွေးနွေးဖူးပါသလား။	Yes........ 1 No 2		|__|__________|
J8	ယခုစက်ရုံ၏ ကောင်းသော အကျိုးသက်ရောက်မှုများ ကြောင့် သင့်တို့အား ပေးမည့်သည့်အ ရာများ စဉ် းဆောင်ပေး နိုင်မည်ဟု ထင်ပါသနည်း။ (အရေးကြီးဆုံးအချက်)	Unaware........ 1 Increase employment........ 2 Increase annual income .... 3 Improve living condition .... 4 Improved transport/infrastructure .... 5 Compensation for land used........ 6 Improved environment........ 7		|__|__________|
J9	ယခုစက်ရုံ၏ တိုးတက်ဖြစ်ဖြိုးမှုအတွက် သဘောတူညီမှု ရှိပါသလား။	Yes .... 1 No .... 2 Not sure........ 3		|__|__|

K10. Perceptions on Impacts of the Project

		Very negative	Negative	Slightly negative	No effect	Slightly positive	Positive	Very positive	
The effect on Physical Resources									
1	Soil quality	1	2	3	4	5	6	7	
2	Surface water quality	1	2	3	4	5	6	7	
3	Ground water quality	1	2	3	4	5	6	7	
4	Air quality	1	2	3	4	5	6	7	
5	Noise	1	2	3	4	5	6	7	
Effect on Biological Resource									
6	Forestry and conservation areas	1	2	3	4	5	6	7	
7	Agriculture/ Farmingareas	1	2	3	4	5	6	7	
8	Local animals	1	2	3	4	5	6	7	
9	Pasture	1	2	3	4	5	6	7	
10	Aquatic animals	1	2	3	4	5	6	7	
Effect on Human Use									
11	Local Fisheries	1	2	3	4	5	6	7	
12	Local Livestock	1	2	3	4	5	6	7	
13	Local Vegetation	1	2	3	4	5	6	7	
14	Local Industry	1	2	3	4	5	6	7	
15	Local Transportation	1	2	3	4	5	6	7	
16	Local Price	1	2	3	4	5	6	7	
17	Recreation	1	2	3	4	5	6	7	
18	Local Economy	1	2	3	4	5	6	7	
Effect on Quality of Life									
19	Housing	1	2	3	4	5	6	7	
20	Health	1	2	3	4	5	6	7	
21	Education	1	2	3	4	5	6	7	
22	Spiritual	1	2	3	4	5	6	7	
23	Safety	1	2	3	4	5	6	7	
23	Crime	1	2	3	4	5	6	7	
23	Family Structure	1	2	3	4	5	6	7	
24	Job opportunities	1	2	3	4	5	6	7	
25	Income	1	2	3	4	5	6	7	
26	Scenery	1	2	3	4	5	6	7	
27	Local Culture	1	2	3	4	5	6	7	
Effect on Cultural Heritage									
28	Religious Building	1	2	3	4	5	6	7	
29	Cemetery	1	2	3	4	5	6	7	
30	Historic buildings/sites	1	2	3	4	5	6	7	

"CHECK the whole questionnaire AGAIN, THANK the respondent and FINISH interview."

Socio-Economic, Health and Environment
Household Data Baseline and Attitude Survey

Introduction

Intro description

The purpose of this questionnaire is to collect general socio economic information and to obtain your perception and understanding of Proposed Project.

The main objective of the project is to review the community perception in the existing premier coffee project. The survey will be carried out in the households, which are located approximately 2 km from premier coffee factory.

The Survey will focus on gaining household member information and attitudes including:

- The structure and demographics of the household
- Household living standard, employment, income and social and economic condition
- Household and individual health
- Information on the natural environment and human use of the environment
- Attitudes on the prospective positive and negative impacts of premier coffee project.

I. HOUSEHOLD IDENTIFICATION

I1	STATE/ DIVISION	|_|
I2	**Village** 1 2 3 4 5 6 7 8		_		
I3	SURVEY/HOUSEHOLD SAMPLE NUMBER _____	||			
I4	NAME OF HOUSEHOLD HEAD	
I5	NAME OF RESPONDENT ________________________________	

I6	DATE OF VISITS:			/	/ **1| 5**|
I7	ENUMERATOR:______________________	SUPERVISOR ____________________

Enumerator's Remark: :..

Supervisor's Remark :..

Module A: Household Member Characteristics

	Question	Response categories	Skip to	Response
Name/Identification				
Household Member Characteristics				
a1	အိမ်ထောင်ဦးစီးနှင့် တော်စပ်ပုံ	ဦးစီး ....1 ဇနီး/ခင်ပွန်း ....2 သား/သမီး ....3 မိဘ/ယောက္ခမ ....4 အခြား/တော်စပ်ပုံ ....5 တော်စပ်မှုမရှိ 6		|__|__|
a2	Gender	ကျား .... 1 မ 2		|__|__|
a3	Age (of the last birthday)	15-20……….1 20-30……….2 30-40……….3 40-50……….4 50-60……….5 60-70……….6 70-+ ……….7		| |__________|
a4	လူမျိုး	ကချင်............................2 ကယား ....3 ကရင် .... 4 ချင်း .... 5 မွန် .... 6 ရခိုင် ....7 ရှမ်း............................8 အခြားတိုင်းရင်းသား .... 9 အခြား........................10		| |__________|
a5	ဘာသာ	ဗုဒ္ဓဘာသာ .... 1 ဟိန္ဒူဘာသာ .... 2 ခရစ်ယာန်ဘာသာ .... 3 အစ္စလာမ်ဘာသာ ....4 အခြား..........5		| |__________|
a6	စုစုပေါင်း မိသားစုဝင် အရေအတွက်	1…………….1 2…………….2 3…………….3 4…………….4 5…………….5 6…………….6 7…………….7 8…………….8 9…………….9 10…………...10		|__|__|

Module A: Household Member Characteristics

<table>
<tr><th colspan="2">Question</th><th>Response categories</th><th>Skip to</th><th>Response</th></tr>
<tr><td colspan="2">Name/Identification</td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Household Member Characteristics</td><td></td><td></td><td></td></tr>
<tr><td>A7</td><td>လွန်ခဲ့သော ၇-ရက်အတွင်းက
လုပ်ကိုင်ခဲ့သော
အဓိကလုပ်ငန်းကို
အမည်နှင့်တကွ ဖော်ပြပါ။</td><td>Worked to earn to income 1
Helped household business… 2
Search for work…… 3
Housework....................................4
Fulltime learning…… 5
Doing religious matters…… 6
Bad health/ disable……… 7
Pension/ support (not working) 8
Not work/ not search for work… 9</td><td></td><td>|||___</td></tr>
<tr><td>A8</td><td>အဓိကလုပ်ငန်းအမည် နှင့် တကွ ဖော်ပြပါ</td><td>Farmer...1
Livestock worker...................... 2
Fisherman 3
Forestry worker........................ 4
Sale worker 5
Service worker 6
Skilled worker 7
Casual worker 8
Unpaid family worker 9
Other (Specify) 10
Oil and Gas Worker................. 11</td><td></td><td>|_|_|</td></tr>
<tr><td>A9</td><td>သင်၏ တစ်နှစ်ဝင်ငွေ (ကျပ်)</td><td>Below 500,000..................................1
500,001 – 1,000,000........................2
1,000,001 – 2,000,000.....................3
2,000,001 – 3,000,000.....................4
3,000,001 - 5,000,000......................5
Above 5,000,000..............................6</td><td></td><td>| |__________|</td></tr>
<tr><td>A10</td><td>ပြီးဆုံးခဲ့သော ပညာရေး</td><td>KG - 1st std 0-1
2nd std.- 3rd std 2-3
4th – 9th std.................. 4-9
10th std. passed 10
Graduate/ post grad 11
Under grad.Diploma …12
Vocation certificate …13.
Monastery 14
Never attended school. 15</td><td></td><td>|_|_|</td></tr>
<tr><td>A11</td><td>မိသားစုအတွင်း အမြင့်ဆုံး
ပညာရေး အခြေအနေ</td><td>KG - 1st std 0-
1
2nd std.- 3rd std 2-
3
4th – 9th std.................. 4-9
10th std. passed 10
Graduate/ post grad 11
Under grad.Diploma …12
Vocation certificate …13.
Monastery .... 14</td><td></td><td>|_|_|</td></tr>
</table>

** indicates the question has skip (>>).

Module B: Household health condition

	Question	Response categories	Skip to	Response
Household Health Condition				
B1	မိသားစုအတြင္း ကိုယ္အဂၤါခ်ိဳ႕ယြင္းမႈ ရွိပါသလား။ (ရာသက္ပန္ ခ်ိဳ႕ယြင္းမႈ)	No ....1 Mobility/walking.....2 Loss of limb ....3 Blindness .... 4 Loss of hearing........5 Other.......................6		|__|__|
B2	လြန္ခဲ့ေသာ ၃ လ က မိသားစုအတြင္း ေမေတာ္တဆ ျဖစ္ပြားမႈရွိပါသလား။	No ....1 Occupational...........2 Non Occupational ..3		|__||
B3	လြန္ခဲ့ေသာလ က မိသားစု အတြင္း ၃ ႀကိမ္ႏွင့္ အထက္ ဝမ္းေလွ်ာမႈ ရွိပါသလား။	No .... 1 Yes................................2		|__|__|
B4	လြန္ခဲ့ေသာ လ က မိသားစု အတြင္းေနမေကာင္း ျဖစ္ပြားမႈရွိခဲ့ပါသလား။	No .... 1 Yes................................2		|__|__|
B5	သင့္ မိသားစုအတြင္း အျဖစ္မ်ားဆံုး ေရာဂါမ်ားအား အမည္ႏွင့္တကြေဖၚျပပါ	None ....1 Malaria .... 2 Flu..3 Diseases of digestive system………4 Musclepain .... 5 Diseases of the skin .... 6 Hypertension .... 7 Ear, eye ,tooth disease.................... 8 Heart disea...9 Cancer…..10 Catch a cold……… ....11 Sexually Transmitted Disease… 12		|__|__|
B6	က်န္းမာေရး ေစာင့္ေရွာက္မႈ မည္သူ႔ႏွင့္ ခံယူပါသလဲ။	Doctor ....1 Health Assistant ....2 Midwife/ LHV ....3 AMW............................4 CHW ....5 Traditional healer ....6 Quack ....7 Self medication ....8 Other (Specify) 9		||_|
B7	ျခင္ေထာင္ ႏွင့္ အိပ္ပါသလား။ (Last Night)	Yes................. 1 No 2		||_|

** indicates the question has skip (>>).

Module C: Household structure and migration

	Question	Response categories	Skip to	Response
House Structure				
C1	သင္ေနထိုင္ေသာအေဆာက္အအံု အမ်ိဳးအစား	Two storey and above........................1 One storey house ....2 Hut...3 Other (Specify) 4		|__|__|
C2	အိမ္ အမုိးကို မည္သည့္ ပစၥည္းျဖင့္ တည္ေဆာက္ထားသနည္း။	Thatch/ large leaves/ Palm.................1 Bamboo ....2 Other unfinished roof ....3 CGI.. 4 Tarpaulin... 5 Other finished roof ....6 Other (Specify).................................7		| |__|
Migration				
C3	သင့္အိမ္၏ မိသားစု ဒီေနရာမွာေနတာ ဘယ္ေလာက္ၾကာၿပီလဲ။	Less than one year.......................................1 One to three years ....2 Three to ten years ....3 More than ten years 4		| |__________|
C4	လြန္ခဲ့ေသာ (၁၂)လအတြင္း ၄င္းက အလုပ္ရွာေဖြရန္ သို႕မဟုတ္ အျခားေသာ အေၾကာင္းေၾကာင့္ အိမ္မွ သြားေရာက္ၿပီး အလုပ္လုပ္သူ ရွိပါသလား။ (အမည္ျဖင့္ တစ္ခု ေဖာ္ျပေပးပါ)	No ....0 Head of household............................1 Other male adult (15+ year) .... 2 Other female adult (15+ year) .... 3 Boys (under 15 year)........................... 4 Girls (under 15 year)........................... 5	>>d1	| | |
C5	ဘယ္ႏွစ္လခန္႔ သြားေရာက္ခဲ့ပါသလဲ။	1-3......................................1 3-6......................................2 6-12....................................3		| |__________|
C6	မည္သည့္ ရာသီက သြားေရာက္ခဲ့သလဲ။	Summer ....1 Rainy season.......................................2 Winter 3		|__|__|
C7	မည္သည့္အတြက္ ေၾကာင့္ သြားေရာက္ခဲ့သလဲ။	Work .... 1 Education ....,..2 Marriage/or live with other family.......3 Other.. 4		|__|__|
C8	အလုပ္အတြက္ဆိုပါက မည္သည့္ အလုပ္အမ်ိဳးအစား သြားေရာက္လုပ္ကိုင္ပါသလဲ။	Agriculture/fishery ....1 Factory/production .... 2 Domestic/house ....3 Civil service .... 4 Other.. 5 Oil and Gas project work 6		|__|__|
C9	လြန္ခဲ့ေသာ (၁၂)လ အတြင္း မည္သည့္ေနရာသို႕ ေျပာင္းေရႊ႕သြားပါသလဲ။	Within Township................................ 0 Within State/Division .... 1 Within Country.................................2 Abroad 3		| |__________|

** indicates the question has skip (>>).

Module E: Livelihood

	Question	Response categories	Skip	Response
Land Ownership				
d5	မြေပိုင်ဆိုင်မှု / နေထိုင်မြေ ပိုင်ဆိုင်မှု ရှိပါသလား။	Yes....1 No....2		|_|_|
d7	ပိုင်ဆိုင်မှု အထောက်အထား ရှိပါသလား။	With document.... 1 No document With permission......... 2 No Document No permission........... 3		|_|_|
	Question	***Response categories***	***Skip***	***Response***
Agriculture				
e1**	လယ်ယာလုပ်ကိုင် ဆောင်ရွက်ပါသလား။	Yes....1 No....2	>>**e4**	|_|_|
e2	လယ်ယာ ဧက ဘယ်လောက်ပိုင်ဆိုင်ပါသလဲ။	Less than 2 acre 1 2-3 acres 2 Greater than 3 acres 3		|_|_|
e3	လွန်ခဲ့သော နှစ်က အဓိကသီးနှံ ထုတ်လုပ်မှု ဖော်ပြပေးပါ။	Rice:____1 Beans/Pulses:____2 Corn:____3 Sesame:____4 Vegetables:____5 Other:____6		| |__________|

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	Question	Response categories	Skip	Response
Livestock				
e4	တိရစ္ဆာန် ပိုင်ဆိုင်မှု ရှိပါသလား။ တိရစ္ဆာန် ပိုင်ဆိုင်မှု ၁။ကြက် ၂။နွားမ ၃။နွားထီး သိုး ၄။မြင်း ၅။မြည်း ၆။လား ၇။သိုး ၈။ဆိတ် ၉။ဝက် ၁၀။စသည်ဖြင့်	Yes....1 No 2		|_|_|
	Question	**Response categories**	**Skip**	**Response**
Livestock				

-

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Module E: Livelihood

<table>
<tr>
<td>E5</td>
<td>တိရစာၦန္ ပိုင္ဆိုင္မႈ (အဓိက ေမြးျမဴေသာ၊ထားရိွေသာ)
၁။ကၽြဲ
၂။ႏြားမ
၃။ႏြားသိုး
၄။ျမင္း
၅။ျမည္း
၆။လား
၇။သိုး
၈။ဆိတ္
၉။ဝက္
၁၀။စသည္ျဖင့္</td>
<td>Non-draught buffalo:_______1_
Non-draught ox:______2_
Cow:__3_
Horse:_______4_
Chickens:_______5_
Goat:_______6
Sheep:______7
Pig:_8__
Other (Specify):_____9__</td>
<td></td>
<td>|_|_|</td>
</tr>
</table>

Question		Response categories	Skip	Response
Fishery				
E6	လွန်ခဲ့သော (၁၂)လ ခန့်က မိသားစုအတွင်း ငါး ရေ လုပ်ငန်း အလုပ်လုပ်ကိုင်သူ ရှိပါသလား။	Yes .... 1 No 2		
E7	ငါး မွေးမြူရေး၊ ပုစွန် မွေးမြူရေး လုပ်ကိုင်ပါသလား (ကိုယ်ပိုင်)	Not own .... 2 Yes 1		

Question		*Response categories*	*Skip*	*Response*
Off-farm livelihood activities				
e7**	မိသားစုအတွင်း (လယ်ယာလုပ်ငန်းနှင့်မသက်ဆိုင် သော အခြားလုပ်ငန်းလုပ်ကိုင်ပါသလား။)	Yes .... 1 No 2	>>e9	
e8	အခြားမည်သည့် အလုပ်ကိုင် ကို လုပ်ကိုင်ပါသနည်း။	Trading (wholesale, general trading) 1 Small retail shop .... 2 Street vendor/ hawker/ green grocer 3 Rice huller .... 4 Government Officer .... 5 Salt field .... 5 Boat/ land transport .... 6 Cottage industry .... 7 Homestead garden .... 8 Company Officer 9		

Question		*Response categories*	*Skip*	*Response*
Labor and Working condition				
e9	ကူညီလုပ်ကိုင်ပေးမည့်လုပ်သားများလွယ်ကူစွာရနိုင်ပါသလား။ (မိသားစုဝင်မဟုတ်သည့်အခြားအလုပ်သမား)	Yes .... 1 No 2	>>e12	
e10	မည်သည့် နေရာမှလာရောက်လုပ်ကိုင်ပါသနည်း။	By hiring from other village .... 1 Substitute with machine .... 2 Other(Specify) 3		
e11	ယခုစက်ရုံ တည်ထောင်ခြင်းအားဖြင့် မိရိုးဖလာ လုပ်ငန်းမဲ့သွားသားအား ထောက်ခံကူမှု ရနိုင်ပါသလား။	Yes .... 1 No 2		
e12	သင့်၏တစ်နေ့ပုံမှန် ဝင်ငွေ မည်မျှရရှိပါသနည်း။	Below 500 .... 1 500 – 1,000 .... 2 1,000- 1,500 .... 3 1,500 – 2,000 .... 4 2,000+ 5		
e13	မိသားစု၏တစ်နှစ်စာခန့်မှန်းခြေဝင်ငွေမည်မျှရှိပါသနည်း။	Below 500,000 .... 1 500,001–1,000,000 .... 2 1,000,001–2,000,000 .... 3 2,000,001–3,000,000 .... 4 3,000,001 - 5,000,000 .... 5 Above 5,000,000 6		
e14	မိသားစု၏လက်ရှိငွေကြေး အခြေအနေ၊ စုဆောင်းနိုင်မှု ရှိပါသလား။	Do not have enough .... 1 Have enough money but no savings .2 Have enough money and savings 3		

Module F: Infrastructure, Resource and Services

Question		Response categories	Skip	Response
Health and Education				
f1	ကျန်းမာရေး စောင့်ရှောက်ရန်ဆေးရုံ၊ ဆေးခန်း ၊ ဆေးပေးခန်း ရှိပါသလား။	Yes .... 1 No 2		
f2	ကျန်းမာရေး စောင့်ရှောက်မှုပိုင်း ပြောင်းလဲသွားခြင်း ရှိပါသလား။	Yes – Limited health Care .... 1 No – No problems .... 2 Better – Improved 3		

f3	အိမ်ထောင်စုအတွင်း ကျောင်းတက်နိုင်သူ ရှိပါသလား။	Yes .... 1 No 2		

	Question	Response categories	Skip	Response
Energy				
f3	လျှပ်စစ် (အလင်းရောင်) ဘယ်ကရရှိပါသလဲ။	Public electricity........1 Community hydro-power........2 Battery........3 Kerosene........4 Candle........5 Other (Specify)........6		
f5	ဟင်းချက်ရာတွင်မည်သည့်(အဓိက)လောင်စာကအသုံး ပြုပါသနည်း။	Electricity........1 Gas/ kerosene/ diesel........2 Charcoal/ firewood substitute........3 Firewood........4 Other (Specify)........5		
Water, Sanitation and Hygiene				
f7	သင့်၏မိသားစုအတွက် (အဓိက) သောက်ရေ ရရန် မည်သည့် အရင်းအမြစ်ကို သုံးပါသနည်း။ (လွန်ခဲ့သော ၁၂လ အတွင်း)	Public piped water........1 Tube well........2 Protected dug well/ pond/ spring/ rain water........3 Unprotected dug well/ pond/ spring/ rain water........4 River/ stream........5		
f8	ရေရရှိဖို့အတွက် အကွာအဝေး မည်မျှ ရှိပါသနည်း။	¼ mile........1 1 mile........2 More than one mile........3		
f9	ရေကို ပြုပြင်၍သောက်သုံးပါသလား။	Yes........1 No........2	>>f11	
f10	ရေသောက်သုံး ရာတွင် သန့်ရှင်းစေရန် မည်ကဲ့သို့ ဆောင်ရွက်ပါသနည်း။	Let it stand (sedimentation)........1 Filtration (ceramic, sand)........2 Boil........3 Chlorine........4 Other (specify)........5		
f11	အချိန်နှင့်အမျှ ရေ၏အရည်အသွေး ပြောင်းလဲမှုရှိပါသလား။	Yes........1 No........2		
f12	ရေ ပမာဏ ပြောင်းလဲမှု ရှိပါသလား။	Yes........1 No........2		
f13	ရေဆိုးမြောင်း အိမ်အနီးတွင် ရှိပါသလား။?	Yes........1 No........2		
f14	အမှိုက်ပုံးတွင် အမှိုက်ပစ်ပါသလား။	Yes........1 No........2		
Transportation				
f15	အများဆုံးအသုံးပြုသော သယ်ယူပို့ဆောင်ရေး။	Walking........0 Taxi/ Bus........1 Motorcycle........2 Bicycle/Trishaw........4 Bullock cart........5 Horse/pony cart........6 Ship/Boat........7		

** indicates the question has skip (>>).

Module G: Cultural Aspect

Question		Response categories	Skip	Response
Cultural Heritage				
g1	အေရးပါေသာ ဆံုးျဖတ္ခ်က္မ်ားအား မည္သူကခ်မွတ္ပါသနည္း။	Village Leader .... 1 Religious Leader..................... 2 Elder People ....3 Small Group Leader................. 4 Others(Specify) 5		|__|__|
g2	အေရးအပါဆံုး ယဥ္ေက်းမႈ ထံုးတမ္းစဥ္လာ ဓေလ့စရိုက္ ကို ေဖာ္ျပပါ။	Language/ Literature .... 1 Custom ....2 Taboo..3 Festival .... 4 Temples/archaeological sites-----. 5 Others (Specify) .-- 6		| |_______|
g3	ေရွးေဟာင္းအေမြအႏွစ္ နယ္ေျမ မ်ားရွိပါသလား။	Yes...1 No..2		| | |
g4	၄င္းေနရာ ကိုလံုေလာက္ေသာ ကာကြယ္ ေစာင့္ေရွာက္မႈ၊ျပဳျပင္ထိန္းသိမ္းမႈမ်ား ရွိပါသလား။	Yes...1 No..2		| |_______|

Module H: Air, Water and Climate

Question		Response categories	Skip	Response
Air, Water and Soil				
h1	ေလအရည္အေသြးေျပာင္းလဲမႈရွိပါသလား။	Improved .... 1 Declined .... 2 No Change 3		| |
h2	အရည္အေသြးေျပာင္းလဲမႈရွိခဲ့လွ်င္ မည္သည့္ ကိစၥေၾကာင့္ ျဖစ္ခဲ့ရပါသနည္း။	Industry ....4 Livestock Industry ....5 Brush-burning/ Forest fire 6		| |
h3	ေရအရည္အေသြး ေျပာင္းလဲမႈ ရွိပါသလား။	Improved ....1 Declined .... 2 No Change 3		| |
h4	အရည္အေသြးေျပာင္းလဲမႈရွိခဲ့လွ်င္ မည္သည့္ ကိစၥေၾကာင့္ ျဖစ္ခဲ့ရပါသနည္း။	Industry ....4 Livestock Industry.........................5 Brush-burning/ Forest fire 6		| |
h5	အရင္ကႏွင့္ယွဥ္ရင္ ရာသီဥတု ေျပာင္းလဲခဲ့မႈ ရွိပါသလား။	Warmer. .... 1 Cooler… ....2 Unchanged 3		
h6	မည္သို႔ ေျပာင္းလဲသြားပါသနည္း။	Wetter… ....4 Drier…................................... 5		

** indicates the question has skip (>>).

Module I: Flora and Fauna

	Questions	Response	
1.Crops	a. What crops do you plant? မည်သည့်ကောက်ပဲသီးနှံမျိုးစိုက်ပျိုးပါသနည်း။	List Crops 1.rice ဆန် 2.sugar cane ကြံ 3.beans ပဲ 4.sesame နှမ်း 5.ground nut မြေပဲ	
	b. Which is the most valuable crop that you grow? မည်သည့်သီးနှံက ဈေးကောင်းအရဆုံး ဖြစ်သနည်း။	List Crops 1.rice ဆန် 2.sugar cane ကြံ 3.beans ပဲ 4.sesame နှမ်း 5.ground nut မြေပဲ	
	c. Do you use fertilizer? အသီးအပင် အားတိုးဆေး သုံးပါသလား။	1.Yes 2.No	
	d. Do you use pesticide? ပိုးသတ်ဆေး သုံးပါသလား။	1.Yes 2.No	
	e. Over the last 10 years has crops yield? ၁၀ နှစ်အတွင်း အထွက်နှုန်း မည်သို့ရှိသနည်း။	A. Increased, တက်လာသလား B. Decreased or ကျသွားသလား C. Remained stable နဂိုအတိုင်းမပြောင်းမလဲရှိသလား	
	f. What is the cause of change? အဘယ့်ကြောင့် ထိုသို့ ပြောင်းလဲမှု ရှိသနည်း။	List Causes of possible change 1 not enough water ရေမလုံလောက်ခြင်း	

		2 too much water ေရမ်ားလြန္းျခင္း 3 too hot ပူလြန္းျခင္း 4 Change in ecosystem ေဂဟစနစ္ ေျပာင္းလဲမွဳ ျဖစ္ေပၚျခင္း	
		—	

	g. Are you crops an important food source? i.e. or are they sold စိုက္ပ်ိဳးထားေသာ ေကာက္ပဲသီးႏွံမ်ားကို ေရာင္းခ်ပါသလား။	1.Yes 2.No	
4. Wild Plants ေတာရိုင္းပင္မ်ား	a. Over the past 10 years has the abundance or distribution of wild plants? ၁၀ႏွစ္အတြင္း အပင္ရိုင္း မ်ား ေပါမ်ားမႈ ျပန္႔ႏွံ႔မႈ ရွိသနည္း။	A. Increased, တက္သလား B. Decreased or က်သြားသလား C. Remained stable နဂိုအတိုင္းမေျပာင္းမလဲရွိသလား	
	b. Over the past 10 years has the diversity/type of wild plants? လြန္ခဲ့ေသာ ၁၀ ႏွစ္အတြင္း ေတာရိုင္းအပင္ အမ်ိဳးအစားမ်ား မည္သို႔ ေျပာင္းလဲသနည္း။	A. Increased, တက္သလား B. Decreased or က်သြားသလား C. Remained the same နဂိုအတိုင္းမေျပာင္းမလဲရွိသလား	
	c. If there has been a change in number and or diversity of wild plants, why do you think this change has occurred? ေတာရိုင္းအပင္၏ အေရအတြက္ / အမ်ိဳးအစား ေျပာင္းလဲ ခဲ့င္ မည္သည့္အခ်က္ ေၾကာင့္ေျပာင္းလဲ နည္း။	1. Less Harvesting စိုက္ပ်ိဳးျခင္း ေလ်ာ့နည္းလာျခင္း 2. More Harvesting ပိုစိုက္ပ်ိဳးျခင္း 3. Change in habits/ecosystem ေဂဟစနစ္ ေျပာင္းလဲလာျခင္း 4. Climate change ရာသီဥတု ေျပာင္းလဲျခင္း	
	d. Over the past 10 years has the timing of flowering changed in any plants ၁၀ႏွစ္အတြင္း အပင္မ်ား၏ ပန္းပြင့္ေသာ အခ်ိန္ ေျပာင္းလဲပါသလား	1.Yes 2.No	
	e. Are these wild plants an important source of food/medicine? ေတာရိုင္းပင္မ်ားသည္ အစာနဲ႔ေဆး အတြက္ အေရးပါ ပါသလား။	1.Yes 2.No	
5. Birds General ငွက္	a. Over the past 10 years has the number of wild birds? ၁၀ ႏွစ္အတြင္း ငွက္အေရအတြက္ ေျပာင္းလဲပါသလား။	A. Increased, တက္သလား B. Decreased or က်သြားသလား C. Remained the same နဂိုအတိုင္းမေျပာင္းမလဲရွိသလား	

	b. Over the past 10 years has the diversity/type of wild birds? ၁၀ နှစ်အတွင်း ငှက်မျိုးစိတ် ပြောင်းလဲပါသလား။	A. Increased, တက်သွားလား B. Decreased or ကျသွားသလား C. Remained the same နဂိုအတိုင်းမပြောင်းမလဲရှိသလား	

	c. If there has been a change in number and or diversity of wild birds, why do you think this change has occurred? ငှက်အမျိုးအစားနှင့်အရေအတွက် ပြောင်းလဲမှုဖြစ်ပေါ်ပါလျှင် မည်သည့်အချက်ကြောင့် ပြောင်းလဲပါသနည်း။	1. Less Hunting အမဲလိုက်ခြင်း လျော့နည်းလာခြင်း 2. More Hunting ပို အမဲလိုက်ခြင်း 3. Change in habits/ecosystem ဂေဟစနစ် ပြောင်းလဲလာခြင်း 4. Climate change ရာသီဥတု ပြောင်းလဲခြင်း	
	d. Are wild birds and important source food/medicine? ငှက်များသည် အစာနှင့်ဆေး အတွက် အရေးပါ ပါသလား။	1.Yes 2.No	
11. Rats and Mice ကြွက်	a. Have you ever seen a Rats and Mice in this area? ဤဒေသတွင် ကြွက်ကို မြင်ဖူးပါသလား။	1.Yes 2.No	
	b. Are Rats and Mice common? ဤဒေသတွင် ကြွက် ပေါ်များပါသလား။	1.Yes 2.No	
	c. Has the number of Rats and Mice increased, decreased or remain stable over the past 10 years? ၁၀ နှစ်အတွင်း ကြွက် အရေအတွက် ပြောင်းလဲပါသလား။	A. Increased, တက်သွားလား B. Decreased or ကျဆင်းသွားသလား C. Remained the same နဂိုအတိုင်းမပြောင်းမလဲရှိသလား	
	d. Has the diversity/type of Rats and Mice increased, decreased or remain stable over the past 10 years? ၁၀ နှစ်အတွင်း ကြွက်မျိုးစိတ် ပြောင်းလဲပါသလား။	A. Increased, တက်သွားလား B. Decreased or ကျဆင်းသွားသလား C. Remained the same နဂိုအတိုင်းမပြောင်းမလဲရှိသလား	
	e.If there has been a change in number and or diversity of wild Rats and Mice, why do you think this change has occurred? ကြွက်အမျိုးအစားနှင့်အရေအတွက် ပြောင်းလဲမှုဖြစ်ပေါ်ပါလျှင် မည်သည့်အချက်ကြောင့် ပြောင်းလဲပါသနည်း။	1. Less Hunting အမဲလိုက်ခြင်း လျော့နည်းလာခြင်း 2. More Hunting ပို အမဲလိုက်ခြင်း 3. Change in habits ကျက်စားရာဒေသ ပြောင်းလဲခြင်း 4. Climate change ရာသီဥတု ပြောင်းလဲခြင်း	
	f. Are Rats and Mice a source of foods/medicine? ကြွက်များသည် အစာနှင့်ဆေး အတွက် အရေးပါ ပါသလား။	1.Yes 2.No	

15. Bees ပျား	a. Have you ever seen a Bees in this area? ဤဒေသတွင် ပျားများကို မြင်ဖူးပါ သလား။	1.Yes 2.No	
	b. Are Bees common? ဤဒေသတွင် ပျားများ ပေါများပါသလား။	1.Yes 2.No	

	c. Has the number of Bees increased, decreased or remain stable over the past 10 years? ၁၀ ႏွစ္အတြင္း ပ်ားအေရအတြက္ ေျပာင္းလဲပါသလား။	A. Increased, တက္လာလား B. Decreased or က်သြားသလား C. Remained the same နဂိုအတိုင္းမေျပာင္းမလဲရွိသလား	
	d. Has the diversity/type of Bees increased, decreased or remain stable over the past 10 years? ၁၀ ႏွစ္အတြင္း ပ်ားမ်ိဳးစိတ္ ေျပာင္းလဲပါသလား။	A. Increased, တက္လာလား B. Decreased or က်သြားသလား C. Remained the same နဂိုအတိုင္းမေျပာင္းမလဲရွိသလား	
	e.If there has been a change in number and or diversity of wild Bees, why do you think this change has occurred? ပ်ားအမ်ိဳးအစားႏွင့္အေရအတြက္ ေျပာင္းလဲမႈျဖစ္ေပၚပါလွ်င္ မည္သည့္အခ်က္ေၾကာင့္ ေျပာင္းလဲပါသနည္း။	1. Less Hunting အမဲလိုက္ျခင္း ေလ်ာ့နည္းလာျခင္း 2. More Hunting ပို အမဲလိုက္ျခင္း 3. Change in habits က်က္စားရာေဒသ ေျပာင္းလဲျခင္း 4. Climate change ရာသီဥတု ေျပာင္းလဲျခင္း	
	f. Are Bees a source of foods/medicine? ပ်ားမ်ားသည္ အစားအေသာက္ ေဆး အတြက္ အေရးပါ ပါသလား။	1.Yes 2.No	
16. Butterflies လိပ္ျပာ	a. Have you ever seen a Butterflies in this area? ဤေဒသတြင္ လိပ္ျပာမ်ားကို ျမင္ဖူးပါသလား။	1.Yes 2.No	
	b. Are Butterflies common? ဤေဒသတြင္ လိပ္ျပာမ်ား ေပါမ်ားပါသလား။	1.Yes 2.No	
	c. Has the number of Butterflies increased, decreased or remain stable over the past 10 years? ၁၀ ႏွစ္အတြင္း လိပ္ျပာအေရအတြက္ ေျပာင္းလဲပါသလား။	A. Increased, တက္လာလား B. Decreased or က်သြားသလား C. Remained the same နဂိုအတိုင္းမေျပာင္းမလဲရွိသလား	

	d. Has the diversity/type of Butterflies increased, decreased or remain stable over the past 10 years? ၁၀ ႏွစ္အတြင္း လိပ္ျပာမ်ိဳးစိတ္ ေျပာင္းလဲ ပါသလား။	A. Increased, တက္လား B. Decreased or က်သြားသလား C. Remained the same နဂိုအတိုင္းမေျပာင္းမလဲရွိသလား	
	e.If there has been a change in number and or diversity of wild Butterflies, why do you think this change has occurred? လိပ္ျပာအမ်ိဳးအစားႏွင့္အေရအတြက္ ေျပာင္းလဲမႈျဖစ္ေပၚပါလွ်င္ မည္သည့္အခ်က္ေၾကာင့္ ေျပာင္းလဲပါသနည္း။	1. Less Hunting အမဲလိုက္ျခင္း ေလွ်ာ့နည္းလာျခင္း 2. More Hunting ပို အမဲလိုက္ျခင္း 3. Change in habits က်က္စားရာေဒသ ေျပာင္းလဲျခင္း 4. Climate change ရာသီဥတု ေျပာင္းလဲျခင္း	

	f. Are Butterflies a source of foods/medicine? လိပ္ျပာမ်ားသည္ အစာနွ့ဲေဆး အတြက္ အေရးပါ ပါသလား။	1.Yes 2.No	
17. Mosquitoes ျခင္	a. Have you ever seen a Mosquitoes in this area? ဤေဒသတြင္ ျခင္မ်ားကို ျမင္ဖူးပါ သလား။	1.Yes 2.No	
	b. Are Mosquitoes common? ဤေဒသတြင္ ျခင္မ်ား ေပါမ်ားပါသလား။	1.Yes 2.No	
	c. Has the number of Mosquitoes increased, decreased or remain stable over the past 10 years? ၁၀ ႏွစ္အတြင္း ျခင္အေရအတြက္ ေျပာင္းလဲပါသလား။	A. Increased, တက္လာသလား B. Decreased or က်သြားသလား C. Remained the same နဂိုအတိုင္းမေျပာင္းမလဲရွိသလား	
	d. Has the diversity/type of Mosquitoes increased, decreased or remain stable over the past 10 years? ၁၀ ႏွစ္အတြင္း ျခင္မ်ိဳးစိတ္ ေျပာင္းလဲပါသလား။	A. Increased, တက္လာသလား B. Decreased or က်သြားသလား C. Remained the same နဂိုအတိုင္းမေျပာင္းမလဲရွိသလား	
	e.If there has been a change in number and or diversity of wild Mosquitoes, why do you think this change has occurred? ျခင္အမ်ိဳးအစားႏွင့္အေရအတြက္ ေျပာင္းလဲမႈျဖစ္ ေပၚပါလွ်င္ မည္သည့္အခ်က္ေၾကာင့္ ေျပာင္းလဲပါသနည္း။	1. Less Hunting အမဲလိုက္ျခင္း ေလွ်ာ့နည္းလာျခင္း 2. More Hunting ပို အမဲလိုက္ျခင္း 3. Change in habits က်က္စားရာေဒသ ေျပာင္းလဲျခင္း 4. Climate change ရာသီဥတု ေျပာင္းလဲျခင္း	
	f. Are Mosquitoes a source of foods/medicine? ျခင္မ်ားသည္ အစာနွ့ဲေဆး အတြက္ အေရးပါ ပါသလား။	1.Yes 2.No	
18. Snakes ေျမြ	a. Have you ever seen a Snakes in this area? ဤေဒသတြင္ ေျမြမ်ားကို ျမင္ဖူးပါ သလား။	1.Yes 2.No	

	b. Are Snakes common? ဤဒေသတွင် မြွေများ ပေါများပါသလား။	1.Yes 2.No	
	c. Has the number of Snakes increased, decreased or remain stable over the past 10 years? ၁၀ နှစ်အတွင်း မြွေအရေအတွက် ပြောင်းလဲပါသလား။	A. Increased, တက်သလား B. Decreased or ကျသွားသလား C. Remained the same နဂိုအတိုင်းမပြောင်းမလဲရှိသလား	

	d. Has the diversity/type of Snakes increased, decreased or remain stable over the past 10 years? ၁၀ ႏွစ္အတြင္း ေျမြ မ်ိဳးစိတ္ ေျပာင္းလဲပါသလား။	A. Increased, တက္သလား B. Decreased or က်သြားသလား C. Remained the same နဂိုအတိုင္းမေျပာင္းမလဲရွိသလား	
	e.If there has been a change in number and or diversity of wild Snakes, why do you think this change has occurred? ေျမြအမ်ိဳးအစားႏွင့္အေရအတြက္ ေျပာင္းလဲမႈျဖစ္ ေပၚပါလွ်င္ မည္သည့္အခ်က္ေၾကာင့္ ေျပာင္းလဲပါသနည္း။	1. Less Hunting အမဲလိုက္ျခင္း ေလွ်ာ့နည္းလာျခင္း 2. More Hunting ပို အမဲလိုက္ျခင္း 3. Change in habits က်က္စားရာေဒသ ေျပာင္းလဲျခင္း 4. Climate change ရာသီဥတု ေျပာင္းလဲျခင္း	
	f. Are Snakes a source of foods/medicine? ေျမြမ်ားသည္ အစာနဲ႔ေဆး အတြက္ အေရးပါ ပါသလား။	1.Yes 2.No	
19.General Environment	a. Over the past 10 years has natural habitat decreased by over25% ၁၀ ႏွစ္အတြင္း က်က္စားရာ ေဒသ ၂၅% ထက္ပို၍ ေလွ်ာ့က်ပါသလား။	1.Yes 2.No	
	b. Over the past 10 years has the amount of wildlife decreased significantly? ၁၀ႏွစ္အတြင္း ေတာရိုင္းတိရစာၦန္ မ်ားသိသိသာသာ ေလ်ာ့နည္းပါသလား။	1.Yes 2.No	

	c. Over the past 10 years are there significantly more people in this area? ၁၀နှစ်အတွင်း ဤဒေသတွင် သိသိသာသာ လူပိုများလာပါသလား။	1.Yes 2.No	
	d. Over the past 10 years has the weather changed significantly? ၁၀နှစ်အတွင်း ရာသီဥတု သိသိသာသာ ပြောင်းလဲလာပါသလား။	1.Yes 2.No	

	e. Are the wild plant and animals in this local environment a significant importantsource of food or medicine? ေတာ႐ိုင္းအပင္ ႏွင့္ တိရစာၦန္မ်ား သည္ဤေဒသတြင္ အစားနဲ႔ေဆး အတြက္ အေရးပါ ပါသလား။	1.Yes 2.No	
	f. Are the wild plant and animals in this local environment a significant importantsource of income? ေတာ႐ိုင္းအပင္ ႏွင့္ တိရစာၦန္မ်ား သည္ဤေဒသတြင္ အေရးပါေသာ ဝင္ေငြရႏိုင္သည့္ အလုပ္ျဖစ္ပါသလား။	1.Yes 2.No	

Module J: Household Attitudes

Question		Response categories	Skip	Response
Awareness and Attitude about the project				
j1	ယခုစက်ရုံ အကြောင်းကို သင်မည်မျှ သိပါသနည်း။	Nothing at all............1 A little............2 Some............3 A lot............4	**>>j3**	| |__________|
j2	ယခုစက်ရုံ ကို မည်သူ့ဆီမှ သင်သိရှိပါသနည်း။	Government agencies............1 Community Leader............2 Media............3 Family members/Friends............4 Surveyors/ Interviewers............5 Other(Specify)............6 No............2		| |__________|
J3	ယခုစက်ရုံ သည် လူမှု ပတ်ဝန်းကျင် အတွက် မည်မျှအရေးကြီးပါသနည်း။	Not extremely important............1 Not very important............2 Not important............3 Normal............4 important............5 Very important............6 Extremely important............7 Unaware............8		| |__________|
J4	ယခင်က မည်သည့်နေရာ စက်ရုံ (သို့)စီမံကိန်း များ တွေ့ကြုံဖူးပါသနည်း။	Please mention		
J5	ထို စက်ရုံ (သို့)စီမံကိန်း ကြောင့်လူမှုပတ်ဝန်းကျင် အကျိုးသက်ရောက်မှု(ကောင်းကျိုး/ဆိုးကျိုး)ရှိပါသလား။	Positive............1 Negative............2 No effect............3		| |__________|
J6	ထို စက်ရုံ (သို့)စီမံကိန်း များမနစ်နာစေကြေးနှင့်ပတ်သက်ပြီးဆွေးနွေးဖူးပါသလား	Yes............1 No............2		| |__________|
J8	ယခုစက်ရုံ၏ ကောင်းသော အကျိုးသက်ရောက်မှုများ ကြောင့် သင်တို့ ပြောင်းလဲမည့်အရာများ စဉ်းဆောင်ပေး နိုင်မည်ဟု ထင်ပါသနည်း။ (အရေးကြီးဆုံးအချက်)	Unaware............1 Increase employment............2 Increase annual income............3 Improve living condition............4 Improved transport/infrastructure.... 5 Compensation for land used............6 Improved environment............7		| |__________|
J9	ယခုစက်ရုံ၏ တိုးတက်ဖွံ့ဖြိုးမှုအတွက် သဘောတူညီမှု ရှိပါသလား။	Yes............1 No............2 Not sure............3		|__|__|

K10. Perceptions on Impacts of the Project

		Very negative	Negative	Slightly negative	No effect	Slightly positiv	Positive	Very positiv	
The effect on Physical Resources									
1	Soil quality	1	2	3	4	5	6	7	
2	Surface water quality	1	2	3	4	5	6	7	
3	Ground water quality	1	2	3	4	5	6	7	
4	Air quality	1	2	3	4	5	6	7	
5	Noise	1	2	3	4	5	6	7	
Effect on Biological Resource									
6	Forestry and conservation areas	1	2	3	4	5	6	7	
7	Agriculture/ Farming areas	1	2	3	4	5	6	7	
8	Local animals	1	2	3	4	5	6	7	
9	Pasture	1	2	3	4	5	6	7	
10	Aquatic animals	1	2	3	4	5	6	7	
Effect on Human Use									
11	Local Fisheries	1	2	3	4	5	6	7	
12	Local Livestock	1	2	3	4	5	6	7	
13	Local Vegetation	1	2	3	4	5	6	7	
14	Local Industry	1	2	3	4	5	6	7	
15	Local Transportation	1	2	3	4	5	6	7	
16	Local Price	1	2	3	4	5	6	7	
17	Recreation	1	2	3	4	5	6	7	
18	Local Economy	1	2	3	4	5	6	7	
Effect on Quality of Life									
19	Housing	1	2	3	4	5	6	7	
20	Health	1	2	3	4	5	6	7	
21	Education	1	2	3	4	5	6	7	
22	Spiritual	1	2	3	4	5	6	7	
23	Safety	1	2	3	4	5	6	7	
23	Crime	1	2	3	4	5	6	7	
23	Family Structure	1	2	3	4	5	6	7	
24	Job opportunities	1	2	3	4	5	6	7	
25	Income	1	2	3	4	5	6	7	
26	Scenery	1	2	3	4	5	6	7	
27	Local Culture	1	2	3	4	5	6	7	
Effect on Cultural Heritage									
28	Religious Building	1	2	3	4	5	6	7	
29	Cemetery	1	2	3	4	5	6	7	
30	Historic buildings/sites	1	2	3	4	5	6	7	

"CHECK the whole questionnaire AGAIN, THANK the respondent and FINISH interview."

Cultural Heritage Questionnaire

1. Actual location of Pagodas and Monasteries
ဘုရား၊ ဘုန်းကြီးကျောင်းများ၏ တည်နေရာ

2. Location of Cultural Heritage Places;
ယဉ်ကျေးမှု ဆိုင်ရာ ထိန်းသိမ်းရေး နယ်မြေများ၏ တည်နေရာ

3. Location of Cemetaries
သင်္ချိုင်းများ၏ တည်နေရာ

4. Location of local archeological sites
ရှေးဟောင်းအမွေအနှစ် ဆောက်အဦများ၏ တည်နေရာ

5. Dates of Important Cultural Activities
အရေးပါသော ယဉ်ကျေးမှုဆိုင်ရာ လုပ်ငန်းဆောင်တာများအတွက် နေ့ရက်များ

lluvia

EQM

Public Consultation Meeting Minutes

Date : **(27.12.2023, Thursday)**
Time : **10:00- 11:30**
Venue : **Meeting Room of Lluvia Co., Ltd, No. 108 (A)၊ 108 (B), Quarter (3), Hlaingtharyar Industrial Zone, Hlaingtharyar Township, Yangon, Myanmar.**

Date	Time	Meeting	Stakeholders Covered/Township	Number of Attendees
27th,Dec ,2023	10:00 – 11:30	LLUVIA Co., Ltd	- Hlaingtharyar Township Administration - Heads of Township - ECD - Health Dept. - Fire Services Dept. - Head and Representative from Zone Committee - Factories nearby - Interested Factories - Local Communities of five quarters - EQM	27

Meeting minutes

<u>The Public Consultation to be conducted in the Initial Environmental Examination (IEE)</u>

Detail

Project	BEVERAGE (Coffee, Tea and Milk powder) MANUFACTURING & DISTRIBUTION FACTORY	**Region / State**	Yangon
District	Yangon West Region	**Township**	Hlaingtharyar
Objective	To explain the project operation, IEE's process and obtain the stakeholders' perception		
Date	(10:00 AM to 11:30 AM) / 27.12.2023		

<u>Q1: Comment from Daw Shwe Yi Aung (Environmental Conservation Department, Staff Officer, Western Yangon District)</u>

Has your company submitted the revised IEE report in accordance with the comments from the Environmental Conservation Department?

<u>Ans: Answered by Daw Win Thida Khine (Environmental Quality Management, Environmental Consultant)</u>

In compliance with the agreement made with ECD on August 27, 2023, Environmental Quality Management Co., Ltd is currently in the process of preparing the IEE report in alignment with the provided comments. We assure you that we will submit the report no later than February 2024, as committed during our signing at the ECD office.

Q2: Comment from Daw Shwe Yi Aung (Environmental Conservation Department, Staff Officer, Western Yangon District)

- Does your company know that monitoring reports need to be submitted biannually to the Environmental Conservation Department (ECD)?

Ans: Answered by Daw Win Thida Khine (Environmental Quality Management, Environmental Consultant)

- Yes, we are aware of the biannual monitoring reports that will be submitted to the Environmental Conservation Department (ECD) following the receipt of the approval letter.

Q3: Comment from Daw Shwe Yi Aung (Environmental Conservation Department Staff Officer, Western Yangon District)

- Based on your presentation, the air quality results for this factory have already been continuously monitored for 24 hours. Considering this schedule requires continuous monitoring, can the factory accommodate the associated costs?

Ans: Answered by Daw Win Thida Khine (Environmental Quality Management, Environmental Consultant)

- We conducted continuous monitoring for 24 hours within a single day, not as a daily occurrence. Furthermore, the air monitoring will specifically be carried out continuously for 24 hours at each selected location

Q4: Comment from Daw Shew Yi Aung (Environmental Conservation Department, Staff Officer, Western Yangon District)

- Has your company included the estimated cost for the environmental management plan in your IEE report?

Ans: Answered by Daw Win Thida Khine (Environmental Quality Management, Environmental Consultant)

- Yes, we are currently in the process of preparing the estimated costs for air/odor, noise, waste (solid and hazardous waste), portable & wastewater, occupational health & safety, and community health & safety in this IEE report.

Q5: Comment from U Aung Kyaw Oo (Head of the Zone Committee)

- I wanted to know the specific location of the factory's drainage outlet, as wastewater discharge has the potential to impact Panhlaing River and lead to pollution.

Ans: Answered by Daw Win Thida Khine (Environmental Quality Management, Environmental Consultant)

- Considering the process of the factory, there is no industrial wastewater effluent. However, there is some domestic wastewater generated from the canteen. The factory's drainage outlet is strategically positioned at the lower side of the factory area to facilitate an efficient water drainage system, particularly after the removal of solid waste, including oil and grease.

Q6: Comment from U Aung Kyaw Oo (Zone Committee, Executive Officer)

To avoid encroachment in the space behind the factory, it is advisable for the factory to seek a permit from the Department of Water Resources and Rivers Development for extending the construction of the factory drainage outlet.

Ans: Answered by U Ngwe Thein (Health & Safety Officer)

- To address the encroachment issue in the back side of the factory, we will submit a report to the Head of the company

Q7: Comment from U Patric (Mama Noodle Factory, HR Manager)

- I am interested to know about the wastewater treatment system employed by the factory, and I would also like to inquire about the expected lifespan of the sand filter in the proposed treatment system.

Ans: Answered by Daw Win Thida Khine (Environmental Quality Management, Environmental Consultant)

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The factory is in the process of implementing a wastewater treatment system, utilizing either Sink Filter or Kitchen Wastewater Oil and Grease Trap, Rice Husk Ash Filtration (Phwepyar), Sand Filtration, Gravel Filtration, and Chlorination. For the sand filter, its usage is recommended for up to 3 months, depending on the volume of waste generated, in alignment with the factory's characteristics.

Comment from Daw Shwe Yi Aung (Environmental Conservation Department, Staff Officer, Western Yangon District)

- Considering the factory's nature, there is no industrial wastewater generated; however, there is a discharge of certain types of domestic wastewater. I would like to suggest that the current wastewater treatment system in your factory is adequate, given the process of the facility, which does not align with an extensive wastewater treatment system.

lluvia EQM

Attendance List for officials of government organizations, Hlaing Thar Yar Township, Yangon			
No	**Contact Person**	**Organization**	**Phone Contact**
1	Daw Shwe Yi Aung	Staff Officer, Environmental Conservation Department	09-962637055
2	Daw Yamone	Deputy Assistant Officer, Environmental Conservation Department	09-670446105
Attendance List for company/factory and CSO, Hlaing Thar Yar Township, Yangon			
No	**Contact Person**	**Organization**	**Phone Contact**
3	U Patric	Mama Noodle Factory, HR Manager	09429341143
4	U Aung Kyaw Oo	Zone Committee, Executive Officer	095056360
5	Daw Yadanar Min Oo	New World Mart, Admin Manager	09797005241
6	U Kyaw Kyaw Aung	Hundred Household Head, Okan Thaung Gyar (10)	09261848528
7	U Myint Tun Naing	Hundred Household Head , Yae Okan	09787052320
8	U Than Kywe	Hundred Household Head, Okan Thaung Gyar	
9	U Win Tun	Hundred Household Head , Yae Okan	
10	U Than Oo	Hundred Household Head, Yae Okan	
11	U Yan Naing Soe	Community, Okan Thaung Gyar (10)	09-752975988
12	Daw Khin Myo Thu	Community, Okan Thaung Gyar	09 423850733
13	U Thet Ko Ko Zaw	Community	09-420293438
14	U Nyi Nyi Aung	Community, Yae Okan	09-252640630
15	U Wine Aung	Community	09-264893890
16	Daw Nan Ngwe	Community	09-979424036
17	Daw Hla Hla Khine	Community, Yae Okan	09-421795049
18	Daw Sandar Win	Community, Okan Thaung Gyar	09-252870098
19	Daw Thida Oo	Community, Yae Okan	
20	Daw Poe Oo	Community, Yae Okan	

21	Daw Chaw Su Khaing	Community, Yae Okan	
22	Daw Ei Ei Khine	Community, Yae Okan	
23	Daw Myat Su Mon	Community, Yae Okan	09-782859639
24	Daw Aye Aye Kyu	Community, Yae Okan	
25	Daw Thin Thin Khine	Community, Yae Okan	
26	Daw Win Win Kyu	Community, Yae Okan	
27	Daw Aye Mya Sann	Community, Yae Okan	

Photos Section for Lluvia Co., Ltd

	
Presented by Daw Zin Mar Aung, Lluvia Co.,Ltd)	**Presented by Daw Win Thida Khine, EQM**
	
Question from Daw Shwe Yi Aung, Environmental Conservation Department, Western Yangon District (Staff Officer)	**Question from U Patric (HR – Manager, Mama Noodle Factory)**
	
Question from U Aung Kyaw Oo (Zone Committee, Executive Officer)	**Comment Response by U Ngwe Thein (Lluvia Co.,Ltd, HSE Officer)**