The Initial Environmental Examination and Environmental Management Plan

of

The Lluvia Confectionary Factory

Prepared

By

Environmental Quality Management (EQM) Co., Ltd

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 Confectionary Factory (Lluvia Limited) located in North Okkalapa 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. (137-139, 155-170), in the Yangon Industrial Zone, North Okkalapa 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 Resources 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.

- The project proponent will ensure that the LPG guidelines comply with the regulations established by the Japanese Standard in coordination with Myanma Petrochemical Enterprise (MPE).
- 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,

Factory Manager

Lluvia Limited (Confectionary Factory)

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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 Confectionary Factory (Lluvia Limited) located in North Okkalapa Township, Yangon, Myanmar to submit the report to the Environmental Conservation Department, Ministry of Natural Resources and Environmental Conservation (MONREC) for approval.

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

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

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

The Environmental Quality Management Co. Ltd. (EQM) endorses and confirms to the Environmental Conservation Department, Ministry of Natural Resource and Environmental Conservation the following:

- 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,

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 (Confectionary Factory) to conduct.
2.	Company Information and Declaration of EIA team	EIA Consultancy team, Environmental Quality Management Co. Ltd. (EQM) and the Lluvia Ltd (Confectionary 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 (Confectionary 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 (Confectionary 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 (Confectionary 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 (Confectionary Factory) shall perform biannual environmental monitoring of project activities and submit monitoring reports biannually to the Environmental Conservation Department (ECD).

Chapter	Description	Commitments
10.	Cooperate Social Responsibility and Community Development	The Lluvia Limited (Confectionary Factory) shall spend the 2% of the Net Profit for the community development and corporate social responsibility annually.
9.	Emergency Plan	Lluvia Ltd (Confectionary 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 (Confectionary 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.

Lluvia Limited

Factory Manager

Lluvia Limited (Confectionary Factory)

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Acronyms

BOD	Bio-Chemical Oxygen Demand
COD	Chemical Oxygen Demand
DO	Dissolved Oxygen
ECD	Environmental Conservation Department
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EQEG	Environmental Quality (Emission) Guideline
ERP	Emergency Response Plan
GHG	Greenhouse Gas
HSE	Health, Safety and Environment
IEE	Initial Environmental Examination
IFC	International Finance Corporation
LTR	Leather/Textile/Rubber
LPG	Liquefied Petroleum Gas
MONREC	Ministry of Natural Resources and Environmental Conservation
PAPs	Project Affected Persons
PAUs	Project Area Units
$PM_{10}/PM_{2.5}$	Particulate Matter
SIA	Social Impact Assessment
SW	Solid Waste
TDS	Total Dissolved Solid
TSS	Total Suspended Solid
UN	United Nations
VOC	Volatile Organic Compound
WARM	Waste Reduction Model
WBG EHS	World Bank Group Environmental, Health and Safety Guidelines
WHO	World Health Organization
YCDC	Yangon City Development Committee

၁ အကျဉ်းချုပ်အစီရင်ခံစာ (Lluvia confectionery factory)

၁.၁ နိဒါန်း

Lluvia confectionery စက်ရုံသည် Lluvia Limited မှ ပိုင်ဆိုင်ပြီး Diamond Star Co., Ltd. နှင့် MC Food Holding Asia ကုမ္ပဏီတို့ ဖက်စပ်လုပ်ကိုင်သော ကုမ္ပဏီတစ်ခုဖြစ်ပါသည်။ စက်ရုံသည် အမှတ် (၁၃၇-၁၃၉၊ ၁၅၅-၁၇၀)၊ ရန်ကုန်စက်မှုဇုန်၊ မြောက်ဥက္ကလာပမြို့နယ်၊ ရန်ကုန်မြို့တွင် တည်ရှိပါသည်။ ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း (IEE) နှင့်အတူ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် (EMP) ကို Lluvia confectionery စက်ရုံအတွက် ရေးဆွဲထားပါသည်။

Environmental Quality Management Co., Ltd မှ အကြံပေးအဖွဲ့သည် EMP ပါဝင်သည့် IEE ကို စက်ရုံအတွက် ဆောင်ရွက်ခဲ့ပါသည်။

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

• ကုမ္ပဏီအမည် – **Lluvia Limited (Confectionary Factory) (MC Food Holding Asia Pte Ltd and Diamond Star Co., Ltd)**

• ရင်းနှီးမြှုပ်နှံသူအမည် - ဦးကိုကိုကြီး (က) ဦးစိုးနိုင်

•လုပ်ငန်းအမျိုးအစား – မုန့်မျိုးစုံထုတ်လုပ်ခြင်းလုပ်ငန်းနှင့် ဖြန့်ဖြူးရောင်းချခြင်းလုပ်ငန်း

• ရင်းနှီးမြှုပ်နှံမှုတည်နေရာ – အမှတ် (၁၃၇-၁၃၉၊ ၁၅၅-၁၇၀)၊ ရန်ကုန်စက်မှုဇုန်၊ မြောက်ဥက္ကလာပမြို့နယ်၊ ရန်ကုန်၊ မြန်မာ။

• တယ်လီဖုန်း-၀၉ ၉၇၇၈၇၃၃၃

ဤလေ့လာမှုသည် ရန်ကုန်စက်မှုဇုန်ရှိ မုန့်မျိုးစုံထုတ်လုပ်သည့် စက်ရုံ၏ ပရောဂျက်လည်ပတ်မှုအတွက် ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း (**IEE**) နှင့်အတူ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် (**EMP**) အတွက် လုပ်ဆောင်ပါသည်။

ကနဦး ပတ်ဝန်းကျင်ဆိုင်ရာ ဆန်းစစ်ခြင်း **(IEE)** နှင့်အတူ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ် **(EMP)** အား **Lluvia** မုန့်မျိုးစုံထုတ်လုပ်ရေးနှင့် ဖြန့်ဖြူးရေးလုပ်ငန်းအတွက် **Environmental Quality Management Co. Ltd** ၏ ပတ်ဝန်းကျင်ဆိုင်ရာ အကြံပေးအဖွဲ့မှ ဆောင်ရွက်ခဲ့ပါသည်။

ပတ်ဝန်းကျင်ဆိုင်ရာအတိုင်ပင်ခံကုမ္ပဏီ **(EQM)** သည် ကျွမ်းကျင်သော အတိုင်ပင်ခံများနှင့် နည်းပညာရှင်များဖြင့် 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 ဆောင်ရွက်ခဲ့ပါသည်။

၁။ ရေနံနှင့် သဘာဝဓာတ်ငွေ့လုပ်ငန်း
၂။ မုန့် စက်ရုံ၊
၃။ ဆောက်လုပ်ရေးလုပ်ငန်းသုံး အမှုန့်စက်ရုံ
၄။ ဟိုတယ်စီမံကိန်း
၅။ ဂျုံမှုန့်
၆။ ဆိပ်ကမ်းလုပ်ငန်း
၇။ ဆပ်ပြာစက်ရုံ
၈။ ဆန်စက်စက်ရုံ၊
၉။ ပတ်ဝန်းကျင်ဆိုင်ရာအခြေခံစစ်တမ်း စောင့်ကြည့်ရေး ပရောဂျက်များ

စီမံကိန်းနှင့် ပက်သက်သည့် အစိုးရဌာန၏ မှတ်ပုံတင်ခြင်း အတည်ပြုချက်မှာ အောက်ပါအတိုင်းဖြစ်သည်။

၁	ပတ်ဂန်းကျင်ဆိုင်ရာ ကုမ္ပဏီ မှတ်ပုံတင် အမှတ်	၂၆၉၀/၂၀၁၂-၂၀၁၃
၂	IEE နှင့် EMP ဆောင်ရွက်ရေးဆွဲရန် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ဦးစီးဌာန၊ သယံဇာတနှင့် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ဂန်ကြီးဌာန (MONREC)၏ ထောက်ခံချက် နေ့စွဲ	၁၅ ဖေဖော်ဝါရီလ၊ ၂၀၁၇

၁.၂ ရည်ရွယ်ချက်

က) စာပေအထောက်အထားများ လေ့လာခြင်း - ပတ်ဝန်းကျင်ဆန်းစစ်ခြင်းနည်းလမ်းနှင့် စီမံခန့်ခွဲခြင်း၊ LPG အသုံးပြုသည့် confectionery စက်ရုံဆိုင်ရာ အချက်အလက်များ၊ စွန့်ပစ်ပစ္စည်းစီမံခန့်ခွဲမှုနှင့် မြေအသုံးချခြင်း စသည်တို့နှင့်သက်ဆိုင်သော ပြည်တွင်းနှင့် ပြည်ပမှ မူဝါဒများ၊ ဥပဒေများနှင့် လမ်းညွှန်ချက်များ စသည့် စာပေအထောက်အထားများ။

ခ) လူတွေ့မေးမြန်းခြင်း- အကြံပေး အဖွဲ့အစည်းမှ စီမံကိန်းဆောင်ရွက်မည့်ပတ်ဂန်းကျင်တွင်နေထိုင်သူများ၊ သက်ဆိုင်ရာပုဂ္ဂိုလ်များနှင့် တွေ့ဆုံမေးမြန်းခြင်း။

ဂ) သတင်းအချက်များစုဆောင်းခြင်း- စီမံကိန်းလုပ်ငန်းဆောင်ရွက်မည့် နေရာသို့သွားရောက်ပြီး လိုအပ်သော သတင်းအချက်အလက်များအား စုဆောင်းခြင်း။

ဃ) သက်ဆိုင်သူများနှင့် တွေ့ဆုံခြင်း- အကြံပေးအဖွဲ့ အစည်းမှ စီမံကိန်းဆောင်ရွက်မည့်ဒေသတွင် အဓိကကျသောဦးဆောင်သူများ၊ စီမံကိန်း လုပ်ငန်းအနီးတွင် နေထိုင်သူများအားတွေ့ဆုံပြီး သဘောထား အမြင်များအား မေးမြန်းခြင်း။

င) လက်ရှိပတ်ဝန်းကျင်အနေအထားကို လေ့လာခြင်း- စီမံကိန်းဆောင်ရွက်မည့်နေရာတွင် လေ၊ ရေ၊ မြေဆီလွှာ၊ အစိုင်အခဲစွန့်ပစ်ပစ္စည်းနှင့် စွန့်ပစ်ရေ အရည်သွေးများတိုင်းတာခြင်း။

စ) ပတ်ဝန်းကျင်ထိခိုက်မှု လေ့လာခြင်းနှင့် လျော့ချရေး အစီအစဉ်များ- လေထုညစ်ညမ်းမှု၊ အသံဆူညံမှု၊ ရှုမြင်ကွင်း၊ သောက်/သုံးရေ၊ စွန့်ပစ်ရေ၊ စွန့်ပစ်ပစ္စည်းတို့အပေါ်တွင် ပတ်ဝန်းကျင် ထိခိုက်မှု ဆန်းစစ်ခြင်းနှင့် လျော့ချရေးအစီအစဉ်များ ရေးဆွဲခြင်း။

ဆ) ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်ရေးဆွဲခြင်း- ပတ်ဝန်းကျင်အပေါ်တွင် စီမံကိန်းလုပ်ငန်းများကြောင့် ထိခိုက်နိုင်မှုပေါ် မူတည်ပြီး ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှု အစီအစဉ်အား ရေးဆွဲခြင်း။

ဇ) အစီရင်ခံစာတင်ပြခြင်း- စုဆောင်းထားသော အချက်အလက်များကို အစီရင်ခံစာတွင် ရေးသားဖော်ပြခြင်း

၁.၃ မူဝါဒ၊ ဥပဒေနှင့် ဖွဲ့စည်းပုံမူဘောင်

ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း (IEE) ကို သက်ဆိုင်ရာ ဥပဒေများနှင့်အညီ ပြင်ဆင်ဆောင်ရွက်ပါသည်။ သက်ဆိုင်ရာ လမ်းညွှန်ချက်များ၊ စံချိန်စံညွှန်းများနှင့် ဥပဒေများကို အောက်တွင် ဖော်ပြထားပါသည်။

- မြန်မာနိုင်ငံဖွဲ့စည်းပုံအခြေခံ ဥပဒေ (၂၀၀၈) မှ အပိုဒ် ၃၇ (က) နှင့် အပိုဒ် (၄၅)
- ကမ္ဘာ့ကျန်းမာရေးအဖွဲ့ (WHO)၊ အမေရိကန်ပြည်ထောင်စု ပတ်ဝန်းကျင်ထိန်းသိမ်းကာကွယ်ရေး အေဂျင်စီ (USEPA) နှင့် နိုင်ငံတကာ ငွေကြေးကော်ပိုရေးရှင်း (IFC) အစရှိသည့် နိုင်ငံတကာမူဝါဒများ၊ အခြေခံမူများနှင့် စံနှုန်းများ
- လုပ်ငန်းခွင်ကျန်းမာရေးနှင့် ဘေးကင်းလုံခြုံရေးတို့နှင့် သက်ဆိုင်သည့် ဥပဒေနှင့် နည်းဥပဒေများ
- သယံဇာတနှင့် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာန လက်အောက်ရှိ ပတ်ဝန်းကျင် ထိန်းသိမ်းရေး ဦးစီးဌာနမှ သဘာဝတူလက်မှတ်ရေးထိုးထားသော နိုင်ငံတကာ သဘောတူညီချက်များ
- မြန်မာနိုင်ငံရင်းနှီးမြှုပ်နှံမှုဥပဒေ (၂၀၁၆)
- ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဥပဒေ (၂၀၁၂)
- ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးနည်းဥပဒေ (၂၀၁၄)
- ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း လုပ်ထုံးလုပ်နည်းများ (ဒီဇင်ဘာလ၊ ၂၀၁၅)
- အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက် (၂၀၁၅)
- ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းလမ်းညွှန်ချက်မူကြမ်း (၂၀၁၅)
- မြန်မာနိုင်ငံ EIA လုပ်ငန်းစဉ်တွင် လူထုပါဝင်မှုလမ်းညွှန်ချက်မူကြမ်း (၂၀၁၇)
- စီမံကိန်းပတ်ဝန်းကျင်နှင့် လူမှုရေးဆိုင်ရာ စီမံခန့်ခွဲမှု အခြားဥပဒေများအပါအဝင် စီမံကိန်းနှင့်သက်ဆိုင်သော ဥပဒေများ။
- အလုပ်အကိုင်နှင့် ကျွမ်းကျင်မှုဖွံ့ဖြိုးတိုးတက်ရေးဥပဒေ၊ ၂၀၁၃
- ကူးစက်ရောဂါများကာကွယ်နှိမ်နှင်းရေးဥပဒေ၊၁၉၉၅(ပုဒ်မ ၃(က) (c)၊၄၊၁၁၊)
- ရန်ကုန်တိုင်းဒေသကြီးစည်ပင်သာယာရေးအဖွဲ့များဥပဒေ၊ ၂၀၁၈
- လုပ်ငန်းခွင်ဘေးအန္တရာယ် ကင်းရှင်းရေးနှင့်ကျန်းမာရေး ဆိုင်ရာဥပဒေ၊၂၀၁၉
- တီထွင်မှု မူပိုင်ခွင့်ဥပဒေ ၊ ၂၀၁၉
- ယဉ်ကျေးမှုအမွေအနှစ်ဒေသများကာကွယ်ထိန်းသိမ်းရေးဥပဒေ၊၂၀၁၉
- ကုန်အမှတ်တံဆိပ်မူပိုင်ခွင့်ဥပဒေ၊၂၀၁၉
- စက်မှုဒီဇိုင်းမူပိုင်ခွင့်ဥပဒေ၊၂၀၁၉
- စားသုံးသူကာကွယ်ရေးဥပဒေ၊၂၀၁၉
- နယ်နိမိတ်တိုင်းတာပိုင်းခြားသတ်မှတ်ရေးဥပဒေ၊၂၀၁၉

- အခွန်ဆိုင်ရာ စီမံအုပ်ချုပ်မှုဥပဒေ၂၀၁၉
- ပြည်ထောင်စု၏အခွန်ကောက်ဥပဒေ၂၀၁၉
- စာချုပ်စာတမ်းများ မှတ်ပုံတင်ဥပဒေ၂၀၁၈
- အပင်မျိုးသစ် အကာကွယ်ပေးရေးဥပဒေ၂၀၁၉
- မြေသိမ်းဆည်းခြင်း၊ပြန်လည်နေရာချထားခြင်းနှင့်ပြန်လည်ထူ ထောင်ခြင်းဆိုင်ရာဥပဒေ၂၀၁၉

၁.၄ စီမံကိန်းဖော်ပြချက်နှင့် အခြားနည်းလမ်းများ

တည်နေရာ- အမှတ် (၁၃၇-၁၃၉၊ ၁၅၅-၁၇၀)၊ ရန်ကုန်စက်မှုဇုန်၊ မြောက်ဥက္ကလာပမြို့နယ်၊ ရန်ကုန်မြို့။

MC Food Holding Asia Pte Ltd နှင့် Diamond Star Co.,Ltd တို့သည် အဆောက်အဦးဆောက်လုပ်ရေးအတွက် အမေရိကန်ဒေါ်လာ ၈၃၅၂၆၇၀၊ ကုန်ကြမ်းပစ္စည်းများအတွက် အမေရိကန်ဒေါ်လာ ၁၀၁၇၉၃၁၊ စက်ပစ္စည်းတပ်ဆင်ခြင်းအတွက် အမေရိကန်ဒေါ်လာ ၁၀၀၀၀၀၀၀နှင့် လုပ်ငန်းအရင်းအနှီးအဖြစ် အမေရိကန်ဒေါ်လာ ၁၈၀၀၀၀၀ ရင်းနှီးမြှုပ်နှံပါမည်။ စုစုပေါင်းရင်းနှီးမြှုပ်နှံငွေပမာဏမှာ အမေရိကန်ဒေါ်လာ ၂၁၁၇၀၆၀၁ ဖြစ်ပါသည်။

၁.၄.၁ လက်ရှိတည်နေရာအသုံးပြုမှု

Confectionery စက်ရုံ၏ အဓိကအစိတ်အပိုင်းမှာ ထုတ်လုပ်မှုနှင့် သိုလှောင်ရုံများ၊ ရုံးခန်း၊ LPG၊ ကားရပ်နားနေရာ၊ ထမင်းစားဆောင်၊ ဂိုဒေါင်နှင့် ကွက်လပ်နေရာများ ဖြစ်ပါသည်။

၁.၄.၂ လုပ်ငန်းလည်ပတ်သည့်အဆင့်

(က) လျှပ်စစ်ဓါတ်အား လိုအပ်ချက်

Lluvia confectionery စက်ရုံသည် Liquefied Petroleum Gas (LPG) ကို အသုံးပြုမည်ဖြစ်ပြီး လျှပ်စစ်အတွက် မီးစက်များကို အသုံးပြုပါမည်။ လျှပ်စစ်မီးပြတ်တောက်သွားလျှင် အရေးပေါ်အဖြစ် ၎င်းမီးစက်များကို အသုံးပြုပါမည်။ စက်ရုံသည် ပထမ ၂နှစ် လုပ်ငန်းလည်ပတ်ပြီးနောက် ပင်မလျှပ်စစ်ဓါတ်အားကို အသုံးပြုပါမည်။ အဆိုပြုလုပ်ငန်းအတွက် စုစုပေါင်း လျှပ်စစ်ဓါတ်အားလိုအပ်ချက်မှာ တစ်လလျှင် ၃၃၂၈၀၀ kW (တစ်နှစ်လျှင် ၃၉၉၃၆၀၀ KW) ဖြစ်ပါသည်။ လောင်စာလိုအပ်ချက်မှာ တစ်လလျှင် ၈၄၂၄၀ လီတာခန့် (တစ်နှစ်လျှင် ၁၀၁၀၈၈၀ လီတာ)ဖြစ်ပါသည်။

(ခ) ရေလိုအပ်ချက်

လုပ်ငန်းလည်ပတ်မှုအဆင့်အတွက် အဓိကရေအရင်းအမြစ်မှာ အဝီစိတွင်းများနှင့် အများပြည်သူသုံး ရေပိုက်များမှ ဖြစ်ပါသည်။ စီမံကိန်းနေရာတွင် ရေသိုလှောင်ကန် ၂ ကန် (၆၄၀၀ ဂါလံနှင့် ၃၂၀၀၀ ဂါလံဆံ့ကန်များ) ရှိပါသည်။ သောက်သုံးရေအတွက် ရေသန့်များကို အသုံးပြုသွားပါမည်။ Confectionery စက်ရုံလည်ပတ်သည့် အဆင့်အတွက် ရေလိုအပ်ချက်မှာ တစ်လလျှင် ၄၁၆.၆၇ ကုဗမီတာ (၉၁၆၄၂.၈၉ ဂါလံ) ဖြစ်ပါသည်။ တစ်နှစ်ပတ်လုံးအတွက် ရေလိုအပ်ချက်မှာ ၅၀၀၀ ကုဗမီတာ (၁၀၉၉၇၀၅ ဂါလံ) ခန့်ရှိပါသည်။ အဝီစိတွင်း (၂) တွင်းသည် ၅၅၅ ပေ အနက်ရှိပြီး တစ်နာရီလျှင် ၁၀၀၀ ဂါလံခန့်ထုတ်ယူနိုင်ပါသည်။

(ဂ) အလုပ်သမား လိုအပ်ချက်နှင့် ဝန်ထမ်းခန့်ထားမှု

ထုတ်လုပ်မှုအဆင့်တွင် ထုတ်လုပ်ခြင်း၊ အင်ဂျင်နီယာလုပ်ငန်း၊ အရည်အသွေးထိန်းချုပ်ခြင်းနှင့် သိုလှောင်ရုံများအပါအဝင် ဌာနခွဲ (၄) ခုရှိပါသည်။ ရောနှောခြင်း၊ ပုံသွင်းခြင်း၊ မုန့်ဖုတ်ခြင်း၊ ထုတ်ပိုးခြင်းနှင့် မလိုင်ထည့်ခြင်းဟူ၍ အဆင့် ၅ ဆင့်ရှိပြီး ၎င်းတို့သည် ထုတ်လုပ်မှုကဏ္ဍတွင် ပါဝင်ကာ အလုပ်သမား ၁၅၆ ယောက်အားဖြင့် တာဝန်ယူဆောင်ရွက်ပါမည်။ အင်ဂျင်နီယာဌာနတွင် ဝန်ထမ်း ၁၀ ယောက်အားခန့်အပ်ထားပြီး အရည်အသွေးထိန်းချုပ်ခြင်းအတွက် ဝန်ထမ်း ၇ ယောက်၊ သိုလှောင်ရုံအတွက် ဝန်ထမ်း ၉ ယောက်ခန့်အပ်ထားပါသည်။ လုပ်ငန်းလည်ပတ်သည့်အဆင့်တွင် စုစုပေါင်း ဝန်ထမ်းလိုအပ်ချက်မှာ ၁၈၂ ယောက် ဖြစ်ပါသည်။ စီမံကိန်းအတွက် လိုအပ်သောဝန်ထမ်းများကို အောက်ပါဇယား (၁-၁) တွင် ဖော်ပြထားပါသည်။

ဇယား ၁-၁ အဆိုပြုစီမံကိန်းအတွက် ခန့်အပ်ထားသော ဝန်ထမ်းများ

စဉ်	ဌာန/ ကဏ္ဍ	အလုပ်သမားလိုအပ်ချက်
က	ထုတ်လုပ်မှု	၂
	၁) ရောနှောခြင်း	၁၄
	၂) ပုံသွင်းခြင်း	၄
	၃) မုန့်ဖုတ်ခြင်း	၅
	၄) ထုတ်ပိုးခြင်း	၁၂၃
	၅) ခရင်ထည့်ခြင်း	၈
ခ	အင်ဂျင်နီယာလုပ်ငန်း	၁၀
ဂ	အရည်အသွေးထိန်းချုပ်ခြင်း	၇
ဃ	ကုန်လှောင်ရုံ	၉
စုစုပေါင်း		**၁၈၂**

(ဃ) စွန့်ပစ်ပစ္စည်းစီမံခန့်ခွဲမှု

Lluvia confectionery စက်ရုံသည် စီမံကိန်းနေရာတွင် စွန့်ပစ်ရေသန့်စင်စနစ်ကို တပ်ဆင်ဆောင်ရွက်ပါမည်။ ထုတ်လုပ်ရေးလုပ်ငန်းမှ ထွက်လာသော အစိုင်အခဲစွန့်ပစ်ပစ္စည်းများမှာ မီးကျွမ်းဘီစကစ်များ၊ ထုပ်ပိုးသည့်ဘူးများ၊ ထုပ်ပိုးစက္ကူများ၊ သစ်သားပုံးများ၊ ပလပ်စတစ်အိတ်များ ပါဝင်ပါသည်။ အမှိုက်ပုံးများကို သင့်တော်သည့် နေရာများတွင် ထားရှိပါမည်။ စွန့်ပစ်ပစ္စည်းများကို သိမ်းယူပြီးနောက် ရန်ကုန်မြို့တော်စည်ပင်သာယာရေးကော်မတီ YCDCသည် စွန့်ပစ်အမှိုက်ပုံနေရာတွင် စွန့်ပစ်ပါမည်။

(င) လုံခြုံရေးနည်းလမ်းများ

လုပ်ငန်းလည်ပတ်နေစဉ်အတွင်း ဝန်ထမ်းများ၊ အလုပ်သမားများသည် အောက်ပါလုပ်ငန်းခွင်ကာကွယ်ရေးပစ္စည်းများကို ဝတ်ဆင်ထားရပါမည်။

- နားအုပ်များ
- လုပ်ငန်းခွင်သုံးလုံခြုံရေးဖိနပ်များ (ရှူးဖိနပ်)

- ဖုန်ကာများ
- ဦးထုပ်

စက်ရုံအဆောက်အဦးများတွင် ခေတ်မီလျှပ်စစ်နှင့် ဆက်သွယ်ရေးစနစ်များ၊ မီးဘေးအန္တရာယ် ကာကွယ်ရေးစနစ်၊ ရေထောက်ပံ့မှုနှင့် မိလ္လာစနစ်၊ စွန့်ပစ်ရေသန့်စင်သည့်စနစ်၊ လေဝင်လေထွက် ကောင်းမွန်သည့် စနစ်များဖြင့် ဆောင်ရွက်ရန် စီစဉ်ထားပါသည်။

၁.၅ အခြားရွေးချယ်စရာများ

Lluvia confectionery စက်ရုံ ဆောင်ရွက်ခြင်းမပြုပါက တည်ဆောက်ရေးနှင့် ထုတ်လုပ်မှုကြောင့်ဖြစ်သော ပတ်ဝန်းကျင်နှင့် လူမှုရေးဆိုင်ရာ သက်ရောက်မှုများကို တားဆီးနိုင်သည်။

သို့ရာတွင် စက်ရုံလုပ်ငန်းလည်ပတ်မှု၏ ရလာဒ်အနေဖြင့် စီမံကိန်းဆောင်ရွက်သူနှင့် ရပ်ကွက်လူထုအကြားတွင် ကောင်းမွန်သည့်ပူးပေါင်းဆောင်ရွက်မှု ရှိမည်ဆိုပါက အလုပ်အကိုင် အခွင့်အလမ်းများ၊ အခြေခံ အဆောက်အအုံ တိုးမြှင့်ခြင်းများ နှင့် အခြားသော လူထုအကျိုးစီးပွားများ ကဲ့သို့သော ပတ်ဝန်းကျင်နှင့် လူမှုအကျိုးကျေးဇူးများကို ရရှိနိုင်ပါသည်။

Lluvia confectionery factory သည် အစားအစာထုတ်လုပ်မှုလုပ်ငန်းဖြစ်သောကြောင့် အခြားစက်ရုံများနှင့် နှိုင်းယှဉ်ပါက သိသာထင်ရှားသော ထုတ်လွှတ်မှုနှင့် ပတ်ဝန်းကျင်ကို ညစ်ညမ်းစေခြင်းကဲ့သို့သော ဆိုးကျိုးသက်ရောက်မှုများ နည်းပါသည်ကို တွေ့ရှိရပါသည်။

ထို့အပြင် စီမံကိန်းဆောင်ရွက်သူသည် ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း (IEE)တွင် ဖော်ပြထားသော လျော့ချရေးနည်းလမ်းများနှင့် စီမံခန့်ခွဲမှု အစီအစဉ်များနှင့်အညီ လုပ်ဆောင်မည် ဆိုပါက ပတ်ဝန်းကျင်သက်ရောက်မှု နည်းပါးသည် ဟု ခြုံငုံသုံးသပ်နိုင်ပါသည်။

၁.၆ ပတ်ဝန်းကျင်အခြေအနေ ဖော်ပြချက်၊ လျော့ချရေးနည်းလမ်းများအပါအဝင် သက်ရောက်မှုနှင့် ဘေးအန္တရာယ်အကဲဖြတ်ခြင်း

၁.၆.၁ လေထုအရည်အသွေး

လက်ရှိ အခြေခံ ပတ်ဝန်းကျင် လေအရည်အသွေး နှင့် ဒေသတွင်းမိုးလေဝသ စောင့်ကြည့် မှတ်သား စစ်ဆေးမှုကို Lluvia confectionery စက်ရုံနှင့် ပတ်ဝန်းကျင်နေရာများဖြစ်သော LPG ကန်အနီးနေရာများ၊ ဆောက်လုပ်ရေးလုပ်ငန်းဆောင်ရွက်သည့်နေရာ၊ စီမံကိန်းဆောင်ရွက်မှုမှ လေစုန်နေရာ၊ စီမံကိန်းလုပ်ငန်း နေရာ (၄) နေရာတွင် ၂၀၁၈ ခုနှစ် မေလ (နွေရာသီတွင်) ဆောင်ရွက်ပြီးဖြစ်ပါသည်။

ထို့အပြင် နှိုင်းယှဉ်ဖော်ပြရန်အတွက် သက်ဆိုင်ရာစံနှုန်းများကို တင်ပြအသုံးပြုခဲ့ပါသည်။

စောင့်ကြည့်စစ်ဆေးခြင်းတွင် အမှုန်များ (*PM10* နှင့် *PM2.5*)၊ ၊ ကာဗွန်မိုနောက်ဆိုဒ် (*CO*)၊ မတည်မြဲသော အော်ဂဲနစ် ဒြပ်ပေါင်းများ(*VOC*) ၊ ဆာလ်ဖာဒိုင် အောက်ဆိုဒ် (*SO2*)၊ နိုက်ထရိုဂျင် ဒိုင်အောက်ဆိုဒ်(*NO2*)၊

အမိုးနီးယား (*NH3*) ၊ မီသိန်း(*CH4*) ၊ အိုဇုန်း(*O3*) ၊ မိုးလေဝသဆိုင်ရာ ဓာတ်ရောင်ခြည်များ ၏ ၂၄နာရီစာ ပျမ်းမျှခြင်း ပါဝင်သည်။

ၵင်းတိုင်းတာမှုများတွင် စက်ရုံ၏ ထုတ်လုပ်မှု လုပ်ငန်းစဉ်မှ အဓိကထုတ်သည့် အမှုန်များ (*PM10* နှင့် *PM2.5*) သည် အဓိက ညစ်ညမ်းစေသည့်အရာများ ဖြစ်သည်။ ယေဘူယျအားဖြင့် (*PM10* နှင့် *PM2.5*) အမှုန်များ စုစုပေါင်း ထုတ်လုပ်မှု ၂၄နာရီပျမ်းမျှ သည် 57.25 μg/m^3 နှင့် 37 μg/m^3 အသီးသီး ဖြစ်ကြပြီး အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်ထက် (PM_{10} အတွက် 50μg/m^3 နှင့် $PM_{2.5}$ အတွက် 25μg/m^3) အနည်းငယ် မြင့်မားနေပါသည်။

အခြားထုတ်လွှတ်မှုမြင့်မားသည့် ညစ်ညမ်းစေသည့်အရာမှာ ***SO_2 (58.75μg/m^3)*** ဖြစ်ပြီး စက်ရုံတစ်ခုလုံးအတွက် ပျမ်းမျှသည် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဌာန၏ လမ်းညွှန်ချက်များ (20 μg/m^3) နှင့် ကိုက်ညီမှုမရှိနေသည်ကို တွေ့ရပါသည်။ သို့သော်လည်း ***NO_2 (57 μg/m^3)*** (တစ်နာရီ) သည် လမ်းညွှန်ချက် (200 μg/m3, one hour) နှင့် ကိုက်ညီနေပါသည်။ ဤစက်ရုံတွင် SO_2 ထုတ်လွှတ်မှုသည် အနီးအနားရှိစက်ရုံများနှင့် စက်ရုံအပြင်ဘက် မော်တော်ယာဉ်များ ဖြတ်သန်းသွားလာမှုကြောင့်လည်း ထွက်ရှိနိုင်ပါသည်။

VOC၊ NH4၊ မီသိန်းနှင့် နောက်ခံ atomic radiation များအတွက် ပတ်ဝန်းကျင်ဆိုင်ရာ သတ်မှတ်ချက်များ မရှိသော်လည်း အကြိုစောင့်ကြည့်အကဲဖြတ်ခြင်းအတွက် နှိုင်းယှဉ်နိုင်ရန် တိုင်းတာထားပါသည်။

စီမံကိန်းကာလတစ်လျောက်လုံး (ဆောက်လုပ်ရေးအဆင့်၊ လုပ်ငန်းလည်ပတ်သည့်အဆင့်နှင့် လုပ်ငန်းပိတ်သိမ်းသည့်အဆင့်) လေထုညစ်ညမ်းစေသည့် ထုတ်လွှတ်မှုမှ သက်ရောက်မှုများသည် အလယ်အလတ်အဆင့်ရှိပြီး ဖော်ပြထားသော လျော့ချရေးနည်းလမ်းများကို လိုက်နာဆောင်ရွက်ပါက သက်ရောက်မှုများ နိမ့်သော အဆင့်သို့ ရရှိနိုင်ပါသည်။ လေထုအရည်အသွေးတွေ့ရှိချက် အသေးစိတ်အချက်အလက်များကို နောင်လာမည့်အပိုင်းတွင် တင်ပြထားပါသည်။

ထို့အပြင် ထုတ်လုပ်မှုလုပ်ငန်းစဉ်မှ ထွက်ရှိလာသော လေထုအမှုန်များနှင့် ထိတွေ့မှုမှ ကာကွယ်ရန် ထုတ်လုပ်မှုလုပ်ငန်းစဉ်တွင်ပါဝင်သော အလုပ်သမားများသည် သင့်တော်သည့် အလုပ်အလေ့အထကောင်း တစ်ခုအနေဖြင့် ဖုန်ကာများကို တပ်ဆင်ရပါမည်။ လေထု စောင့်ကြည့် မှတ်သား စစ်ဆေးမှုကို နှစ်စဉ်ဆောင်ရွက်ပြီး အထူးသဖြင့် စက်ရုံတွင်း စက်ကိရိယာသစ်များ ပြောင်းလဲတပ်ဆင်သည့် အခါများတွင် ပိုမိုလိုအပ်ပါသည်။ လျော့ချရေးနည်းလမ်းများကို သက်ဆိုင်ရာ အပိုင်းကဏ္ဍများတွင် အသေးစိတ်ဖော်ပြထားသည်။

လေထုအရည်အသွေးကို သက်ရောက်စေနိုင်သည့် ရာသီဥတုအခြေအနေလည်း သာယာပါသည်။

၁.၆.၂ ကာဗွန်ထုတ်လွှတ်မှု

Lluvia confectionery စက်ရုံမှ ကာဗွန်ထုတ်လွှတ်မှုတွင် လျှပ်စစ်ကဏ္ဍမှ ကာဗွန်ဒိုင်အောက်ဆိုဒ်နှင့် GHG များ တိုက်ရိုက်ထုတ်လွှတ်မှု မရှိပါ။ မီးစက်များသည် အရေးပေါ်အခြေအနေတွင် အသုံးပြုရန်အတွက်သာ

ထားရှိသောကြောင့် ၎င်းမှ ဓါတ်ငွေ့များထုတ်လွှတ်နိုင်မှုကို လျှစ်လျူရှုနိုင်သည့် အဆင့်အဖြစ် သတ်မှတ်နိုင်ပါသည်။

အဆိုပြုစက်ရုံသည် လျှပ်စစ်ထုတ်လွှတ်မှုပြတ်တောက်သည့်အချိန်တွင်သာ မီးစက်များကို အသုံးပြုမည်ဖြစ်ပါသည်။ Lluvia စက်ရုံတွင် ဒီဇယ်လောင်စာသုံး မီးစက် ၆ ခုရှိပါသည်။ ကာဗွန်ဒိုင်အောက်ဆိုဒ် (CO2) ထုတ်လွှတ်မှုစုစုပေါင်းပမာဏမှာ တစ်နှစ်လျှင် ၉၁၃၀၄ ကီလိုဂရမ် (၉၁.၃၀၄ မထရစ်တန်) ရှိပါသည်။

Confectionery စက်ရုံ လုပ်ငန်းလည်ပတ်သည့်အဆင့်တွင် လျှပ်စစ်ရရှိရန်အတွက် LPG ကို အသုံးပြုမည်ဖြစ်ပြီး ၎င်း LPG အတွက် စုပ်စက်၊ ပိုက်နှင့် ဆက်စပ်ပစ္စည်းကိရိယာများအပါအဝင် ၁၅ တန်ဆံ့သော စလင်ဒါပုံသိုလှောင်ကန်ကို တည်ဆောက်မည်ဖြစ်ပါသည်။ လုံခြုံရေးအတွက် အချက်ပေးစနစ် ၃ ခုနှင့် အလိုအလျောက် ပိတ်သည့်စနစ်ကို တပ်ဆင်ထားပါမည်။

LPG အသုံးပြုကြောင့် ကာဗွန်ဒိုင်အောက်ဆိုဒ်ထုတ်လွှတ်မှုသည် ကျောက်မီးသွေးနှင့် ရေနံတို့မှ စွမ်းအင်ထုတ်လုပ်ခြင်းကြောင့် ကာဗွန်ဒိုင်အောက်ဆိုဒ် ထုတ်လွှတ်မှုထက် လျော့နည်းပါသည်။ LPG အသုံးပြုခြင်းမှ ကာဗွန်ဒိုင်အောက်ဆိုဒ်ထုတ်လွှတ်မှုသည် ရေနံအသုံးပြုပြီး 1 kWh အတွက် ကာဗွန်ဒိုင်အောက်ဆိုဒ် ထုတ်လွှတ်မှု၏ ၈၁%၊ ကျောက်မီးသွေးအသုံးပြုပြီး 1 kWh အတွက် ကာဗွန်ဒိုင်အောက်ဆိုဒ် ထုတ်လွှတ်မှု၏ ၇၀% ရှိပြီး၊ ကျောက်မီးသွေးမှ လျှပ်စစ်ထုတ်လွှတ်ပြီး ပင်မလျှပ်စစ်သို့ပို့ခြင်းအတွက် ထုတ်လွှတ်မှုထက် ၅၀% လျော့နည်းပါသည်။ ၁၅ ကီလိုဂရမ်ဆံ့သော စလင်ဒါပုံ LPG ကန်များသည် ၅၀၀၀ လီတာထက်ကျော်လွန်ပါက ကန်၏ ၈၅%ရှိပြီး ၅၀၀၀ လီတာထက် လျော့နည်းပါက ကန်၏ ၈၀% ခန့်ရှိပါသည်။ LPG အသုံးပြုမှုကြောင့် ကာဗွန်ဒိုင်အောက်ဆိုဒ် ထုတ်လွှတ်မှု စုစုပေါင်းမှာ ၇၅၅၀ ကီလိုဂရမ် (၇.၅၅ မက်ထရစ်တန်) ရှိပါသည်။

၁.၆.၃ ဆူညံသံ

Confectionery စက်ရုံ၏ ဆူညံသံအဆင့်တိုင်းတာမှုကို လေအရည်အသွေး စောင့်ကြည့်စစ်ဆေးသည့် နေရာများတစ်လျောက်တွင် ဆောင်ရွက်ခဲ့ပါသည်။ နေ့အချိန်ဆူညံသံအဆင့် *(64.5 dB)* နှင့် ညအချိန်ဆူညံသံအဆင့် *(56 dB)* ရှိပြီး ၎င်းသည် ပတ်ဝန်းကျင်အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက် (*70dB)* ထက် ကျော်လွန်ခြင်းမရှိသည်ကို တွေ့ရပါသည်။

ပတ်ဝန်းကျင်တွင် ဆူညံသံသက်ရောက်မှုအကဲဖြတ်ခြင်းအရ နိမ့်သော အဆင့်တွင် ရှိပါသည်။ ထို့အပြင် စက်ရုံလုပ်ငန်းများကြောင့် ဆူညံသံများကို ကာကွယ်ရန် အလုပ်သမားများနှင့် ဝန်ထမ်းများသည် သင့်တော်သည့် အလုပ်အလေ့အထကောင်း တစ်ခုအနေဖြင့် နားအုပ်များကို တပ်ဆင်ရပါမည်။ စောင့်ကြည့်စစ်ဆေးမှုများကို နှစ်စဉ်ဆောင်ရွက်ပြီး အထူးသဖြင့် စက်ရုံတွင်း စက်ကိရိယာသစ်များ ပြောင်းလဲတပ်ဆင်သည့် အခါများတွင် ပိုမိုလိုအပ်ပါသည်။ လျော့ချရေးနည်းလမ်းများကို သက်ဆိုင်ရာ အပိုင်းကဏ္ဍများတွင် အသေးစိတ်ဖော်ပြထားသည်။

၁.၇ မြေဆီလွှာအရည်အသွေး

PH၊ စိုထိုင်းစ၊ Cadmium၊ Copper၊ ခဲနှင့် သံများအပါအဝင် မြေဆီလွှာအရည်အသွေးဆိုင်ရာ တိုင်းတာမှု ရလဒ်များသည် WBG EHS နှင့် အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာအရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များနှင့် ကိုက်ညီသည်ကို တွေ့ရှိရပါသည်။

၁.၈ အစိုင်အခဲစွန့်ပစ်ပစ္စည်းများ

ထွက်ရှိလာသော အိမ်တွင်းနှင့် လုပ်ငန်းသုံး အမှိုက်များအားလုံးကို နောက်ဆုံးအမှိုက်ပုံသို့ စွန့်ပစ်ရန် နောက်ဆုံးအဆင့်နေရာတွင် ချိန်တွယ်ခြင်းအားဖြင့် စစ်ဆေးသည်။ ချိန်တွယ်တိုင်းတာခြင်းနည်းလမ်းကို အသုံးပြုပြီး အလုပ်သမား ထမင်းစားဆောင်မှ ထွက်လာသော အစိုင်အခဲစွန့်ပစ်ပစ္စည်းများသည် တစ်ရက်လျှင် ၃ ကီလိုဂရမ်ရှိပြီး တစ်နှစ်လျှင် ခန့်မှန်းခြေ ၁.၉ တန်ရှိပါသည်။ ထို့ကြောင့် တစ်ရက်လျှင် စွန့်ပစ်ပစ္စည်းထွက်ရှိမှုပမာဏမှာ လူတစ်ဦးလျှင် ၁.၀၆ ကီလိုဂရမ်ရှိပြီး စုစုပေါင်း ၄၀၀ ပေါ်တွင် အခြေခံတွက်ချက်ထားပါသည်။ ဖွံ့ဖြိုးဆဲနိုင်ငံများတွင် လူတစ်ဦး၊ တစ်ရက်လျှင် ၀.၅-၁.၅ ကီလိုဂရမ် စွန့်ပစ်ပစ္စည်းထွက်ရှိမှုနှင့် နှိုင်းယှဉ်ပါက အဆိုပြုစက်ရုံတွင်ထွက်ရှိမှုသည် ဖွံ့ဖြိုးဆဲနိုင်ငံများတွင် စွန့်ပစ်ပစ္စည်းထွက်ရှိမှုနှုန်းထက် သိသိသာသာ လျော့နည်းနေပါသည်။

Lluvia confectionery စက်ရုံမှ စက်ရုံသုံး စွန့်ပစ်ပစ္စည်းထွက်ရှိမှုသည် တစ်ရက်လျှင် ၃၅၀ ကီလိုဂရမ်ရှိပြီး တစ်နှစ်လျှင် ခန့်မှန်း ၁၀၈.၅ တန်ရှိပါသည်။ စွန့်ပစ်ပစ္စည်းတချို့ကို စွန့်ပစ်ပစ္စည်း ပြန်လည်သန့်စင်အသုံးပြုရန်အတွက် ပို့ဆောင်ပါမည်။ ၎င်းတို့ထဲမှ တချို့တဝက်ကို စည်ပင်သာယာသိမ်းယူမှုစနစ်အားဖြင့် စုဆောင်းပါမည်။

Lluvia confectionery စက်ရုံရှိ အစိုင်အခဲစွန့်ပစ်ပစ္စည်း၏ ပါဝင်မှုအချိုးအစားများပါဝင်မှုကိုလည်း ဆောင်ရွက်ပါသည်။ ပါဝင်မှုအမျိုးအစား (၁၀)မျိုးပါဝင်ပြီး ၎င်းတို့မှာ- အစားအသောက်အကျွင်းအကျန် (၈၄%)နှင့် ခြံထွက်အမှိုက် (၃%)၊ ပလပ်စတစ် (၇%)၊ စက္ကူ (၁%)၊ သားရေ/ချည်ထည်/ရာဘာ (LTR) (၁%)၊ ဖန် (၂%)၊ သတ္တု (၁%)၊ နှင့် အလူမီနီယမ် (ဖွေး)၊ အန္တရာယ်ရှိ စွန့်ပစ်ပစ္စည်းများ (ဆေးဝါး၊ ဘတ္ထရီခြောက်၊ အိမ်သုံးလျှပ်စစ်ပစ္စည်းများ)၊ အမျိုးသမီးလစဉ်သုံးပစ္စည်းများ၊ နှင့် အခြားအရာများ အပါအဝင် အခြားစွန့်ပစ်ပစ္စည်း ၁၆% ထက်နည်း၍ ပါဝင်ပါသည်။

စက်ရုံထွက် အစိုင်အခဲစွန့်ပစ်ပစ္စည်းများတွင် သစ်သား၊ ကွန်ကရစ်၊ သတ္တု၊ အုတ်နှင့် အခြားအရာများ အပါအဝင် အမျိုးအစား ၅ ခုပါဝင်သည်ကို စစ်တမ်းကောက်ယူစဉ်အတွင်း တွေ့ရှိခဲ့ပါသည်။ ချိန်တွယ်တိုင်းတာမှု ရလဒ်အရ သစ်သားနှင့် ကွန်ကရစ်အမှိုက်များ ပါဝင်မှုသည် တူညီနေပါသည်။ ကွန်ကရစ်စွန့်ပစ်ပစ္စည်း ၃၇%နှင့် သစ်သား ၃၅% ပါဝင်ပါသည်။ စွန့်ပစ်ပစ္စည်းအများစုကို ပြန်လည်အသုံးပြုခြင်းများ ဆောင်ရွက်ပါမည်။

စက်ရုံအတွင်း ထွက်ရှိသော အမှိုက်များကို အလုပ်သမားများအားဖြင့် နေ့စဉ် သန့်ရှင်းပါသည်။ အများအားဖြင့် အလုပ်သမားများသည် တစ်နေ့လျှင် ၃ ကြိမ်ရှင်းလင်းပါသည်။ စီမံကိန်းဇရိယာအတွင်း လေ့လာမှုအရ စက်ရုံမှ ထွက်ရှိလာသော စွန့်ပစ်ပစ္စည်းများ အားလုံးကို ရန်ကုန်မြို့တော် စည်ပင်သာယာ (YCDC) အောက်ရှိ မြူနီစီပယ်အားဖြင့် ဆောင်ရွက်ပါသည်။

၁.၉ သောက်သုံးရေနှင့် စွန့်ပစ်ရေ

လေ့လာမှုအရ ရေသည် လုပ်ငန်းလည်ပတ်ဆောင်ရွက်ရန်အတွက် မရှိမဖြစ်လိုအပ်သော လိုအပ်ချက်တစ်ခု ဖြစ်ပါသည်။ စက်ရုံသုံးနှင့် အိမ်သုံးရေ နှစ်မျိုးလုံးအတွက် အဝီစိတွင်းရေကို အသုံးပြုပါသည်။

စက်ရုံမှရရှိသော အချက်အလက်များအရ ထုတ်လုပ်မှုလုပ်ငန်းမှ ရေအသုံးပြုမှုသည် တစ်ရက်လျှင် ၁၇၀ ကုဗမီတာ ရှိပါသည်။ ဆန်းစစ်မှုအရ ရေအသုံးပြုမှု၏ ၆၅%သည် စက်များနှင့် ကြမ်းပြင်ဆေးကြောခြင်းအပါအဝင် စက်ရုံအတွက် အသုံးပြုပြီး ၃၅%သည် သောက်သုံးရေအတွက် ဖြစ်ပါသည်။

စက်ရုံအတွင်းတွင် ရေရရှိနိုင်သော အရင်းအမြစ်အဖြစ် အဝီစိတွင်း ၂ တွင်းရှိပါသည်။ ရေအရင်းအမြစ် ၃ နေရာတွင် တိုင်းတာမှု ၁၉ ခုကို (ဓါတုနှင့် ရူပဆိုင်ရာပါဝင်မှုအတွက် တိုင်းတာမှုများ) ဆောင်ရွက်ခဲ့ပါသည်။ ၎င်းတို့မှာ PH၊ အရောင်၊ အပူချိန်၊ နောက်ကျိမှု၊ Total Dissolved Solid၊ conductivity, iron, hardness, alkalinity, chloride, dissolved oxygen, BOD5, COD, Nitrate- Nitrogen, Arsenic, copper, cadmium, zinc နှင့် sulfate တို့ဖြစ်ပြီး ၎င်းတို့သည် လူတို့၏ ကျန်းမာရေးသာမက ပတ်ဝန်းကျင်ကိုပါ ထိခိုက်စေနိုင်ပါသည်။ သို့လျှောင်ရေ၊ အဝီစိတွင်း (၁)နှင့် အဝီစိတွင်း (၂)တွင် တိုင်းတာမှုရလဒ်များသည် စံချိန်စံနှုန်းများနှင့် ကိုက်ညီပါသည်။

စက်ရုံသည် စွန့်ပစ်ရေသန့်စင်မှုစနစ်ကို စီမံကိန်းနေရာတွင် တပ်ဆင်ဆောင်ရွက်ပါမည်။

၁.၁၀ ဆင့်ကဲသက်ရောက်မှုများ

စီမံကိန်းနေရာတွင် ကွင်းဆင်းလေ့လာမှုနှင့် လူထုအား မေးမြန်းခြင်းများအရ Confectionery စက်ရုံ အနီးတွင် အထည်ချုပ်စက်ရုံနှင့် ဓါတ်မြေဩဇာစက်ရုံများ ရှိပါသည်။

စက်ရုံတစ်ခုအားဖြင့် သက်ရောက်မှုများသည် သိသာထင်ရှားမှုမရှိသော်လည်း အချိန်ကြာလာသည်နှင့်အမျှ အခြားစီမံကိန်းများ၏ အမျိုးမျိုးသော ဆောင်ရွက်မှုများကြောင့် သက်ရောက်မှုများ ရှိလာနိုင်ပါသည်။

(က) ဖုန်မှုန့်များနှင့် လေထုညစ်ညမ်းစေသည့်အရာများ

စက်ရုံအနီးပတ်ဝန်းကျင်မှ ဖုန်မှုန့်များနှင့် စက်ရုံလုပ်ငန်းစဉ်မှ အမှုန်များ အချိန်တိုအတွင်း ထွက်ရှိမှုသည် အနီးပတ်ဝန်းကျင်ရှိ အခြားစက်ရုံများမှ ထုတ်လွှတ်မှုများနှင့် မော်တော်ယာဉ်များ သွားလာမှုများကြောင့် မြင့်မားလာနိုင်ပါသည်။

(ခ) ဆူညံသံ

စက်ရုံပတ်ဝန်းကျင်ရှိ လက်ရှိအခြေခံ ဆူညံသံအဆင့်သည် လက်ရှိယာဉ်အသွားအလာများ၊ မီးစက်များ အသုံးပြုခြင်းနှင့် အနီးစပ်ဆုံး စက်ရုံအလုပ်ရုံများမှ စက်ပစ္စည်းများအသုံးပြု၍ လုပ်ငန်းလည်ပတ်မှုများကြောင့် မြင့်မားလာနိုင်ပါသည်။

(ဂ) မြေပေါ်ရေနှင့် မြေအောက်ရေ အရည်အသွေး

အများသုံးရေနှုတ်မြောင်းများအတွင်းသို့ စက်ရုံမှ စွန့်ပစ်ရေများစွန့်ထုတ်မှုတွင် အခြားစက်ရုံလုပ်ငန်းများမှ ထွက်ရှိမှုများမှ သက်ရောက်မှုများနှင့် စုပေါင်းသွားနိုင်ပါသည်။

၁.၁၁ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် (EMP)

ဆောက်လုပ်ရေးအဆင့်၊ လုပ်ငန်းလည်ပတ်သည့်အဆင့်နှင့် လုပ်ငန်းပိတ်သိမ်းသည့်အဆင့်များ၌ ဆောင်ရွက်မည့် အဓိကပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်တွင် လေထုညစ်ညမ်းမှု၊ ဆူညံသံ၊ တုန်ခါမှု၊ မြေဆီလွှာ၊ ရေအရင်းအမြစ်များ၊ အစိုင်အခဲစွန့်ပစ်ပစ္စည်း၊ စွန့်ပစ်ရေ၊ ဂေဟဗေဒဆိုင်ရာအရင်းအမြစ်များနှင့် ကျန်းမာရေး၊ လုံခြုံရေးအတွက် စောင့်ကြည့်စစ်ဆေးခြင်း၊ ကြိုးကြပ်ခြင်းနှင့် တင်ပြခြင်းစနစ်များနှင့်အတူ ဆောင်ရွက်မည့် လျော့ချရေးနည်းလမ်းများကို အသေးစိတ် ဖော်ပြထားပါသည်။

စီမံကိန်း၏ တည်ဆောက်ရေးကာလမှာ တစ်နှစ်နီးပါးဖြစ်သည်။ စက်ရုံအား ရင်းနှီးမြှုပ်နှံမှုကာလ ၃၀ နှစ် အတွင်း လည်ပတ်မည်ဖြစ်သည်။ Confectionary စက်ရုံသည် EMP ကုန်ကျစရိတ်အတွက် ရင်းနှီးမြှုပ်နှံမှု ပမာဏ၏ ၂% ကို အသုံးပြုမည်ဖြစ်သည်။ ရင်းနှီးမြှုပ်နှံမှုပမာဏမှာ (21,170,601 USD) ဖြစ်သည်။ သဘာဝပတ်ဝန်းကျင် စီမံခန့်ခွဲမှုအစီအစဉ်တစ်ခုအတွက် တစ်နှစ်လျှင် လျာထားချက် အသုံးစရိတ်မှာ (70,568.67 USD) ဖြစ်သည်။ စုစုပေါင်း ၆၀ ရာခိုင်နှုန်းကို သဘာဝပတ်ဝန်းကျင် လျော့ပါးစေရေး အတွက် အသုံးပြုမည်ဖြစ်ပြီး ကျန် ၄၀ ရာခိုင်နှုန်းကို စောင့်ကြည့်ရေး အစီအစဉ်များအတွက် အသုံးပြုမည် ဖြစ်သည်။

လုပ်ငန်းလည်ပတ်ဆောင်ရွက်ခြင်းအတွက် LPG အသုံးပြုမှုကို အခြေခံပြီး လျော့ချရေးနှင့် တားဆီးကာကွယ်ရေး နည်းလမ်းများကို အောက်တွင် ဖော်ပြထားပါသည်။

- ပိုက်လိုင်းများ သို့မဟုတ် အထောက်အပံ့ပစ္စည်းများ သို့မဟုတ် ထောက်တိုင်များ ဆွေးမြေ့ခြင်း၊ ပိုက်လိုင်းနှင့် အနားသတ်များမှ ယိုဖိတ်ခြင်း၊ အငွေ့ပျံခြင်းကြောင့် ပေါက်ထွက်ခြင်း၊ အပေါက်ဖြစ်ခြင်း၊ cathodic protection ကြောင့် တိုက်စားမှုဖြစ်ခြင်း၊ ဖိနှိပ်ခံရခြင်း-တိုက်စားမှုကြောင့်ကွဲကြေခြင်း၊ အပူချိန်ပြင်းထန်ခြင်း၊ cyclic stress၊ ပုံပျက်ယွင်းခြင်းနှင့် ပိုက်စနစ်အား ဖိနှိပ်ထားမှုများကို ရှောင်ရှားရန် LPG ကန်ကို စစ်ဆေးခြင်း၊ စမ်းသပ်ခြင်းများ ဆောင်ရွက်ခြင်း။
- LPG ကို ရေယာဉ်များ သို့မဟုတ် ဆလင်ဒါပုံကန်များကဲ့သို့သော သင့်လျော်သည့်နေရာတွင် သိုလှောင်ထားရှိခြင်း။
- LPG ကန်သင့်လျော်သည့်စံနှုန်းများဖြင့် ဒီဇိုင်းရေးဆွဲပြီး တပ်ဆင်ကာ သက်ဆိုင်ရာပုဂ္ဂိုလ်အား လွှဲအပ်ဆောင်ရွက်ခြင်း
- ကန်ကို လုံခြုံရေးနှင့် စောင့်ကြည့်ထိန်းချုပ်သည့်ကိရိယာများ တပ်ဆင်ထားပြီး သင့်လျော်သည့်ပုဂ္ဂိုလ်မှ ဆောင်ရွက်ခြင်း။
- တပ်ဆင်ထားမှုကို သက်ရောက်စေနိုင်သော ပုံစံ သို့မဟုတ် ပြောင်းလဲမှုများရှိပါက အသုံးပြုသူများသည် ခါတ်ငွေ့ဖြန့်ချီသူများကို အကြောင်းကြားရပါမည်။

- ထိန်းသိမ်းမှုနှင့် စမ်းသပ်မှုများကို သင့်လျော်သည့်သူမှ ဆောင်ရွက်ခြင်း။
- ထိန်းသိမ်းမှုအတွက် သတ်မှတ်ဆောင်ရွက်ခြင်း။
- ထိန်းသိမ်းမှုနှင့် စမ်းသပ်မှုများမှတ်တမ်းများကို ထိန်းသိမ်းထားခြင်း။
- သိုလှောင်ယာဉ်များကာကွယ်ခြင်းအပါအဝင် မီးဘေးနှင့် ပေါက်ကွဲမှုများကို တားဆီးရန် ကြိုတင်ကာကွယ်မှုများကို ဆောင်ရွက်ခြင်း။
- အနှောင့်အယှက်များကို တားဆီးကာကွယ်ရန် တပ်ဆင်သည့်အခါ ဘေးကင်းလုံခြုံရေးနည်းလမ်းများဖြင့် ဆောင်ရွက်ခြင်း
- သေဆုံးခြင်း သို့မဟုတ် ဆေးရုံတင်ကုသရခြင်း၊ မီးဘေး သို့မဟုတ် ပေါက်ကွဲခြင်း သို့မဟုတ် LPG များဖိတ်ကျခြင်းအပါအဝင် မတော်တဆဖြစ်မှုများကို သက်ဆိုင်ရာအာဏာပိုင်များထံ တင်ပြပြီး ၄င်းမတော်တဆဖြစ်ရပ်မှတ်တမ်းများကို ထိန်းသိမ်းထားရပါမည်။

ထို့အပြင် လုပ်ငန်းဆောင်ရွက်သည့် မန်နေဂျာ/ HSE အရာရှိ၊ စီမံကိန်းစီမံခန့်ခွဲမှုအဖွဲ့များ၊ HSE အဖွဲ့၏ တာဝန်နှင့် ဝတ္တရားများကို သတ်မှတ်ထားမည်ဖြစ်ပြီး ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်များကို စက်ရုံဥပဒေများအရ ထိရောက်စွာ ဆောင်ရွက်သွားမည်ဖြစ်ပါသည်။

အစီရင်ခံမှုစနစ်တွင် စောင့်ကြည့်စစ်ဆေးမှုအကြိမ်ရေကို ပြဿနာတစ်ခုချင်းစီအပေါ် အခြေခံပြီး အပတ်စဉ်မှ နှစ်စဉ်အထိ သတ်မှတ်ထားပါသည်။

၁.၁၁.၁ လည်ပတ်မှုအဆင့်အတွင်း Lluvia Limited (Confectionary Factory) စက်ရုံ၏ ပတ်ဝန်းကျင်နှင့် လူမှုစီမံခန့်ခွဲမှုအစီအစဉ်

အဆိုပြုထားသည့် စက်ရုံကြောင့် ဖြစ်နိုင်ခြေရှိသော အကျိုးသက်ရောက်မှုများကို လျှော့ချရန် လျော့ပါးသက်သာရေး အစီအမံများနှင့် တိကျသော အရေးယူဆောင်ရွက်မှုများကို အောက်ပါအတိုင်း အနှစ်ချုပ်ဖော်ပြထားသည်။

ဇယား (xx) စီမံကိန်းလည်ပတ်ဆဲကာလအတွင်း ဆိုးကျိုးလျှော့ချရေးနည်းလမ်းများနှင့် လိုအပ်သည့် လုပ်ငန်းစီမံချက်

သက်ရောက်မှုများ	စီမံကိန်း အစီအစဉ်များ/ ပတ်ဝန်းကျင်ဆိုင်ရာ ရှုထောင့်	အဆိုပြုလျော့ချသည့် နည်းလမ်းများ	စောင့်ကြပ်ကြည့်ရှုခြင်း		
			အကောင်ထည်ဖော် ဆောင်ရွက်ခြင်း	ကြီးကြပ်ခြင်း	အစီရင်ခံခြင်း
လေအရည်အသွေး	ကုန်ကြမ်းထုတ်ယူခြင်း စက်ရုံ၊ မော်တော်ယာဉ်များ၊ အရန်မီးစက်စသည် တို့ကဲ့သို့သော ထုတ်လုပ်မှုလုပ်ငန်းများမှ ထွက်ရှိ လာသည့် ဓာတ်ငွေ့ထုတ် လွှတ်မှုများ၊ .	• အပင်အတွင်း၌ စုပုံနေသော ဖုန်မှုန့်များကို ဖယ်ရှားနိုင်စေရန်အတွက် ပုံမှန်သန့်ရှင်းရေးပြုလုပ်သင့်သည်။ • စီမံကိန်းဧရိယာအတွင်း မည်သည့် အမှိုက်ကိုမဆို မီးရှို့ခြင်းကို တားမြစ်သင့်ပါသည်။ • ကြေမွသော ကုန်ကြမ်းများကို ဖုံးအုပ်ထားသော သို့မဟုတ် ပိတ်ထားသော အခန်းများတွင် သိမ်းဆည်းသင့်ပါသည်။ • အထူးသဖြင့် ကြိတ်ခွဲစက်များတွင် အလုပ်နေရာများမှ ဖုန်မှုန့်များကိုဖယ်	လုပ်ငန်းဆောင်ရွက်သည့် မန်နေဂျာမှ အောက်ပါအတိုင်း ဆောင်ရွက်သင့်ပါသည်– • မော်တော်ယာဉ်နှင့် စက်ပစ္စည်းများ၏ သင့်လျော်သော လုပ်ငန်းခွင် အခြေအနေကို ဆန်းစစ်၍ ဖုန်မှုန့် နှိမ်နင်းရေး လုပ်ငန်းများကို ပုံမှန် လုပ်ဆောင်ရန်။ • စက်ပစ္စည်း၏ အဖြစ်အပျက်များနှင့် ပြုပြင်ထိန်းသိမ်းမှုမှတ်တမ်းအားလုံးကို မှတ်တမ်းတင်ထားရန်။ • ပေးထားသော PPE များသည်	စီမံကိန်း စီမံခန့်ခွဲသည့် အဖွဲ့အစည်း (သို့) HSE team	အပတ်စဉ်အထွေထွေ လုပ်ငန်းခွင် အခြေအနေ အစီရင်ခံခြင်း တစ်နှစ်(၂) ကြိမ် လေထုအရည်အသွေး အစီရင်ခံခြင်း

သက်ရောက်မှုများ	စီမံကိန်း အစီအစဉ်များ/ ပတ်ဝန်းကျင်ဆိုင်ရာ ရှုထောင့်	အဆိုပြုလျော့ချသည့် နည်းလမ်းများ	စောင့်ကြပ်ကြည့်ရှုခြင်း		
			အကောင်ထည်ဖော် ဆောင်ရွက်ခြင်း	ကြီးကြပ်ခြင်း	အစီရင်ခံခြင်း
		ရှားရန် ဖုန်မှုန့်ထုတ်ယူခြင်းနှင့် ပြန်လည်အသုံးပြုခြင်းစနစ်များကို အသုံးပြုသင့်ပါသည်။ • ထုတ်ပိုးထားသော နေရာများတွင် လေဝင်လေထွက်ကောင်းမွန်အောင် ပြုလုပ်ခြင်းနှင့် ဓာတ်ငွေ့ထုတ်လွှတ်မှုနည်းသော ဂျင်နရေတာအင်ဂျင်များကို အသုံးပြုသင့်ပါသည်။ • ဖုန်မှုန့်များကို ထိန်းချုပ်ရန် မြေပြင်ပေါ်သို့ ရေဖြန်းသင့်ပါသည်။ • လွှဲပြောင်းသည့် နေရာများတွင် ပစ္စည်းများ သယ်ယူပို့ဆောင်ရေးနှင့် ဓာတ်ငွေ့ထုတ်လွှတ်မှုကို ထိန်းချုပ်ရန်အတွက် အလုံပိတ်ပြုလုပ်၍ အသုံးပြုသင့်ပါသည်။ • လေထုညစ်ညမ်းမှုကို အချိန်အခါအလိုက် စောင့်ကြည့်စစ်ဆေးပြီး တန်ဖိုးများသည် စံသတ်မှတ်ချက်များ	စီမံကိန်း၏ လုပ်ငန်းဆောင်ရွက်ချက်တိုင်းအတွက် သင့်လျော်ပြီး ဖော်ပြထားသော စံနှုန်းများနှင့် ကိုက်ညီ၍ လုပ်သားများအတွက် ဘေးကင်းလုံခြုံစေရန်။ • ဝန်ထမ်းများအားလုံးကို စွမ်းအင်ချွေတာရေးတွင် တက်ကြွစွာပါဝင်ရန်နှင့် တွန်းအားပေးရန် ပညာရေးနှင့် လေ့ကျင့်ရေးအစီအစဉ်များ ဆောင်ရွက်ရန်။		

သက်ရောက်မှုများ	စီမံကိန်း အစီအစဉ်များ/ ပတ်ဝန်းကျင်ဆိုင်ရာ ရှုထောင့်	အဆိုပြုလျော့ချသည့် နည်းလမ်းများ	စောင့်ကြပ်ကြည့်ရှုခြင်း		
			အကောင်ထည်ဖော် ဆောင်ရွက်ခြင်း	ကြီးကြပ်ခြင်း	အစီရင်ခံခြင်း
		ထက်ကျော်လွန်ပါက သင့်လျော်သော လျော့ပါးရေး အစီအမံများကို ဆောင်ရွက်မည်ဖြစ်ပါသည်။ • ဝန်ထမ်းများအားလုံးကို စွမ်းအင် ချွေတာရေးတွင် တက်ကြွစွာပါဝင်ရန် ပြုင်ဆိုင်မှုများနှင့်အတူ ပညာရေးနှင့် လေ့ကျင့်ရေးအစီအစဉ်များကို ဆောင် ရွက်ပေးသင့်ပါသည်။			
ဆူညံသံ	စက်မှုလုပ်ငန်းဆောင် တာများနှင့် မော်တော် ယာဉ်များကို ဝန်ချခြင်းမှ ထွက်ရှိသည့် ဆူညံသံ	• ဆူညံသံအဆင့်ကို လျော့ချရန် စက် ကိရိယာများ၏ ပုံမှန်ပြုပြင်ထိန်း သိမ်းမှုအားလုံးကို လုပ်ဆောင်သင့်ပါ သည်။ • ဒီဇယ်/ဓာတ်ငွေ့ဖြင့် မောင်းနှင်သည့် စက်များတွင် ဆူညံသံလျော့ချသည့် mufflers များအား အသုံးပြုစေရန်နှင့် ဆူညံသံနည်းစေသော စက်ပစ္စည်းများ ကို အသုံးပြုသင့်ပါသည်။	လုပ်ငန်းဆောင်ရွက်သည့် မန်နေဂျာမှ အောက်ပါအတိုင်း ဆောင်ရွက်သင့် ပါသည်– • ဆူညံသံထုတ်ပေးသည့်ရင်းမြစ်များ နှင့် ၎င်းတို့၏ပလပ်ဖောင်းများကို ၎င်းတို့မှထုတ်ပေးသော ဆူညံသံတုန်ခါမှုများကို လျော့ချရန် ကောင်းစွာထိန်းသိမ်းရန်။ • မတော်တဆ ထိခိုက်မှုများရှိပါက	စီမံကိန်း စီမံ ခန့်ခွဲသည့် အဖွဲ့အစည်း (သို့) HSE team	အပတ်စဉ်အထွေ ထွေ လုပ်ငန်းခွင် အခြေအနေ အစီ ရင်ခံခြင်း တစ်နှစ်(၂) ကြိမ် ဆူညံသံ တိုင်းတာ အစီရင်ခံခြင်း

သက်ရောက်မှုများ	စီမံကိန်း အစီအစဉ်များ/ ပတ်ဝန်းကျင်ဆိုင်ရာ ရှုထောင့်	အဆိုပြုလျော့ချသည့် နည်းလမ်းများ	စောင့်ကြပ်ကြည့်ရှုခြင်း		
			အကောင်ထည်ဖော် ဆောင်ရွက်ခြင်း	ကြီးကြပ်ခြင်း	အစီရင်ခံခြင်း
		• ဆူညံသံအတားအဆီးအဖြစ်လုပ်ဆောင်ရန် အစိမ်းရောင်မြက်ခင်း (သို့) သစ်တောများ ဆောင်ရွက်ထားသင့်ပါသည်။ • နေ့ဘက်အချိန်များတွင် ဆူညံသောလုပ်ငန်းဆောင်တာများနှင့် သယ်ယူပို့ဆောင်ရေးလုပ်ငန်းများကို ဆောင်ရွက်သင့်ပါသည်။ • တန်ဖိုးများသည် စံကန့်သတ်ချက်များထက်ကျော်လွန်ပါက ဆူညံသံအဆင့်များကို အချိန်နှင့်တစ်ပြေးညီ စောင့်ကြည့်စစ်ဆေးဆောင်ရွက်ရမည်။ • PPE များအသုံးပြုခြင်းဖြင့် ဆူညံသံများနှင့် အရေးပါမှုတို့ကို သိရှိနားလည်လာစေရန် ဝန်ထမ်းများအား လေ့ကျင့်သင်ကြားပေးသင့်ပါသည်။	သတင်းပေးပို့ဆောင်ရွက်ရန်။.		

သက်ရောက်မှုများ	စီမံကိန်း အစီအစဉ်များ/ ပတ်ဝန်းကျင်ဆိုင်ရာ ရှုထောင့်	အဆိုပြုလျော့ချသည့် နည်းလမ်းများ	စောင့်ကြပ်ကြည့်ရှုခြင်း		
			အကောင်ထည်ဖော် ဆောင်ရွက်ခြင်း	ကြီးကြပ်ခြင်း	အစီရင်ခံခြင်း
ရေသယံဇာတများ	စက်သုံးဆီနှင့် ယာဉ် ဆေးသုတ်ခြင်း၊ ပါးလွှာခြင်း၊ ဆီများနှင့် ယိုစိမ့်မှုများ၊ ချောဆီ။ သန့်ရှင်းရေးသုံး ပစ္စည်းများနှင့် ရေများ အသုံးပြုရာတွင် ယိုဖိတ်မှု။ အမှိုက်၊ မိလ္လာရေနှင့် မုန်တိုင်းရေ/မိုးရေများကို မှားယွင်းစွာ စီမံခန့်ခွဲခြင်း။	• စက်/ယာဉ်/ပစ္စည်းများ ယိုစိမ့်မှုတွေ့ရှိပါက အသုံးမပြုသင့်ပါ။ • မြေဆီလွှာနှင့် မြေအောက်ရေကို ညစ်ညမ်းစေနိုင်သော စက်ပစ္စည်းကိရိယာများ (လက်တွေ့လုပ်ဆောင်နိုင်သောနေရာတွင်) ပြုပြင်ထိန်းသိမ်းမှုမလုပ်သင့်ပါ။ • ဖုန်ထူသော ပလက်ဖောင်းများကို ဖြန်းရန်အတွက် အခြားအသုံးပြုပြီးရေကို မှန်ကန်စွာ ပြန်လည်အသုံးပြုသင့်ပါသည်။ • ရေပိုက်များနှင့် တိုင်ကီယိုစိမ့်မှုများကို ချက်ခြင်းရှာဖွေပြုပြင်သင့်ပါသည်။ • မိုးရာသီတွင် ကုန်ကြမ်းများကို ခေါင်မိုးအောက်တွင် စနစ်တကျသိမ်းဆည်းသင့်ပါသည်။ • အနည်ထိန်းခြင်းအတွက် ရေနုတ်	လုပ်ငန်းဆောင်ရွက်သည့် မနေ့နေ့ဂျမှ အောက်ပါအတိုင်း ဆောင်ရွက်သင့်ပါသည်- • ရေပိုက်များနှင့် တိုင်ကီယိုစိမ့်မှုများကို ချက်ခြင်းရှာဖွေ၍ ပုံမှန်စစ်ဆေး ဆောင်ရွက်ရန်။ • ရေများလွတ်လွတ်လပ်လပ် စီးဆင်းမှုရှိစေရန်အတွက် ရေနူတ်မြောင်းများ အားလုံးကို အမှိုက်သရိုက်များ ရှင်းလင်းဆောင်ရွက်ရန်။ • မိလ္လာကန်များ၏ စွမ်းဆောင်ရည်သည် လုံလောက်ပြီး ယိုစိမ့်ခြင်းမှ ကင်းဝေးအောင် ဆောင်ရွက်ထားရှိရန်။ • မတော်တဆ ထိခိုက်မှုများရှိပါက သတင်းပေးပို့ဆောင်ရွက်ရန်။.	စီမံကိန်း စီမံခန့်ခွဲသည့် အဖွဲ့အစည်း (သို့) HSE team	အပတ်စဉ်အထွေထွေ လုပ်ငန်းခွင် အခြေအနေ အစီရင်ခံခြင်း တစ်နှစ်(၂) ကြိမ် ဆူညံသံ တိုင်းတာ အစီရင်ခံခြင်း

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			အကောင်ထည်ဖော် ဆောင်ရွက်ခြင်း	ကြီးကြပ်ခြင်း	အစီရင်ခံခြင်း
		မြောင်းစနစ်အား ကောင်းမွန်စွာထား ရှိသင့်ပါသည်။ • လောင်စာဆီ သိုလှောင်မှုနေရာကို စိုစွတ်သောအခင်းများ/နံရံများပါရှိသော သီးသန့်ဧရိယာတွင် ထားရှိသင့်ပါသည်။ • ရေကို အသုံးမပြုသည့်အခါ အလို အလျောက်ပိတ်မည့် ရေထိန်းပိုက်များကို တပ်ဆင်အသုံးပြုသင့်ပါသည်။			
မြေဆီလွှာ အရည်အသွေး	စက်မှုလုပ်ငန်းများမှ စွန့်ပစ်ပစ္စည်းများကို မှားယွင်းစွာ စီမံခန့်ခွဲခြင်း .	• တစ်ကိုယ်ရေသန့်ရှင်းရေး အထောက် အကူပြုပစ္စည်းများနှင့် ရေဆိုးမြောင်း စနစ်ကို ကောင်းမွန်စွာ ထားရှိသင့် ပါသည်၊ အိမ်သာများနှင့် အိမ်တွင်းစွန့် ပစ်ရေများကို အများအားဖြင့် မိလ္လာ စနစ်ဖြင့် ကောက်ခံသွားသင့်ပြီး အနည်းဆုံး အိမ်သာအရေအတွက် သည် လူဆယ်ဦးလျှင် အိမ်သာတစ်လုံး ဆောက်လုပ်အသုံးပြုသင့်သည်။	လုပ်ငန်းဆောင်ရွက်သည့် မန်နေဂျာမှ အောက်ပါအတိုင်း ဆောင်ရွက်သင့် ပါသည်- • ကွန်တိန်နာများမှ ယိုစိမ့်မှုများ အတွက် သိုလှောင်ရာနေရာကို နေ့စဉ်ကြည့်ရှု စစ်ဆေးရန်နှင့် မှတ်တမ်း ထားရှိရန်။ • စီမံကိန်းမှ ထွက်ရှိသည့် စွန့်ပစ် ပစ္စည်းများကို မှတ်တမ်းထားရှိရန်၊	စီမံကိန်း စီမံ ခန့်ခွဲသည့် အဖွဲ့အစည်း (သို့) HSE team	အပတ်စဉ်အထွေ ထွေ လုပ်ငန်းခွင် အခြေအနေ အစီ ရင်ခံခြင်း

သက်ရောက်မှုများ	စီမံကိန်း အစီအစဉ်များ/ ပတ်ဝန်းကျင်ဆိုင်ရာ ရှုထောင့်	အဆိုပြုလျော့ချသည့် နည်းလမ်းများ	စောင့်ကြပ်ကြည့်ရှုခြင်း		
			အကောင်ထည်ဖော် ဆောင်ရွက်ခြင်း	ကြီးကြပ်ခြင်း	အစီရင်ခံခြင်း
		• စွန့်ပစ်အမှိုက်များကို စွန့်ပစ်အမှိုက်များ စုဆောင်းခြင်း သို့မဟုတ် မြေဆွေးများ ပြုလုပ်ရန်အတွက် အမှိုက်များကို လုံခြုံသောနေရာတွင် သိမ်းဆည်းပြီး စွန့်ပစ်ပစ္စည်းများကို နေ့စဉ်နေ့တိုင်း ရှင်းလင်းသင့်ပါသည်။ • ယိုဖိတ်မှုဖြစ်နိုင်ချေကို လျှော့ချရန် အန္တရာယ်ရှိသော ပစ္စည်းများ ကိုင်တွယ်ခြင်းဆိုင်ရာ လုပ်ငန်းစဉ်များနှင့် မတော်တဆယိုဖိတ်မှုများအား လျင်မြန်ပြီး ဘေးကင်းစွာ ရှင်းလင်းသေချာစေရန် အရေးပေါ်တုံ့ပြန်မှု အစီအစဉ်ဆောင်ရွက်ထားသင့်ပါသည်။ • ရေကိုအခြေခံထားသော ဓာတုပစ္စည်းများကိုသာ အသုံးပြုသင့်ပါသည်။	• ဆီ သို့မဟုတ် အန္တရာယ်ရှိသော ပစ္စည်း ယိုဖိတ်မှုကို ချက်ခြင်းရှင်းလင်းရန် ပန်ထမ်းများအား လေ့ကျင့်ပေးရန်။ • မုတ်သုံရာသီအတွင်း မြေပြင်မှစိမ့်ထွက်မှုများ လျော့နည်းစေရန် ဆိုဒ်နယ်နိမိတ်များကို ခိုင်ခန့်စွာပြုလုပ်ထားရန်။ • နေရာအနှံ့ သင့်လျော်သော housekeeping နည်းလမ်းများကို လုပ်ဆောင်ရန်။		

သက်ရောက်မှုများ	စီမံကိန်း အစီအစဉ်များ/ ပတ်ဝန်းကျင်ဆိုင်ရာ ရှုထောင့်	အဆိုပြုလျော့ချသည့် နည်းလမ်းများ	စောင့်ကြပ်ကြည့်ရှုခြင်း		
			အကောင်ထည်ဖော် ဆောင်ရွက်ခြင်း	ကြီးကြပ်ခြင်း	အစီရင်ခံခြင်း
စွန့်ပစ်အမှိုက်	စက်ရုံ၏ အမှိုက်စွန့်ပစ်ခြင်း ၊ အစိုင်အခဲအမှိုက်များ၊ အရည်စွန့်ပစ်ပစ္စည်းများနှင့် အန္တရာယ်ရှိသော စွန့်ပစ်ပစ္စည်းများ	• စွန့်ပစ်သော မိလ္လာများကို ပုံမှန်စောင့်ကြည့်စစ်ဆေးသင့်ပါသည်။ • ဝန်ထမ်းများအတွက် သင့်လျော်သော သန့်ရှင်းရေး အထောက်အကူပစ္စည်းများ လုံလောက်စွာ ထားရှိသင့်ပါသည်။ • အမှိုက်များ ပြန့်ကျဲသွားခြင်းမှ ကာကွယ်ရန် စက်ရုံရှိအမှိုက်ပုံးအားလုံးကို အချိန်တိုင်း စနစ်တကျ အလုံပိတ်ထားသင့်ပါသည်။ • ဝန်ထမ်းရုပ်ကွက်များနှင့် အခြားစက်ရုံများတွင် အစားအသောက်စွန့်ပစ်ပစ္စည်းများ၊ သတ္တုနှင့်အခြား စွန့်ပစ်	လုပ်ငန်းဆောင်ရွက်သည့် မန်နေဂျာမှ အောက်ပါအတိုင်း ဆောင်ရွက်သင့်ပါသည်– • အန္တရာယ်ရှိသော စွန့်ပစ်အမှိုက်များအား တံဆိပ်တွင်ပြထားသည့် ညွှန်ကြားချက်အတိုင်း လုံခြုံသော နေရာတွင် စွန့်ပစ်ရန်။ • အမှိုက်ပုံးများကို ကြည့်ရှုစစ် ဆေးပြီး သက်ဆိုင်ရာ မှတ်တမ်းထားရှိရန်နှင့် • ဆီ သို့မဟုတ် အန္တရာယ်ရှိသော ပစ္စည်းများ ယိုဖိတ်မှုကို ရှင်းလင်းရန် ဝန်ထမ်းများအား လေ့ကျင့်သင်တန်းပေးရန်။	စီမံကိန်း စီမံခန့်ခွဲသည့် အဖွဲ့အစည်း (သို့) HSE team	အပတ်စဉ်အထွေထွေ လုပ်ငန်းခွင် အခြေအနေ အစီရင်ခံခြင်း

သက်ရောက်မှုများ	စီမံကိန်း အစီအစဉ်များ/ ပတ်ဝန်းကျင်ဆိုင်ရာ ရှုထောင့်	အဆိုပြုလျော့ချသည့် နည်းလမ်းများ	စောင့်ကြပ်ကြည့်ရှုခြင်း		
			အကောင်ထည်ဖော် ဆောင်ရွက်ခြင်း	ကြီးကြပ်ခြင်း	အစီရင်ခံခြင်း
		အမှိုက်များအတွက် သီးခြားပုံးများ ထားရှိသင့်ပါသည်။ • ပြန်လည်အသုံးပြုရန်မသင့်သော (သို့မဟုတ်) စွန့်ပစ်ရန်အတွက် အန္တရာယ်မရှိသော အစိုင် အခဲများကို မြေမြုပ်စွန့်ပစ်သင့်ပါသည်။			
ဂေဟဗေဒ အရင်းအမြစ်များ	စီမံကိန်း လည်ပတ်ဆောင်ရွက်မှုများ	• လုပ်ငန်းဆောင်ရွက်မှု အဆင့်တွင် စိုက်ပျိုးမြေများ ဆုံးရှုံးသွားစေရန် စီမံကိန်းနေရာအတွင်းရှိ အိမ်ရာဧရိယာ အတွင်း ပြန်လည်စိမ်းလန်းစိုပြေစေရန် အစိမ်းရောင်နယ်မြေများ ဆောင်ရွက် သွားမည်ဖြစ်ပါသည်။	လုပ်ငန်းဆောင်ရွက်သည့် မန်နေဂျာမှ အောက်ပါအတိုင်း ဆောင်ရွက်သင့် ပါသည်- • စက်ရုံဝင်းအတွင်း စိမ်းလန်းသော ဧရိယာကို ဖော်ဆောင်ပါ။	စီမံကိန်း စီမံခန့်ခွဲသည့် အဖွဲ့အစည်း (သို့) HSE team	အဆိုပြုထားသော စက်ရုံနှင့် တိုက်ရိုက်သက် ဆိုင်ခြင်းမရှိသော် လည်း၊ ဖျက်သိမ်း ရေးအဆင့်တွင်

သက်ရောက်မှုများ	စီမံကိန်း အစီအစဉ်များ/ ပတ်ဝန်းကျင်ဆိုင်ရာ ရှုထောင့်	အဆိုပြုလျော့ချသည့် နည်းလမ်းများ	စောင့်ကြပ်ကြည့်ရှုခြင်း		
			အကောင်ထည်ဖော် ဆောင်ရွက်ခြင်း	ကြီးကြပ်ခြင်း	အစီရင်ခံခြင်း
		•			အစီရင်ခံရန် လိုအပ်ပါသည်။
လုပ်ငန်းခွင်ကျန်းမာရေးနှင့်ဘေးကင်းလုံခြုံရေး	ကုန်ကြမ်းထုတ်ယူခြင်းကဲ့သို့သော ထုတ်လုပ်မှုလုပ်ငန်း များမှထွက်ရှိသည့် အမှုန်အမွှားများ။ အစိုင်အခဲအမှိုက်များ၊ အရည်စွန့်ပစ်ပစ္စည်းများနှင့် အန္တရာယ်ရှိသော	• ဘေးကင်းရေးအသုံးအဆောင်များ၊ လေ့ကျင့်ရေးဘေးကင်းရေးပိုစတာများ၊ ကြွေးကြော်သံများ၊ ပုံများကဲ့သို့သော ဘေးကင်းရေးဆိုင်ရာ ဆောင်ရွက်မှုအားလုံးကို စက်ရုံတွင် ရှင်းရှင်းလင်းလင်းဖတ်နိုင်စေရန် ဆောင်ရွက်ထားရှိရန်၊ • ဆူညံသောရင်းမြစ်များနှင့် ထိတွေ့သော အလုပ်သမားများအား နားကြပ်/ပလပ်များ တပ်ဆင်ထားရှိရန်။ • အလုပ်သမားများ၏ ကျန်းမာရေးကို အရည်အချင်းပြည့်မီသော ဆရာဝန်မှ ပုံမှန်စစ်ဆေးသင့်ပြီး အလုပ်သမား	လုပ်ငန်းဆောင်ရွက်သည့် မန်နေဂျာမှ အောက်ပါအတိုင်း ဆောင်ရွက်သင့်ပါသည်- • ပေးထားသော PPE များသည် သီးခြားလုပ်ငန်းအတွက် လုံလောက်/သင့်လျော်အောင် ထားရှိရန်။ • အချိန်တိုင်း စက်ရုံဧရိယာအတွင်း ဟွန်းတီးခြင်းများ မပြုလုပ်ရန်။ • ဝန်ထမ်းအားလုံးအတွက် သင့်လျော်သော အလုပ်ချိန်ဇယားကို သေချာပါစေ။	စီမံကိန်း စီမံခန့်ခွဲသည့် အဖွဲ့အစည်း (သို့) HSE team	အပတ်စဉ်အထွေထွေ လုပ်ငန်းခွင် အခြေအနေ အစီရင်ခံခြင်း

သက်ရောက်မှုများ	စီမံကိန်းအစီအစဉ်များ/ပတ်ဝန်းကျင်ဆိုင်ရာ ရှုထောင့်	အဆိုပြုလျော့ချသည့် နည်းလမ်းများ	စောင့်ကြပ်ကြည့်ရှုခြင်း		
			အကောင်ထည်ဖော်ဆောင်ရွက်ခြင်း	ကြီးကြပ်ခြင်း	အစီရင်ခံခြင်း
	စွန့်ပစ်ပစ္စည်းများကို ထိတွေ့ခြင်း။ မြင့်မားသော ဆူညံသံများနှင့် ထိတွေ့ခြင်းကြောင့် အကြားစွမ်းရည် ချို့ယွင်းခြင်း။	တစ်ဦးစီအတွက် သင့်လျော်သော မှတ်တမ်းများကို သိမ်းဆည်းထားရှိရန်။ • ဖုန်မှုန့်များနှင့် ထိတွေ့မိပါက မျက်လုံးကို ရေဖြင့် ဆေးကြောပြီး ဆရာဝန်နှင့် တိုင်ပင်ပြသရန်။ • အရေပြားထိခိုက်မှုမဖြစ်စေရန် ဖုန်မှုန့်များကို ဆေးကြောရန် ဆပ်ပြာနှင့်ရေကို အသုံးပြုပါ။ • လေထုထဲမှ ဖုန်မှုန့်များနှင့် လေအမှုန်အမွှားများကို ကာကွယ်ရန် PPEs (တစ်ကိုယ်ရေ အကာအကွယ်ပစ္စည်း)၊ အထူးသဖြင့် မျက်နှာဖုံးများ တပ်ဆင်အသုံးပြုရန်။ • မီးနှင့်ဘေးကင်းရေး ပစ္စည်းများကို စနစ်တကျအသုံးပြု၍ ပုံမှန်ထိန်းသိမ်းဆောင်ရွက်ရန်။ • အလွယ်တကူရရှိနိုင်ပြီး လက်လှမ်းမီ			

သက်ရောက်မှုများ	စီမံကိန်း အစီအစဉ်များ/ ပတ်ဝန်းကျင်ဆိုင်ရာ ရှုထောင့်	အဆိုပြုလျော့ချသည့် နည်းလမ်းများ	စောင့်ကြပ်ကြည့်ရှုခြင်း		
			အကောင်ထည်ဖော် ဆောင်ရွက်ခြင်း	ကြီးကြပ်ခြင်း	အစီရင်ခံခြင်း
		နိုင်သော ရှေးဦးသူနာပြုသေတ္တာကို အဆောက်အဦအတွင်း ထည့်သွင်း ထားရှိရန်။			
Liquified Petroleum Gas (LPG)	Use of LPG plant	• LPG သည် သက်ဆိုင်ရာ ကျင့်ထုံး ဥပဒေများနှင့်အညီ အသုံးပြုသည့် နေရာအလိုက် လုံခြုံစွာထားရှိရန်။ • LPG စက်ရုံကို သင့်လျော်သော စံချိန်စံညွှန်းများနှင့်အညီ ဒီဇိုင်းထုတ်ပြီး အရည်အချင်းပြည့်မီသူများမှ စနစ်တကျ တပ်ဆင်ပြီး တာဝန်ပေးအပ်ရမည်။ • ပိုင်ဆိုင်သူများသည် ဓာတ်ငွေ့ တပ်ဆင်ခြင်းအား ထိခိုက်စေနိုင်သည့် ဖွဲ့စည်းပုံ သို့မဟုတ် အခြားပြောင်းလဲမှု တစ်ခုခုအတွက် ဓာတ်ငွေ့ပေးသွင်းသူကို အကြောင်းကြားရမည်။ • ပြုပြင်ထိန်းသိမ်းမှုနှင့် စမ်းသပ်မှု	လုပ်ငန်းဆောင်ရွက်သည့် မန်နေဂျာမှ အောက်ပါအတိုင်း ဆောင်ရွက်သင့်ပါသည်- • စက်ရုံအား လုံလောက်သောဘေးကင်းမှုနှင့် စောင့်ကြည့်ထိန်း ချုပ်မှုကိရိယာများဖြင့် တပ်ဆင်ထားပြီး အရည်အချင်းရှိသူများမှ ဆောင်ရွက်ပေးကြောင်း သေချာပါစေ။ • သင့်လျော်သော သိုလှောင်ရေယာဉ်များ၏ အကာအကွယ်များ အပါအဝင် မီးနှင့် ပေါက်ကွဲခြင်းမှ ကာကွယ်ရန် ကြိုတင်ကာကွယ်မှုများ ပြုလုပ်ထားကြောင်း သေချာပါစေ။	စီမံကိန်း စီမံခန့်ခွဲသည့် အဖွဲ့အစည်း (သို့) HSE team	အပတ်စဉ်အထွေထွေ လုပ်ငန်းခွင် အခြေအနေ အစီရင်ခံခြင်း

သက်ရောက်မှုများ	စီမံကိန်း အစီအစဉ်များ/ ပတ်ဝန်းကျင်ဆိုင်ရာ ရှုထောင့်	အဆိုပြုလျော့ချသည့် နည်းလမ်းများ	စောင့်ကြပ်ကြည့်ရှုခြင်း		
			အကောင်ထည်ဖော် ဆောင်ရွက်ခြင်း	ကြီးကြပ်ခြင်း	အစီရင်ခံခြင်း
		မှတ်တမ်းများကို သိမ်းဆည်းထားရမည်။ • သင့်လျော်သော သိုလှောင်ရေ ယာဉ်များ၏ အကာအကွယ်များ အပါအဝင် မီးနှင့် ပေါက်ကွဲခြင်းမှ ကာကွယ်ရန် ကြိုတင်ကာကွယ်မှုများ ပြုလုပ်ရပါမည်။ • သေဆုံးခြင်း သို့မဟုတ် ဆေးရုံတက်ကုသခြင်း၊ မီးလောင်မှု သို့မဟုတ် ပေါက်ကွဲခြင်း သို့မဟုတ် LPG များ သိသိသာသာ ထွက်လာခြင်း အပါအဝင် အဖြစ်အပျက်များကို အာဏာပိုင်ထံ တိုင်ကြားရမည်ဖြစ်ပြီး ယင်းဖြစ်ရပ်များ၏ မှတ်တမ်းများကို သိမ်းဆည်းထားရမည်ဖြစ်သည်။			

ဇယား (xx) 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 ပတ်ဝန်းကျင်ထိန်း သိမ်းရေးဥပဒေနှင့်အညီ ၂၀၁၅	ကာလ – (၂၄) နာရီ ဆက်တိုက် ကြိမ်ရေ – တစ်နှစ်လျှင် (၂) ကြိမ် • လုပ်ငန်းလည်ပတ်စဉ် တစ်နှစ်လျှင် ၂ ကြိမ်နှင့် စက်ရုံဖျက်သိမ်းခြင်း အဆင့်တွင် တစ်ကြိမ် လေအရည်အသွေးနှင့် ပတ်သက်၍ တိုင်ကြားချက်တစ်စုံတစ်ရာ ရှိပါက ၊	LPG Tank (တည်နေရာ-၁) 16°56' 42.54" N 96° 11'43.47" E စက်ရုံဝန်းအတွင်း(တည်နေရာ-၂) 16°56' 42.10" N 96° 11'40.33" E Downwind of the project site (တည်နေရာ-၃) 16°56' 40.65" N 96° 11'46.11" E စက်ရုံဝန်းအတွင်း (တည်နေရာ-	• HSE တာဝန်ခံ (သို့) တတိယအဖွဲ့အစည်း

Factors	Index/ Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location	Responsible Person
		ခုနှစ်တွင် အသက်ဝင်သော မြန်မာနိုင်ငံ၏ အမျိုးသားအဆင့် ပတ်ဝန်းကျင်ဆိုင်ရာ လမ်းညွှန်ချက်များ (EQEG)	သီးခြားတိုင်ကြားမှုများ အတွက် နောက်တစ်ကြိမ် လေအရည်အသွေးတိုင်းတာမှုကို လိုအပ်ပါက လုပ်ဆောင်ပါမည်။	၄) 16°56' 40.34" N 96° 11'33.28" E	
ဆူညံသံ	• Leq (၂၄)နာရီ • Lmax • Ldn	Method –siteတစ်ခုစီတွင်၊ (နေ့ခင်းဘက် (LAeq 90 D)၊ ညအချိန် (LAeq 90 N))၊ နှင့် ၂၄ နာရီ (LAeq 90) အတွက် Sound Level Meter (မော်ဒယ်– SL–4023SD) နှင့်အတူ SD ကတ်တွင်	ကာလ – (၂၄) နာရီ ဆက်တိုက် ကြိမ်ရေ – တစ်နှစ်လျှင်(၂)ကြိမ် • လုပ်ငန်းလည်ပတ်စဉ် တနှစ်လျှင် ၂ ကြိမ်နှင့် စက်ရုံဖျက်သိမ်းခြင်းအဆင့်တွင် တစ်ကြိမ်	LPG Tank (တည်နေရာ–၁) 16°56' 42.54" N 96° 11'43.47" E စက်ရုံဝန်းအတွင်း(တည်နေရာ–၂) 16°56' 42.10" N 96° 11'40.33" E Downwind of the project	HSE တာဝန်ခံ (သို့) တတိယ အဖွဲ့အစည်း

Factors	Index/ Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location	Responsible Person
		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	**ဆူညံသံနှင့်ပတ်သက်၍ တိုင်ကြားချက်တစ်စုံတစ်ရာ ရှိပါက ၊ နောက်တစ်ကြိမ် ဆူညံသံတိုင်းတာမှုကို လိုအပ်ပါက လုပ်ဆောင်ပါမည်။**	**site (တည်နေရာ-၃)** 16°56' 40.65" N 96° 11'46.11" E **စက်ရုံဝန်းအတွင်း (တည်နေရာ-၄)** 16°56' 40.34" N 96° 11'33.28" E	

Factors	Index/ Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location	Responsible Person
		အသက်ဝင်သော မြန်မာနိုင်ငံ၏ အမျိုးသားအဆင့် ပတ်ဝန်းကျင်ဆိုင်ရာ လမ်းညွှန်ချက်များ (EQEG)			
ညစ်ညမ်းရေ	ရုပ်ပိုင်းဆိုင်ရာ သတ်မှတ်ချက်များ : • pH ဓါတုဆိုင်ရာ သတ်မှတ်ချက်များ : • Total Suspended Solid (TSS) • Ammonia Nitrogen • Nitrate Nitrogen • Oil and	နည်းလမ်း • အမျိုးသားပတ်ဝန်းကျင်အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက် (EQEG) မှ အကြံပြုထားသော ရေနှင့် စွန့်ပစ်ရေဆန်းစစ်ခြင်းအတွက် ခွဲခြမ်းစိတ်ဖြာမှုနည်းလမ်းများ	• လုပ်ငန်းဆောင်ရွက်သည့် ကာလအတွင်း • ညစ်ညမ်းရေအတွက် တစ်နှစ်လျှင် နှစ်ကြိမ် • သောက်သုံးရေအတွက် သုံးလတစ်ကြိမ်	သောက်သုံးရေးအတွက် , (GW1), 16°56'42.30"N, 96°11'40.23"E (GW2) 16°56'42.92"N, 96°11'41.61"E (GW3)	• HSE တာဝန်ခံ (သို့) တတိယ အဖွဲ့အစည်း

Factors	Index/ Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location	Responsible Person
	Grease • Phosphorus • DO • BOD • COD ဇီဝဆိုင်ရာ သတ်မှတ်ချက်များ : • Total Coliform • *Escherichia coli*			16°56'39.21"N, 96°11'37.59"E စွန့်ပစ်ရေအတွက်, (SW1) 16°56'42.31"N, 96°11'39.87"E (SW2) 16°56'40.36"N, 96°11'45.75"E	
အန္တရာယ်ရှိေ ေသာ နှင့် အန္တရာယ်မရှိသော စွန့်ပစ်ပစ္စည်းမျ ားား	ရှင်းလင်းစွာ စွန့်ပစ်ခြင်းနှင့် ခြေရာခံခြင်း အစီရင်ခံစာ	စွန့်ပစ်သည့်အမျိုးအစားနှင့် စွန့်ပစ်သည့်နေရာလိုက်၍ အမှိုက်ပမာဏကို ခြေရာခံခြင်း	• လုပ်ငန်းလည်ပတ်စဉ် ကာလ အတွင်း	• စီမံကိန်း တည်နေရာအားလုံး	• HSE တာဝန်ခံ (သို့) တတိယ အဖွဲ့အစည်း

Factors	Index/ Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location	Responsible Person
လူမှုရေး	• တိုင်ကြားချက် • စောင့်ကြည့်လေ့လာခြင်းနှင့် အဖြေရှာခြင်း	• တိုင်ကြားချက်ကိုမှတ်တမ်းတင်ရန် • သင့်တော်သောအဖြေများကို စောင့်ကြည့်ဖော်ထုတ်အကောင်အထည်ဖော်ရန်	• လုပ်ငန်းစဉ်အားလုံးတစ်လျှောက်	• စီမံကိန်းဧရိယာ၊စီမံကိန်းဧရိယာဝန်းကျင်နှင့် သယ်ယူပို့ဆောင်ရေးလမ်းကြောင်း	• HSE တာဝန်ခံ (သို့) တတိယအဖွဲ့အစည်း
အများပြည်သူနှင့် လုပ်ငန်းခွင်ကျန်းမာရေးနှင့် ဘေးကင်းလုံခြုံရေး	• မတော်တဆဖြစ်ပွားမှု ဆိုင်ရာ အချက်အလက်များ (စက်များနှင့် လုပ်ကိုင်ရာတွင် မတော်တဆမှုများ၊ ချော်လဲခြင်း၊ပြုတ်ကျခြင်းများ၊ အခြားအသေးစား ထိခိုက်ဒဏ်ရာရမှုများ) • လုပ်ငန်းခွင်အတွင်း	• စစ်ဆေးတွေ့ရှိချက်များ(တော်တဆ) အား အကျဉ်းချုပ်အစီရင်ခံစာ ပြုစုရန် • အဖွဲ့တာဝန်ခံမှ အလုပ်သ မားများ၏ ကျန်းမာရေးအချက်အလက်များကို ပုံမှန်အကဲဖြတ်ရန် • အခါအားလျော်စွာ ဆေး စစ်ရန်	• လုပ်ငန်းစဉ်တစ်လျှောက်လုံး ကြိမ်ရေ – လစဉ် • လုပ်ငန်းဆောင်ရွက်သည့်ကာလအတွင်း ကြိမ်ရေ – ရံဖန်ရံခါ ကြိမ်ရေ – လစဉ် ကြိမ်ရေ – ရံဖန်ရံခါ • ကာလ – တစ်ရက် ကြိမ်ရေ – နှစ်စဉ်	• စီမံကိန်းဧရိယာ၊စီမံကိန်းဧရိယာဝန်းကျင်နှင့် သယ်ယူပို့ဆောင်ရေး လမ်းကြောင်း • စီမံကိန်းဧရိယာနှင့် ထိတွေ့ဧရိယာများ	•

Factors	Index/ Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location	Responsible Person
	အသက်ရှူလမ်းကြောင်းဆိုင်ရာ ရောဂါများ • ရေရှည်တွင် ဆူညံသံနှင့် ထိတွေ့မှုကြောင့် ဖြစ်ပေါ်သော အကြား အာရုံထိခိုက် ပျက်စီးခြင်း (NHL) နှင့် အခြားသော ဇီဝကမ္မဆိုင်ရာ သက်ရောက်မှုများ • လျှော့ချရေးနည်းလမ်းများ	• လူထုအကြံပြုချက်များ ရယူခြင်း • အများပြည်သူသို့ သတင်း အချက်အလက်များ ထုတ် ဖော်ကြေညာခြင်း • မတော်တဆမှုများနှင့် အသေးစားမတော်တဆမှုများအား သတင်းပို့ရန် အရေးပေါ် တုံ့ပြန်ရေးသင်တန်း / ကျန်းမာရေးနှင့် ဘေးကင်း လုံခြုံရေးသင်တန်းများနှင့်	ကာလ – (၁) သို့ (၂) ရက် ကြိမ်ရေ – နှစ်စဉ် ကာလ – (၁) သို့ (၂) ရက် ကြိမ်ရေ – အခါအားလျော်စွာ– ကာလ – ပြင်ဆင်ထားသော ပတ်ဝန်းကျင်ဆိုင်ရာအစီအမံပေါ်မူတည်၍		

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

၁.၁၂ အရေးပေါ်တုန့်ပြန်မှုအစီအစဉ်

ရည်ရွယ်ချက်မှာ စက်ရုံဆောင်ရွက်မှုများကြောင့် ဖြစ်ပေါ်လာနိုင်သော အရေးပေါ်အခြေအနေများနှင့် မတော်တဆဖြစ်ရပ်များ၊ သဘာဝဘေးအန္တရာယ်များကို တုန့်ပြန်နိုင်ရန်အတွက် အရင်းအမြစ်များ (လူနှင့် ကိရိယာများ)ကို ပြင်ဆင်ထားရန် ဖြစ်ပါသည်။

Lluvia confectionery စက်ရုံတွင် အရေးပေါ်အခြေအနေများအတွက် ယေဘူယျအားဖြင့် Emergency service in charge (သို့မဟုတ်) HSE မန်နေဂျာနှင့် Response team ရှိသင့်ပါသည်။ အဖွဲ့သည် အောက်ပါတို့ကို ပြင်ဆင်ထားသင့်ပါသည်။

- အဖွဲ့သားများကို အရေးပေါ်ပစ္စည်းများ အသုံးပြုကာ ၎င်းတို့တာဝန်နှင့် သက်ဆိုင်သည့် သင်တန်းများ ပို့ချခြင်း။
- အရေးပေါ်နည်းလမ်းများကို ဖော်ဆောင်ရေးသားခြင်းနှင့် ပြဌာန်းခြင်း။
- အရေးပေါ်တုန့်ပြန်မှုအစီအစဉ် (ERP) ဖော်ပြချက်နှင့် ရရှိနိုင်မှုများကို ဝန်ထမ်းများနှင့် စက်ရုံအလုပ်သမားများအားလုံး သိရှိနားလည်ပြီး စာရွက်စာတမ်းဖြင့်ထုတ်ကာ ကြေငြာထားသင့်ပါသည်။
- အရေးပေါ်ကယ်ဆယ်ရေး muster points များ၏ တည်နေရာများကို သတ်မှတ်ထားခြင်း။
- အချက်ပြစနစ်နှင့် မီးငြိမ်းသတ်ကိရိယာများ ထောက်ပံ့ထားခြင်း။
- First aid ကိရိယာများ ထောက်ပံ့ထားခြင်း။
- မတော်တဆဖြစ်ရပ်များ (သို့မဟုတ်) အရေးပေါ် အခြေအနေတွင် ထိရောက်ပြီး အကျိုးရှိသော ဆောင်ရွက်မှုများဖြင့် လူအသက်၊ ပတ်ဝန်းကျင်၊ ပိုင်ဆိုင်မှုနှင့် စီးပွားရေးလုပ်ငန်းများအပေါ် ထိခိုက်နိုင်မှုများကို လက်တွေ့ကျကျ လျော့ချခြင်း။
- ကောင်းမွန်သော ဆက်သွယ်ရေးစနစ်ဖြင့် အရေးအပေါ်အခြေအနေများတွင် လုံလောက်သော သတင်းအချက်အလက်များကို ရရှိစေခြင်း။
- ထိရောက်ပြီး အကျိုးရှိသော တုန့်ပြန်မှုဖြင့် ထိရောက်သော အရေးပေါ် စီမံခန့်ခွဲမှုကို သေချာစေခြင်း။
- ဆက်သွယ်ဆောင်ရွက်ရန်အတွက် ဖော်ပြထားသော လမ်းစဉ်များကို ဆောင်ရွက်ရန် အစိုးရအာဏာပိုင်များ၊ မီဒီယာများနှင့် အခြားသက်ဆိုင်သူများအား သတ်မှတ်ထားခြင်း။

စက်ရုံတွင် ဖြစ်နိုင်ခြေရှိသော အရေးပေါ်ကိစ္စများမှာ-

- မီး/ ပေါက်ကွဲခြင်း
- အရေးပေါ်ဆေးကုသခြင်း
- ဓါတုပစ္စည်းများနှင့်ထိတွေ့ခြင်းအတွက်အရေးပေါ်တုန့်ပြန်မှုအစီအစဉ်

အရေးပေါ်တုန့်ပြန်ရေးအစီအစဉ်များကို ကောင်းမွန်စွာ ဆက်သွယ်ဆောင်ရွက်နိုင်ရန် အရေးပေါ်အဖွဲ့ဖွဲ့စည်းဆောင်ရွက်မည်ဖြစ်ပြီး စက်ရုံတွင် သက်ဆိုင်ရာသင်တန်းများကို ပေးပို့ဆောင်ရွက်သွားမည်ဖြစ်ပါသည်။

လုပ်ငန်းစဉ်အား ပြင်ဆင်ဆောင်ရွက်ခြင်းမပြုမီ အရေးပေါ်အဖြစ်အပျက်များ ဖြစ်ပွားနိုင်မှုနှင့် ဖြစ်ပွားပါက ပြင်းထန်အားနှင့် ပျက်စီးဆုံးရှုံးမှုများကို တွက်ချက်ရန်အတွက် ဘေးအန္တရာယ်အကဲဖြတ်ခြင်းကို ဆောင်ရွက်ပါမည်။

အစီရင်ခံစာတွင် စောင့်ကြည့်စစ်ဆေးရေး အစီအစဉ်များ အကောင်အထည်ဖော်ခြင်းနှင့် အရေးပေါ်တုန့်ပြန်မှု ပုံစံများကို စုဆောင်းထားပြီး စက်ရုံရှိ သက်ဆိုင်ရာ တာဝန်ရှိပုဂ္ဂိုလ်ထံ တင်ပြရပါသည်။ ထို့အပြင် အဓိကကျသော ဖြစ်ပွားမှုများကို သက်ဆိုင်ရာ အုပ်ချုပ်မှု အဖွဲ့အစည်းများထံ တင်ပြရပါမည်။

EMP၊ စောင့်ကြည့်စစ်ဆေးရေး အစီအစဉ်များနှင့် သက်ဆိုင်ရာဥပဒေများ အပါအဝင် ပတ်ဝန်းကျင်ဆိုင်ရာ ဖိုင်တွဲကို စာရွက်စာတမ်းဖြင့် ထုတ်ထားပြီး EMP ပါအချက်များကို လိုက်နာဆောင်ရွက်ရပါမည်။ ပတ်ဝန်းကျင် ဘေးကင်းလုံခြုံစေရန် HSE စည်းမျဉ်းစည်းကမ်းများကို အလုပ်နေရာတွင် ထားရှိပါမည်။

ထိရောက်သော စွမ်းရည်တိုးမြှင့်ခြင်း၊ သင့်တော်သော သင်တန်းများနှင့် နည်းပညာအထောက်အပံ့များသည် စက်ရုံ၏ EMP အောင်မြင်စေရန် အထောက်အကူပြုပါသည်။

ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် (EMP) ကနဦးအကောင်အထည်ဖော်ဆောင်ရွက်ခြင်းအတွက် ခန့်မှန်းခြေ ကုန်ကျစရိတ်ကို ကနဦးအခြေခံဖော်ပြချက်တွင် သတ်မှတ်ဖော်ပြသွားပါမည်။ စက်ရုံသည် ၎င်းကုန်ကျစရိတ်များနှင့် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် (EMP) ဆောင်ရွက်မှုအတွက် နှစ်စဉ်ကုန်ကျစရိတ်များကို ပြန်လည်စီစစ်သွားပါမည်။

၁.၁၃ လူထုတွေ့ဆုံဆွေးနွေးခြင်းနှင့် အများပြည်သူအား ထုတ်ဖော်ပြောကြားခြင်း

လူထုတွေ့ဆုံဆွေးနွေးပွဲဆောင်ရွက်ရခြင်း၏ ရည်ရွယ်ချက်မှာ စီမံကိန်းသတင်းအချက်အလက်များနှင့် စီမံခန့်ခွဲမှု အစီအစဉ်များကို စီမံကိန်းအနီးရှိ နေထိုင်သူများနှင့် သက်ဆိုင်သူများအား ထုတ်ဖော်ပြောကြားရန်ဖြစ်ပြီး ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း (IEE) အစီရင်ခံစာတွင် ၎င်းတို့၏ သဘောထားနှင့် အမြင်များကို သိရှိရန် ဖြစ်ပါသည်။ လူထုတွေ့ဆုံဆွေးနွေးခြင်းအသေးစိတ်ကို သက်ဆိုင်ရာအခန်းများတွင် အသေးစိတ် ဖော်ပြထားပါသည်။

အိမ်အရောက် လူထုသဘောထားအမြင် မေးခွန်းများကောက်ယူမှုကို ရွှေပေါက်ကန်မြို့နယ်တွင် ဆောင်ရွက်ခဲ့ပါသည်။ ရွှေပေါက်ကန်မြို့နယ်သည် ရန်ကုန်စက်မှုဇုန်ရှိ အဆိုပြုစက်ရုံနှင့် အနီးဆုံးဖြစ်ပြီး အဆိုပြုစက်ရုံတည်ရှိမှုကြောင့် သက်ရောက်နိုင်ခြေရှိသော ပတ်ဝန်းကျင်နှင့် လူမှုရေးဆိုင်ရာသက်ရောက်မှုများကို သိရှိနိုင်ရန် ရည်ရွယ် ဆောင်ရွက်ပါသည်။

၁.၁၃.၁ လူမှုစီးပွားစစ်တမ်းကောက်ယူခြင်း

စီမံကိန်းဇရိယာ (PAUs) နှင့် စီမံကိန်းကြောင့်ထိခိုက်ခံစားရသူများ (PAPs) များကို ၎င်းတို့၏ နေထိုင်မှု၊ ဝင်ငွေ၊ ပို့ဆောင်ဆက်သွယ်ရေး၊ ကျန်းမာရေးအခြေအနေများကို အရေအတွက်နှင့် အရည်အသွေးဆိုင်ရာများအတွက်ပါ ပြင်ဆင်ထားသော မေးခွန်းများဖြင့် စစ်တမ်းကောက်ယူရရှိခဲ့ပါသည်။

စစ်တမ်းကောက်ယူခြင်း၏ရည်ရွယ်ချက်မှာ သတင်းအချက်အလက်ဖြန့်ဖြူးခြင်းအားဖြင့် စီမံကိန်းအကြောင်း လူထုကပိုမိုနားလည်သိရှိစေရန်နှင့် စီမံကိန်းဆောင်ရွက်ချက်များကြောင့် တိုက်ရိုက်ဖြစ်စေ၊

သွယ်ဝိုက်၍ဖြစ်စေ ဖြစ်နိုင်ချေရှိသည့် သက်ရောက်မှုများကို စီမံကိန်းဆောင်ရွက်သူများနှင့် လူထုအကြား ဖလှယ်ရန် ဖြစ်သည်။

ဤအနှစ်ချုပ်သည် လူမှုပတ်ဝန်းကျင် သက်ရောက်မှု အကဲဖြတ်ခြင်းကို ထည့်သွင်းဆွေးနွေးမည်ဖြစ်ပြီး အခြေခံကျသည့် ကဏ္ဍလေးရပ်ပါဝင်မည် ဖြစ်သည်။

- လူမှုပတ်ဝန်းကျင် သက်ရောက်မှု အကဲဖြတ်ခြင်းပညာ၏ သွင်ပြင်လက္ခဏာကို ဖော်ဆောင်ခြင်း။
- လူထုတွေ့ဆုံဆွေးနွေးခြင်းများ။
- လူမှု အဖွဲ့အစည်း အသိုးသီးရှိ အဓိကသက်ဆိုင်သူများ (ရပ်ကွက်အုပ်ချုပ်ရေးမှူးနှင့် ဆရာမ၊ အစရှိသဖြင့်) နှင့် အစိုးရ အရာရှိများနှင့် မေးမြန်းဆွေးနွေးခြင်း။
- အိမ်ထောင်စု ၁၀၀ ၏ လူမှုစီးပွားနှင့် သဘောထားအမြင် စစ်တမ်းကောက်ယူခြင်း။

ဒေသတွင်း လူဦးရေနှင့်ပက်သက်၍ ရွှေပေါက်ကန်မြို့နယ်အနီးတွင် နေထိုင်သောလူဦးရေသည် တိုးလျက်ရှိပါသည်။ စစ်တမ်းကောက်ယူမှုအရ အများစုမှာ ၃၀-၄၀ နှစ်ကြားရှိသော လူဦးရေဖြစ်ပြီး (၂၆%)ရှိကာ ၄၀-၅၀နှစ်ကြားရှိလူဦးရေ ၂၁%၊ ၅၀-၆၀ နှစ်နှင့် ၆၀-၇၀ ကြားရှိလူဦးရေ ၁၈%၊ ၇၀ နှစ်အထက်ရှိလူဦးရေ ၅%နှင့် အနည်းဆုံးမှာ ၁၅-၂၀ နှစ်ကြားရှိလူဦးရေဖြစ်ပြီး ၁%သာ ရှိပါသည်။ ၄င်းတို့ထဲတွင် ၁၆% သည် ဝင်ငွေရရှိရန်အတွက် အလုပ်လုပ်ကိုင်နေသောသူများ ဖြစ်ကြပါသည်။ နှစ်စဉ်ဝင်ငွေရရှိမှုနှင့်ပတ်သက်၍ ရရှိသည့်ငွေပမာဏအများစုမှာ ၂၀၀၀၀၀၀ နှင့် ၃၀၀၀၀၀၀ ကျပ်ကြားဖြစ်ပြီး ၃၈% ခန့်ရှိပါသည်။

ပညာရေးနှင့် ပက်သက်၍ ဤရပ်ကွက်အတွင်းနှင့် ရပ်ကွက်အနီးအနားတွင် စာသင်ကျောင်းများရှိသည်ကို တွေ့ရသည်။ ဖြေဆိုသူ ၅၀%မှာ အလယ်တန်းနှင့် အထက်တန်းအဆင့်ပြီးဆုံးပြီးသူများ ဖြစ်ကြပါသည်။ ၄င်းတို့မှရရှိသော သတင်းအချက်အလက်များအရ လူထု၏ ၃၄%သည် တီဘီရောဂါ၊ နှလုံးရောဂါ၊ သွေးတိုးနှင့် နာတာရှည်ဖျားနာခြင်းကဲ့သို့သော ကျန်းမာရေးဆိုင်ရာပြဿနာများ မရှိသည်ကို တွေ့ရပါသည်။

စစ်တမ်းကောက်ယူမှုအရ စုစုပေါင်း အိမ်ထောင်စု၏ ၄၀%သည် ကိုယ်ပိုင်မြေများရှိကြပြီး ၆၀% သည် အိမ်ငှားနေထိုင်သူများ ဖြစ်ကြပါသည်။

Lluvia confectionery စက်ရုံအပေါ် လူထု၏ သိရှိနားလည်မှုနှင့် ပတ်သက်၍ စုစုပေါင်းအိမ်ထောင်စု၏ ၅%သာ စက်ရုံအကြောင်းကို အုပ်ချုပ်ရေးမှူးနှင့် မိတ်ဆွေများထံမှ သိရှိကြပါသည်။

အဆိုပြု confectionery စက်ရုံဖွဲ့ဖြိုးမှုနှင့်ပတ်သက်၍ ဖြေဆိုသူစုစုပေါင်း၏ ၅၂% သည် စက်ရုံတည်ရှိမှုကြောင့် လူထုကိုသက်ရောက်မှုမရှိဟုဖြေကြားခဲ့ပြီး၊ ၆% သည် လူထုအတွက်စက်ရုံ၏ အရေးပါမှုကို မသိရှိကြပါ။ ဒေသခံများ၏ ၃၈%သည် စက်ရုံသည် အရေးကြီးသည်ဟုဖြေကြားကာ ၁%သည် စက်ရုံဖွဲ့ဖြိုးမှုသည် အလွန်အရေးကြီးသည်ဟုဖြေကြားခဲ့ပါသည်။ သို့သော်လည်း အခြား၁%သည် စက်ရုံဖွဲ့ဖြိုးမှုသည် အရေးမကြီးဟု ဖြေကြားခဲ့ပါသည်။

စုစုပေါင်းအိမ်ထောင်စုများတွင် ဖြေဆိုသူများ၏ ၂၃% သည် စက်ရုံကြောင့် ပတ်ဝန်းကျင်အပေါ် ကောင်းကျိုးသက်ရောက်မှု ရှိနိုင်သည်ဟု ဖြေကြားခဲ့ပါသည်။ သို့သော်လည်း အိမ်ထောင်စု ၃၃%သည် အချို့ဆိုးကျိုးသက်ရောက်မှုများ ရှိနိုင်သည်ဟုလည်း ဖြေကြားခဲ့ပါသည်။ ဖြေဆိုသူ ၄၄% သည် ပတ်ဝန်းကျင်အပေါ်တွင် ဆိုးကျိုးသက်ရောက်မှုရော ကောင်းကျိုးသက်ရောက်မှုပါ မရှိနိုင်ဟု ဖြေကြားခဲ့ပါသည်။

တွေ့ရှိချက်များအရ လူထုသဘောထားအမြင်များနှင့်ပတ်သက်၍ Lluvia confectionery စက်ရုံအပါအဝင် စက်မှုဇုန်အတွင်း ဆောင်ရွက်မှုလုပ်ငန်းများကြောင့် လူမှုစီးပွားရေးအပေါ် သက်ရောက်နိုင်ခြေရှိသော ကောင်းကျိုး၊ ဆိုးကျိုးနှစ်ခုလုံး မရှိဟု ပေါ်လွင်နေပါသည်။ အသေးစိတ်ဆွေးနွေးခြင်းနှင့် ရလဒ်များကို ဤအစီရင်ခံစာ၏ စာကိုယ်တွင် ဖော်ပြထားပါသည်။

အချုပ်အားဖြင့် ဤအစီရင်ခံစာသည် မြန်မာနိုင်ငံပတ်ဝန်းကျင်ဆိုင်ရာ နည်းဥပဒေများ၊ စည်းမျဉ်းစည်းကမ်းများ၊ ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှုအစီအစဉ်၊ လျော့ချရေးနည်းလမ်းများနှင့် စောင့်ကြည့်စစ်ဆေးမှုလုပ်ငန်းစဉ်များနှင့် အညီဆောင်ရွက်ကာ အလုပ်သမားများကို လုပ်ငန်းခွင်အန္တရာယ်များမှ ကင်းလွတ်စေပြီး ရေရှည်တည်တံ့သော အစိမ်းရောင်ဖွံ့ဖြိုးတိုးတက်မှုကို ထိန်းသိမ်းနိုင်ရန်အတွက် Lluvia confectionery စက်ရုံလုပ်ငန်း ဆောင်ရွက်သူများကို လမ်းညွှန်ချက်နှင့် မူဘောင်များကို ချမှတ်ပေးပါသည်။

၁.၁၃.၂ လူထုတွေ့ဆုံပွဲကျင်းပခြင်း

Lluvia Limited (Confectionary Factory) နှင့် EQM တို့သည် ECD အကြံပြုချက်အတိုင်း စီမံကိန်း၏ AOI အတွင်း ရပ်ကွက် ၃ ခုမှ ပြည်သူများ၊ ဇုန်ကော်မတီ ကိုယ်စားလှယ်နှင့် မင်္ဂလာဒုံမြို့နယ်ရှိ၊ အစိုးရနှင့် ဒေသဆိုင်ရာ တာဝန်ရှိ သူများနှင့် လူထုညှိနှိုင်းအစည်းအဝေးများကို ပြုလုပ်ခဲ့ပါသည်။

လူထုတွေ့ဆုံပွဲအခမ်းအနားကို ၂၀၁၈ ခုနှစ်၊ ဩဂုတ်လ ၂၄ ရက်နေ့တွင် ကျင်းပခဲ့ပါသည်။

Lluvia Limited (Confectionary Factory) နှင့် EQM တို့မှ ဆောင်ရွက်လျက်ရှိသည့် စီမံကိန်းနှင့်ပတ်သက်သော လုပ်ဆောင်မှုများကို အဓိကပါဝင်ပတ်သက်သူများ သိရှိနားလည်ကြောင်း သေချာစေရန်နှင့် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း နှင့် ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှုအစီအစဉ်၏ တစ်စိတ်တစ်ပိုင်းအဖြစ် ထည့်သွင်းစဉ်းစားမည်ဖြစ်ပါသည်။

ဆွေးနွေးပွဲသို့ တက်ရောက်သော သက်ဆိုင်ရာ ကာယကံရှင်များသည် အောက်ဖော်ပြပါဇယားတွင် အသေးစိတ်ဖော် ပြထားသည့်အတိုင်း လူထုတွေ့ဆုံဆွေးနွေးညှိနှိုင်းအစည်းအဝေးများအတွင်း အောက်ပါစိုးရိမ်မှုများနှင့် မေးခွန်းများကို မေးမြန်းခဲ့ကြပါသည်။ အစည်းအဝေးမှတ်တမ်းများကို နောက်ဆက်တွဲ VI တွင် ထည့်သွင်းထားသည်။

ဇယား (X)လူထုတွေ့ဆုံဆွေးနွေးပွဲ၏ လူထုမှ မေးမြန်းချက်အပေါ် ပြန်လည်ဖြေကြားခြင်းနှင့် လုပ်ငန်းဆောင်ရွက်ချက်များ

အဓိက မေးခွန်း/စိုးရိမ်မှုများ	ပြန်လည်ဖြေကြားခြင်း	လျော့ပါးသက်သာစေရေး ဆောင်ရွက်ချက်များ
Liquefied Petroleum Gas (LPG) နှင့် ပတ်သက်၍ စက်ရုံအနေဖြင့် လုံခြုံရေးနှင့် မီးဘေးကာကွယ်ရေး ဖြစ်စဉ်များအား မည်ကဲ့သို့ ဆောင်ရွက်ထား ပါသနည်း။	Liquefied Petroleum Gas (LPG) သည် clean fuel ဖြစ်ပြီး ရေနှီဆီ၊ ဒီဇယ်ဆီများထက် ဘေးထွက်ဆိုးကျိုးနည်းပါသည်၊ သို့သော် LPG တွင် high flash point- အရည်အဖြစ်မှ အငွေ့အဖြစ်သို့ ပြောင်းလဲရန် လိုအပ်သော အနိမ့်ဆုံးအပူချိန် ရှိ၍ အထူးဂရုတစိုက် ကိုင်တွယ်ဖြေရှင်း ရန်လိုအပ်ပါသည်။	
Material Safety Data Sheet (MSDS) နှင့် ပတ်သက်၍ အင်္ဂလိပ်ဘာသာဖြင့် ပြန်ဆိုထားပါသဖြင့် စက်ရုံဝန်ထမ်းများ အလွယ်တကူသိရှိနိုင်ပါသလား။	စက်ရုံအတွင်း ဓာတုပစ္စည်းများ သိုလှောင် ထားသည့် နေရာများ၊ စက်ရုံဝန်ထမ်းများ အလွယ်တကူမြင်နိုင်သည့် နေရာများတွင် MSDS များကို ထားရှိပါသည်၊ ထို့ပြင် ဓာတုပစ္စည်းများနှင့် သက်ဆိုင်သည့် အချက်အလက်များကိုလည်း အရေးပေါ်တုန့်ပြန်သည့် အစီအစဉ်တွင် မြန်မာလို ပြန်ဆို၍ ဖော်ပြထားပါသည်။	
စီမံကိန်း အဆိုပြုသူသည် Liquefied Petroleum Gas (LPG) နှင့် ပတ်သက်သည့် IFC guidelines များအတိုင်း လိုက်နာကျင့်သုံးသင့်ပါသည်၊ ထို့ပြင် စီမံကိန်း အဆိုပြုသူသည် လိုက်နာဆောင်ရွက်ပါမည် ဆိုသည့်ကတိကဝတ်အား ထည့်သွင်းဖော်ပြသင့်ကြောင်းနှင့် သက်ဆိုင်သည့် အစိုးရဌာနမှ လိုက်နာဆောင်ရွက်မှု ရှိ/မရှိ စစ်ဆေးဆောင်ရွက်သင့်ပါသည်။	လျော့ပါးသက်သာစေသည့် နည်းလမ်းများ– Mitigation measures ကို စီမံကိန်းအဆိုပြုသူမှ တကယ့်လက်တွေ့လိုက်နာဆောင်ရွက်မည့် နည်းလမ်းများကို အဓိကရွေးချယ်ပြီး ရေးဆွဲတင်ပြသွားပါမည်။	

အဓိက မေးခွန်း/စိုးရိမ်မှုများ	ပြန်လည်ဖြေကြားခြင်း	လျော့ပါးသက်သာစေရေး ဆောင်ရွက်ချက်များ
စက်ရုံအနေဖြင့် စွန့်ပစ်ရေစီမံခန့်ခွဲမှုနှင့် ပတ်သက်၍ မည်သို့ဆောင်ရွက်ထားပါသနည်း။	စက်ရုံသည် မုန့်မျိုးစုံထုတ်လုပ်သည့် လုပ်ငန်းဖြစ်သည့်အတွက် ဓာတုပစ္စည်း အသုံးပြု၍ ရေဆိုးစွန့်ထုတ်သည့် စက်ရုံမဟုတ်ပါကြောင်းနှင့် စက်ရုံမှထွက်ရှိသည့် အိမ်သုံးရေဆိုးသာ ထွက်ရှိပါသည်။	
စက်ရုံအနေဖြင့် အရေးပေါ်ပြဿနာများ အလွယ်တကူဖြစ်နိုင်ပြီး သဘာဝဘေး အန္တရာယ်များ၊ လူများနှင့် စက်ကိရိယာများကြောင့် ပတ်ဝန်းကျင်ပေါ် ထိခိုက်နိုင်မှုများအား မည်သို့ စီစဉ်ဆောင် ရွက်ထားပါသနည်း။	စက်ရုံသည် ၂၀၁၅၊ ပတ်ဝန်းကျင်ထိခိုက်ဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ငန်းစဉ်များအတိုင်း အစီရင်ခံစာ၏ အခန်း (၉)တွင် အရေးပေါ်ပြဿနာများအား စီမံခန့်ခွဲသည့် နည်းလမ်းများအား အသေးစိတ်ထည့်သွင်း ဖော်ပြသွားမည်ဖြစ်ပါသည်။	
စက်ရုံအနေဖြင့် စွန့်ပစ်အမှိုက်နှင့် စွန့်ပစ်ရေဆိုးများ၏ သက်ရောက်မှုများအား စနစ်တကျကောက်ယူ၍ စီစဉ်ဆောင်ရွက်ထားပြီး ရလာဒ်များအား မည့်သည့်နည်းလမ်းများနှင့် နှိုင်းယှဉ်၍ အသုံးပြုပါသလဲ။	စက်ရုံသည် မုန့်မျိုးစုံထွက်ရှိသည့် လုပ်ငန်းဖြစ်သည့်အတွက် (NEQG-2015) တွင် မုန့်မျိုးစုံထွက်ရှိသည့် လုပ်ငန်းများတွင် အသုံးပြုနိုင်သည့် နှိုင်းယှဉ်တန်ဖိုးများအတိုင်း စွန့်ပစ်အမှိုက်နှင့် စွန့်ပစ်ရေဆိုးများအား ဆောင်ရွက်သွားပါမည်။	

၁.၁၃.၃ ထုတ်ဖော်ခြင်း။

လူထုတွေ့ဆုံပွဲ အစည်းအဝေးအပြီးတွင် ပါဝင်သူများ၏ မှတ်ချက်များ၊ စိုးရိမ်မှုများအပေါ် Lluvia Limited (Confectionary Factory) ၏ လုပ်ဆောင်ချက်များကို သိရှိစေရန် အစိုးရအရာရှိများ၊ ဒုန်ကော်မတီနှင့် အခြားသက်ဆိုင်ရာ သက်ဆိုင်သူများထံ ဒေသခံရပ်ရွာ စေတနာ့ဝန်ထမ်းများ၊ ကျေးရွာဖွံ့ဖြိုးတိုးတက်ရေးအသင်း (VDA) ကော်မတီ၊ ဒုန်ကော်မတီတစ်ခုမှ စေတနာ့ဝန်ထမ်း၊ တယ်လီဖုန်းဆက်သွယ်မှုနှင့်

ပတ်ဝန်းကျင်ထိခိုက်မှု အကဲဖြတ်မှုမှ တစ်ဆင့် သတင်းအချက်အလက်များ ဖြန့်ဝေပေးခြင်း တို့ကိုဆောင်ရွက်ခဲ့ပါသည်။

Chapter (1)
Executive Summary

1. Executive summary (Lluvia confectionary factory)

1.1 Introduction

The Lluvia confectionary factory is being owned by the Lluvia Limited which is a joint venture between ***Diamond Star Co., Ltd. and MC Food Holding Asia***. It is situated at No. (137-139, 155-170), in the Yangon Industrial Zone, North Okkalapa Township, Yangon. The Initial Environmental Examination (IEE) along with the Environmental Management Plan (EMP) was conducted for the Lluvia confectionary factory.

The contact details of the project proponent are as follows:

- Company name – Lluvia Limited (MC Food Holdings Asia Pte Ltd and Diamond Star Co., Ltd)
- Investor name - U Ko Ko Gyi (a) U Soe Naing
- Type of Business – confectionary and distribution
- Investment location -No. 108(A0 and 108 (B), Quarter(3), Hlaing Thar Yar Industrial Zone, Hlaing Thar Yar Township, Yangon, Myanmar.
- Telephone -09 977873613

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 Yangon 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).

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) Confectionary 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

The consultant team of ***Environmental Quality Management Co., Ltd (EQM)*** had carried out IEE together with EMP for the factory.
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 Natural Resource and Environmental Conservation to conduct the IEE and EMP.	15th, February, 2017

1.2 Objective

a) **Literature review**: Documentation on the existing and relevant policies, laws, regulations and guidelines related to environmental assessment process and management, confectionary factory along with LPG related information, waste management, land use etc. at the national level as well as the international level have been done.

b) **Interviews**: The consulting team has interviewed the respective personnel from the proposed factory.

c) **Data collection**: Through site visit, required qualitative and quantitative data have been collected

d) **Stakeholder consultation**: the consultants conducted stakeholder meetings and door to door household questionnaire surveys on the neighboring communities, to find out their perception on this project

e) **Environmental baseline monitoring** on air, water, soil and solid waste and wastewater

f) **Environmental impacts assessment along with the mitigation measures on the issues including** air, noise, visual, potable water, waste water, waste etc.

g) **Environmental Management plan** on the environment likely affected by the project activities was developed accordingly :

h) **Reporting:** the data and information collected were organized and compiled in a report.

1.3 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 WHO guidelines, USEPA, 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)
- The Myanmar Investment Law (2016); Amendment (2019)
- Myanmar Environmental Conservation Law (2012);
- Environmental Conservation Rules (2014);
- Environmental Impact Assessment Procedure (2015); Amendment (2019)
- National Environmental Quality (Emission) Guideline (2015).
- Draft Guideline on Public Participation in Myanmar's EIA Processes (2017);

- Project-Relevant Laws including a number of other laws exists which, either directly or indirectly, relate to environmental and social management of the project
- Employment and Skill Development Law, 2013
- The Prevention and Control of Communicable Disease Law, 1995
- Yangon City Development Committee Law (2018)
- Occupational Safety and Health Law, 2019
- The Copyright Law (2019)
- The Protection and Preservation of Cultural Heritage Regions Law, 2019
- Trademark Law (2019)
- The Industrial Design Law (2019)
- The Consumer Protection Law, 2014
- The Boundary Demarcation and Survey Law (2019)
- Tax Administration Law (2019)
- Union Taxation Law 2023
- The Registration Act (2018)
- The New Plant Variety Protection Law (2019)
- The Land Acquisition, Resettlement and Rehabilitation Law (2019)

1.3.1 Surrounding area of the proposed project

In terms of the nearby factories and locations, Tiger Supply Co.,Ltd, Trade One Asia International Co.,Ltd, Myanmar Awba Group and APT warehouse are located in the south of the proposed factory. MPG Mahar Paramount Group, Asia Caps Co.,Ltd, MEBS International,Znp warehouse, Armo warehouse,Smile World Garment, Sawbwa VT Limited,Nobel Garment Industry Limited and Classic Electrical & Engineering Co.,Ltd are located in the west of the proposed factory. SC Auto Myanmar Co.,Ltd, MCB Company, Myanmar Consumer Beverage, Crown Beverage Cans Myanmar, Designer water, MFA Service Center, Thinzar Kyaw Production Co.,Ltd, MDHG Group of companies, Yathar Cho Industry Co.,Ltd, Pandora Trading Co.,Ltd warehouse, Asia Pacific Beverages Myanmar Co.,Ltd,MDG warehouse YIP, Shwe Aung Naing Industrial. Co.,Ltd and LUDU Building Materials Co. (ZKB Warehouse) are located in the north of the proposed factory. Chan Yin Industries and Daung Nyi Naung Tile factory are located in the east of the proposed factory.

1.4 Project description and alternatives selection

Location: at No. (137-139, 155-170), Yangon Industrial Zone, North Okkalapa Township, Yangon

MC Food Holding Asia Pte Ltd and Diamond Star Co., Ltd will invest 8,352,670 USD for the buildings construction, 1,017,931 USD for the raw materials, 10,000,000 USD for the machines installation and 1,800,000 as a working capital. The total investment amount is 21,170,601 USD.

1.4.1 Current use of the location

The main part of the project of the confectionary factory is being occupied by the production and storage buildings, main office, LPG, parking yard, canteen, warehouse and open spaces.

1.4.2 The sheeting and cutting method of the proposed factory

The sheeting and cutting method are fundamental process in the production of biscuits, crackers, sandwiches, and cookies in a factory setting. The following are the process of sheeting and cutting methods.

1. **Dough Preparation**: The process begins with the preparation of the dough. Ingredients such as flour, sugar, fat, water, and other additives are mixed together to form a dough of the desired consistency and flavor.
2. **Sheeting**: The dough is then fed into a sheeter, which is a machine that rolls the dough into a thin,

flat sheet of the desired thickness. The sheeting process helps to distribute the ingredients evenly and ensure uniform baking.

3. **Cutting**: After sheeting, the dough sheet is passed through a cutting machine. This machine is equipped with cutting blades or molds that cut the dough into individual shapes, such as rounds, squares, rectangles, or other shapes, depending on the product being made.
4. **Baking**: The cut dough pieces are then placed on baking trays and transferred to an oven for baking. The baking process varies depending on the type of product but generally involves baking at a specific temperature for a set amount of time until the products are golden brown and fully baked.
5. **Cooling and Packaging**: After baking, the products are allowed to cool on wire racks. Once cooled, they are inspected for quality and then packaged into boxes, packets, or trays for distribution and sale.

This method is efficient and allows for the mass production of biscuits, crackers, sandwiches, and cookies with consistent quality and appearance.

1.4.3 The rotary moulding method of the proposed factory

The rotary moulding method is another common technique used in the production of biscuits, crackers, sandwiches, and cookies in a factory setting. The following are the steps of rotary moulding methods,

1. **Dough Preparation**: Similar to the sheeting and cutting method, the process begins with the preparation of the dough. Ingredients are mixed together to form a dough of the desired consistency and flavor.
2. **Moulding**: In the rotary moulding method, the dough is fed into a hopper that deposits it into a rotating drum or moulding machine. The drum is typically engraved with the desired biscuit or cookie pattern. As the drum rotates, the dough is pressed against the engraved pattern, shaping it into the desired form.
3. **Cutting**: After moulding, the dough is cut into individual pieces by a cutting mechanism. This can be a separate cutting machine or part of the rotary moulding machine itself. The cutting process separates the individual biscuits, crackers, sandwiches, or cookies from the continuous dough sheet.
4. **Baking**: The cut dough pieces are then placed on baking trays and transferred to an oven for baking. The baking process varies depending on the type of product but generally involves baking at a specific temperature for a set amount of time until the products are golden brown and fully baked.
5. **Cooling and Packaging**: After baking, the products are allowed to cool on wire racks. Once cooled, they are inspected for quality and then packaged into boxes, packets, or trays for distribution and sale.

The rotary moulding method is efficient and allows for the production of biscuits, crackers, sandwiches, and cookies with intricate designs and shapes. It is often used for products that require a specific shape or design that cannot be easily achieved with the sheeting and cutting method.

1.4.4 The general process of biscuit manufacturing

1. **Mixing**: Ingredients like flour, sugar, and fat are mixed together with water to form a dough.
2. **Moulding**: The dough is shaped into biscuits using molds or machines.
3. **Baking**: The biscuits are baked in ovens at high temperatures until they are fully cooked.
4. **Cooling**: Once baked, the biscuits are cooled down to room temperature.
5. **Packaging**: Finally, the biscuits are packaged and prepared for distribution to stores.

1.4.5 The general process of cracker manufacturing

1. **Mixing**: Ingredients like flour, water, fat, and seasoning are mixed together to make a dough.
2. **Forming**: The dough is rolled into thin sheets.
3. **Cutting**: The sheets are cut into cracker shapes.

4. **Baking**: The crackers are baked in an oven to make them crisp.
5. **Oil spray**: In the cracker manufacturing process, oil spray is used as a final step to enhance the flavor, appearance, and texture of the crackers.
6. **Cooling**: Once baked, the crackers are cooled down.
7. **Packaging**: The cooled crackers are then packaged and prepared for sale.

1.4.6 The general process of Sandwich manufacturing

1. **Ingredient Preparation**: Gather all the ingredients needed for the sandwich, such as bread, meat, cheese, vegetables, and condiments.
2. **Filling preparation**: Place the bread slices on a work surface and add the desired fillings on top, such as meat, cheese, and vegetables.
3. **Cutting**: Cut the assembled sandwich into halves, quarters, or other desired shapes.
4. **Packaging**: Place the cut sandwiches into individual packaging, such as plastic wrap or containers, ready for sale or distribution.

1.4.7 The general process of Cookie manufacturing

1. **Ingredient Preparation**: Gather all the ingredients needed for the cookies, such as flour, sugar, butter, eggs, and flavorings.
2. **Mixing**: Mix the ingredients together to form a cookie dough.
3. **Shaping**: Shape the cookie dough into individual cookies, either by hand or using cookie cutters.
4. **Baking**: Bake the cookies in an oven until they are golden brown.
5. **Cooling**: Allow the cookies to cool down to room temperature.
6. **Packaging**: Package the cookies in boxes or bags, ready for sale or distribution.

1.4.8 Operation phase

(a) Electricity and fuel requirement

The Lluvia confectionary factory will use Liquefied Petroleum Gas (LPG) and generators for the electricity. In case of main's power failure, these generators will run and supply power to the emergency loads. The factory will use the national gird line after the first two years of operation. The total power required for the proposed unit is 332,800 kW/ month (3,993,600kWh/year). The fuel requirement is also about 84,240 liter/ month (1,010,880 liter/year).

(b) Water requirement

The main sources of water for the operation phase are tube wells and public supply through water pipelines. There are two water storage tanks (6,400 gallons and 32,000 gallons) in the project site. For drinking water, purified drinking water bottles will be used. The water requirement for the confectionery operation phase is about 416.67 m3 per month (91,642.89 gallons/month). The total water requirement for the whole year is about 5,000 m3 (1,099,705 gallons/year). The two tube wells are 555 feet depth each and capacity is about 1,000 gallons per hour.

(c) Workforce requirement and staff categories

There are four departments including production, engineering, quality control and warehouse in the operation process. The five sections namely, mixing, forming, baking, packing and cream room, are combined as a production department that will be assigned with 156 workers. The engineering department will assign 10 numbers of staffs and 7 staffs will be assigned as a quality control and 9 staffs will assign in a warehouse department. The total workforce requirement in the operation stage is 182 staff. The required resources of the project are shown in the following table (1-1)

Table 1.1 Human resources assignment for the propose project

Sr.No	Department/Section	Requirement Manpower
A	Production	2
	1)Mixing	14
	2)Forming	4
	3)Baking	5
	4)Packing	123
	5)Cream Room	8
B	Engineering	10
C	Quality Control	7
D	Warehouse	9
Total		**182**

(d) Waste management

The Lluvia confectionary factory will be installed wastewater treatment system in the project site. Solid wastes that can be produced in the operation process are Burnt Biscuits, Carton Boxes, Kraft Paper, Wooden Packing Material, Poly Bags etc. The waste bins will be placed in the suitable area. After collecting the wastes, YCDC will be disposed to the dump sites.

(i) Solid Waste

Both domestic and industrial solid wastes were examined by 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 the labour camp is 3kg/day which is approximately 0.9tonnes per year. Thus, the waste generation per capital per day is (0.06) kg per person per day based on total population nearly 400 totals from two shift staff. 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.

Estimated industrial waste generation from the Lluvia Confectionary factory is 350 kg per day which is proximately 108.5tonnes per year, some of them will be sent to the waste recycler. Some of them will be disposed in collection system from the Municipal.

Physical composition analysis of solid waste in Lluvia confectionary factory was carried out randomly. Individual component was categorized into 10 categories: food waste (84%), and others wastes are less than 16% of the total domestic waste including yard waste (3%), plastic (7%), paper (1%), leather/textile/rubber (LTR) (1%), glass (2%), metal (1%) and aluminum (can), hazardous waste (medicine, dry batteries, and household electronic and electronic device waste), sanitary napkins, and others.

In terms of industrial solid waste, the five main types of waste including wood, concrete, metal, brick and others were found out during the survey. As the result of weight basis result, generations of wood and concrete wastes are more or less the same. Concrete waste is around 37% and wood is 35%. Mostly all the waste will be ended up at the recycling activities.

Within the factory, all the wastes that generated is cleaned everyday by the workers. Mostly, the workers usually clean for three times per day. According to observation within the project site, all wastes generating from the industry have been taken by the municipal under Yangon City Development Committee, (YCDC).

(e) Safety measures

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

- Earplugs
- Boots (shoes)
- Dust Masks
- Helmets & caps

The factory buildings are planned to be equipped with up-to-date electrical and communication system, fire protection system, water supply and sanitation system also waste water treatment tank, air conditioning and ventilation system as well.

1.5 Alternatives selection

The ***no development option*** for the Lluvia Confectionary 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.

Furthermore, it is widely recognized that ***being the food industry***, Lluvia Confectionary 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 recognises and ***complies with the mitigation measures and management plan*** described in the IEE accordingly, the overall impacts become rated as ***low.***

1.6 Description of the surrounding environment, impact and risk assessment, and mitigation measures

1.6.1 Ambient air quality

The existing baseline ambient air quality along with the local climate monitoring was conducted at (4) locations including nearby Confectionary LPG Tank, Inside the building under construction, downwind of the project site and at the project compound in May, 2018 (summer season) in the Lluvia Confectionary factory and surrounding areas.

Additionally, applicable standards are presented and used for comparison.
The monitoring includes 24-hour average of ***Particulate Matter (PM10), Particulate Matter (PM2.5), Carbon Monoxide (CO), Volatile Organic Compounds (VOC), Sulphur Dioxide (SO2) and Nitrogen Dioxide (NO2), Ammonia (NH3), Methane (CH4), Ozone (O3), Atomic Radiation along with meteorology*** condition at the monitoring site.

Among these parameters, the major pollutants are particulate matters ***(PM10 and PM2.5)*** which are mostly emitting from the Confectionary production process. The total average emissions of PM10 and PM2.5 for averaged 24-hours are ***57.25 µg/m^3 and 37µg/m^3*** which are ***slightly higher than National Environmental Quality (Emission) guideline)*** (50µg/m3 for PM10 and 25µg/m3 for PM2.5).

Another high emission pollutant is ***SO2 (58.75µg/m^3)*** which is average level for the whole flour factory ***did not meet the ECD guidelines*** (20 µg/m^3., However, ***NO2 (57 µg/m^3)*** (one hr) met the guideline (200 µg/m3, one hour). In this factory, source of SO2 will be releasing from nearby industrial and motor vehicles passing by as well as running in and out of the factory.

VOC, NH4, methane and background Atomic radiation were measured to reveal the existing level and as

comparison for the post monitoring assessments as well although these levels have not been set for general environment (non-industrial settings).

Although the ***impacts of all air pollutants emissions*** throughout the project phase (construction, operation and decommission) were rated as ***medium according to the impact assessment***, it will become ***less significant*** if the ***mitigation measures stated*** are followed accordingly. The detail information of air quality findings are presented in the following section.

Moreover, to protect air pollutants mainly in particulates from production process, the workers and a group staff working indoor must wear ***appropriate masks*** *as a* ***good working practice during production process***. ***Monitoring process must be conducted annually*** particularly if the new machineries are installed in the factory. Mitigation measures will be detailed in the respective sections.

The weather condition is generally fine which can affect the air quality situation.

1.6.2 Carbon emission

In terms of the CO2 emission from Lluvia Confectionary factory, the electricity sector does not directly produce the emission of CO2 and GHG. The potential gas emissions source from generators which are only standby has been considered as negligible.

The proposed factory will only use generators when the electricity generation is cut off. Lluvia factory has six generators and is using diesel fuel to generate electricity. Total amount of CO2 emission from generator is 91,304 kg of CO2/ year (91.304 metric tons of CO2/ year).

The operation phase of Confectionary factory will be utilizing electricity mainly form the LPG which will be built with 15 ton cylindrical type storage tank including pump, piping and related accessories equipped with three alarms and auto shut off system for the safety.

LPG does, however, release less CO2 per unit of energy than does coal or oil. It emits 81% of the CO2 per kWh produced by oil, 70% of that of coal, and less than 50% of that emitted by coal-generated electricity distributed via the grid. In a 15kg cylinder, LPG tanks are filled to 85% capacity if over 5,000 liter and 80% capacity if less than 5,000 liter. The total emission of CO2 from LPG uses was calculated as 7,550 kg of CO2 (7.55 metric tons of CO2).

1.6.3 Noise

The noise level of Confectionary was measured at the ***main different locations along with air monitoring.*** The noise levels of ***day time (64.5 dB)*** and ***night time (56 dB)*** which do ***not exceed the noise standard level 70dB*** by Environmental Quality (Emission) Guideline (EQEG).

According to the ***impact assessment of noise on surrounding***, generally it is rated as ***low***. Moreover, to protect noise from factory process, the workers and staff must wear ***ear muffs as a good working practice during production process***. ***Monitoring process must be conducted for annually*** particularly if the new machineries are installed in the factory. Mitigation measures are detailed in the respective sections.

1.6.4 Soil Quality

The soil parameters including pH, Moisture, Cadmium, Copper, Lead and Iron which have been selected to align with the relevant WBG EHS and Myanmar National Environmental Quality (Emission) Standards meet the guidelines respectively.

1.6.5 Solid Waste

Both ***domestic and industrial solid waste***s were examined by 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 the labour camp is 3kg/day which is approximately 0.9tonnes per year. Thus, the waste generation per capital per day is (0.06) kg per person per day based on total population nearly 400 totals from two shift staff. When it is compared with the waste generation per capital in the developing countries which is 0.5 to
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Within the factory, all the wastes that generated is cleaned everyday by the workers. Mostly, the workers usually clean for three times per day. According to observation within the project site, all wastes generating from the industry have been taken by the municipal under Yangon City Development Committee, (YCDC).

1.6.6 Potable water and wastewater

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 from tube well.

According to the information provided by the factory, the ***water usage*** in this ***manufacturing process is around 170m3/day***. Based on the analysis, ***65% of water*** usage is for the ***factory use*** together with cleaning of machineries and floors and ***35%*** of the water usage is for ***drinking water***.

In terms of the potable water sources, there are two tube wells in the factory. Total (3) sources were analyzed for ***19 parameters*** each including (***chemical and physical parameters).*** These are ***pH, color, temperature, turbidity, Total Dissolved Solid, conductivity, iron, hardness, alkalinity, chloride, dissolved oxygen, BOD5, COD, Nitrate-***

Nitrogen, Arsenic, copper, cadmium, zinc and sulfate which can affect on not only human health but also environment. According to the results, the tank water, tube well (1) and tube well (2), meet the standards.

Regarding wastewater, the factory will be installed ***wastewater treatment system*** in the project site.

1.7 Cumulative impact assessment

According to the onsite surveys and interviews with public, the nearby factories around the Confectionary

factory are garment factory and fertilizer factory.

The individual impacts can be assumed as non-significant but it becomes significant when other projects are taking place collectively over a period of time.

(i) Fugitive dust and air pollutants

Short term generation of dust around the factory area during construction phase and particulates emission from the factory process would increase when the other ***nearby factories emit 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) Surface water and ground water quality

Discharge of wastewater by the factory into the common drainage could ***compound any impact*** that occurs from ***other effluents*** from the other industries.

1.8 Impacts and mitigation measures for Confectionary factory workers due to closure

The closure of a Confectionary factory can have significant impacts on workers, including financial hardship, emotional stress, skill mismatch, and community economic downturn. To mitigate these impacts, several measures can be implemented:

1. **Financial Support**: Provide severance packages and collaborate with government agencies for retraining and financial aid.
2. **Counseling and Mental Health Services**: Offer counseling and workshops on resilience and stress management.
3. **Retraining and Skill Development**: Develop retraining programs and collaborate with educational institutions for specialized training.
4. **Community Support Programs**: Establish programs to assist affected families and encourage local businesses to create job opportunities.
5. **Communication and Transparency**: Maintain transparent communication with workers and establish feedback mechanisms.

Implementing these measures can help minimize the adverse effects of unemployment and support a smoother transition for workers and the community.

1.9 Environmental Management Plan (EMP)

Major environmental management plan to be conducted ***throughout construction, operation and decommission phase*** were detailed in ***proposed mitigation measures*** along with ***monitoring implementation, supervision and report*** system for ***air pollution control, noise, vibration, soil, water resource, solid waste, wastewater, ecological resource and health and safety*** accordingly.

The construction period of the project is approximately one year and the plant will be operational within the 30-year investment period of the Myanmar Investment Commission.

The Confectionary Factory will use ***2%*** **of the investment amount** for the EMP cost. The investment amount is Foreign Currency USD 21,170,601. The target expenditure is 70,568.67 USD per year for an environmental management plan. Out of total, 60% will be used for environmental mitigation and the

remaining 40% will be used for monitoring programs.

Being based on the ***LPG use*** for the operation process, the mitigation and preventive measures are also highlighted as follows:

- Check and test the LPG plant to prevent fatigue of pipeline or supporting structure or holding structure, pipeline and flange leaks, vapor lock, cavitation, corrosion due failure of cathodic protection, stress – corrosion cracking, thermal expansion, cyclic stress, structural failure and over pressurizing pipe system.
- LPG must be stored in adequate location wherein vessels or cylinders are suitably positioned having regard to the relevant codes of practice.
- LPG plant must be designed to appropriate standards and be properly installed and commissioned by competent persons.
- Plant must be fitted with adequate safety and monitoring control devices and operated by competent persons.

- Occupiers must notify the gas supplier of any structural or other changes which might affect the gas installation.
- There must be a suitable program of maintenance and testing by competent person.
- Plant must be identifiable and accessible for maintenance.
- Records of maintenance and tests must be kept.
- Precautions must be taken to prevent fire and explosion including appropriate protection of storage vessels.
- Installations must have appropriate security measures to prevent deliberate interference.
- Incidents involving death or hospitalization, fire or explosion or a significant release of LPG must be reported to the Authority and records of such incidents must be kept.

Furthermore, the ***roles and responsibilities*** of the ***Operation Manager/ HSE officer***, ***Project Management Team*** on site and/or ***Designated HSE Team*** will be identified so that the environmental management plans can be carried out in accordance with the factory's policy effectively.
In regard to reporting system, the ***frequency of monitoring*** is classified ranging from ***weekly to annually*** based on the individual issue.

1.10 Environmental and Social Management Plan for Lluvia Limited during Operation Phase

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

Table 1.2: Summary of Mitigation measures and required action plan during operation phase

Impact	Project Activities/ Environmental Aspects	Proposed Mitigation Measure	Monitoring		
			Implementation	Supervision	Report
Air Quality	Fugitive emissions from production operations such as raw material extraction Processing plant, vehicles, backup generator, etc.	• Regular cleaning should be performed in order to remove dust that have accumulated within the plant. • Prohibit open burning of any waste at project site. • Storage of crushed raw materials in covered or closed bays. • Use of dust extraction and recycling systems to remove dust from work areas, especially in grinding mills. • Use of air ventilation in packing areas. • Consider the use of low-emission generator engines. • Spray water onto the ground to control dust.	The Operation Manager/ HSE officer will: • Ensure proper working condition of vehicles and equipment and daily inspects to the site. • Ensure that regular dust suppression activities are performed on a regular basis. • Education and training programs with competitions to encourage all employees to actively participate in energy saving. • Keep records of all the incidents and maintenance history of the equipment. • Systematic arrangement of	Project Management Team on site and/or Designated HSE Team	Weekly report on general working condition Biannually air quality report

Impact	Project Activities/ Environmental Aspects	Proposed Mitigation Measure	Monitoring		
			Implementation	Supervision	Report
		• Use of enclosed belt conveyors for materials transportation and emission controls at transfer points. • Careful selection and use of environmentally friendly and low emission vehicles. • Appropriate management of project traffic. • Education and training programs with competitions to encourage all employees to actively participate in energy saving. • Discouraging the common practice of burning the any waste in the field, and encouraging biodegradation. • Periodical monitoring of air pollutants and if values exceed the standard limits, suitable mitigation measures will be taken.	delivery operation schedules and times. • Ensure the PPE provided are appropriate for the activity and meets the standards specifically mentioned for the activities.		
Noise Quality	Industrial activities and vehicle load-unload	• All Carryout regular maintenance of the equipment to minimize the noise level. • Ensure use of mufflers on diesel/gas driven machinery. • Using enclosure for all generator	The Operation Manager/ HSE officer will: • Noise generating sources and their platforms will be maintained properly to minimize noise vibrations	Project Management Team on site and/or Designated HSE Team	Weekly report on general working condition Biannually

Impact	Project Activities/ Environmental Aspects	Proposed Mitigation Measure	Monitoring		
			Implementation	Supervision	Report
		sets. • Use low noise equipment. • Carry out periodic monitoring of noise levels, if values exceed the standard limits, suitable mitigation measures to be taken. • Develop green belt to act as a noise barrier. • Schedule noisy operation activities and transportation during day-time hours. • Training to personnel will be imparted to generate awareness about effects of noise and importance of using PPEs.	generated by them. • Report the incidents if any.		noise quality report
Water Resources	Spills/ leaks from Fuel Equipment and Vehicles Paints, Thinner, Oils and Lubricants.	• If any machines/vehicles/equipment are found to have any leaks they should not be used. • Nomaintenance (where practicable) of equipment should be performed onsite that can potentially contaminate the soil and groundwater.	The Operation Manager/ HSE officer will: • Ensure regular visual checks for any leaks that may be present. • Promptly detect and repair of water pipes and tank leaks. • Quick fixing of leaking pipes. • Ensure that all storm drains are cleared of debris so as to ensure	Project Management Team on site and/or Designated HSE Team	Weekly report on general working condition Biannually water quality report

Impact	Project Activities/ Environmental Aspects	Proposed Mitigation Measure	Monitoring		
			Implementation	Supervision	Report
	Spills from the use of cleaning materials used and water used. Improper anagement of waste, sewage water and storm water/rainwater.	• Proper recycling of water from other uses for sprinkling dusty pavements • Promptly detect and repair of water pipes and tank leaks. • Raw materials should be properly stored under the roof to prevent dumping into the water courses in the rainy season. • Treat drainage system for sediment control. • Install water conserving taps that turn-off automatically when water is not being used. • Reuse of treated grey water for dust control and plant watering. • The storage of fuel should be in a dedicated area provided with drip trays / walls with impermeable flooring.	free flow of water. • Ensure that all septic tanks' capacity is adequate and impervious to leaks. • Ensure that waste management plan is implemented. • Report the incidents if any.		
Soil Quality	Improper waste management from industrial activities. Improper waste	• Hygienic sanitary facilities and sewerage system. The toilets and domestic waste water will be collected through a common sewerage. The minimum number of toilet facilities required is one	The Operation Manager/ HSE officer will: • Daily visual inspection of storage areas for leaks from containers, completion of log. • Waste generation from each	Project Management Team on site and/or Designated HSE Team	Yearly report on general condition

Impact	Project Activities/ Environmental Aspects	Proposed Mitigation Measure	Monitoring		
			Implementation	Supervision	Report
	management from industrial activities.	toilet for every ten persons. • Store inorganic wastes in a safe place within the site and clear organic wastes on daily basis to waste collector or compost the waste. • Hazardous-materials handling procedures to reduce the potential for a spill and will include an emergency response program to ensure quick and safe cleanup of accidental spills. • Water based chemicals are preferred.	project activities will be recorded. • Train employees to promptly clean up any oil or hazardous material spill. • Ensure site boundaries will be strategically placed in order to minimize surface runoffs especially during the monsoon season. • Make sure proper housekeeping is done throughout the site.		
Waste	Waste generation and disposal of the project site including solid waste, liquid waste and hazardous waste.	• Ensure regular monitoring of the sewage discharged from the project. • Ensure sufficient number of proper sanitary facilities provided for employees. • Ensure that all trash containers in the plant are properly sealed at all times to prevent waste being blown and scattered. • Provide separate bins for food waste, metal and other wastes at the	The Operation Manager/ HSE officer will: • Ensure all the hazardous waste are in secured area followed by the instruction showed in label. • Perform the visual inspection of the waste containers and complete the relevant log. The logs are the proof that the inspections have been performed. • Train employees to promptly clean up any oil or hazardous	Project Management Team on site and/or Designated HSE Team	Weekly report on general condition

Impact	Project Activities/ Environmental Aspects	Proposed Mitigation Measure	Monitoring		
			Implementation	Supervision	Report
		staff quarters and other facilities on site. • Collect non-hazardous solid wastes for recycling or disposal at landfill. • Education and training will be offered to all factory employees and reward for innovative reduction and recovery approaches will be given to company departments in monthly competitions.	material spill.		
Ecological Resource	Project operation activities	• Re-greening in the housing area within project site will be carried out to compensate the vegetation loss in the operation phase.	The Operation Manager/ HSE officer will: • Develop green area in the project compound.	Project Management Team on site and/or Designated HSE Team	Not directly applicable to the proposed project, however, during the decommission phase, need to report.
Occupational Health and Safety	- Fugitive emissions from production operations such as raw material extraction.	• All measures related to safety such as safety appliances, training safety posters, Slogans, pictures should be posted readable clearly at the factory. • The workers exposed to noisy	The Operation Manager/ HSE officer will: • Ensure the PPEs provided are sufficient / appropriate for the particular work. • No unnecessary blowing of	Project Management Team on site and/or Designated HSE Team	Weekly report

Impact	Project Activities/ Environmental Aspects	Proposed Mitigation Measure	Monitoring		
			Implementation	Supervision	Report
	- Exposure to solid waste, liquid waste and hazardous waste. - Impairment of hearing capacity due to the exposure to high noise levels.	sources should be provided with ear muffs/plugs. • 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. • Provide PPEs (Personal Protective Equipment), particularly masks to protect dust and air particulate matters from the atmosphere. • 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.	horns at any time • Ensure proper working schedule for all employees.		

Impact	Project Activities/ Environmental Aspects	Proposed Mitigation Measure	Monitoring		
			Implementation	Supervision	Report
Liquified Petroleum Gas (LPG)	Use of LPG plant	• LPG must be stored in adequate location wherein vessels or cylinders are suitably positioned having regard to the relevant codes of practice. • LPG plant must be designed to appropriate standards and be properly installed and commissioned by competent persons. • Occupiers must notify the gas supplier of any structural or other changes which might affect the gas installation. • Records of maintenance and tests must be kept. • Precautions must be taken to prevent fire and explosion including appropriate protection of storage vessels. • Incidents involving death or hospitalization, fire or explosion or a significant release of LPG must be reported to the Authority and records of such incidents must be kept.	The Operation Manager/ HSE officer will: • Ensure that plant is fitted with adequate safety and monitoring control devices and operated by competent persons. • Ensure that precautions are taken to prevent fire and explosion including appropriate protection of storage vessels.	Project Management Team on site and/or Designated HSE Team	Weekly report

1.11 Environmental, Social, and Health Impacts and Monitoring Measures

Table 1.3: Monitoring plan for environmental, social and health impact

Factors	Index/ Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location	Responsible Person	Remark
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,	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)	**LPG Tank (Location 1)** 16○°56' 42.54" N 96○° 11'43.47" E **Inside the factory building (Location 2)** 16○°56' 42.10" N 96○° 11'40.33" E **Downwind of the project site (Location 3)** 16○°56' 40.65" N 96○° 11'46.11" E **The project compound (Location 4)**	•HSE In charge of Or -3rd party	• EQM Co.,ltd already surveyed the upwind, downwind and the project sites of the factory. • The current existing monitoring measures are sufficient to reveal the existing situation. • The upwind location provides the data on the project site's background air quality which is less likely , affected by lthe project

Factors	Index/ Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location	Responsible Person	Remark
		2012		16○°56' 40.34" N 96○° 11'33.28" E		activities. • The Downwind location provides the data for the assessment of the impact likely affected by the project activities including local emissions sources, such as industrial facilities, traffic, or urban areas, on air quality. • Furthermore, When the operation starts, air monitoring will be carried out at the selected locations which can represent the air pollution sources of the factory

Factors	Index/ Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location	Responsible Person	Remark
Noise	• Leq2 4 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	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)	**LPG Tank(Location 1)** 16◌°56' 42.54" N 96◌° 11'43.47" E **Inside the factory building (Location 2)** 16◌°56' 42.10" N 96◌° 11'40.33" E **Downwind of the project site (Location 3)** 16◌°56' 40.65" N 96◌° 11'46.11" E **The project compound (Location 4)**	HSE Incharge Or (3rd party)	• EQM Co.,ltd already surveyed noise monitoring measures biannually during operation and decommissioning phase. • And this noise monitoring plan will cover efficiently the noise impact likely affected by the factory since the locations are selected to represent the noise sources. Being the operation phase is not started, noise locations will be closely selected

Factors	Index/ Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location	Responsible Person	Remark
		Environmental Quality(Emission) Guidelines, Effective since 2015 in accordance with The Environmental Conservation Law, 2012		16○°56' 40.34" N 96○° 11'33.28" E		when the factoryoperation is running.,
Effluent	Physical parameters: pH Temperature Color Turbidity Total dissolved solids Conductivity Iron Hardness Alkalinity Chloride Dissolved Oxygen BOD	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	**For Potable Water**, (GW1), 16°56'42.30"N, 96°11'40.23"E (GW2) 16°56'42.92"N, 96°11'41.61"E (GW3) 16°56'39.21"N, 96°11'37.59"E **For wastewater,** (SW1) 16°56'42.31"N, 96°11'39.87"E (SW2) 16°56'40.36"N,	• HSE Incharge or 3rd party	• EQM Co.,ltd already surveyed the upstream and downstream sites of the factory. • The current existing monitoring measures are efficient to reveal the existing situation. • In terms of the baseline study, surface water nearby the factory,two tube wells and one tank water were monitored

Factors	Index/ Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location	Responsible Person	Remark
	COD Nitrate-Nitrogen Arsenic Copper Cadmium Zinc Sulphate			96°11'45.75"E		. And two drainage outlets were collected and tested accordingly. Being the operation phase is not started, effluent locations will be closely selected when the factory operation is running.,
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**	• All wastes generating from the factory will be disposed by the municipal under Yangon City Development Committee, (YCDC) once a week.
Social	• Complaint • Monitoring and solving	• Record complaint • Monitor, investigate and implement suitable solutions	• Throughout all phases	• Project area, community around project area, and	**• HR of the factory** • **3rd party**	• The factory will take into account the impacts and complaints coming out from local

Factors	Index/ Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location	Responsible Person	Remark
				transportation route		communities community through grievance mechanism.
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	• 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	• 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**	• The factory will take proper on-site monitoring program to assess occupational health and safety hazards and risks for the workers during construction phase.

Factors	Index/ Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location	Responsible Person	Remark
	in long run cause Noise Induced Hear Loss (NHL) and other physiological effects} • Mitigation measures	Training and Submission of accident reports • Regular trainings regarding health and safety aspects by HSE Coordinator. • Scrutinize the current environmental plan				

1.12 Emergency response plan

The objective is ***to prepare the resources (personnel and equipments)*** available to respond emergency situations and accidents which can be resulted by the factory activities and major disasters as well.

In the Lluvia Confectionary, in general, there should be either ***Emergency service in charge*** or ***HSE manager*** and ***Response Team*** for the emergencies. The team should be 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 factory 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.

The ***potential emergencies*** that likely occur at the factory:

- Fire/ Explosion
- Medical emergency
- Emergency response plan for chemical exposure

In order to communicate and carry out the emergency action efficiently, ***Organization chart for emergency team will be set up in the factory together with related training.***

Before preparing a procedure, ***a risk assessment*** will be carried out for estimating how likely it is for an emergency event to occur and if it does, how serious or damaging the consequences would be.

Reports shall be produced through the course of implementation of monitoring programs and collecting incident/emergency response forms as well and then submitted to the factory respective authorized personnel. Moreover, if the major incidents occur, these shall be reported to the relevant regulatory agencies.

The ***Environmental file*** including EMP, the monitoring programs and relevant legislation etc. must be documented in order to record compliance with the EMP. HSE regulations shall be placed on site so as to have the safe working environment.

The ***effective capacity building, adequate training*** *and* ***Technical Assistant*** lead to the success of the EMP of the Confectionary Factory.

Estimated costs for the initial implementation of the EMP will be defined on an initial set up basis. The factory will revise these costs and develop annual operating costs for the EMP.
Lluvia Limited (Confectionary) shall allocate 2% of net profit for a CSR Fund to be used for CSR purposes.

(1) Activities to benefit the Employees (Safety Equipment, Canteen, Staff loans, Medical Insurance)
(2) Activities to benefit the regional community (Scholarship for the children of employees, Say Ta Nar (Free) Clinics in connection with the Public Health Foundation)
(3) Activities to benefit all of Myanmar (Emergency Relief for Flood/ Disaster recovery)

1.13 Public consultation and disclosure

The purpose of ***public consultation*** is to disclose project information and management plans to the residents near by the project and the relevant stakeholders identifying their perceptions and attitudes of the immediate community in the final IEE report. The public consultation meeting minutes were detailed in the respective section.

The ***door to door community questionnaire survey*** conducted at ***the Shwe Pauk Kan Township*** which is the nearest vicinity to the proposed factory, Yangon Industrial Zone is aimed at identifying of environmental and social impacts potentially affected by the existence of the proposed factory.

1.13.1 Socio-economic Survey

More specifically, information of the Project Area Units (PAUs) as well as Project affected Persons (PAPs) along with their livelihoods, income, transportation, health condition were collected through questionnaire surveys prepared with both quantitative and qualitative variables.

Conducting of the surveys 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***.
- ***Public consultation meetings***
- ***Key Informant Interview*** with the respective community (community leader, teacher etc) and key government officials
- ***(100) Socio-economic and Attitude Survey of households***

Regarding the demographic feature, the ***common facilities*** of the community who lives in the Shwe Pauk Kan Township areas are ***quite improved***. The survey identified that ***majority (26%) is 30-40 yrs old*** and then followed by 40-50 is 21%, 50-60 and 60-70 are 18% each, 70 above is 5% and the least is 15-20 which is 1 % . Among these, ***16%*** are ***working for income.*** The annual income of majority (38%) is between ***2,000,001 and 3,000,000.***

In the ***education*** aspect, there are some ***schools*** both within and nearby the quarter area. Majority (50%) of respondents completed starting from middle school to high school. Based on their information, majority (34%) of the community has ***no major health problems*** including TB, Heart disease, Hypertension, and chronic illness etc.

Out of total survey, ***40%*** of the households have ***their own land*** while 60% of respondents are tenants.

Regarding awareness of the community on the Lluvia Confectionary factory, only ***5% of the total households*** are ***aware on the factory*** through community leaders and friends.
Concerning the development issue of the proposed Confectionary, it is found out that ***52%*** of the respondents mentioned that the existence of the industry is ***neutral to the community*** and ***6% are unaware*** of how much the industry is important for the community. Then, ***38%*** of the local people stated that the ***industry is important*** and ***1%*** stated that the industry is ***very important*** for the community, but 1% mentioned that the industry is not important.

Among the total households, ***23%*** of respondents said that there is ***positive impact on the environment*** by the factory. However, ***33%*** of the households said that it has ***some negative impact.*** Then, up to ***44% of respondents*** mentioned that there is ***neither positive nor negative impact*** on the environment.

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 industrial zone including the Lluvia Confectionary factory*** on the nearest community. The detail discussions and results are presented in the main context of this report.

In conclusion, this report gives the guidance and framework for the Lluvia Confectionary factory employers to maintain the sustainable green development, provide their employees with a workplace free from recognized hazards and review the compliance with Myanmar environmental rules and regulations; environmental management plans, mitigation measures and monitoring programs.

1.13.2 Public Consultation Meeting

Lluvia Limited (Confectionary Factory) and EQM conducted the Public consultation meetings with government and local officials for Mingalardon Township, representative of zone committee and local communities of three quarters within AOI of the project site following ECD advised protocol.

The Public Meetings were held on 24th, August, 2018.

Lluvia Limited (Confectionary) 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.

Table 1.4: Key Points from Public Consultation Meeting

Discussion Session
Question 1 – U Ye Min Aung (Health and Safety Officer, Myanmar Padauk Co., Ltd) I would like to ask from safety point of view. LPG has high flash point and therefore how do you plan for safety and firefighting system for this. Relating to material safety data sheet (MSDS), it is stated in English Language. So, it is not convenient to understand the negative impacts of chemicals. (e.g. We don't know definitely the negative impact of chemicals when it is inhaled or when in contact with the skin.) **Answer 1- U Pyi Soe (Project manager, Lluvia Confectionary Factory)** Thank you for your question. Relating to LPG, it is a clean fuel. The negative impact and side effects of LPG is lower than that of petrol and diesel. But, it has high flash point. Therefore, higher safety is needed while using LPG. We have to get permission from Myanma Petroleum Enterprise (MPE) and Fire Force for the design of bakery oven by complying measures and guidelines. **Answer 1- Dr. Ohnmar May Tin Hlaing (EQM)** There are safety sheets for each chemical. MSDS sheet has to be displayed nearby the storage of chemicals. Being stated in English, It is true that it is not easy to understand and follow the safety procedures. However, MSDS shall be placed and Emergency response plan will be also displayed in Myanmar version. We also add these information in the chapter of the Emergency Response Plan. (e.g. emergency kits, shower etc. have to be ready for emergency case). Nowadays, environmental audit will be conducting in some industrial zones based on their needs. **Question 2- U Kyaw Lwin (Vice President, Yangon Industrial Park)** According to the presentation, the project proponent should comply IFC guidelines relating to the safety of LPG. I would like to know that is it possible to comply these guidelines completely in Myanmar. The project proponent needs to do a compliance contract. I would like to know how do the relevant department inspect whether the project proponent comply with the guidelines or not. **Answer 2– Dr. Ohnmar May Tin Hlaing** Mitigation measures will be conducted based on the feasibility. While the report is in process, we have to discuss with the project proponent to ensure that they can comply

the measures stated. Then, we have to choose the reliable and effective procedures which are concurrent with the project and our country situation. If we set the advanced guidelines, the project proponent may not follow the measures written in the plan. We will set the mitigation measures that can be practically applied by the project proponent as well as to mitigate the impacts potentially affected by the project.

Answer - Daw Kyawt Kay Paing (ECD)

Relating to Environmental Compliance Certificate, the project proponent has to submit the report (IEE, EMP or EIA) to Environmental Conservation Department (ECD) and ECD has to review this report. If there are requirements for the report, they have to amend and resubmit the report to ECD. But now, ECD cannot currently approve for ECC. Another one is that I would like to recommend to invite Yangon City Development Committee (YCDC) for next meeting for waste management. (e.g; solid waste and sludge from wastewater treatment)

Question 3- U Yan Naing Soe (Manager, Piti Pyay Sone)

I would like to know which method will be used for the treatment of waste water.

Answer 3- Dr. Ohnmar May Tin Hlaing (EQM)

For choosing the treatment method of wastewater, we have to know the operation process of the factory. Generally, we presume as there will have no toxic wastes discharge from this factory because it is a Confectionary factory. But, we will continue to look at the factory process. There are two types of wastewater discharged from industry such as domestic and industrial wastewater. Mostly, domestic water will be discharged into drainage. If the project proponent will use chemical in industrial process, waste water cannot be discharge directly. For chemical manufacturing industry, they have to build individual wastewater treatment plant. Wastewater form the factory will also be analysed in laboratory. Method for wastewater treatment will be chosen based on the result of waste water quality analysis. This information will also be elaborated in the report.

Question 4- U Kyaw Sein Oo (General Manager, GIDA Co., Ltd)

The presentation that you explain is good. But there can be many emergency cases in everywhere. There will be impacts on the environment due to the natural disaster, human beings and the machines errors, even though there are lots of safety plans. I would like to know that are there any accountability and responsibility plans developed by project proponent?

Answer 4- Dr. Ohnmar May Tin Hlaing (EQM)

We will include Chapter 9 - Emergency Response Plan in the report according to the Environmental Impact Assessment Procedures published by (ECD), (MONREC) as the

separate chapter. This will be prepared for the emergency cases of oil spills, and explosion. It will concern the potential emergency conditions that will be occurred throughout the project phase. If there is no environmental team in the factory, it is needed to train and explain the workers how to use the procedures for the potential emergency cases. After completed the IEE report, we have to submit to ECD. If any comments come out from the department, we have to revise the reports based on the comments stated by ECD and submit again. Environmental Compliance Certificate is only given to the well prepared reports.

Question 5- Daw Kay Thi (HR, Yathar Cho, Co., Ltd)

Wastewater samples will be measured by the laboratory. I found that solid waste and wastewater are systematically conducted. The disposal water will be discharged to reach to the level of PH7, PH6 etc. Which guidelines will be used to compare the sampling results with the standards?

Answer 5- Dr. Ohnmar May Tin Hlaing (EQM)

Environmental Conservation Department (ECD) stated National Environmental Quality (Emission) Guideline since 2015. In this Guideline, there are also standards of air, noise, water and waste water parameters for the various industries. There are standards for confectionary industries in the guideline. We will collect wastewater and portable water samples after this consultation meeting. And then will send these samples to the laboratory. We will analyses the parameters according to this Guideline The results from the laboratory are going to compare with the standards values of the National Environmental Quality (Emission) Guideline regarded by ECD.. ECD will review on the parameters that we measured as well.

Question 6- U Aung Myo Thant (QHSE Director, Piti Pyay Sone)

How do you disclose the results?

Answer 6- Dr. Ohnmar May Tin Hlaing (EQM)

We will have to prepare the executive summary in Myanmar version. Thus it can be posted at the Industrial Zone committee's office as well as the respective Township GAD office. If the company has their own web site, they can upload on that website.

1.13.3 Disclosure

The disclosure of participants' comments, concerns, and Lluvia Limited confectionary factory's actions following the PC meeting involved local community volunteers, the Village Development Association (VDA) Committee, one zone committee volunteer, telephone communication, and the dissemination of information through the Environmental Impact Assessment (IEE) Report to local communities, government officials, the zone committee, and other relevant stakeholder.

Chapter 2

Introduction

2. Introduction

2.1 Background

This Initial Environmental Examination (IEE) has been prepared for the Lluvia Confectionary factory of MC Food Holding Asia Pte Ltd and Diamond Star Co., Ltd based on the site assessment of the proposed project and secondary data. The location of this factory is No.(137-139, 155-170) in the Yangon Industrial Zone, North Okkalapala Township, Yangon. The Project Area is 6.2 acres.

According to the Myanmar Environmental Conservation Law (2012), it requires that the proponents of every development project in the country to conduct either Environmental Management Plan (EMP), Initial Environmental Examination (IEE) or Environmental Impact Assessment (EIA), to the Ministry of Natural Resource and Environmental Conservation (MONREC) depending upon the nature of the project which can impact on the environment. The proposed project requires an IEE & EMP to meet the environmental assessment requirements of Myanmar Environmental Conservation Law. Therefore, MC Food Holding Asia Pte Ltd and Diamond Star Co., Ltd. commissioned Environmental Quality Management (EQM) Co., Ltd to conduct the Initial Environmental Examination (IEE).

This IEE report is prepared to initially assess the potential impacts of the proposed project on environmental components and communities nearby. It is also necessary to develop adequate and feasible management plan and monitoring plan including budget plan for environmental mitigation measures according to the project proposal as well as cooperate social responsibility (CSR) plan. This Initial Environmental Examination (IEE) is formulated in accordance with the existing environmental policy, laws, rules, regulations and instructions. It is submitted as a partial fulfillment to receive the Environmental Compliance Certificate (ECC) from the Environmental Conservation Department (ECD).

The consultant team of Environmental Quality Management Co., Ltd had carried out Initial Environmental Examination (IEE) with Environmental Management Plan (EMP) for this Lluvia Confectionary factory in accordance with the appropriate procedures stated by Environmental Conservation Department (ECD), Ministry of Natural Resources and Environmental Conservation (MONREC).

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

Table 2.1: Company registration details

1	Environmental Company Registration Number	117491021, 2023-2024
2	Date of Recommendation from Myanmar Investment Commission to conduct the IEE & EMP	25th, January, 2016

The contact details of the project proponent are as follows:

- Company name : Lluvia Limited
- Investor name : U Soe Naing
- Registration No : 37755/29.09.15
- Registration Date : 29/09/2015
- Expiry Date : 01/06/2020

- Address : No. 126/A, Kabaraye Pagoda Road, Bahan TSP, YAGNON
- Type of Business : Manufacturing
- Investment location : No(137-139, 155-170) in the Yangon Industrial Zone, North Okkalapa Township, Yangon

This study consists in assessing the Initial Environmental Examination (IEE) for the project operation along with the Environmental Management Plan (EMP) of the confectionary factory located in the Yangon Industrial Zone.

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

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 IEE 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,Fax: (951) 563994
- Fax: (951) 23339942-1
- Email – contact@eqmmyanmar.com, ohnmarmay@gmail.com
- 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 IEE team consisted of the individuals described in Table 2- 2.

2.3 IEE Assessment Team

Table 2.2: 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**

Name (Sir name, Given name)	Registration/ License No.by ECD (if applied)	Designation	Area of expertise
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** **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 2.3: 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

Sr.	Name (Sir name, Given name)	Education/Degree	Scope of Work
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

Table 2.4: 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 (Confectionary 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

Sr	Project name	Year	Client	Remark
12	LLUVIA, Premier Beverage	(Jan-2016)	Lluvia Ltd and MC Food Holdings Asia	IEE & EMP
	Manufacturing factory		Pte., Ltd	
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)

Sr	Project name	Year	Client	Remark
(ii) Environmental baseline monitoring projects				
1	ngon Development Company	2019	NYDC	Baseline Ambient air monitoring, Socio economic survey
2	PanAust project	2019	PanAust Limited	Baseline Ambient air and noise monitoring, water and soil sampling

Sr	Project name	Year	Client	Remark
3	Myanma Awba's Hmawbi Agriculture Import Complex (HAIC) project, Hmawbi Township	2019	Myanma Awba's Hmawbi Agriculture Import Complex (HAIC)	Ambient air and noise monitoring, Soil and water sampling
4	Block - A1 and A3	2018	Daewoo Oil and gas company	Scoping stage public consultation, Socio economic survey
5	Hotel Project in Htee Kee, Dawei Township	2108	Hotel Project in Htee Kee,	Baseline Ambient air monitoring
6	Wind Power Project	2018	Infra Capital Myanmar (ICM)	Public Consultation of scoping stage and EIA stage, Socio economic survey
7	Smart Office (Indoor air monitoring)	2018	Smart Office	Indoor air monitoring
8	PanAust Limited, Gold Mining Project	2018	PanAust Limited	Baseline Ambient air and noise monitoring, water and soil sampling
9	Myanmar Logistic Hub Centre project	2018	Myanmar Logistic Hub Centre	Baseline Ambient air and noise monitoring
10	Power Plant project (TEPM)	2018	Pipe line Center (PLC)	Ambient air monitoring
11	MPRL Oil offshore supply base project	2018	MPRL Company	Public consultation of final disclosure Socio economic survey
12	Block-M11,12,13,14	2018	Petronas Oil and gas company	Public Consultation of scoping stage and EIA stage, Socio economic survey

Sr	Project name	Year	Client	Remark
13	Block - M9	2018	PTTEP Oil and gas company	Public Consultation of scoping stage and EIA stage, Socio economic survey
14	Power Plant project	2018	I-Land company	Socio economic survey
15	Middle Paunglaung hydro-power plant	2018	Energize Myanmar	Socio economic survey
16	Exploration Drilling Project, Block A-5	2018	Chevron Oil and gas Company	Socio economic survey
17	Hmawbi Agricultural Inputs Complex (HAIC) For Hmawbi Group Project	(2017-2018)	Hmawbi Agricultural Inputs Complex (HAIC)	Baseline Ambient air monitoring, noise monitoring, water and soil sampling and socio economic survey
18	Tin and Tungsten Mine Project	2017	DELCO	Baseline Ambient air monitoring, noise monitoring, water and soil sampling
19	Plywood factory project in Belin	2017		Baseline Ambient air and noise monitoring
20	Plywood factory project in Sagaing	2017		Baseline Ambient air and noise monitoring
21	Chan Mya- Shwe Pyi High way station complex project	2017		Baseline Ambient air and noise monitoring
22	Yangon 300 MW Project	2017		Baseline Ambient air monitoring, noise monitoring, water

Sr	Project name	Year	Client	Remark
				and soil sampling
23	NO (2) Cement factory (4000) Ton project in Myaing Ka Lay Township	2018		Ambient air and noise monitoring
24	Onshore Oil and Gas Exploration Project (TEPM, PLC & MS)	2018	Total E&P, Myanmar	Ambient air and noise monitoring
25	CLO support for Shell's offshore seismic survey programme in Myanmar	(2015-2016)	Shell Oil and Gas company	seismic survey programme
26	PTTEP ESHIA Post	2015	PTTEP Oil and gas company	monitoring and Feedback Survey
27	Jetty Floating Hotel project	2014		Baseline Air monitoring
28	Total E&P, Myanmar (Environmental Monitoring)	2013	Total E&P, Myanmar	(as Industrial Hygine consultant) (Air & Water)
29	Mandalay Port project	2013		Baseline Air monitoring
30	Kathar Sugar Mill project	2013		Baseline Air monitoring
31	50MW Gas Engine Power Project in Insein, Ywama, Yangon City,	2013		Baseline Air monitoring & Air Impact Assessment
32	Fully - Integrated Coal Fired Power Plant Cement	2013		Baseline Air monitoring & Air Impact Assessment

Sr	Project name	Year	Client	Remark
	Production Facility,mawlamyine			
33	Taungoo University Project	2013	(JICA)	Baseline Air monitoring & Air Impact Assessment
34	430MW Combined Cycle Gas Turbine (CCGT) project in Hlaingtharyar, Yangon	2012		Baseline Air monitoring & Air Impact Assessment
35	500MW Hlawga Gas Turbine project in Yangon	2012		Baseline Air monitoring & Air Impact Assessment
36	The cement packaging factory in Thilawa Port, Yangon,	2012		Baseline Air monitoring & Air Impact Assessment
37	Letpadaung Copper Mining project,	2012		Baseline Air monitoring
38	Ambient and indoor Air monitoring and potential exposure assessment carried out in onshore and offshore platform and Ergonomics campaign	(2011 & 2012)	Total Exploration & Production, Myanmar (Oil &Gas Company)	Ambient and indoor Air monitoring and potential exposure assessment carried out in onshore and offshore platform and Ergonomics campaign
39	500MW Gas Based Combined Cycle Power Plant project, Myanmar	2011		Baseline Air monitoring & Air Impact Assessment

Sr	Project name	Year	Client	Remark
40	Environmental monitoring (Air, Water and Soil) in surrounding area near by industrial zone	2010	(WHO funded)	Environmental monitoring (Air, Water and Soil)
41	Hospital waste	2009	(WHO funded)	
	management survey in Yangon General Hospital			
42	The first initiative ambient air quality monitoring in Myanmar,	2007 to 2009	(UNEP funded)	ambient air quality monitoring
43	Monitoring on particulate bound cyanide emitted from fish sauce factory and plastic factory	2009	(WHO funded)	Monitoring on particulate bound cyanide emitted
44	Retrospective and Prospective Hospital Based Survey - Poison control projects	(2002 - 2004)	(WHO funded)	Socio-economic surveys on acute poisoning cases
45	Socio-eco survey in South Okkalapa Women and Children Hospital	2001	(Department of Medical Research funded)	Socio-eco survey

Sr	Project name	Year	Client	Remark
(iii) National and Departmental Projects				
1	Seminor on Monitoring of Waste Management	Feb 25, 2019	ECD, Institute for Global Environmental Strategies (IGES, Japan)	Local Consultant for development of Strategy and action plan

Sr	Project name	Year	Client	Remark
2	Regional Workshop for improving Municipal Solid Waste Management in Mandalay	Feb 21-22, 2019	MCDC, Institute for Global Environmental Strategies (IGES, Japan)	Local Consultant for development of Strategy and action plan
3	National and City Level Waste Management Strategy project for (2016-2017)	2016-2017	ECD, Institute for Global Environmental Strategies (IGES, Japan) center collaborating with UNEP)	Local Consultant for development of Strategy and action plan
4	Hazardous Waste Management being conducted in the Industrial Zones in Myanmar	(2016-2017)	ECD, SINTEF(NORWAY)	Local Consultant for SINTEF, Norway

2.4 Government registrations/approvals for the project status

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

Table 2.5: EQM's Company registration details

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

2.5 Objectives of the project

In order to be sustainable development, the environmental and social impacts shall be necessarily reduced accordingly. Moreover, along with resources which become limited and polluted, environmental assessment 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, this proposed project needs "Initial Environmental Examination (IEE), Social Impact Assessment (SIA) along with Environmental Management Plan (EMP)" as the project is likely to have adverse impact on the environment.

This IEE and EMP 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 IEE objective.

1. To identify the potentially significant environmental impacts likely affected by the Confectionary factory
2. To promote sustainable development by ensuring that the project activities do not undermine critical resource and ecological functions or the wellbeing, 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 activities on neighboring environment including** air atmosphere, water bodies, soil, people and infrastructure
3. To propose the **mitigation measures** where adverse effects may have occurred;
4. To set up **an environmental management plan** that will govern all activities of the project for the better protection of the environment.
5. To reveal the community perception and impacts by conducting socioeco surveys.

2.6 Methodology for the study

Based on the IEE procedures issued by the Environmental Conservation Department (ECD), Ministry of Natural Resources and Environmental Conservation (MONREC), the methodology used by the consultants consisted of the followings below:

- **Literature review**: Documentation on the existing and relevant policies, laws, regulations and guidelines related to environmental assessment process and management, factory service, waste management, land use etc. at the national level as well as the international level have been done.
- **Interviews**: The consulting team has interviewed the community residing near the proposed project as well as in the administrative personnel related to this project.
- **Data collection**: Through site visit, required qualitative and quantitative data have been collected
- **Stakeholder consultation**: the consultants conducted stakeholder meetings and door to door household questionnaire surveys on the neighboring communities, to find out their perception on this project.
- **Environmental baseline monitoring** on air, water, waste and soil
- **Environmental impacts assessment along with the mitigation measures on the issues including** air, noise, visual, potable water, waste water, waste, etc.
- **Environmental Management plan** on the environment likely affected by the project activities was developed accordingly.
- **Reporting:** the data and information collected were organized and compiled in a report.

Chapter 3

Policy, Legal and Institutional Framework

3. Policy and Legal Framework

This section lists all legislation relevant to the undertaking of industrial projects in Myanmar. The legislation can be divided into two categories as follows:

- Policy & Legal Framework (Section 3.1)
- Contractual and other Commitments (Section 3.2)
- Institutional Framework (Section 3.3)
- Project's Environmental and Social Standards (Section 3.4)

3.1 Policy and Legal Framework

3.1.1 Environmental Policy & Framework

Environmental legislation and arrangements for environmental conservation in Myanmar are developing rapidly. As part of Myanmar's reform process that involves the updating and enforcing environmental policy and legislation. The Framework for Economic and Social Reform (FESR 2013) and the National Comprehensive Development Plan (NCDP 2011-2030) continue Myanmar's goal of environmental conservation.

At present, all laws relating to the environment are being formulated and administered by the sectoral ministries and departments concerned. Section 3.2.2 provides a list of environmental legislation relevant to the Project activities.

3.1.2 National Environmental Legislation

The national legislation applicable to the Project comprises the following sources of law, listed hierarchically in accordance with the Constitution and other laws of Myanmar:

- The Constitution of the Republic of the Union of Myanmar (2008);
- The Myanmar Investment Law (2016); Amendment (2019)
- Myanmar Environmental Conservation Laws (2012);
- Environmental Conservation Rules (2014);
- Environmental Impact Assessment Procedure (2015); Amendment (2019)
- National Environmental Quality (Emission) Guideline (2015).
- Draft Guideline on Public Participation in Myanmar's EIA Processes (2017);

3.1.2.1 The Constitution of the Republic of the Union of Myanmar (2008)

The latest enacted Constitution of the Republic of the Union of Myanmar (May 2008) provides the most up to date information on governing laws and regulations in Myanmar. The Constitution prevails over any other national legislation or international agreements.

It guarantees every citizen equal right before the law, and requires enactment of necessary laws that recognize citizens' freedom, equality, rights to liberty and justice, benefits, responsibilities, and restrictions (Article 347, and 21 (a) and (d)).

Article (45) states that The Union shall protect and conserve natural environment. Article 390, calls on the duty of its citizens to assist the Union on the following issues:

- preservation and safeguarding of cultural heritage;
- environmental conservation;
- striving for development of human resources;
- protection and preservation of public property.

3.1.2.2 Myanmar Investment Law (2016), Amendment (2019)

The Myanmar Investment Law, enacted in 2016, vastly simplified the process for investment applications and offers a number of tax breaks, incentives, guarantees, rights and protections for business ventures. The Myanmar Investment Commission (MIC) is a government-appointed body formed under the Myanmar Investment Law.

The law includes provisions to restrict or prohibit investment activities which affect public health, the environment and ecosystems, which produce toxic waste or which engage with toxic chemicals; duties of investors to conduct business in such a way as to avoid environmental damage, air and water pollution, in accordance with existing laws as per the following sections.

Chapter (12) Rights to Use Land, Section 50.

(a) An Investor who obtains a Permit or an Endorsement under this Law has the right to obtain a long-term lease of land or building from the private owned or from the relevant government departments, governmental organizations managed by the Government, or owned by the State in accordance with the stipulations in order to do investment. Citizen investors may invest in their own land or building in accordance with relevant laws.

(d) The investor shall register the land lease contract at the Office of Registry of Deeds in accordance with the Registration Act.

Chapter (13), Section 51

(c) shall appoint only citizens for works which does not require skill;

(d) shall appoint skilled citizen and foreign workers, technicians, and staff by signing an employment contract between employer and employee in accordance with the labor laws and rules;

(e) shall ensure to obtain the entitlements and rights in the labor laws and rules, including minimum wages and salaries, leave, holidays, overtime fees, damages, compensation of the workman, social welfare, and other insurance related to workers in stipulating the rights and duties of employers and employees and occupational terms and conditions in the employment contract;

(f) shall settle disputes arising among employers, among workers, between employers and workers, and technicians or staff in the investment in accordance with the applicable laws.

Chapter (16) Responsibilities of Investors, Section 65. The Investor –

(e) shall immediately inform the Commission if it is found that natural mineral resources or antique objects and treasure trove not related to the investment permitted above and under the land on which the investor is entitled to lease or use and not included in the original contracts. If the Commission allows, the investor shall continue to carry out the investment in such land, and if not allowed, the investor shall transfer and carry out, by obtaining the permission, at the substituted place which is selected and submitted by him;

(g) shall abide by the applicable laws, rules, procedures and best standards practiced internationally for this investment so as not to cause damage, pollution, and loss to the natural and social environment and not to cause damage to cultural heritage;

(i) shall close and discontinue the investment only after payment of compensation to employees in accordance with applicable laws for any breach of employment contracts, closure of investment, sale and transfer of investment, discontinuation of investment, or reduction of workforce;

(j) shall pay wages and salaries to employees in accordance with applicable laws, rules, procedures, directives and so forth during the period of suspension of investment for a credible reason;

(k) shall pay compensation and indemnification in accordance with applicable laws to the relevant employee or his successor for injury, disability, disease and death due to the work;

(l) shall supervise foreign experts, supervisors and their families, who employ in its investment, to abide by the applicable laws, rules, orders and directives, and the culture and traditions of Myanmar;

(m) shall respect and comply with the labor laws;

(n) shall have the right to sue and to be sued in accordance with the laws;

(o) shall pay effective compensation for loss incurred to the victim, if there is damage to the natural environment and socioeconomic losses caused by logging or extraction of natural resources which are not related to the scope of the permissible investment, except from carrying out the activities required to conduct investment in a Permit or an Endorsement.

(p) shall allow the Commission to inspect in any places, when the Commission informs the prior notice to inspect the investment;

(q) shall take in advance a Permit or an Endorsement of the Commission for the investments which need to obtain prior approval under the Environmental Conservation Law and the procedures of environmental impact assessment, before undertaking the assessment. Such investments shall be submitted the situation of environmental and social impact assessment to the Commission during the permitted investment period.

Section 71. In conducting their investment activities, the investor shall carry out health assessments, cultural heritage impact assessments, environmental impact assessments and social impact assessments according to the type of investment activities in accordance with the relevant laws, rules, regulations and procedures.

3.1.2.3 The Environment Conservation Law (2012)

The Environmental Conservation Law (Pyidaungsu Hluttaw Law No. 9 / 2012) has the following objectives:

a) to enable to implement the Myanmar National Environmental Policy;

b) to enable to lay down the basic principles and give guidance for systematic integration of the matters of environmental conservation in the sustainable development process;

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

d) to reclaim ecosystems as may be possible which are starting to degenerate and disappear;

e) to enable to manage and implement for decrease and loss of natural resources and for enabling the sustainable use beneficially;

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

g) to enable to promote international, regional and bilateral cooperation in the matters of environmental conservation;

h) to enable to cooperate with Government departments, Government organizations, international organizations, non-government organizations and individuals in matters of environmental conservation.

Section 7 of the law, the rights of the Committee are as follows:

(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 conservation works;

Chapter V

Environmental Emergency

Section 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

Section 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

Section 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.

Section 14 A person causing a point source of pollution shall treat, emit, discharge, and deposit the substances which cause pollution in the environment in accord with stipulated environmental quality standards.

Section 15 The owner or occupier of any business, material or place which causes a point source of pollution shall install or use an on-site facility or controlling equipment in order to monitor, control, manage, reduce, or eliminate environmental pollution. If it is impracticable, it shall be arranged to dispose the wastes in accord with environmentally sound methods.

Section 16 (a) is responsible to carry out by contributing the stipulated cash or kind in the relevant combined scheme for the environmental conservation including the management and treatment of waste;

(b) shall contribute the stipulated users' charges or management fees for the environmental conservation according to the relevant industrial estate, special economic zone and business organization;

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

Chapter VIII

Management of Urban Environment

Section 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 XII Prohibitions

Section 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.

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

Section 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

Section 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 XIII

Offences and Penalties

Section 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.

Section 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.

Section 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.

3.1.2.4 Environmental Conservation Rules (June 2014)

The Environmental Conservation Rules relating to the Environmental Conservation Law, were enacted in 2014 which contain specific items relating to IEE and pollution prevention which fall under the powers of the Ministry Natural Resources and Environmental Conservation.

Section 54. The business, department, organization or person who would carry out categories of plan, business or activity stipulated under rule 52:

(a) shall carry out environmental impact assessment for his plan, business or activity;

(b) submit to the Ministry in advance by which organization or person, the environmental impact assessment is intended to be carried out;

(c) submit the environmental impact assessment report to the Ministry.

Section 55. The plan, business or activity which is established before the issue of these rules and responsible to carry out the environmental impact assessment or initial environmental examination shall prepare the environmental management plan in accord with the environmental impact assessment procedure to be issued under the Law and submit to the Ministry. The Ministry shall scrutinize the environmental management plan for approving it. The person who carries out the project, business or activity shall implement the environmental management plan approved by the Ministry and matters stipulated by the Ministry within the time stipulated by the Ministry.

Section 56. The person who carries out any project, business or activity shall arrange and carry out for conducting the environmental impact assessment for any project, business or activity by a qualified third person or organization accepted by the Ministry.

Section 69.

(a) Any person shall not emit, cause to emit, dispose, cause to dispose, pile and cause to pile, by any means, the pollutants and the hazardous waste or hazardous material stipulated by notification under the Law and any of these rules at any place which may affect the public directly or indirectly.

(b) Any person shall not carry out to damage the ecosystem and the natural environment which is changing due to such system, except for carrying out with the permission of the Ministry for the interest of the people.

3.1.2.5 Environmental Impact Assessment Procedure (2015), Amendment (2019)

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.

CHAPTER VIII. Environmental Compliance Certificate, Conditions and Revisions to Conditions

Section 87. Upon receipt of the written approval from the relevant authority, the Project Proponent shall commence implementation of the Project strictly in accordance with the conditions attached to the ECC and including the EMP, within such time as may be prescribed by the Ministry.

Responsibility for all Adverse Impacts

Section 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.

Section 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.

Section 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.

Section 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.

Section 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.

Section 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.

Section 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.
Section 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.

Section 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.

Section 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.

Section 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.

3.1.2.6 National Environmental Quality (Emission) Guideline (2015)

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.

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.

3.1.2.7 Draft Guideline on Public Participation in Myanmar's IEE Processes (2017)

Section 1.2. Objectives and application

a) This Guideline provide an indication of the type, level and approach to public participation expected to give effect to the requirements for meaningful public participation in the EIA Procedure.

b) For the purposes of this Guideline, the term public participation is used to encompass the minimum requirements in the IEE Procedure, and recommendations on good practice that go beyond these minimum requirements, relating to:

(i) information disclosure;

(ii) consultation, including through meetings; and

(iii) the consideration of public views, concerns and inputs at all stages of the IEE process, including the decision-making steps.

c) In accordance with the IEE Procedure, this Guideline applies to the preparation, review, implementation and monitoring of the IEE process, which comprises:

(i) Initial Environmental Examinations (IEEs) (ii)Environmental Impact Assessments (EIAs) and (iii)Stand-alone Environmental Management Plans (EMPs)

d) The Guideline has been structured in line with the IEE Procedure and in the following way to enable users to focus on the parts of the IEE process relevant to a particular Project Proposal:

(i) Chapter 1 provides general provisions about the Guideline and its application

(ii) Chapter 2 provides information about planning public participation that should apply to all types of Project Proposals under the IEE Procedure

(iii) Chapter 3 applies to IEE Type Projects

(iv) Chapter 4 applies to IEE Type Projects (v) Chapter 5 applies to Project Proposals requiring a stand-alone EMP

(vi)Chapter 6 applies to the implementation of all projects that are approved following the IEE process.

e) This Guideline promotes public participation as early as possible in the development of project proposals and undertaking of IEE processes possible in order to maximize the benefits of relationship building between Project Proponents and local communities.

(i) In this context, while the IEE Procedure does not mandate public participation at the screening step, Project Proponents are encouraged to undertake public participation before and during screening in accordance with the principles and approaches in this Guideline.

(ii) Public participation is also important at this step because the screening decision may result in no further formal IEE process and therefore this may be the only opportunity for communities to contribute to a government decision in the IEE process.

f) This Guideline is to be adapted by Project Proponents, IEE Consultants and government agencies to the particular circumstances when implementing the public participation requirements under the IEE Procedure.

g) The Guideline is also intended to provide all stakeholders, including project affected people (PAP), with an understanding of the type of public participation that can be expected, subject to adaptation to fit the particular circumstances.
h) The Guideline may also be used to guide public participation processes in circumstances where public participation is not legally required, but is recognized to be beneficial to the development of the project proposal and relationships with PAP and other stakeholders.

i) Throughout this Guideline, a reference to a task or responsibility of the IEE Consultant should be understood as applying ultimately to the Project Proponent as the responsible and accountable party.

3.1.3 Project-Relevant 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 exists 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:

- Private Industrial Enterprise Law, 1990
- The Factories Act, 1951
- Myanmar Citizen Investment Law, 2013
- Public Health Law, 1972
- The Prevention and Control of Communicable Disease Law, 1995
- The Control of Smoking and Consumption of Tobacco Product Law, 2006 (Section 9)
- The Myanmar Fire Brigade Law, 2015 (Section 25)
- The Protection and Preservation of Antique Objects Law, 2015 (Section 12)

- The Protection and Preservation of Ancient Monument Law, 2015 (Section 12, 20(f) (c), 15(c))
- Labor Organization Law, 2011
- Employment and Skill Development Law, 2013 (Section 5, 14, 30)
- The Workmen Compensation Act, 1951
- Settlement of Labor Dispute Law, 2012
- Minimums Wages Law, 2013
- Payment of Wages Law, 2016- (3,4,8,7(ii),9,10(a) to e
- Social Security Law, 2012 - 11, 16(a), 48(a), 51(a) (b), 54
- Leaves and Holidays Act, 1951
- The Motor Vehicles and Safety Management Law, 2020
- Myanmar Insurance Law, 1993 (Section 16)
- The Underground Water Act, 1930
- The Prevention of Hazard from Chemical and related Substances Law, 2013 (Section 16,17,23,27)

- Export and Import Law, 2012 (Section 7)
- Conservation of Water Resources, Creeks and Rivers Law, 2006 (Section 24 (b), 21(a)(b), 19, 11(a) (b))

3.1.3.1 Private Industrial Enterprise Law, 1990

Section 3. Private Industrial Enterprises shall be conducted in accordance with the following basic principles:

(a) to enhance the higher proportion of the manufacturing value added in the gross national product and value of services, and to increase the production of the respective economic enterprises which are related to the industrial enterprise;

(b) to acquire modern technical know-how for raising the efficiency of industrial enterprises and to establish the sale of finished goods produced by the industrial enterprise not only in the local market, but also in the foreign market;

(c) to cause utilization by relying mainly as local natural resources;

(d) to cause narrowing down of the gap between rural development and urban development by causing the development and improvement of industrial enterprises;

(e) to cause opening up of more employment opportunities;

(f) to cause avoidance of or reduction of the use of technical know-how which cause environmental pollution;

(g) to cause the use of energy in the most-economical manner.

3.1.3.2 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.

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.

3.1.3.3 Myanmar Citizen Investment Law, 2013

Section 4. The followings are the basic principles under this law:

(a) Supporting the main objectives of the national economic development plan;

(b) Safeguarding the citizen obtained, should obtain economic enterprise and opportunities;

(c) Developing employment opportunities;

(d) Acquisition of high technology and development of manufacturing business by high technology;

(k) Revealing less energy consuming businesses;

(p) Participating investments in local development work, by emigrant citizen, intellectuals, intelligentsia, entrepreneurs;

(q) Developing intellectual property manufacturing and services;

(r) Supporting environmental conservation and protection.

Section 11. The duties of the commission are as follows:

(a) In scrutinizing the proposals of the investment, taking into consideration on the facts such as affecting national security, financial credibility, economic justification of the business, appropriateness of technology, protection and conservation of environment.

Section 15. The duties of an investor are as follows:

(f) Carrying out not to cause environmental pollution, damage in accord with existing laws in respect of investment business;

3.1.3.4 Public Health Law, 1972

Section 3 of the Public Health Law 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

Section 9 of this law empowers the Government 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. However, detailed provisions do not exist to ensure more effective and comprehensive regulation of these areas.

3.1.3.5 The Prevention and Control of Communicable Disease Law, 1995

The Prevention and Control for Communicable Diseases Law (No. 01/1995) (Revised in No. 16/2011) includes Provisions to prevent the outbreak of communicable diseases; regulate environmental sanitation; and measures in the event of a disease epidemic.

Section 8

Aim: For the prevention and control of Communicable Disease.

Under the supervision and guidance of the Health Officer of the relevant area, undertake the responsibility of carrying out the following environmental sanitation measures: -

(a) in-door, out-door sanitation or inside the fence outside the fence sanitation;

(b) well, ponds and drainage sanitation;

(c) proper disposal of refuse and destruction thereof by fire;

(d) construction and use of san1tary latrines; and

(e) other necessary environmental sanitation measures.

3.1.3.6 The Control of Smoking and Consumption of Tobacco Product Law, 2006 (Section 9)

The Control of Smoking and Consumption of Tobacco Product Law (No. 05/2006)

Chapter IV - Non-Smoking Areas

Section 6. The following compounds, buildings, rooms and places are non-smoking areas:

(a) hospital buildings, offices, compounds and other buildings in the compound except staff houses and apartments in the hospital compound;

(b) medical treatment centers and clinics;

(c) stadium and indoor playing fields;

(d) children drill sheds and playgrounds;

(e) teaching buildings, classrooms, offices, compounds and other buildings in the compound except staff houses and apartments in the school compound;

(f) teaching buildings of universities, degree colleges, colleges and institutes, classrooms and offices;

(g) opera houses, cinema halls, video halls and other buildings of entertainment;

(h) marts, department stores, stores and market sheds;

(i) museums, archives, public libraries and reading rooms;

(j) elevators and escalators;

(k) motor vehicles and aircrafts for passenger transport;

(l) air-conditioned public rooms;

(m) public auditoriums;

(n) teaching buildings and classrooms of private tuition classes and training schools;

(o) other public compounds, buildings and places prescribed through notification by the Ministry of Health.

Section 7. Places to which the public have access in the following buildings, vehicles and crafts are non- smoking areas except the private offices and rooms. However, specific places where smoking is allowed, shall be arranged in such areas:

(a) buildings of offices and departments;

(b) buildings of factories and workshops;

(c) buildings of hotels, motels, guest houses and lodging houses;

(d) buildings of railway stations, airports, ports and highway bus terminals;

(e) restaurants;

(f) trains and vessels for passenger transport:

(g) other public buildings, rooms and places prescribed through notification by the Ministry of Health.

3.1.3.7 The Myanmar Fire Brigade Law, 2015 (Section 25)

The Myanmar fire force law, 2015 covers requirements for firefighting and fire protection as follows)

Chapter (2)	Section (3-a, b, c, d)	It is covered all the issue of man-made disaster to the nations
Chapter (8)	Section (15-a, b, c, d), Section (17- a, b, c, d, e, f)	It is covered all the steps how to protect the fire issues
Chapter (11)	Section (24) Section (25-a, b) Section (26) (27), (28), (29), (30), (31), (32), (33)	Issue of Prohibitions and plan how to manage for firefighting
Chapter (12)	Section (34), (35), (36), (37), (38), (39)	Penalties
Chapter (13)	Section (40), (41), (42), (43), (44), (45), (46), (47)	General Information to protect laws regulations and penalties

3.1.3.8 The Protection and Preservation of Antique Objects Law, 2015 (Section 12)

The Protection and Preservation of Antique Objects Law (No. 43/2015) covers requirements for the finding of antique objects.

Section 12. The person who finds any object which has no owner or custodian, he shall promptly inform the relevant Ward or Village-Tract Administrator if he knows or it seems reasonable to assume that the said object is an antique object.

Section 13.

(a) If the information is received under section 12, the Ward or Village- Tract Administrator shall keep the said object as may be necessary and shall forward the information to the relevant Township Administrative Office within 14 days. The Township Administrator shall promptly carry out the necessities and inform the Department within 7 days from the date on which the information is received;

(b) The Department shall inspect whether it is a real antique object or not and keep or cause to keep as may be necessary in accord with the stipulations when the information is received under sub- section (a).

3.1.3.9 The Protection and Preservation of Ancient Monument Law, 2015 (Section 12, 20(f) (c), 15(c))

The Protection and Preservation of Ancient Monuments Law (No. 51/2015)

Section 12. If a person who finds an ancient monument of over one hundred years old and above or under the ground or above or under the water which has no owner or custodian knows or it seems reasonable to assume that the said monument is an ancient monument, he shall promptly inform the relevant Ward or Village-Tract Administrative Office.

Section 13.

(a) If the information is received under Section 12, the Ward or Village- Tract Administrator shall keep the said monument as may be necessary and shall forward the information to the relevant Township Administrative Office within 14 days. The Township Administrator shall promptly carry out the necessities and inform the Department within 7 days from the date on which the information is received.

(b) The Department shall inspect whether it is a real ancient monument or not and keep or cause to protect as may be necessary in accord with the stipulations when the information is received under sub-section (a).

Chapter VII. Applying for prior Permission, Scrutiny and Issue

Section 14. Any Department, any organization or any person desirous of any of the followings shall abide by the provisions of other existing laws and apply for the prior permission under this Law to the Department in accord with the stipulations:

(a) repairing and maintaining the whole or a part of an ancient monument without altering its original form or its original workmanship or altering the boundary of its enclosure;

(e) surveying, digging and researching places where an ancient monument is situated;

Section 15. A person aiming at realizing any of the followings within the specified area of an ancient monument shall apply to get prior permission to the Department:

(b) constructing or extending or repairing new buildings including hotels, factories and residential buildings or fencing or extending a fence;

(c) digging to search petroleum, natural gas, gem or mineral, piping petroleum and natural gas, constructing factories, connecting national grid, constructing communication tower, constructing or extending infrastructures such as road, bridge, airfield, irrigation and embankment;

(d) connecting underground electric cable, communication cable and other underground works;

(f) gold sieving, digging, burning bricks, digging well, lake, creek, ditch, gully, pit digging, refilling, levelling, mining, quarry, gravel digging and unearth sand, removing the mounds and hills which can damage the physical feature of the land;

Chapter VIII Prohibitions

Section 19. No one shall carry out any of the following acts within the specified campus of an ancient monument without the written permission of the Department:

(a) destroying or damaging an ancient monument;

(b) carrying out to alter the original form or the original workmanship of an ancient monument;

(c) digging to search for remains;

(d) looting and removing original elements and artefacts from an ancient monument.

Section 20. No one shall carry out any of the following acts which are assumed to cause damage to an ancient monument within the specified area of an ancient monument or of a listed ancient monument without a written prior permission:

(b) using machines which causes vibration within the specified place of an ancient monument and running various types of vehicles;

(c) cultivating, gardening, breeding, fencing by blocking nearby an ancient monument or doing any other act which can affect an ancient monument;

(d) emission of gas such as hot-air balloon which can affect an ancient monument;

(e) landing and taking off and, flying aero-plane and helicopter which can directly or indirectly affect an ancient monument;

(f) discarding chemical substance and rubbish which can affect an ancient monument and the environment.

3.1.3.10 Labor Organization Law, 2011

The Labor Organization Law, (No. 07/2011) and The Labor Organization Rules, 2012 were enacted to protect the rights of the workers, to have good relations among the workers or between the employer and the worker, and to enable to form and carry out the labor organizations systematically and independently.

Section 3. Every worker, who has attained the age prescribed in respective existing law to work in any trade or activity shall have the right to:

(a) join as a member in a labor organization and to resign from a labor organization according to their own desire;

(b) join as a member only in a labor organization formed according to the category of trade or activity relating to them.

Section 29. The employer shall recognize the labor organizations of his trade as the organizations representing the workers.

Section 30. The employer shall allow the worker who is assigned any duty on the recommendation of the relevant executive committee to perform such duty not exceeding two days per month unless they have agreed otherwise. Such period shall be deemed as if he is performing the original duty of his work.

Section 31. The employer shall assist as much as possible if the labor organizations request for help for the interest of his workers. However, the employer shall not exercise any acts designed to promote the establishment or functioning of labor organizations under his domination or control by financial or other means.

Section 49. No person shall coerce, threaten, use undue influence or seduce by illegal means any worker to participate or not to participate in a labor organization.

Section 50. No person shall:

(a) interfere or obstruct the executive committees in performing duties and powers contained in this Law;

(b) in respect of labor affairs, carry out demonstrations within 500 yards from hospitals, schools, religious buildings, airports, railways, bus terminals, ports or diplomatic missions and military or police installations.

3.1.3.11 The Development of Employees and Expertise (Skill), 2013 (Section 5, 14, 30)

Employment and Skill Development Law (No 29/2013)

Section 5.

(a) (1) If the employer has appointed the employee to work for an employment, the employment agreement shall be made within 30 days. But it shall not be related with government department and organization for a permanent employment.

(2) If pre-training period and probation period are stipulated before the appointment the said trainee shall not be related with the stipulation of sub-section (1).

(b) The following particulars shall be included in the employment agreement:

(1) the type of employment;

(2) the probation period;

(3) wage, salary;

(4) location of the employment; (5) the term of the agreement; (6) working hour;

(7) day off, holiday and leave; (8) overtime;

(9) meal arrangement during the work hour;

(10) accommodation;

(11) medical treatment;

(12) ferry arrangement to worksite and travelling;

(13) regulations to be followed by the employees;

(14) if the employee is sent to attend the training, the limited time agreed by the employee to continue to work after attending the training;

(15) resigning and termination of service;

(16) termination of agreement;

(17) the obligations in accord with the stipulation of the agreement;

(18) the cancellation of employment agreement mutually made between employer and employee;

(19) other matters;

(20) specifying the regulation of the agreement, amending and supplementing;

(21) miscellaneous.

(c) The worksite regulations contained in the employment agreement shall be in compliance with any existing law and the benefits of the employee shall not be less than those of the any existing law.

(d) According to the employment agreement, the Ministry shall issue the notification for paying the stipulated compensation to the employee by the employer, if the work is completed earlier than the stipulated period or the whole work or any part of it have to be terminated due to unexpected condition or the work has to be terminated due to various conditions.

(e) The employment agreement made under sub-section (a) shall be related with daily wage workers, piece rate workers who are appointed temporarily in the government department and organization.

(f) The worksite regulations and benefits contained in the employment agreement mutually made between the employer and employee or among the employees shall be amended as necessary, in accord with the existing law.

(g) The employer shall send a copy of the employment agreement made between the employer and employee, to the relevant employment and labor exchange office within the stipulated period and shall get the approval of it.

(h) The employment agreement made before the enforcement of this law shall be confirmed up to the end of the term of the original agreement.

Section 14. The employer shall carry out the training program in accord with the work requirement in line with the policy of the skill development team to develop the skill relating to the employment for the workers who are proposed to appoint and working at present.

Section 30.

(a) The employer of the industry and service business shall put in to the fund monthly as put in fees without fail for the total wages of the subordinates and the supervisors' salary for not less than 0.5%;

(b) Put in money paid under sub-section (a) shall not be deducted from the wage and salary of the employees.

3.1.3.12 The Workmen Compensation Act, 1951

Workman's Compensation Act (1923) Amended by Law No 4/2005

Section 10 (A): Power to Require from Employers, Statements Regarding Fatal Accidents

(1) Where a commissioner receives information from any source that a workman has died as a result of an accident arising out of, and in the course of, his employment, he may send by registered post a notice to the workman's employer requiring him to submit, within thirty days of the service of the notice, a statement, in the prescribed form, giving the circumstances of the death.

(2) If the employer is of opinion that he is liable to deposit compensation, he shall make the deposit within thirty days of the service of the notice.

(3) If the employer is of the opinion that he is not liable to deposit compensation, he shall in his statement indicate the grounds on which he disclaims liability.

(4) Where the employer has so disclaimed liability, the Commissioner after such inquiry as he may think fit, may inform any of the dependents of the deceased workman that it is open to the dependents to prefer a claim for compensation, and may give them such other further information as he may think fit.

Section 10 (B): Reports of Fatal Accidents

(1) Where, by any law for the time being in force, notice is required to be given to any authority, by or on behalf of an employer of any accident occurring on his premises which results in death, the person required to give the notice shall, within seven days of the death, send a report to the Commissioner, giving the circumstances attending the death;

(2) Provided that, where the President of the Union has so prescribed, the person required to give the notice may, instead of sending such report to the Commissioner. Send it to the authority to whom he is required to give the notice.

(3) The President of the Union, may by notification in the Gazette, extend the provisions of subsection (1) to any class of premises other than those coming within the scope of that sub-section, and may by such notification, specify the persons who shall send the report to the Commissioner.

Section 11: Medical Examination

(a) Where a workman has given notice of an accident, he shall, if the employer, before the expiry of three days from the time at which service of the notice has been effected, offers to have him examined free of charge by a qualified medical practitioner, submit himself for such examination; and any workman who is in receipt of a half-monthly payment under this Act shall, if so required, submit himself for such examination from time to time:

(b) If the commissioner considers it necessary for the settlement of any question arising in any proceedings under this Act, he may require a workman who has given notice of an accident to submit himself for examination by a medical practitioner, and the cost of such medical examination, if any, shall be payable by the employer; Provided that a workman shall not be required to submit himself for examination by a medical practitioner otherwise than in accordance with rules made under this Act or at more frequent intervals than may be prescribed.

(1) If a workman, on being required to do so by the employer under sub-section (I) or by the Commissioner at any time refuses to submit himself for examination by a qualified medical practitioner or in any way obstructs the same, his right to compensation shall be suspended during the continuance of such refusal or obstruction unless, in the case of refusal he was prevented by sufficient cause from so submitting himself.

(2) If a workman, before the expiry of the period within which he is liable under subsection (1) to be required to submit himself for medical examination voluntarily leaves without having been so examined, his right to compensation shall be suspended until he returns and offers himself for such examination.

(3) Where a workman, whose right to compensation has been suspended under sub-section (2) or subsection (3), dies without having submitted himself for medical examination as required by either of those sub-sections, the Commissioner may, if he thinks fit direct the payment of compensation to the dependents of the deceased workman.

(4) Where under sub-section (2) or sub-section (3) a right to compensation is suspended, no compensation shall be payable in respect of the period of suspension.

(5) Where an injured workman has refused to be attended by a qualified medical practitioner whose services have been offered to him by the employer free of charge, or having accepted such offer has deliberately disregarded the instructions of such medical practitioner then if it is thereafter proved that the workman has not been regularly attended by a qualified medical practitioner and that such refusal, failure or disregard was unreasonable in the circumstances of the case, and that the injury has been aggravated thereby, the injury and resulting disablement shall be deemed to be of the same nature and duration as they might reasonably have been expected to be if the workman had been regularly attended by a qualified medical practitioner, and compensation, if any, shall be payable accordingly.

3.1.3.13 Settlement of Labor Dispute Law, 2012

Settlement of Labor Dispute Law (No. 05/2012) Amended by Law No. 40/2014 was enacted for the settlement of labor disputes:

Section 23. A party, employer or worker, may complain individual dispute relating to his grievance to the Conciliation Body and if he is not satisfied with the conciliation of such body in accord with stipulated manners, may apply to the competent court in person or by the legal representative.

Section 38. No employer shall fail to negotiate and coordinate in respect of the complaint within the prescribed period without sufficient cause.

Section 39. No employer shall alter the conditions of service relating to workers concerned in such dispute at the consecutive period before commencing the dispute within the period under investigation of the dispute before the Arbitration Body or Tribunal, to affect the interest of such workers immediately.

Section 40. No party shall proceed to lock-out or strike without accepting negotiation, conciliation and arbitration by Arbitration Body in accord with this law in respect of a dispute.

Section 41. No person shall carry out lock-out or strike to amend such decision or agreement within the effective period of the decision of the Arbitration Body or the Arbitration Council or any collective agreement.

Section 42. No person shall prohibit the right to work independently of the workers who are not desirous to participate in the strike nor impede the right of a worker to strike.

Section 43. No person shall fail to abide by or carry out any condition contained in agreement concluded before the Conciliation Body in respect of individual dispute or collective dispute.

Section 44. No person, after having informed in advance by the Arbitration Body or Tribunal for settling the dispute, shall fail to arrange to enable to examine the trade under dispute or to produce the documents which is considered by the Arbitration Body or Tribunal that it concerns with the dispute or to appear as a witness when he is so summoned.

Section 45. No person, if he is sent notice for examination before the Arbitration Body or Tribunal, shall fail without sufficient cause to appear in person or to send legal representative within the stipulated period.

3.1.3.14 Minimums Wages Law, 2013

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. The employer:

(a) shall not pay wage to the worker less than the minimum wage stipulated under this Law;

(b) may pay more than the minimum wage stipulated under this Law;

(c) shall not 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) shall 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;

(e) in paying minimum wage to the workers working in the agricultural and livestock business, some cash and some property at prevailing regional price may be paid jointly according to local custom or desire of the majority of workers or collective agreement. Such payment shall be for any personal use and benefit of the worker and his family and the value shall also be considerable and fair.

Section 13. The employer:

(a) shall 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) shall prepare and maintain the lists, schedules, documents and wages of the workers correctly;

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

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

(e) shall 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. Any employer:

(a) shall not fail to pay the workers the minimum wage stipulated under this Law;

(b) shall not 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) shall not 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) shall not fail to go and accept inspection when summoned by the inspection officer;

(e) shall not obstruct or interfere with the inspection officer who comes and inspects on duty.

Section 24. Any employer:

(a) shall not violate any term and condition contained in the minimum wage notification;

(b) shall not 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;

The Minimum Wages Rules, 2013 include:

Chapter 9 - The power and obligations of the employers
Section 43.

The employer:

(a) shall increase the remuneration depending on the skill, to promote the productivity and the employment skill of the employees;

(b) shall perform in accord with the factory act 1951, leave and holiday act 1951 under section 13 (b) at the law for the list, schedule and document, remunerations;

(c) when the employees are not able to work due to ill health, injury at work site:

(i) if they are under premium paid insurance to the health and social care fund, the insurance under health and social security care 2012, or

(ii) if they are not entitled to enjoy social security law 2012, they must be arranged to enjoy the leave and holiday act 1951.

(d) in the event of family or parent's funeral affairs, his entitled remuneration should not be deducted and shall be arranged to enjoy according to leave and holiday act 1951;

(e) before fixing of the minimum wage by the National Committee under this rule, if his remuneration is less than the prescribed amount, he should be paid up to the full amount;

(f) part time, hourly job employees shall be paid the prescribed minimum wage for the working hours;

(g) for the salary employees one day day-off shall be allowed in a week. If he has to work on the off day, overtime wage shall be paid in accord with the existing law;

(h) if the employee has to work less than the prescribed working hour and if it is not due to his will or he has to stop the work due to the shortage of work from the employer, he shall be entitled to enjoy the remuneration as if he has to work full time;

(i) the prescribed minimum wage shall be paid without discrimination of the male or female;

(j) although he has the obligation to pay the minimum wage in cash, separate entitlement, benefit in accord with the stipulation shall be given due to the employee's will, majority of the employees' will, collective consent, in cash or partial in cash or prevailing regional rate or regional tradition;

(k) overtime work shall be allowed according to the law after negotiation with the employees;

(l) the employee who is not capable to fulfill the standard norm or production norm prescribed in accord with the factory, workshop, department, shall be trained to be skillful in the probation period. If necessary, the relevant factory, workshop, departments under this law shall be paid for not less than 50% of the remuneration within three months. In the probation period 75% of the remuneration shall be paid.

3.1.3.15 Payment of Wages Law, 2016- (3, 4, 8, 7(ii), 9, 10 (a) to e

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
Chapter (7)	Section (22), Section (23)	Prohibitions
Chapter (8)	Section (24), (25), (26), (27), (28), (29), (30)	General Information to protect laws regulations and penalties

3.1.3.16 Social Security Law, 2012 - 11, 16(a), 48(a), 51(a) (b), 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:

(i) employers of establishments;
(ii) 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;
(iii) 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.

3.1.3.17 Leaves and Holidays Act, 1951

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.

3.1.3.18 The Motor Vehicles and Safety Management Law, 2020

The Motor Vehicle Law No. 55/15. The Union Parliament has enacted this law.

Section 49. No one shall do the following in public places:

(a) Driving above the speed limit or below the minimum speed.

(b) Driving a dangerous motor vehicle.

(c) Driving a motor vehicle under the influence of drugs and intoxicants or alcohol.

Section 54. No one shall do the following:

(c) Driving a motor vehicle loaded above the loading capacity.

(f) Driving a motor vehicle in violation of any provisions of the by-laws related to the pedestrian crossing.

(g) Changing, without legal permission or reasons backed up by evidence, a vehicle to lose its original type and physical appearance, altering parts of machinery equipment, or changing the conditions stated in the motor vehicle inspection certificate.

Section 65. If anyone is found guilty of breaching any provisions stated in the by-laws issued in accordance with this law, he/she shall bare a punishment of a fine worth not more than thirty thousand kyats.

Section 75. The ministry shall include one or all of the following in releasing the by-laws.

(c) Issues relating to the building of a motor vehicle, building of a carriage, installation of parts and equipment, and maintenance.

(d) Specifying the type of motor vehicle, the weight and the maximum load.

(f) Private industry of motor vehicle inspection

(h)Matters to be carried out by the responsible person for the driver and motor vehicle in the event of an accident caused by the motor vehicle.

(j) Matters related to the reduction of the environmental impact caused by the motor vehicle.

3.1.3.19 Myanmar Insurance Law, 1993 (Section 16)

Requires any business which may pollute the environment to effect compulsory general liability 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 cause pollution to the environment shall

affect compulsory general liability insurance with Myanmar government.

3.1.3.20 The Underground Water Act, 1930

The Underground Water Act, 1930 provides measures for systematic and sustainable use of underground water and prohibitions on accessing and using underground water without a license.

Whereas it is expedient to conserve and protect underground sources of water supply in the Union of Burma; it is hereby enacted as follows:

Section 1. This Act extends to such areas as the President of the Union may, by notification,1 direct and shall apply only to tubes exceeding a depth to be prescribed by the President of the Union: Provided that the President of the Union may prescribe different depths for different local areas.

Section 3. No person shall sink a tube for the purpose of obtaining underground water except under and in accordance with the terms of a license granted by the water officer. Every person owning a tube which was in existence before the extension of this Act to the local area concerned shall apply to the water officer for a license for the said tube, and such license shall be granted free of charge.

Section 4.

(1) Any Magistrate taking cognizance of an offence under section 3 may at any time order the tube in respect of which the offence has been or is alleged to have been committed to be forthwith closed until such time as a license for the same has been taken out in accordance with the provisions of the said section.

(2) If the order for the closure of a tube under sub-section (1) is not complied with, the Deputy Commissioner, Sub divisional Officer or Township Officer exercising jurisdiction over the local area concerned may cause the said tube to be closed, and the expense of such closure shall be recoverable from the owner of the tube as if it were an arrear of land-revenue.

Section 5. Every person obtaining or attempting to obtain underground water shall supply the water officer with such information as the President of the Union may by rule prescribe.

3.1.3.21 The Prevention of Hazard from Chemical and related Substances Law, 2013 (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.

3.1.3.22 Export and Import Law, 2012 (Section 7) Chapter IV Prohibitions
Section 5. No person shall export or import restricted, prohibited and banned goods.

Section 6. Without obtaining license, no person shall export or import the specified goods which is to obtain permission.

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

3.1.3.23 Conservation of Water Resources and Rivers Law, 2006 (Section 24 (b), 21(a), (b), 19, 11(a) (b))

The Conservation of Water Resources and Rivers Law (2006) was promulgated on 2nd October 2006. The aims of this Law are as follows:

- To conserve and protect the water resources and rivers system for beneficial utilization by the public;
- To ensure smooth and safe waterways navigation along rivers and creeks;
- To contribute to State economic development through improving water resources and river systems; and
- To protect environmental impact.

Section 11. No person shall:

(a) dispose of engine oil, chemical, poisonous material and other materials which may cause environmental damage, or dispose of explosives from the bank or from a vessel which is plying, vessel which has berthed, anchored, stranded or sunk.

(b) catch aquatic creatures within river-creek boundary, bank boundary or waterfront boundary with poisonous materials or explosives.

Section 19. No one shall dispose of any substance into the river-creek that may cause damage to waterway or change of watercourse from the bank or vessel which is plying, vessel which has berthed, anchored, stranded or sunk.

Section 21. No one shall:

(a) build lavatories unsuitable to the urban and rural community lifestyle in the bank area and watercourse area.

(b) drill well or pond or dig earth without the permission of the Directorate.

Section 24. No one shall:

(a) violate the conditions relating to navigation of vessels in rivers and creeks prescribed by the Directorate for conservation of water resources, rivers and creeks.

(b) violate the conditions prescribed by the Directorate so as not to cause water pollution and change of watercourse in rivers and creeks.

3.1.3.24 Employment and Skill Development 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.

(a) (1) If the employer has appointed the employee to work for an employment, the employment agreement shall be made within 30 days. But it shall not be related with government department and organization for a permanent employment.

(2) If pre-training period and probation period are stipulated before the appointment the said trainee shall not be related with the stipulation of sub-section (1).

(b) The following particulars shall be included in the employment agreement:

1. the type of employment;
2. the probation period;
3. wage, salary;
4. location of the employment;
5. the term of the agreement;
6. working hour;
7. day off, holiday and leave;
8. overtime;
9. meal arrangement during the work hour;
10. accommodation;
11. medical treatment;
12. ferry arrangement to worksite and travelling;
13. regulations to be followed by the employees;
14. if the employee is sent to attend the training, the limited time agreed by the employee to continue to work after attending the training;
15. resigning and termination of service;
16. termination of agreement;
17. the obligations in accord with the stipulation of the agreement;
18. the cancellation of employment agreement mutually made between employer and employee; other matters;
19. specifying the regulation of the agreement, amending and supplementing;
20. miscellaneous.

I The worksite regulations contained in the employment agreement shall be in compliance with any existing law and the benefits of the employee shall not be less than those of the any existing law.

(d) According to the employment agreement, the Ministry shall issue the notification for paying the stipulated compensation to the employee by the employer, if the work is completed earlier than the stipulated period or the whole work or any part of it have to be terminated due to unexpected condition or the work has to be terminated due to various conditions.

I The employment agreement made under sub-section (a) shall be related with daily wage workers, piece rate workers who are appointed temporarily in the government department and organization.

(f) The worksite regulations and benefits contained in the employment agreement mutually made between the employer and employee or among the employees shall be amended as necessary, in accord with the existing law.

(g) The employer shall send a copy of the employment agreement made between the employer and employee, to the relevant employment and labor exchange office within the stipulated period and shall get the approval of it.

(h) The employment agreement made before the enforcement of this law shall be confirmed up to the end of the term of the original agreement.

Section 14. The employer shall carry out the training program in accord with the work requirement in line with the policy of the skill development team to develop the skill relating to the employment for the workers who are proposed to appoint and working at present.

Section 30.

(a) The employer of the industry and service business shall put in to the fund monthly as put in fees without fail for the total wages of the subordinates and the supervisors' salary for not less than 0.5%;

(b) Put in money paid under sub-section (a) shall not be deducted from the wage and salary of the employees.

3.1.3.25 The Prevention and Control of Communicable Disease Law, 1995

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 3, 4, 11.
Section 3. In order to prevent the outbreak of Communicable Diseases, the Department of Health shall implement the following project activities:-
(a) immunization of children by injection or orally;
I carrying out health educative activities relating to Communicable Diseases.

Section 4. When a Principal Epidemic Disease of a Notifiable Disease occurs;-
a) immunization and other necessary measures shall be undertaken by the Department of Health, in order to control the spread thereof;
b) the public shall abide by the measures undertaken by the Department of Health under sub- section (a).

Section 11.
In order to prevent and control the spread of a Principal Epidemic Disease, the Health Officer may undertake the following measures;-
a) investigation of a patient or any other person required;
b) medical examination;
c) causing laboratory investigation of stool, urine, sputum and blood samples to be carried out;
d) causing investigation by injection to be carried out;

e) carrying out other necessary investigations;

3.1.3.26 Yangon City Development Committee Law (2018)

Section 317
The proponent shall not block the natural river channel, change the course, and disrupt the water channel, filling with soil within the city boundaries without the consent of the Committee.

Section 318
The project proponent shall not construct buildings, factories, and industries without sewage, toilet, septic tanks, and wastewater treatment system.

Section 322
The project proponent is not allowed to make activities that will produce noise pollution, water pollution, air pollution, and soil pollution to impact the environment within the city's boundaries.

3.1.3.27 Occupational Safety and Health Law, 2019

The project proponent has to comply Section 12,
The project proponent has to comply in accordance with the stipulations of the Ministry:
(a) appoint the Person In-charge for Occupational Safety and Health to closely supervise safety and health of Workers in line with the type of Industry/Business; and
(b) form the respective Occupational Safety and Health Committee in line with the type of Industry/Business comprising equal number of Employer and Worker representatives to become safe and healthy Workplace on condition that the number of Workers in his/her Industry/Business exceeds the number determined by the Ministry for that purpose. The Occupational Safety and Health of female Workers shall be considered according to the nature of Industry/Business when forming such Occupational Safety and Health Committee.
The project proponent has to comply with Section 14,
The project proponent make persons In-charge for Occupational Safety and Health comply with this Law and rules, orders, directives and procedures made under this Law to make the Workplace to be a safe Workplace that is good for health.
The project proponent has to comply with Section 26,
The has to be responsible to: -
(a) arrange as required to assess the risks of Workplace, Process and machines and materials used thereat;
(b) arrange as required to assess the likelihood of occurrence of hazards at the Workplace and to the environment;
(c) arrange to have Workers medical checked-up by the Recognized Doctor in accordance with stipulations whether they suffer from any Occupational Disease;
(d) arrange to improve the Workplace until it is safe and good for health based on the findings as per sub-sections (a), (b) and (c);
(e) provide Workers with sufficient number of personal protective clothing, materials and facilities prescribed and approved by the Department on free of charge basis and cause Workers to wear them while working;
(f) prescribe precautionary plans and plans for emergency;
(g) provide a clinic, appoint the Registered Doctors and nurses and provide medicines and supporting equipment for any Industry/Business where the number of Workers is not less than the number determined by the Ministry;
(h) make necessary arrangements for managers, Workers and members of the Occupational Safety and Health Committee including (Employer) himself/herself to attend Occupational Safety and Health training courses stipulated by the Ministry in accordance with their departments or types of work;
(i) make necessary arrangements to enable immediate reporting to the Person In-charge for Occupational Safety and Health or manager in case where a Worker suffers an Occupational Accident or his/her life or health is likely to be in danger;

(j) arrange to prevent any persons in the Workplace from Occupational Safety and Health risks occurred due to materials, machines or wastes used in the Workplace or Process;
(k) immediately stop the Process, evacuate Workers and conduct necessary rescue plans if any Occupational Accident is about to occur. If possible, Workers will be relocated to another appropriate safe Workplaces;
(l) display Occupational Safety and Health instructions, danger signs, notices, posters and signage for directions in accordance with stipulations;
(m) arrange to be complied with precautions when entering restricted hazardous Workplaces;
(n) arrange to disseminate Occupational Safety and Health manuals and guidelines issued by the relevant Ministries for knowledge, technology, information and skills not only to Workers but also to related persons or raise their awareness or knowledge thereof;
(o) lay down the fire safety plan, perform fire drilling and train Workers to use fire extinguishers systematically;
(p) allow the Chief Inspection Officer and Inspection Officers to enter Workplaces, inquire, request documents and information or seize exhibits;
(q) cause Workers to work only for the specified working hours if they have to work in Hazardous Industry/Business and Workplace; and
(r) Incur the expenses for Occupational Safety and Health matters.
The project proponent has to comply with Section 27,
No Employer has to dismiss or demote a Worker: -
(a) during any period before a medical certificate is issued by the Registered Doctor for occupational injury or by the Recognized Doctor for contact with Occupational Disease;
(b) because the said Worker has addressed a complaint for hazardous or health detrimental condition;
(c) because the said Worker has conducted the responsibilities of Occupational Safety and Health Committee; or
(d) because the said Worker has refused to work in any condition where an Occupational Accident or Occupational Disease is about to occur.

The project proponent has to comply with Section 28,

If any Worker who has been injured due to an Occupational Accident or contacted with Occupational Disease is not covered under the Social Security Law 2012, the Employer must pay for medical expenses to check the extent of capacity reduction and class of disability of such Worker.

The project proponent has to comply with Section 29,

The project proponent
(a) can prohibit or restrict any Worker to work if he/she does not meet the health standards due to medical check-up results done by the Registered Doctor in accordance with the needs and nature of the Industry/Business;
(b) must, without delay, employ any Worker who has been prohibited or restricted to work subject to sub-section (a) in his/her original position or at the relevant Workplace upon his/her submission of health improvement evidence; and
(c) must make necessary arrangements in the Workplace in order not to damage health of female Workers who are pregnant or breast-feed.

The project proponent has to comply with Section 48,

(a) Any person who is currently operating or wants to operate any Industry/Business to which this Law applies shall not fail to lodge the registration with the Department.
(b) No one shall fail to notify the Department in accordance with the stipulations that he/she will build, extend or restructure a building, place, install, extend or change the use of machines in respective Processes for the Industry/Business to which this Law applies in accordance with Occupational Safety and Health stipulations.

The project proponent has to comply with Section 49,

No Employer: -
(a) shall fail to comply with an order to close the Workplace temporarily in accordance with Section 18;
(b) shall fail to comply with the conditions prescribed under Section 20 sub-section (b);
(c) shall fail to comply with the instructions issued by the Inspection Officer in accordance with Section 21 sub-section (a);

(d) shall ask Workers to work for more than the specified hours in accordance with Section 26 sub-section (q); or
(e) shall fail to pay for Occupational Safety and Health expenses subject to Section 26 sub- section (r)

3.1.3.28 The Copyright Law (2019)

The project proponent will comply with this related law which, either directly or indirectly, relates to environmental and social management of the project as the following sections.

Chapter (9), Section (17) Term of Copyright
Although literary or artistic works are not registered under this Law:
(a) the term of protection for economic rights are as follows:
(i) the life of the author and 50 years after the year of his death;
(ii) the life of the last surviving author and 50 years after the year of his death in the case of a literary or artistic work of joint authorship;
(iii) 50 years after the year of the work has been made available to the public with the consent of the author, or, failing such an event, 50 years after the making of such a work in the case of a cinematographic work or an audiovisual work;
(iv) 50 years after the year of the work has been lawfully made available to the public in the case of a literary or artistic work published anonymously or under a pseudonym provided that where the author's identity is revealed before the expiration of the said period, the terms shall be the same as in clauses (i) and (ii) of this subsection;
(v) 50 years after the year of the work has been created, lawfully made available to the public or firstly published by Governmental department and Governmental organization for which it is the first owner of the copyright, whichever year is later in the case of a literary or artistic work of Governmental department or Governmental organization except the matters unprotected under section 16;
(vi) 25 years from the making of the work in the case of a work of applied art;
(b) the term of protection for moral rights shall be the life of the author and for an unlimited period after his death.
(c) the term of protection provided by subsection (a) shall always be counted beginning on the first of January of the year following the death of the author or the work has been created, lawfully made available to the public or first published.

Chapter (10), Section (18), Economic Rights and Moral Rights

Without contrary to the provisions in Chapter XII of this Law, the author or owner of copyright shall have the exclusive economic rights to carry out or to authorize any other person to carry out the following:
(a) reproduction;
(b) translation, adaptation, arrangement or other alteration or modification;
(c) distribution of the origin or a copy of the work to the public through sale or other transfer of ownership;
Proviso: The right of distribution does not apply to the original or a copy of the work that has already been subject to a sale or transfer of ownership anywhere with the authorization of the author or owner of copyright.
(d) rental of the original or a copy of computer programme, an audiovisual work, a cinematographic work, a literary or artistic work embodied in a phonogram, a database or a musical work in the form of notation to the public; Proviso: Provided that the rights of rental do not apply to rental of computer programs where the program itself is not the essential object of the rental;
(e) public performance;
(f) broadcasting;
(g) communication to the public by any other means; (h) collection of literary or artistic works of his creation.

Section (19) The author or owner of copyright may transfer the economic rights to any person in accordance with the provisions contained in Chapter XIII of this Law.

Section (20) The author, even where he is no longer the owner of the rights under section 18 regarding the literary or artistic work, shall have the following exclusive moral rights:
(a) right to claim authorship and to have his name indicated as the author on the copies of any public use of his

literary or artistic work;
(b) right to use a pseudonym if it was originally described on copies of a literary or artistic work lawfully made available to the public;
(c) right to object to any distortion, mutilation or other modification of, or other derogatory action in relation to his literary or artistic work which would be prejudicial to his honor or reputation.

Section (21)

(a) If the author is already dead, his inheritor according to the testament or law or a person or legal entity which has been transferred under the law before the death of the author has right to exercise any of exclusive moral rights in section 20;
(b) The author may waive the exercise of their moral rights for specific uses provided that such waiver is made in a signed, written agreement.

Chapter (15), Protection of Copyright or Related Rights Management Information and of Technological Protection Measures

Section (43)

(a) With respect to the protection of copyright or related rights management information:
(i) any electronic rights management information shall not be removed or altered without consent of the right holder;
(ii) literary or artistic work or objects of related rights or other subject-matters protected under this Law shall not be carried out for distribution, importation for distribution, broadcasting or communication to the public after they have been removed or altered as mentioned in clause (i).
(b) provision of subsection (a) shall not apply to any governmental activities for public policy or security authorized by law.

Section (44)

With respect to the technological protection measures:
(a) the technological protection measures shall not be circumvented, removed, deactivated, or destroyed: 31 Explanation: Circumvention of technological protection measures includes descrambling a scrambled literary or artistic work or objects of related rights.
(b) devices, products, components or services for commercial purposes of circumventing effective technological protection measures, enabling or facilitating circumvention of effective technological protection measures shall not be produced, imported, distributed, sold, rent, advertised for sale or rental, or possessed.

Section (45)

(a) Notwithstanding the provisions of section 44, the beneficiary person or entity that are entitled to exceptions and limitations in subsections (a) and (b) of section 27, subsection (b) of section 28 and section 33 may enjoy circumvention of such measures for using the works protected by technological measures.
(b) The provision of subsection (a) shall not apply to literary or artistic works or objects of related rights or other literary or artistic subject-matters made available to the public on agreed contractual terms to access them from a place or at a time individually chosen by them.

Chapter (16), Registration of Copyright or Related Rights

Section (46)

Under this law, any author or owner of copyright who wishes to register a literary or artistic work in order to have sufficient evidence, may apply to the Registrar in accordance with the stipulations.

Section (47)

The Registrar shall notify the applicant that he shall revise and resubmit the application which does not conform with the stipulations as may be necessary after examining the application for registration of the literary or artistic work.

Section (48)

The applicant for the registration of a literary or artistic work may:
(a) file with the Registrar to correct any clerical error and other mistakes that may be permitted to correct in the application or any document after subscribing the prescribed fees, before the Registrar makes the decision on registration or before the

Agency makes the decision on the appeal against the decision of the Registrar;
(b) withdraw the application for registration of a literary or artistic work before the Registrar makes the decision on registration or before the Agency makes the decision on the appeal against the decision of the Registrar.

Section (49)

If the applicant does not fulfill the requirements within 30 days from the date of receiving the notice, although the applicant has received the notice under section 47, the application for registration of a literary or artistic work shall be considered that it has been withdrawn.

Section (50)

With respect to application for registration of a literary or artistic work which conforms with the stipulations, the Registrar:
(a) may grant or refuse the registration after examining whether it conforms with sections 13, 14, 15 and 16;
(b) shall record such grant or refusal under subsection (a) and notify the applicant about it, and publish it in the prescribed manner if registration is granted;
(c) shall issue the Certificate of Copyright Registration to the applicant if registration is granted.

Section (51)

(a) The owner of copyright may apply to the Registrar to issue the certified copy of the Certificate of Copyright Registration after subscribing the prescribed fees if the original certificate is damaged or lost.
(b) The Registrar shall check and issue the certified copy of the Certificate of Copyright Registration.

Section (52)

The owner of copyright may apply to the Registrar to correct clerical error or other mistakes that may be permitted to correct or to change nationality and address recorded in the register after subscribing the prescribed fees.

Section (53)

The owner of related rights who wishes to register the performance and phonogram in order to have valid evidence may apply to the Registrar in accordance with the provisions of registration mentioned in this Chapter.

Section (54)

Copyright or related rights of performers, producers of phonogram and broadcasting organizations shall enjoy the rights in this Law whether they are registered or not under this Law.

Chapter (17), Cancellation of Copyright or Related Rights Registration

Section (55)

If it is found that any of the registered copyright or related rights is prejudicial to any person or to public interests, the person or organization concerned may apply to the Registrar for cancellation of the said registration.

Section (56)

The Registrar shall, upon the application of the person or organization concerned, cancel the copyright or related rights registration if:
(a) it is found that the literary or artistic work is not protected under section 16;
(b) it is found that the author or owner of copyright or related rights is not entitled to registration;
(c) it is found that the Certificate of Copyright or Related Rights Registration has been obtained by fraud, misrepresentation or concealment of any prescribed substantive information; or
(d) the final decision or judgment of the relevant Intellectual Property Court regarding the application for cancellation of registration of copyright or related rights has been received.

Section (57)

If registration has been cancelled, the Registrar shall record such cancellation and notify the owner of the copyright or related rights of the cancellation and publish it in accordance with the stipulations.

3.1.3.29 The Protection and Preservation of Cultural Heritage Regions Law, 2019

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 13, 15, 21.

Section 13. A person desirous of carrying out one of the following shall abide by the provisions of other existing laws and also apply to the Department in accordance with stipulations to obtain prior permission under this Law:-
a) within the ancient monumental zone or the ancient site zone:

1. constructing or extending a building;
2. renovating the ancient monument or extending the boundary of its enclosure;

b) within the protected and preserved zone, constructing, extending, renovating a hotel, motel, guest house, lodging house or industrial building or extending the boundary of its enclosure;

c) within the cultural heritage region:

1. carrying out the renovation and maintenance work of the ancient monument without altering the original ancient form and structure or original ancient workmanship;
2. carrying out archaeological excavations;
3. building road, constructing bridge, irrigation canal and embankment or extending the same.

Section 15. A person desirous of carrying out one of the following shall abide by the provisions of other existing laws and also apply in accordance with the stipulations to the Department to obtain prior permission under this Law:-

a) renovation of a building other than an ancient monument or extension of the boundary of its enclosure in the ancient monumental zone or the ancient site zone;

b) within the protected and preserved zone, constructing, extending, renovating a building other than a hotel, motel, guest house, lodging house or industrial building or extending the boundary of its enclosure;

c) digging well, pond and fish-breeding pond or extending the same within the cultural heritage region.

Section 21 (b) A person who wishes to carry out any of the following undertakings shall adhere to the provisions of the existing laws, and apply to the Region or State Preservation Committee if it is within the world heritage region or national level cultural heritage region, and apply to the Regional Preservation Committee if it is within the respective cultural heritage region apart from the world heritage region or national level cultural heritage region for obtaining the prior permission that there is no impact on cultural heritages in accordance with the stipulations:

(b) in the buffer area:

(i) constructing roads, renovating and extending wharfs, parking lots, rail tracks, railway station, stadium, sports grounds, buildings and bridges;

(ii) conducting and erecting pylons, underground works, underground electric power lines, high voltage power lines, transformer stations, lamp posts and gas pipelines;

(iii) arranging the flights of helicopter, hot air balloons and gliders;

(iv) constructing theatres such as the entertainment building, accommodation facilities, recreation centers, riding and race camps and infrastructures.

3.1.3.30 Trademark Law (2019)

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 sections.

Chapter (7), Marks not Eligible for Registration

Section (13)

Any of the following characteristics of a mark constitutes absolute grounds for refusal and the aforementioned mark is not eligible for registration:

(a) lack of distinctiveness;

(b) containing only marks or indications of a good's or service's type, related information, quality, quantity, intended use, value, origin, time of manufacture, or other characteristics;

Exceptions - If one of the following circumstances applies to the provisions in subsections (a) and (b), there are no grounds for refusal of the registration of the mark in question.

(1) If the mark's distinctiveness is known among consumers due to its use before the date of application for mark registration;

(2) If the applicant, in good faith, is exclusively using the mark continuously within the commercial area of Myanmar.

(c) may be detrimental to public order, reputation, beliefs, the Union's reputation, or traditions valued by ethnic minorities;

(d) becoming common usage in contemporary expressions or becoming a part of traditions and is becoming used practically in the commercial area;
(e) in relation to subsection (b), misleading the public or commercial area;
(f) directly copying or imitating or misleading, without the approval of relevant authorities, all or part of a country's flag, ceremonial appearance, other marks and symbols, a legal mark indicating the management or guarantee by a State, or a mark of quality guarantee, or a multilateral international organization's ceremonial appearance, flags, or other marks, names, including said organization's acronyms, full name, or any part;
(g) use of marks and signs separately protected under the international agreements in which the Republic of the Union of Myanmar is a Party.
Section (14)
If any of the following applies to a mark, then it constitutes relative grounds for refusal and the mark is ineligible for registration.
(a) if the mark misleads consumers through its use by being identical or similar to any other person's registered mark or mark for which registration or right of priority has been applied for beforehand for identical or similar goods and services for said marks;
(b) if it uses, without the consent of a relevant person or legally formed organization, a mark which may be harmful to the individual rights of any person or the name and reputation of a legally formed organization;
(c) if it is a mark which may infringe upon the intellectual property rights of any other person;
(d) if the registration of a mark is applied for without good faith;
(e) if a mark registration application is made for a mark that misleads consumers by not only being identical or similar to a well-known mark but is also used in identical or similar goods or services;
(f) if a mark registration application is made for a mark that is identical or similar to a registered well-known mark but the goods or services are not identical or similar but may indicate that there is a connection between the owner of the well-known mark and the goods or services that the mark in question is being used for and such use may be harmful to the interests of the owner of the well-known mark.
Chapter (8), Application
Section (15)
In order to enjoy the rights of a registered mark under this Law, any applicant may apply to the Registrar for the registration of a mark in accordance with the prescribed regulations.
Section (16)
The applicant for the registration of a mark:
(a) may write the registration application in Myanmar or English.
(b) must translate the Myanmar language application into English or vice versa if the Registrar requests so.
(c) must write a statement that the translation under subsection (b) is true and correct and sign it.
Section (17)
The applicant for the registration of a mark shall:
(a) include the following in the application:
(1) an application for registration;
(2) name and address of the person or legally formed organization applying for registration;
(3) name, citizenship scrutiny card number, and address of the agent or representative if the applicant entrusts an agent or representative with this matter;
(4) a clear and complete description of the mark;
(5) name and type of goods and/or services for which a request for registration is made and the category of international mark classification to which it belongs;
(b) In addition to the requirements in subsection (a), the following must be attached to the application if necessary:
(1) if the application is made for a legally formed organization, the registration number, type and country of said organization;
(2) if the applicant requests the right of priority, an application for the right of priority together with sufficient evidence proving that he has the right of priority, and description;

(3) if the applicant requests the right of priority for trade exhibitions, an application for the right of priority for trade exhibitions together with sufficient evidence proving he has the right of priority for trade exhibitions, and description;
(4) if the mark is registered at the documents registration office, documentary evidence proving such registration;
(5) other requirements stipulated by the Agency and the Department from time to time.

Section (18)
The date on which the Department has received a complete application under subsection (a) of section 17 and the stipulated fee, is deemed as the date of submission of the application for registration in the Union.
Section (19).
The Registrar:
(a) If applications for the registration of identical or similar marks are submitted on different dates by more than one person and disputes arise over said applications, must permit only the first applicant who has submitted an application that meets stipulations to register his mark.
(b) If the applicants requested right of priority or right of priority for trade exhibitions according to applications made under subsection (a) and disputes arise over said applications, must permit only the applicant with the earliest right of priority date who has submitted an application that meets stipulations to register his mark.
Section (20)
If more than one applicant request the registration of identical or similar marks on the same date or if the right of priority dates are the same:
(a) The Registrar must direct the applicants to negotiate this matter amongst themselves and to resubmit the name of the applicant whom will register his mark within the prescribed period.

(b) According to the Registrar's directions, the applicants must report the name of the applicant, whom all the other applicants nominate for the registration of his mark, to the Registrar.
(c) If the applicants cannot reach an agreement although the Registrar has instructed them to do so according to subsection (a), they must follow the decision made using the prescribed method.

Section (21)
(a) An applicant for the registration of a mark:
(1) may, after paying the prescribed fee, apply to the Registrar if he wishes to amend the application, translation, and documentary evidence due to text errors or other errors which may be corrected, before the Registrar makes a decision regarding the acceptance or refusal of an application or before the Agency makes a decision on the appeal case against the decision of the Registrar.
(2) may apply for the withdrawal of the application for the registration of a mark.
(3) may, after paying the prescribed fee, request the Registrar for amendment by separating any application which includes multiple goods or services into more than one new application or to limit or decrease, without increasing, the submitted list of goods or services.
(b) the date of submission of the separate registration applications made under item (3) of subsection (a) shall be the date of submission of the original application.

Section (22)

The Registrar may allow the amendments after the application under section 21 has been examined according to stipulations.

Chapter (9), Examination, Objection, and Registration

Section (23)

With regards to an application for the registration of a mark, the Examiner must:

(a) submit the application, which has been made according to stipulations, together with his remarks to the Registrar after examining whether the application meets any of the provisions set out in section 13 and whether it contains the points set out in section 17;
(b) with the Registrar's approval, notify the applicant, whose application did not meet the stipulations, to revise the application as needed after examining whether the application meets any of the provisions set out in section 13 and whether it contains the points set out in section 17. If the applicant fails to revise his application within 30 days of receipt of notice, then the application will be considered withdrawn.
(c) if necessary revisions to the application are received under subsection (b), the Examiner must reexamine the application and submit the application to the Registrar, together with his remarks.

Section (24)

In order to register a mark, the applicant:
(a) may request, if the following conditions are met, for the registration of a mark when the failure to comply within the stipulated period of time results in the loss of rights connected to the relevant mark application:
(1) submitting a request within 60 days from the date of withdrawal due to the failure to comply within the stipulated period;
(2) attaching all explanations, information or requirements with regards to the failure to comply within the stipulated period;
(3) describing sufficient reasons for the failure to comply within the stipulated period in the request;
(4) paying the prescribed fee.
(b) If a request to restore the rights related to the request under subsection (a) was made during the period of appeal, the Registrar must suspend the request under subsection (a).

Section (25)

A Registrar:
(a) may allow the registration of a mark, after examination, if the request to register a forfeited mark, where there is a loss of right related to a mark application, is made again under subsection (a) of section 24.
(b) must make a public announcement, in accordance with stipulations, regarding the application made in line with sections 13 and 17 in order to notify the public and allow for objections to be made.

Section (26)

When a person wants to make an objection regarding an application for the registration of a mark, he may submit an objection form to the Registrar after paying the prescribed fee, within 60 days from the date of announcement on grounds that the application fulfills any of the requirements under sections 13 and 14.

Section (27)

Upon receipt of the objection, the Registrar must notify the applicant within the prescribed period so that the applicant can provide a defense against the objection.

Section (28)

With regards to applications for the registration of marks, a Registrar:
(a) may allow the registration of the mark stated in the application if there are no objections submitted within 60 days from the date of public announcement.
(b) if objections are submitted, may allow or refuse the registration of a mark after examining whether such objection meets the provisions of sections 13 or 14.
(c) must enter the allowance or refusal of the mark registration into the registration records and notify the applicant. In addition, he must announce the outcome to the public in a manner that is consistent with stipulations.
(d) must issue the registration certificate of the mark to the applicant if the registration of said mark is permitted.

Section (29)

An owner of a registered mark may:
(a) after paying the prescribed fee to the Department, request the Registrar to issue a certified copy of the registration certificate of the mark in cases of damage or loss of the original.

(b) after paying the prescribed fee, request the Registrar to revise writing errors and other errors which can be corrected under this Law, as well as nationality and address, in the registration records.

Section (30)

The Registrar:

(a) must issue the certified copy of the registration certificate of the mark after examining the request made under subsection (a) of section 29.

(b) may allow the revision request made in subsection (b) of section 29 after examining such request.

Chapter (11), Term of Mark Registration and Renewal

Section (34)

The term of a registered mark shall be 10 years from the submission date of the registration application. After this period, the applicant may renew the term of registration for 10 years at a time.

Section (35)

If the owner of a mark wishes to renew the term of mark registration, he must carry out according to the following:

(a) the renewal of the term of registration must be applied for within six months prior to the expiration of the term by paying the prescribed fees.

(b) after the expiration of the term of registration, the renewal application can be made within the grace period of six months. If the renewal application is submitted within this period, the applicant must pay the prescribed registration fee and overdue fee.

Section (36)

The Registrar must:

(a) allow the renewal application for the term of registration for a mark if it meets the stipulated requirements. The renewal term is effective starting from the date of expiration of the previous term.

(b) examine the application for the renewal of the term of registration and grant the renewal for a term of 10 years if the application meets the criteria for renewal and make a public announcement in a manner that is consistent with stipulations.

(c) record the renewal of the term of registration and payment of the prescribed fee in the registration records.

(d) suspend the registration of the registered mark if the owner of the registered mark has not paid the renewal fees within the grace period of six months.

(e) record the suspension of the registration of the registered mark in the registration records and make a public announcement in a manner according to stipulations.

Chapter (12), Rights Relating to a Registered Mark

Section (37)

If the owner of a mark complies with the provisions in Chapter XI, he shall enjoy the registered mark-related rights stipulated in this chapter for the term of the registration.

Section (38)

The right holder shall, without prejudice to the provisions in sections 39 and 40,:

(a) Enjoy the following as an exclusive right:

(1) a right to prevent, in accordance with this law, the use by any other person, without his consent in the course of trade, of an identical or similar mark for identical or similar goods or services if such use misleads the public.

(2) the right to pursue criminal action, civil action or both against those who infringe on the rights relating to a registered mark.

(3) under the following conditions, a right to prevent the use of a mark identical or similar to a registered, well-known mark for different goods or services, without the consent of owner of the mark, in the course of trade:

(aa) if it indicates that there is a connection with the owner of a registered well-known mark and the goods or services for which said mark is used;

(bb) if it is harmful to the interests of such registered mark owner.

(b) The rights of a registered mark may be transferred or licensed, in accordance with the provisions in chapters XIII and XIV, to any other person.

Section (39)

An owner of a registered mark is not entitled to prevent another person's use, in relation to the following, in good faith for industrial or commercial business:

(a) owner's name or address;

(b) indications of type, related information, quality, quantity, intended use, value, origin, manufacturing period or other characteristics of the goods or services;

(c) descriptions of intended use of goods or services, particularly descriptions of the intended use of accessories or spare parts.

Section (40)

The owner of a registered mark is not entitled to prohibit the use of his mark for goods delivered to a market by himself or another person who has his consent.

Section (41)

Regardless of any provisions in section 40, the owner of a registered mark is entitled to prohibit the sale of his goods, in accordance with existing laws, if the conditions of the goods have changed or have been damaged after they have been delivered to the market.

3.1.3.31 The Industrial Design Law (2019)

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 sections.

Chapter (10), Application

Section (20)

Any person entitled to file the registration of industrial design under this Law shall, if he desires to have the right of registered industrial design, file an application for registration of the industrial design to the Registrar, in the manner prescribed.

Section (21)

The applicant for the registration of industrial design:

(a) may file an application for one or more industrial designs provided that all the products which constitute the industrial design, or in 10 relation to which the industrial designs are to be used, belong to the same class of the Locarno Agreement Establishing an International Classification for Industrial Designs;

(b) may write the application for registration either in Myanmar or English language;

(c) shall translate the application from Myanmar into English or English into Myanmar if requested by the Registrar;

(d) shall certify the translation under subsection (c).

Section (22)

The applicant for the registration of industrial design:

(a) shall mention the following facts in the application:

(i) a request for registration;

(ii) name and address of the applicant or legal entity;

(iii) name, citizenship scrutiny card number and address of the representative where the application is filed by the representative;

(iv) a sufficiently clear representation of the industrial design;

(v) indication of the products to which the industrial design is applied or embodied.

(b) shall attach the following facts, if necessary, in addition to the facts in subsection (a):

(i) where the application is filed for a legal entity, registration number, type and name of the country of that legal

entity;
(ii) where the applicant wants to take advantage of the priority of an earlier application, a declaration claiming the priority of that earlier application, together with indications and evidence in support of the declaration of priority;
(iii) where the applicant wants to take advantage of any priority resulting from the display of industrial design in an exhibition, a declaration to that effect, together with indications and evidence in support of that declaration of exhibition priority;
(iv) any other elements prescribed by the Agency and Department from time to time

Section (23)
The date on which the application of industrial design, in accordance with subsection (a) of section 22, received by the Department, shall be presumed to be the filing date of the application for registration in the State, subject to the payment of fees.

Section (24)
The Registrar shall:
(a) where more than one party applies to register identical or similar industrial designs on different dates and any dispute arises, grant registration to the earliest applicant submitting the application consistent with the requirements for registration;
(b) where each and every applicant claims the right of priority or the right of exhibition priority under subsection (a) and any dispute arises, grant registration to the applicant submitting the application for the registration of the industrial design that has earliest filling date and conforms with the requirements for registration.

Section (25)
Where more than one applicant have filed the application for the registration of identical or similar industrial design on the same date or have requested for the same priority date:
(a) the Registrar shall direct all applicants to submit the name of a person whom they want to prescribe as the applicant for industrial design after consultation among themselves, within the prescribed period.
(b) the applicants shall, in accordance with the direction of the Registrar, resubmit the name of a person whom they have agreed to specify as an industrial design applicant after consultation among them or if desire to prescribe as joint applicant, such point to the Registrar.
(c) although the Registrar directs all applicants under subsection (a), if no agreement is reached among them, the applicants shall follow the Registrar's decision in the prescribed manner.

Section (26)
(a) The applicant for the registration of industrial design:
(i) may file with the Registrar to correct any error of translation or transcription, clerical error or other mistakes in any application or document after subscribing the prescribed fees before the Registrar makes the decision on grant of or refusal to an application or before the Agency makes the decision on the appeal against the decision of the Registrar;
(ii) may request to withdraw the application with respect to all or some of industrial designs if the application contains more than one industrial design;
(iii) may apply to divide any application listing several designs into two or more new application by paying the prescribed fees.
(b) shall presume the filing date of a new divisional application for registration under clause (iii)of subsection (a) to be the same filing date of original application.

Section (27)
The Registrar may amend the application under section 26 in accordance with the stipulations after examining.

Chapter (11), Examination, Opposition and Registration

Section (28)
With regard to the application for registration of industrial design, the Examiner shall:
(a) submit the applications which conform to the provisions of sections 21 and 22 to the Registrar together with remarks after examining whether the application complies with the requirements;

(b) notify the applicant to amend the application which does not conform to the provisions of sections 21 and 22 with the permission of the Registrar after examining whether the 13 application complies with the requirements. If the applicant fails to amend the application within 30 days from the date of receipt of the notice, the application for the registration shall be considered as withdrawn;
(c) submit the application to the Registrar together with remarks after examining if the amendment in accordance with the provisions of subsection (b) has been received;
(d) refuse the application with respect to the industrial design not complying with the definition set out in subsection (j) of section 2 or conforming to subsection (b) of section 16 and submit to the Registrar together with his remarks.

Section (29)
(a) Where an applicant for the registration of industrial design has failed to comply with a time limit for an action in a procedure and that failure has the consequence of causing a loss of rights with respect to an application for the registration of industrial design, he may reapply for the registration of industrial design to the Registrar if it meets the following requirements:
(i) submitting a request within 60 days from the date of withdrawal of the application in respect of the cause of failure to comply with the time limit;
(ii) providing the requirements, information or explanations in respect of the cause of failure to comply with the time limit;
(iii)describing the sufficient reasons in the request for the failure to comply with the time limit;
(iv)fees which had been paid.
(b) The Registrar shall suspend the reinstatement of rights under subsection (a) within the period of appeal.

Section (30)
The Registrar:
(a) may allow the request after examining the application if it is likely to cause the loss of rights in respect of the application for the registration of abandoned industrial design and reapplying the application under subsection (a) of section 29;
(b) shall publish the application in order to oppose for any person in the prescribed manner and that application complies with sections 21 and 22;
(c) shall not publish until the expiration of the period of deferment if the deferment of publication has been requested by the applicant under section 36.

Section (31)
Any person may oppose with respect to the application for the registration of industrial design within 60 days from the date of publication and submit objections in writing on the following grounds to the Registrar together with the prescribed fees:
(a) the industrial design does not meet with the definition of industrial design set out in subsection (j) of section 2;
(b) the industrial design lacks novelty;
(c) the industrial design falls in matter excluded from the protection of industrial design under section 16;
(d) the sufficient ground appears for evidence that the applicant is not entitled to file.

Section (32)
If the Registrar receives the opposition, he shall send a notice to the applicant to defend the objections within the prescribed period.

Section (33)
With respect to application for registration of industrial design, the Registrar:
(a) may grant the application for registration of industrial design if the opposition is not filed within 60 days from the date of publication;
(b) may grant or refuse the opposition after examining it if the opposition is filed;
(c) shall record such grant or refusal in the register and notify the applicant. In addition, he shall publish such grant

or refusal in the prescribed manner;

(d) shall issue the certificate of registered industrial design to the applicant if the registration is granted

Section (34)

The owner of industrial design:

(a) may apply to the Registrar to issue the certified copy of the certificate of a registered industrial design after subscribing the prescribed fees if the original certificate is damaged or lost;

(b) may apply to the Registrar to correct clerical error or other mistakes that may be permitted to correct or to change nationality and address recorded in the register after subscribing the prescribed fees.

Section (35).

The Registrar:

(a) shall issue the certified copy of the certificate of registered industrial design after examining the application under subsection (a) of section 34;

(b) may amend the application after examining under subsection (b) of section 34

Chapter (17), Licence of the Registered Industrial Design

Section (54)

The owner of the industrial design may license any person or legal entity to use the registered industrial design by determining the terms and conditions.

Section (55)

The owner of the registered industrial design or his licensee may apply to the Registrar to record the licence together with the certified copy of licensing documents by subscribing the prescribed fees.

Section (56)

The Registrar shall record the licence under section 55 and publish it in the prescribed manner.

Section (57)

The Registrar shall cancel the record of a licence, and publish it in the prescribed manners if the owner of industrial design or his licensee applies for cancellation of the record of a licence in the prescribed manner.

Section (58)

A licence shall have no effect unless it is applied to record to the Registrar.

Chapter (18), Invalidation and Cancellation of Registration of Industrial Design

Section (59)

If it is found that any registered industrial design, contrary to section 60, affects the interest of a person or public, a relevant person or legal entity may apply to the Registrar for invalidation or cancellation of the whole or part of the registration of the said industrial design.

Section (60)

The Registrar may invalid or cancel the whole or part of the registration of industrial design based on the application of the relevant person or legal entity if the registered industrial design is involved with any of the following facts:

(a) that the industrial design falls under section 16;

(b) that the industrial design does not meet with the definition of industrial design set out in subsection (j) of section 2;

(c) that the industrial design lacks novelty;

(d) that the sufficient ground appears for evidence that the applicant is not entitled to file;

(e) that the registered industrial design was obtained by fraud, misrepresentation or concealment of any prescribed fact;

(f) based on a final decision or judgment of the Intellectual Property Court regarding with the application of invalidation for registered industrial design.

Section (61)

The Registrar may cancel the registered industrial design from the register upon any of the following facts:

(a) failure to apply for renewal within the grace period of 6 months after expiry of the term of registration;

(b) surrender to the owner of the registered industrial design;

(c) invalidate publication of industrial design which falls under section 60.

Section (62)

The Registrar shall record the cancellation of the registered industrial design and notify it to the owner of industrial design and publish it in the prescribed manner.

3.1.3.32 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.
(iv) 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

Section(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.

Section (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
Section(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
Section(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.

Section (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.
Section (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.
Section (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.

3.1.3.33 The Boundary Demarcation and Survey Law (2019)

The project proponent will comply with the followings –

Chapter (5), Erection and Maintenance of Boundary-marks
Section (10)
Once the boundaries have been marked out, the Demarcation-officer may cause Surveymarks or Boundary- marks

to be erected along the boundary by the owners or occupiers of the land.

Section (11)

After determination of a boundary and erections of Survey-marks or Boundary-marks along such boundary have been completed, the demarcation process is final and it is not open to appeal.

Section (12)

The Demarcation-officer shall assign land owners or occupiers to preserve or maintenance of the Survey-marks or Boundary-marks which have been erected on the boundary of his or her land or along the boundary line.

Section (13)

It shall be the duty of every Ward/Village-tract Administrator and of every owner or occupier of the land to prevent the destruction, injury, lost or alteration of any Survey-mark or Boundary-mark within the local limit of his jurisdiction or on or within the land owned or occupied by him.

Section (14)

The relevant Ward/Village-tract Administrator, whenever he becomes aware by himself or by other means that any such Survey-mark or Boundary-mark has been moved, destroyed, injured, lost, altered and obscurity of some markings on it, in any case, it shall be reported to the Township Administrator as soon as possible.

Section (15)

Subject to the matter of Section (14), the relevant Township Administrator shall make field inspection and assign the duty to the concerned Ward/ Village-tract Administrator to be able to take action in accordance with the law based on his findings.

Section (16)

Any such Survey-mark or Boundary-mark has been injured, lost or needed to repair due to bad weather, natural disaster or any other cause, it shall be reported to the relevant Township Administrator by an owner or occupier of the land or concerned Ward/Villagetract Administrator.

Section (17)

Whenever the Township Administrator becomes aware that any mark erected under this Law within the local limits of his jurisdiction has been injured, removed or requires repairs may cause such mark to be re-erected, restored or repaired and the persons who pays the expense must be identified.

3.1.3.34 Tax Administration Law (2019)

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

Chapter (4), RECORDKEEPING AND INFORMATION COLLECTION

Keeping Accounts and Records

Section (20)

(a) A taxpayer engaged in business or independent professional activity or required to make a tax return under tax legislation is required to keep and maintain in the Republic of the Union of Myanmar records and accounts sufficient to record all transactions and to ascertain the gains and profits made or the loss incurred in respect of those transactions.

(b) In addition to the records and accounts described in subsection (a), a taxpayer must also retain source documents and underlying documentation utilized in the creation of the records and accounts.

(c) A person required to prepare or retain records of a transaction under tax legislation must retain the documents—

(1) for a period of seven years from the date on which the transaction took place; or

(2) if longer than the period of seven years, until expiration of the time limit for assessment of tax for a tax period to which the records are relevant.

(d) If a person has prepared records required under this section in a language other than Myanmar or English, that person is required at that person's expense, upon request, to provide a Myanmar or English translation.

(e) Financial statements, invoices, books of original entry, and all written communications between the Department and the taxpayer must be in Myanmar or English.
(f) For the purposes of this section, source documents include—
(1)sales and purchase invoices, costing documents, bookings, diaries, purchase orders, delivery notes, bank statements, contracts, and other documents which relate to an element of a transaction; and
(2)for purposes of a tax law, a copy of all invoices, credit notes, debit notes issued and received by the person, all customs documentation relating to imports and exports of goods by a person and, sufficient written evidence to identify the producer, service provider, or importer and the recipient, and to show the nature and quantity of goods or services supplied, the time of supply, the place of supply, the consideration for the supply, and the extent to which the supply has been used by the recipient for particular purposes.

Obligations of Financial Institutions

Section(21).

A bank or financial institution is required to keep account of all transactions with a client, including the client's profile and taxpayer identification number.

Tax Returns

Section(22) .

(a) Every taxpayer must, if required by a tax law, furnish to the Director General a tax return in accordance with subsection (b), within the time and at the place specified by that law, or as demanded by the Director General.
(b) The Director General specifies—
(1) the form for tax returns;
(2) the information to be furnished on the tax return and attachments, if any, required to be filed with the tax return; and
(3) the manner of filing.
(c) A taxpayer may file an amended tax return no later than six years after the latest date on which the original tax return was required to be filed.
(d) A taxpayer must attest to the accuracy and completeness of the tax return or, in the case of a taxpayer under a legal disability, the taxpayer's legal representative must attest to its accuracy and completeness.
(e) If a tax return or part of a tax return was prepared for reward by some other person, that other person must also sign the tax return.
(f) The Director General may, by notice in writing, require a person to file, whether on that person's own behalf or as agent or trustee for another person, more complete or additional tax returns for a tax period as the Director General specifies, even if the taxpayer has not submitted a tax return for the period.

Information Returns

Section(23).

The provisions of this Law relating to tax returns apply to a person required by a tax law to file a return of information related to matters other than the person's own tax liability.

Extension of Time to File Returns

Section(24)

(a) The Director General may extend the time limit prescribed for filing a tax return if the taxpayer or other person required to file applies for the extension of the time limit.
(b) The granting of an extension of time under subsection (a) does not affect the due date for payment of tax, unless an extension of time for payment is also expressly granted.

Access to Information, Assets, and Land

Section(25)

(a) A designated officer may enter a business premises, or other premises open to the public, without prior notice, to carry out a task for an authorized purpose —
(1) during normal business hours; or
(2) at another time authorized in writing by a Township Court or judge upon application by the Director General.
(b) The designated officer may enter a taxpayer's dwelling, or other premises not described in subsection (a), to

carry out a task for an authorized purpose—
(1) with the consent of the taxpayer; or
(2) at the time stated and in the manner authorized in writing by a Township Court or judge upon application by the Director General and a showing of necessity to enter.
(c) The designated officer may enter on, examine, search, survey, and value any property owned by a taxpayer—
(1) with the consent of the taxpayer; or
(2) after giving not less than twenty-four hours' notice in writing.
(d) A designated officer who is lawfully upon premises or in a dwelling under subsections (a), (b), or (c) may—
(1) make a copy of a document;
(2) seize a document or other item if necessary that appears to be relevant to an authorized purpose; or
(3) seal documents or other items in order to be recognized.
(e) If a designated officer seizes a document or other item pursuant to the authority provided under this section, the Director General may make a copy of the document or other item and must return the original to the person in the shortest time practicable, unless otherwise permitted by court order.
(f) If a designated officer seizes another item pursuant to the authority provided under this section, and the item cannot be copied, the Director General may keep the item for a reasonable period, subject to an order by the court that the item must be returned to its owner.
(g)A copy of a document made pursuant to the power conferred by this section may be produced in Court and has the same evidentiary value as if it were an original.
(h)This section does not authorize access to premises of diplomatic, consular, or other missions of foreign countries and international organizations that enjoy immunity from such investigations under international law.
(i) Documents specifically requested by a designated officer or the Director General under this section, and which a taxpayer or other specified person fails to provide, cannot be used by the taxpayer or other person in a judicial proceeding challenging an assessment, except with the agreement of the Director General.
(j) A person whose books, records, documents, or other items have been seized under this section may examine them and make copies, at the person's expense, during office hours.
(k)The Director General or authorized staff must sign for all records, books, documents, or other items removed and retained under this section and must return them to the owner within fourteen days of the conclusion of the investigation or related proceedings.
(l) The Director General may cause any land to be visited, inspected, and measured and may call on any person to produce for inspection any document in the custody or under the control of that person which relates to the land.
(m) The Director General may require a police officer or administration authority to be present for the purposes of exercising powers under this Part.
(n) In this section and section 26, "authorised purpose" means:
(1) the collection of information for the purpose of determining the liability of a specific person for a tax;
(2) the collection of information for the purpose of collecting tax from a specific person; or
(3) the collection of information related to the investigation or prosecution of tax matters related to a specific person.
(o) The owner or lawful occupier of the premises or place to which an exercise of power under this section relates must provide all reasonable facilities and assistance to the designated officer or the Director General.

Notice to Obtain Information
Section(26)

(a) In respect of an authorized purpose, the Director General may, by giving reasonable notice in writing, require a person, whether a taxpayer or not—
(1) to furnish the information that is required by the notice, including information concerning another person; or
(2) to appear at the time and place designated in the notice for the purpose of being examined or of producing documents or other evidence in the control of that person which are described in the notice.
(b) Section 25 and this section have effect notwithstanding an existing law or a contract, including the Central Bank of Myanmar Law, with respect to the production of or access to documents or other evidence.

3.1.3.35 Union Taxation Law 2023

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

Chapter (6), Commercial Tax
Section (14)(a)
The schedules attached to the Commercial Tax Law are enacted as follows according to section 6 Commercial Tax Law:

Schedules attached to the Commercial Tax Law

Sr	Name of the goods
Food products	
1.	Paddy; rice; broken rice; rice bran; rice chaff; paddy husk; wheat; wheat bran; wheat chaff; corn; various kinds of corn kernels.
2.	Various kinds of pulses; various kinds of split; various kinds of bean flower; bean bran; bean pods; unshelled peanuts; shelled peanuts; sesame; canola; peanut dregs; sesame dregs; cottonseed dregs; oil after grinding and bran oil such as rice bran oil.
3.	Garlic; onions; potatoes; leaves, fruits bark and seeds used as spices; masala; chilis; chili powder; turmeric; turmeric powder; ginger; ripe tamarinds; various kinds of salt.
4.	Various kinds of fresh fruits; vegetables.
5.	Pickled tea leaves; dried tea leaves; sweet dried tea leaves; various kinds of processed and packaged teas.
6.	Fresh fish; fresh shrimps; fresh meat; various kinds of eggs such as chicken eggs and duck eggs.
7.	Peanut oil; sesame oil.
8.	Sugarcane; sugar; jaggery; brown slab sugar; soy milk; milk and various types of dairy products; condensed milk; evaporated milk; various kinds of milk powder; yogurt.
9.	Creamer.
10	Various kinds of fish sauce; dried fish; various kinds of dried shrimps; pickled fish; various kinds of pickled shrimps; shrimp powder; fish powder; various kinds of fish paste.
Agricultural and livestock products	
11	Mulberry leaves; silk cocoons.
12	Living animals, fish, shrimps, land animals, aquatic animals and amphibians; their eggs, larvae, hatchlings and species; plants and seeds that grow in water; sprouts; algae and seaweeds.
13	Various kinds of fertilisers, including soil used in agriculture to make plants grow strong and bear fruits, and chemical fertilisers; various herbicides; various vaccines and pesticides to prevent agricultural diseases such as fungi, bacteria, nematodes and other diseases; various kinds of livestock sprays (not including sprays without active components, rodenticides); medicines and vaccines for animals, fish and shrimps (including medicines and vaccines certified by the Ministry of Agriculture, Livestock and Irrigation, and medicines recommended by the Livestock Breeding and Veterinary Department); raw materials for producing animal, fish and shrimp feed, and finished animal, fish and shrimp feed, if not used as pet food.

Sr	Name of the goods
14	Oil palm and sunflower seeds; cotton seeds; pumpkin seeds; watermelon seeds; cashew nuts, betel nuts; betel nut shells; pure strains, pure seeds and pure saplings of crops.
15	Raw cotton; various kinds of cotton; cardamom; thanaka and farm and garden produce not elsewhere specified; coconut oil (not palm oil).
16	Coir yarn.
17	Wood; bamboo; raw and finished rattan; briquettes from organic materials substituting firewood.

Section (14)(c)

5% commercial Tax shall be levied on the sales proceeds of any person carrying out the following activities, including specific goods according to section 11, except when carrying on trade in goods exempted in accordance with this Law:
(1) Importing goods and reselling them locally;
(2) trading.

Section (15)(b)

(b) No commercial Tax shall be levied under the Commercial Tax Law in the cooperative and the private sector unless the sales proceeds and service revenue are higher than the following:
(1) Sales proceeds of MMK 50,000,000 in total in a financial year from the domestic manufacture and sale of goods subject to commercial Tax;

(2) service revenue of MMK 500,000,000 in total in a financial year from providing services subject to commercial Tax;
(3) sales proceeds of MMK 500,000,000 in total in a financial year from trading; (4) the de-minimis value threshold of the Customs Department, which may exempt goods from customs duty if they require expedited delivery in accordance with customs procedure standards;
Explanation: (1) The sales proceeds and service revenue of in total MMK 50,000,000 refer to the sales proceeds and the service revenue to be received within the next consecutive 12 months, including the month in which the business started.
(2) Irrespective of anything provided in the Commercial Tax Law, regarding registration, any person who has taxable sales proceeds or who wants to benefit from setting off commercial Tax shall register.

Section (17)

(a) 8% commercial Tax shall be levied on the export of electricity, and 5% commercial Tax on the export of crude oil.
(b) Except for the goods in sub-section (a), 0% commercial Tax shall be levied on the sales proceeds from the export of goods. Commercial Tax paid when purchasing or manufacturing the goods may be set off as prescribed from the commercial Tax due when exporting. Irrespective of what is provided in the Commercial Tax Regulations, regarding the export of goods, a refund may be demanded if the commercial Tax due when exporting is less than the commercial Tax paid when purchasing or manufacturing the goods. However, this shall not apply to goods purchased locally for personal use and taken abroad.
(c) The provisions of this section shall not apply to the determination of the amount of the sales proceeds and service revenue which are not taxable.

Section (18)

The expressions used in chapter 6 of this Law shall have the same meanings as in the Commercial Tax Law.

3.1.3.36 The Registration Act (2018)

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 sections.

Chapter (12), REFUSAL TO REGISTER

Section (71)

(1) Every Sub-Registrar refusing to register a document, except on the ground that the property to which it relates is not situate within his sub district, shall make an order of refusal and record his reasons for such order in his book No, 2 and endorse the words "registration refused" on the document; and, on application made by any person executing or claiming under the document, shall, without payment and unnecessary delay, give him a copy of the reasons so recorded.

(2) No registering officer shall accept for registration a document so endorsed unless and until, under the provisions hereinafter contained, the document is directed to be registered.

Section (72)

(1) Except where the refusal is made on the ground of denial of execution, an appeal shall lie against an order of a Sub-Registrar refusing to admit a document to registration (whether the registration of such document is compulsory or optional) to the Registrar to whom such Sub-Registrar is subordinate, if presented to such Registrar within thirty days from the date of the order; and the Registrar may reverse or alter such order.

(2) If the order of the Registrar directs the document to be registered and the document is duly presented for registration within thirty days after the making of such order, the SubRegistrar shall obey the same, and thereupon shall, so far as may be practicable, follow the procedure prescribed in sections 58, 59, and 60; and such registration shall take effect as if the document had been registered when it was first duly presented for registration.

Section (73)

(1) When a Sub-Registrar has refused to register a document on the ground that any person by whom it purports to be executed, or his representative or assign, denies its execution, any person claiming under such document, or his representative, assign or agent Housing, Land And Property Laws In Force 295 authorized as aforesaid, may, within thirty days after the making of the order of refusal, apply to the Registrar to whom such Sub-Registrar is subordinate in order to establish his right to have the document registered.

(2) Such application shall be in writing and shall be accompanied by a copy of the reasons recorded under section 71, and the statements in the application shall be verified by the applicant in manner required by law for the verification of plaints.

Section (74)

In such case, and also where such denial as aforesaid is made before a Registrar in respect of a document presented for registration to him, the Registrar shall, as soon as conveniently may be, enquire.

(a) whether the document has been executed;

(b) whether the requirements of the law for the time being in force have been complied with on the part of the applicant or person presenting the document for registration, as the case may be, so as to entitle the document to registration.

Section (75)

(1) If the Registrar finds that the document has been executed and that the said requirements have been complied with, he shall order the document to be registered.

(2) If the document is duly presented for registration within thirty days after the making of such order, the registering officer shall obey the same and thereupon shall so far as may be practicable, follow the procedure prescribed in sections 58, 59 and 60.

(3) Such registration shall take effect as if the document had been registered when it was first duly presented for registration.
(4) The Registrar may, for the purpose of any enquiry under section 74, summon and enforce the attendance of a witnesses, and compel them to give evidence, as if he were a civil Court, and he may also direct by whom the whole or any part of the costs of any such enquiry shall be paid, and such costs shall be recoverable as if they had been awarded in a suit under the Code of Civil Procedure.

Section (76)
(1) Every Registrar refusing:
(a) to register a document except on the ground that the property to which it relates is not situate within his district or that the document ought to be registered in the office of a SubRegistrar, or
(b) to direct the registration of a document under section 7 or section 75, shall make an order of refusal and record the reasons for such order in his Book No. 2, and, on application made by any person executing or claiming under the document, shall, without unnecessary delay, give him a copy of the reasons so recorded. 296 Housing, Land and Property Rights in Burma: The Current Legal Framework
(2) No appeal lies from any order by a Registrar under this section or section 72.
Section (77).
(1) Where the Registrar refuses to order the document to be registered under section 72 or section 76, any person claiming under such document, or his representative, assign or agent, may, within thirty days after the making of the order of refusal, institute in the civil Court, within the local limits of whose original jurisdiction is situate the office in which the document is sought to be registered, a suit for a decree directing the document to be registered in such office if it be duly presented for registration within thirty days after the passing of such decree.
(2) The provisions contained in sub-sections (2) and (3) of section 75 shall, mutatis mutandis, apply to all documents presented for registration in accordance with any such decree, and, notwithstanding anything contained in this Act, the document shall be receivable in evidence in such suit.
Chapter (13), THE FEES FOR REGISTRATION, SEARCHES AND COPIES
Section (78)
The President of the Union shall prepare a table of fees payable:
(a) for the registration of documents;
(b) for searching the registers;
(c) for making or granting copies of reasons, entries or documents, before, on or after registration; and of extra or additional fees payable;
(d) for every registration under section 30;
(e) for the issue of commissions;
(f) for tiling translations;
(g) for attending at private residences;
(h) for the safe custody and return of documents; and
(i) for such other matters as appear to the President of the Union necessary to effect the purposes of this Act.
Section(79)
A table of the fees so payable shall be published in the Gazette, and a copy thereof [….] shall be exposed to public view in every registration office.
Section(80)
All fees for the registration of documents under this Act shall be payable on the presentation of such documents.

3.1.3.37 The New Plant Variety Protection Law (2019)

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 sections.

Chapter (7), PLANT BREEDER'S RIGHT

Section (23)

(a) Subject to the provisions of Sections 27 and 28, the following acts in respect of the propagating material of the protected variety shall not be done by any other person without out the authorization of the breeder:
(i). production or reproduction;
(ii) conditioning for the purpose of propagation;
(iii) offering for sale;
(iv) selling or other marketing;
(v) exporting;
(vi) importing;
(vii) stocking for any of the purposes mentioned in (i) to (vi), above;
(b) The breeder may make his authorization under subsection (a) to others subject to agreement between them.

Section (24)

Subject to the provisions of Sections 27 and 28, the acts referred to in Section 23 in respect of harvested material, including entire plants and parts of plants, obtained through the unauthorized use of propagating material of the protected variety shall require the authorization of the breeder, unless the breeder has had reasonable opportunity to exercise his right in relation to the said propagating material.

Section (25)

Subject to provisions of Sections 27and 28, the acts referred to in Section 23 in respect of products made directly from harvested material of the protected variety falling within the provisions of Section 24 through the unauthorized use of the said harvested material shall require the authorization of the breeder, unless the breeder has had reasonable opportunity to exercise his right in relation to the said harvested material.

Section (26)

The provisions in Sections 23, 24, and 25 shall also apply in relation to the following varieties.
(a) Varieties, which are essentially derived from the protected variety, where the protected variety is not itself an essentially derived variety, which may be obtained by the selection of a natural or induce mutants, or of a somaclonal variant, the selection of a variant individual from plants of the initial variety, backcrossing, or transformed by genetic engineering. A variety shall be deemed to be essentially derived from another variety ("the initial variety") when
(i) it is predominantly derived from another variety('initial variety") or from the variety that is itself predominantly derived from the initial variety, while retaining the expression of the essential characteristics that result from the genotype or combination of genotypes of the initial variety,

(ii) it is clearly distinguishable from the initial variety and
(iii)except for the differences which result from the act of derivation, it conforms to the initial variety in the expression of the essential characteristics that result from the genotype or combination of genotypes of the initial variety.
(b) varieties which are not clearly distinguishable in accordance with Section 9 from the protected variety;
(c) varieties whose production requires the repeated use of the protected variety

Section (27)

(a) The breeder's right shall not extend to the following:
(i) acts done privately and for non-commercial purposes;
(ii) acts done for experimental purposes and
(iii) acts done for the purpose of breeding other varieties, and, except where the provisions of Section 26 apply, acts referred to in Sections 23, 24 and 25 in respect of such other varieties.
(b) Farmers shall not be considered that they infringe the breeder's right, if they use for propagating purposes, on their own holdings, only for their home consumption, the product of the harvest which they have obtained by planting, on their own holdings, the protected variety or a variety covered by Section 26 (a) or (b) of this Law.

(c) Varieties of fruits, ornamentals, vegetables and forest plants are excluded from the exception under subsection (b) of this Section.

Section (28)

(a) The breeder's right shall not extend to acts concerning any materials of the protected variety, or of a variety covered by the provisions of Section 26 which has been sold or otherwise marketed by the breeder or with his consent in the territory of Myanmar or any material derived from the said material, unless such acts

(i) involve further propagation of the variety,

(ii) involve an export of material of the variety , which enables the propagation of the variety, into a foreign country which does not protect varieties of the plant genus or species to which the variety belongs, except where the exported material is for final consumption purposes.

(b) For the purposes of subsection (a), "material" means, in relation to a variety,

(i) propagating materials,

(ii) harvested materials and

(iii) any product made directly from the harvested material.

Section (29)

Any person-

(a) shall not carry out the acts provided for in Sections 23, 24, 25 and 26 without the authorization of the plant breeder to a protected new plant variety.

(b) shall not restrict for reasons other than public interest except where expressly provided in this Law, the free exercise of a breeder's right.

Section (30)

When any such restriction, in accordance with Section 29(b), has the effect of the Central Committee, authorizing a party to perform any act for which the breeder's authorization is required, the breeder shall receive equitable remuneration.

Section (31)

The breeder's right is independent of any measure to regulate the production, certification and marketing of material of varieties or the importing or exporting of such material. In any case, such measures shall not affect the application of the provisions of this Law.

Section (32)

The protection period of a plant breeder's right is 25 years for trees and vines and 20 years for other new plant varieties commencing from the date of the grant of the breeder's right.

Chapter (8), NULLITY AND CANCELLATION OF A PLANT BREEDER'S RIGHT

Section (33)

A plant breeder's right shall be declared null and void when it is established

(a) that the conditions laid down in Sections 8 or 9 were not complied with at the time of granting the breeder's right of a new plant variety;

(b) that, where the grant of the breeder's right has been essentially based upon information and documents furnished by the breeder, the conditions laid down in Sections 10 or 11 were not complied with at the time of granting the breeder's right of a new plant variety;

(c) that the breeder's right has been granted to a person who is not entitled to it, unless it is transferred to the person who is so entitled.

Section (34)

A plant breeder's right shall not be declared null and void for other reasons than those referred to in Section 33.

Section (35)

The Central Committee shall cancel the breeder's right for the following reasons:

(a) if it is established that the conditions laid down in Sections 10 or 11 are no longer fulfilled.
(b) if, after being requested to do so and within the prescribed period, the breeder does not provide the Central Committee with the information, documents or material deemed necessary for verifying the maintenance of the variety;
(c) if, after being requested to do so and within the prescribed period, the breeder fails to pay such fees as may be payable to maintain his right in force;

Section (36)

A plant breeder's right shall not be cancelled for other reasons than those referred to in Section 35.

3.1.3.38 The Land Acquisition, Resettlement and Rehabilitation Law (2019)

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 sections.

Chapter (7) , Landowner's Right to Choose Compensation and Damage for Land Acquisition

Section (35)

If there is no building properly constructed on the acquired land or if there is no business conducted in such a building, the Land Acquisition Implementation Body shall, without having to grant any right under Section 36 (b), pay the compensation and damages for land acquisition to the landowner or damages to the person related to the acquired land in accordance with the provisions contained in Chapter VIII.

Section (36)

If there are buildings properly constructed on the acquired land or if there are businesses conducted in such buildings, the Land Acquisition Implementation Body shall grant any of the following rights as desired by the landowner, including relocation expenses, to the Landowner after negotiating and making agreement with the Department or Organization that Proposes for Land Acquisition, but not in excess of the market price of such acquired land and buildings:

(a) right to obtain entirety or part of compensation and damages for the acquired land and building; or
(b) right to obtain the following rights along with any part of rights contained in sub-section (a):

(i) right to obtain land or land and building for resettlement,
(ii) right to enjoy any resettlement program, and
iii) right to invest in the project to be carried out on the acquired land or right to obtain the suitable portion of such land for any activity.

Section (37)

The Landowner:

(a) shall have the right to receive relocation expenses granted under this Law for land and building acquisition; and
(b) shall, in addition to the right granted under sub-section (a), have the right to demand any of the rights granted under Section 36, and enjoy these rights, but not exceeding the market value of the acquired land and building, after negotiating and securing agreement with the Department or Organization that Proposes for Land Acquisition.

Section (38)

The Land Acquisition Implementation Team may, upon making the consent with the Landowner, grant other lands or rights that are equivalent to the compensation to be paid for the land to be acquired, with approval from the Union Government.

Chapter (8), Payment of Compensation and Damages

Section (39)

The Land Acquisition Implementation Body shall follow the hereunder procedures for paying compensation and damages for land acquisition to the Landowner, or paying damages to the persons related to the acquired land:

(a) payment of compensation and damages for land acquisition to the Landowner, and payment of damages to the persons related to the acquired land, if there is no building properly constructed on the acquired land or if there is no business conducted in such a building;

(b) payment of the local market value of the acquired land and building to the Landowner as compensation, if there are buildings properly constructed on the acquired land or if there are businesses conducted in such buildings;

(c) payment of the local market value of the land to the Landowner, if there are no perennial plants, seasonal crops or livelihoods on the acquired land;

(d) payment of the following compensation and damages, if there are perennial plants, seasonal crops or livelihoods on the acquired land -

(i) Three times the value of perennial plants grown on the land that is calculated at the local market price based on the current value of such plants,

(ii) Three times the value of seasonal crops that is calculated at the market price based on the crop yield per acre,

(iii) The estimated loss of income due to termination of livelihoods and jobs, and

(iv) The value of the loss of buffalos, cows and other livestock and machinery.

(e) pay compensation and damages to affected persons or representatives after screening; and

(f) record separately between those who agree and withdraw the compensation and damages and those who do not withdraw them as they do not agree with such compensation.

Section (40)

The Land Acquisition Implementation Body shall:

(a) Calculate the relocation expenses in accordance with the Rules and notifications enacted under this Law, as well as the amount of compensation and damages under Section 39, and submit them to the Central Committee visa the relevant Regional or State Government and Nay Pyi Taw Council in order to seek approval from them; and

(b) Disburse the compensation and damages, including the relocation expenses to the Landowner, and the damages to the persons related to the acquired land, which are approved by the Central Committee.

Section (41)

If any affected person is not satisfied with any of the following issues, he/she may apply to the Land Acquisition Implementation Body to submit the referral form to the relevant court providing the reasons:

(a) The matter regarding the area demarcated for compensation and damages;

(b) The matter regarding the amount of compensation and damages;

(c) The matter regarding which affected persons shall be compensated or who shall or shall not be entitled to compensation; and

(d) The matter regarding who shall be subject to the compensation or how it should be apportioned.

Section (42)

The Land Acquisition Implementation Body:

(a) shall submit the referral form to the relevant court within 60 days providing the following information along with the application letter of the affected person under Section 41:

(i) The amount of compensation based on the market price of the acquired land or land and building,

(ii) Three times the value of perennial plants grown on the land that is calculated at the local market price based on the current value of such plants,

(iii) Three times the value of seasonal crops that is calculated at the market price based on the crop yield per acre, and

(iv) The estimated costs for accommodation and meal for the Landowner before he/she is resettled.

(b) In submitting the application form for referring to the court under sub-section (a), the following information shall be included:

(i) the list of names, residential addresses and summoning addresses of affected persons,

(ii) compensation and damages that have not been paid yet,

(iii) Copy of the Field Investigation Sub-Team's report under Section 33 with respect to the land to be acquired, and

(c) Compensation and damages not accepted by any affected person shall be deposited to the court.

Section (43)

The relevant court:

(a) shall, with respect to the referral form submitted as per Section 42, open a case and begin investigation within 30 days, in accordance with the Code of Civil Procedure;

(b) may, if an objection is concerned with the areas for which compensation and damages are determined under Section 41(a), summon and inquire a member or a representative of the Land Acquisition Implementation Body;

(c) shall, regarding other objections under Sub-Sections 41(b), (c) and (d), summon and inquire affected persons only and necessary witnesses, without having to summon and inquire a member or a representative of the Land Acquisition Implementation Body; and in this regard, their representative or lawyer may be allowed to act on behalf;

(d) may, regarding the matters contained in sub-section (b) and (c), pass a judgment, order or decree; and

(e) As the affected person refuses to accept, may direct to pay to him or her the money lodged with the court under Section 42 (c) in addition to the interest incurred as such a sum is saved at the state-owned bank.

Section (44)

The Land Acquisition Implementation Body:

(a) shall, if the referral form is submitted to the relevant court as per the application of any affected person, suspend the payment of compensation and damages before the case is finalized; and

(b) shall proceed with the payment of compensation and damages if the referral form is not submitted to the relevant court, or if the referred case has been finalized by the court.

Section (45)

Notwithstanding anything contained in the provisions of this Chapter regarding the payment of compensation and damages, payment of compensation and damages and other arrangements shall be carried out in accordance with the relevant law in order to prevent any adverse impact on the person who has the right to operate and use the land due to the acquisition of farmland or vacant, virgin and fallow land.

Chapter (9), Resettlement and Rehabilitation

Section (46)

The Resettlement and Rehabilitation Implementation Body shall grant any of the rights under Section 36 (b) as desired by the Landowner, and implement the following resettlement and restoration schemes in accordance with the provisions of this chapter based on the negotiations and agreements with the Department or Organization that Proposes for Land Acquisition:

(a) Implementing in accordance with the schemes of resettling the Landowner as soon as the schemes of taking possession of the land and transferring the land have commenced;

(b) Resettlement schemes that include schemes for housing development, essential infrastructures and amenities for the social rehabilitation of households, infrastructures for the development of wards and villages, and other needs; and

(c) Rehabilitation schemes that involve arrangements for livelihoods and job opportunities that are based on the acquired land.

Section (47)

If the resettlement schemes under Section 46 have not been carried out even when the possession of the land had been transferred, the Department or Organization that Proposes for Land Acquisition shall arrange temporary quarters for which the relocation expenses shall be used as per negotiation and agreement with the Landowner.

Section (48)

In implementing the schemes under Section 46 based on the negotiation and agreement as per Section 37, Sub-Section (b), Resettlement and Rehabilitation Implementation Body shall, if necessary:

(a) take necessary measures to ensure resettlement does not cause impacts on the livelihoods, social lives and environment of Landowners and locals residing in such an area; and

(b) implement the schemes as negotiated and agreed, when the Landowner asks for permission to enjoy any of the rights granted under Section 36 (b) or to invest in the project as per negotiation and agreement with the Department or Organization that Proposes for Land Acquisition.

Section (49)

In order to be able to implement the resettlement and rehabilitation schemes which has not been negotiated or agreed in advance by the Land Acquisition Implementation Body has not negotiated and agreed in advance, the Central Committee shall have the right to allocate the duties that are to be discharged by the relevant ministry and by the Department or Organization that Proposes for Land Acquisition respectively.

Section (50)

The Resettlement and Rehabilitation Implementation Body shall take special care and arrange to ensure that their resettlement and rehabilitation activities do not cause any harmful effect on vulnerable groups including women, children, ethnic minorities and traditional owners.

3.1.3.39 Notification No. 37/2014 for usage and handling of substances that deplete the ozone layer

Order relating to the usage and handling of substances that deplete the ozone layer.

Paragraph 3 of this Order indicates that any individual or organization who intends to import or export ozone-depleting substances or products and/or which are used by ozone-depleting substances must apply to MONREC.

3.1.4 International Environmental Conventions, Protocols and Agreements

Myanmar has ratified several international and regional conventions.

No.	Conventions	Year (Ratified/Acceded/ Accepted)
Environment		
1	ICAO: ANNEX 16 to the Convention on International Civil Aviation Environmental Protection Vol. I and II, Aircraft Noise and Aircraft Engine Emission	Accession
No.	**Conventions**	**Year (Ratified/Acceded/ Accepted)**
2	Vienna Convention for the Protection of the Ozone Layer, Vienna 1985	1993 (Ratification)
3	Montreal Protocol on Substances that Deplete the Ozone Layer, Montreal 1987	1993 (Ratification)
4	London Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer, London 1990	1993 (Ratification)
5	United Nations Framework Convention on Climate Change (UNFCCC), New York 1992	1994 (Ratification)

6	Convention on Biological Diversity, Rio de Janeiro 1992	1994 (Ratification)
7	The Convention Concerning the Protection of the World Cultural and Natural Heritage, Paris 1972	1994 (Acceptance)
8	United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought, Paris 1994	1997 (Accession)
9	Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Washington DC 1973; and as amended in Bonn, Germany 1979	1997 (Accession)
10	ASEAN Agreement on Conservation of Nature and Nature Resources, Kuala Lumpur, 1985	1997 (Signatory)
11	Kyoto Protocol to the Convention on Climate Change, Kyoto 1997	2003 (Accession)
12	ASEAN Agreement on Trans-boundary Haze Pollution	2003 (Ratification)
13	Stockholm Convention on Persistent Organic Pollutants (POPs), 2001	2004 (Accession)
14	Ramsar Convention on Wetlands of International Importance	2005 (Accession)
15	Establishment of ASEAN Regional Centre for Biodiversity	2005 (Signatory)
16	Declaration on ASEAN Heritage Parks	2003 (Signatory)

No.	Conventions	Year (Ratified/Acceded/ Accepted)
17	United Nations Convention on the Law of the Sea (UNCLOS), Montego Bay, 1982	1996 (Ratified)
18	Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (1992)	2015 (Acceptance)
Social, Labor and Health		
19	Universal Declaration of Human Rights (UNDHR)	signed
21	Convention on the Rights of the Child	1991 (acceded)
22	Convention on Elimination of All Forms of Discrimination against Women (CEDAW)	1997 (acceded)
23	Relevant ILO Conventions in force in Myanmar: C1 Hours of Work (Industry) C14 Weekly Rest (Industry) C17 Workmen's Compensation (Accidents) C19 Equality of Treatment (Accident Compensation) C26 Minimum Wage Fixing Machinery C29 Forced Labor Convention C42 Workmen's Compensation (Occupational Diseases) Revised 1934 C52 Holidays with Pay C87 Freedom of Association and Protection of the Right to Organize C182 - Worst Forms of Child Labor	

3.1.5 International Standards & Guidelines

The Project will also follow International Environmental guidelines and standards including World Bank /IFC (International Finance Corporation) Guidelines & Industry Standards as detailed in Table**.**

Applicable International Standards & Guidelines	
1	Equator Principles (2013)
2	International Financial Cooperation/ World Bank (IFC/WB) General Environmental Health and Safety (EHS) Guidelines (April 30, 2007)
4	IFC Environmental, Health, and Safety Guidelines for Onshore Oil and Gas Development (2017).
6	IFC Performance Standards on Environmental and Social Sustainability (2012);

3.2 Contractual and other Commitments

The Project will comply with the Myanmar Environmental Conservation Law, Environmental Conservation Rules, Environmental Quality (Emission) Standards and all necessary international standards. Lluvia (Confectionary) company makes the following commitments:

- The project will comply with commitments, mitigation measures and management plans stated in the IEE report.
- The company is responsible for its actions and omissions and those of its contractors, subcontractors, officers, employees, agents, representatives, and consultants employed, hired, or authorized by the company acting for or on behalf of the Project.
- 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.
- 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.
- Be responsible for, and shall fully and effectively implement, all requirements set forth in the ECC, applicable Laws, the Rules, this Procedure and standards.
- Timely notify and identify in writing to the Ministry, providing detailed information as to the proposed Project's potential Adverse Impacts.
- Respect and comply with the customs, traditions and traditional culture of the ethnic groups in the Union;
- Abide by the terms and conditions, stipulations of special licenses, permits, and business operation certificates issued to them, including the rules, notifications, orders, and directives

and procedures issued by the MIC and the applicable laws, terms and conditions of contract and tax obligations;

- Carry out in accordance with the stipulations of the relevant department if it is, by the nature of business or by other need, required to obtain any license or permit from the relevant Union Ministries government departments and governmental organizations, or to carry out registration;
- Immediately inform the Commission if it is found that natural mineral resources or antique objects and treasure trove not related to the investment permitted above and under the land on which the investor is entitled to lease or use and not included in the original contracts.
- To inform the respective industrial zone committee /township administrative department if any historical thing is found during the project operations.

- Abide by the applicable laws, rules, procedures and best standards practiced internationally for this investment so as not to cause damage, pollution, and loss to the natural and social environment and not to cause damage to cultural heritage;
- Close and discontinue the investment only after payment of compensation to employees in accordance with applicable laws for any breach of employment contracts, closure of investment, sale and transfer of investment, discontinuation of investment, or reduction of workforce;
- Pay wages and salaries to employees in accordance with applicable laws, rules, procedures, directives and so forth during the period of suspension of investment for a credible reason;
- Pay compensation and indemnification in accordance with applicable laws to the relevant employee or his successor for injury, disability, disease and death due to the work;
- Supervise foreign experts, supervisors and their families, who employ in its investment, to abide by the applicable laws, rules, orders and directives, and the culture and traditions of Myanmar;
- Respect and comply with the labor laws;
- Have the right to sue and to be sued in accordance with the laws;
- Pay effective compensation for loss incurred to the victim, if there is damage to the natural environment and socioeconomic losses caused by logging or extraction of natural resources which are not related to the scope of the permissible investment, except from carrying out the activities required to conduct investment in a Permit or an Endorsement.
- Ensure equal rights for local workers and avoid salary bias, i.e. ensure that local and foreign workers have the same salary at the same level.
- Ensure that all foreign employees apply for the proper work permit and visa through the Myanmar Investment Commission (MIC).
- Provide rights and benefits including but not limited to, leave, holidays, overtime pay, compensation and social security. Most of the relevant particulars are in the Myanmar Companies Act.
- Settle disputes, within the law, between workers, employers, consulting experts or any other personnel involved in the business operation.

3.3 Institutional Framework

The aim of this Chapter is to describe the Administrative and political divisions of Myanmar including environmental organizations.

(1)Administrative Divisions

Myanmar is a multi-ethnic country composed of over 130 ethnic groups, and viewing macroscopically, in the central part of the country from north to south along Ayeyarwady River

resides the largest group covering 70% of the total population, Bama, and in mountainous area in east and west reside most of the minorities.

Myanmar has a three levels administrative structure, as described below. The first level subdivision includes:

- Seven states;
- Seven regions (regions were previously referred to as "divisions", prior to August 2010);
- Five self-administered zones;
- One self-administered division;
- One union territory.

States and regions are divided into districts. Districts consist of townships, which are composed of towns, wards and village-tracts, that are groups of adjacent villages. The administrative structure of the states, regions and self-administering bodies is defined in the Constitution.

Each region and state have a Regional/State Government, consisting of a Chief Minister, Ministers and an Advocate General. Legislative authority resides with the State/Regional "Hluttaw" (a parliament or legislative body), which are made up of elected civilian members and representatives of the military.

The Constitution states that Naypyidaw is a Union Territory under the direct administration of the President. The Naypyidaw Council, led by a Chairperson, carries out general functions on behalf of the President. The Chairpersons of the Naypyidaw Council are appointed by the President, and include civilians and representatives of the military.

Self-Administered Zones and Self-Administered Divisions are administered by a Leading Body, which is headed by a Chairperson, and has executive and legislative powers. The Leading Body consists of elected State/Regional Hlutttaw members and military personnel.

Lluvia factory is located in Mingalardon Township in the Yangon Region of Myanmar.

2) Ministry of Natural Resources and Environmental Conservation (MONREC) 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).

3) Yangon City Development Committee (YCDC), At the local level, the YCDC has a critical role. For instance, it 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 Environmental Conservation and Sanitation Department of YCDC** used to conduct environmental inspections whether adherence to the regulations regarding disposal of waste water and other waste products in Yangon's 18 industrial zones.

3.4 Project's Environmental and Social Standards

MONREC has established environmental quality standards, the National Environmental Quality Standard [Legal Reference: ECL 2012 (Article 2c) and EQS 2016]. ECD / MONREC have indicated that the discharge standards are applicable for confectionary activities. These are in accordance with international standards.

Myanmar Discharge Standards Applicable to Confectionary activities

Guideline	Standard
Effluent	Treatment and disposal in accordance with applicable standards provided in the General EHS Guidelines for discharge to surface waters or to land: - 5-day Biochemical oxygen demand 50 mg/L - Chemical oxygen demand 250 mg/L - Oil and grease 10 mg/L - pH 6-9 - Temperature <3[b] C - Total coliform bacteria 400 per 100ml - Total nitrogen 10 mg/L - Total phosphorous 2 mg/L - Total suspended solids 50 mg/L - Active ingredients/Antibiotics to be determined on a case specific basis
Air emissions	Treatment as per General EHS Guidelines Emission concentrations as per General EHS Guidelines, and: PM_{10} 50mg/Nm3
Storm water drainage	Storm water runoff should be treated through an oil / water separation system able to achieve oil and grease concentration of 10 mg/L
Sewage	Sewage Treatment as per General EHS Guidelines, including discharge requirements

The Environmental, Health, and Safety (EHS) Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP). They are designed to provide relevant industry background and technical information. This information

supports actions aimed at avoiding, minimizing, and controlling EHS impacts during the construction, operation, and decommissioning phase of a project or facility.

The EHS Guidelines contain the performance levels and measures that are generally considered to be achievable in new facilities by existing technology at reasonable costs (Environmental Health and Social Guidelines, IFC 2007).

Applicable IFC EHS Guidelines

Environmental topic	**Applicable EHS Guidelines**

Air quality	Section 1.1 provides guideline applies for facilities or projects that generate emissions to air at any stage of the project life-cycle. It presents information about common techniques for emissions management. This guideline provides an approach to the management of significant sources of emissions, including specific guidance for assessment and monitoring of impacts. Additional information on approaches to emissions management in projects located in areas of poor air quality, where it may be necessary to establish project-specific emissions standards are included. These Guidelines include the following key recommendations: • facilities and projects should avoid, minimize, and control adverse impacts to human health, safety, and the environment from emissions to air; • impacts should be estimated through qualitative or quantitative assessments by the use of baseline air quality assessments and atmospheric dispersion models to assess potential ground level concentrations; • the dispersion model applied should be internationally recognized, or comparable (examples of acceptable emission estimation and dispersion modelling approaches for point and fugitive sources are reported in these guidelines); • emissions from point sources should be avoided and controlled according to good international industry practice (GIIP) applicable to the relevant industry sector, depending on ambient conditions, through the combined application of process modifications and emissions controls (examples are provided in these guidelines); • a monitoring system should be implemented. For ambient air quality IFC refers to WHO Guidelines (Air Quality Guidelines Global Update, 2005.)
Noise and vibration emissions	Section 1.7 provides standards for daytime and night time noise emissions (for residential and industrial environments, WHO 1999) and recommends that noise prevention and mitigation measures are implemented with regard to predicted noise levels at sensitive receptors.

	Noise monitoring may be carried out for the purpose of establishing the existing ambient noise levels in the area of the proposed facility or for verifying operational phase noise levels. A key priority should be the implementation of noise control measures at source; the selected methods will depend on the source type and the proximity of sensitive receptors, and can include: equipment selection, acoustic enclosures, vibration isolation, traffic route selection, other.
Wastewater and Liquid effluent quality	Section 1.3 provides guidelines applied for projects that have either direct or indirect discharge of process wastewater or wastewater from utility operations. Section 1.3 provides guidelines for treatment approaches of process wastewater and wastewater from utility operations. These Guidelines include the following key recommendations: • points of discharge, rate of discharge, chemical use, dispersion and environmental risk should be considered in a disposal plan; • discharges should be planned away from environmentally sensitive areas, with specific attention to high water tables, vulnerable aquifers, wetlands, and community receptors, including water wells and intakes.
Waste management	Section 1.6 provides guidelines for projects/facilities that generate, store, or handle any quantity of industrial hazardous or not hazardous waste. Section 1.6 provides appropriate guidelines for hazardous waste storage, transport, treatment and disposal, in order to prevent harm to health, safety and environment. These Guidelines include the following key recommendations: • waste management should be addressed through a Waste management system that addresses issues linked to waste minimization, generation, transport, disposal, and monitoring; • in addition to the implementation of waste prevention strategies, the total amount of waste may be significantly reduced through the implementation of recycling plans; • if waste materials are still generated after the implementation of feasible waste prevention, reduction, reuse, recovery and recycling measures, waste materials should be treated and disposed and all measures should be taken to avoid potential impacts to human health and the environment.

Chapter 4
Description of the project and alternatives selection

4.Project location and description

4.1 Project site location and description

The Lluvia Confectionary factory is located at the No.(137-139, 155-170) in the Yangon Industrial Zone, North Okkalapa township, the Republic of the Union of Myanmar, at the coordinates of 16° 56' 41.70" N and 96°11' 43.51" E. The Yangon Industrial Park is located at the corner of Kayaypin and Thudamar Road and the proposed project covers the total area of 4 acres. The project site has also a close boundary with Dagon Myo Thit (East) township and North Okkalarpa Township at the East and North respectively.

The Lluvia Confectionary factory is being implemented to manufacture and distribute the flour based food products including biscuits, crackers, sandwich and cookies.

Figure 4.1: Location of Lluvia confectionary factory and surrounding environment

Figure 4.2: The topography map

Figure 4.3: Proposed design for Lluvia confectionary factory layout

plan 4.2 Investment ratio and Project background

4.2.1 Investment ratio

Investment Item	Amount (USD)
Building Construction	8,352,670
Raw Materials	1,017,931
Machines Installation	10,000,000
Working Capital	1,800,000
Total Investment	21,170,601

4.2.2 Project background

The Lluvia Limited (Confectionary Factory) is a food processing industry which produces beverages like the biscuits, Cracker, Sandwich and cookies. It has acquired land at No. (137-139, 155-170), Yangon Industrial Zone, North Okkalapala Township, Yangon, Myanmar. The plot is about 4 Acres. The Lluvia Ltd. (Confectionary Factory) is a joint venture between the Lluvia Limited and MC Food Holdings Asia Pte Limited (Japan). The Lluvia is the leading industrial group with its operations extended in Myanmar.

4.2.3 Project Timeline

The proposed project will operate as follows,

Project Name	Construction Start Date – End Date	Operation Running Date	Decommissioning Phase
Lluvia Limited (Lluvia Confectionary Factory)	2016 - 2017	2018 – 2048 (30 years)	2047 – **2048** Total expected years cover about 30 years period of Myanmar Investment Commission

4.3 Analysis of the area affected by the proposed project

1. Physical Environment (Air, noise, water and soil):
   - Air - Consider emissions from factory operations, such as smoke, dust, or odors, and their potential
     impact on air quality in the vicinity.
   - Noise - Industrial noise, unpleasant and disruptive, becomes 'noise pollution' when it exceeds desired levels. This project aimed to assess industrial noise pollution's effects on workers and the surrounding community."
   - Water - Assess the factory's water needs, potential wastewater generation, and the impact on local water bodies due to discharge or contamination.
   - Soil - Collecting of soil samples from the proposed project area and physico-chemical analysis of the existing soil samples

Figure 4.4: The location map of the physical environment (Air, Noise, Water and Soil)

2. Biodiversity:

- The Lluvia Confectionary factory project has no nearby forests, wildlife, or aquatic life in its vicinity. Consequently, the proposed project is assessed to have 'negligible' significance in terms of impact on forests, wildlife, and aquatic animals/fish.

3. Social Aspects:

- Identify communities in the vicinity and assess how the factory might affect their livelihoods, health, or access to resources.
- Evaluate if any cultural or historical sites might be affected by the factory's construction or operation.
- The survey conducted at the Shwe Pauk Kan Township which is the nearest vicinity to the proposed factory, Yangon Industrial Zone is aimed at identifying of environmental and social impacts potentially affected by the existence of the proposed factory. The survey was carried out using both quantitatively and qualitatively. More specifically, public consultation meetings were carried out and then information of the Project Area Units (PAUs) as well as Project affected Persons (PAPs) along with their livelihoods, income, transportation, health condition were collected through questionnaire surveys. The survey was carried out from 26 to 29 of November, 2018 by the EQM socio-eco survey Team.
- Consider the employment opportunities the factory might create and any potential changes in local economies.
- Evaluate if the factory's resource consumption might affect the availability of resources (e.g., water, raw materials) for local communities.

Figure 4.5: The location map of the social survey area

4. **Infrastructure Impact:**
- Assess how the factory might impact local traffic or infrastructure due to transportation of goods and employees.

5. **Health and Safety:**
- Evaluate safety measures within the factory to prevent accidents or health hazards for employees.
- Assess potential health risks by emissions, waste disposal, or other aspects of factory operation to nearby residents.

4.3.1 Nearest projects or development activities from the proposed project construction phase and operation phase

(a) Nearest projects to the South of the proposed factory

(1) Tiger Supply Co.,Ltd
(2) Trade One Asia International Co.,Ltd
(3)Myanmar Awba Group and
(4)APT ware house are located in the south of the proposed factory.

Figure 4.6: Nearest projects to the South of the proposed factory

(b) Nearest projects to the West of the proposed factory

(1)MPG Mahar Paramount Group
(2) Asia Caps Co.,Ltd,
(3)MEBS International
(4)Znp warehouse
(5)Armo warehouse
(6)Smile World Garment
(7)Sawbwa VT Limited
(8)Nobel Garment Industry Limited and
(9)Classic Electrical & Engineering Co.,Ltd are located in the west of the proposed factory.

Figure 4.7: Nearest projects to the West of the proposed factory

(c) **Nearest projects to the North of the proposed factory**
(1) SC Auto Myanmar Co.,Ltd
(2)MCB Company
(3)Myanmar Consumer Beverage
(4)Crown Beverage Cans Myanmar
(5)Designer water
(6)MFA Service Center
(7) Thinzar Kyaw Production Co.,Ltd
(8)MDHG Group of companies
(9) Yathar Cho Industry Co.,Ltd
(10) Pandora Trading Co.,Ltd warehouse
(11) Asia Pacific Beverages Myanmar Co.,Ltd
(12)MDG warehouse YIP
(13) Shwe Aung Naing Industrial. Co.,Ltd and
(14) LUDU Building Materials Co. (ZKB Warehouse) are located in the north of the proposed factory.

Figure 4.8: Nearest projects to the North of the proposed factory

(d) **Nearest projects to the East of the proposed factory**
(1)Chan Yin Industries and
(2)Daung Nyi Naung Tile factory are located in the east of the proposed factory.

Figure 4.9: Nearest projects to the East of the proposed factory

4.4 Objectives of the proposed project

The objectives of the Lluvia Confectionary factory are as follows:

(1) To add value to the local agricultural produce
(2) To generate employment opportunities for local youth
(3) To give affordable, rich, wholesale export substitution product and
(4) To save foreign exchange

4.4.1 Project proponent information

The project proponents for the Confectionary factory are MC Food Holding Asia Pte Ltd and Diamond Star Co.ltd. Under the Foreign Investment Law, the investment of the proposed project has been submitted to Myanmar Investment Commission (MIC) since 2017. The project concerns with the manufacturing and distribution of flour based food products including biscuits, crackers sandwich and cookies. The proposed duration of investment is 50 years with the joint venture investment. The following chart describes the detail information of the organization structure of Lluvia Confectionary factory construction phase.

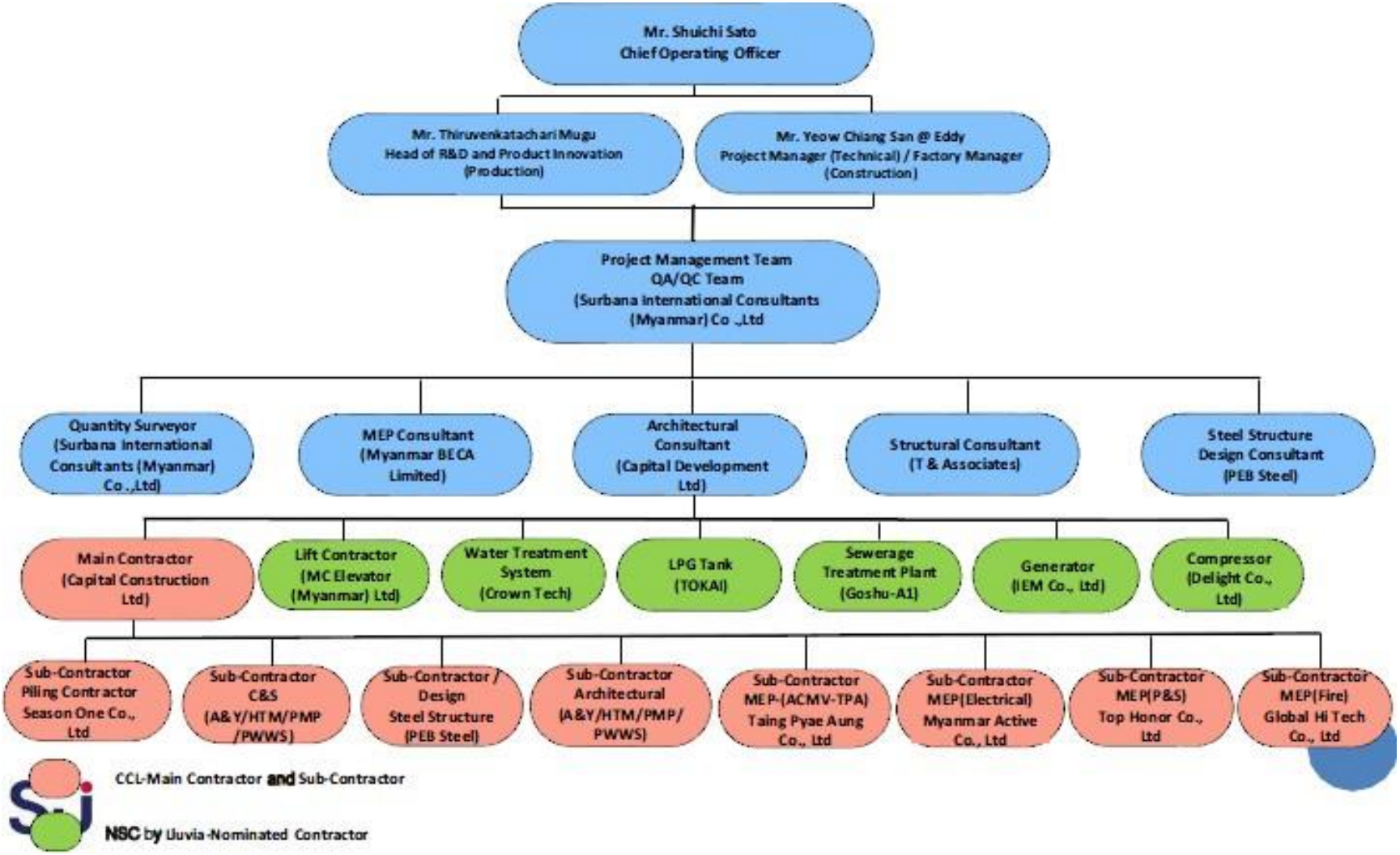


Figure 4.10: Organization chart of the Lluvia confectionary factory construction phase

The following chart describes the detail information of the organization structure of Lluvia Confectionary factory operation phase.

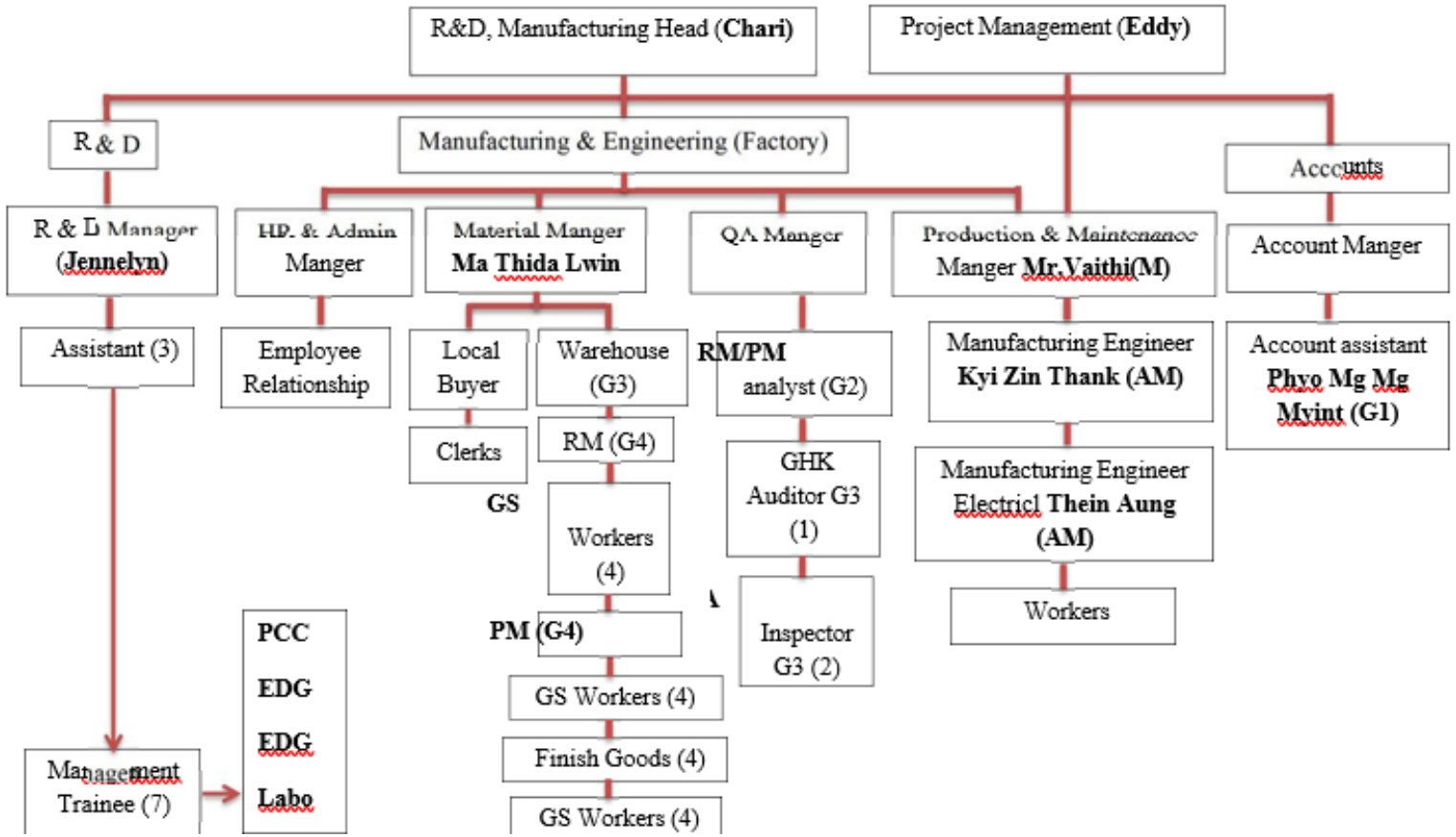


Figure 4.11: Organization chart of the confectionary factory operation phase

4.5 Project site description

4.5.1 Description of buildings

The LPG will be built with 15 ton cylindrical type storage tank including pump, piping and related accessories. Three alarms and auto shut off system will be built for the safety. The factory buildings are planned to be equipped with up-to-date electrical and communication system, fire protection system, water supply and sanitation system also waste water treatment tank, air conditioning and ventilation system as well.

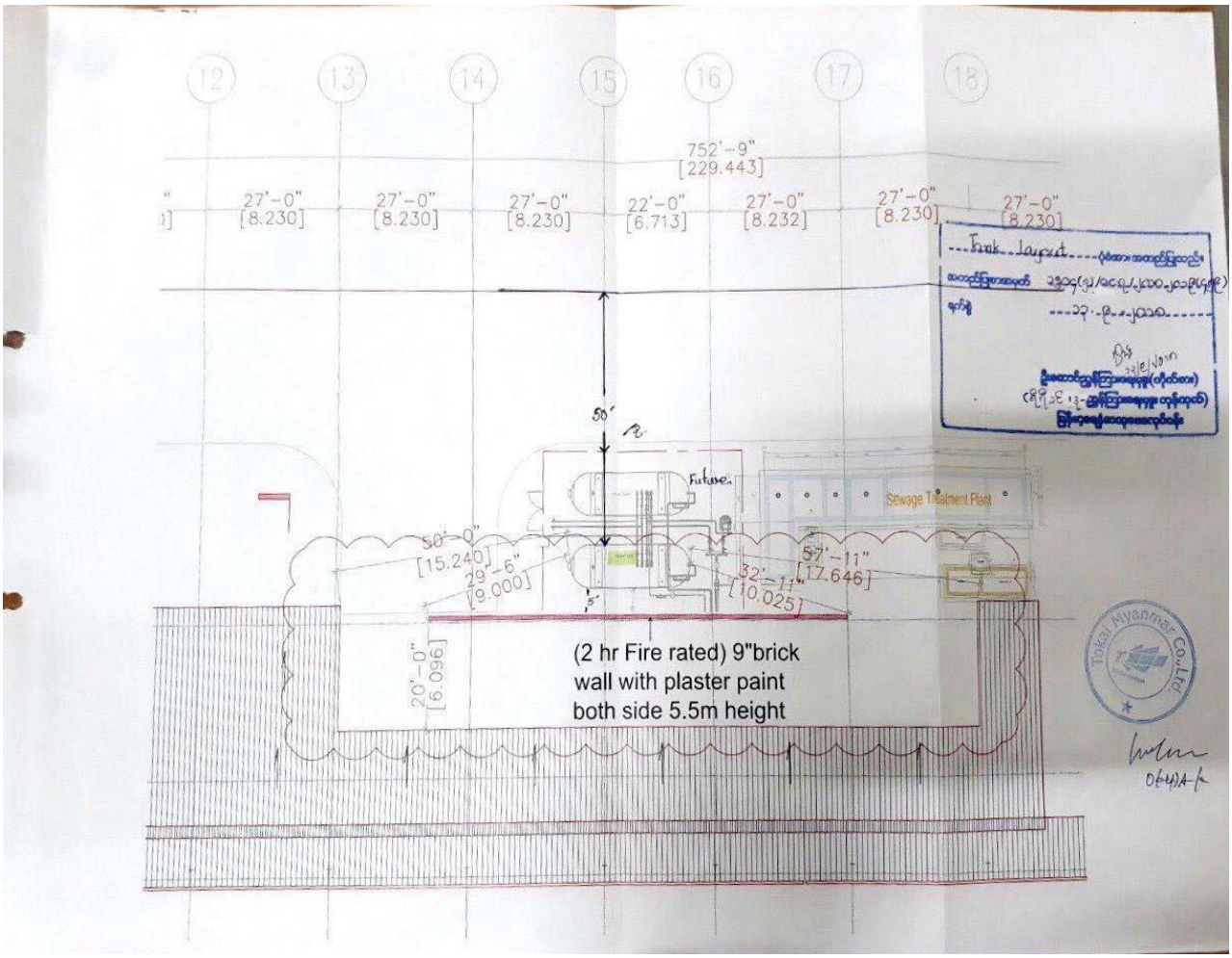


Figure 4.12: LPG layout plan

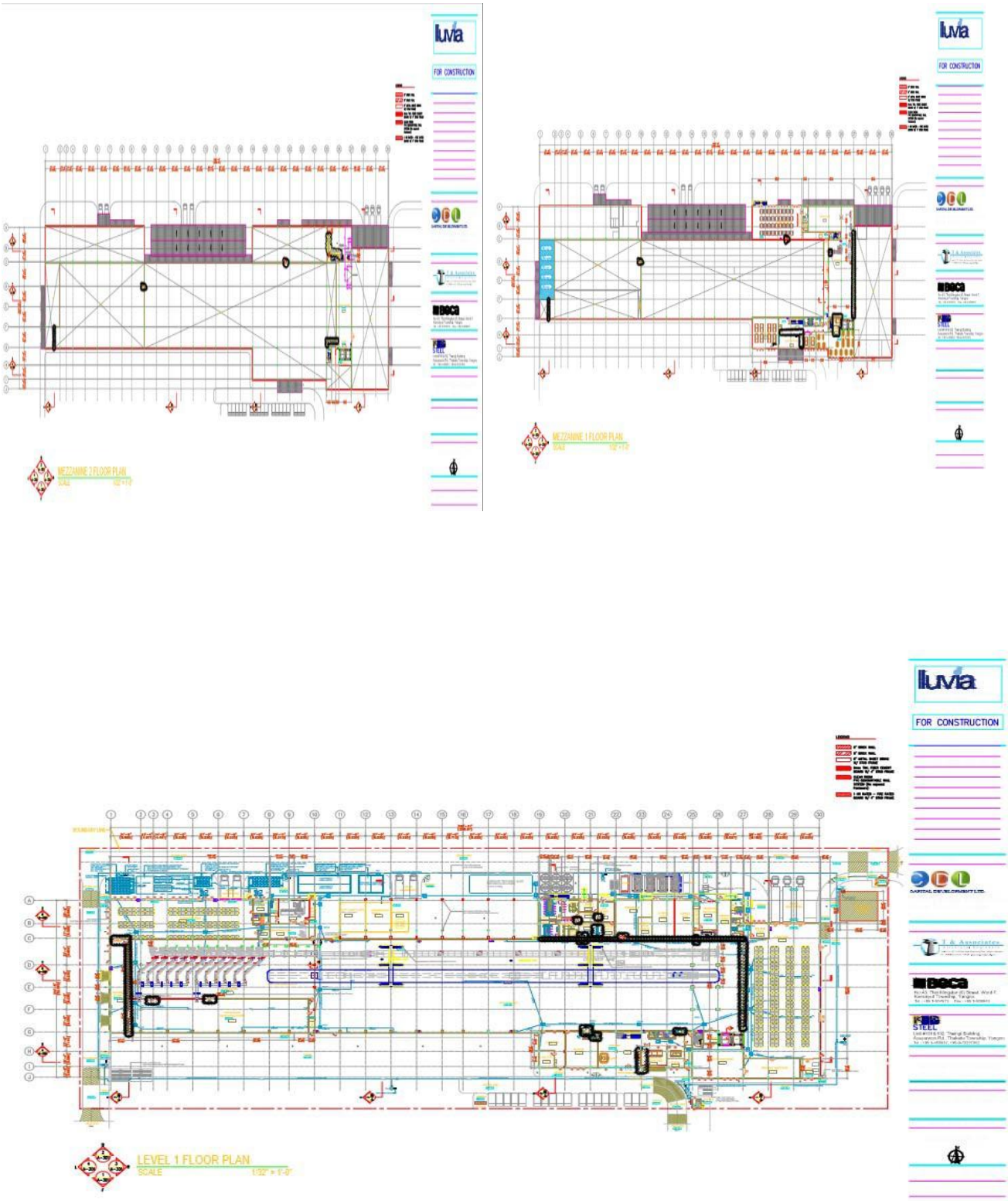


Figure 4.13: General layout plan of the proposed project

4.5.2 Investment plan

MC Food Holding Asia Pet Ltd and Diamond Star Co.,Ltd will invest 8,352,670 USD for the building construction, 1,017,931 USD for the raw materials, 10,000,000 USD for the machines installation and 1,800,000 as a working capital. The total investment amount is 21,170,601 USD. The following table shows the investment amount of proposed project.

Table 4.1:Investment amount of the proposed project

No	Investment Type		Amount (USD)
I	**Working Capital**		**1,800,000**
		TOTAL	**1,800,000**
II	**Building**		
1	Building- Factory construction (internal area)		**7,129,122**
2	Building- Factory construction (External areas)		**223,548**
3	Building Mechanical		**0**
4	Building-incidental		**1,000,000**
		TOTAL	**8,352,670**
III	**Machinery**		
1	Machine Line 1 & 10 packaging machines		**5,000,000**
2	Machine Line 2 & 10 packaging machines		**5,000,000**
		TOTAL	**10,000,000**
IV	**Raw Materials**	**TOTAL**	**1,017,931**
	Initial Raw Materials	**Grand Total Investment (USD)**	**21,170,601**

4.6 Utilities

4.6.1 Construction phase

4.6.1.1 Requirement of electricity and fuel

The total power required for the proposed unit is 110kWh/day. The main source of power requirements is from the national grid line 100 KVA and from the generators. There are 6 generators in the construction site (66 KVA one unit, 25 KVA one unit and 20 KVA four units) which are for lighting and construction process, etc. The total diesel requirement for the generators is approximately 30 gallons per day. The fuels are purchased from the local market and then these are transported to the project area by cars.

4.6.1.2 Firefighting system

The carbon dioxide fire extinguishers are placed near the diesel tanks for the potential of fire emergency cases. The fire extinguishers are placed next to the special purpose areas for emergency situations. In case of a fire emergency, the volume of 32,000 gallons water is stored in the water storage tank within the factory area. With the installation of compressor, air valve and fire hoses for fire protection in suitable places of the projected site, water for firefighting will be used from the water storage tank. The fire safety training module is also designed to all staff for preventive measures to eliminate causes of fire or fire hazards in the workplace.

Figure 4.14: (a) Fire extinguishers are installed at the special areas during the construction phase

Figure 4.14: (b) Diesel storage building during construction phase

4.6.1.3 Water requirement

The main sources of water for the construction are tube wells and public supply. There are two tube wells having 555 feet depth each and capacity of producing average 1,000 gallons per hour from both tube wells are settled. The total water usage of the project site is 170 m3/day (37,390 gallons/day). The total water requirement for the whole year is 62,050 m3 /year (13,647,350 gallons/year). The required water for construction of Lluvia Confectionary factory is being supplied from that public supply through

water pipelines and stored water storage tanks (6,400 gallons and 32,000 gallons) in the project site. For drinking water, purified drinking water bottles are being used.


Figure 4.15: Water storage tanks

4.6.1.4 Requirement of human resources

During the construction phase, over 400 workers are assigned for the day time and over 100 workers are assigned for night time depending on the workforce requirement and 29 number of staff for the operation team. All the staff members of the project have to finish Occupational Safety and Health Administration (OSHA) training before going to the construction site. The working shift time starts from 8:00 a.m. to 5:00 p.m. including lunch time. The proposed factory operates 270 days per year. The Working hours are 9 hours per day. The required resources (human and machinery lists) of the project are shown in the following tables (4.2) and (4.3).

Table 4.2: Human resource assignment for the proposed project

Sr.No	Personnel	Day	Night
CCL Operation Team			
1	Project Manager (PM)	1	
2	Assistant Project Manager	2	
3	Site Engineer	7	1
4	Surveyor	2	
5	QA/QC (Site Inspection)	2	1
6	M&E Engineer	4	
7	Safety	2	
8	Admin	1	
9	Store Keeper	2	
10	Security	3	3
11	Driver	3	
Total		**29**	**5**
Surbana Jurong Team			
1	QC	6	
2	Office Worker	6	1
3	MEP Labour	2	
Subcontractor			
1	A&Y Subcontractor	55	6

2	HTM Subcontractor	26	6
3	P&P Subcontractor	24	
4	PWWS Subcontractor	44	10
5	AMA Subcontractor	5	
6	Divine Subcontractor	5	
7	PEB	90	10
8	Tri Engineering	20	12
9	Top Honour	13	
10	Myanmar Actie	30	2
11	Ting Pyae Aung	26	17
12	Global High Tech	46	44
13	Excavator Operator	4	
Total Head Count		**431**	**118**

Table 4.3: Equipment lists for Confectionary factory construction

Sr.No	Particular	Quantity
1	Excavator	1
2	Roller Compactor	1
3	Crawler Crane	2
4	Generator	1
5	Press Pile Machine	1
6	Cutter	1
7	Welding Machine	1
8	Wheel Loader	1
9	Green Head Lorry	1
Total		**10**

4.6.2 Operation Phase

4.6.2.1 Electricity and fuel requirement

The Lluvia Confectionary factory will use Liquefied Petroleum Gas (LPG) and 4 generators for the electricity. In case of main's power failure these generators will run and supply power to the emergency loads. The factory will use the national gird line after the first two years of operation. The total power required for the proposed unit is 332,800 kW/month(3,993,600kWh/year). The fuel requirement is also about 84,240 liter/month (1,010,880 liter/year). The plant would operate for 7,440 hours per year.

The proposed factory does not use the boiler.

4.6.2.2 Water requirement

The main sources of water for the operation phase are tube wells and public through water pipelines. There are two water storage tanks (6,400 gallons and 32,000 gallons) in the project site. For drinking water, purified drinking water bottles will be used. The water requirement for the Confectionary

operation phase is about 416.67 m^3 per month (91,642.89 gallons/month). The total water requirement for the whole year is about 5,000 m^3 (1,099,705 gallons/year). The two tube wells are 555 feet depth each and capacity is about 1,000 gallons per hour.

4.6.2.3 Existing Wastewater Treatment that will be used in the Lluvia Confectionary Factory

The proposed factory's operation is currently suspended. Thus, there is no wastewater treatment system. However, if the factory operates back, the hazards of the wastewater discharged from the Confectionary factory can be minimal due to the nature of the factory which consumes less amount of water ending up in its processing unit. Hence, there is less effluent discharge from factory processing. There is only grey water from bathing, canteen and run-off water which will flow into the public drainage.

Process Description

The factory is expected to discharge only greywater; therefore, the physical treatment will be used for wastewater 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 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 the wastewater treatment processes. This type of filtration involves passing water through a combination of gravel and sand to remove impurities and particles.

Phyiscal 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 coarser 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-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 Lluvia Confectionary Factory

1) The filter bed may become clogged with trapped particles overtime. To maintain the filter's effectiveness, periodic backwashing will be conducted.

Figure 4. 16: Sand and Gravel Filtration of the Lluvia Confectionary Factory

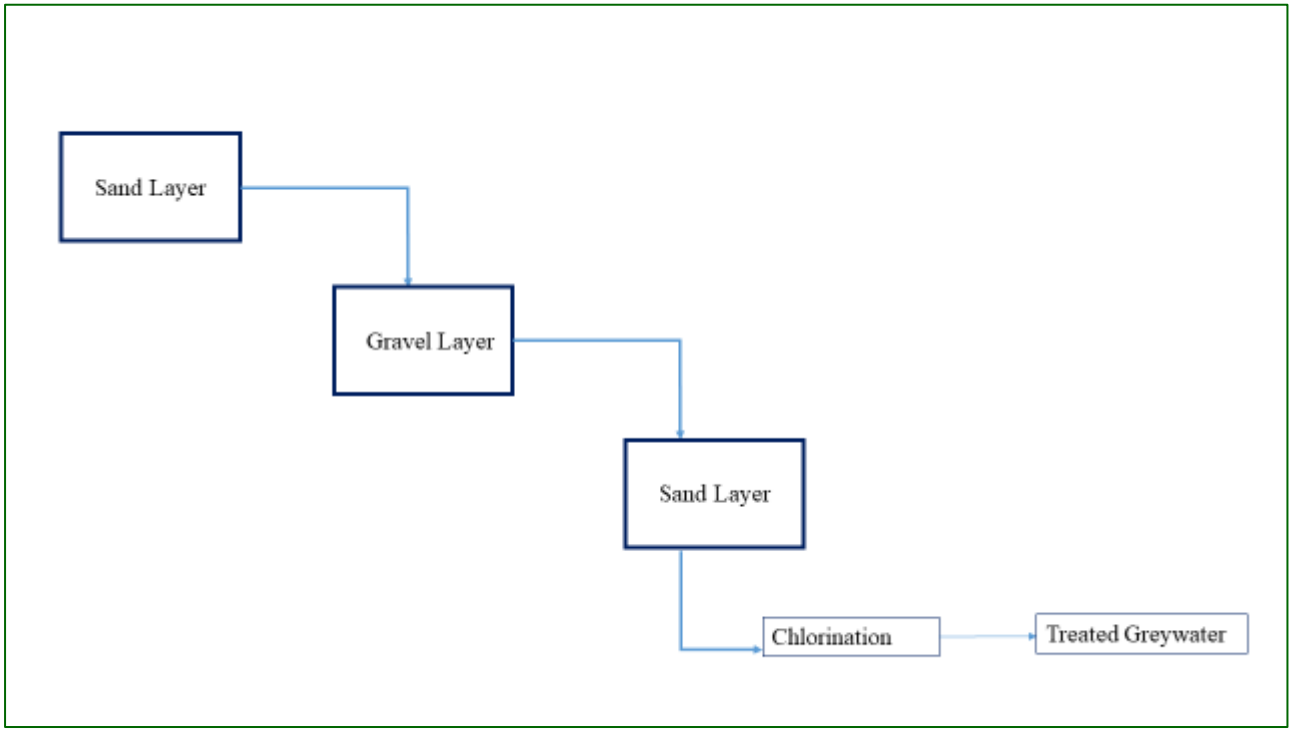


Figure 4. 17: Flow Diagram of Greywater treatment system

4.6.2.4 Management of septic tank

The proper built septic tank can prevent surface water and ground pollution through the proper sewage management. The common steps of septic water discharging system using in the proposed factory are as follows:

1. **Sewage water Collection:** Sewage water from toilets flows into the septic tank.
2. **Separation:** In the tank, the sewage water undergoes a separation process. Solid waste settles at the bottom to form sludge, while lighter materials like grease and oils float to the top to form scum.
3. **Treatment:** Anaerobic bacteria in the tank break down the organic matter in the sewage water, partially treating it. However, this process doesn't fully purify the water.
4. **Disposal:** The partially treated sewage water will be collected by YCDC in on call basis

4.6.2.5 Requirement of human resources

There are four departments including production, engineering, quality control and warehouse in the operation process. The five sections namely mixing, forming, baking, packing and cream room are combined as a production department that will be assigned with 156 workers. The engineering department will assign 10 numbers of staffs, 7 numbers of staffs will be assigned in the quality control department and 9 staffs will assign in a warehouse department. The total workforce requirement in the operation stage is 182 staffs. The required resources of the project are shown in the following table (4.4)

Table 4.4: Human resources assignment for the propose project

Sr.No	Department/Section	Requirement Manpower
A	Production	2
	1)Mixing	14
	2)Forming	4
	3)Baking	5
	4)Packing	123
	5)Cream Room	8
B	Engineering	10
C	Quality Control	7
D	Warehouse	9
Total		**182**

4.6.2.6 Raw materials

Raw materials, refined sugar, shortening/ fat, leavening agents, coco and milk powder, starches , flavors, color and inner packaging, will be imported from Thiland, Malaysia, Indonesia and France for the Confectionary factory. However, raw materials including flours, coconut oil and materials for outer packaging will be used from local sources. The total metric ton for each raw material that will be used by the proposed Confectionary factory is described in table (4.5). The equipment that will use in the operation process is described in table (4.6).

Table 4.5: Raw materials for the Lluvia Confectionary factory

No	Raw Materials	Initial Raw Volume (MT)
A	Imported Raw Material Lists for Lluvia Confectionary Factory	
1	Refined Sugar	208
2	Shortening/ Fat	293.5
3	Leavening Agents	24.5
4	Coco and Milk Powder	99
5	Starches	98
6	Flavors	12.25
7	Color	12.25
8	Inner Packaging	67.5
B	Local Raw Material Lists for Confectionary Project	
1	Flours	2690
2	Coconut Oil	978,048
3	Outer Packaging	587

Table 4.6: Equipment list for the Lluvia Confectionary factory

	Import Equipment Lists	Quantity
1	MAIN : Biscuits & Crackers LINE	1
	Misting Machine	1
	Radiation Machine	1
2	MAIN : Cookies LINE	1
3	SUB : Dough Tubs	60
4	SUB : Vertical Mixer	1
5	SUB : Sandwich Machine	2
6	SUB : Cream Mixer	2
7	SUB : Enrobing Machine	1
8	SUB : Cooling Tunnel for Enrobing MC	1
9	SUB : Chocolate Stirer - Hot Water Jacketed Tank	1
10	SUB : Fat Melter	1
11	SUB : Flour Handling System	1
12	SUB : Metal	4
13	SUB : Malkish	1
14	SUB : Sugar Grinder	1
15	PACKAGING : Cartoning Machine	8
16	PACKAGING : Lot Date Coder	13
17	PACKAGING : Packing Machine	13
18	PACKAGING : Vibrating Feeder & Magazine Hopper	13
19	PRODUCTION : DE-HUMIDIFIER	1
20	PRODUCTION : Dust Extraction and Collection Equipment	1
21	LAB QC : pH meter	1
22	LAB QC : Moisture analyzer	1
23	LAB QC : Weighing balance	3
24	LAB QC : Analytical balance	1
25	LAB QC : Auto titrator (to test FFA and PV of incoming fat materials)	1
26	LAB QC : Colormeter (Minolta)	1
27	LAB QC : Water activity meter (Novasina)	1

28	LAB QC : Texture analyzer	1
29	LAB QC : Consistometer or Viscometer	1
30	LAB QC : Micrometer calipher	1
31	LAB QC : Accessories and Utensils	1
32	LAB QC : Gloassware Apparatus	1
33	LAB QC : Laboratory Equipment & Utensils	1
34	LAB R&D : Deck Electric Oven	1
35	LAB R&D : Sheeter	1
36	LAB R&D : Weighing balance	2
37	LAB R&D : Analytical balance	1
38	LAB R&D : Band sealer	1
39	LAB R&D : Mixer (big)	1
40	LAB R&D : Mixer small	1
41	LAB R&D : Pilot scale chocolate ball mill	1
42	LAB R&D : Vernier Caliper	1
43	LAB R&D : Incubation Oven	1
44	LAB R&D : Accessories	1
45	LAB R&D : Equipment & Utensils	1
46	LAB R&D : Laboratory Furnishing work carpentary, etc	1
47	LAB R&D : Constant Climate Chamber	1
48	Weighing Scale (0.001 g - 1 g)	1
49	Electrical cables & wiring (1 sq mm - 25 sq mm)	1
50	Lathe Mc, Milling Mc, Grinder, Milling Mc, etc. 1 51 1 52 1 53 1 54	1
51	Forklift (2 ton)	1
52	Snack Biscuit Machine/Flavour Tumbler/Packer	1
53	Rotary moulds & cutters	1
54	Complete Set of Generator (1 MVA & 0.5 MVA1	2
Local Equipment Lists		
1	WAREHOUSE: Flowracks	1000
2	WAREHOUSE: Forklifts	4
3	WAREHOUSE: Pallets	5000
4	WAREHOUSE: Power Pallet Jack/ Hand Pallet Jack	3
5	PRODUCTION: BOILER	1
6	PRODUCTION: CHILLER	1
7	PRODUCTION: WATER PROCESSING EQUIPMENT (RO) - Water Treatment	1
8	POWER: Generator Set	8
9	POWER: Transformer Setup	1
10	Furniture (Desk, Chair, Partition)	20

4.7 Production Process

The Lluvia Confectionary factory is composed of four main steps, mixing, rotary moulding, baking and packaging. The following flow chart clearly describes the manufacturing process Lluvia Confectionary factory.

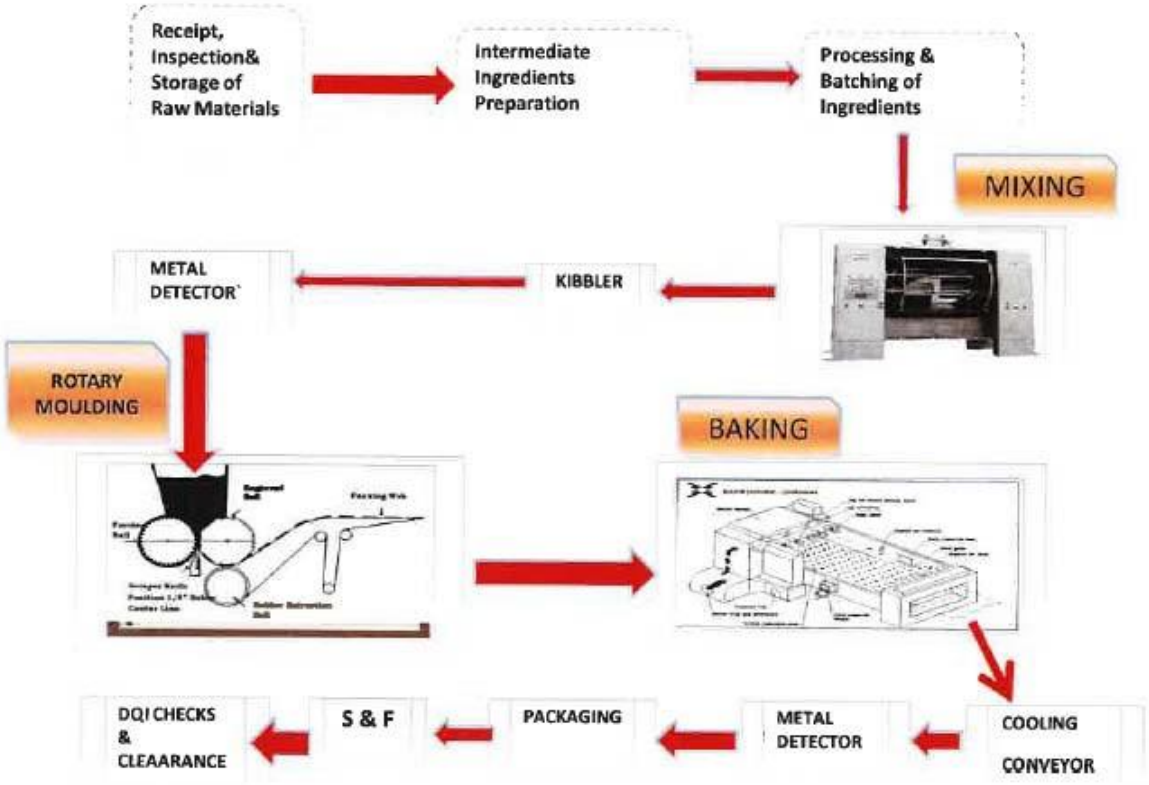


Figure 4.18: Production flow chart of Lluvia confectionary factory

4.7.1 Mixing Step

Before mixing, raw materials are stored and intermediate ingredients have to be prepared for processing and batching. Mixing process in the Confectionary factory is crucial, being the first of the major production steps where all the ingredients are perfectly blended to allow the baker to produce the perfect product.

Figure 4.19: Mixing step in operation stage

4.7.2 Sheeting and cutting method

The Lluvia Confectionary factory will use the following sheeting and cutting method for the manufacturing of materials.

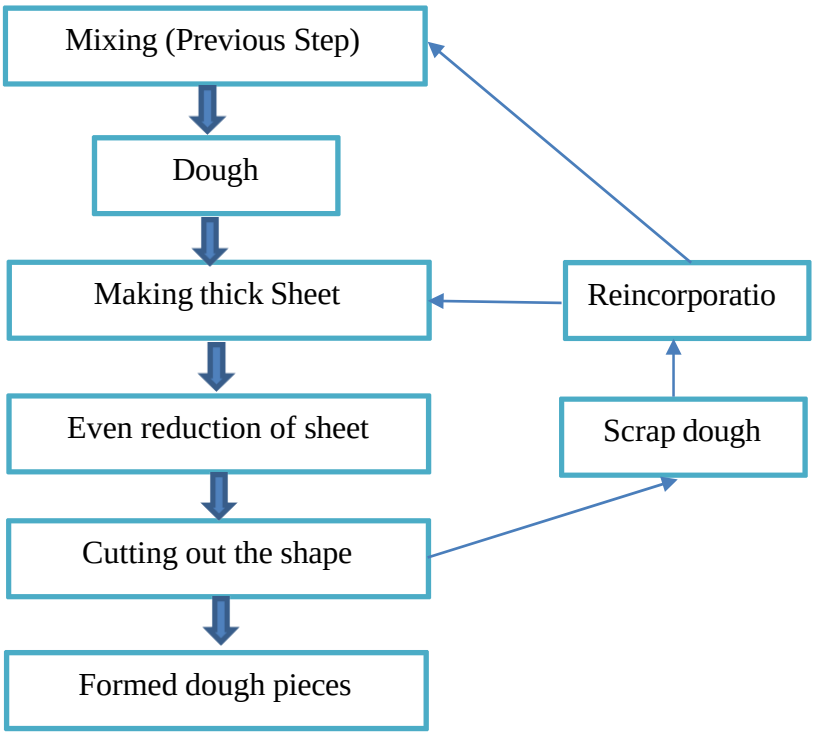


Figure 4.20 Process flow chart for sheeting and cutting method

The sheeting and cutting method are fundamental process in the production of biscuits, crackers, sandwiches, and cookies in a factory setting. The following are the process of sheeting and cutting methods.

6. **Dough Preparation**: The process begins with the preparation of the dough. Ingredients such as flour, sugar, fat, water, and other additives are mixed together to form a dough of the desired consistency and flavor.
7. **Sheeting**: The dough is then fed into a sheeter, which is a machine that rolls the dough into a thin, flat sheet of the desired thickness. The sheeting process helps to distribute the ingredients evenly and ensure uniform baking.
8. **Cutting**: After sheeting, the dough sheet is passed through a cutting machine. This machine is equipped with cutting blades or molds that cut the dough into individual shapes, such as rounds, squares, rectangles, or other shapes, depending on the product being made.
9. **Baking**: The cut dough pieces are then placed on baking trays and transferred to an oven for baking. The baking process varies depending on the type of product but generally involves baking at a specific temperature for a set amount of time until the products are golden brown and fully baked.
10. **Cooling and Packaging**: After baking, the products are allowed to cool on wire racks. Once cooled, they are inspected for quality and then packaged into boxes, packets, or trays for distribution and sale.

This method is efficient and allows for the mass production of biscuits, crackers, sandwiches, and cookies with consistent quality and appearance.

4.7.3 Rotary moulding

The rotary molding process offers advantages over sheeting and cutting that there is no scrap to recycle and very less labour requirement. This process is used for dry and crumbly dough only.

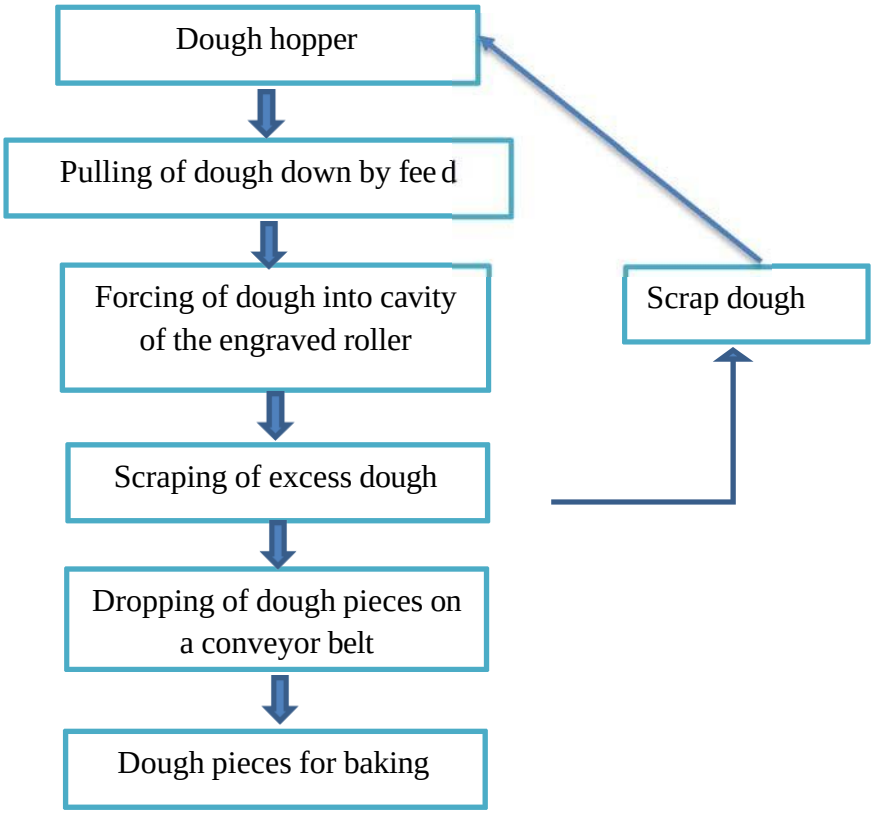


Figure 4.21: Process flow chart for rotary moulding method

The rotary moulding method is another common technique used in the production of biscuits, crackers, sandwiches, and cookies in a factory setting. The following are the steps of rotary moulding methods,

6. **Dough Preparation**: Similar to the sheeting and cutting method, the process begins with the preparation of the dough. Ingredients are mixed together to form a dough of the desired consistency and flavor.
7. **Moulding**: In the rotary moulding method, the dough is fed into a hopper that deposits it into a rotating drum or moulding machine. The drum is typically engraved with the desired biscuit or cookie pattern. As the drum rotates, the dough is pressed against the engraved pattern, shaping it into the desired form.
8. **Cutting**: After moulding, the dough is cut into individual pieces by a cutting mechanism. This can be a separate cutting machine or part of the rotary moulding machine itself. The cutting process separates the individual biscuits, crackers, sandwiches, or cookies from the continuous dough sheet.
9. **Baking**: The cut dough pieces are then placed on baking trays and transferred to an oven for baking. The baking process varies depending on the type of product but generally involves baking at a specific temperature for a set amount of time until the products are golden brown and fully baked.
10. **Cooling and Packaging**: After baking, the products are allowed to cool on wire racks. Once cooled, they are inspected for quality and then packaged into boxes, packets, or trays for distribution and sale.

The rotary moulding method is efficient and allows for the production of biscuits, crackers, sandwiches, and cookies with intricate designs and shapes. It is often used for products that require a specific shape or design that cannot be easily achieved with the sheeting and cutting method.

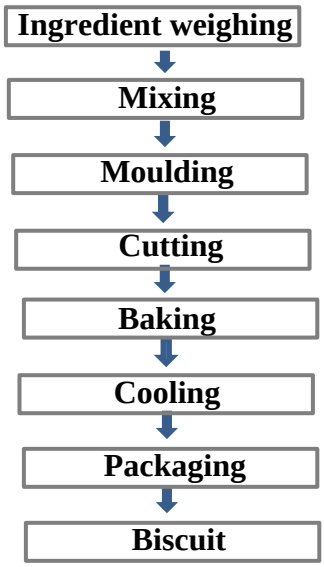


Figure 4.22: The process flow chart of biscuit manufacturing

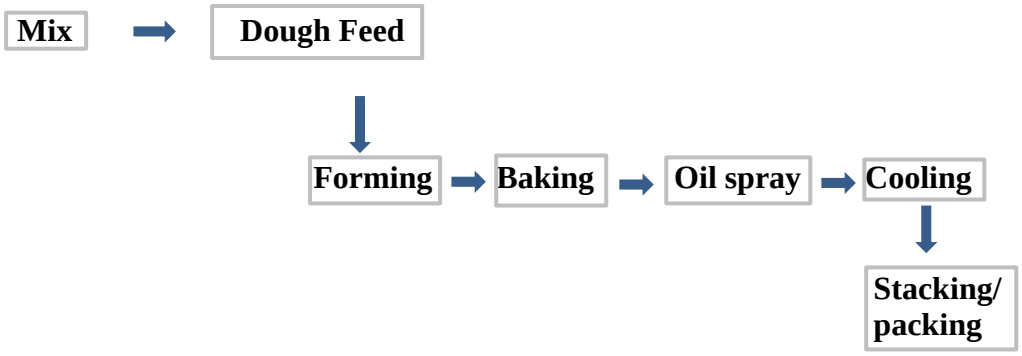


Figure 4.23: The process flow chart of cracker manufacturing

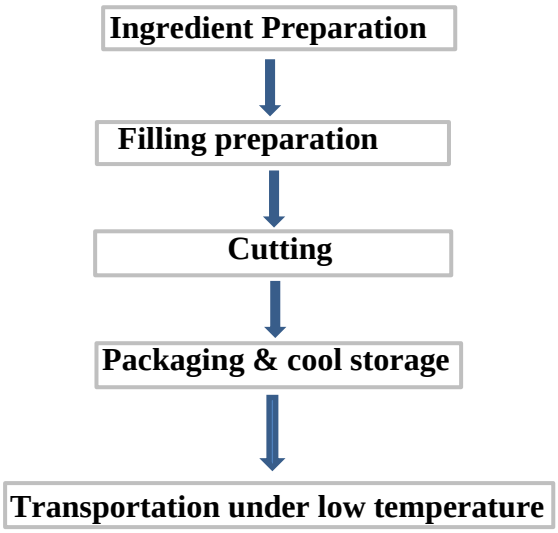


Figure 4.24: The process flow chart of Sandwich manufacturing

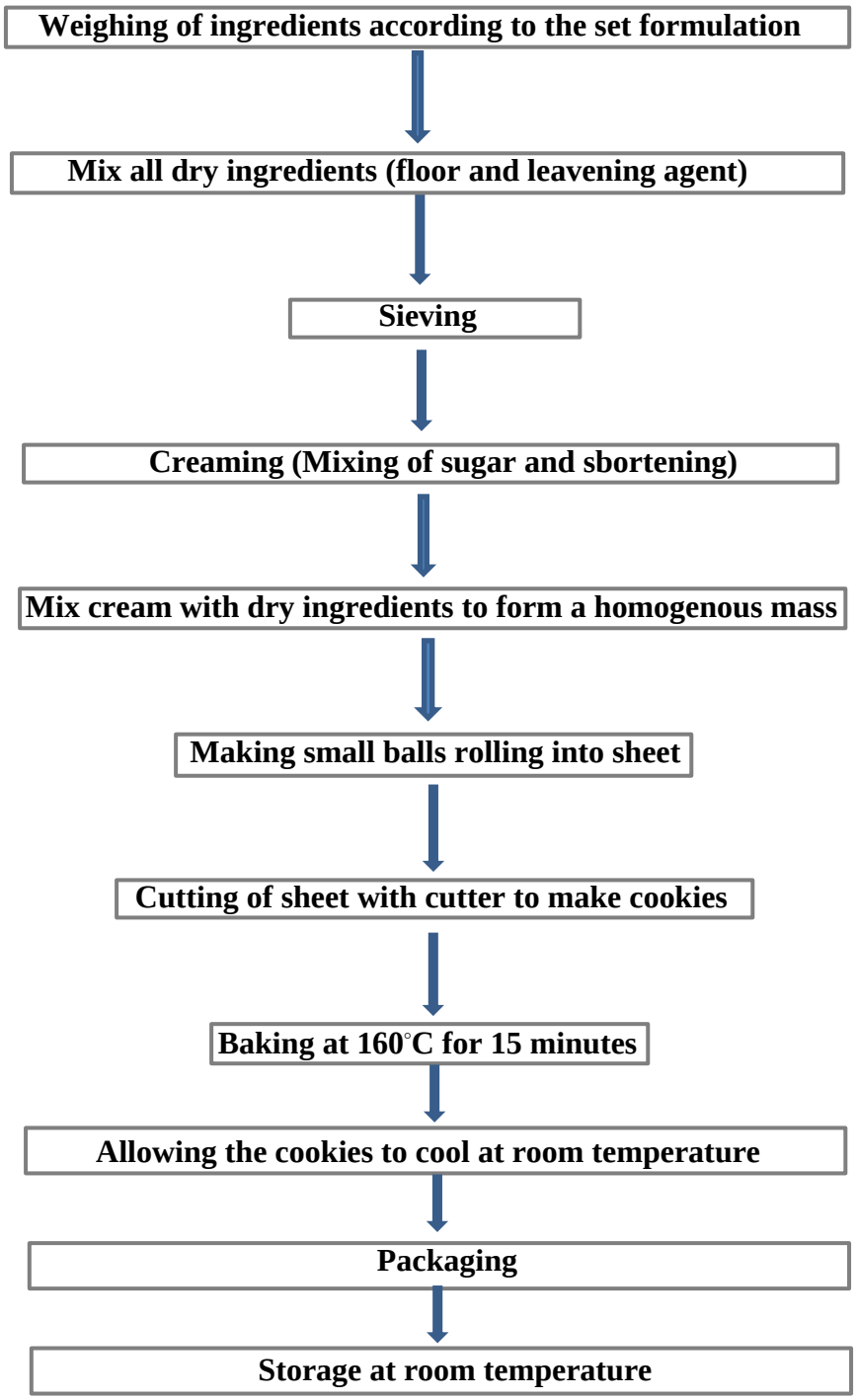


Figure 4.25: The process flow chart of cookie manufacturing

4.7.4 Baking

This is the area where we pass these moulded/ formed wet biscuit into baking oven. The biscuits or cookies are baked on desired temperatures.

4.7.5 Cooling

The hot product obtained from baking must be cooled to room temperature prior to packaging for several reasons-

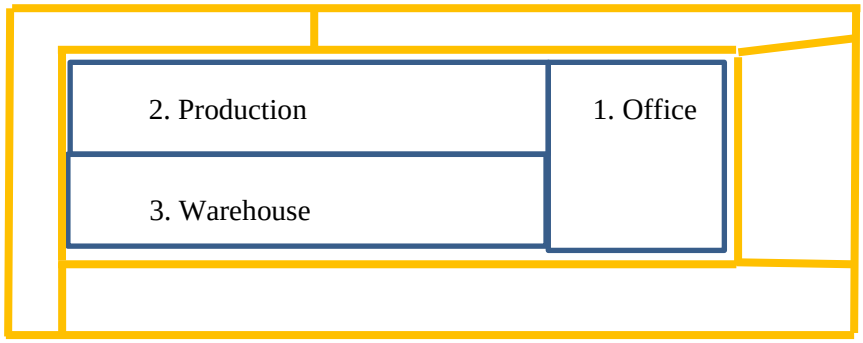
- Being warm, reduced firmness of the baked product so as to withstand packaging process
- Packaging material shrinkage due to contact to hot product
- Hot packed may continue release some steam causing condensation inside the packaging.
- Cooling can be achieved either by placing the baked product at ambient conditions or by forced air cooling.

4.7.6 Packaging

The biscuits or cookies that have been cooled are then stacked and fed into the packing machine for packing. These packs are then put into secondary packaging like cartons to be transported to retailers. Packing machines can be selected as per the plant capacities and nature of packing.

Table 4.7: Characteristics of distribution trucks from Lluvia mill and loading and unloading containers

No	Type of car	Type of fuel	Quantity of car	Fuel usage per year (gallon)
1	Truck (< 3 tons)	Diesel	8	6984
2	Truck (3~9 tons)	Diesel	6	7002
3	Truck (< 10 tons)	Diesel	3	4590
4	Containers	Diesel	4,944	14,832
Total			**4,961**	**33,408**



- The orange color is Drainage system of the Lluvia Confectionary Factory
- (1)Office building, (2) Production, (3) Warehouse
- The brown color is main road

Figure 4.26: Layout map of Lluvia Confectionary Factory's effluent discharge

4.8 The waste generation in Lluvia confectionary factory during the construction phase

(a) Domestic solid waste (DSW) generation from the Lluvia Confectionary factory compound

Looking at domestic Solid waste generation from the Lluvia Company Ltd., the waste released from the Confectionary process and from the entire compound will be measured by both automatically and manually weighing at the final stage which are at dumping station.

The type of domestic solid waste from the proposed factory will be personal left over, food residues (organic wastes), glasses, tins, bottles, papers. According to the manual weighting analysis, domestic solid waste generation from the labour camp is 3kg/day which is approximately 0.9 tonnes per year which come from the construction areas. Thus, from the total population nearly 400 total from two shift staff, waste generation per capital per day is (0.06) 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.

(b) Industrial solid waste generation from the Lluvia confectionary factory

Estimated industrial waste generation from the Lluvia Confectionary factory is 350 kg per day which is proximately 108.5tonnes per year, some of them will be sent to the waste recycler. According the analysis, some waste are ended in the recycling action. Some of them will be ended in collection system from the Municipal.

(c) Physical composition of domestic solid waste from the Lluvial Confectionary factory

Physical composition analysis of solid waste at the Lluvia Confectionary factory will be carried out randomly. Individual components that typically make up most of the municipal solid wastes were categorized into 10 categories: food waste, yard waste, plastic, paper, leather/textile/rubber (LTR), glass,

metal and aluminum (can), hazardous waste (medicine, dry batteries, and household electronic and electronic device waste), sanitary napkins, and others. The following figure 4.15 shows the estimated physical composition of domestic solid waste that produce from the compound.

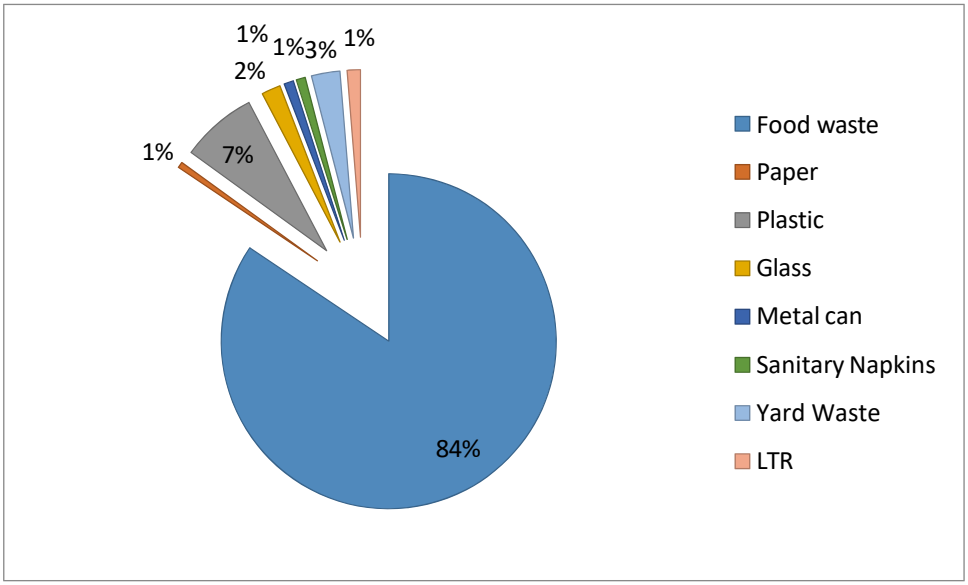


Figure 4.27: The estimated physical composition of domestic solid waste

Figure 4.15 shows percentage (%) of Domestic Solid Waste from the Lluvia Confectionary factory Compound Weight Basis.The top waste components is identified as; Food waste (84%) and the combination of others waste are less than 16% of the total domestic waste. Among 16%, plastic is around 7%, paper is only 1%, glass is around 2%, metal can is 1%, sanitary napkins is 1%, yard waste is 3% and LTR is 1.

(a) Physical Composition of construction solid waste from Lluvia Confectionary factory

Table 4.8: Common sources of construction waste generation

Waste Type	Descriptions	Sources
Wood	Dimensional, Lumber, Plywood, Timber props, Sawn timber	Formwork, roof truss, False work
Concrete	Substructure, Superstructure, Drains and gutters	Footings, piling, Beams, columns, floor slabs
Metal	Reinforcement bar, wire mesh, Roofing sheet, Aluminium frames	Reinforcement fixing, Roof, Window, false ceiling
Brick	Clay brick, Cement brick, Cinder block	Wall, fencing works, gutters, partition walling
Others	Packaging, Gypsum & cement, board, plaster, ceramic, PVC pipe, conduit&wiring	Cement packaging, plastics, timber pallets, cardboard, false ceiling, finishing works, roofing tiles, floor tiles, wall tiles, plumbing works, electrical works

Like the domestic solid waste, physical composition of construction solid waste was also assessed randomly.

According to the survey and analysis, there are only five types of waste which has been sent to the Municipal. Others are ended in the recycling activities. The five main types of waste are wood, concrete, metal, brick and others. In the following figure 5.12 shows the percentage of construction waste generate from the industry.

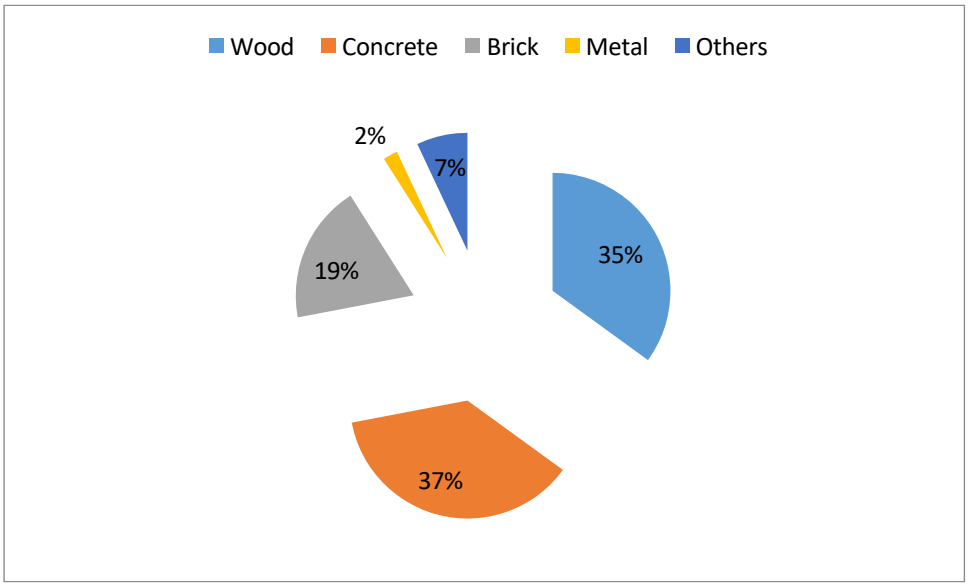


Figure 4.28: Physical composition of construction waste

As the result of weight basis result, generation of wood and concrete wastes are more or less the same. Concrete waste is around 37% and wood is 35%. Mostly all the waste is ended up at the recycling activities.

Figure 4.29: Solid waste released from the factory's construction process

4.8.1 Existing situation of waste handling during the construction process

Lluvia Confectionary factory is at the construction stage which is industrial and residential (temporary worker camp), however, in the residential parts, the factory staff members take their breakfast and lunch at their temporary camp. Within the factory, all the waste that generated is cleaned everyday by the workers. Mostly, the workers usually clean for three times per day. According to observation within the project site, all wastes generating from the industry have been taken by the municipal under Yangon City Development Committee, (YCDC).

These wastes are being collected once a week and then directly sent to dumping site. Before waste were collected from the municipal, all the wastes from both temporary worker camp areas were disposed in the one bin provided by the YCDC and all the solid wastes produced from the industry are dumped at the backyard of industry. The process of waste disposal is lack of segregation and all of wastes are mixed in all bins. This practice is due to only one bin system which is currently practiced in the factory.

Figure 4.30: Domestic solid waste

Figure 4.31: Construction waste disposed in the bin

4.9 Analysis of the Existing Use of Chemical Substances in Lluvia Confectionary Factory

As the Lluvia confectionary factory is at the pending stage, there is no current use of chemicals at the factory. However, it is assumed that the existing use of chemical substances of a similar factory under the same company (Lluvia) were adopted as the precautionary approach.

The proposed factory will be using Fumigants and Insecticides for the pest and insects control. In doing so, the project proponent strongly commits to follow section 17, 24, 26 and chapter 14 of "The Pesticide Law, 2017". In addition, the Lluvia confectionary factory will adhere to directives periodically issued by the Myanmar Pesticide Registration Board; complying with provided instructions.

Figure 4.32: Waste Segregation through the Implementation of Label Signs

4.9.1 Use of Fumigants in Fumigation

The proposed factory is implementing fumigation to control stored product pests, including insects such as beetles, weevils, and moths) and ensure the quality and safety of the final product. The Lluvia Confectionary factory exclusively employs Myanmar-registered pesticides with labels in Burmese for the management of storage pests, Aluminium Phosphoide. (Figure 4.18). *(Its Material Safety Data Sheets_MSDS are provided in* Annex X).

1) Aluminium Phosphide (AlP)

Aluminum phosphide (AlP) is commonly used in fumigation as a fumigant to control pests in stored products and enclosed spaces of raw materials and finished products in the proposed factory. It is a solid, inorganic chemical compound that releases phosphine gas (PH3) when it comes into contact with moisture or atmospheric humidity. These formulations are strategically placed in the area to be fumigated, and the release of phosphine gas occurs gradually.

The following are the hazard categories and degree of hazard for aluminum phosphide:

- Category Degree of Hazard
- Health 4 (Severe Hazard)
- Flammability 4 (Severe Hazard)
- Reactivity 2 (Moderate)

- Special Notice Key

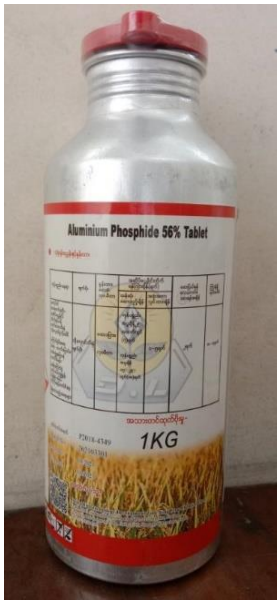


Figure 4. 33:Use of the fumigants in the Lluvia Confectionary factory

4.9.2 Standard Operating Procedures (SOPs) for using Fumigants in the fumigation process

The proposed factory is implementing Fumigation process in accordance with **the pesticide law (2016)** and with the permission of **Pesticide Registration Board.** The proposed factory will adhere to **directives periodically issued** by the Myanmar Pesticide Registration Board; comply with provided instructions.

According to the Ministry of Agriculture, Livestock and Irrigation, one representative from the Lluvia Confectionary factory applied for the registration of a certified pesticide applicators. After that, that representative successfully attended a course on the proper handling and use of pesticides.

Strategies and Protocols: The Fumigation Approach at the Lluvia Confectionary Factory

The type of pests present in the proposed factory includes Flour Beetles: Red Flour Beetle (Tribolium castaneum), Rice Weevil (Sitophilus oryzae), Flour Mites and Psocids. These pests can be controlled by the fumigants (Aluminium Phosphide) to achieve effective measures.
The leader of Fumigation Process (certified person) has developed the fumigation plan as follows:

1. Implementation of Occupational Health and Safety Protocols for Personnel Engaged in Fumigation Operations before the operation starts

- Proper labeling and signage for hazardous substance storage areas and labeling fumigation date and ventilation date.
- Designation the specific areas by warning sign for fumigation processes in the factory, clearly marking and restricting access to authorized personnel only.

- Mandating the use of respiratory protection, such as certified N95 respirators, gloves, coveralls. It is recommended to use respirator filters specifically designed to capture phosphine gas, labeled with the appropriate National Institute for Occupational Safety and Health (NIOSH) approval for phosphine or half-face respirators, full-face respirators, and powered air-purifying respirators (PAPRs).
- Placing proper ventilation in fumigation areas to control and reduce the concentration of fumigants in the air and using local exhaust systems and ensuring that ventilation equipment is well-maintained and functioning correctly after the fumigation process.
- Exercising caution when fumigants applied in airtight pile of flour bags, as this practice is not only ineffective but also poses potential risks to both individuals and the environment.
- Stored hazardous substances in dedicated, well-ventilated areas with appropriate containment measures to prevent leaks or spills.
- Developing and communicating clear emergency response procedures, including evacuation plans, fire response plans and first aid protocols.
- Implementation a health surveillance program to monitor any early signs of exposure-related health issues.

2. Clearance and Removal of Unnecessary Items:

The initial step entails the systematic clearing and removal of unnecessary items around the piles.

3. Preparation of the area:

Sealing the area to be fumigated to prevent the fumigant from escaping. This may involve closing doors, windows, and other openings and using plastic sheeting to create an airtight seal. It is to ensure that the area is empty of people, pets, and non-essential items. It is also implementing safety measures, including posting warning signs and restricting access and records of fumigation/ventilation date to the fumigated area.

To facilitate plastic sheeting, a meticulous approach is adopted in which the fumigants are applied to ensure a minimum distance of at least 3 feet between each image or wall. This deliberate spacing enhances the ease of plastic covering processes and contributes to operational efficiency.

In addition, the following standards are being employed in the preparation of Fumigation area.

- Employing boards and sandbags is to effectively seal the perimeter of the premises, mitigating the risk of hazardous substances escaping.
- Exercising caution in safeguarding the corner quadrants of the pile of flour bags, as these areas pose a heightened probability of emitting toxic fumes; taken appropriate measures to ensure coverage.
- Exercising caution when fumigants applied in airtight pile of flour bags, as this practice is not only ineffective but also poses potential risks to both individuals and the environment.

4. Identification via Pin Card:

Types of each products, number and weight in the pin card on the pile must be specifically noted and recorded. This systematic identification process ensures accurate tracking and management of fumigants items. The pile is fully covered with plastic warp.

5. Application of Fumigants

The quantification of required Aluminum Phosphide Fumigant Tablets is systematically calculated, and subsequently, these tablets are strategically positioned within plastic trays. Dosing for Aluminum Phosphide Fumigant Tablet is (3 –5) Tablets/Ton for normal. These trays are meticulously arranged beneath the wooden posts supporting the pile, with each tray slightly turned over along all four sides of the plastic cover. This deliberate placement ensures an effective distribution of the fumigant within the confined space, optimizing the fumigation process.

6. Exposure Period:

Allowing the fumigant to remain in contact with the pests for the SOPs prescribed exposure period. The duration is calculated based on the temperature as follows:

Temperature	Fumigation Date
Below 12C˚ 12-20 C˚ 21 -25 C˚ 26 -30 C˚	Not to use Phosphoine 6 -7 Days 4 -5 Days 3– 4 Days

7. Aeration:

After the exposure period, ventilation the area and turning the plastic cover from one side for 12 hours is to remove the fumigant and reduce residual levels to safe concentrations.

8.Post-Fumigation Procedures:

Fumigation products have air-vacuated for 48 hours before delivery to consumers. Any residues and contaminants present on surfaces or commodities are systematically disposed of by burying them in the soil. This method ensures the proper and environmentally responsible management of waste generated during the fumigation procedure.

4.9.3 Insecticides' Application

The proposed factory is using the insecticides to ensure both the safety of the product and the health of employees. The factory is using some insecticide such as MAP Cypermethrine and Dipthor Duo Insecticide. (Their Material Safety Data Sheets_MSDS are provided in Annex X).

1) MAP Cypermethrine

Cypermethrin is a broad-spectrum insecticide belonging to the pyrethroid family. It is a synthetic chemical designed to mimic the insecticidal properties of pyrethrins, which are natural insecticides derived from chrysanthemum flowers. Cypermethrin works by contact, meaning that insects come into direct contact with the chemical to be affected. It also has residual activity, meaning it remains effective for a period after application, providing ongoing control.

2) Dipthor Duo Insecticide

It is the formulation of Cypermethrin where the active ingredient (Cypermethrin) is mixed with a

hydrocarbon-based solvent.

Both insecticides used in the Lluvia Confectionary factory are being hold food safety certificate. Use of these products is compliant with the Austrians New Zealand Standard Code. From the environmental point of view, the formulation of this insecticides that have lower environmental impact compared to other carrier materials. These formulations can be less harmful to non-target species and ecosystems.

Figure 4.34: Use of Insecticides in the Lluvia Confectionary Factory

4.9.3.1 Standard Operating Procedures (SOPs) for Insecticides Application

The Lluvia Confectionary factory is employing Standard Operating Procedure (SOP) for using insecticides with an emphasis on environmentally sound practices are to ensure the protection of the environment, minimize negative impacts, to protect human health and safety and responsible pesticide use.

The propose factory is using long-lasting insecticide solution to spray space in factory warehouses (Armo Cyano 10 % EC (Cypermethrin). It is considered to be less harmful to humans and animals compared to some older classes of insecticides, but its environmental impact can still be a concern.

However, by following proper application guidelines from the relevant government officials, including recommended doses and application methods, can help minimize negative effects. Lluvia Confectionary

factory follows the guidelines prescribe in the Pesticide Law (2016) as follows:

- The proper utilization of personal protective equipment (certified N95 masks, coveralls, gloves etc.) to mitigate potential health risks to individuals involved in the application process.
- Preparation of the insecticide solution by mixing it with water and administer the application using a backpack sprayer.
- The insecticide solution using in this factory is Armo Cyano 10 % EC (Cypermethrin).
- The wooden stands used as a base for Flour bags are well applicated with spray insecticides and are deliberately exposed to sunlight.
- The pile of flour bags is spraying insecticides which is to prevent and suppress the bugs that come out of the bag and the insects that will fly in from outside.
- The vehicles transporting goods are well applicated with spray insecticides is to prevent the potential infestation of stored products during transit.

4.10 Exploring reasonable alternatives to the use of raw materials, water resources, energy resources and manufacturing design for the proposed Confectionary factory

To further explore reasonable alternatives to the use of raw materials, water resources, energy resources and manufacturing design for the proposed Confectionary factory could involve several approaches:

(1)Raw material – (a) **Ingredient Substitution**: Investigate alternative ingredients or substitutes that offer similar taste, texture, and functionality. For instance, exploring natural sweeteners like honey or fruit concentrates as substitutes for sugar could be an option.

- (b) **Waste Reduction and Recycling:** To reduce waste by reusing by-products or incorporating recycled materials into the production process. For example, using recycled packaging materials.

- (c) **Local Sourcing:** Consider sourcing raw materials locally to reduce transportation emissions and support local economies. This might involve partnering with nearby farmers or producers for fresh and seasonal ingredients.

(2) Water resources – (a) Rainwater Harvesting: Implementing rainwater collection systems to gather and utilize rainwater for non-potable purposes within the factory, such as cleaning or irrigation for landscaping.

- (b) **Wastewater Treatment and Reuse:** Implementing effective wastewater treatment systems that allow treated water to be reused within the facility for non-consumptive purposes, reducing the overall demand for freshwater.

- (c) **Education and Awareness:** Educating employees and stakeholders about the importance of water conservation and encouraging responsible usage practices within the factory compound.

(3) Energy resources – (a) **Renewable Energy Sources:** Investing in renewable energy, such as solar power, to partially or fully power the factory. Installing solar panels on-site can reduce reliance on using present energy sources.

- (b) **Energy-Efficient Equipment:** Upgrading machinery and equipment to energy-efficient models that consume less electricity or utilize innovative technologies to optimize energy usage during production.

- (c) **Employee Training:** Educating employees about energy-

saving practices and encouraging a culture of energy conservation within the workplace.

(4) manufacturing design – (a) Lean Manufacturing Principles: Implementing lean practices to minimize waste, reduce unnecessary steps in production. This can enhance efficiency and reduce resource consumption.

- (b) **Product Redesign:** Exploring product redesign to optimize packaging, reduce materials used, and improve recyclability or biodegradability. This reduces waste generation throughout the product lifecycle.

4.11 Alternatives selection

The ***no development option*** would prevent all potential environmental and social impacts due to the Lluvia Confectionary factory production process.

However, if the project proponent recognises and ***complies with the mitigation measures, HSE regulations and management plan*** described in the IEE and EMP accordingly, the overall impacts become rated as ***insignificant.***

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 related to the existing baseline air, water, noise, soil and waste monitored at and around the proposed project site. The more detailed and in-depth analysis will be provided accordingly in the sub sections.

5.1 Existing air quality

5.1.1 Introduction

The baseline ambient air sampling was carried out at the Lluvia Confectionary Factory (Mingalardon Township) in August, 2018 in order to reveal the existing air quality status at and around the factory.

5.1.2 Objective

The objectives of the monitoring are:

- To reveal the existing baseline ambient air quality of the proposed factory
- To provide the data in order to assess the air impact likely affected by the project activities

5.2 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 inthe subsection which follows.

Table 5.1: Air sampling locations for baseline survey

Points	Locations	Coordinates		Start Date	End Date
		N	E		
1	LPG Tank (Location 1)	16°56'42.54"	96°11'43.47"	15.5.2018	16.5.2018
2	Inside the factory building (Location 2)	16°56'42.10"N	96°11'40.33"E	16.5.2018	17.5.2018
3	Downwind of the project site (Location 3)	16°56'40.65"N	96°11'46.11"E	17.5.2018	18.5.2018
4	The project compound (Location 4)	16°56'40.34"N	96°11'33.28"E	18.5.2018	19.5.2018

Figure 5.1: Map of air sampling

5.2.1 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 Confectionary factory.

Table 5.2 The 24hr average air parameters around the factory

Air Monitoring Location	**CO (µg/m^3)**	**VOC (ppb)**	**NO2 (ug/m3)**	**SO2 (ug/m3)**	**NH3 (ppm)**	**CH4 (ppm)**	**O3 (ug/m3)**	**PM10 (ug/m3)**	**PM2.5 (ug/m3)**
Lluvia factory	**587.5**a**±1 05.6b665** c(280d-740e)	**2.47a ±1 0.66b 2.5**c(0d-103e)	**57a ±12.99b 57.5**c(1d-189e)	**58.75a ±16.57b 57**c(0d-574e)	**2.63a ±2.46b 0.26**c(0d-34e)	**964.75a ±233.68b 1177**c(38d-1640e)	**5.25a ±0.85b** 5.5c(0d-29e)	**57.25a ± 11.12b** 48.5c(2d-236e)	**37a ±10.51b** 31.5c(1d-214e)
National Environmental Air Quality Guideline (ECD) guideline	30,000 µg/m^3 (one hr) 10,000 µg/m^3 (8 hr)	**NA**	40 µg/m^3 (annual) /200 µg/m^3 (one hour)	20 µg/m^3 (24 hour)	NA	NA	100ug/m3 (8hr)	50 µg/m^3	25 µg/m^3

available a Average b SE c Median d Min e Max ,NA – not available

(a) Point (1) Nearby the LPG Tank (Location-1) (16 56' 42.54" N,96 11'43.47" E)

The point 1 is located nearby the LPG tank to be located within the proposed project site. Regarding particulates, Table 5.3 presents both the levels of PM10 (90 µg/m^3) and PM 2.5 (69 µg/m^3) did not meet the National Environmental Air Quality Guideline (ECD) adopted from WHO Guideline. In terms of gases levels, SO2 level did not meet the guideline.

The meteorology findings (Temperature, Relative Humidity, Wind Speed, Wind Direction) during the monitoring were presented below. (**Table 5.3**).

Ambient air monitoring around LPG tanks is pivotal to make sure everyone stays safe, preserve the environment, and stay healthy. It supports find gas leaks early to stop explosions, keeps the environment safe, protects people's health, follows the rules, and lets the proposed factory act fast if something happens to keep everyone safe.

Table 5.3 Baseline air monitoring at the LPG Tank (Location-1)

Parameters	**Concentration (24hr average) except some Gases (NO2, CO and O3)***	**National Environmental Air Quality Guideline (ECD)**
PM10	90[a](2[b]-236[c]) µg/m^3	50 µg/m^3
PM 2.5(µg/m^3)	69[a](1[b]-214[c]) µg/m3	25 µg/m^3
NO_2*	88 µg/m^3(24 hr) 143 µg/m^3 (one hr)	40 µg/m^3 (annual) /200 µg/m^3 (one hour)
SO_2	101µg/m^3	20 µg/m^3
CO *	620 mg/m^3 (24hr) 1100 mg/m^3 (one hr)	30,000 µg/m^3 (one hr) 10,000 µg/m^3 (8 hr)
O_3*	3 µg/m^3 (24hr) 7 µg/m^3 (8 hr)	100 µg/m^3 (8hr)
H2S	76[a](0[b]-222[c]) ppb	NA
CO2	315[a](278[b]-405[c]) ppm	NA
VOC	3[a](0[b]-103[c]) ppb	NA
NH_3	10[a](0[b]-33[c])ppm	NA
CH_4	1124[a](436[b]-1636[c]) ppm	NA
Atomic Radiation	5	25-75 CPM (USEPA)
Meteorology		
T (Degree C)		25[a](22[b]-30[c])
RH		79[a](47[b]-100[c])
Wind Speed (kph)		2[a](0[b]-13[c])
Wind Direction (Degree from North)		157 (SSE)
Remark:		
There were 130 times of truck car, 90 times of big car and 180 times of motor cycle passing by the monitoring area. And also , 2 generators were running for 24 hours in the project site. PM 10, PM 2.5 and SO2 are exceeded the guideline because of vehicles and generator activities.		

Referring to National Environmental Air Quality Guideline (ECD), the color codes are categorized in order to reveal the general air quality status around the of the project area.

Green – meets the standards

Yellow (slightly over and less than double)

Orange (exceeding if more than double)

Figure 5.2 Ambient air monitoring at the LPG Tank (Location-1)

(b) Point (2) Inside the project building (Location-2) (16 < 56' 42.10"N, 96 < 11' 40.33"E) The point 2 is located in the project building . Regarding particulates, Table 5.4 presents the levels of PM10 (51 µg/m^3) more or less met the guideline and PM 2.5 (33 µg/m^3) which was slightly higher than Guideline (ECD) adopted from WHO Guideline (24hr average). In terms of gases levels, SO_2 did not meet the guideline.

The meteorology findings (Temperature, Relative Humidity, Wind Speed, Wind Direction) during the monitoring were presented below. (**Table 5-4**).

Ambient air monitoring within a Confectionary factory's project building is fundamental for maintaining a healthy work environment, preventing contamination, complying with regulations, and optimizing production processes.

Table 5.4 Baseline air monitoring inside of the project site (Location-2)

Parameters	**Concentration (24hr average) except some Gases (NO2, CO and O3)***	**National Environmental Air Quality Guideline (ECD)**
PM10	$51^a(2^b\text{-}140^c)$ µg/m^3	50 µg/m^3
PM 2.5(µg/m^3)	$33^a(1^b\text{-}106^c)$ µg/m3	25 µg/m^3
NO_2*	52 µg/m^3(24 hr) 81 µg/m^3 (one hr)	40 µg/m^3 (annual) / 200 µg/m^3 (one hour)
SO_2	55µg/m^3	20 µg/m^3
CO *	710 mg/m^3 (24hr) 1210 mg/m^3 (one hr)	30,000 µg/m^3 (one hr) 10,000 µg/m^3 (8 hr)
O_3*	7 µg/m^3 (24hr) 10 µg/m^3 (8 hr)	100 µg/m^3 (8hr)
H2S	$24^a(0^b\text{-}73^c)$ ppb	NA
CO2	$310^a(204^b\text{-}384^c)$ ppm	NA
VOC	$2^a(0^b\text{-}66^c)$ ppb	NA
NH_3	$0.52^a(0^b\text{-}8.3^c)$ppm	NA
CH_4	$1231^a(947^b\text{-}1544^c)$ppm	NA
Atomic Radiation	0	25-75 CPM(USEPA)
Meteorology		
T (Degree C)		$26^a(24^b\text{-}30^c)$
RH		$74^a(46^b\text{-}93^c)$
Wind Speed (kph)		$1^a(0^b\text{-}7^c)$
Wind Direction (Degree from North)		266(W)
Remark:		
There were 148 times of truck car, 86 times of big car and 160 times of motor cycle passing around the monitoring area. And also, 2 generators were running for 24 hours in the project site. PM 2.5 and SO2 are slightly over the guideline because of vehicles and generator activities.		

Referring to National Environmental Air Quality Guideline (ECD), the color codes are categorized in order to reveal the general air quality status around the of the project area.
Green – meets the standards
Yellow (slightly over and less than double)
Orange (exceeding if more than double)

Figure 5.3 Ambient air monitoring inside of the project site (Location-2)

(c) Point (3) Downwind of the project site (16 56' 40.65" N, 96 11' 46.11"E)

The point 3 is located approximately 1 km radius around the proposed project site. Regarding particulates, Table 5.5 presents both the levels of PM10 (45 µg/m^3) met the guideline and PM 2.5 (30 µg/m^3) which was slightly higher than Guideline (ECD) adopted from WHO Guideline (24hr average). In terms of gases levels, SO2 did not met the guideline.

The meteorology findings (Temperature, Relative Humidity, Wind Speed,Wind Direction) during the monitoring were presented below. (**Table 5-5**).

Ambient air monitoring of downwind from the Confectionary factory supports assess its environmental impact, safeguard community health, comply with regulations, and maintain transparency with the local community regarding air quality.

Table 5.5 Baseline air monitoring downwind of the project site (Location-3)

Parameters	**Concentration (24hr average) except some Gases (NO2, CO and O3)***	**National Environmental Air Quality Guideline (ECD)**
PM10	$45^a(2^b\text{-}150^c)$ µg/m^3	50 µg/m^3
PM 2.5(µg/m^3)	$30^a(1^b\text{-}180^c)$ µg/m3	25 µg/m^3
NO_2*	62µg/m^3(24 hr) 108 µg/m^3 (one hr)	40 µg/m^3 (annual) /200 µg/m^3 (one hour)
SO_2	58µg/m^3	20 µg/m^3
CO *	740 mg/m^3 (24hr) 1140 mg/m^3 (one hr)	30,000 µg/m^3 (one hr) 10,000 µg/m^3 (8 hr)
O_3*	5 µg/m^3 (24hr) 10 µg/m^3 (8 hr)	100 µg/m^3 (8hr)
H2S	$30^a(0^b\text{-}84^c)$ ppb	NA
CO2	$310^a(283^b\text{-}413^c)$ ppm	NA
VOC	$0.89^a(0^b\text{-}69^c)$ ppb	NA
NH_3	$0^a(0^b\text{-}0^c)$ppm	NA
CH_4	$1237^a(919^b\text{-}1639^c)$ppm	NA
Atomic Radiation	0	25-75 CPM(USEPA)
Meteorology		
T (Degree C)		$26^a(24^b\text{-}30^c)$
RH		$76^a(49^b\text{-}96^c)$
Wind Speed (kph)		$1^a(0^b\text{-}5^c)$
Wind Direction (Degree from North)		171 (S)
Remark:		
There were 140 times of truck car, 94 times of big car and 190 times of motor cycle passing around by the monitoring area. And also, 2 generators were running 24 hours in the project site. PM 2.5 and SO_2 is slightly over the guideline because of vehicles and generator activities.		

Referring to National Environmental Air Quality Guideline (ECD), the color codes are categorized in order to reveal the general air quality status around the of the project area.
Green – meets the standards
Yellow (slightly over and less than double)
Orange (exceeding if more than double)

Figure 5.4 Ambient air monitoring at the downwind of the project site (Location-3)

(d) Point (4) at the project compound (16 56' 40.34" N, 96 11' 33.28"E)

The point 4 is located in the compound of of the proposed project site. Regarding particulates, Table 5.6 presents both the levels of PM10 (41 µg/m^3) and PM 2.5 (18 µg/m^3) met the National Environmental Air Quality Guideline (ECD) adopted from WHO Guideline (24hr average). In terms of gases levels, all parameters met the guideline.

The meteorology findings (Temperature, Relative Humidity, Wind Speed, Wind Direction) during the monitoring were presented below. (**Table 5-6**).

Ambient air monitoring within the Confectionary factory's compound assists safeguard worker health, maintain production quality, comply with regulations, and address any potential issues early on to ensure a safe working environment.

Table 5.6 Baseline air monitoring at the project compound (Location-4)

Parameters	**Concentration (24hr average) except some Gases (NO2, CO and O3)***	**National Environmental Air Quality Guideline (ECD)**
PM10	$41^a(13^b\text{-}79^c)$ µg/m^3	50 µg/m^3
PM 2.5(µg/m^3)	$18^a(2^b\text{-}45^c)$ µg/m3	25 µg/m^3
NO_2*	25µg/m^3(24 hr) 42 µg/m^3 (one hr)	40 µg/m^3 (annual) /200 µg/m^3 (one hour)
SO_2	20µg/m^3	20 µg/m^3
CO *	280 mg/m^3 (24hr) 380 mg/m^3 (one hr)	30,000 µg/m^3 (one hr) 10,000 µg/m^3 (8 hr)
O_3*	5 µg/m^3 (24hr) 11 µg/m^3 (8 hr)	100 µg/m^3 (8hr)
H2S	$52^a(0^b\text{-}313^c)$ ppb	NA
CO2	$375^a(273^b\text{-}566^c)$ ppm	NA
VOC	$4^a(0^b\text{-}77^c)$ ppb	NA
NH_3	$0^a(0^b\text{-}5^c)$ppm	NA
CH_4	$268^a(38^b\text{-}351^c)$ppm	NA
Atomic Radiation	0	25-75 CPM(USEPA)
Meteorology		
T (Degree C)		$26^a(23^b\text{-}31^c)$
RH		$66^a(47^b\text{-}83^c)$
Wind Speed (kph)		$1^a(0^b\text{-}12^c)$
Wind Direction (Degree from North)		151 (SSE)
Remark:		
No specific findings noted .		

Referring to National Environmental Air Quality Guideline (ECD), the color codes are categorized in order to reveal the general air quality status around the of the project area.
Green – meets the standards
Yellow (slightly over and less than double)
Orange (exceeding if more than double)

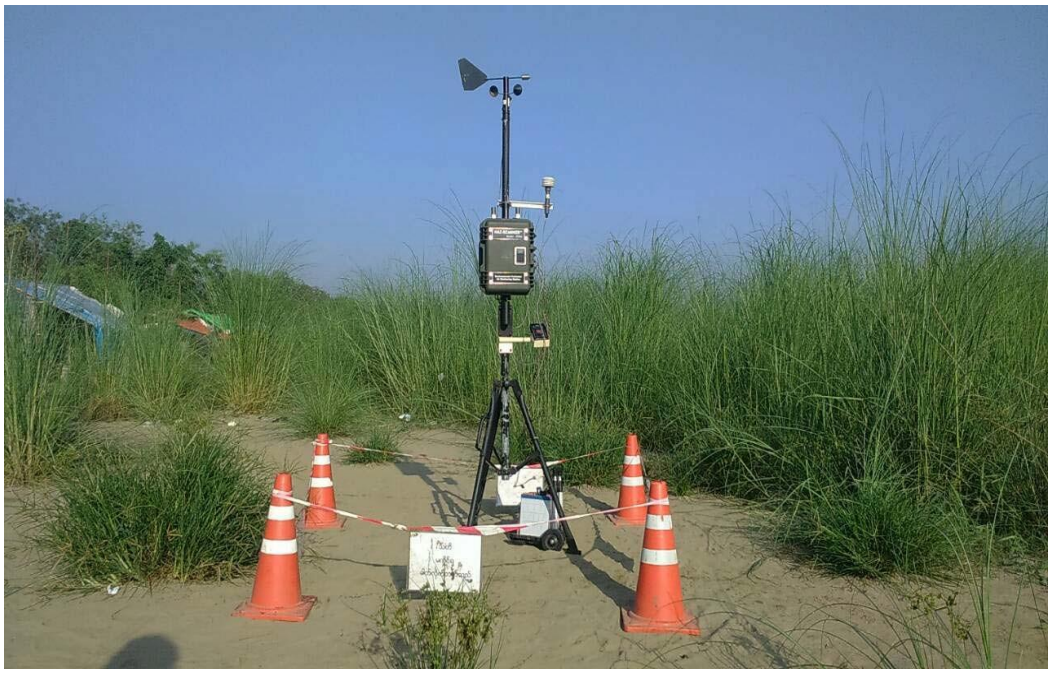


Figure 5.5 Ambient air monitoring at the project compound (Location-4)

5.2.2 Baseline gas quality in Lluvia factory

The table 5.7 presents the gases levels which are averaged for all measurements carried out at the different places of the Lluvia factory.

Among the parameters focused,SO2 level did not meet the air quality guideline.. It is probably due to the cumulative emissions from the Lluvia factory itself and the surrounding industries emission.

Table 5.7 Baseline gas quality in Lluvia factory

Substance (µg/m^3)	Lluvia factory	National Environmental Air Quality Guideline (ECD)
NO2	57a ±12.99b 57.5c(1d-189e) µg/m^3 (24 hour) / 81a ±16.5b 87.4c(1.04d-5.9e µg/m^3 (one hour)	40 µg/m^3 (annual) /200 µg/m^3 (one hour)
SO2	58.75a ±16.57b 57c(0d-574e) µg/m^3	20 µg/m^3
CO	587.5a±280b 740c(105d-665e) µg/m^3 (24 hour)/ 1175a±532b 1332c(220.5d-1197e) µg/m^3 (one hour)/ 881.25a±392b 1110c(126d-997.5e) µg/m^3 (8 hour)	30,000 µg/m^3 (one hr) 10,000 µg/m^3 (8 hr)
VOC	2.47a±1 0.66b 2.5c(0d-103e) ppb	NA
NH3	2.63a±2.46b 0.26c(0d-34e) ppm	NA
CH4	964.75a±233.68b 1177c(38d-1640e) ppm	NA
O3	5.25a±0.85b 5.5c(0d-29e) µg/m^3 (24hour)/ 12.03a±1.96b 12.65c(0d-66.7e) µg/m^3 (8hr)	100ug/m^3(8hr)

aAveragedSE b Min c Max eMedian

5.2.3 Air pollutants (particulates)

Table 5.8 presents the results of dust concentrations with the EPAS air monitoring station for 24hr period.

Baseline levels of PM10 more or less meet the National Environmental (emission) guideline but PM2.5 did not meet the guideline.

Table 5.8 Baseline PM10 and PM2.5concentrations at Lluvia factory

Substance (g/m3)	Lluvia factory	National Environmental Air Quality Guideline (ECD)
PM10	57.25a± 11.12d 48.5e(2b-236c)	50 µg/m^3
PM2.5	37a± 10.51d 31.5e(1b-214c)	25 µg/m^3

aAverage dSE b Min c Max eMedian

5.2.4 Local climate

The onsite meteorology data measured by the EPAS monitoring station indicates temperature,relative humidity, wind speed and wind direction. Table 5.9 shows the average temperature was around 25°C, wind speed was 1.25 and relative humidity was 73%. These parameters do affect on the air quality status.

Table 5.9 Meteorology data obtained from air quality sampling stations at Lluvia factory

Substance	Lluvia factory
Temperature (Degree C)	**25.75a± 0.25d** 26e(22b-31c)
Wind Speed (kph)	**1.25a± 0.25d** 1e(0b-13c)
Wind Direction (Degree from North)	**186.75a± 27.05d** 164e(0b-362c)
Relative Humidity (%)	**73.75a± 2.78d** 75e(46b-100c)

aAverage dSE bMin cMax eMedian

The table 5.10 presents the atomic radiation at and around the factory which meets the international standards.

Table 5.10 Atomic radiation at the Lluvia factory

Substance	Lluvia factory	(USEPA)
Atomic Radiation	**1.25a ± 0.25d 0e(0b-21c)**	**25-75 CPM**

aAveraged SE b Min c Max eMedian

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". 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.

Table 5.11: Noise sampling locations for baseline survey

Points	Locations	Coordinates		Start Date	End Date
		N	E		
1	LPG Tank (Location 1)	16°56'42.54"	96°11'43.47"	15.5.2018	16.5.2018
2	Inside the factory building (Location 2)	16°56'42.10"N	96°11'40.33"E	16.5.2018	17.5.2018
3	Downwind of the project site (Location 3)	16°56'40.65"N	96°11'46.11"E	17.5.2018	18.5.2018
4	The project compound (Location 4)	16°56'40.34"N	96°11'33.28"E	18.5.2018	19.5.2018

Figure 5.6 Map of noise sampling

5.3.2 Noise Levels

The following table 5.11 shows the overall noise level from the factory. The noise level around of the proposed factory is assumed as acceptable level.

Table 5.12 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 for industry zone
Lluvia Factory	64.5[a]±3.52[b] 64.5[c](56[d]-73[e])	56[a]±2.27[b] 55[c](52[d]-62[e])	70

aAverage bStandard cMedian dMin eMax

(a) Point (1) LPG Tank

The noise monitoring area of Lluvia Confectionary factory is near to LPG Tank but the LPG is now at the installation stage. The 24hr continuous average noise level was mainly captured from vehicles' noise and it is acceptable for both day and night.

The noise monitoring near LPG Tank ensures the safety of individuals working in proximity to this tank by assessing whether noise levels pose a risk of hearing impairment or discomfort. It assists to understand and mitigate any disturbances caused by noise, preserving the surrounding environment and minimizing disruption to nearby communities.

Table 5.13The noise level near to the LPG Tank

Area	Day Time Noise Level (Db)	Night Time Noise Level (Db)	Noise standard value of EQG
LPG Tank	66[a]±0.2[b] 67[c](49[d]-85[e])	57[a]±0.1[b] 56[c](53[d]-65[e])	70

aAverage bStandard cMedian dMin eMax

Figure 5.7 Noise monitoring station at LPG Tank

(b) Point (2) Inside the building under construction

The major noise source of the project site is inside the building under the construction. . The 24hr continuous average level of noise is mainly captured from the working area and it is acceptable for both day and night time.

Monitoring noise levels inside the building under construction ensures that workers within the construction site are not exposed to excessive noise levels, safeguarding their hearing health and reducing stress-related issues. It supports evaluate potential noise disturbances to nearby environments, ensuring minimal disruption to neighboring communities or wildlife habitats.

Table 5.14 The noise level inside the building under construction

Area	Day Time Noise Level (Db)	Night Time Noise Level (Db)	Noise standard value of EQG
Upwind of the project site	$63^{a}\pm0.2^{b}$ $65^{c}(47^{d}\text{-}91^{e})$	$52^{a}\pm0.1^{b}$ $52^{c}(47^{d}\text{-}66^{e})$	70

aAveragebStandard Error cMediandMineMax

Figure 5.8 Noise monitoring station at the project site building

(c) Nearby the project site building

The major noise source nearby the project site is mainly from the working area. The levels more or less met the guidelines for both day and night.

Monitoring noise levels near the project site building ensures a safe and healthy working environment for on-site personnel, preventing potential hearing damage and minimizing stress-related issues due to excessive noise exposure. By monitoring and controlling noise levels, it encourages positive relations with neighboring residents or businesses, minimizing disturbances and fostering goodwill within the local community.

Table 5.15: 24hr average noise level nearby the project site building

Area	Day Time Noise Level (Db)	Night Time Noise Level (Db)	Noise standard value of EQG
downwind of the project site	$73^{a}\pm0.2^{b}$ $74^{c}(54^{d}\text{-}96^{e})$	$62^{a}\pm0.2^{b}$ $62^{c}(46^{d}\text{-}82^{e})$	70
Day Time Noise Level in point 3 is slightly over the guideline because of vehicles and generator activities.			

aAveragebStandard Error cMediandMineMax

Figure 5.9 Noise monitoring station nearby the project site building

(d) **The project compound**

The monitoring site is at the project compound in which temporary labour camp and other working site area are located. The levels of noise for both day and night time are mainly captured from the working site area and met with the guideline respectively.

Monitoring noise levels within the project compound prioritizes the health and safety of employees. It ensures that the working environment is free from excessive noise, reducing the risk of hearing impairment and minimizing stress-related issues among the workforce. Monitoring noise levels aids in understanding the potential impact on the surrounding environment.

Table 5.16: 24hr average noise level at the project compound

Area	Day Time Noise Level (Db)	Night Time Noise Level (Db)	Noise standard value of EQG
The project compound area	$56^{a}\pm0.1^{b}$ $55^{c}(49^{d}\text{-}81^{e})$	$53^{a}\pm0.1^{b}$ $52^{c}(49^{d}\text{-}71^{e})$	70

aAveragebStandard Error cMediandMineMax

Figure 5.10 Noise monitoring station at the project compound

5.4 Existing Soil quality

5.4.1 Importance of soil

Soil is a vital part of the natural environment. It is just as important as plants, animals, rocks, landforms, lochs and rivers. It influences the distribution of plant species and provides a habitat for a wide range of organisms. It controls the flow of as water and chemical substances between the atmosphere and the earth and acts as a source and store for gases (like oxygen and carbon dioxide) in the atmosphere. Soil is one of the most valuable natural resources available to us. It is very important for sustenance of life on the earth.

Soil sampling supports in understanding whether the factory's activities have caused any soil degradation or pollution. Regular soil sampling can identify issues early, allowing for corrective actions to prevent or minimize potential soil contamination, protecting nearby ecosystems and groundwater. By regularly monitoring soil health, the factory can implement sustainable practices and interventions to preserve soil fertility, ensuring long-term viability.

5.4.2 Objectives

- Collecting of soil samples from the proposed project area.
- Physico-chemical analysis of the existing soil samples

5.4.3 Soil sampling

Soil sample collection was carried out around the propose factory

Figure 5.11 Soil sampling at point (S-1)

Figure 5.12 Soil sampling at point (S-2)

Table 5.17 Soil samples at different locations

Station Code	Station	Location	Distance from plant site (m)	Direction from the plant site
S1	Around the factory	16< 56' 40.44" N 96 < 11' 36.53" E	102	West
S2	Around the factory	16< 56' 40.04" N 96 < 11' 30.99" E	294	West

Figure 5.13 Map of soil sampling

Table 5.18 Soil analysis

Sr.no	Parameters	Results			FAO Soil Bulletin 65 & Dutch Standards
		S1	S2	Units	
1	pH Value	6.21	6.01	Soil : Water 1 : 2.5	
2	Moisture	0.62	0.63	%	
3	Cadmium	Not Detected	Not Detected	ppm	0.8
4	Copper	Not Detected	Not Detected	ppm	20-300
5	Lead	1.55	1.80	ppm	85
6	Iron	85.08	97.73	ppm	15-150

The levels of these parameters can be used as the baseline level of the propose project

5.4.4 Topography

The study area is located at the Yangon industrial region, Mingalardon township, Yangon region. 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.

5.4.5 Rainfall and Temperature

Study area has a tropical monsoon climate. The summer here have a good deal of rainfall while the winters have very little. The average annual temperature is 27.3°C and the average annual rainfall is2, 378 mm. The difference in precipitation between the driest month and the wettest month is513mm. During the year, the average temperature varies by 5.5°C.

5.5 Carbon emission

5.5.1 Introduction

Carbon dioxide (CO2) is the primary greenhouse gas emitted through human activities. Many industrial processes emit CO2 through fossil fuel combustion. Several processes also produce CO2 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 CO2 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 CO2.

In terms of the CO2 emission from the Lluvia Confectionary factory, the electricity sector of Lluvia Confectionary factory does not directly produce the emission of CO2 and GHG. The proposed factory is directly consuming electricity from government. LPG gas would be used when the factory operates. However, when the electricity is cut off, proposed factory has to use generators to generate electricity. This generation of electricity produces CO2 and GHG by using diesel fuel.

Transportation sector is one of the major sources of emission of CO2 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 CO2emission from the proposed factory.

5.5.2 Emission from electricity

Being the limited current electricity usage data of the proposed Lluvia confectionary factory, the electricity consumption was calculated assuming based on the average electricity consumption of the flour factories of both Lluvia Co.,Ltd. and Green Land International Co.,Ltd. These factories including the proposed factory have more or less similar capacity as well as size of the factory.

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 CO2 emissions. The type of fossil fuel used to generate electricity by using generator which will emit different amounts of CO2.

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 3939MWh.

Carbon dioxide (CO2) makes up the vast majority of greenhouse gas emissions from the sector, but smaller amounts of methane (CH4) and nitrous oxide (N2O) 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 will utilize LPG during the process. Electricity also would be 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***,863MWh.***

(b) Lighting power requirements Lighting systems:

Being the limited information from the Lluvia Confectionary, the respective kinds of data were based on the previous similar Lluvia (Greenland and Lluvia wheat flour) factories. The electricity required for lighting was calculated based on the following assumptions:

- The typical lighting requirement for industrial or factory buildings, of 2 W/m2 of floor area.
- Total floor area of proposed factory is approximately 148,703 m^2 which consists of two admin office, two floor mill, car parking, canteen area, storage warehouse and open space.
- The open space area is 5,9612 m^2 which is not required to use electricity.
- The net area of electricity require is only 8,9091m2.
- There had six floors in the building would require lighting at any given time.
- 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 ***1,326MWh***calculated as:

Lighting Power (MWh) = (Floor area x lighting requirement x hours/year) / 1,000,000
= (89,091 m2 x 2 W/m^2x 7,440 hrs/year) / 1,000,000
= 1,326MWh

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 ***750MWh.***

(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 CO2 output emission rate.

Total electricity usage = 1,863 MWh + 1,326 MWh + 750MWh
= 3,939 MWh (3,939,000 kWh)

kWh = 6.89551×10-4 metric tons CO2---------- eq (1)

(eGRID, U.S. annual non-baseload CO2 output emission rate, year 2010 data)

CO2 emission (metric tons) = 3,939,000 kWh x (6.89551×10-4)
= 2,716.1metric tons of CO2

The annual emission of $CO^2$from electricity usage of lighting system, other usage of proposed factory and plant equipments are 2,716.1 metric tons of CO2.

(d) Generator usage

The proposed factory would use generators when the electricity generation is cut off. Lluvia factory has six generators and is 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 9,000 gallons (34,068.69 liters) per year.

1 Liters of Diesel = 2.68 kg of CO2 ----------eq (2)

CO2 emission (kg) = 34,068.69Liters x 2.68
= 91,304 kg of CO2 (91.304 metric tons of CO2)
Total amount of CO2 emission from generator is 91,304 kg of CO2/ year (91.304 metric tons of CO2/ year).

Total emission from electricity sector = (Electricity energy usage from plant and equipment power requirement and lighting and air-condition power requirement)
+(Generator usage)
= 2,716.1 metric tons + 91.304 metric tons
= 2,807.404 metric tons
Total emission of CO2 from electricity sector is2,807.404 metric tons of CO2.

5.5.3 Emission from transportation

For the transportation sector, being the limited data, the number of vehicles with the fuel types were estimated taking assumption from the average vehicles usage of Lluvia flour factory. and Green Land International flour factory which are more or less similar with the capacity and size under the same Lluvia Co., Ltd.

Regarding the combustion of fossil fuels from the Lluvia Confectionary factory, 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.

Table 5.19 Characteristics of distribution trucks from Lluvia confectionary factory

No	Type of car	Type of fuel	Quantity of car	Fuel usage per year (gallon)
1	Truck (< 3 tons)	Diesel	8	6984
2	Truck (3~9 tons)	Diesel	6	7002
3	Truck (< 10 tons)	Diesel	3	4590
Total			**17**	**18576**

The container cars transporting the number of raw materials also used diesel fuel. These container cars are 4,944 in number for annual. Container vehicles used to transport the raw material from to Liuvia flour mill and the amount of fuel consumption is 3 gallons for one container vehicle.

The amount of fuel consumption for raw material transportation is 14,832 gallons per annual.

Total amount of fuel consumption from transportation sector is 33,408 gallons (126463 liter) of diesel fuel per year.

To obtain the number of grams of CO2 emitted per gallon of gasoline combusted, the heat content of the fuel per gallon is multiplied by the kg CO2 per heat content of the fuel.

Gallon of gasoline = 8.887 × 10-3 metric tons CO2

This value assumes that all the carbon in the gasoline is converted to CO2 (IPCC 2006).
1Litre of Diesel = 2.68 kg of CO2
A few percentages of vehicles used natural gas instead of gasoline or diesel as a fuel.

Therm = 0.005302 metric tons CO2
1 Therm = 0.1 mmbtu
1mmbtu = 14.46 kg carbon

CO2 emission (diesel usage) = 126,463 liters x 2.68
= 338,921 kg of CO2 (338.921 metric tons of CO2)

The ***total emission of CO2 from transportation sector is 338.921 metric tons of CO2.***

5.5.4 Emission from waste

Currently, being under construction, wastes management of the proposed factoryis not well developed.. However, according to the recycling practice of the Lluvia Co., Ltd, it was presumed that this practice will be continue in the propose factory.

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 0.76 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 ofcarbon dioxide to carbon. Total tons of waste instead of landfill from the proposed factory is108.5 ton/year.

Ton of waste recycled instead of landfill = 0.76 metric tons of **CO2 E** × 44 kg CO2/12 kg C Ton of waste recycled instead of landfill = 2.79 metric tons CO2 equivalent
The equivalent of CO2 from waste recycled = 109.4 x 2.79 metric tons CO2 Instead of landfill
= 305.226 metric tons
The equivalent of CO2 from waste recycled instead of landfill is 305 metric ton per year.

5.5.5 Emission from LPG

LPG is widely used in many food processing systems because of its clean burning properties. Bakeries and the manufacture of biscuits, chips and chocolate are inclined to choose LPG as their preferred energy option as their products will not be exposed to the risk of contamination.
Commercially available LPG is currently derived mainly from fossil fuels. Burning LPG releases carbon dioxide, a greenhouse gas. LPG does, however, release less CO2 per unit of energy than does coal or oil. It emits 81% of the CO2 per kWh produced by oil, 70% of that of coal, and less than 50% of that emitted by coal-generated electricity distributed via the grid.
In a 15kg cylinder, LPG tanks are filled to 85% capacity if over 5,000 liter and 80% capacity if less than 5,000 liter.

1 liter of LPG = 1.51 kg of CO2
= 5,000 liter (assumption) x 1.51
= ***7,550 kg of CO2 (7.55 metric tons of CO2)***

5.5.6 Total CO2 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 + Emission from the LPG) – The equivalent of CO2 from waste recycled instead of landfill
= (*2,807.404 metric tons* + *338.921metric tons*+ *7.55 metric tons)- 305 metric tons*
= 2,848.875 metric tons

Total emission of CO2 from proposed factory of all of the sectors (electricity, transportation and waste recycle) are 2,848.875 metric tons of CO2.

5-5.6 Existing situation of potable water and wastewater quality

5.6.1 Introduction

Water is not only necessary for Man's survival on Earth but also is an essential component for the improvement of the quality of life of the people living in developing countries (Biswas and Asce, 1980). 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.
Confectionary is one of the most essential products around the world. In this factory, from the process of Confectionary production, both solid wastes, wastewater and others environmental

problems come out day to day in the surrounding.. The wastewater from the confectionary manufacturing factory has high concentration of organic pollutants. So it can impact on for the surrounding water bodies along with aquatic life and, human health if discharged directly into the surface water.
Assessing water quality ensures that the water sources near the factory meet required standards for use in manufacturing processes. Sampling water sources assists in order to evaluate the factory's impact on the local environment. It assesses whether the factory's operations have led to any water pollution or contamination. Water quality monitoring safeguards the health of local communities who might use these water sources for various purposes. It prevents potential health hazards associated with contaminated water.

5.6.2 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

5.6.3 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 Lluvia Confectionary factory, according to the information provided by the factory, the water usage in this manufacturing process is around **170m^3/day**. It is from the two different main sources including construction process and others activities. Based on the analysis, 65% of water usage is for the domestic use together with cleaning of machineries and floors and 35% of the water usage is for drinking water. The factory will be installed wastewater treatment system in the project site.

In the construction process, the main sources of potable water come from the tube well. Before using for drinking, Reverse Osmosis method as a treatment will be 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 tube wells, two samples from each well, and the remaining one is from the overhead tank water were taken for ***potable water analysis.*** These (3) samples were analyzed for ***19parameters each including chemical and physical***

parameters which are significantly important for the human health and surrounding environment.
The locations of potable water sampling are 16°56'42.30"N, 96°11'40.23"E (GW1), 16°56'42.92"N, 96°11'41.61"E (GW2) and 16°56'39.21"N, 96°11'37.59"E (GW3).

Figure5.14 Portable water sampling

Figure 5.15: Map of water sampling

Table 5.20 The results along with the permissible limits of the factory's potable water

No.	Test Parameters	Unit	Tank water	Tube well water	Tube well water	National Drinking Water Standard (NDWS)	Remarks
1.	pH	pH	6.6	6.9	7.3	6.5~8.5	Drinking watercontaminant meet the WHO guidelines, USEPA guidelines and IFC effluent guidelines.
2.	Temperature	˚C	21.5	21.5	21.5	N/A	
3.	Color	Pt - Co	0	24	58	15 cu	
4.	Turbidity	FTU	<5	<5	23	<5	
5.	Total dissolved solids	mg/L	307	273	251	1000	Total dissolved solids meet the WHO guidelines, USEPA guidelines and IFC effluent guidelines
6.	Conductivity	mS/cm	0.5	0.5	0.4	N/A	Conductivity is a measurement used to determine a number of applications related to water quality. (WHO)
7.	Iron	mg/L	<0.1	<0.1	<0.1	<0.3	Iron contamination in potable water can occur naturally or as a result of human activities. While small amounts of iron in drinking water are generally not harmful to health, elevated

							levels might cause health issues, particularly in people with certain conditions like hemochromatosis.
8.	Hardness	mg/L as CaCO3	450	1220	1430	N/A	Hard water is mainly an aesthetic concern because of the unpleasant taste.
9.	Alkalinity	mg/L	162	155	169	N/A	
10.	Chloride	mg/L	460	99	139	250	Chloride is mainly an aesthetic concern because of the unpleasant taste
11.	**Dissolved Oxygen**	**mg/L**	**2.04**	**3.41**	**2.67**	**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.
12.	**BOD5**	**mg/L**	**3.5**	**<3**	**10**	**N/A**	
13.	**COD**	**mg/L**	**<30**	**<30**	**56**	**N/A**	
14.	**Nitrate- Nitrogen**	**mg/L**	**<0.5**	**<0.5**	**<0.5**	**N/A**	
15.	**Arsenic**	**mg/L**	**0**	**0.01**	**0**	**0.05**	

16.	**Copper**	**mg/L**	**ND**	**ND**	**0.02**	**1-2**	
17.	**Cadmium**	**mg/L**	**ND**	**ND**	**ND**	**0.003**	
18.	**Zinc**	**mg/L**	**<0.02**	**0.03**	**0.16**	**3**	
19.	**Sulphate**	**mg/L**	**14.9**	**12.2**	**53.2**		

The results were compared with ***National Drinking Water Quality standard***.
According to the drinking water guidelines, there are around 19 parameters of potable water was analyzed for the potable water of the factory. 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, color, temperature, turbidity, Total Dissolved Solid, conductivity, iron, hardness, alkalinity, chloride, dissolved oxygen, BOD_5, COD, Nitrate- Nitrogen, Arsenic, copper, cadmium, zinc and sulfate.

According to the results, the tank water, tube well (1) and tube well (2), meet the standards except from the chloride in tank water, chloride contamination in factory tank water which is intended for potable use can arise from various sources, both natural and human-induced. Some common causes are geological conditions, industrial processes, corrosion of pipes or storage tanks and mixing of water sources. Especially, the significant parameters, such as pH, Conductivity, Total Dissolved Solid, Hardness, alkalinity, BOD, COD, Nitrate-Nitrogen, arsenic, copper, cadmium, zinc and sulfate meet the standards. Because of those water conditions, the ***potable water will not negatively affect not only on the environmental but also on the factory community*** (employees).

5.6.4 Wastewater analysis

In the Confectionary construction phase, 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 wastewater from different sources are flowing through those drains. All the combination of wastewater from different sources finally flows into public drainage system.

In terms of the sewage water, there is only wastewater effluent from bathing, canteen and run-off water which flow into the public drainage. The proposed factory will install wastewater treatment system.

Looking at wastewater analysis, both physical and chemical characteristics were analyzed. The parameters were selected mainly based on National Environmental Quality (Emission) Guidelines by Environmental Conservation Department (ECD). These are pH, Total Suspended Solid, Nitrate Nitrogen, BOD, COD. The following table shows the results and the permissible limits for water discharges. The samples were taken from two sources at Drainage area (1) and Drainage area (2).

The locations of wastewater sampling are 16°56'42.31"N, 96°11'39.87"E (SW1) and 16°56'40.36"N, 96°11'45.75"E (SW2)


Figure 5.16 Waste water sample collection from drainage area 1


Figure 5.17 Waste water sample collection from drainage area 2

Table 5.21 Wastewater analysis

No	Test Parameters	Unit	Drainage waste water	Outside Drainage Waste water	NEQG	Remark
1.	pH	pH	7.3	11	6 - 9	Drinking water contaminant is considered aesthetic. Then, it can also affect on the human health EQEG. The contamination of pH is depending on the type of soil and rock of the tube well located.
2.	Temperature	°C	21.5	21.5	N/A	
3.	Color	HU	-	294		
4.	Turbidity	FAU	7	67		
5.	Total dissolved solids	mg/L	213	523	N/A	High Total Dissolved Solid may affect the taste of water. If TDS was high in the water, it can be health problem EQEG. It is depending on the type of soil and rock of the tube well located
6.	Conductivity	mS/cm	0.4	0.9	N/A	Conductivity is a measurement used to determine a number of applications related to water quality EQEG. It is depending on the type of soil and rock of the tube well located
7.	Iron	mg/L	<0.1	0.22	N/A	
8.	Hardness	mg/L	460	361	N/A	
9.	Alkalinity	mg/L	148	320	N/A	

10.	Chloride	mg/ L	75	139	N/A	
11.	Dissolved Oxygen	mg/ L	4.90	3.92	N/A	
12.	BOD_5	mg/ L	<3	17	50	High BOD can cause lower oxygen which is needed for the aquatic organisms to survive
13.	COD	mg/ L	<30	61	250	High COD can cause lower oxygen which is needed for the aquatic organisms to survive
14.	Nitrate-Nitrogen	mg/L	<0.5	<0.5	N/A	
15.	Arsenic	mg/ L	0	0.01	N/A	
16.	Copper	mg/ L	ND	0.03	N/A	
17.	Cadmium	mg/ L	ND	ND	N/A	
18.	Zinc	mg/ L	<0.02	<0.02	N/A	
19.	Sulfate	mg/ L	20.1	34.6	N/A	

Based on the findings, the effluent ***pH from the drainage 1 and drainage 2*** were of the wastewater were ***higher than the Effluent guideline.*** Besides, the analytical result of nitrite nitrogen and phosphorous from all drainages met the guidelines.

The optimum **pH** levels for fish are from 6.5 to 9.0. Outside of optimum ranges, organisms can become stressed or die. If the **pH** of water is too high or too low, the aquatic organisms living within it will die.

However, the remaining important parameters such as ***BOD and COD, Total dissolved solid , iron, arsenic, copper, zinc and sulfate met the guidelines*** except from dissolved oxygen.

Dissolved oxygen is necessary to many forms of life including fish, invertebrates, bacteria and plants. These organisms use oxygen in respiration, similar to organisms on land. High dissolved oxygen level speed up corrosion in water pipe. For this reason industries use water with the least possible amount of dissolved oxygen.

5.6.5 Community Demographics, Occupations, Education, Governance, Environment Overview

Age

Most people are between 30 and 40 years old. The next largest group is 40-50 years old at 21%. Then, 50-60 and 60-70 are the same at 18% each. People who are 70 years or older make up 5%. The smallest group is those aged 15-20, which is only 1%.

Living style

About 40% of households own houses, with 15% having two-storey buildings, 68% single-storey, and 5% huts. Over 95% use CGI roofing; 5% use thatch or tarpaulin.

Education

Half of the respondents hold educational qualifications ranging from the 4th to 9th standards, while 18% have completed secondary education. Approximately 19% have attained higher education, 12% have primary education. Only 1% has the monastery education level.

Occupations

Occupations include 33% company officers, 23% cottage industry workers, 12% small retail shop owners, 10% traders, 7% street vendors/green grocers, 5% government officers, and 4% have homestead gardens. Livelihoods aren't primarily dependent on livestock for most households.

Land ownership

Regarding land ownership, 40% own land; 60% are tenants. Among landowners, 39% have approval documents; others have permission.

Annual income

The majority (38%) of households have an annual income between 200,001 and 300,000. In terms of occupations, there are 19% skilled workers, 12% service workers, 7% casual workers, and 4% unpaid family workers.

Governance

The important decisions in the community are made by the village leader.

Population

Meanwhile, there has been a notable surge in human population density in the area over the same period

Cultural Heritage

The most important cultural tradition in the community is festivals. The effect on cultural heritage is slightly positive because there is no historic building.

Biodiversity

Wild plant populations have marginally declined in the last decade due to ecosystems alterations and climate change. However, certain animal species such as birds, rats, mice, bees, butterflies, and mosquitoes have maintained their population levels.

5.7 Secondary data to refer for baseline environmental information

5.7.1Climate and Air Quality

5.8.1.2 Climate Summary of Yangon Region

The climate of Myanmar is dominated by ***the Southeast Asian (SEA) monsoon***; about 70% of the total annual rainfall is received during monsoon season (June to September). The mountain ranges in Myanmar are generally running N-S, so that they present effective climate barriers for the SW monsoon in the summer and the NE monsoon in the winter. Most of Myanmar has a tropical monsoon climate with three seasons: Hot, Cool and Rainy Season.

Yangon falls under the ***tropical monsoon climate category*** according to the Köppen climate classification system. The specific code for this climate type is "Am." In the Köppen system, "A" represents a tropical climate, and "m" indicates a monsoon climate characterized by distinct wet and dry seasons.

Therefore, Monsoon rains are the most persistent in Yangon, and the south, east, west and in the center of the Yangon. The climate in Yangon features ***a wet season (monsoon) from May to October,*** during which the city experiences heavy rainfall, ***and a dry season from November to April. The temperatures in Yangon*** remain consistently ***warm throughout the year***, with relatively ***high humidity levels, typical of tropical climates***.

The ***monthly average temperature and monthly average rainfall for 10years*** (2013-2023) are presented in Table 5-24 and 5-25 respectively. The 10 years interpretation (2013-2023) of precipitation and temperature are exhibited in Figure 5.23. The 10 years (2013-2023) interpretation of Relative humidity is shown in Figure 5.24.

The annual rainfall from 2013-2023 in Yangon typically exceeds 1,200 millimeters. Yangon experiences high humidity levels throughout the year. During the monsoon, rainfall is short and intense – often more than 100 mm of water falls in an hour resulting in localized flooding.

Total Precipitation from 2013-2023: For the most part, February exhibits a notable absence of precipitation across the months. However, in June, precipitation levels initiate at a substantial magnitude of 213.94 mm of water falls. Throughout the months of June, July, and August and September, the precipitation attains its peak, measured in millimeters and exhibited a gradual decline over time after October to December. During the monsoon, rainfall is short and intense – often more than 400 mm of water falls in an hour resulting in localized flooding.

Annual Average Temperature from 2013-2023: During the hottest months, which are typically from March to May, the mean maximum temperatures in Yangon can range from 32 to 36 degrees Celsius (90 to 100 degrees Fahrenheit). In the coolest months, which are usually from December to February, the mean minimum temperatures in Yangon can range from 18 to 24 degrees Celsius (64 to 75 degrees Fahrenheit). April emerges as the warmest month of the year, characterized by an average temperature of approximately 87.65 degrees Farenheit. In July and August, there are relatively consistent uniform temperatures. The period spanning December to late January is characterized by the lowest temperatures, ranging from 79.74 degrees Farhenheit
in December to 78.08 degrees Farhenheit at the end of January.

The mean relative humidity from 2013-2023 is about 75 often exceeds 70% and can be much higher, especially during the wet season (monsoon season) when rainfall is more frequent. The combination of warm temperatures and high humidity contributes to the overall tropical climate of the region.

Annual Mean Relative Humidity from 2013-2023: The peak relative humidity occurs during the monsoon season, notably in July, reaching its highest level at 86.25%. Throughout June, July, and August, there is a relatively consistent and uniform humidity pattern. Conversely, February experiences the lowest humidity levels due to its association with the summer season. The months of January through April exhibit a relatively stable humidity range, fluctuating between 60% and 67%. It is noteworthy that across all seasons, humidity levels vary within the broad range of 60% to 90%.

Annual Win Speed from 2013-2023: The mean wind speeds for each month vary throughout the year, ranging from a minimum of 4.45 mph in January to a maximum of 6.39 mph in April. During the spring months (March to May), the mean wind speed experiences an upward trend, with values reaching 5.65 mph in March, 6.39 mph in April, and 6.28 mph in May. In the summer months (June to August), the mean wind speed remains relatively consistent, with values ranging from 5.77 mph in July to 5.90 mph in August.As autumn approaches, the mean wind speed shows a gradual decrease, reaching 4.53 mph in November after a peak of 5.14 mph in SeptemberThe winter months (December to February) exhibit lower mean wind speeds, with values ranging from 4.46 mph in December to 4.89 mph in FebruaryAnalyzing the annual cycle, the mean wind speed demonstrates a noticeable fluctuation, reflecting the seasonal changes and weather patterns throughout the year Comparing the mean wind speeds, April stands out as the windiest month with a mean speed of 6.39 mph, while January has the lowest mean wind speed at 4.45 mph.

Table 5.22 Average ,Maximum, Minimum ,Temperature and Relative Humidity of Yangon

Month	Average min temp	Average max temp	Relative Humidity
January	18(64)	32(90)	60%
February	19(66)	34(94)	61%
March	22(70)	36(96)	64%
April	24(75)	36(98)	67%
May	25(77)	33(92)	82%
June	24(76)	30(86)	86%
July	24(75)	29(85)	88%
August	24(75)	29(85)	88%
September	24(75)	30(86)	87%
October	24(75)	31(88)	80%
November	23(72)	31(89)	75%
December	19(66)	31(88)	68%

Source: GoMyanmar.com

Table 5.23 Monthly mean temperature and monthly Rainfall of Yangon Region (Years 2013-2023) (10 Years)

Year (2013-2023)	Jan	Feb	Mar	Apr	May	Jun	July	August	Sep	Oct	Nov	Dec
Average Monthly Temperature (°F)	78.08	80.95	84.98	87.65	85.79	81.37	80.61	80.59	81.42	82.20	82.69	79.74
Total Monthly Precipitation (mm)	3.71	0.05	0.77	5.27	74.56	213.94	260.11	297.57	231.19	107.20	33.43	1.89

Source: WeathreUnderground, WeatherandClimate

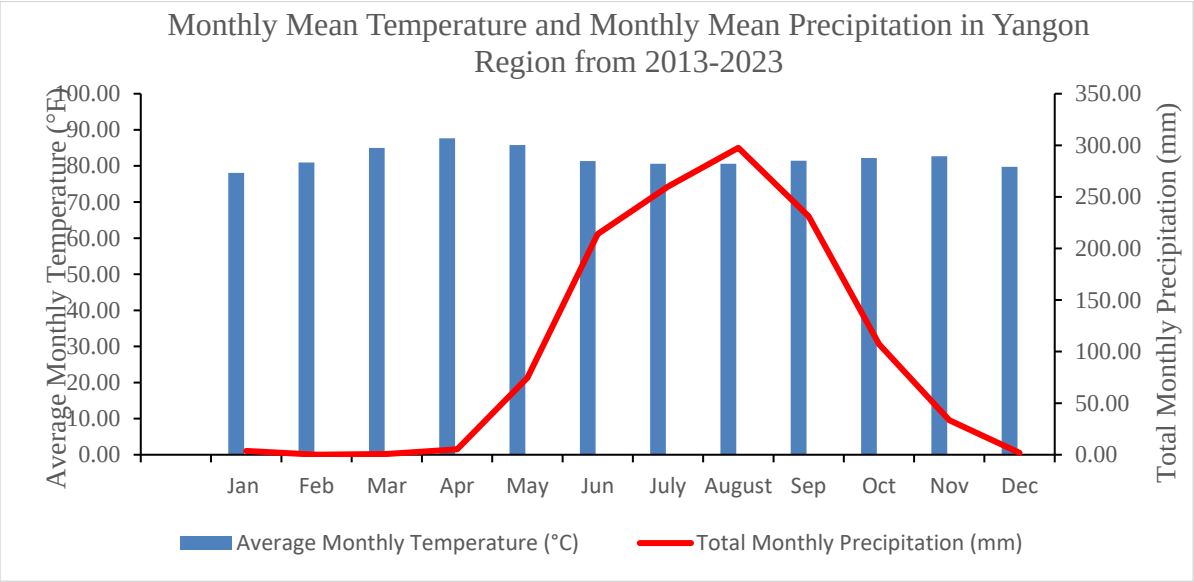


Figure 5.18: 10 Years Monthly mean temperature and monthly rainfall of Yangon Region from 2013-2023

Table 5.24 Annual Mean Teamperature (°F) in Yangon Region from 2013-2023

Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2013	78.34	83.89	86.05	89.11	85.11	80.58	78.92	79.71	79.84	81.79	82.82	76.32
2014	76.43	79.63	84.27	87.32	85.13	81.34	79.92	80	81.04	82.3	81.5	80.25
2015	77.81	80.18	85.17	87.72	85.33	81.36	80.77	80.37	81.69	81.77	83.22	80.22
2016	76.5	81.07	86.24	90.13	87.43	81.74	81.39	81.01	81.4	82.24	82.3	81.41
2017	79.37	82.69	85.8	86.89	86.54	82.24	80.29	80.72	82.88	81.93	83.16	79.32
2018	78.45	80.67	83.83	87.23	85.18	81.12	79.91	80.43	82.16	82.65	82.09	80.9
2019	78.49	81.91	84.31	88.74	86.78	82.19	80.58	80.26	81.4	83.52	82.4	77.00
2020	77.41	79.9	83.64	87.06	86.69	81.18	81.66	80.6	81.89	81.62	82.39	79.53
2021	78.72	80.33	85.14	84.64	85.73	80.92	80.71	81.85	80.81	81.85	83.6	78.16
2022	79.22	79.86	85.88	87.37	83.32	81.49	81.48	79.95	81.39	82.66	82.39	80.83
2023	78.16	80.35	84.49	87.95	86.46	80.89	81.04	81.59	81.1	81.89	83.67	83.16
Annual Mean Temperature	**78.08**	**80.95**	**84.98**	**87.65**	**85.79**	**81.37**	**80.61**	**80.59**	**81.42**	**82.20**	**82.69**	**79.74**

Source: WeatherUnderground, WeatherandClimate

Table 5.25 Total Annual Precipitation (mm) in Yangon Region from 2013-2023

Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2013	0.3	0.2	0.2	0	60.2	132	215.6	201.1	139.7	78.7	11.2	1.2
2014	0	0	0.4	2.4	80.6	223.1	266.5	215.1	180.5	48.1	53.7	0.8
2015	0.2	0.1	7	7.9	102.9	187.7	218.5	207.4	210.2	64.3	2.6	0.4
2016	0.1	0.2	0	7.7	106.6	140.2	225.2	183.9	139.6	69.8	5.8	0.4
2017	1.5	0	0	21.9	91	167.5	233.9	311.9	215.5	153.6	14.1	0
2018	0.4	0	0.5	3.5	152.4	300.6	389	439.1	195.6	87.5	4.1	10.1
2019	38.3	0	0.4	0.3	114	676.1	841.7	861	867.7	136	147.5	2.2
2020	0	0	0	14.3	112.5	526.1	470.8	853.8	594.3	541.2	128.7	5.7
2021	0	0	0	0	0	0	0	0	0	0	0	0
2022	0	0	0	0	0	0	0	0	0	0	0	0
2023	0	0	0	0	0	0	0	0	0	0	0	0
2013-2023	**3.71**	**0.05**	**0.77**	**5.27**	**74.56**	**213.94**	**260.11**	**297.57**	**231.19**	**107.20**	**33.43**	**1.89**

Table 5.26 Annual Mean Relative Humidity in Yangon Region from 2013-2023

Years	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*
2013	*64.23*	*59*	*60.56*	*61.38*	*76.48*	*91.24*	*91.73*	*90.66*	*92.41*	*85.39*	*82.6*	*82.45*
2014	*78.99*	*77.22*	*69.52*	*66.84*	*68.77*	*87.59*	*90.38*	*89.37*	*86.76*	*83*	*80.1*	*69.23*
2015	*62.95*	*57.49*	*59.24*	*62.73*	*74.26*	*87.67*	*89.85*	*90*	*88.01*	*84.1*	*74.66*	*68.97*
2016	*61.76*	*61.27*	*63.11*	*60.02*	*53.2*	*51.56*	*50.61*	*55.5*	*49.51*	*70*	*76.05*	*69.45*
2017	*65.33*	*58.97*	*58.12*	*65.6*	*74.95*	*86.92*	*91.01*	*81.64*	*52.92*	*56.26*	*74.99*	*73.75*
2018	*69.63*	*64.76*	*67.9*	*66.44*	*74.78*	*89.04*	*91.64*	*89.91*	*84.56*	*82.96*	*77.55*	*76.22*
2019	*72.03*	*63.78*	*63.89*	*62.64*	*72.19*	*84.72*	*89.31*	*90.58*	*85.97*	*80.11*	*79.71*	*70.63*
2020	*68.28*	*63.73*	*65.56*	*67.52*	*72.89*	*87.47*	*86*	*89.44*	*86.58*	*86.53*	*78.77*	*74.13*
2021	*70.98*	*66.5*	*66.39*	*76.11*	*75.68*	*88.6*	*90.05*	*86.7*	*89.14*	*86.18*	*81.36*	*72.96*
2022	*72.33*	*68.24*	*69.96*	*71.23*	*82.5*	*88.51*	*87.67*	*90.07*	*87.59*	*82.06*	*79.73*	*79.46*
2023	*72.71*	*69.66*	*70.05*	*70.3*	*77.18*	*91.35*	*90.49*	*88.91*	*90.67*	*87.83*	*79.1*	*79.13*
Mean Relative Humidity	*69.02*	*64.60*	*64.94*	*66.44*	*72.99*	*84.97*	*86.25*	*85.71*	*81.28*	*80.40*	*78.60*	*74.22*

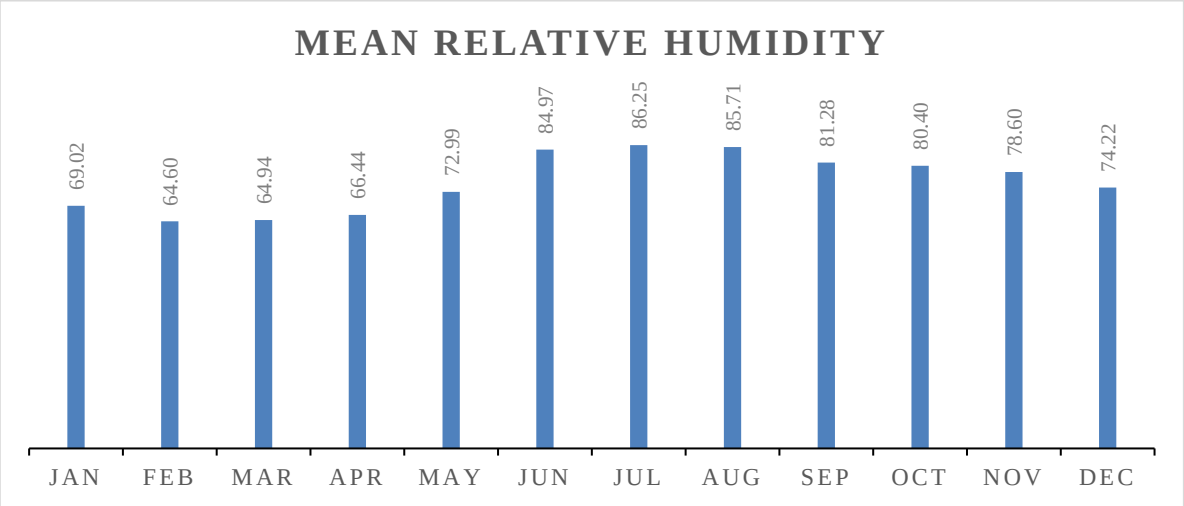


Figure 5.19 Monthly Mean Relative Humidity in Yangon Region from 2013-2023

Table 5.27 Monthly WIND SPEED(m.p.h) AT (06:30)hrs M.S.T from 2013-2023

Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2013	3.14	3.81	4.78	6.4	6.1	4.47	5.58	5.44	4.87	4.7	4.5	4.42
2014	4.11	4.85	5.34	6.27	5.68	5.55	5.59	5.32	4.83	4.46	4.15	4.54
2015	4.15	4.3	5.45	6.19	5.97	5.45	6.1	5.32	5.25	4.57	4.25	4.02
2016	4.23	4.74	5.55	6.39	5.94	5.79	5.64	5.85	4.76	4.55	4.46	4.73
2017	4.73	5.07	5.88	6.01	6.13	6.19	5.94	5.63	5.07	4.91	5.03	4.75
2018	4.55	5.02	5.43	6.1	6.05	6.58	5.8	6.38	5.26	4.23	4.14	4.06
2019	4.57	4.64	5.58	6.22	6.43	6.15	6.1	6.65	6.16	4.94	4.67	4.41
2020	4.81	5.34	6.61	6.61	6.27	6.05	5.02	6.09	4.9	5.46	4.43	4.21
2021	4.56	5.1	5.06	5.86	6.16	7.04	6.14	5.74	4.88	4.74	4.77	5.11
2022	5.72	5.74	6.16	6.85	6.27	5.27	5.49	5.92	5.47	5.26	4.73	4.48
2023	4.41	5.2	6.34	7.43	8.09	5.23	6.09	6.6	5.12	4.59	4.65	4.33
Mean Wind Speed	**4.45**	**4.89**	**5.65**	**6.39**	**6.28**	**5.80**	**5.77**	**5.90**	**5.14**	**4.76**	**4.53**	**4.46**

Source: WeatherUnderground, WeatherandClimate

Table 5.28 Annual rainfall, temperature, and relative humidity (Years 2013-2023)

Annual rainfall (mm)	Temperature (ºC)	Mean relative humidity (%)
1229.69	Mean Average	75.78
	27.87	

Chapter (6)
Impact and Risk Assessment and Mitigation Measures

6.Identification and assessment of potential environmental impacts

All potential environmental and social impacts from construction phase and operation phase are identified to develop preventive mechanisms and management plans. While short term impacts are assessed, compulsory regular monitoring and evaluation procedures by qualified independent body will address long term issues. This chapter comprises pollution types, sources, issues, affected parties, and finally, classifications of impacts. The objectives of this assessment are to assess the impacts of the Lluvia confectionary factory developments and operation on the natural environment and human beings and to develop a proper management plan which is to eliminate or reduce adverse impacts on the surrounding environment.

The impacts on the environment from various project activities can be categorized as follow; Impacts on Environmental Resource

- Impact on Air Quality
- Impact on Noise and Vibration Levels
- Impact on Surface Water Quality
- Impact on Ground Water Quality
- Impact on Soil
- Oil and Fuel Spills

Impacts on Ecological Resources

- Forest
- Wildlife
- Aquatic
- Animal/ Fish

Impact on Human Environment

- Health and Safety
- Socioecnomics

Impact on Waste Disposal

6.1 Construction phase

6.1.1 Impact assessment and mitigation measures for air quality

6.1.1.1 Potential impacts on air

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 PM_{10}, $PM_{2.5}$, NO_2, CO_2, SO_2, VOC, Methane O3 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.

- 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.

6.1.1.2 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 Lluvia Confectionary 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

Characteristics					
Magnitude	Extent	Duration			
3 (High)	2 (Medium)	1 (Low)	Equivalent Characteristics	Importance	
Characteristics = 3+2+1 = 6			2 (Medium)	2 (Medium)	Significance
			Significance = Characteristics x Importance		4 (Medium)

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 Lluvia Confectionary 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 Lluvia Confectionery 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)

6.1.1.3 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.

Table 6.2.1 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)

6.1.2 Impact assessment and mitigation measures for noise level

6.1.2.1 Potential impacts on noise

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.

6.1.2.2 Impact significance on noise levels

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 the Lluvia Confectionery 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

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)

6.1.2.3 Mitigation measures for noise quality

During proposed project construction, the following mitigation measures are recommended to minimize noise impact on individuals, sensitive areas and livestock.

- Use quiet equipment (i.e. equipment designed with noise control elements)
- 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.
- Careful handling of material loading and unloading.
- Ensure use of silencers or mufflers on heavy construction equipment engines.
- Construction machinery and vehicles will undergo periodic maintenance to keep them in good working condition.
- Perform regular inspection and maintenance of preparation vehicles and equipment.
- Turn equipment off when not in use.
- Taking consideration to be careful sequencing and scheduling times.
- Schedule noisy construction activities and transportation during day-time hours.
- Combine noisy operations at the same time, but avoid combination of vibration
- Provide PPE particularly hearing protection devices for those working in noisy areas.
- Locate noisy plant as far away from receptors as practicable.
- Orientate equipment known to emit noise strongly in one direction so that the noise is directed away from receptors as far as practicable.
- 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.

Table 6.3.1 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)

6.1.3 Impact assessment and mitigation measures for water quality

6.1.3.1 Potential impacts on water quality

In the Construction phase, removal of vegetation, top soil level and ground surface for the biscuit production 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:

- Clearing land for operation purposes
- 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.

6.1.3.2 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)

6.1.3.3 Mitigation for water resources

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.

- 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.
- Promote recycling and reuse of water as much as possible.
- Implement road drainage system and smooth road to limit erosion.
- Promptly detect and repair of water pipe and tank leaks.
- Ensure taps are not running when not in use.

- Proper recycling of water from other uses for sprinkling dusty pavements.

- Soil erosion and sediment control mechanisms will add positive effects on mitigation matters for water pollution.
- 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.
- Conducting regular training, monitoring, and inspection schemes together with keeping track of water uses minimizes waste and leaks from faulty connections and faucets.
- Open stockpiles of construction materials or construction wastes on-site should be covered 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.
- 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.

6.1.4 Impact assessment and mitigation measures for soil quality

6.1.4.1 Potential impacts on soil quality

During this construction process, it may cause impact to soil system and its quality due to soil erosion, clearing and preparation of factory area. Earth moving and excavation activities will affect the natural surface flow regime of water.

Improper disposal of the excavated earth during installation of structures/equipment may result into temporary loss of topsoil productivity of that particular area. Further, clearing of vegetation and scarifying the site of topsoil with soil compaction during site preparation will result in reduced capacity of the land to retain water and increase surface water run-off during periods of rainfall. Accidental spillage of construction materials/chemicals during handling and leakage from the storage area may lead to soil contamination.

6.1.4.2 Impact significance on soil quality

In construction period, it may cause impact to soil system because the existing soil and vegetation had to be removed and consequently soil erosion can take place.
The magnitude of impact on soil quality was “Medium”

The area of impact will be only within the area of factory compound. Therefore, the extent of the impact on soil quality and structure was “Low”.

The period of impact occurrence will be remained after the project period and the duration of the impact on soil quality and structure was considered as “Medium”.

According to magnitude, extent and duration of the impact, the impact characteristic was considered as “Medium”. The importance of the impact was considered as “Low”.

Therefore, the impact on soil quality and structure by the Lluvia Confectionery factory was less and the significance of the impact would be “Low”.

Table 6.6 Impact significance on soil quality during construction period

Characteristics					
Magnitude	Extent	Duration			
2 (Medium)	1 (Low)	2 (Medium)	Equivalent Characteristics	Importance	
Characteristics = 2+1+2 = 5			2 (Medium)	1 (Low)	Significance
			Significance = Characteristics x Importance		2 (Low)

6.1.4.3 Mitigation measures for soil

Mitigation measures should be applied to minimize soil pollution 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.

- 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 soil pollution.
- Careful planning to establish work zones, defining phases of construction, and active management of daily activities will be employed to minimize soil disturbance during the construction phase.
- The project area will be divided into smaller sectors and vegetation from the smaller sectors will be cleared sequentially to minimize soil exposure during construction.
- When required, topsoil will be carefully removed and saved for reuse.
- Frequent water sprinkling and appropriate scheduling for truck and heavy equipment movements will also be arranged throughout the construction period.
- A waste management plan (WMP) starting from waste reduction, waste separation, proper waste collection and transportation for the project should be developed that sets out plans and actions for construction wastes. 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.

6.1.5 Impact assessment and mitigation measures for waste disposal

6.1.5.1 Potential impacts 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.

6.1.5.2 Impact assessment on waste disposal

In construction phase of Lluvia confectionery 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 confectionery 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 the Lluvia Confectionery factory during construction phase was less and the significance of the impact was considered as "Medium"

Table 6.7 Impact significance on waste disposal during construction 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)

6.1.5.3 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.

- 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.
- Construction materials will be managed in a way to avoid over-ordering, poor storage and maintenance, mishandling as well as improper operation procedures.
- Construction wastes will be separated into reusable items and materials to be disposed of or recycled whenever possible.
- Waste suitable for reuse will be stored on site and reintroduced to the construction process as and when required.
- 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.
- 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.
- The waste management plan will identify disposal routes (including transport options and disposal sites) for all wastes generated during the construction phase.
- 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).
- Carefully select less hazardous materials and use the necessary amount only.
- Establish a designated hazardous waste collection site and make it secure.
- Do not clean the used hazardous material containers and mix wastes.
- Recyclables such as scrap steel, metals, plastics, and paper items will be collected for recycling wherever possible.
- 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.

- Use of building materials that have minimal packaging to avoid the generation of excessive packaging waste.
- Use of plastic bags will be discouraged and explained to the workforce and local communities.
- Disposal of construction waste in or off the construction site should be prohibited.
- Prohibit open burning of any waste at project site.
- Regular collection times will be arranged to prevent overflow in waste collection bins.
- Chain of custody documents should be used for construction waste to monitor disposal.
- 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.

Table 6.7.1 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)

6.1.6 Impact assessment and mitigation measures for ecological resources

6.1.6.1 Forest

There is no forest in the vicinity of the Lluvia confectionery factory project. Therefore, the impact on forest by the proposed project is “negligible” significance.

6.1.6.2 Wildlife

There is no wildlife existing in the proximity of the Lluvia confectionery factory project. Therefore, the impact on wildlife by the proposed project is “negligible” significance.

6.1.6.3 Aquatic animal/ fish

There is no impact on aquatic animal/ fish because the project is located in Industrial Zone. Therefore, the impact on aquatic animal/ fish by the proposed project is “negligible” significance.

6.1.7 Impact assessment and mitigation measures on human environment

6.1.7.1 Impacts 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.

6.1.7.2 Impact assessment 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 beside the 2nd road 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 Lluvia Confectionery factory will be less and the significance of the impact would be “Medium”.

Table 6.8 Impact significance on occupational health and safety during construction 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)

b) **Impact significance on socio- economic**

Lluvia confectionery factory is located inside the Yangon Industrial Zone, North Okkalapala Township but has a close boundary with Shwe-Pauk Kan Township and the nearest residential areas with the factory are ward 11, ward 12, and ward 15. 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.

6.1.7.3 Mitigation measures for occupational health and safety

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.

Table 6.8.1 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)

6.2 Operation phase

6.2.1 Environmental and social impacts during the operation phase

The operation phase of the confectionery factory generates solid wastes, wastewater, substances contributing to air pollution, a certain degree of noise, vibration, and hazardous wastes. Despite the project's optimum efforts to keep the pollutants at the lowest level by employing the best available technologies and management mechanisms, it continues to have lesser degree of footprint on the environment. Waste minimization procedures, including but not limited to careful selection of raw materials and less polluting chemicals, reuse of all possible resources, recovery of recycle materials, and energy efficient methods, are carried out as a part of the project's drive to further reduce the environmental footprint, the following will be activated:

6.2.1.1 Impacts on air quality

Confectionery production has impacts in terms of production process along with energy consumption as well as greenhouse gas emissions.

(a) Fugitive particulate emissions

The particulates will be emitted from the following process:

1) Mixing
2) Molding
3) Baking
4) Packing

Among these activities, the potential sources of dust emissions during the operation phase include:

- Handling and storage of raw materials and fuels
- Crushing and grinding of raw materials
- Transportation of materials by trucks and other vehicles
- Storage, packing, bagging and delivery activities

(b) Gases emission

GHG emissions including fugitive methane emissions would arise from energy consumption for the production process, transportation and generator operations. Indirect operating emissions from the proposed project would be associated with electric generation from LPG needed to power the pump stations.

The gases will be emitted from the following process that will further escalate air pollution issues:

1) vehicle activities
2) The use of waste fuels such as solvents, waste oil, organic chemicals
3) food cooking operations

To reduce air pollution impacts, the facility adopts and implements the policy of maximum energy efficiency, manages well-coordinated traffic flows, encourages green vegetation, and establishes re-greening plan. These will serve as the facility's drive to minimize air pollution issues.

6.2.1.2 Impact assessment on air quality

a) **Impact significance on air quality by particulates**

There will have a minor impact from particulate matter during the operation of the Lluvia confectionery factory.

The magnitude of impact by particulate matter will be "Low".

The area of impact will be only within the production area. Therefore, the extent of the air quality impact from particulates will be considered as "Low".

The period of impact occurrence will be within the operation period and the duration of the impact by particulate matters will be considered as "Low".

According to magnitude, extent and duration of the impact, the impact characteristics will be "Low". The importance of the impact on air was considered as "Medium".

Therefore, the impact from particulate matters by the Lluvia Confectionery factory operation will be less and the significance of the impact would be "Low".

Table 6.9 Impact significance on air quality during operation 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)

b) **Impacts significance on air quality by gas emission**

In operation period of the factory, machines used for production processes and LPG generators will emit gas and have impact on ambient air quality.

Emission from LPG generators is always lower than of other fuels used generators. The magnitude of impact on air quality by this gas emission was "Medium".

The area of impact will be within the area of factory compound. Therefore, the extent of the impact on air quality was "Low".

The period of impact occurrence will be within the project period and these impacts will affect the factory workers. The duration of the impact of gas emission will be "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 air quality by gas emission by the Lluvia Confectionery factory operation will be less and the significance of the impact would be "Medium".

Table 6.10 Impact significance on gas emission during operation processes

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)

6.2.1.3 Mitigation measures for air quality

During proposed project operations, the following mitigation measures are recommended to minimize the impact on the ambient air quality.

- Prohibit open burning of any waste at project site.
- Careful use of energy efficient equipment and tools.
- Actively seeking cleaner technologies and investing in less polluting technologies.
- Storage of crushed raw materials in covered or closed bays.
- Collecting dust and other impurities from the air by using dust filter or filter-cleaning system.
- Use of air ventilation in packing areas.

- Ensure that all machines are maintained in accordance with manufacturer's recommendations.
- Consider the use of low-emission generator engines.
- Spray water onto the ground to control dust.
- Plant long trees around the project area to control air pollution (a green belt)
- Storage of waste-derived fuels in areas protected from wind and other weather conditions.
- Use of enclosed belt conveyors for materials transportation and emission controls at transfer points.
- Careful selection and use of environmentally friendly and low emission vehicles;
- Appropriate management of project traffic
- Systematic arrangement of delivery operation schedules and times;
- Educating drivers and vehicle operators to stop engine idling;
- Education and training programs with competitions to encourage all employees to actively participate in energy saving.
- Discouraging the common practice of burning the any waste in the field, and encouraging biodegradation.
- Placing a buffer zone with a garden or with a man-made forest between residential areas and project operation zones.
- Periodical monitoring of air pollutants and if values exceed the standard limits, suitable mitigation measures will be taken.
- Green belt program will be maintained.

After mitigation measure, the impact on air quality will become less significant.

Table 6.10.1 after mitigation measures, impact significance on air quality during operation 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 Impact assessment and mitigation measures on noise level

6.2.2.1 Potential impacts on noise quality

During the operational phase of the proposed factory, noise will be generated from the factory operations and transportation. The potential sources of noise pollution include:

- Material handling equipment and operations
- Vehicles and factory operations
- 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.

6.2.2.2 Impact significance on noise quality

Generally, noise at work can cause hearing damage that can lead to permanent and disabling. In operation phase of Lluvia confectionery factory, some processing activities and machines such as rotary moulds and cutters, grinders, packaging and generators can have noise impact on workers.

The magnitude of noise and vibration during the operation period will be "Low".

The area of impact will be only within the area of production. Therefore, the extent of the impact of noise and vibration will be "Low".

The period of impact occurrence will be within the production period, but it may last around 8 hours per day. The duration of the impact of noise and vibration during operation will be considered as "Medium".

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 of noise level by the Lluvia Confectionery factory will be less and the significance of the impact would be "Medium".

Table 6.11 Impact significance on noise level during operation period

Characteristics					
Magnitude	Extent	Duration			
1 (Low)	1 (Low)	2 (Medium)	Equivalent Characteristics	Importance	
Characteristics = 1+1+2 = 4			2 (Medium)	2 (Medium)	Significance
			Significance = Characteristics x Importance		4 (Medium)

6.2.2.3 Mitigation measures on noise level

Following precautionary measures should be adopted to control the noise level.

- The workers and employees working at the factory premises particularly nearby the operation emitting noise should use ear plugs and ear muffs for protection against the noise.
- Provide appropriate PPEs including ear muffs and make sure to wear these PPEs during working hours.
- Reduce the working hours of operating noisy machines.
- Ensure use of mufflers on diesel/gas driven machinery.
- Using enclosure for all generator sets.
- Use low noise equipment.
- Carryout regular maintenance of the equipment to minimize the noise level.
- Carry out periodic monitoring of noise levels, if values exceed the standard limits, suitable mitigation measures needed to be taken.
- Develop green belt to act as a noise barrier.
- Establish a grievance mechanism as part of a stakeholder engagement plan.
- Schedule operation of noisy construction equipment at different times.
- Schedule noisy operation activities and transportation during day-time hours.
- Turn equipment off when not in use.
- Training to personnel will be imparted to generate awareness about effects of noise and importance of using PPEs.
- Traffic control measures to be enforced strictly.

After mitigation measure, the impact on noise level will become less significant.

Table 6.11.1 after mitigation measure, impact significance on noise level during operation 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)

6.2.3 Impact assessment and mitigation measures for water quality

6.2.3.1 Potential impacts on water quality

Food processing may need ***large quantities of good quality water*** for a range of operations, including blending or mixing, cleaning etc. Furthermore, water consumption is also necessary for cleaning utensils, equipment and residential units including kitchen, toilets for workers. Thus, water consumption of the proposed factory like affects the underground water level and the impact is likely to be significant. In the operation phase, the daily required water volume for manufacturing purpose and other purposes will be provided by the storage water tanks. The impact of water consumption likely affects the underground water pattern based on the range of process.

However, the current project is temporarily suspended, at the present, the wastewater cannot be measured since there is no wastewater including (domestic and factory) released from the project. When the project is operating back, the wastewater will be monitored in accordance with the required standards.

6.2.3.2 Impact significance on water quality

In operation phase, the magnitude of the impact of physical, chemical and biological result of the ground water will be considered as “Medium”.

The area of the potential impact will be within the immediate area of project activities and factory community, and the extent of the impact would be “Low”.

The period of potential impact duration can be long term duration. The duration of the impact for water quality during operation will be set as “Medium”.

Therefore, the characteristic of water quality impact by the proposed project 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 water quality was set as “Medium”.

The significant rating of impact was set as “Medium”.

Table 6.12 Impact significance on water quality during operation phase

Characteristics					
Magnitude	**Extent**	**Duration**	**Equivalent Characteristics**	**Importance**	
2 (Medium)	1 (Low)	2 (Medium)	2 (Medium)	2 (Medium)	**Significance**
Characteristics = 2+1+2 = 5			Significance = Characteristics x Importance		4 (Medium)

6.2.3.3 Mitigation measures for water resources

Specific measures that should be implemented include the followings:

- Promote recycling and reuse of water as much as possible.
- Proper recycling of water from other uses for sprinkling dusty pavements
- Promptly detect and repair of water pipes and tank leaks.
- Quick fixing of leaking pipes.
- Ensure taps are not running when not in use.
- Promote awareness to employees on water conservation and reducing water wastage
- Raw materials should be properly stored under the roof to prevent dumping into the water courses in the rainy season.
- Installing water efficient toilets and shower heads.
- Users to conserve water e.g. by avoiding unnecessary toilet flushing.
- Treat drainage system for sediment control.
- Store, dispose and clean up all diesel and hazardous materials according to the procedures.
- Preventing leaks and spills.
- Install water conserving taps that turn-off automatically when water is not being used.
- Reuse of treated grey water for dust control and plant watering.
- Proper management of storm water.
- 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.
- Conducting regular training, monitoring, and inspection schemes together with keeping track of water uses minimizes waste and leaks from faulty connections and faucets.

Characteristics					
Magnitude	**Extent**	**Duration**	**Equivalent Characteristics**	**Importance**	
1 (Low)	1 (Low)	1 (Low)	1 (Low)	2 (Medium)	**Significance**
Characteristics = 1+1+1 = 3			Significance = Characteristics x Importance		2 (Low)

After the mtigation measure, the impact will be negligible ***"Low"***

6.2.4 Impact assessment and mitigation measures for waste disposal

6.2.4.1 Potential impacts on waste disposal

Once the proposed project is complete and operational, it is expected to generate major solid waste on a daily basis whose composition will be dominated by organic waste. A lot of waste such as food residues (organic wastes), glasses, tins, bottles, packing materials, papers, stationeries, damaged/expired devices and other miscellaneous will be generated during the operational phase of the project.

Liquid waste of the factory biscuit production is low due to less amount of water consumption for processing. So, the impact of liquid waste to the environment will be low.

The foods processing and production does generate insignificant amount of wastewater that bring damage to the surface and ground water sources. The generation of sanitary wastewater discharges has no significant adverse impacts on the surrounding environment because the septic tank system is installed in the projected area. But, the lubricants, oil and grease used for vehicles and machines can cause contamination into the surrounding environment particularly air, water and soil.

6.2.4.2 Impact significance on waste disposal

In operation phase of Lluvia confectionery factory, there are some kinds of solid wastes generated from raw materials, production activities, packaging process and domestic solid waste of workers. There are also waste water from the processing of biscuits and cookies manufacturing.

The magnitude of waste disposal during operation phase will be “Medium”.

The area of impact will be only within the area of factory compound. Therefore, the extent of the impact by waste during operation phase will be “Low”.

The period of impact occurrence will be within the confectionery factory operation period and the duration of the impact by 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 will be considered as “Medium”.

Therefore, waste impact by the Lluvia Confectionery factory during operation phase will be less and the significance of the impact would be “Medium”.

Table 6.13 Impact significance on solid waste during operation period

Characteristics					
Magnitude	Extent	Duration			
2 (Medium)	1 (Low)	2 (Medium)	Equivalent Characteristics	Importance	
Characteristics = 2+1+2 = 5			2 (Medium)	2 (Medium)	Significance
			Significance = Characteristics x Importance		4 (Medium)

6.2.4.3 Mitigation measures for waste disposal

General mitigation practices and principles that could apply to the operation phase of the biscuit production project include:

- Maintain drains regularly as and when required.
- Solid wastes should not be dumped into the drain.

- Blocked drains should be cleaned properly and debris disposed at approved sites.
- Conduct regular inspections for drainage pipe blockages or damages and fix appropriately.
- Ensure regular monitoring of the sewage discharged from the project.
- Provide separate bins for food waste, metal and other wastes at the staff quarters and other facilities on site.
- Collect non-hazardous solid wastes for recycling or disposal at landfill.
- Setting up of separate waste collectors at different points.
- Regular cleaning and replacing of waste collectors.
- Encourage waste sorting by the facility users.
- Solid wastes that cannot be recycled must be treated appropriately before final disposal.
- Avoid contamination of the surrounding environment by maintaining machines equipment and vehicles regularly and handling of fuel and lubricants with caution.
- Avoid leaks, spills or accidental releases into the soil, surface water and ground water resources by proper storage, handling and transport of hazardous materials.
- Education and training will be offered to all factory employees and reward for innovative reduction and recovery approaches will be given to company departments in monthly competitions.
- Solid waste generation from each department will be recorded
- All employees will be encouraged to take part in education and training programs, and cleanup activities in turn not only in the facility but also with the adjacent communities.
- Develop a hazardous materials management plan addressing storage, use, transportation and disposal for each item.
- Train employees to promptly clean up any oil or hazardous material spill.

After mitigation measure, the impact on waste disposal will become less significant.

Table 6.13.1 after mitigation measures, impact significance on waste disposal during operation 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)

6.2.5 Impact assessment and mitigation measures for LPG impact

6.2.5.1 LPG impact

Leakage of LPG can cause serious health risk to humans. LPG can affect the body when it is inhaled. Also, it may affect when it comes in contact with eyes or skin accidentally. Overexposure to LPG can cause fatigues, lightheadedness and sleepiness. Over exposure may also result in unconsciousness and death. Contact with the liquid may also cause frostbite and irritation and may even cause gangrene. LPG in gaseous form acts as a simple asphyxiant and a central nervous system depressant. In liquid form it may cause frostbite, as well as skin irritation. Toxicological data are meager, and no chronic systemic effects have been reported from industrial exposure.

6.2.5.2 Impact significance on LPG

Liquefied petroleum gas (LPG) is very flammable hydrocarbon gases and it can affect the workers when inhaled and when it comes in contact with eyes or skin accidentally. Therefore, the impact of LPG can be serious if it will not control properly.

The magnitude of impact from LPG will be "Medium".

The area of impact will be only within the area of factory compound. Therefore, the extent of the impact from LPG will be considered as "Low".

The period of impact occurrence will be within the project period and the duration of the impact by LPG considered as "Low".

According to magnitude, extent and duration of the impact, the impact characteristics will be "Medium". LPG is very flammable and can affect human health. The importance of impact by LPG will be "High".

Therefore, the impact of LPG using for operation of the Lluvia Confectionery factory will be high and the significance of the impact would be "Medium".

Table 6.14 Impact significance on LPG during operation period

Characteristics					
Magnitude	Extent	Duration			
2	1 (Low)	1 (Low)	Equivalent Characteristics	Importance	
(Medium)			2 (Medium)	3 (High)	Significance
Characteristics = 2+1+1 = 4			Significance = Characteristics x Importance		6(Medium)

6.2.5.3 Mitigation measures on LPG impact

LPG must be stored in adequate location wherein vessels or cylinders are suitably positioned having regard to the relevant codes of practice.

- LPG plant must be designed to be appropriate standards and be properly installed and commissioned by competent persons.
- Plant must be fitted with adequate safety and monitoring control devices and operated by the competent persons.
- Occupiers must notify the gas supplier of any structural or other changes which might affect gas installation.
- There must be a suitable program of maintenance and testing by the competent person.
- Plant must be identifiable and accessible for maintenance.
- Records of maintenance and tests must be kept.
- Precautions must be taken into account to prevent fire and explosion including appropriate protection of storage vessels.
- Installations must have appropriate security measures to prevent deliberate interference.
- Incidents involving death or hospitalization, fire or explosion or a significant release of LPG must be reported to the Authority and records of such incidents must be kept.

After mitigation measure, LPG impact will become less significant.

Table 6.14.1 after mitigation measures, impact significance by LPG during operation period

Characteristics					
Magnitude	Extent	Duration			
1 (Low)	1 (Low)	1 (Low)	Equivalent Characteristics	Importance	
Characteristics = 1+1+1 = 4			1 (Low)	3 (High)	Significance
			Significance = Characteristics x Importance		3 (Low)

6.2.6 Impact assessment and mitigation measures on human environment

6.2.6.1 Potential impact on human environment

a) **Potential impact on occupational health and safety**

The Lluvia Confectionary Factory project will use wheat flours and different kinds of foods products and quality improving ingredients as raw materials. Although water is not the primary ingredient in most confectionary, it plays a very important role in manufacturing, product quality, and shelf life. The use of these raw materials will have moderately significant adverse environmental impacts on ambient air and cause immediate air quality degradation and employees' health conditions unless properly handled. Therefore, the expected adverse pollution impacts from raw materials will be ambient air quality depletion and health effects on employees due to presence of dusts and particulate matters.

Employees' health hazard is high if the protective devices are not provided to them. 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 foods processing factory.

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. Mitigation measures are described in the next sections and on their working conditions.

b) **Potential impacts on social benefits**

After construction and during the operation and 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.

6.2.6.2 Impact significance on 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 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 "Low".

Therefore, the impact on residential area by the Lluvia Confectionery factory will be less and the significance of the impact would be "Low".

Table 6.15 Impact significance on health and safety during construction period

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)

b) Impact significance on socio- economic

The Lluvia confectionery factory is located inside the Yangon Industrial Zone, North Okkalapala Township but has a close boundary with Shwe-Pauk Kan Township and the nearest residential areas with the factory are ward 11, ward 12, and ward 15. 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 venders (or) influx of venders near the project area because the proposed project is located in the industrial zone.

6.2.6.3 Mitigation measures for human environment impact

Employees' health hazard will be high if protective devices are not provided to them. 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 foods processing factory. 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 cement dust.
- 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.

6.3 Environmental and social impacts during the decommissioning phase

The activity of **Decommissioning/Closure Phase** is related to the use of decommissioning equipment. **Decommissioning/Closure Phase** includes site clearing and some earth work activities.

6.3.1 Impacts assessment and mitigation measures on air quality

6.3.1.1 Potential 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.

6.3.1.2 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 Lluvia Confectionery factory demolition will be a little high and the significance of the impact would be “Medium”.

Table 6.16 Impact significance on air quality during decommissioning phase

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)

6.3.1.3 Mitigation measures for air quality

The following mitigation measures should be practiced to reduce potential dust and gaseous emissions into the environment.

- Ensure strict enforcement of on-site speed limit regulations.
- Avoid demolitions works in extremely dry weathers.
- Sprinkle water on graded access routes when necessary to reduce dust generation by

machines.

- Demolished materials on site to be covered to prevent to be blown off by wind
- Minimization of exhaust emissions.
- Air pollution from vehicles will be minimized by using low emission equipment and vehicles.
- Vehicle idling time shall be minimized.
- Alternatively, fueled construction equipment shall be used where feasible equipment shall be properly maintained
- 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.
- Minimizing dust from material handling sources by using covers.
- Optimize vehicle movements to eliminate unnecessary vehicle movements.
- Spraying water to minimize dust from vehicle movements.
- Prohibit burning of domestic waste on site.
- Ensure strict enforcement of on-site speed limit regulations.
- Avoid excavation works in extremely dry weathers.
- Sprinkle water on graded access routes when necessary to reduce dust generation by construction vehicles.
- 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.

Table 6.16.1 after mitigation measures, impact significance on air quality during 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)

6.3.2 Impact assessment and mitigation measures for noise and vibration

6.3.2.1 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.

6.3.2.2 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 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 Lluvia Confectionery factory will be a little high and the significance of the impact would be “Medium”.

Table 6.17 Impact significance on noise and vibration during decommissioning phase

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)

6.3.2.3 Mitigation measures on noise and vibration

The following mitigation measures should be used to reduce noise pollution.

- Machinery drivers and machinery operators should switch off engines of vehicles or machinery not being used.
- Schedule noisy decommission activities and transportation during day-time hours.
- Used good condition and insulated demolition machineries and other equipment should be used in good condition and insulated.
- Combine noisy operations at the same time, but avoid combinations of vibration
- Turn equipment off when not in use.
- 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.

Table 6.17.1 after mitigation measure, impact significance on noise and vibration during decommissioning period

Characteristics					
Magnitude	Extent	Duration			
1 (Low)	1 (Low)	Low(1)	Equivalent Characteristics	Importance	
Characteristics = 1+1+1 = 3			1 (Low)	Medium (2)	Significance
			Significance = Characteristics x Importance		2 (Low)

6.3.3 Impact assessment and mitigation measures on water quality

6.3.3.1 Potential impacts 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.

6.3.3.2 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 6.18 Impact significance on water quality during decommissioning phase

Characteristics					
Magnitude	Extent	Duration			
1 (Low)	1 (Low)	1 (Low)	Equivalent Characteristics	Importance	
Characteristics = 1+1+1 = 1			1 (Low)	1 (Low)	Significance
			Significance = Characteristics x Importance		1 (Low)

6.3.3.3 Mitigation measures for water resources

The following mitigation measures should be practiced and used to reduce potential impacts for water resources.

- Water should be used efficiently at the site by the workers carrying out decommissioning activities in order to avoid irresponsible water use.
- Soil erosion and sediment control mechanisms will add positive effects on mitigation matters for water pollution;
- Use leak proof containers for storage and transportation of oil and grease.
- Collect solid wastes in containers and disposed of properly.

6.3.4 Impact assessment and mitigation measures on waste disposal

6.3.4.1 Impacts on 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.

6.3.4.2 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 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 confectionery factory 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 Lluvia Confectionery factory demolition will be less and the significance of the impact would be "Medium".

Table 6.19 Impact significance on waste disposal 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)

6.3.4.3 Mitigation measures on waste disposal

The following mitigation measures should be used to reduce potential impacts for waste disposal:

- Solid wastes should not be dumped into the drain.
- Encourage waste sorting by the facility users.
- Develop a hazardous materials management plan addressing storage, use, transportation and disposal for each item.
- Provide separate bins for food waste, metal and other waste at the temporary camp and other facilities on site.
- Fuel storage facilities should be removed immediately upon completion of the decommissioning phase.
- Wastes can be recycled or disposed at the landfill.
- The hazardous wastes should be disposed with proper disposal method and caution.
- Train employees to promptly clean up any oil or hazardous material spill.

After mitigation measure, the impact on waste disposal will become less significant.

Table 6.19.1 after mitigation measure, impact significance on waste disposal during decommissioning period

Characteristics					
Magnitude	Extent	Duration			
1 (Low)	1 (Low)	1 (Low)	Equivalent Characteristics	Importance	
Characteristics = 3+1+1 = 5			1 (Low)	2 (Medium	Significance
			Significance = Characteristics x Importance		2 (Low)

6.3.5 Impact assessment and mitigation measures on human environment

6.3.5.1 Potential impacts 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.

6.3.5.2 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 the Lluvia Confectionery factory demolition would be "Low".

Table 6.20 Impact significance on occupational health and safety during decommissioning phase

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)

6.3.5.3 Mitigation measures for occupational health and safety

The project will implement the following mitigation measures for Occupational Health and Safety:

- Initial job trainings relevant to the assignments should be offered for the relevant staff
- All workers will be provided with personal protection equipment (PPE) and will be obliged to wear them in work zones
- Particular works shall strictly follow work permit scheme
- Promote safe and healthy working environment, health, and well-being of all employees.
- 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.
- 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.

After mitigation measure, the impact on occupational health and safety will become less significant.

Table 6.21 after mitigation measure, impact significance on occupational health and safety during 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 Addressing Unemployment: Impacts and Mitigation Measures for displaced factory Workers in the confectionery factory due to closure of the proposed factory

6.4.1 Possible Impacts

The closure of a confectionery factory can have significant impacts, particularly for the workers directly affected by unemployment. There can be four potential impacts of factory closure on workers:

1 **Economic impact (Financial Hardship):** Closure of the factory can lead factory workers to face immediate financial difficulties due to loss of income, impacting their ability to meet basic needs. Mitigation: Implement financial assistance programs such as severance packages, unemployment benefits, or job retraining initiatives to support workers during the transition period.

2 **Psychological Impact** (**Emotional Stress):** Job loss can lead to emotional distress, anxiety, and a sense of uncertainty about the future for workers and their families.

3 **Skill Development and Reemployment (Skill Mismatch):** Workers may find it challenging to secure new employment if their skills are specialized to the confectionery industry. The factory workers may lack the skills needed for alternative employment opportunities, hindering their ability to find new jobs.

4 **Social Impact (Community Economic Downturn):** The factory closure may contribute to a broader economic downturn in the community, affecting local businesses and services. Unemployment may strain familial relationships and community dynamics, leading to social isolation and reduced social cohesion.

6.4.2 Mitigation Measures

1. **Financial Support:**
   - Establish a severance package to provide financial assistance to employees immediately after the closure.
   - Collaborate with government agencies and NGOs to create a fund for retraining and financial aid for affected workers.
2. **Counseling and Mental Health Services:**
   - Offer counseling services to help employees cope with the emotional stress of job loss.
   - Provide workshops on resilience, stress management, and future career planning.
3. **Retraining and Skill Development:**
   - Develop and implement retraining programs to equip workers with skills relevant to other industries.
   - Collaborate with local educational institutions for specialized training in areas with high demand. Provide vocational training, education grants, and apprenticeship programs to help workers acquire relevant skills and transition into new roles or industries.

4. **Community Support Programs:**
   - Establish community support programs to assist families affected by the closure.
   - Encourage local businesses to create job opportunities through targeted hiring initiatives.

5. **Communication and Transparency:**
   - Maintain transparent communication with workers throughout the closure process, keeping them informed about support services and available resources.
   - Establish a feedback mechanism to address concerns and improve mitigation strategies based on worker input.
   - By implementing these mitigation measures, the adverse effects of post-closure unemployment for confectionery factory workers can be minimized, fostering a smoother transition for both individuals and the community at large.

Chapter 7

Cumulative Impact Assessment

7. Cumulative impacts

7.1 Cumulative impact assessment

Cumulative impacts typically refer to those effects on local communities and ecosystems which result from incremental direct and indirect effects from the proposed project as well as added contributed effects from other projects or actions at and around the same projected site area.

As the proposed project is located in the industrial zone, there are some other factories in the surrounding area of the proposed project. According to the onsite surveys, most of the factories within 2 km of the Lluvia Confectionery Factory are garment factories and fertilizer factory.

The cumulative effects in relation to existing activities at the local environment were reviewed and assessed for significance.

The following table 7.1 shows the factories including Lluvia Confectionery Factory located in the Yangon Industrial Park.

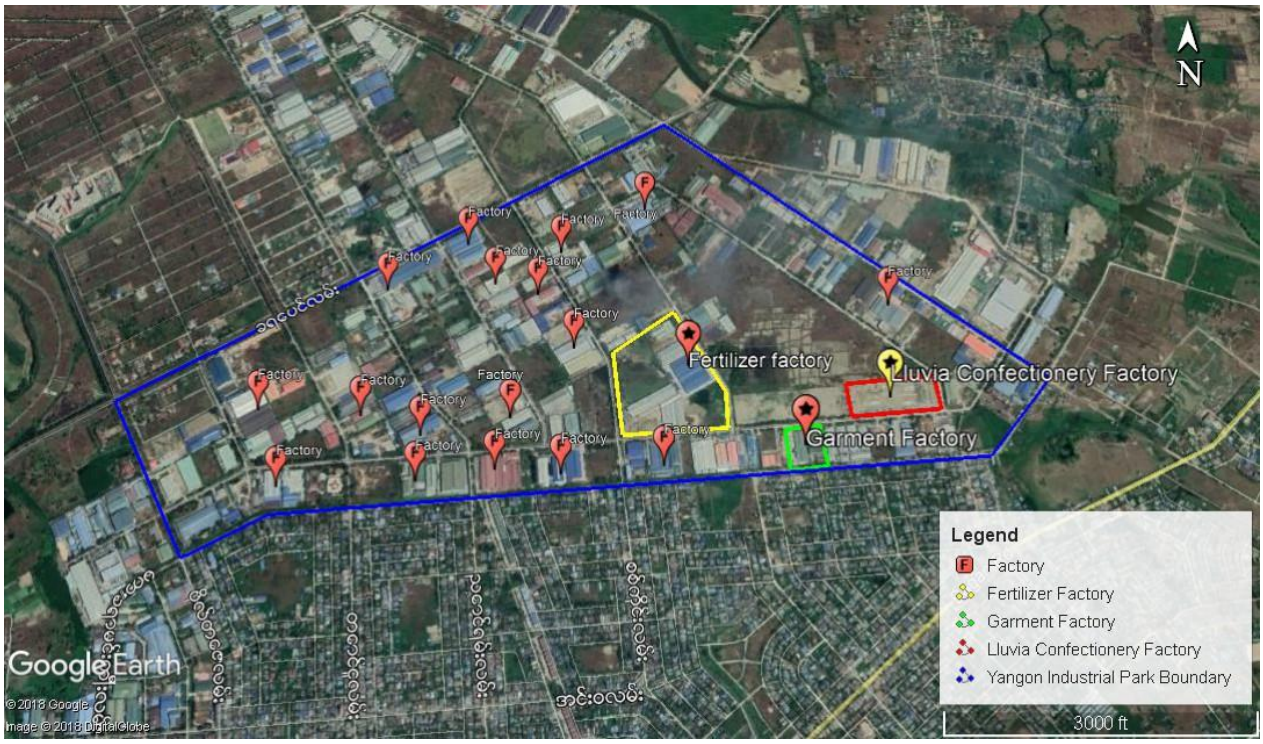


Figure 7.1: Lluvia Confectionary Factory with nearby factories located

7.2 Cumulative impact on air quality

There will be cumulative increase in air quality as other projects such as garment factory and fertilizer factory located in the surrounding area of the proposed Lluvia Confectionery Factory. Cumulative impacts refer to the incremental effect of several projects that may have an individually minor, but collectively significant, impact on air quality.

7.3 Cumulative impact on noise quality

Cumulative noise impacts are considered for the proposed Lluvia Confectionery Factory and other existing industries in the vicinity. The cumulative noise impact at a residence is the noise received at that residence when two or more of the industries are operating simultaneously. The noise generated from the proposed factory and the process of other industries would increase noise level.

7.4 Cumulative impact on water quality

The Lluvia Confectionery Factory is currently used the water from both tube wells and public supply. Total water usage of the project site is 170 m3/day (37,390 gallons/day) for the operation phase and there will be a cumulative increase in water usage. The Lluvia Confectionery Factory, itself, including its wastewater treatment plant will treat wastewater from domestic and industrial purposes. Therefore, the cumulative impact on water usage and water quality is concerned as non-significant cumulative effect.

7.5 Cumulative impact on traffic

There will be a cumulative increase in automobile and truck traffic in the vicinity of Lluvia Confectionery Factory as a result of existing other factories. It will be expected there will be an increase number of vehicles at the main road during the hours of 8:00 a.m. to 5:00 p.m. However, based on the existing infrastructure, it is more than adequate to handle the increased number of vehicles. Therefore, the cumulative impact in terms of "congestion" is negligible.

7.6 Cumulative impact on solid waste and wastewater

The solid wastes collected are sent to dump sites approved by Yangon Township Municipality. However, the impact of waste disposal from Lluvia Confectionery Factory would likely to be moderately contribute the incremental effects of various activities of the other factories running in the industrial zone.

The cumulative effect of wastewater disposal is limited to the construction phase of the project. The wastewater generated during the operation phase of the project will be recycled in the treatment plant.

Chapter 8
Environmental Management Plan

8. Environmental management plan (EMP)

8.1Introduction

Proper implementation of a comprehensive Environmental Management plan (EMP) will ensure that the proposed Lluvia (confectionary) production meets regulatory and operational performance (technical) criteria. This section describes the modalities provided in the project for the implementation of the proposed mitigation measures to its potential negative impacts.

It proposes the institutional responsibilities for the implementation of the mitigation measures, the implementation indicators, and the time frame for monitoring and follow-up for the implementation activities. Environmental Management Plan for each phase (Construction phase, operation phase and demolition phase) provides specific environmental guidance for each activity of a project. The intention of the Environmental Management Plan is to ensure that activities borne from the construction, operation and demolition phase of the project are managed and mitigated in order to ensure that the impacts will be within applicable national standards.

8.2 Objectives of the environmental management plan

Environmental Management Plan (EMP) for all the identified environmental impacts during construction and operational stages of biscuit production of Lluvia is prepared to ensure that sufficient procedural measures are in place to reduce and minimize associated adverse impacts to acceptable or manageable levels.

This environmental management plan aims at recommending improvements to management structures and procedures to ensure that future management recognizes the impacts assessed in this**.** The strict implementation of the EMP and project management's strict enforcement of the adequate construction practices and standards will greatly reduce the negative impacts of the Project.

Environmental and social consultants if necessary, will be engaged to support EMP implementation including monitoring. Mitigation measures presented in the following tables [**Table 8.1** for construction phase, **Table 8.2** for operational phase, **Table 8.3** for decommissioning phase] for all three phases are recommended for the impacts specified for the project.

8.3 Organizational structure and responsibilities

The Lluvia confectionery factory has to assign HSE team to accomplish environmental controls, mitigation measures and monitoring process throughout the entire project. This section also defines the roles and responsibilities of various entities for the Lluvia confectionery 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.

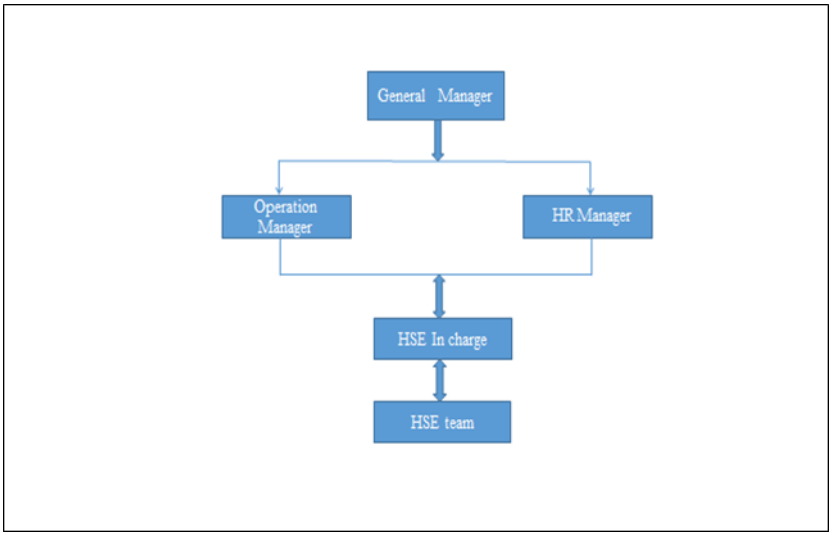


Figure 8.1 Organizational Structure of HSE team

(i) 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 8.1 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.

8.4 Environmental and social management plan

Environmental and Social Management Plan Measures are prepared by the following three tables:

Table 8.1 for construction phase, **Table 8.2** for operational phase, **Table 8.3** for decommissioning phase.

8.4.1 Environmental and Social Management Plan for Construction Phase

The necessary objectives, activities, mitigation measures, and allocation of costs and responsibilities pertaining to prevention, minimization and monitoring of significant negative impacts and maximization of positive impacts associated with the construction phase.

Table 8.2: Environmental and Social Management Plan Measures for the 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 the construction phase	Monitoring Report
			2.1.1.2 Construction machinery and vehicles will undergo periodic maintenance to keep them in good working condition.		Construction machinery and vehicles will undergo periodic maintenance to keep them in good working condition.			
			2.1.1.3 Turn equipment off		Turn equipment off when not in			

Environmental Factors/Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
			when not in use.		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 the 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 rainstorms	Construction team and/or HSE team	Throughout the construction phase	Monitoring Report
		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	4.1.1 Contaminate to	4.1.1.1 Managed construction	Low	Managed construction	Construction team and/or	Throughout the	Monitoring Report

Environmental Factors/Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
	construction activities	the environment (surface and ground water), and may be vector for disease	materials in a way to avoid over-ordering, poor storage and maintenance, mishandling as well as improper operation		materials in a way to avoid over-ordering, poor storage and maintenance and improper operation	HSE team	construction phase	
			4.1.1.2 Separate construction wastes into reusable items and materials to be disposed of or recycled whenever possible.		Separate construction wastes into reusable items and materials to be disposed 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 the construction phase	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		Regular inspection and maintenance of			

Environmental Factors/Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
			pollution control		pollution control			
6.Socio-economic	6.1 Project operation activities	6.1.1 Job opportunities for local people 6.1.2 Increasing government revenue		Positive	Community meetings	Construction team and/or HSE team	Throughout the construction phase	Meeting notes

8.4.2 Environmental and Social Management Plan for Operational Phase

The necessary objectives, activities, mitigation measures, and allocation of costs and responsibilities pertaining to prevention, minimization and monitoring of significant negative impacts and maximization of positive impacts associated with the operational phase.

Table 8.3: Environmental and Social Management Plan Measures for the Operational Phase

Impact	Project Activities/ Environmental Aspects	Proposed Mitigation Measure	Monitoring		
			Implementation	Supervision	Report
Air Quality	**Fugitive emissions from production operations such as raw material extraction Processing plant, vehicles, backup generator, etc.**	• **Ensure that the whole plant is suitably covered to limit / prevent the windblown dusts from dispersing.** • **Regular cleaning should be performed in order to remove dust that have accumulated within the plant.** • **An air pollution control system shall be installed in in areas where the source of the emissions has been identified.** • **Prohibit open burning of any waste at project site.**	**The Operation Manager/ HSE officer will:** • **Ensure proper working condition of vehicles and equipment.** • **Ensure daily inspects the site.** • **Ensure that regular dust suppression activities are performed on a regular basis.** • **Educating drivers and vehicle operators to stop engine idling.** • **Education and training programs with competitions to encourage all employees to**	**Project Management Team on site and/or Designated HSE Team**	**Weekly report on general working condition** **Biannually air quality report**

Impact	Project Activities/ Environmental Aspects	Proposed Mitigation Measure	Monitoring		
			Implementation	Supervision	Report
		• Careful use of energy efficient equipment and tools. • Actively seeking cleaner technologies and investing in less polluting technologies. • Storage of crushed raw materials in covered or closed bays. Collecting dust and other impurities from the air by using dust filter or filter-cleaning system. • Use of dust extraction and recycling systems to remove dust from work areas, especially in grinding mills. • Use of air ventilation in packing areas. • Ensure that all machines are maintained in accordance with manufacturer's recommendations. • Consider the use of low-emission generator engines. • Spray water onto the ground to control dust. • Plant long trees around the project area to control air pollution (a green belt) • Storage of waste-derived fuels in areas protected from wind and other weather conditions. • Use of enclosed belt conveyors for materials transportation and	actively participate in energy saving. • Ensure that all trucks hauling soil are adequately protected. • Keep records of all the incidents and maintenance history of the equipment. • Make sure that safe working conditions are provided for the workers. Ensure daily inspects the housekeeping of the area. • Systematic arrangement of delivery operation schedules and times. • Storage of waste-derived fuels in areas protected from wind and other weather conditions. • Inspect and evaluate all the safety aspects of the production activities. • Ensure the PPE provided are appropriate for the activity and meets the standards specifically mentioned for the activities. • Assure the provision of proper PPE for the workers. Report the incidents if any.		

Impact	Project Activities/ Environmental Aspects	Proposed Mitigation Measure	Monitoring		
			Implementation	Supervision	Report
		emission controls at transfer points. • Careful selection and use of environmentally friendly and low emission vehicles. • Appropriate management of project traffic. Systematic arrangement of delivery operation schedules and times. • Educating drivers and vehicle operators to stop engine idling. • Education and training programs with competitions to encourage all employees to actively participate in energy saving. • Discouraging the common practice of burning the any waste in the field, and encouraging biodegradation. • Placing a buffer zone with a garden or with a man-made forest between residential areas and project operation zones. • Periodical monitoring of air pollutants and if values exceed the standard limits, suitable mitigation measures will be taken			

Impact	Project Activities/ Environmental Aspects	Proposed Mitigation Measure	Monitoring		
			Implementation	Supervision	Report
Noise Quality	Industrial activities and vehicle load-unload	• All Carryout regular maintenance of the equipment to minimize the noise level. • Ensure use of mufflers on diesel/gas driven machinery. • Using enclosure for all generator sets. • Use low noise equipment. • Carry out periodic monitoring of noise levels, if values exceed the standard limits, suitable mitigation measures to be taken. • Develop green belt to act as a noise barrier. • Establish a grievance mechanism as part of a stakeholder engagement plan. • Schedule operation of noisy equipment at different times. • Schedule noisy operation activities and transportation during day-time hours. • Turn equipment off when not in use. • Training to personnel will be imparted to generate awareness about effects of noise and importance of using PPEs. • Traffic control measures to be	The Operation Manager/ HSE officer will: • Noise generating sources and their platforms will be maintained properly to minimize noise vibrations generated by them. • Report the incidents if any.	Project Management Team on site and/or Designated HSE Team	Weekly report on general working condition Biannually noise quality report

Impact	Project Activities/ Environmental Aspects	Proposed Mitigation Measure	Monitoring		
			Implementation	Supervision	Report
		enforced strictly. • Vehicular trips should be performed only during daytime hours in order to limit the impacts of any increased noise generated. • Consultation with nearby residential areas if extreme levels of noise are predicted.			
Water Resources	Spills/ leaks from Fuel Equipment and Vehicles Paints, Thinner, Oils and Lubricants. Spills from the use of cleaning materials used and water used. Improper anagement of waste, sewage water and storm water/rainwater.	• If any machines/vehicles/equipment are found to have any leaks they should not be used. • No maintenance (where practicable) of equipment should be performed onsite that can potentially contaminate the soil and groundwater. • Promote recycling and reuse of water as much as possible. • Proper recycling of water from other uses for sprinkling dusty pavements • Promptly detect and repair of water pipes and tank leaks. • Quick fixing of leaking pipes. • Ensure taps are not running when not in use. • Promote awareness to employees on water conservation and reducing water wastage	The Operation Manager/ HSE officer will: • Ensure regular visual checks for any leaks that may be present. • Promptly detect and repair of water pipes and tank leaks. • Quick fixing of leaking pipes. • Ensure that all storm drains are cleared of debris so as to ensure free flow of water. • Ensure that all septic tanks' capacity is adequate and impervious to leaks. • Ensure that waste management plan is implemented. • Report the incidents if any.	Project Management Team on site and/or Designated HSE Team	Weekly report on general working condition Biannually water quality report

Impact	Project Activities/ Environmental Aspects	Proposed Mitigation Measure	Monitoring		
			Implementation	Supervision	Report
		• Raw materials should be properly stored under the roof to prevent dumping into the water courses in the rainy season. • Installing water efficient toilets and shower heads. • Users to conserve water e.g. by avoiding unnecessary toilet flushing. • Treat drainage system for sediment control. • Store, dispose and clean up all diesel and hazardous materials according to the procedures. • Preventing leaks and spills. • Install water conserving taps that turn-off automatically when water is not being used. • Reuse of treated grey water for dust control and plant watering. • Proper management of storm water. • 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. • Conducting regular training,			

Impact	Project Activities/ Environmental Aspects	Proposed Mitigation Measure	Monitoring		
			Implementation	Supervision	Report
		monitoring, and inspection schemes together with keeping track of water uses minimizes waste and leaks from faulty connections and faucets. • The storage of fuel should be in a dedicated area provided with drip trays / walls with impermeable flooring. • Good and adequately maintained drainage to facilitate run-off and minimize the likelihood of • flooding.			
Soil Quality	Improper waste management from industrial activities. Improper waste management from industrial activities.	• Ensure only well-maintained equipment and vehicles used for the operation phase. • Hygienic sanitary facilities and sewerage system. The toilets and domestic waste water will be collected through a common sewerage. The minimum number of toilet facilities required is one toilet for every ten persons. • Store inorganic wastes in a safe place within the site and clear organic wastes on daily basis to waste collector or compost the waste • Daily inspection of the project site	The Operation Manager/ HSE officer will: • Daily visual inspection of storage areas for leaks from containers, completion of log. • Perform the visual inspections and complete the relevant log. The logs are the proof that the inspections have been performed. • Waste generation from each project activities will be recorded. • Perform the visual inspection of the waste containers and complete the relevant log. The	Project Management Team on site and/or Designated HSE Team	Yearly report on general condition

Impact	Project Activities/ Environmental Aspects	Proposed Mitigation Measure	Monitoring		
			Implementation	Supervision	Report
		and completion of logs. • Ensure liners are been under fuel storage tanks. • Ensure the stored wastes (e.g. empty / used paints and thinner) are properly collected and handled by the authorized personnel daily. • Hazardous-materials handling procedures to reduce the potential for a spill and will include an emergency response program to ensure quick and safe cleanup of accidental spills. • Water based chemicals are preferred. • Vegetate in some areas immediately to avoid soil erosion. • Waste management for the Project should be developed that sets out plans and actions for operational waste.	logs are the proof that the inspections have been performed. • Ensure all the hazardous waste are in secured area followed by the instruction showed in label. • Train employees to promptly clean up any oil or hazardous material spill. • Ensure site boundaries will be strategically placed in order to minimize surface runoffs especially during the monsoon season. • Daily visual inspection for incorrectly stored containers. • Make sure proper housekeeping is done throughout the site. • Inspect weekly the storage areas for the assurance of the spill/leak proof system • Complete the incident report should any leak occur. • Maintain all the records of the logs. • Report the incidents if any.		

Impact	Project Activities/ Environmental Aspects	Proposed Mitigation Measure	Monitoring		
			Implementation	Supervision	Report
Waste	Waste generation and disposal of the project site including solid waste, liquid waste and hazardous waste.	• Maintain drains regularly as and when required. • Solid wastes should not be dumped into the drain. • Blocked drains should be cleaned properly and debris disposed at approved sites. Conduct regular inspections for drainage pipe blockages or damages and fix appropriately. • Ensure regular monitoring of the sewage discharged from the project. • Ensure sufficient number of proper sanitary facilities provided for employees. • Ensure that all trash containers in the plant are properly sealed at all times to prevent waste being blown and scattered. • Encourage waste sorting by the facility users. • Provide separate bins for food waste, metal and other wastes at the staff quarters and other facilities on site. • Collect non-hazardous solid wastes for recycling or disposal at landfill. • Setting up of separate waste collectors at different points. • Regular cleaning and replacing	The Operation Manager/ HSE officer will: • Ensure all the hazardous waste are in secured area followed by the instruction showed in label. • Produce the log template for checking the waste disposal compliance. • Waste generation from each production process will be recorded. • Ensure that any waste is disposing correctly way. • Perform the visual inspection of the waste containers and complete the relevant log. The logs are the proof that the inspections have been performed. • Train employees to promptly clean up any oil or hazardous material spill. Education and training programs with competitions to encourage all employees to actively participate in 4Rs.	Project Management Team on site and/or Designated HSE Team	Weekly report on general condition

Impact	Project Activities/ Environmental Aspects	Proposed Mitigation Measure	Monitoring		
			Implementation	Supervision	Report
		of waste collectors. • Avoid contamination of the surrounding environment by maintaining machines equipment and vehicles regularly and handling of fuel and lubricants with caution. • Avoid leaks, spills or accidental releases into the soil, surface water and ground water resources by proper storage, handling and transport of hazardous materials. • Education and training will be offered to all factory employees and reward for innovative reduction and recovery approaches will be given to company departments in monthly competitions. Train employees to promptly clean up any oil or hazardous material spill.			
Ecological Resource	Project operation activities	• Re-greening in the housing area within project site will be carried out to compensate the vegetation loss in the operation phase. • Consider use of indigenous species in revegetation. Contractors and personnel will not be allowed off site where they could cause unnecessary disturbance to vegetation or wildlife.	The Operation Manager/ HSE officer will: • Develop green area in the project compound. Ensure Environmental management procedures shall be developed before the start of the operation work.	Project Management Team on site and/or Designated HSE Team	Not directly applicable to the proposed project, however, during the decommission phase, need to report.

Impact	Project Activities/ Environmental Aspects	Proposed Mitigation Measure	Monitoring		
			Implementation	Supervision	Report
Occupational Health and Safety	- Fugitive emissions from production operations such as raw material extraction. - Exposure to solid waste, liquid waste and hazardous waste. Dust from soil disturbances and vehicle movement. Emission from the production activities. - Impairment of hearing capacity due to the exposure to high noise levels.	• All measures related to safety such as 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 cement dust. • 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.	The Operation Manager/ HSE officer will: • Ensure the PPEs provided are sufficient / appropriate for the particular work. • Ensure that regular dust suppression activities are performed on a regular basis • No unnecessary blowing of horns at any time • Ensure PPEs are in stock. Ensure proper working schedule for all employees.	Project Management Team on site and/or Designated HSE Team	Weekly report

Impact	Project Activities/ Environmental Aspects	Proposed Mitigation Measure	Monitoring		
			Implementation	Supervision	Report
		• 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. • Regular medical hearing ability test should be done for the employees working near the high noise level			

Impact	Project Activities/ Environmental Aspects	Proposed Mitigation Measure	Monitoring		
			Implementation	Supervision	Report
Liquified Petroleum Gas (LPG)	Use of LPG plant	• Check and test the LPG plant to prevent fatigue of pipeline or supporting structure or holding structure, pipeline and flange leaks, vapor lock, cavitation, corrosion due failure of cathodic protection, stress – corrosion cracking, thermal expansion, cyclic stress, structural failure and over pressurizing pipe system. • LPG must be stored in adequate location wherein vessels or cylinders are suitably positioned having regard to the relevant codes of practice. • LPG plant must be designed to appropriate standards and be properly installed and commissioned by competent persons. • Plant must be fitted with adequate safety and monitoring control devices and operated by competent persons. • Occupiers must notify the gas supplier of any structural or other changes which might affect the gas installation. • There must be a suitable program	The Operation Manager/ HSE officer will: • Ensure that plant is fitted with adequate safety and monitoring control devices and operated by competent persons. • Ensure a suitable program of maintenance and testing LPG plant by competent person. • Ensure that precautions are taken to prevent fire and explosion including appropriate protection of storage vessels. • Ensure that LPG plant is identifiable and accessible for maintenance. • Ensure to maintain records of maintenance and tests. Report the incidents if any.	Project Management Team on site and/or Designated HSE Team	Weekly report

Impact	Project Activities/ Environmental Aspects	Proposed Mitigation Measure	Monitoring		
			Implementation	Supervision	Report
		of maintenance and testing by competent person. • **Plant must be identifiable and accessible for maintenance.** • **Records of maintenance and tests must be kept.** • **Precautions must be taken to prevent fire and explosion including appropriate protection of storage vessels.** • **Installations must have appropriate security measures to prevent deliberate interference.** • **Incidents involving death or hospitalization, fire or explosion or a significant release of LPG must be reported to the Authority and records of such incidents must be kept.**			

8.4.3 Environmental and Social Management Plan for Decommissioning Phase

The necessary objectives, activities, mitigation measures, and allocation of costs and responsibilities pertaining to prevention, minimization and monitoring of significant negative impacts and maximization of positive impacts associated with the decommissioning phase.

Table 8.4: Environmental and Social Management and Monitoring Measures for the 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		Optimizing vehicle movements to eliminate unnecessary vehicle movements.			

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Record
			movements.					
			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	Throughout 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			

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Record
					in noisy areas			
3. Water Quality	3.1Demolition activities	3.1.1Accumulating the demolition materials which cause deterioration of water quality (such as clay, plaster, limestone, concrete, mercury in the nearby water course)	3.1.1.1Efficiently using water at the site for carrying out decommissioning activities	Low	• Efficiently using water at the site for carrying out decommissioning activities in order to avoid irresponsible water use.	Construction team and/or HSE team	Throughout project duration	Monitoring report
			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	Throughout 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		• Removing fuel			

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Record
			fuel storage facilities immediately upon completion of decommissioning phase.		storage facilities immediately upon completion of decommissionin g phase.			
			4.1.1.4 Recycling or disposing at the landfill		• Recycling or disposing at the final disposal 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 5.1.2 Accidents and injuries to workers by heavy vehicle movement for transport of materials and equipment	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	Throughout project duration	Incident Record
			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			

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Record
6. Socio-economic	6.1Project demolition activities	6.1.1 Job opportunities for local people		Positive		Community meetings	Throughout project duration	Meeting note

8.5 Environmental, Social, and Health Impacts and Monitoring Measures Table 8.5 Monitoring plan for environmental, social and health

Factors	Index/ Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location	Responsible Person	Remark
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,	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)	**LPG Tank (Location 1)** 16◌°56' 42.54" N 96◌° 11'43.47" E **Inside the factory building (Location 2)** 16◌°56' 42.10" N 96◌° 11'40.33" E **Downwind of the project site (Location 3)** 16◌°56' 40.65" N 96◌° 11'46.11" E **The project compound (Location 4)** 16◌°56' 40.34" N	•HSE In charge of Or -3rd party	• EQM Co.,ltd already surveyed the upwind, downwind and the project sites of the factory. • The current existing monitoring measures are sufficient to reveal the existing situation. • The upwind location provides the data on the project site's background air quality which is less likely , affected by lthe project activities.

Factors	Index/ Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location	Responsible Person	Remark
		2012		96◌° 11'33.28" E		• The Downwind location provides the data for the assessment of the impact likely affected by the project activities including local emissions sources, such as industrial facilities, traffic, or urban areas, on air quality. • Furthermore, When the operation starts, air monitoring will be carried out at the selected locations which can represent the air pollution sources of the factory
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-	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)	**LPG Tank(Location 1)** 16◌°56' 42.54" N 96◌° 11'43.47" E **Inside the factory building (Location 2)** 16◌°56' 42.10" N	HSE Incharge Or (3rd party)	• EQM Co.,ltd already surveyed noise monitoring measures biannually during operation and decommissioning phase. • And this noise monitoring plan will

Factors	Index/ Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location	Responsible Person	Remark
		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 Conservation Law, 2012		96◌° 11'40.33" E **Downwind of the project site (Location 3)** 16◌°56' 40.65" N 96◌° 11'46.11" E **The project compound (Location 4)** 16◌°56' 40.34" N 96◌° 11'33.28" E		cover efficiently the noise impact likely affected by the factory since the locations are selected to represent the noise sources. Being the operation phase is not started, noise locations will be closely selected when the factoryoperation is running.,
Effluent	Physical parameters: pH Temperature Color Turbidity Total dissolved solids Conductivity Iron Hardness Alkalinity	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	**For Potable Water**, (GW1), 16°56'42.30"N, 96°11'40.23"E (GW2) 16°56'42.92"N, 96°11'41.61"E (GW3) 16°56'39.21"N, 96°11'37.59"E **For wastewater,**	• HSE Incharge or 3rd party	• EQM Co.,ltd already surveyed the upstream and downstream sites of the factory. • The current existing monitoring measures are efficient to reveal the existing situation. • In terms of the baseline study, surface water

Factors	Index/ Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location	Responsible Person	Remark
	Chloride Dissolved Oxygen BOD COD Nitrate-Nitrogen Arsenic Copper Cadmium Zinc Sulphate			(SW1) 16°56'42.31"N, 96°11'39.87"E (SW2) 16°56'40.36"N, 96°11'45.75"E		nearby the factory,two tube wells and one tank water were monitored . And two drainage outlets were collected and tested accordingly. Being the operation phase is not started, effluent locations will be closely selected when the factoryoperation is running.,
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**	• All wastes generating from the factory will be disposed by the municipal under Yangon City Development Committee, (YCDC) once a week.
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**	• The factory will take into account the impacts and complaints coming out from local communities community through grievance mechanism.

Factors	Index/ Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location	Responsible Person	Remark
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 by HSE Coordinator. • Scrutinize the current	• 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**	• The factory will take proper on-site monitoring program to assess occupational health and safety hazards and risks for the workers during construction phase.

Factors	Index/ Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location	Responsible Person	Remark
		environmental plan				

8.6 Budgets and responsibilities for monitoring

The management plan will use the 2% of the total investment (21,170,601 USD). Among the budget 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. The estimated cost for the monitoring plan will be (40 %) of the total.

Table 8.6 Budgets and responsibilities for environmental monitoring

Environmental Factors	Index/ Parameters	Responsibility	Estimated Budget (MMK)
Operation phase			
Air Quality	• PM-10 • PM-2.5 • NO2, • SO2 • CO • Ozone	3rd party Environmental Consultant	**28,227.468 USD** **air monitoring**
Noise	• Leq24 hr. • Lmax • Ldn	3rd party Environmental Consultant	**28,227.468 USD** **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	**28,227.468 USD** **effluent monitoring**
Hazardous and Non-hazardous waste	• Manifest Disposal and Tracking Report	3rd party Environmental Consultant	**28,227.468 USD (monitoring)**

Environmental Factors	Index/ Parameters	Responsibility	Estimated Budget (MMK)
Community Health and Safety	• Complaint • Monitoring and solving	3rd party Environmental Consultant	**28,227.468 USD (monitoring)**
Public and Occupational health and safety	• Accidental statistics • cause of accidents • Mitigation measures	3rd party Environmental Consultant	**28,227.468 USD (monitoring)**

8.7 EMP Budget for the mitigation measures

The management plan will use the 2% of the total investment (21,170,601 USD). 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.

Table 8.7 Budget allocation for Environmental Management Plan

Environmental Factors	Activities	Responsibility	Estimated Budget
Operation phase			
Air Quality + Odor	Air/ Quality +Odor Management (Air monitoring plan + Mitigation measure)	HSE Team	70,568.67 USD
	Air/Odor Monitoring plan		
	Air/Odor Mitigation measure		
Noise Pollution	Noise Management Plan	HSE Team	70,568.67 USD
	Noise Monitoring plan		
	Noise Mitigation measure		
Solid Waste	Solid Waste Management Plan	HSE Team	70,568.67 USD
	Solid Waste Monitoring plan		
	Solid Waste Mitigation measure		

Environmental Factors	Activities	Responsibility	Estimated Budget
Surface Water/Ground Water	Water/ Quality (Surface water and ground water)	HSE Team	70,568.67 USD
	Water Quality monitoring plan		
	Water Quality Mitigation measure		
Occupational Health and Safety	Occupational Health and Safety	HSE Team	70,568.67 USD
	OHS monitoring plan		
	OHS Mitigation measure		
Community Health and Safety	Community Health and Safety	HSE Team	70,568.67 USD
	Community Health and Safety monitoring plan		
	Community Health and Safety Mitigation measure		

Chapter 9
Emergency Response Plan

9. Emergency response plan

9.1 Introduction

This chapter describes the strategy how to manage all possible emergencies along with actions required and 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 production phase of Lluvia Confectionery Factory. Moreover, it will give guidance on actions and lines of communication in the event of an emergency and outline the respective responsibilities of the Lluvia Confectionery Factory and Health and Safety (HSE) contractor/Manager.

The objective is to prepare the resources (personnel and equipment) available to respond accidents all which can be resulted by the Lluvia Confectionery Factory's activities, emergency situations (spill, fire, security incident, medical evacuation) and major disasters 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 Confectionery Factory, in general, there should be either Emergency response in charge or HSE manager and Response Team for the emergencies. The team should be 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
- Factory 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 equipment
- Supporting of first aid equipment
- 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.

The potential emergencies that likely occur at the Lluvia Confectionery Factory:

- LPG gas leak
- Fire/ Explosion
- Chemical exposure
- Workplace accidents/ Injury

9.2 Emergency policy

The Lluvia confectionary factory needs to establish policies and oversee all matters of operation of these factory's activities. If as an emergency may occur at any time and, in all likelihood, without warning, it is essential to have policies and procedures in place to assure the orderly operation and recovery of the factory.

- The established policies and procedures will be set up together with roles and responsibility for making decisions and taking actions.
- Thus, emergency management plans described in the above sections should lie with either an emergency service in charge or the factory's designee and the onsite response team

9.3 Organization of emergency team

Phase I Emergency team shall be formed with senior persons available in shift and/or trained or experienced with environmental management issues. This team shall be constituted with Factory Shift- In charge (for factory emergencies) as Emergency response in charge/Site Incident Controller and pilot on duty. The numbers of the in charge will depend on the factory's decision and its capacity. The Workplace Health and Safety representative shall be designated.

Phase II Emergency team lead by emergency service in charge shall be formed with the response team occupying action group.

Phase III Emergency team shall be organized immediately in order to be well prepared to respond the emergency events that can happen either unexpectedly or accidently.

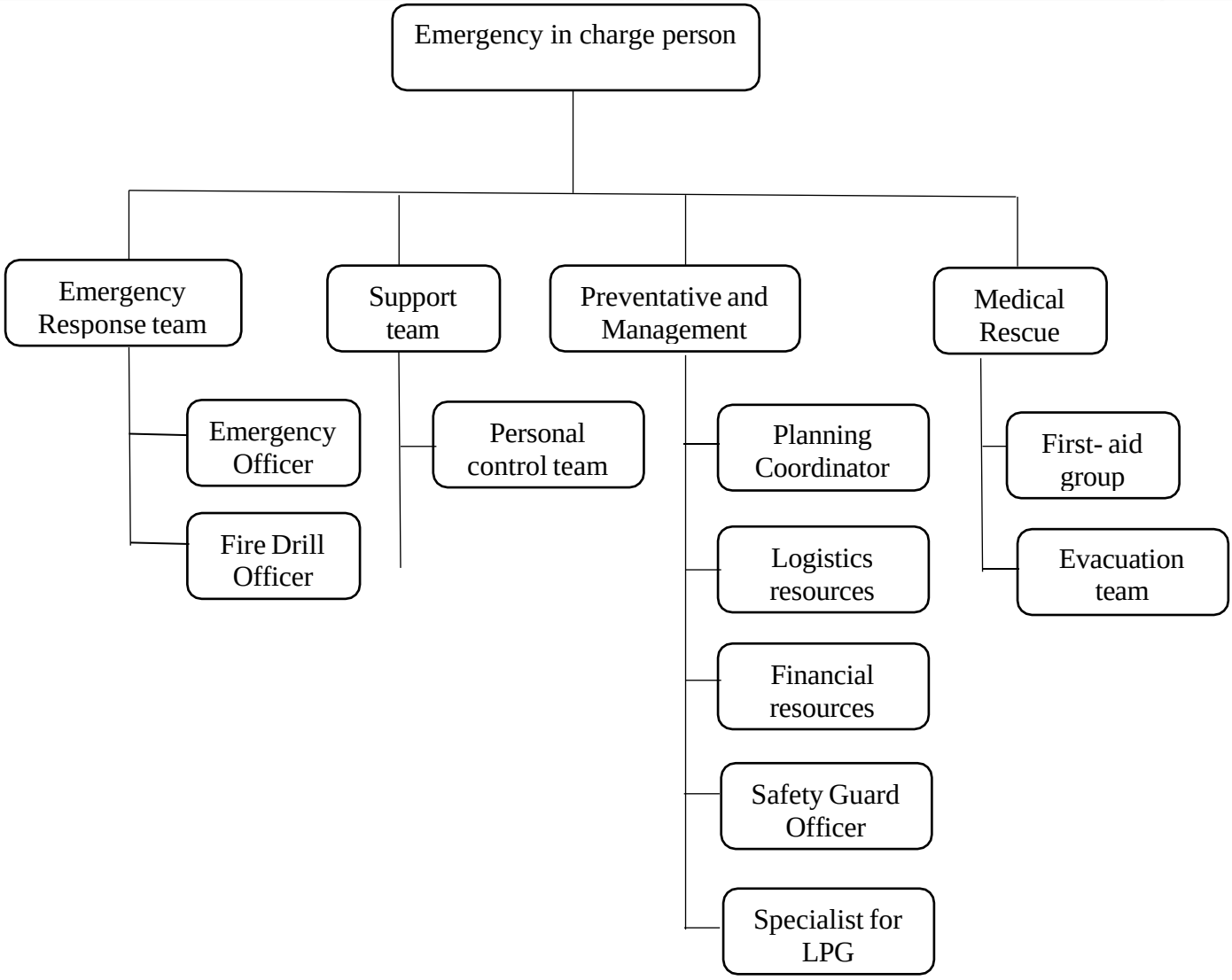


Figure 9.1 Organization chart for emergency team

9.3.1 Emergency response procedure

Before preparing a procedure, a risk assessment will be carried out for estimating how likely it is for an emergency event to occur and if it does, how serious or damaging the consequences would be. The emergency procedure should provide an appropriate and proportionate response to this situation.

9.3.2 Reporting an emergency

The person who discovered an emergency case shall immediately inform the Factory Manager. Whenever there is an imminent or emergency situation, the building must immediately:

1. Activate facility alarms or communications systems to notify personnel to evacuate the building.
2. Notify the relevant department using the following outline:
    a. your name and name of company
    b. location of factory, i.e. No.(165,166), North Okkalapa Township, Yangon Industrial Zone,

Yangon.
   c. Describe nature of the case, i.e. fire, chemical spill, LPG leak or workplace accident.
   d. any other requested information
3. Go to the parking lot or send someone to the parking lot to direct the relevant department to the emergency area.
4. Contact Yangon Electricity Supply Corporation (YESC) to secure electrical service to the affected area.

Yangon Electricity Supply Corporation Offices
197/199, Lower Kyee Myin Daing Rd., Saw Yan Paing (South) Ward, Ahlone Township, Yangon Region
01-1717 [Hot Line], 01-2302285~9

5. Assist in assessing the extent of damage caused.
6. Assess the adequacy of the Emergency Plan and the response by personnel to determine if the Plan is adequate and if additional training is needed.

Careful and complete details of all emergencies should be recorded in the appropriate log book, with each entry giving at least the following information:

- date of incident,
- item of equipment,
- details of emergency,
- details of immediately previous maintenance work carried out to the equipment,
- previous evidence or warnings of trouble,
- any special circumstances or other relevant details,
- Action taken to affect both temporary and permanent repairs.

9.3.3 Emergency response plan for LPG

Liquefied Petroleum Gas (LPG) will be used as a heat source in the production of electricity for Lluvia Confectionery Factory. The possibility of gas leak is mostly associated with “negligence” because Tokai Myanmar Co., Ltd., which is the LPG distributer/ installer for Lluvia confectionery factory, is going to conduct gas leakage tests of piping and storage facilities and tests on fire extinguishing systems in accordance with the national high pressure gas safety laws of japan. However, the probability of gas leak cannot be ruled out completely. Fire and explosion may be resulted from the leakage of LP gas and therefore Dry chemical powder or water spray, and carbon dioxide (CO2) that can be extinguished the fire from a gas explosion with fire monitors, lifesaving equipment and medical equipment should be kept in good condition.
Tokai Myanmar Co., Ltd., as a maintenance, Tokai Myanmar provides one year warranty and after one year, the maintenance menu will be prepared to use LPG safety. Tokai Myanmar Co., Ltd. already got approval for installation of LPG supply system from Myanmar Petrochemical Enterprise (MPE) and the company cooperates to make the regulation based on Japanese Standard with MPE.

9.3.4 Action plan for LPG gas leak

Responsible Person	Action Item
Anyone who smell natural gas or another strange odor	Immediately Inform factory manager or Emergency response in charge.

Emergency in charge person	On receiving the information, the Factory Manager shall immediately proceed to find out the source of the gas leak. When the source of gas leak can be determine_ Alert all of the workers and any passers- by to stay clear of the affected area. When the source of gas leak cannot be find out_ Announce to vacate the room/ space, and initiate an evacuation by manually engaging the nearest fire alarm pull station. Depending on the seriousness of the gas leak, nearest fire station will be needed to contact.
Onsite emergency response team & Fire Station	• On receiving an emergency response request, members of the Emergency Response Team are to proceed to the scene of the incident ensuring that they have all their emergency personal protective equipment (PPE). • Carry out the required emergency actions as directed by the Emergency Response Team leader/ in charge person. • Extinguish all flames, incense sticks, etc • Close the LPG regulator and put the safety cap on the LPG tank. Then, open the doors and windows to ventilate the area. • Dry chemical powder or water spray, and carbon dioxide (CO2), that can be extinguished the fire from a gas explosion, with fire monitors, lifesaving equipment and medical equipment shall be available. • Use proper personal protection and extinguishing media • Assess the situation from time to time and use appropriate strategy • Medical rescue team must be stand by for personal injury in case. ***Important*** • Do not try to repair the leak if the leak is at the junction of the cylinder valve and the cylinder. In this situation, contact the supplier and ask for appropriate response instructions • Do not return to an evacuated building until and unless told to do so by • Contact to the LPG distributer/ supplier for emergency repair information. Tokai Myanmar Co., Ltd 130 Shwegonedine Road, Bahan Tsp, Yangon, Myanmar. (Rm.419, 4th Floor, YUZANA Hotel)

9.3.5 Emergency shutdown for LPG

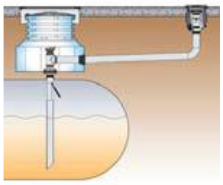
The factory shall install emergency shutdown system to stop the outlet pumps in case of low level, and high- level transmitters providing high level alarm. The following modifications have been planned by Lluvia confectionery factory for LPG emergency shutdown_

- Installation of overfill prevention valve and it will not allow to inject LP Gas more than 85%.
- Installation of a new shutdown valve at the inlet of each tank to be closed in case of high level and in case of emergency shutdown.
- Installation of new shutdown valves at the outlet of each tank, which will be closed in case of low level in the corresponding tank.
- Installation of a new shutoff valves in the vapor line of each tank. The vapor

lines will be connected together to equalize the pressure in the vapor spaces of the tank.

- Installation of sprinkler and it will spray water automatically over the tank when the outside temperature becomes near limited.
- Installation of gas leaking detector to catch leaking and it will alert automatically sound alarm and then the gas will be stop.

9.3.6 Equipment for safety

No	Safety Equipment	Function	Equipment
1	**Safety Valve**	If the Pressure becomes higher than the set pressure, the safety valve operates to lower the pressure in the tank.	
2	**Sprinkler**	If outside temperature becomes near limited, automatically spray water for tank.	
3	**Emergency Shut-off Valve**	In emergency, operator can open Blow Valve and stop it.	
4	**Gas Leaking Detector**	If LP Gas is leaking at tank yard and oven, Gas Leaking Detector catches leaking and then automatically sound alarm and stop the gas.	
5	**Overfill Prevention Valve**	LP Gas cannot be injected more than 85% of the tank.	
6	**LPG Tank**	Tank is imported from Vietnam the same as Yangon Can Manufacturing. There are so many similar tank record in Vietnam, but no accident.	

9.4 Emergency fire/ explosion response plan

The possibility of fire occurrence is mostly associated with “low”. However, the probability of a fire cannot be ruled out completely. Thus, the firefighting equipment should be available at all work area and warehouses of the factory and should be kept in good working state. The use of this fire-fighting equipment 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 this equipment and ensure that they are always ready to be used.

Moreover, the fire alarm system should be installed both at the factory and admin office. Floor plan along with the emergency exits should be allocated.

Figure 9.2 Fire alarm and fire fighting equipment

9.4.1 Action plan for fire/ explosion

Responsible Person	Action Item
Anyone who notices fire	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 Yangon Industrial Zone. Nearest police station 1. Shwe Pauk Kan Police Station Address: Nyaung Yan St, Shwe Pauk Kan Township Phone: 01 969 5561 2. North Okkalapa Police Station Address: Khaymar Thi Rd, Yangon

	Phone: 01 969 9384 Nearest Fire Station 1. Fire station 2 .North okkalapa, 01 969 9151 2. Fire Station, 01 699 149 3. Pale Volunteer Fire Brigade, 09 431 80200 4. North Okkalapa Fire Station, 01 969 9378 5. North Dagon Township Fire department, 01 584 060 6. Fire Station, Bagan Street, Yangon. 01 695 506
Emergency in charge person	On receiving the information of an emergency, the Factory Manager shall 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	• 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 fire fighting emergency action as directed by Emergency Response Team leader/ in charge person. • Water borne fire fighting equipment such as fire fighting 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. *Important* 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

9.4.2 Fire extinguishers and fire drills

Fire extinguishers: In the event fire, extinguishers are used to fight a fire only when it is safe for the employee to do so and the employee has been trained on how to properly use a fire extinguisher, the factory manager should contact the service supplier to have the extinguisher(s) serviced and recharged.

Fire drills: Fire drills will be held at least once per year to determine effectiveness of this emergency procedure. A written record of the drill will be kept on file at the facility by human resources.

9.5 Natural disasters response plan

9.5.1 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.

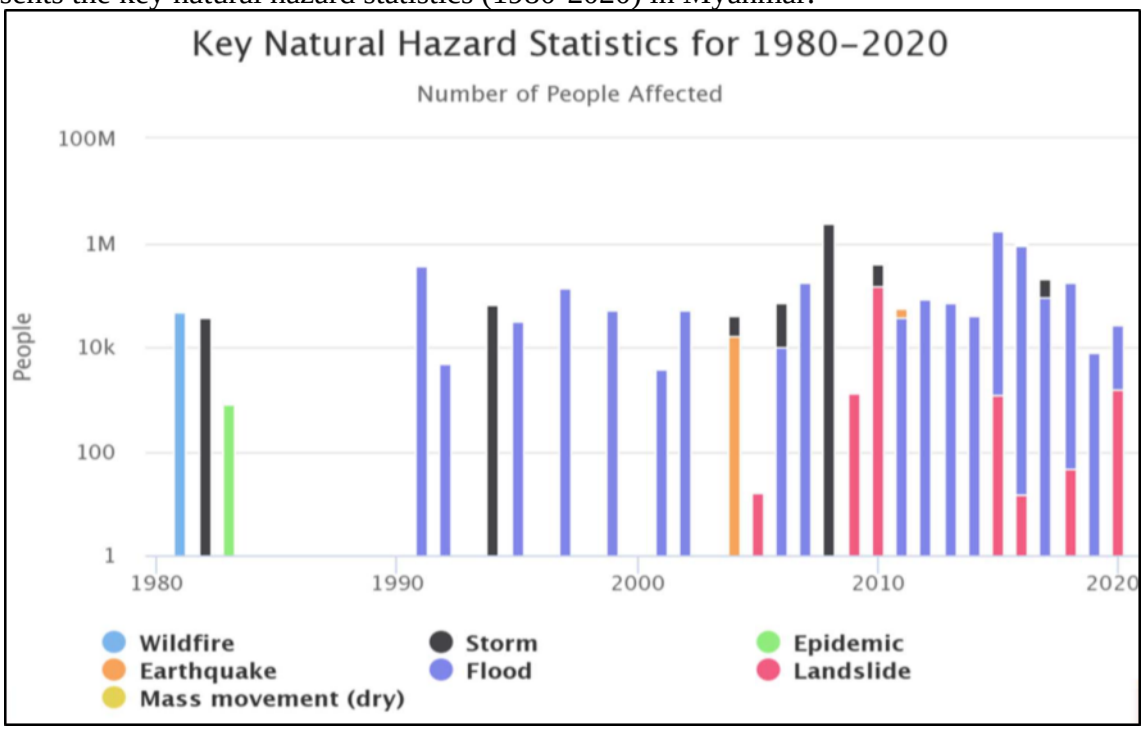
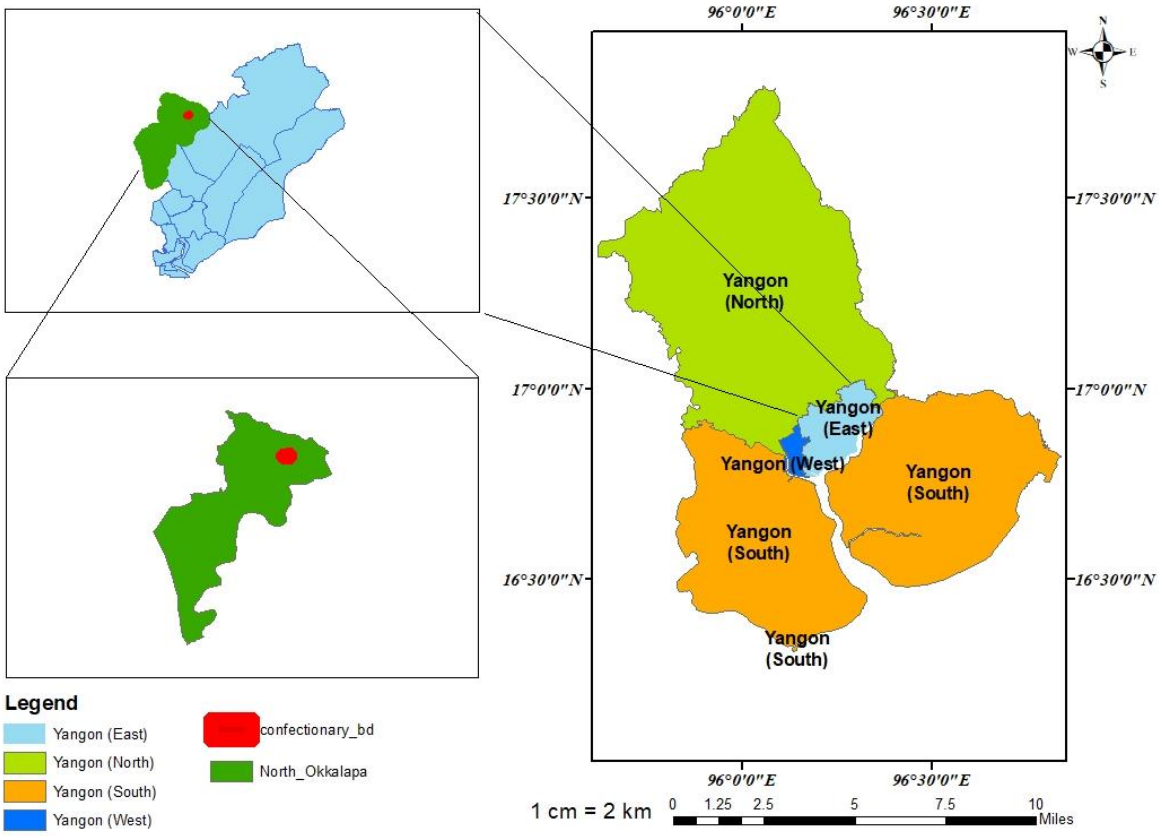


Figure 9.3 Key Natural Hazard Statistics for 1980-2020

Source: Myanmar Information Management Unit (MIMU)



Environmental Quality Management

Esri, Global Mapper, Google Earth

Figure 9.4 Location Map of The Confectionary Factory, North Okalapa Township, East Yangon Region.

9.5.2 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 East Yangon Region is 0.2-0.54.

In addition, Figure 9.6 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 9.7, the project area is high risk of Flooding. According to Flood Hazard Map of ADB, 2016d, the water depth can be between 0.1 to 0.5 mm in 100 years.

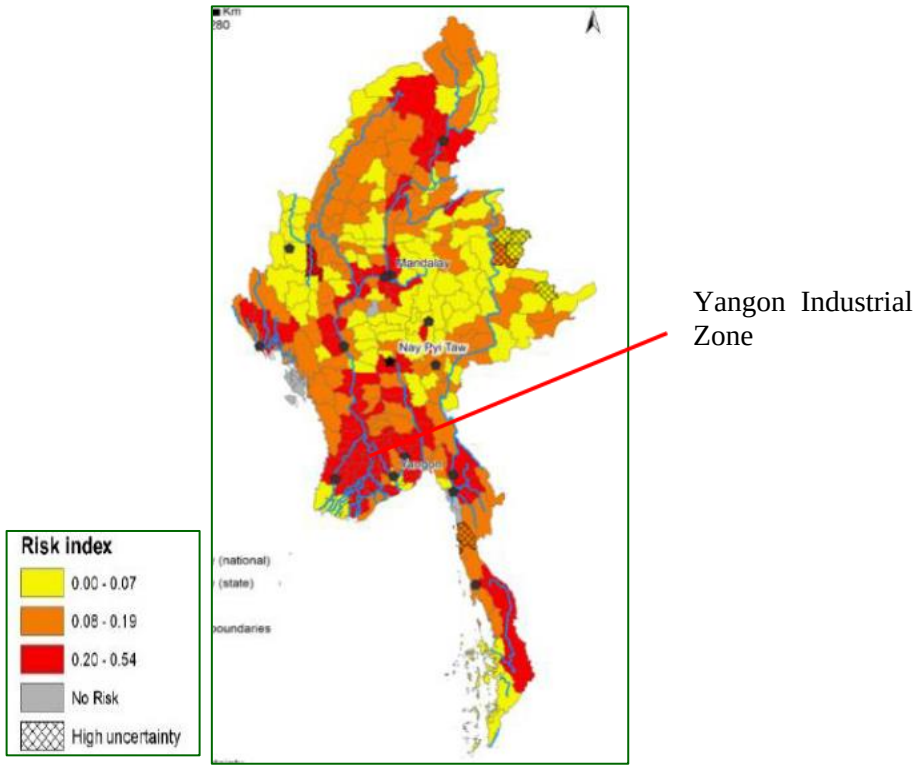


Figure 9.5 Flood Risk at Yangon 2010-2020
Source: (Hnin Wuit Yee Kyaw, Alexandra Dudley, 2023)

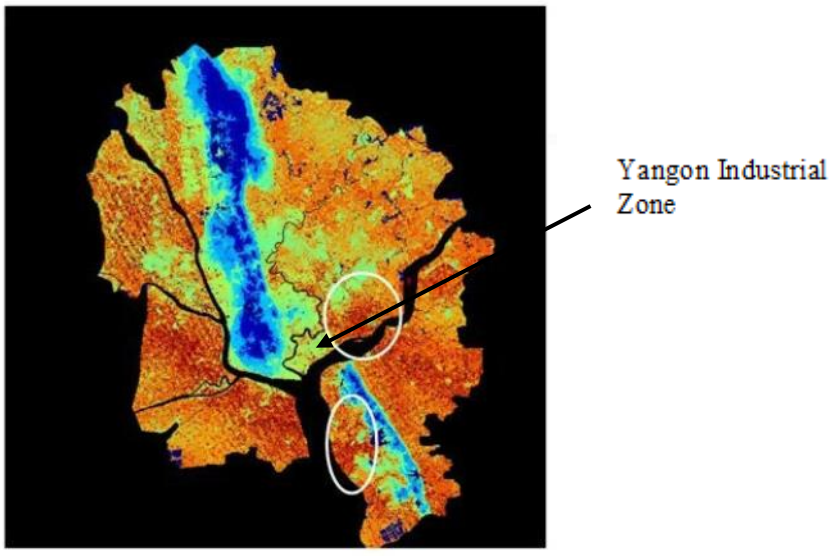


Figure 9.6 Spatial Distribution of Flood Risk at North Yangon Region

Figure 9.7 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.

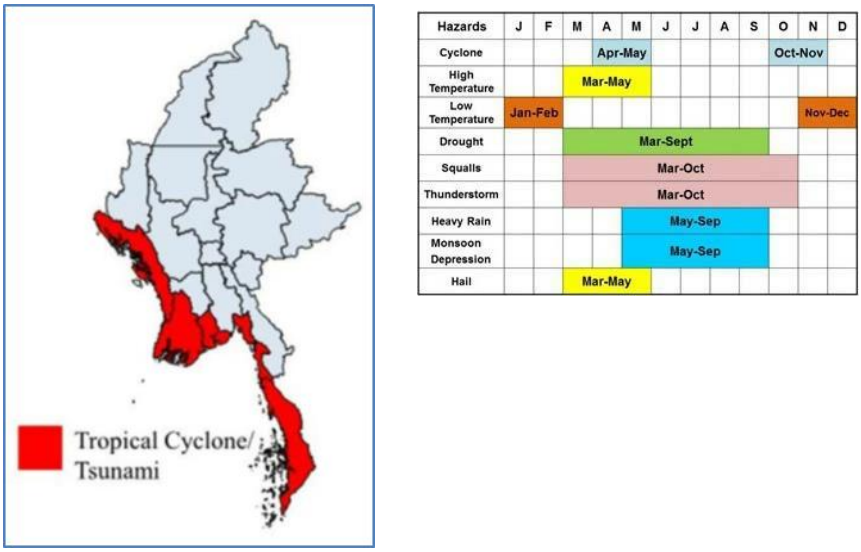


Figure 9.8 (1) Cyclone and Tsunami disaster area, (2) Meteorological Hazard Calendar

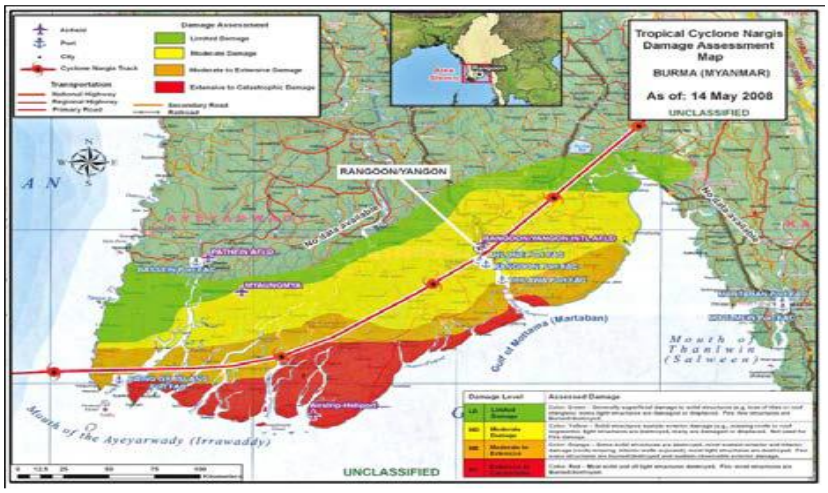


Figure 9.9 Damage Distribution Track of Cyclone Nargis

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 9.10). 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.

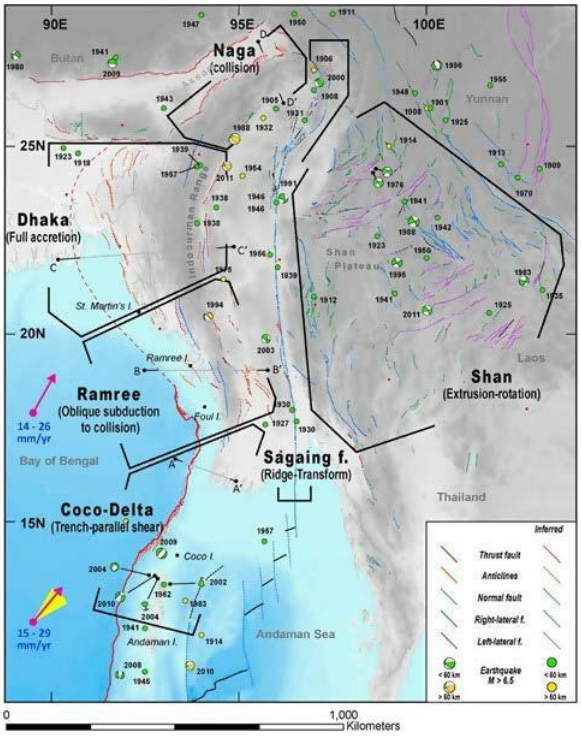


Figure 9.10 Sagaing fault and historic destructive earthquakes

(Source: Wangetal., 2014)

9.5.3 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 severe rate. Therefore**, disaster risk for flood** could be defined as ***a high degree of likelihood durig the next 10 years.***

9.5.4 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 Confectionary) 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 Safety and	- Maintaining a list of emergency contacts, including

	Health	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 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.

9.5.5 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 premises.

Flood Alert 	**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.		
Flood Warning 	**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.		
Severe Flood Warning 	**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.		

9.6 Workplace accident

All of the workers for the operation of Lluvia Confectionery Factory are well trained through the capacity building and training program provided by the factory. However, workplace accident is inestimable and can be happen accidently. Factory provides first aid training for the workers, and medicines and materials needed in case of emergency.

The factory shall establish a workplace policy, where all unplanned or undesired occurrence which may or may not result in injury to person and or damage to property, must be reported immediately.

9.6.1 Action plan for workplace accidents

Responsible Person	Action Item
Nearby person (or) Colleague	• Immediately inform the emergency service in charge • In serious case, call doctor at once or transport to doctor or hospital. Hospitals near the project are as follows (**Open 24 hours**) ✓ Waibargi Hospital Telephone - 01 690 118 ✓ North Okkalapa General Hospital, Telephone - 01 969 9422 ✓ OSC Hospital (Private), Thudhamma Rd, Yangon Telephone - 01 656 176 • Take actions in consultation with Emergency service in charge/ Shift In Charge and activate Emergency Action Plan
The Emergency response in charge	• Clearing employees from the area. • Cut off electrical supply if necessary • Controlling or eliminating sources of imminent danger • Ensuring that there is minimal scene disturbance, aside from anything required to be disturbed to deliver first aid and/ or control or eliminate an imminent danger. • Cure the injured person with provided first aid kit by a first aider trained in Emergency First Aid before the ambulance arrives.

9.7 Medical emergency response plan

The Lluvia confectionary factory shall provide First Aid, Emergency Treatment, and Administration of medication for the factory workers during the working activities.

9.7.1 General provisions

1) The provisions of this policy are intended to meet workers health which needs during minor and major injuries or medical emergencies.

2) To ensure workers safety, the factory shall adopt the position that workers shall administer medications at home whenever possible.

3) The factory shall recognize that accidents and medical emergencies can happen during working hours; therefore, factory shall adopt guidelines to prepare staff members to provide first aid and emergency care during these unexpected events.

9.7.2 First aid emergency treatment

1. First aid shall be provided to factory admin staff, and workers.
   - Either any factory staff member or licensed medical professional designated by the factory to render care that should complete training in CPR and First Aid provided by the nationally recognized training organization.

- First aid supplies shall be kept in central locations in the factory where they will remain clean, dry, and available to all personnel.

2. When an emergency exists, factory staff members will implement appropriate emergency procedures, "activating the factory's Emergency Response Plan (ERP)."

- Any worker can contact the Emergency medical treatment place
- Either factory member or licensed medical professional at the factory should be trained to administer emergency procedures needed in life-threatening situations.

9.7.3 Work field trips

For field trips that are considered an extension of the work activities, first aid supplies shall be available on all vehicles during work trips.

Figure 9.11 First aid kit

9.8 Emergency response plan for chemical exposure

Regarding the chemical exposure issue, if the factory uses some kinds of soft chemicals used in confectionery factory, the factory shall keep A **Material Safety Data Sheet** (**MSDS**) which is able to represent the chemicals that are being used in the factory. It will include information of the chemicals on the potential hazards (health, fire, reactivity and environmental) and how to work safely with the chemical product. Emergency eye wash station should be kept at the factory for emergency cases.

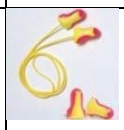
Figure 9.12 Emergency eye wash station

9.8.1 Special equipment for emergency

Factory employees may need personal protective equipment to evacuate during an emergency. Personal protective equipment must be based on the potential hazards in the workplace and the appropriate controls and protective equipment for those hazards. Personal protective equipment may include items such as the following:

- Safety glasses, goggles, or face shields for eye protection;
- Hearing protection
- Hard hats and safety shoes for head and foot protection;
- Proper respirators;
- Any other special equipment or warning devices necessary for LPG emergency case.

Table 9.2: Personal protective equipment (PPE) and their functions

Function of PPE	Feature and Characteristics
Protective goggles	
Goggles with direct vents are not suitable for protection from chemical splattering or smoke.	
Hearing Protection	
Cotton earplugs: disposable earplugs for short- term use – not suitable for high noise levels	
Elastic earplugs: washable, reusable earplugs	

Earmuffs: They offer a high level of sound reduction and are suitable for high noise levels. They can be used in combination with safety helmet.	
Respiratory Protection	
Dust mask: lightweight mask that is fitted over the nose and mouth and secured behind the head with elastic	
Head Protection	
Use head gear which conforms to recognized safety standards	
Hand and Arm Protection	
Gloves for common tasks (cotton/ leather)	
Heat- resistant gloves	
Foot Protection	
Select footwear that fits the purpose and conforms to recognized safety standards.	
Body Protection	
Reflective clothing: For working in busy traffic: brightly-colored reflective clothing can increase the visibility of employees and reduce their chances of being struck by vehicles or machinery	

9.9 Emergency evacuation plan

Lluvia Confectionery Factory prepare the emergency evacuation outlines basic procedures to follow in the event of an emergency such as fire or explosion, chemical spill, incident, or natural disaster that may require evacuation of the building.

9.9.1 Evacuation procedures

There is air horn method for notifying occupants and they may indicate an emergency or a test of the emergency systems.

When an alarm sounds, all personnel must immediately evacuate the building in accordance to the emergency evacuation procedure.

All departments will adhere to the following instructions in an emergency:

1. In the event of an evacuation, everyone should use the nearest exit if safe to do so. If an emergency situation prevents the use of the emergency exit nearest to your work station, proceed to the nearest alternate exit.
2. If safe to do so, zone marshals will walk through their zones to make sure all staff have left and to close all doors.
3. The receptionist will take the visitor log book and the staff itinerary for a roll call.
4. All personnel should stay calm and proceed in an orderly fashion to prevent any injuries to themselves or other employees.
5. Once outside the building, assemble in the parking lot, keeping a safe distance away from the building. Immediately report to the factory manager or designate who will be taking headcount to ensure everyone is out of the building.
6. All personnel must await further instructions.

9.10 Reporting Procedures

Reports shall be produced through the course of implementation of monitoring programs and collecting incident/emergency response forms as well and then submitted to the industrial zone representative.

The either Emergency response in charge or HSE manager will be responsible for ensuring that reporting and management procedures are being followed and documented accordingly.

9.10.1 Air quality

The onsite response team is needed to report any excessive emissions from the site to the Emergency response in charge. A community complaints register will be maintained in order to identify areas where dust management is a significant problem.

Moreover, the data of 24 hour continuous ambient air monitoring (Preferable period (dry weather) once a year) will be reported to the relevant regulatory agencies.

9.10.2 Noise quality

All operational phase complaints are to be reported to the Emergency response in charge and a record of any noise complaints along with the corrective action will be placed in a log book.

Moreover, the data of 24 hour continuous noise monitoring (once a year) will be reported to the relevant regulatory agencies.

9.10.3 Water Quality

9.10.3.1 Ground water and surface water quality

Annual report based on quarterly analysis along with the corrective actions will be reported through the emergency service in charge to the relevant regulatory agencies.

9.10.3.2 Waste water

Annual report based on quarterly analysis along with the corrective actions of point sources of negative impact will be reported through the emergency service in charge to the relevant regulatory agencies.

9.11 Waste management

Waste generation rate, waste auditing and bulk density will be reported once a week for the first parameter (waste generation) and once a month for the rest two to the emergency response in charge and shall be placed in a log book.

9.11.1 Emergency response plan

Immediately notify the emergency response in charge in the event of an unexpected LP Gas leakage.
Weekly reports (as appropriate) will be completed on-site and reviewed by the emergency service in charge.
In the event of a leak, the emergency response in charge is responsible for the preparation of an Environmental Incident Report, Corrective Action Report and for provision to the concerned industrial zone authority.
The Workplace Health and Safety representative will be responsible for enforcing all occupational and public health directives and keeping all related records and communications regarding this.

9.12 Documentation/Logbooks/ Environmental management file

The following documentation must be kept on site in order to record compliance with the EMP. An Environmental File which includes:

- Copy of the EMP,
- Copy of the Environmental Approval,
- Copy of the health and safety regulations and measures
- Copy of all other licenses/permits;
- Copy of the respective Emergency response Plans;
- Copy of relevant legislation;
- Environmental Method statements compiled by the Contractor;

- Non-conformance Reports;
- Environmental register which shall include:
  - Communications Register–including records of Complaints, and, minutes and attendance registers of all environmental meetings.
  - Monitoring Results including environmental monitoring reports, register of audits,
  - Incident book including copies of notification of Emergencies and Incidents, this must be accompanied by a photographic record
- Waste manifests.
  - Waste Documentation such as waste generation, waste audit, waste water disposal and Sewerage Disposal Receipts;
- Material Safety Data Sheets for all hazardous substances;
- Air, Noise and Water Quality Monitoring reports;
- Written Corrective Action Instructions; and
- Notification of Emergencies and Incidents

Furthermore, the following information shall be posted at the office and working environment:

Important Phone Numbers

1. FIRE station:
2. MEDICAL emergency:
3. AMBULANCE
4. SECURITY – Township Police, Industrial zone security

6. Factory Control room
7. Arrangement of assembly points

9.13 Actuating of Siren

1. ***Siren for declaring Emergency*:** Siren to be sounded continuously for 30 Seconds with an interval of 5 Seconds to be repeated 10 times.
2. ***Siren declaring Evacuation from the factory area*:** Siren to be sounded for 5 seconds till the area is evacuated by people or for ½ hour whichever is less.
3. ***Siren declaring*** All Clear and returning to the work: Siren to be sounded continuous for 5 minutes

9.14 Review of the EMP

The factory environmental personnel shall review the EMP to assess its effectiveness and relevance as follows:

- The full EMP shall be reviewed at least annually

Relevant parts of the EMP shall be reviewed periodically following a reportable incident, an addition, up-date or change or a sub-plan, reporting; non-compliances; and corrective actions implemented

9.15 Capacity building and training program

Lluvia Confectionery Factory will educate the factory employees about the types of emergencies that may occur and train them in the proper course of action; such as awareness disaster training, firefighting training and first aid training. The size of the workplace and workforce, processes used, materials handled, and the availability of onsite or outside resources will determine the training requirements. Factory employees will be sure to understand the function and elements of the emergency action plan, including types of potential emergencies, reporting procedures, alarm systems and evacuation plans.

Training may include practising evacuations, identifying assembly points, location of emergency equipment, first aid arrangements and how to safely shut down machinery.

In determining training requirements, the following should be considered:

- inclusion of emergency procedure training in induction courses for new workers
- provision of refresher training for existing workers
- provision of training for short-term contractors or visitors at the workplace (this may not need to be as extensive as may be required for workers), and
- Provision of specific training for individuals who have a formal role in an emergency for example fire wardens, floor wardens, first aid officers.

General training for factory employees should address the following:

- Individual roles and responsibilities;
- Threats, hazards, and protective actions;
- Notification, warning, and communications procedures;
- Means for locating employee/ workers in an emergency;
- Emergency response procedures;
- Evacuation, shelter, and accountability procedures;
- Location and use of common emergency equipment; and

The employee will be trained in first-aid procedures, including protection against blood borne pathogens; respiratory protection, including use of an escape-only respirator; and methods for preventing unauthorized access to the site. A good idea is to hold practice drills as often as necessary to keep employees prepared. After each drill, gather management and employees to evaluate the effectiveness of the drill. Identify the strengths and weaknesses of the plan and work to improve it.

9.16 Preliminary EMP Costs

Estimated costs for the initial implementation of the EMP will be defined on an initial set up basis. The factory will revise these costs and develop annual operating costs for the EMP. These include the following costs:

a. Supervision on environment (includes sampling for environmental quality)
b. Engineering supervision cost
c. Institutional Strengthening, Training and Capacity Building

d. Costs of salaries, administration and function of the environmental unit of factory
e. Technical assistance to factory environmental unit
f. Development of Manual of functions and procedures including HSE procedure
g. Equipment and logistics

Chapter 10

Public Consultation and Disclosure

10.Public consultation and disclosure

10.1 Introduction

The survey conducted at the Shwe Pauk Kan Township which is the nearest vicinity to the proposed factory, Yangon Industrial Zone is aimed at identifying of environmental and social impacts potentially affected by the existence of the proposed factory,. The survey was carried out using both quantitatively and qualitatively. More specifically, public consultation meetings were carried out and then information of the Project Area Units (PAUs) as well as Project affected Persons (PAPs) along with their livelihoods, income, transportation, health condition were collected through questionnaire surveys.

The survey was carried out from 26 to 29 of November, 2018 by the EQM socioeco survey Team. The set of questionnaire form used in the survey is attached in Appendix (D).

10.2 Objectives of the study

The main objectives of the public consultation and socio economic survey as follows:

1. To reveal community perception on the Lluvia confectionary production process and how it can effect on their lifestyles

2. To collect data on current socio-economic situation including livelihoods and existing environmental conditions in the project area.

3. To assess the condition of the positive and negative impact on the socio-economic status along with better suggestions to minimize the negative effects.

10.3 Survey period

The project site is located in Yangon Industrial Zone, Shwe Pauk Kan Township, Yangon Region, Myanmar. The public consultation was held in Armo Industry which is nearby proposed factory.

10.4 Public consultation meeting

Public consultation meeting was carried out with stakeholders and local community in 24th August, 2018. The detail information of stakeholder consultation meeting is shown as below.

Table 10.1: Meeting of Minutes: The Initial Environmental Examination (IEE) and Environmental Management Plan (EMP) for the Lluvia Confectionery Factory Project – Consultation Meeting at Yangon Industrial Zone, Mingalardon Township

Detail			
Project	Lluvia Confectionery Factory Project		
Venue	Meeting Room, Armo Factory	**Region**	Yangon
District	Yangon	**Township**	Mingalardon
Objective	Public Consultation Meeting		
Date	24/08/2018		
Time	9:00 – 12:00 am		

Presentation

Introduction about the Lluvia confectionary factory

U Pyi Soe Win, Project Manager explained in brief about the company and the products of the Lluvia confectionary factory.

Introduction about EQM Information

Dr. Ohnmar may Tin Hlaing, Environmental Health Consultant explained in brief about the EQM and the process of the IEE and EMP to be done for the Lluvia Confectionary factory. EQM is an environmental, health, social consultancy company established in 2012 and has registered in Directorate of Investment and Company Administration (DICA). EQM has also registered in the Environmental Conservation Department (ECD) under the Ministry of Natural Resources and Environmental Conservation (MONREC).

Presentation about IEE

The IEE Process requires a third party to prepare an IEE and EMP for the Project proponent. The Draft IEE will be reviewed by MONREC. MONREC will only approve Environmental Compliance Certificate (ECC) if meets requirements of the Environmental Conservation Law (2012), Environmental Conservation Rules (2014) and the procedures (2105) accordingly.

The ***objective of IEE*** is to assess project activities that can be resulting in environmental impacts. The main objectives are to undertake potential environmental and social impact assessment, to prepare preventive measures, mitigation measures, environmental management plan, monitoring plans, waste handling and disposal and plans for unplanned accidents.

The ***purpose of public consultation*** is to disclose project information and management plans to the residents near by the project and the relevant stakeholders. Another purpose is to describe perception and attitudes of the immediate community in the final IEE report.

Environmental Setting consists of Physical Environment (Climate, Air, Noise, Water, Soil), Ecological Environment (special conservation status, protection, concern), Human Use (Infrastructure, Water Supply, Energy Supply, Waste Management) and Quality of Life (Employment & Income, Health of Workers & Community, significant health issues & concerns, health Infrastructure & services).

Environmental baseline collection would be conducted near project area in May-August 2018. The samplings would be collected in the followings: three ground water samples, two waste water samples, two soil samples, four air quality samples and four noise quality samples.

Sensitive Receptors are the residential areas and the relevant factories near the project area. Concerning public disclosure, consultation and socio-economic, perception and attitude survey would be conducted on local communities and other relevant people.

The potential environmental impacts are concerned with air quality, water quality (underground and surface water), soil quality and waste disposal. The potential social impacts are related to economy, employment, infrastructure and health.

The one more thing to be discussed is that the factory will be using **the LPG** as the energy source during the operation phase. LPG is an economical gas, a mixture of propane and butane. Although propane release heat more than butane and useful for fire, butane has a characteristic of easy access to liquid phase and is east to be controlled. Butane is now being used in refrigerators and is harmonized with environment more than Halo methane gas damaged to ozone layer. LPG is a clean, economic and environmental.

In some villages where do not have access to the electricity and natural gas in India, the government provides the LPG for cooking. Nowadays, in Europe, LPG is widely used as an environmental gas. The latest research and studies show that LPG is a more environmental gas than petrol and diesel. Regarding LPG impact, it has no long-term impact on environment except oil spill and low emission to environment with no danger. Its emission is lower than coal and petrol.

Regarding other impacts, major leaks of flammable material from pipelines have resulted in fires and vapor cloud explosions. Pipe line failure occurs due to liquid hammer, vibration and fatigue of pipeline or weak maintenance on supporting structure or holding structure. Furthermore, the potential impacts caused by LPG are air pollution due to leakage of LPG tank and filling plants. This can lead to human health problems and fire.

LPG mitigation measures specified by IFC will be written in the EMP. Moreover, the safety measures will be included in the EMP as follows:

Equipment for the safety are:

1) Safety Valve (If the Pressure becomes higher than the set pressure, the safety valve operates to lower the pressure in the tank.),

2) Sprinkler (If outside temperature becomes near limited, automatically spray water for tank.),

3) Emergency Shut-off Valve (In emergency, operator can open Blow Valve and stop it.),

4) Gas Leaking Detector (If LP Gas is leaking at tank yard and oven, Gas Leaking Detector catches leaking and then automatically sound alarm and stop the gas.),

5) Overfill Prevention Valve (LP Gas cannot be injected more than 85% of the tank.),

6) LPG Tank (Tank is imported from Vietnam. There are so many similar tank records in Vietnam, but no accident.).

Moreover, if chemicals including detergents are used, the MSDS sheet and other relevant information shall be posted near by the place in which chemicals store.

Concerning environmental mitigation measures, the following measures will be conducted as the minimum issues:

- Air Emissions– emissions from generators and dust from vehicle movements - wet suppression on roads & limited vehicles speed, regular maintenance of roads to reduce dust.
- Noise – noise from equipment and generators - sound proof Generator and dampeners on equipment would be provided.
- Water Contamination - No discharge of untreated liquid waste to water resources will be allowed, temporary fuel storage carefully bounded, refuelling sites with appropriate spill containment equipment, personnel training in emergency spill response, no washing of machinery allowed near watercourses.

Concerning Social Mitigation Measures,

- Economic and Employment - Project will provide clear information on the number and timescales of employment opportunities.
- Infrastructures and Public Services - all power will be generated on site; waste minimized; roads will be upgraded and maintained.
- Health - Implementation of good hygiene practices for the workers; Prevention of illness among through health awareness and education initiatives

Concerning mitigation measures for unplanned events,

- Conduct chemical storage, waste treatment, and waste disposal in compliance with regulation and standards.
- Classify chemicals according to storage type followed by chemical properties and store in compliance with regulation and standards.
- Conduct Oil Spill Response
- Provide fire protection equipment
- Implement Emergency Response Plan in case of emergency.

Both client and 3rd party will have to sign the commitment letters mentioning that the client will conduct the EMP procedures accordingly and the 3rd party will write the EMP in accordance with the appropriate guidelines. The EMP represents a commitment by Lluvia to ensure that the mitigation measures are translated into operational plans and procedures by the contractors. The EMP includes provisions for measuring its effectiveness through review and audit of the contractor's performance, to ensure that Lluvia's objectives for environmental and social performance are being met. Lluvia through its contractual relationships will require the contractor(s) to develop detailed plans and procedures and demonstrate compliance with the EMP.

Following this first Public Consultation, the next actions are:

- Gathering information and data about the environmental and social context in the project area
- Identifying and Assessing the impacts of the project
- Proposing mitigation measures to minimize the potential impacts
- Disclosing the results of the study, and presenting the outcomes to the stakeholders during a second Public Consultation meeting.
- Ongoing Stakeholder Engagement during the project activities

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Question 1 – U Ye Min Aung (Health and Safety Officer, Myanmar Padauk Co., Ltd)

I would like to ask from safety point of view. LPG has high flash point and therefore how do you plan for safety and firefighting system for this. Relating to material safety data sheet (MSDS), it is stated in English Language. So, it is not convenient to understand the negative impacts of chemicals. (e.g. We don't know definitely the negative impact of chemicals when it is inhaled or when in contact with the skin.)

Answer 1- U Pyi Soe (Project manager, Lluvia Confectionery Factory)

Thank you for your question. Relating to LPG, it is a clean fuel. The negative impact and side effects of LPG is lower than that of petrol and diesel. But, it has high flash point. Therefore, higher safety is needed while using LPG. We have to get permission from Myanma Petroleum Enterprise (MPE) and Fire Force for the design of bakery oven by complying measures and guidelines.

Answer 1- Dr. Ohnmar May Tin Hlaing (EQM)

There are safety sheets for each chemical. MSDS sheet has to be displayed nearby the storage of chemicals. Being stated in English, It is true that it is not easy to understand and follow the safety procedures. However, MSDS shall be placed and Emergency response plan will be also displayed in Myanmar version. We also add these information in the chapter of the Emergency Response Plan. (e.g. emergency kits, shower etc. have to be ready for emergency case). Nowadays, environmental audit will be conducting in some industrial zones based on their needs.

Question 2- U Kyaw Lwin (Vice President, Yangon Industrial Park)

According to the presentation, the project proponent should comply IFC guidelines relating to the safety of LPG. I would like to know that is it possible to comply these guidelines completely in Myanmar.

The project proponent needs to do a compliance contract. I would like to know how do the relevant department inspect whether the project proponent comply with the guidelines or not.

Answer 2– Dr. Ohnmar May Tin Hlaing

Mitigation measures will be conducted based on the feasibility. While the report is in process, we have to discuss with the project proponent to ensure that they can comply the measures stated. Then, we have to choose the reliable and effective procedures which are concurrent with the project and our country situation. If we set the advanced guidelines, the project proponent may not follow the measures written in the plan. We will set the mitigation measures that can be practically applied by the project proponent as well as to mitigate the impacts potentially affected by the project.

Answer - Daw Kyawt Kay Paing (ECD)

Relating to Environmental Compliance Certificate, the project proponent has to submit the report (IEE, EMP or EIA) to Environmental Conservation Department (ECD) and ECD has to review this

Discussion Session

report. If there are requirements for the report, they have to amend and resubmit the report to ECD. But now, ECD cannot currently approve for ECC. Another one is that I would like to recommend to invite Yangon City Development Committee (YCDC) for next meeting for waste management. (e.g; solid waste and sludge from wastewater treatment)

Question 3- U Yan Naing Soe (Manager, Piti Pyay Sone)

I would like to know which method will be used for the treatment of waste water.

Answer 3- Dr. Ohnmar May Tin Hlaing (EQM)

For choosing the treatment method of wastewater, we have to know the operation process of the factory. Generally, we presume as there will have no toxic wastes discharge from this factory because it is a confectionery factory. But, we will continue to look at the factory process. There are two types of wastewater discharged from industry such as domestic and industrial wastewater. Mostly, domestic water will be discharged into drainage. If the project proponent will use chemical in industrial process, waste water cannot be discharge directly. For chemical manufacturing industry, they have to build individual wastewater treatment plant. Wastewater form the factory will also be analysed in laboratory. Method for wastewater treatment will be chosen based on the result of waste water quality analysis. This information will also be elaborated in the report.

Question 4- U Kyaw Sein Oo (General Manager, GIDA Co., Ltd)

The presentation that you explain is good. But there can be many emergency cases in everywhere. There will be impacts on the environment due to the natural disaster, human beings and the machines errors, even though there are lots of safety plans. I would like to know that are there any accountability and responsibility plans developed by project proponent?

Answer 4- Dr. Ohnmar May Tin Hlaing (EQM)

We will include Chapter 9 - Emergency Response Plan in the report according to the Environmental Impact Assessment Procedures published by (ECD), (MONREC) as the separate chapter. This will be prepared for the emergency cases of oil spills, and explosion. It will concern the potential emergency conditions that will be occurred throughout the project phase. If there is no environmental team in the factory, it is needed to train and explain the workers how to use the procedures for the potential emergency cases. After completed the IEE report, we have to submit to ECD. If any comments come out from the department, we have to revise the reports based on the comments stated by ECD and submit again. Environmental Compliance Certificate is only given to the well prepared reports.

Question 5- Daw Kay Thi (HR, Yathar Cho, Co., Ltd)

Wastewater samples will be measured by the laboratory. I found that solid waste and wastewater are systematically conducted. The disposal water will be discharged to reach to the level of PH7, PH6 etc. Which guidelines will be used to compare the sampling results with the standards?

Answer 5- Dr. Ohnmar May Tin Hlaing (EQM)

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Environmental Conservation Department (ECD) stated National Environmental Quality (Emission) Guideline since 2015. In this Guideline, there are also standards of air, noise, water and waste water parameters for the various industries. There are standards for confectionary industries in the guideline. We will collect wastewater and portable water samples after this consultation meeting. And then will send these samples to the laboratory. We will analyses the parameters according to this Guideline The results from the laboratory are going to compare with the standards values of the National Environmental Quality (Emission) Guideline regarded by ECD.. ECD will review on the parameters that we measured as well. **Question 6- U Aung Myo Thant (QHSE Director, Piti Pyay Sone)** How do you disclose the results? **Answer 6- Dr. Ohnmar May Tin Hlaing (EQM)** We will have to prepare the executive summary in Myanmar version. Thus it can be posted at the Industrial Zone committee's office as well as the respective Township GAD office. If the company has their own web site, they can upload on that website.

Table10.2: Attendance List

No	Name	Organization	Position	Address	Phone
1	U Kyaw Lwin	Zay Kabar Company	Vice President	Yangon Industrial Zone	098636396
2	Daw Myint Myint Yee	Zay Kabar Company	General Manager	186, Kayay Yeik Thar	095102454
3	U Zaw Htun Oo	Zay Kabar Company	Engineer	186, Kayay Yeik Thar	095102454
4	U Sein Aye	Zay Kabar Company	Staff	Yangon Industrial Zone	09254323112
5	Daw Htay	EnvironmentalConservation Department	Staff Officer	South Dagon	09256359169
6	Daw Kyawt Kay Paing	EnvironmentalConservation Department	Deputy Staff Officer	Insein Township	09420035845
7	Mr. Murakami	Lluvia Limited	General Director	-	-
8	Mr. Otsuka	Lluvia Limited	In charge (I. C)	-	-
9	Daw Hla Hla Kyi	Confectionery factory	Facility Manager	Kyemyintaing	09400470186
10	U Pyi Soe Win	Lluvia Limited	Project Manager	Yangon Industrial Zone	09788242142
11	U Aung Zaw Htay	Lluvia Limited (SJ)	Project Manager	Yangon Industrial Zone	09453201988
12	Ma Khine Thazin Maw	Sawbwa VT Limited	HR (Human Resource)	8st, Yangon Industrial Zone	09256179415
13	U Zaw Thet Oo	Sawbwa VT Limited		131, Mingalardon Industrial Zone	09253034124
14	U Ye Min Aung	Myanmar Padauk Co.,Ltd	Safety Officer	Yankin	09455012419
15	U San Yu	Myanmar Padauk Co.,Ltd	Executive	No-144, 9st, Yangon Industrial Zone	09400305005

No	Name	Organization	Position	Address	Phone
16	U Yan Naung Soe	Myanmar Padauk Co.,Ltd	HR Manager (Human Resource)	135/ 137	09425013591
17	Daw Thein Than Htay	Myanmar Distribution Group	HR(Human Resource)	No-147, 10st, Yangon Industrial Zone	09424335646
18	Daw Moe Moe Aung	Myanmar Lion Co.,Ltd	Quality Control Manager	147, 10 Street, Mingalardon	09973056375
19	U Aung Kyaw	Baho Company	Staff	R2 Street	
20	U Win Htwe	Baho Company	-	R2 Street	
21	U Yan Naing Soe	Piti Pyay Sone Co.,Ltd	Manager	Mingalardon	09076909016
22	U Aung Myo Thant	Piti Pyay Sone Co.,Ltd	QHSE Director	Mingalardon	09401578416
23	U Saw Naing Htoo Aung	Piti Pyay Sone	Community Engagement Coordinator		09797994679
24	U Kyaw Sein Oo	GIDA Company	General Manager	115, 9th Street, 10 miles	0973117281
25	U Yee Yee Win	GIDA Company	Manager	115, 9th Street	0944452346
26	U Myint Yee	GIDA Company	Manager	115, 9th Street	0944452346
27	U Aung Zin Win	GIDA Company	Manager	115, 9th Street	0944452346
28	Daw Kay Thi	Yathar Cho Co.,Ltd	Human Resource	147,10th Street	09424335646
29	Dr. Ohnmar May Tin Hlaing	EnvironmentalQuality Management Co.,Ltd	Environmentalhealth Consultant/ Managing Director	No.233, Sayeepin lane, Thuwunna, Thingungyun	095016606

No	Name	Organization	Position	Address	Phone
30	U Thiha Htut	Environmental Quality Management Co.,Ltd	Project Coordinator	No.233, Sayeepin lane, Thuwunna, Thingungyun	09420706319
31	Daw Soe Moe Nwe	Environmental Quality Management Co.,Ltd	Assistant Environmental Consultant	No.233, Sayeepin lane, Thuwunna, Thingungyun	09264384687
32	Daw Myat Myitzu	Environmental Quality Management Co.,Ltd	Assistant Environmental Consultant	No.233, Sayeepin lane, Thuwunna, Thingungyun	09972707592
33	Daw No No Lwin	Environmental Quality Management Co.,Ltd	Senior Environmental Technician	No.233, Sayeepin lane, Thuwunna, Thingungyun	09772354943
34	U Ye Naung Tun	Environmental Quality Management Co.,Ltd	Senior Environmental Technician	No.233, Sayeepin lane, Thuwunna, Thingungyun	09957633466
35	U Aung Zin Min	Environmental Quality Management Co.,Ltd	Senior Environmental Technician	No.233, Sayeepin lane, Thuwunna, Thingungyun	09970275101
36	U Thet Paing Phyo	Environmental Quality Management Co.,Ltd	Environmental Technician	No.233, Sayeepin lane, Thuwunna, Thingungyun	09256215545
37	U Soe Thu Aung	Environmental Quality Management Co.,Ltd	Environmental Technician	No.233, Sayeepin lane, Thuwunna, Thingungyun	0996254801

10.5 Social Survey Instruments

The household surveys were conducted in three wards of Shwe Pauk Kan Township including 11, 12 and 15 wards from 26th November 2018 to 29st November 2018 as indicated in the table below.

Table 10.3: The area of survey and their respective numbers of respondents

No.	Date	Name of Ward	No. of Respondents
1.	26/11/2018	11	26
2.	27/11/2018	12	26
3.	28/11/2018	15	34
4.	29/11/2018	11,12	14
Total			100

This section outlines how the socio-eco surveys were conducted and presents the key findings. The experienced and qualified team members were engaged to collect field data through proper developed questionnaire. The household questionnaire consists of sections on household member characteristics, household economics, health condition, education, transportation system, cultural aspect, electricity utilization as well. One section focused solely on respondents' experiences with and awareness of climate and ecosystem changes. The data entry, data analysis as well as interpretation were conducted by using SPSS 21.

According to sample size calculation, about 100 samples are necessary to have a sufficient statistical power and to increase precision. So, socio-economic survey consisted of a questionnaire administered to 100 households in three wards of Shwe Pauk Kan Township. It is the best way to consider typical and representative of the community which may potentially affected by industrial activities.

10.6Socio-Economic Surveys

10.6.1 Socio-Economic Surveys on Key Informants and local community

The (100) households including household leaders, religious leaders and community surveys were conducted using the socio-economic and attitude questionnaire.

10.6.1.1 Current situation of infrastructure, resources and services

From the key informant survey, firstly it focused on infrastructure, resources and services including health, education, water sanitation, hygiene and transportation. According to the findings, there is very limited health care available near the community areas and it has not changed till now. In this area, majority can access education. . In the usage of electricity, public electricity is mainly for lighting; however, but, not only electricity but also, charcoal and firewood are still being used for cooking. .

For water supply, the main source of drinking water is from public pipe water and tube well. Most households, they treated water before use, and their treatment method is either sedimentation or boiling. But from the past to until now, water quality, water amount have not changed. They said that there is limited water drainage system near their surrounding areas. Besides, there are waste disposal areas in the community areas.

10.6.1.2 Analysis of climate condition and environmental aspects

(a) Air, water and soil quality analysis

As the results of socio-eco surveys, water quality, soil quality and air quality have not changed until now. All the conditions of the natural environment are normal situation. Thus, it is observed that natural environment conditions are not significantly impacted by the industrial process.

Aspect of wildlife, wild plant and human population

For the wildlife, during 10-year periods, there is no significantly changed and it remains as the same condition. It is observed that wild plants are slightly decreased over the past 10 years due to ecosystem changes as well as climate change. On the other side of the diversity of animal species, it can be seen that birds, rats and mice, bees, butterflies and mosquitoes remained the same during the last ten years. But over the past 10 years, human population density is significantly increased in this area.

10.6.1.3 Analyzing result for the information related to industry

Regarding awareness and attitude on the project, it is surveyed that most of the respondents know some information about the Lluvia Confectionary factory from community leaders, interviewers and friends. Moreover, it is studied that the industry has no both positive and negative aspect on the local community and the environment. There is no discussion related to compensation. But they agreed to the development condition of industrial improvement.

Socio-Demographic of the community

(i) Distribution of population responding questionnaires

In the respective township, 100 respondents were randomly selected and interviewed. Among the survey population, 53% is female and remaining 47% is male. Most respondents are comprised of head of households and wife; however, but a few are family members including sons, daughters, parents and parents in law. According to the results, almost all household members are Buddhist. The ethic occupied by the population lived around the proposed project is Burma. The family size of the respective household member is within the range of 3 to 9 numbers.

Age distribution

The survey identified that majority (26%) is 30-40 and then followed by 40-50 is 21%, 50-60 and 60-70 are 18% each, 70 above is 5% and the least is 15-20 which is 1 %.

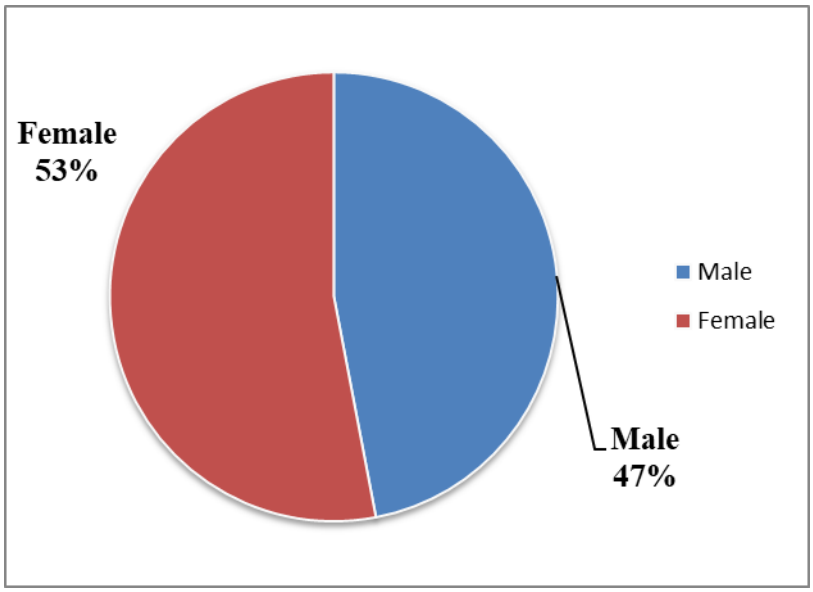

Figure 10.1: Distribution of population responding to the questionnaire

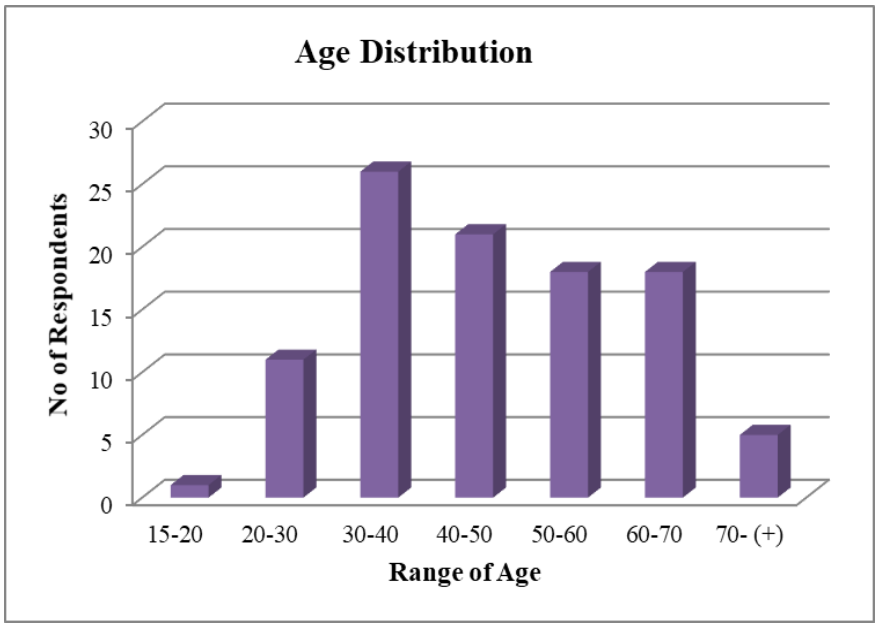

Figure 10.2: Age distribution

(ii) Occupation status

The following pie chart summarizes the information on the pattern of occupation status of the households in the quarters. There are 52% of the respondents doing housework, 16% are working for income, 12% doing religious matter, 6% are retired, another 6% are without working, 3% of respondents are searching for work, 2% helping the household business, another 2% are fulltime leaning and only 1% is not working due to ill health.

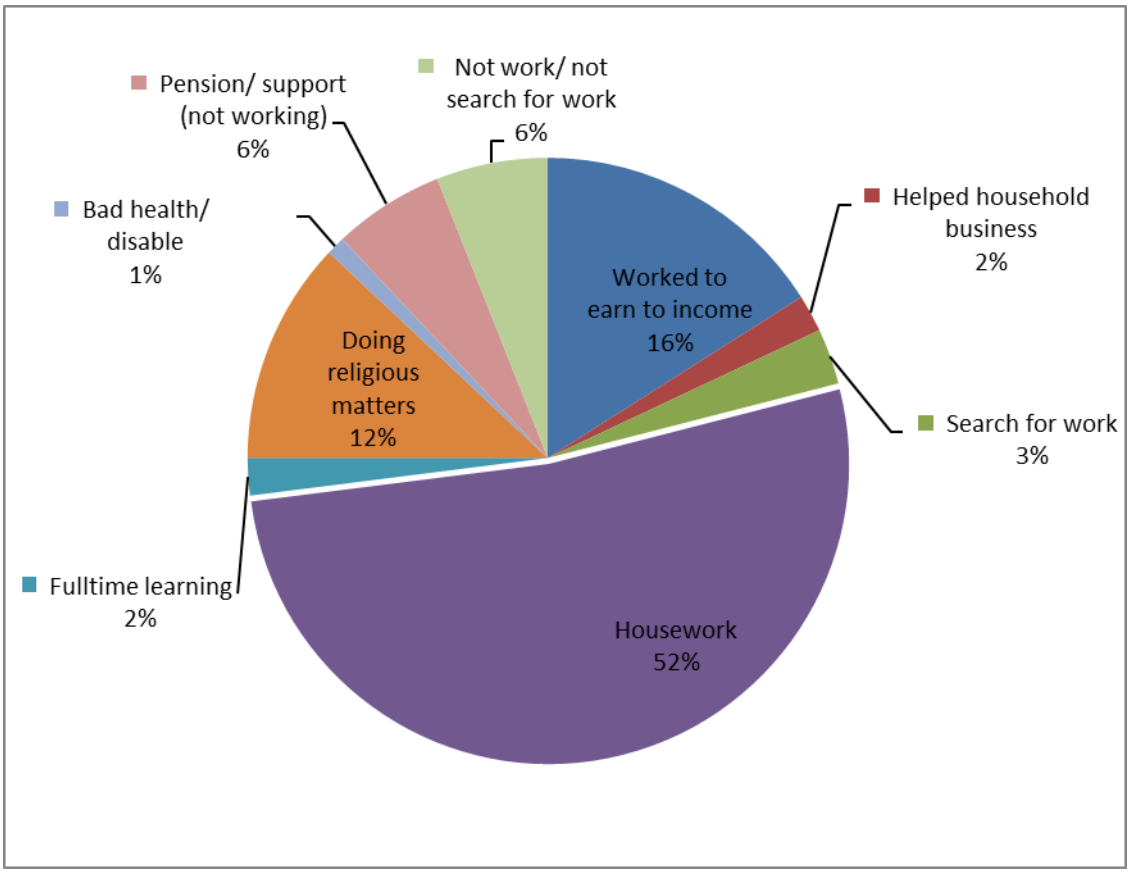

Figure 10.3: Different types of occupation

(iii) Type of work

It is also studied that most of the respondents are sale workers (26%). There are relatively 19% skill workers, 12% service workers, 7% casual workers and 4% unpaid family worker.

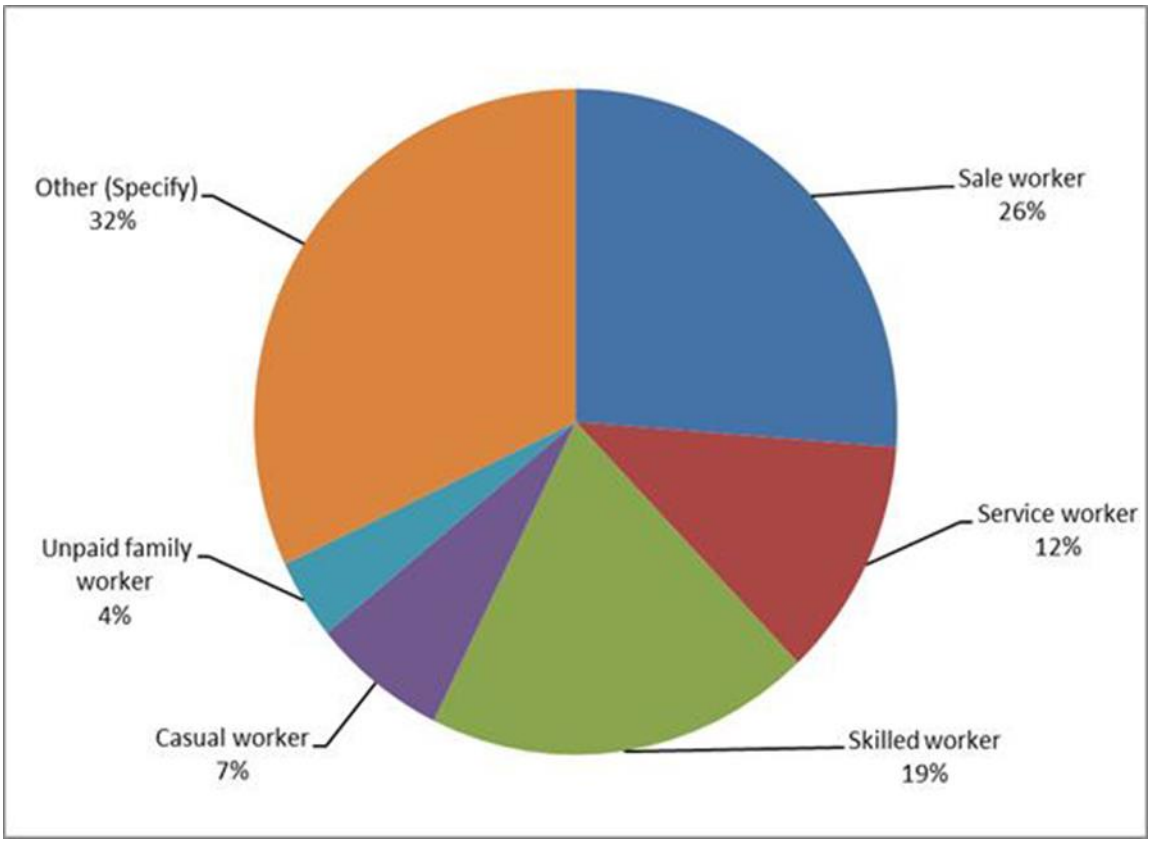

Figure 10.4: Different types of work

(iv) Income level

The annual income of households was assessed through the survey of household's characteristics. In the figure below shows the percentage of annual income level in the community.

The majority (38%) is between 200,001 and 300.00.

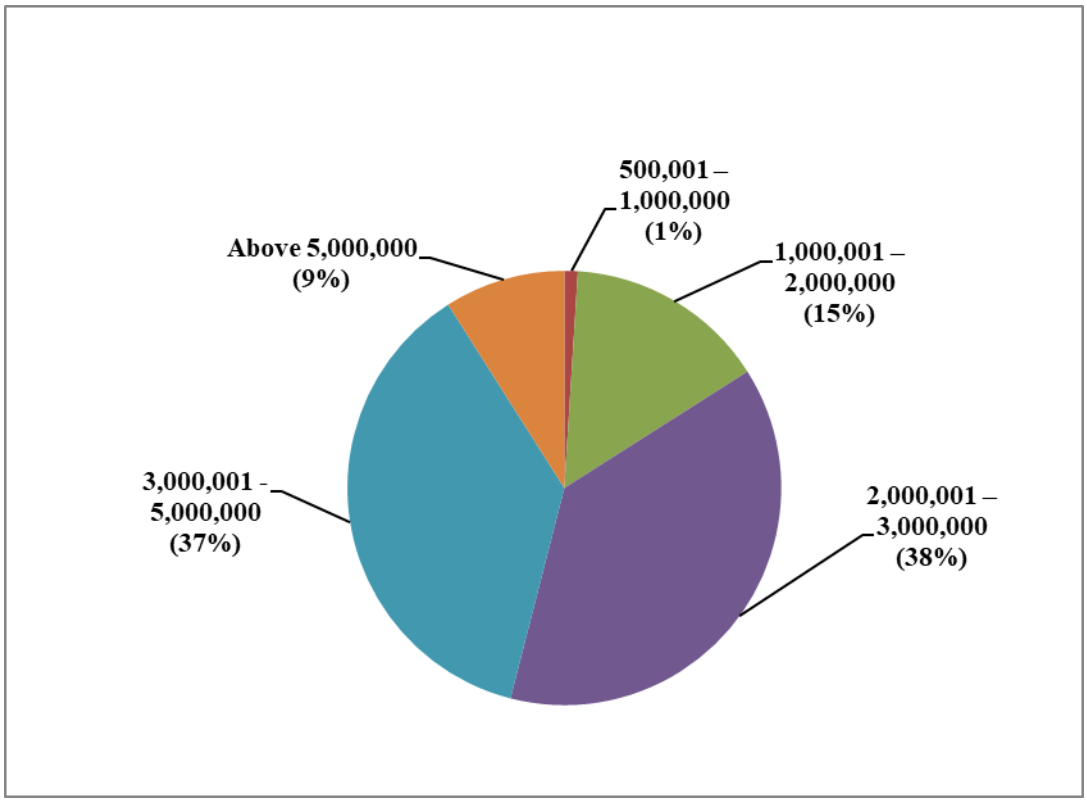

Figure 10.5: Percentage of income level at community

(v) Education

It is observed that 50% of respondents are 4th to 9th standards and 18% have the qualification up to secondary education level. About 19% have high education level and 12% have primary education level. Only 1% has the monastery education level.

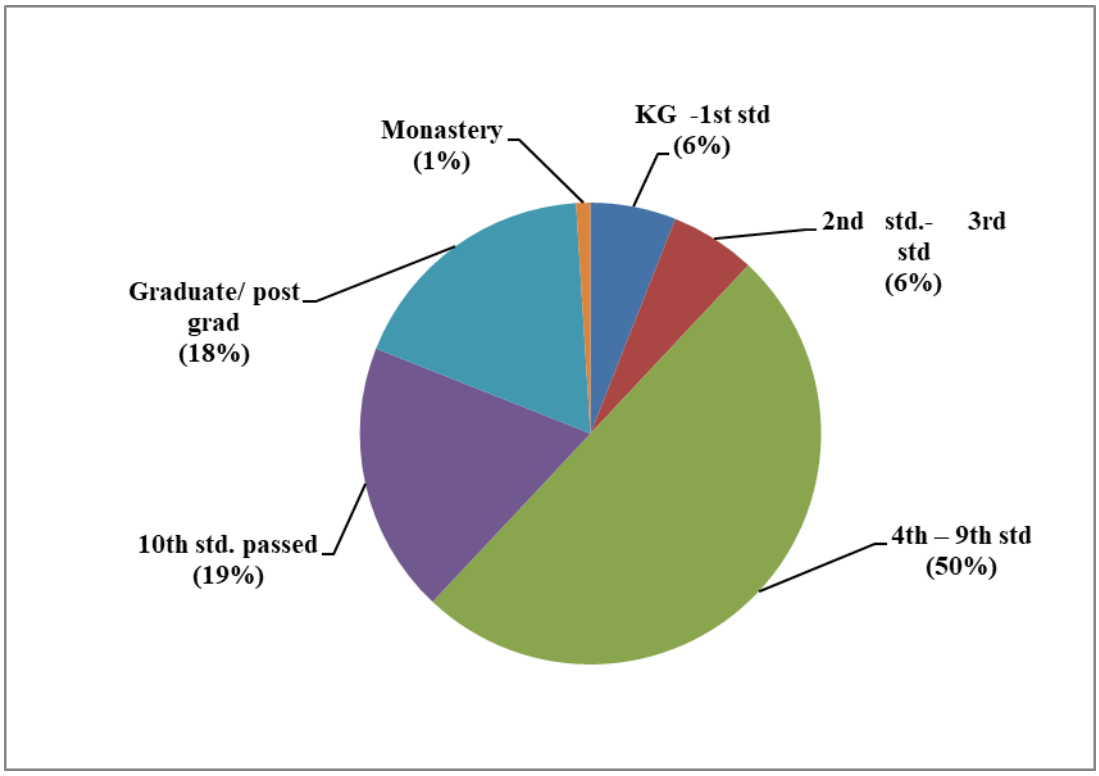

Figure10.6: Education level of respondents

Household Expenditures

The household expenditure of local people per month including tax, cooking fuel, education, diesel/petrol, transportation, telephone/mobile, entertainment, healthcare/medical expenditure, input investment, annual maintenance of house, loan repayment, cultural/religious expenses and food expenditures were analyzed. . For all these different categories, the following figure shows the outcomes of the respondents.

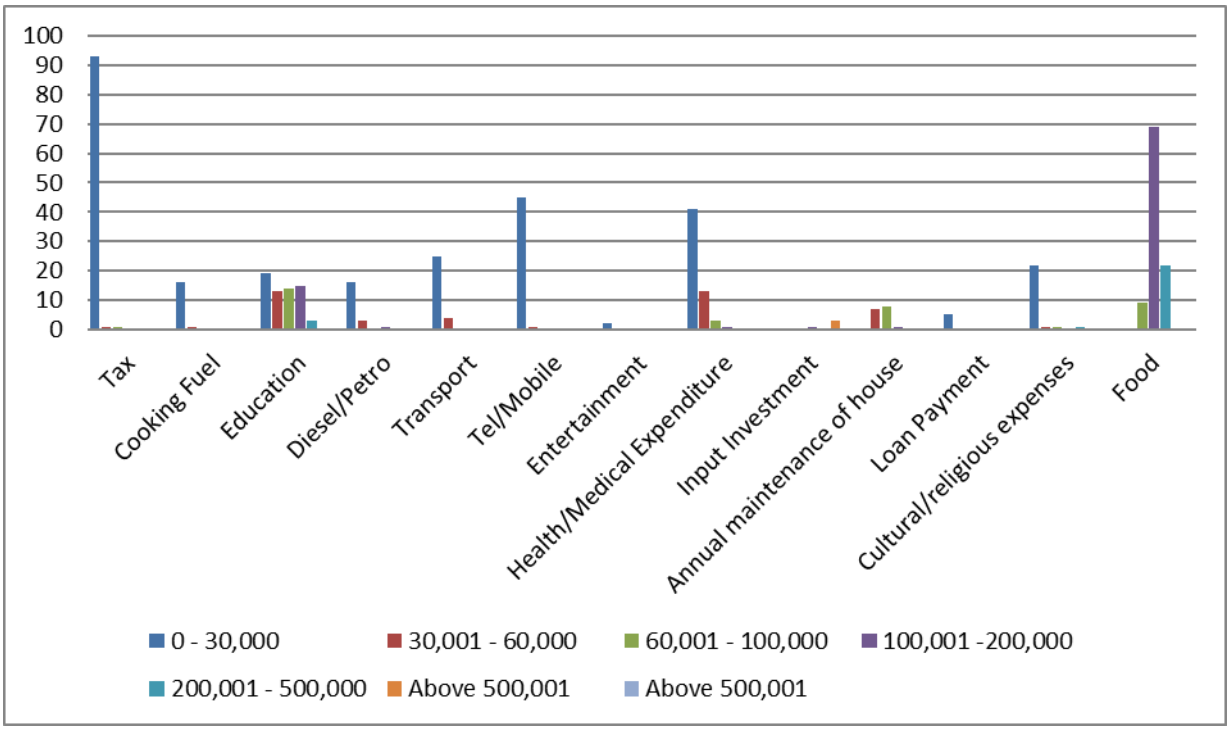

Figure 10.7: Percentage of household expenditures

Household health condition

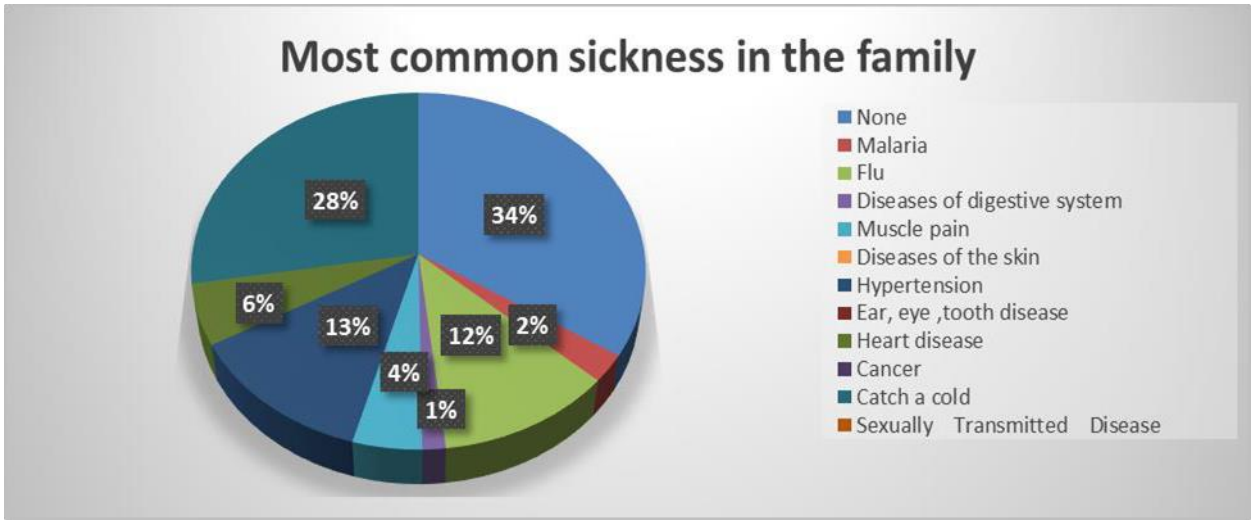

Figure 10.8: Health condition

According to the surveyed, the household members in each ward do not suffer from the high incidence of serious health issues or disability. The majority (98%) of those surveyed did not have any physical disability and 1% each for the mobility/walking and occupational. The 34% do not suffer from disease, 28% is catch a cold, 13% is hypertension, 12% is Flu, 6% is heart disease, 4% is muscle pain, 2% is malaria and the remaining 1% is cancer. The primary types of health services are from doctors' treatment (95%) and followed by health assistant (5%). Regarding mosquito net usage, 100% of respondents use the mosquito nets.

Household structure

It is observed that 40% households have their own house in the quarter while 60% households have no their own.. In

the below pie chart, 15% of houses have with two storey buildings, 68% of one storey and 5% of huts. Over 95% of houses were used CGI for roof and only 5% of houses were used thatch and tarpaulin for roof.

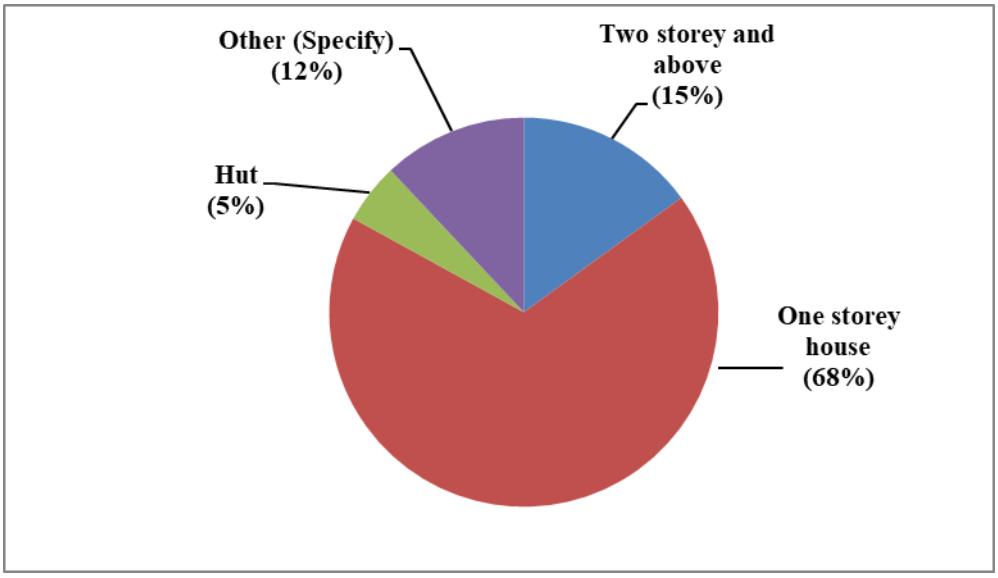

Figure 10.9: Household structure

Migration

Regarding migration, the living years of local people in this place including less than one year, one to three years, and three to ten years and above were analyzed. For all these different categories, the following figure shows the outcomes of the respondents. There is no household member leaving for work due to job scarcity in the past 12 months.

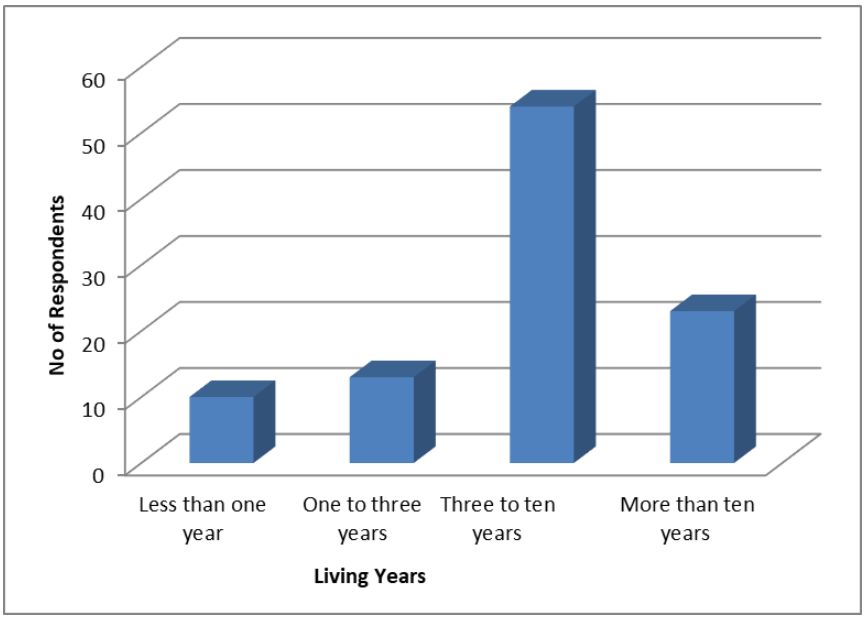

Figure 10.10: Living years

Possession of Land

While collecting the information of the possession of land by the households, it is observed that 40% of the households have their own land while 60% of respondents are tenants. Among the own land (40%), 39% of households have with

approval documents while remaining households have no documents but permission to stay.

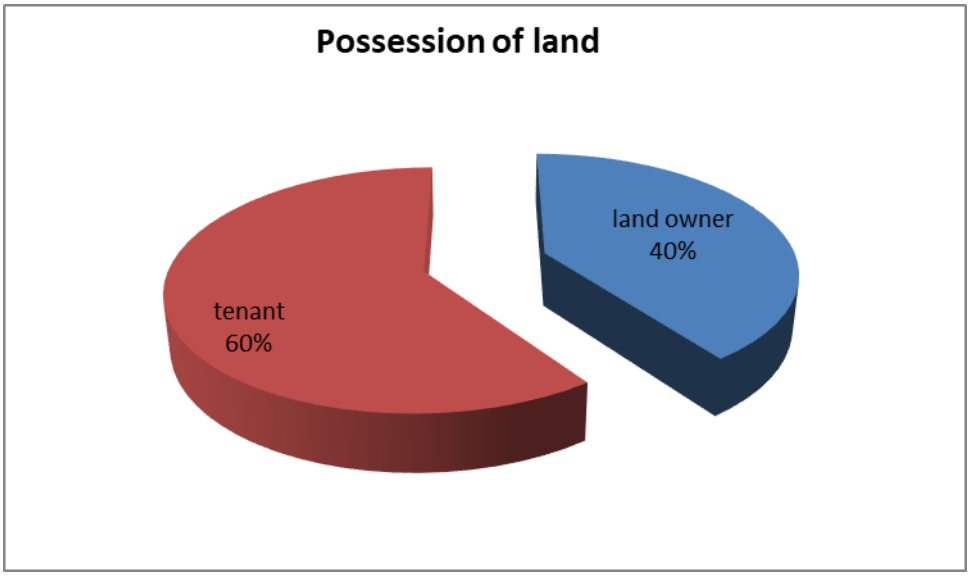

Figure 10.11: Percentage of land ownership

(vi) Livelihood activities

It was observed that the 33% of the respondents are company officer, 23% cottage industry, 12% small retail shop, 10% trading, 7% street vendor/hawker/green grocer, 5% government officer and only 4% homestead garden. The study shows that most of the households are not depending on livestock for livelihoods.

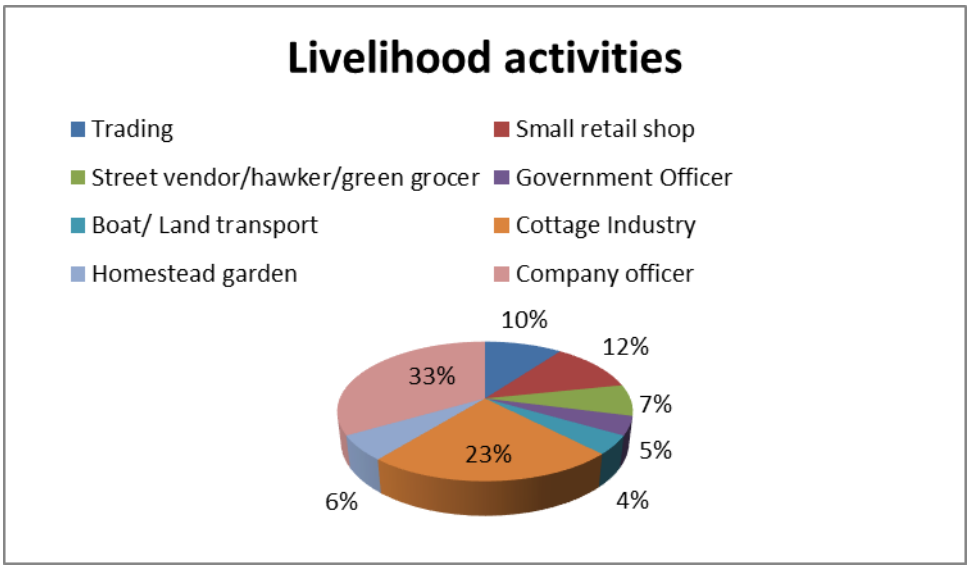

Figure 10.12: Percentage of livelihood activities

(vii) Health care availability and access to education for household members

Health and education including availability of health care and access to education for household members were analyzed. For these different categories, the following figure shows the outcomes of the respondents.

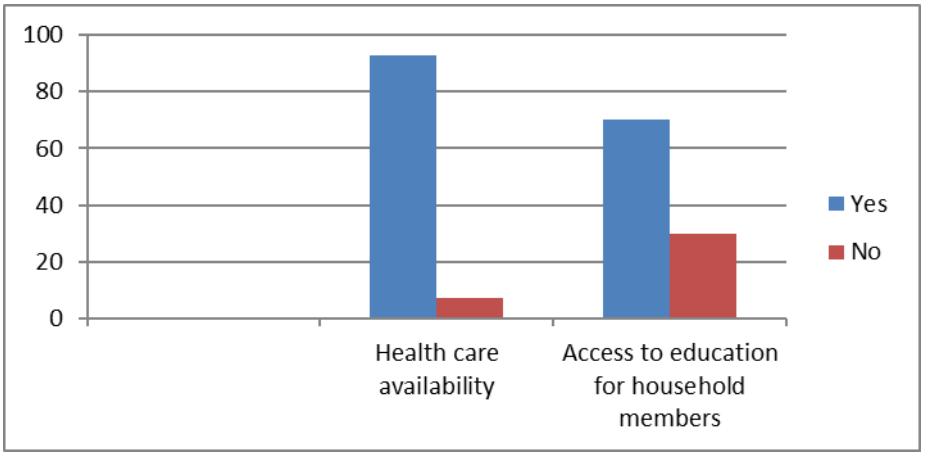

Figure 10.13: Perception on the impact on health and education

(viii) Sources of Electricity

It was observed that all of the households in Shwe Pauk Kan used public electricity.

Energy usage in cooking

The survey results showed that the various types of energy are being used for cooking by respondents including electricity (96%), charcoal/fuel wood substitute (3%) and other such as gas, kerosene and diesel (5%).

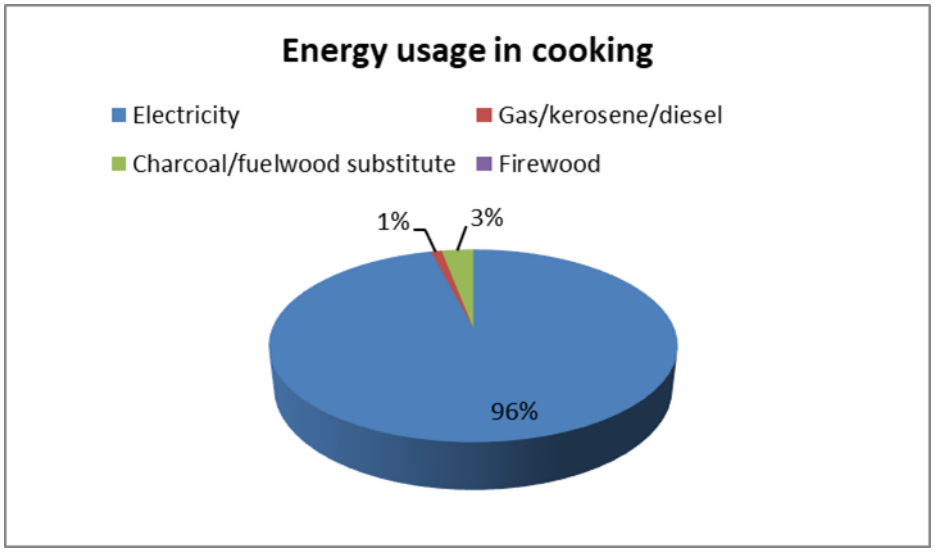

Figure 10.14: Percentage of energy use in cooking

(ix) Different sources of drinking water

Concerning to drinking water condition, only 3% household used purified drinking water. Most households use other sources of water for drinking such as public piped water (68%), tube well (34%). Some households use both public piped and tube well.

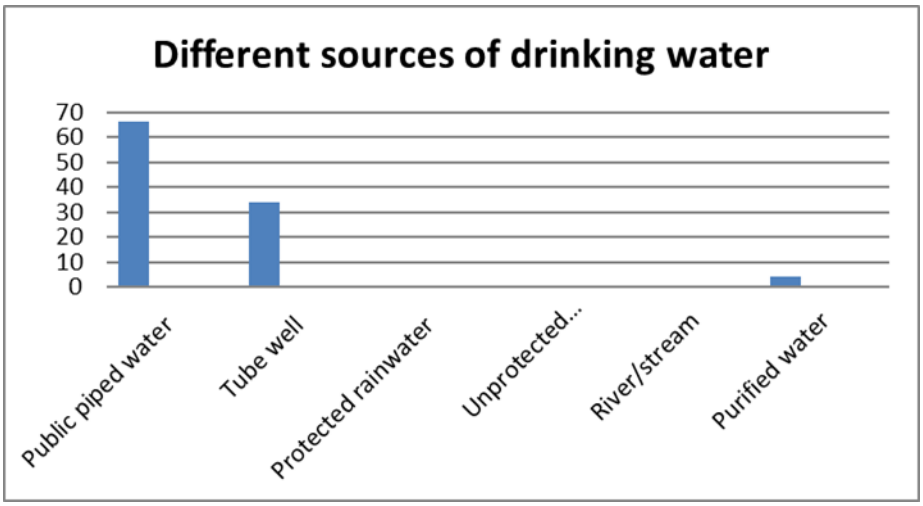

Figure 10.15: Different sources of water for drinking

(x) Drinking water treated and making water safe to drink

Among the outcomes of the respondents, 63% of local people treated drinking water while the remaining 37% didn't do that. Concerning local people who treated drinking water, the following figure showed that the various types of making water safe to drink including sedimentation 62%, filtration 3%, boiling 42% and with chlorine 1% were treated for drinking water.

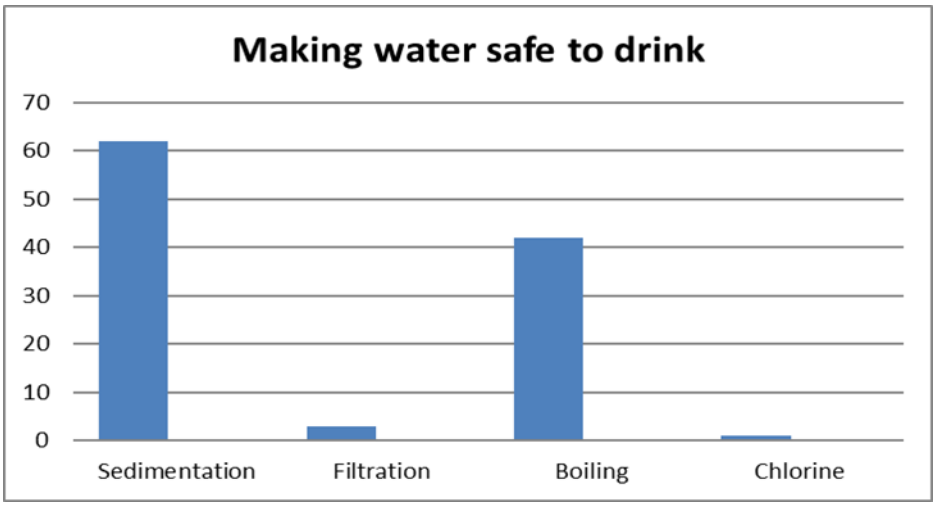

Figure 10.16: Making water safe to drink

(xi) General Environment

The study has identified the existing situation of the surrounding environment of the industry.

The questions related to the changes in capacity of water used, amount of water used, sanitation nearby household and solid waste on community disposal area were analyzed. The following figure shows the general issues related to the environment in current.

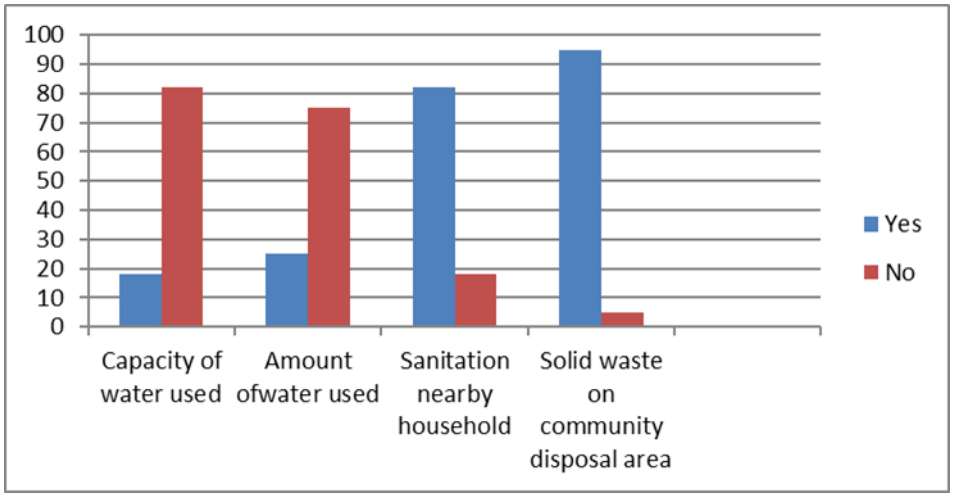

Figure 10.17: The issues of general environment

(xii) Commonly use in transportation

Regarding transportation, there are 50% of respondents used to travel by bus and only 3% used to travel by taxi. 56% of the total households use motorcycle and 15% use bicycle, trishaw. Some households usually use both bus and motorcycle in transportation.

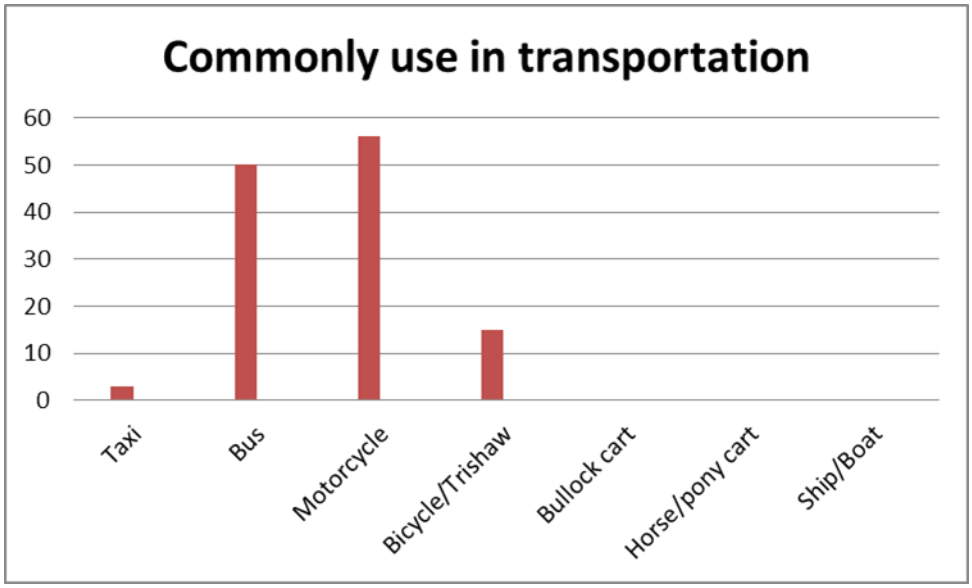

Figure 10.18: Commonly use in transportation

(xiii) Cultural aspect

The important decisions in the community are made by the village leader. The most important cultural tradition in the community is festivals. The following figure (10-19) shows the percent of the important cultural tradition in the community. The effect on cultural heritage is slightly positive because there is no historic building.

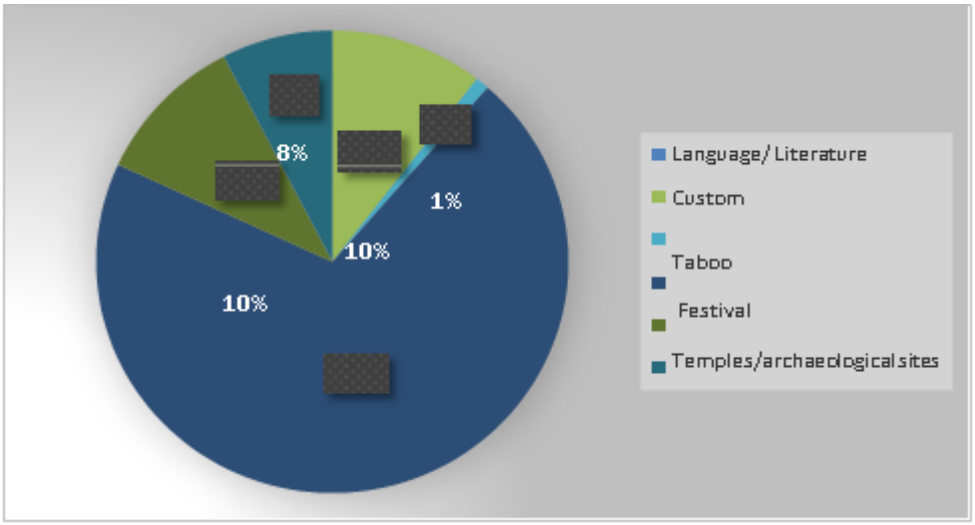

Figure 10.19: The percent of the important cultural tradition in the community

(xiv) Air, water and soil quality analysis

As the results of interview with the community, they said that water quality, soil quality and air quality have not changed until now. All the conditions of the natural environment are normal situation. Thus, it is observed that natural environment conditions are not significantly impacted by the industrial process.

Among the respondents, 59% of stakeholders said that the weather is more warming, 37 % said more cooler and the remaining 4% said that the weather condition is not changed. According to the perception of the stakeholders, the local climate becomes drier.

Awareness on the proposed factory

The chart represents the data about the awareness of the local people on the proposed project.

There are 87% of respondents do not know about the factory and 8% of the total households know a little and 5% know some information on the project through community leaders, friends and interviewers.

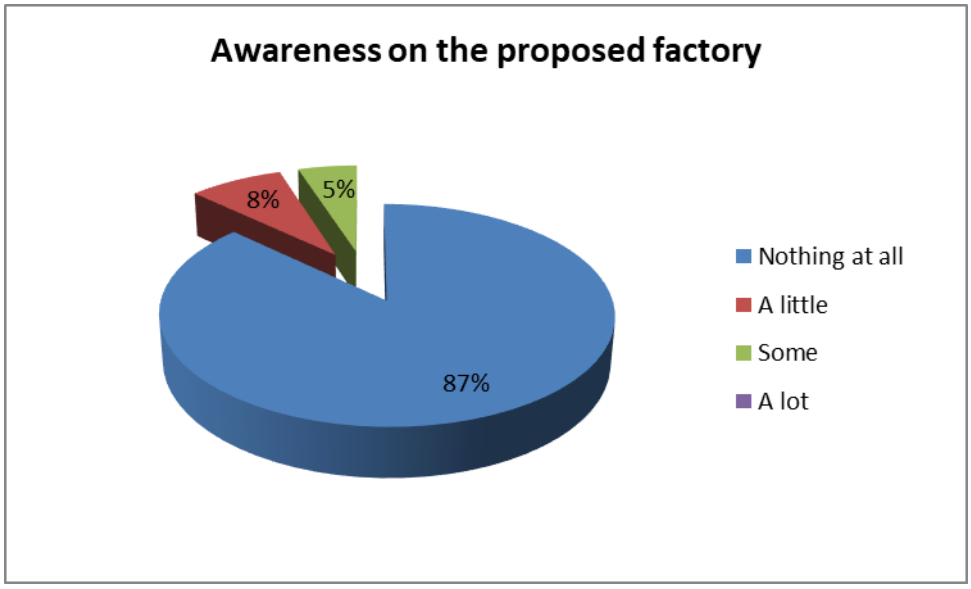

Figure 10.20: Awareness on the proposed project

(xv) Perception on the importance of industry

It is found out that 52% of the respondents mentioned that the existence of the industry is neutral to the community and 6% are unaware of how much the industry is important for the community. Then, 38% of the local people stated that the industry is important and 1% stated that the industry is very important for the community, but 1% mentioned that the industry is not important.

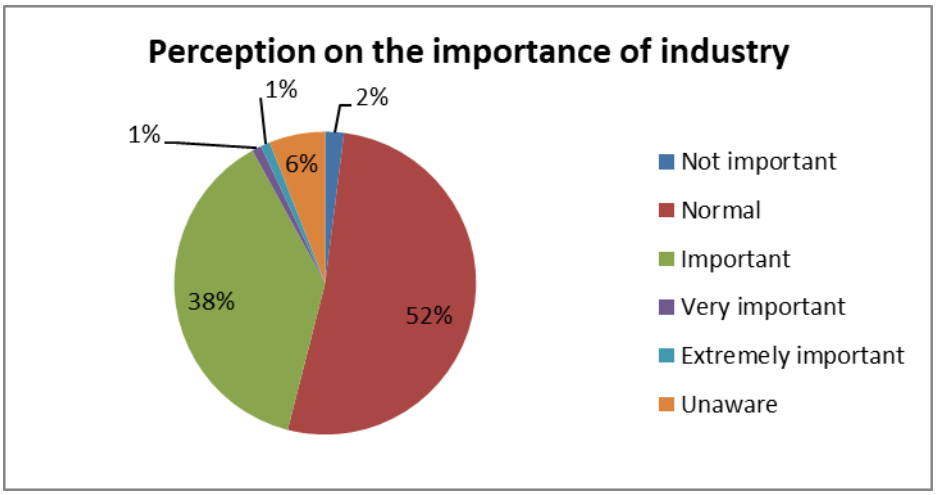

Figure 10.21: Perception on the industry

(xvi) Impact on the livelihood by the industry

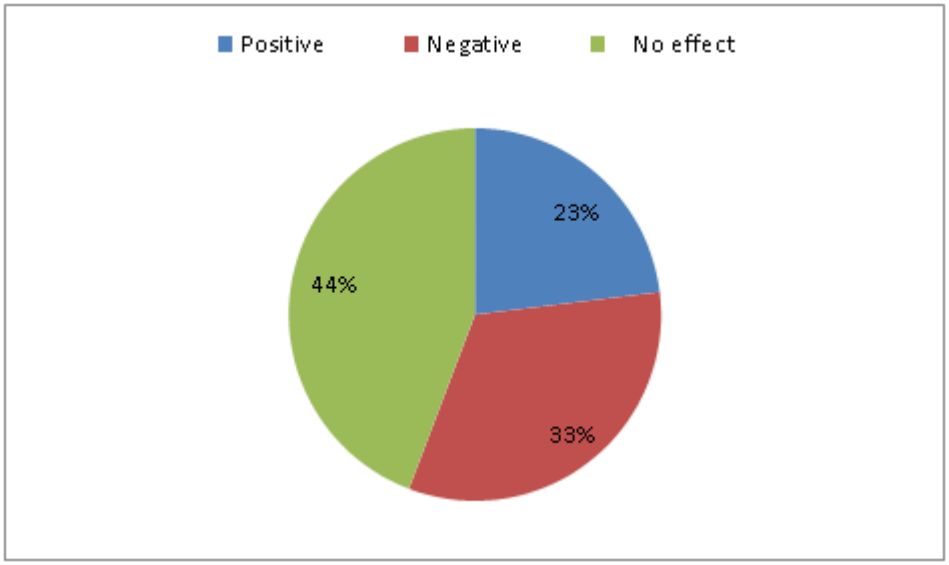

Figure 10.22: The percent of the impact on the livelihood by the industry

The chart shows the respondents' attitudes of the impact on the livelihood caused by the factory. Among the total households, 23% of respondents said that there is positive impact on the environment by the factory. However, 33% of the households said that it has some negative impact. Then, up to 44% of respondents mentioned that there is neither positive nor negative impact on the environment. Most of the local people have not been discussed about compensation from industry or project.

Positive Impacts on the community

The following figure shows the development and improvement of the community due to the existence of the proposed factory. According to the analytical results, 9% of the households showed that they are not aware how much the factory gives the improvement for their lives.

Concerning the improvement of the community due to the proposed factory provide, increased annual income (16%), increased employment (77%), improved living condition (5%), improved transportation (5%) and improved environment (2%).

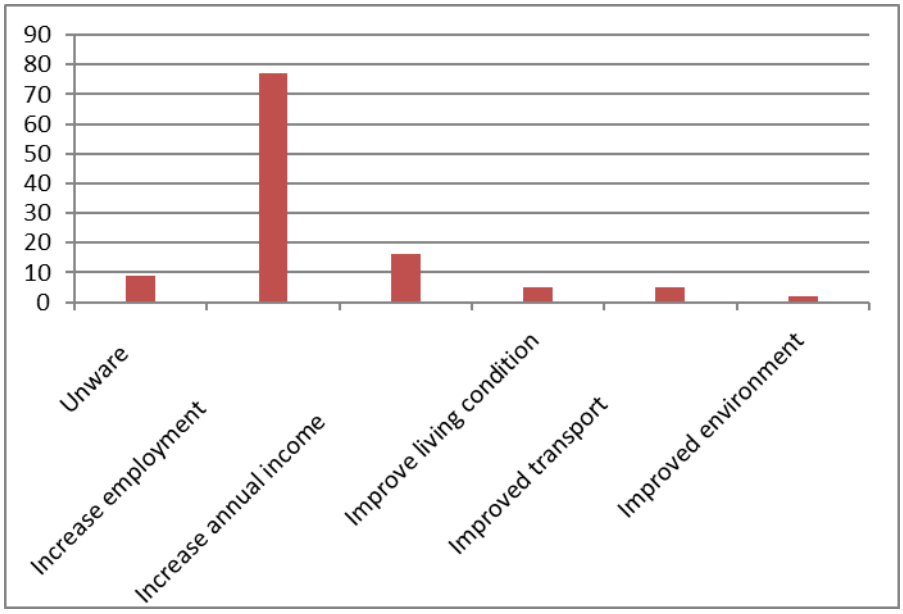

Figure 10.23: Perception on the positive impact by the industry

(xvii) Perception on the development of the project

Looking at the attitudes of the respondents towards the development of the industry, 89% of the respondents said that they agree with the development of the industry because of good opportunities and increased employment. 3% of the households do not agree whereas 8% are not sure for the development of the industry.

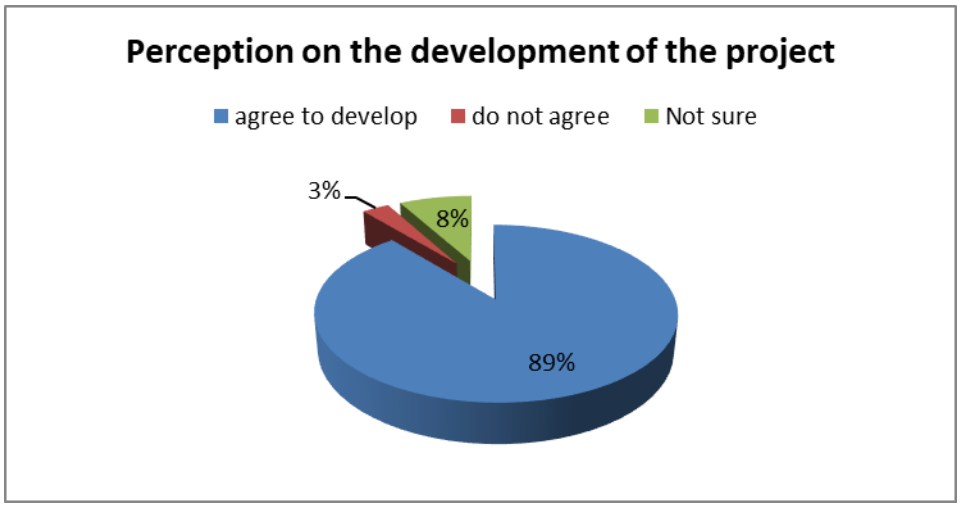

Figure 10.24: Perception on the development of the project

(xviii) Negative Impacts on the community

According to the analytical results, 58% of the households showed that they are not aware how much the negative impacts from the factory may affect their environment.

The negative impacts of the community due to the proposed factory provide negative social environment 6%, environmental pollution 29%, safety 2%, damaged environment 11%, income disruption 2% and health 7%. Some respondents give two or three outcomes for these categories. 85% of the local people were not worried about outside people coming to your community to work on the construction and maintenance of the project.

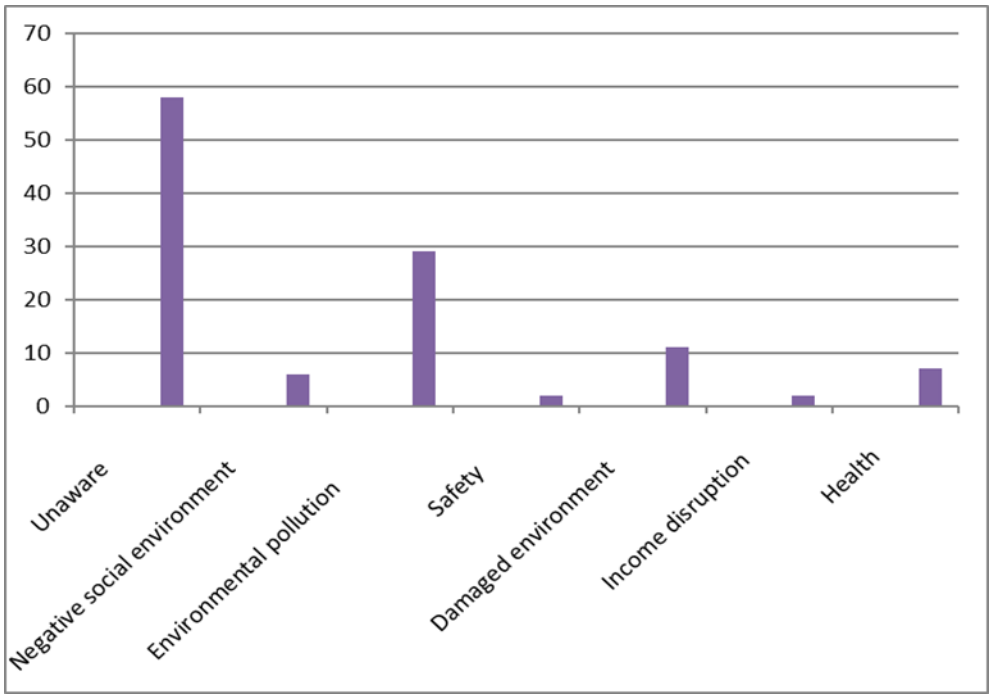

Figure 10.25: Negative Impacts on the community

(xix) Perception on the industrial impact on the quality of life

According to the outcomes of respondents, there are some development priorities for their community including road transport, waste, sanitation, and hygiene, health care and so on. And then, 50% of the local people answer that the most negatively affected groups by the industry within the community are unskilled workers and followed by children 35%, women10% and other 6%.

Perception on the socio-economic impacts by the factory

1.The effect on physical resources

Regarding the effect on physical resources including soil quality, surface water quality, ground water quality, air quality and noise, the following figure shows the outcomes of the respondents.

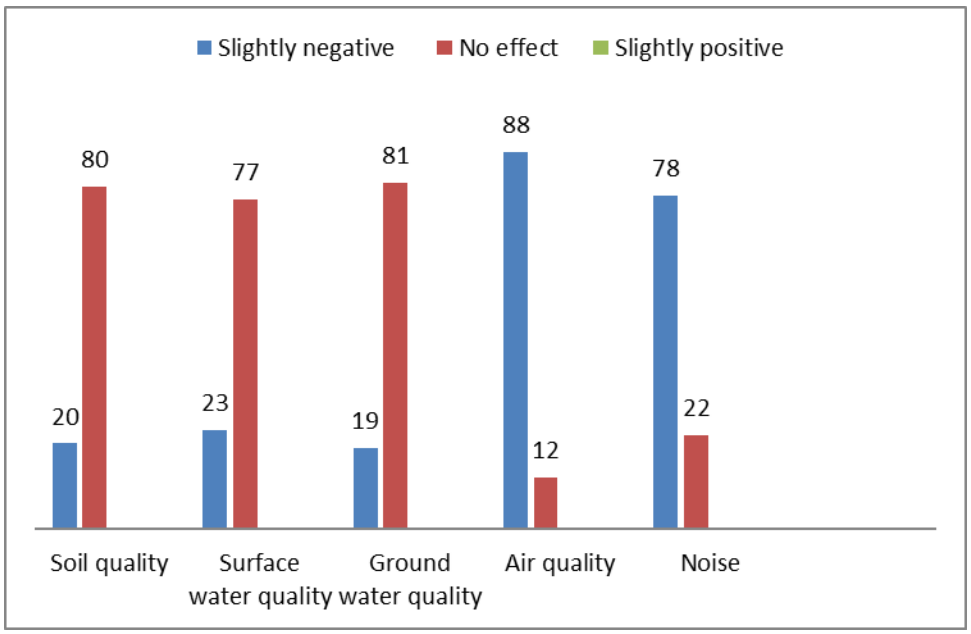

Figure 10.26: Perception on the impact on physical resources

2.The effect on biological resources

In summary, the following figure presented the community perception on effect of the factory development on biological resources especially forestry, agriculture, local animals, pasture and aquatic animals.

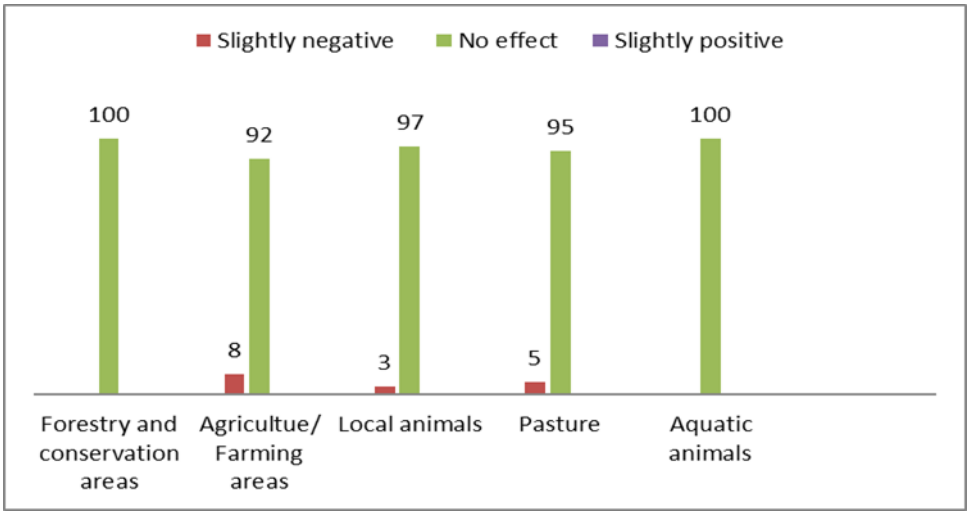

Figure 10.27: Perception on the impact on biological resources

3.The effect on Human Use

The following figure shows the effect on human use including local fisheries, local livestock, local vegetation, local industry, local transportation, local price, recreation and local economy.

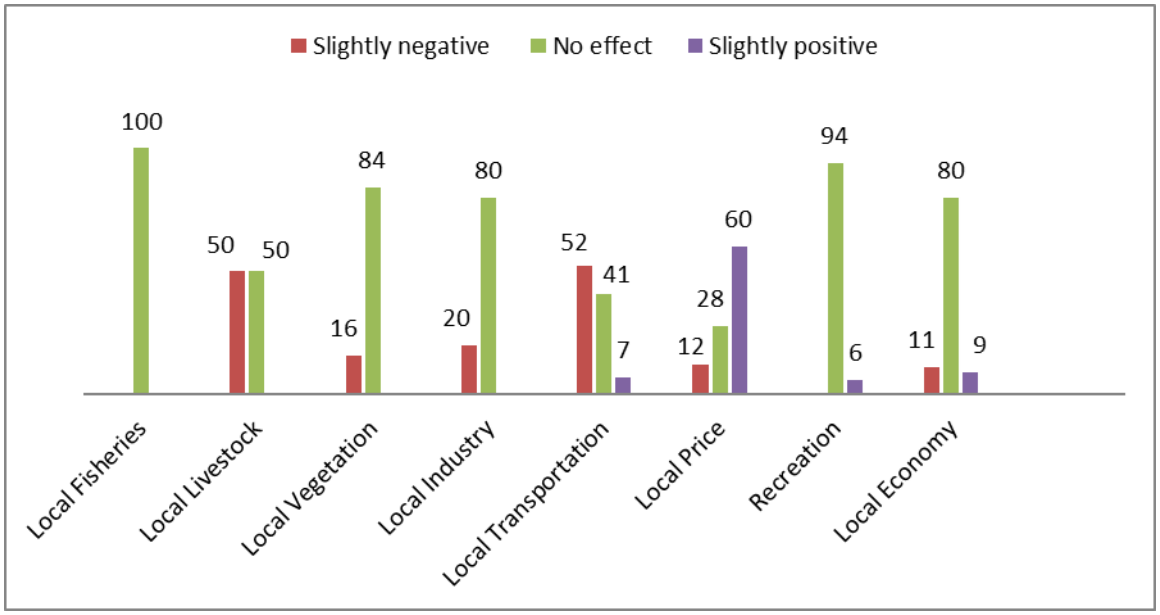

Figure 10.28: Perception on impact of human use by the factory

4. Effect on the quality of life

The quality of life is also considered as the main issue in the social impact assessment. In this regard, there are (11) different categories divided for the analysis of the quality of life as shown in the following figure.

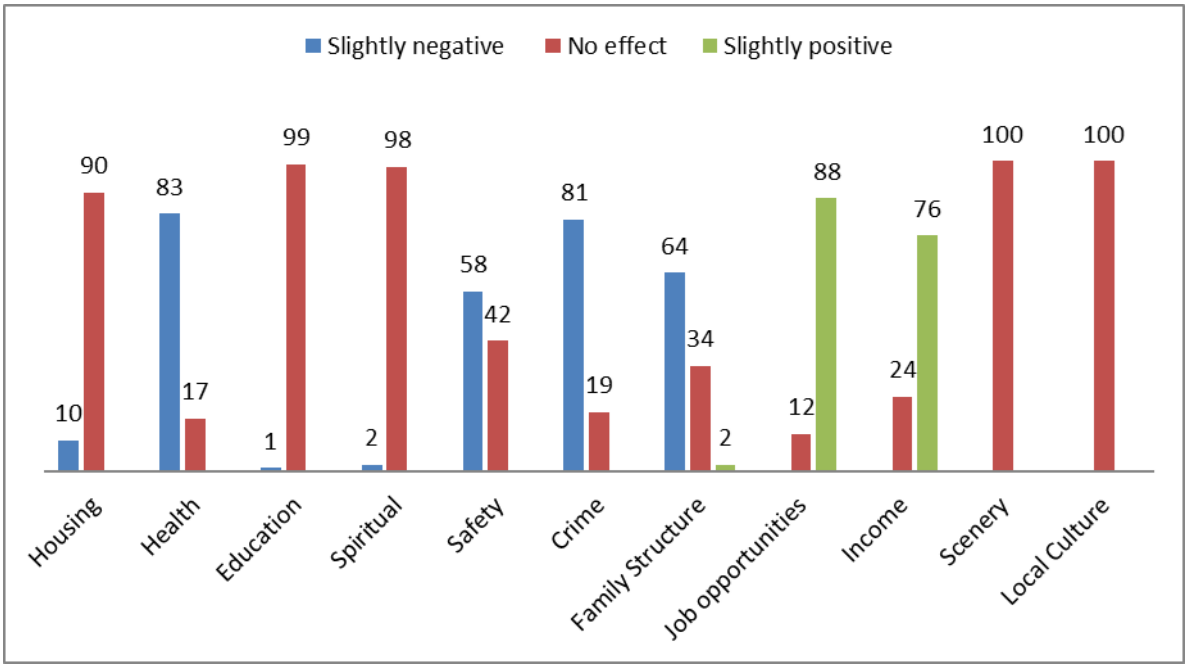

Figure 10.29: Perception on impact of the quality of life

5. Effect on cultural heritage

The effect on cultural heritage is also considered as a common factor for the impact by the industry. In the issue of the cultural heritage, the main three different parameters including religious building, cemetery and historical buildings were analyzed. The figure shows the community perception on the cultural heritage and impact by the industry.

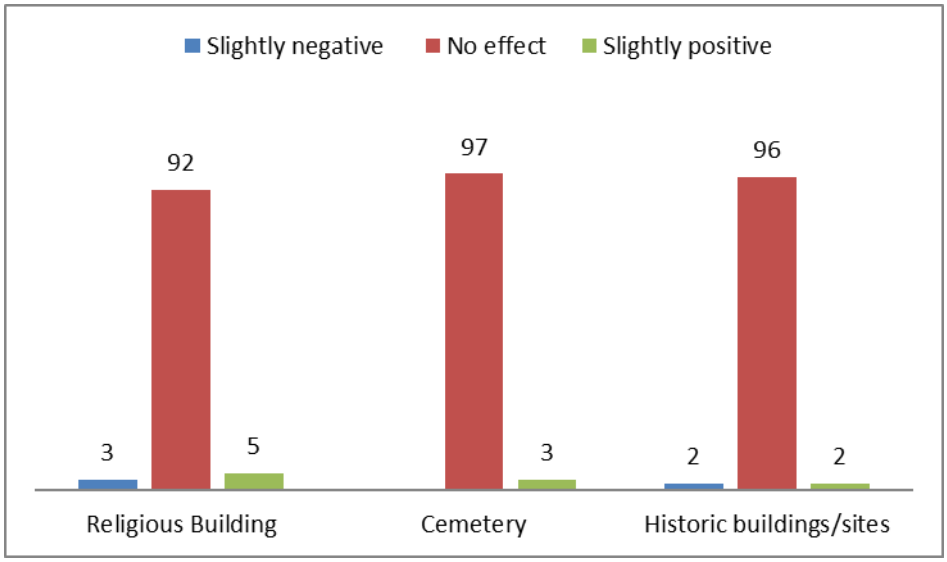

Figure 10.30: Perception of the impact on cultural heritage

6. Estimation of socio-economic impact likely affected by the factory operation

The following methodology has been applied to assess the socio-economic impacts of the factory during construction, operation and decommissioning phases mainly on livelihoods, education, infrastructure, water quality, physical resources, biological resources, human use, quality of life and cultural heritage. Each source of impacts has been assessed by two parameters namely magnitude and Probability along with five scores assessment as well. Detail methodology can be seen in annex (A).

Table 10.4: Impact Assessment Parameters and its scores

Assessment	Score				
	1 (very low)	**2 (Low)**	**3 (Medium)**	**4 (High)**	**5 (Very High)**
Magnitude	Insignificant	Small and will have on the socio- economic environment	Moderate and will result in minor changes on community	High and will result in significant changes on community	Very high and will result permanent changes on community
Probability	Insignificant	Little socio-economic challenges	Indirect Socio-economic challenges	Direct socio-economic challenges	Direct and significance socioeconomic challenges

Then, significant rating is calculated by the following formula.
Significant point = Magnitude x Probability
Impact Significance Level: Based on the calculated significant point, impact significance can be categorized as follows;

Table 10.5: Impact Significance Levels

Risk level	Rating	Definition
Very low	1-3	No impacts occur.
Low	4-9	Acceptable level without controlling impacts/ does not require additional management.
Medium	10-16	Acceptable level/but must be controlled to prevent increased risk to unacceptable levels.
High	17-25	Unacceptable level/ the impact must be managed/must be reduced to an acceptable level.
Very High	Above 25	Unacceptable level/ the impact must be managed/ reduced to an acceptable level immediately.

Table 10.6: Analysis of Socio-economic Impact

(a) Construction phase

No.	Socio-economic impacts	Significance of potential socioeconomic impacts			Impact significance
		Magnitude	Probability	Impact significance	
The effect on Physical Resources					
1	Soil quality	3	3	9	Low
2	Surface water quality	2	2	4	Low
3	Ground water quality	3	4	12	Medium
4	Air quality	3	4	12	Medium
5	Noise	3	4	12	Medium
Effect on Biological Resources					
6	Forestry and conservation Areas	2	3	6	Low
7	Agriculture/Farming areas	3	3	9	Low
8	Local animals	1	2	2	Very low
9	Pasture	1	2	2	Very low
10	Aquatic animals	1	2	2	Very low
Effect on human use					
11	Local fisheries	1	2	2	Very low
12	Local livestock	1	2	2	Very low
13	Local vegetation	3	3	9	Low
14	Local industry	1	2	2	Very low
15	Local transportation	3	4	12	Medium
16	Local price	1	2	2	Very low
17	Recreation	1	2	2	Very low
18	Local economy	1	2	2	Very low
Effect on Quality of life					
19	Housing	1	2	2	Very low
20	Health	1	2	2	Very low
21	Education	1	2	2	Very low
22	Spiritual	1	2	2	Very low
23	Safety	3	3	9	Low
24	Crime	3	3	9	Low
25	Family Structure	3	3	9	Low
26	Job opportunities	3	4	12	Medium
27	Income	2	3	6	Low
28	Scenery	1	2	2	Very low
29	Local culture	1	2	2	Very low
Effect on Cultural Heritage					
30	Religious building	1	2	2	Very low
31	Cemetery	1	2	2	Very low
32	Historic buildings	1	2	2	Very low

(b)Operation phase

No.	Socio-economic impacts	Significance of potential socioeconomic impacts			Impact significance
		Magnitude	Probability	Impact significance	
The effect on Physical Resources					
1	Soil quality	3	3	9	Low
2	Surface water quality	2	2	4	Low
3	Ground water quality	3	4	12	Medium
4	Air quality	3	4	12	Medium
5	Noise	3	4	12	Medium
Effect on Biological Resources					
6	Forestry and conservation Areas	1	2	2	Very Low
7	Agriculture/Farming areas	1	2	2	Very Low
8	Local animals	1	2	2	Very low
9	Pasture	1	2	2	Very low
10	Aquatic animals	1	2	2	Very low
Effect on human use					
11	Local fisheries	1	2	2	Very low
12	Local livestock	1	2	2	Very low
13	Local vegetation	1	2	2	Very Low
14	Local industry	1	2	2	Very low
15	Local transportation	3	3	9	Low
16	Local price	1	2	2	Very low
17	Recreation	1	2	2	Very low
18	Local economy	1	2	2	Very low
Effect on Quality of life					
19	Housing	1	2	2	Very low
20	Health	1	2	2	Very low
21	Education	1	2	2	Very low
22	Spiritual	1	2	2	Very low
23	Safety	3	3	9	Low
24	Crime	3	3	9	Low
25	Family Structure	3	3	9	Low
26	Job opportunities	3	4	12	Medium
27	Income	2	3	6	Low
28	Scenery	1	2	2	Very low
29	Local culture	1	2	2	Very low
Effect on Cultural Heritage					
30	Religious building	1	2	2	Very low
31	Cemetery	1	2	2	Very low
32	Historic buildings	1	2	2	Very low

(c) Decommission phase

No.	Socio-economic impacts	Significance of potential socioeconomic impacts			Impact significance
		Magnitude	Probability	Impact significance	
The effect on Physical Resources					
1	Soil quality	3	3	9	Low
2	Surface water quality	2	2	4	Low
3	Ground water quality	3	4	12	Medium
4	Air quality	3	4	12	Medium
5	Noise	3	4	12	Medium
Effect on Biological Resources					
6	Forestry and conservation Areas	2	3	6	Low
7	Agriculture/Farming areas	3	3	9	Low
8	Local animals	1	2	2	Very low
9	Pasture	1	2	2	Very low
10	Aquatic animals	1	2	2	Very low
Effect on human use					
11	Local fisheries	1	2	2	Very low
12	Local livestock	1	2	2	Very low
13	Local vegetation	3	3	9	Low
14	Local industry	1	2	2	Very low
15	Local transportation	3	4	12	Medium
16	Local price	1	2	2	Very low
17	Recreation	1	2	2	Very low
18	Local economy	1	2	2	Very low
Effect on Quality of life					
19	Housing	1	2	2	Very low
20	Health	1	2	2	Very low
21	Education	1	2	2	Very low
22	Spiritual	1	2	2	Very low
23	Safety	3	3	9	Low
24	Crime	3	3	9	Low
25	Family Structure	3	3	9	Low
26	Job opportunities	3	4	12	Medium
27	Income	2	3	6	Low
28	Scenery	1	2	2	Very low
29	Local culture	1	2	2	Very low
Effect on Cultural Heritage					
30	Religious building	1	2	2	Very low
31	Cemetery	1	2	2	Very low
32	Historic buildings	1	2	2	Very low

10.7 Socio-Economic Impact Assessment on the community

The primary data (survey data) was used to assess socio-economic impacts on the local communities. According to the analysis of socio-economic data, most of the impacts on

socioeconomic is not significant. . The effect on physical resources namely soil quality, surface water and ground water quality and air quality have low impacts due to the proposed factory. But, the impact on noise quality has medium range because of the operation activities. There will be very low effect on human use, quality of life and cultural heritage.

As the result of analysis, most of the project activities have no significant impact on the environment, livelihood and cultural heritage while some medium impacts which are need to be improved for environmental performance such as job opportunities. However, all these impacts are low scale and can be mitigated accordingly. The mitigation measures are detailed in the chapter (6): Impact assessment and mitigation measures and chapter (9). Environmental management plan accordingly.

Presentation by U Pyi Soe Win (Project manager, Lluvia Confectionery Factory)

Presentation by Dr. Ohnmar May Tin Hlaing (Managing Director, EQM)

Question by U Ye Min Aung (Health and Safety Officer, Myanmar Padauk Co., Ltd)

Question by U Kyaw Lwin (Vice President, Yangon Industrial Park)

Discussion by Daw Kyawt Kay Paing (Deputy Staff Officer, Environmental Conservation Department)

Question by U Kyaw Sein Oo (General Manager, GIDA Co., Ltd)

Question by Daw Kay Thi (HR, Yathar Cho, Co., Ltd)

Question by U Aung Myo Thant (QHSE Director, Piti Pyay Sone Co., Ltd)

Figure 10.31: Stakeholder meeting

Figure 10.32: Socio-Economic Interviews with Key Informants

Figure 10.33: Socio-Economic Interview with household members

10.8 Further Engagement

Continual engagement is an important part of the Project. The Lluvia confectionary factory will disclose PC Meeting Minute, Presentation about the factory and this IEE Report to nearest factories and local communities. Engagements are undertaken periodically with local communities to ensure that they are informed on the Project and to present the results of the grievance mechanism. The Lluvia confectionary factory will distribute PC Meeting Minute Results, and IEE report (within 1 month of approval period) to nearest factories and local communities (Yangon Industrial Zone

and nearby factories) through the methods described in section **10.9 Disclosure.**

10.9 DISCLOSURE

The IEE has been disclosed in compliance with EIA procedure. The Lluvia confectionary factory will disclose the report via Lluvia confectionary' factory official website ***www.cdsq.com.mm*** in Myanmar. The Lluvia confectionary factory will distribute IEE report to the local communities (nearby villages, Yangon Industrial Zone and any other interested parties through VDAC and community volunteers within 1 month of approval period. The Lluvia confectionary factory is planning publicly disclosure of project information to the local community through

1. Volunteers who are factory workers
2. Notice boards outside the factory
3. VDA Committee
4. Telephone communication
5. Post-boxes on the fence of the factory
6. Disclosures in Newspaper

10.10 Corporate Social Responsibility (CSR) of Lluvia limited (Confectionary Factory)

Corporate Social Responsibility (CSR) are formulated and to be implemented by Lluvia limited (Confectionary Factory) 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 (Confectionary Factory) appointed to the nearest community as a first prioritize for employment. Lluvia limited (Confectionary Factory) use (2) % of the net profits of the company.

Table 10.7 CSR plan of Lluvia limited (Confectionary Factory)

Area	Activities	Contribution (%)	Plans
Health	Healthcare for employees and their family	0.5 %	- Medical check-up 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 10.8 Detailed plans for CSR activities in Lluvia limited (Confectionary Factory)

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

10.10.1 Additional actions taken to support Corporate Social Responsibility (CSR)

Lluvia Limited (Confectionary) shall allocate 2% of net profit for a CSR Fund to be used for CSR purposes.

(1) Activities to benefit the Employees (Safety Equipment, Canteen, Staff loans, Medical Insurance)
(2) Activities to benefit the regional community (Scholarship for the children of employees, Say Ta Nar (Free) Clinics in connection with the Public Health Foundation)
(3) Activities to benefit all of Myanmar (Emergency Relief for Flood/ Disaster recovery)

Chapter 11

Conclusions

11.Conclusions and recommendations

The IEE and EMP for the Lluvia confectionery factory was carried out based on the extensive literature surveys, baseline existing environmental monitoring, public consultation meetings with the respective stakeholders including administrative personnel, the factories nearby, local community and interested persons etc. and socio-eco surveys along with consultation with the community.

As defined in chapter (5), in-depth environmental existing baseline situations were assessed. This project has defined all environmental and social impacts associated with the construction, operation and decommission phase of the confectionary factory.

The characteristics of the proposed factory particularly its medium significance of the potential environmental impacts (air, noise, waste) on the working community and the nearest environment can be reduced and prevented by complying with the mitigation measures.

Based on the impact assessment made in chapter (6), the environmental management plan in chapter (8) together with the significant appropriate mitigation measures and plans on environmental monitoring along with emergency response plans chapter (9) were developed accordingly.

In conclusion, EQM has considered that:

- The prevention and mitigation measures defined are capable of providing the appropriate environmental management system to ensure that environmental and social impacts are prevented or minimized.

- As explained in chapter (8) and (9), the EMP on the various environmental issues are capable of detecting and solving the potential emergencies including LPG management that likely occur at the confectionary factory.

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 confectionary factory to carry out its operation activities in accordance with the Myanmar environmental rules and regulations; International practices, and Health and safety regulations.

- In conclusion, this report gives the Lluvia confectionary factory employers the guidance and framework in order to maintain the sustainable green development, provide their employees with a workplace free from recognized hazards and review the compliance with Myanmar environmental rules and regulations; environmental management plans, mitigation measures and monitoring programmes accordingly.

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Annex (A)

Methodology for Environmental sampling

1. Ambient air monitoring instrument

The air monitoring survey will use the HAZ-SCANNER EPAS Wireless Environmental Perimeter Air Monitoring Station. (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, PM10 and PM2.5 impactors would be used for 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 is annually calibrated and 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 Ambient air monitoring

(i) The sensor intakes

The survey would deploy the sensor intakes based on the sitting criteria as specified. 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 and gases 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: PM10, PM2.5 } USEPA Criteria air pollutants
2) Gases: NO2, SO2, CO, VOC, NH3, CH4, O3, CO2, H2S
3) Atomic Radiation
4) Meteorology: Temperature, Relative Humidity, Wind Speed, Wind Direction which can have the influence on both local and regional air quality

(I) Particulates

Sr	Parameters	Sensors	Detection limit
1	**TSPM, PM10, PM2.5**	**90 degree Infra Red Light Scattering**	0 to 5000 µg/m3

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.

(II) Gases
Calibration: ppm equivalent change/year in lab air (24month warranted)

Sr	Parameters	Sensors	Detection limit
1	NO2	Electrochemical	(0-5000) ppb
2	SO2	Electrochemical	(0-5000) ppb
3	CO	Electrochemical	(0 -10,000) ppb
4	NH3	Electrochemical	(0 -100) ppm
5	H2S	Electrochemical	(0 -25) ppm
6	VOC	Photoionization	0 to 50,000 ppb
7	CO2	NDIR	0 to 5000 ppm
8	Methane	NDIR	0 to 1% Vol,0 to 10,000 ppm,0 to 20% LEL
9	**O3**	Metal oxide semiconductor (MOS),	(0 -150) ppb

(III) Meteorology (EPAS Meters)

Sr	Parameters	Sensors	Detection limit
1	Temperature, Detection limit -)/ (-20□C - 60□C)	NTC	(-20 to 60 C)/ (-4□ to 140□F
2	Relative Humidity	CAP	(0-100)%
3	Wind Speed (sensor:), Detection limit -	3-cup anemometer a	(0 – 125 mph)
4	Wind Direction	Continuous rotation potentiometric wind direction vane	(5 – 355)degrees

(IV) Atomic Radiation

Sr	Parameters	Sensors	Detection limit
1	Atomic/Nuclear Radiation	Geiger counter	Geiger counter

References:

ENVIRONMENTAL PROTECTION AGENCY (US EPA), 40 CFR Appendix E to Part 58, Probe and Monitoring Path Siting Criteria for Ambient Air Quality Monitoring https://www3.epa.gov/ttnamti1/files/ambient/longpath/fropenph.pdf

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1 Baseline ambient noise monitoring methodology

Baseline ambient noise monitoring was conducted at five (5) locations within (2-4) km of the proposed project site.

The locations of monitoring sites are presented as follows:

Table 1.1- Air monitoring locations for the baseline survey

Point	Locations	Coordinates	
		N	E
1	LPG Tank (Location 1)	16˚56' 42.54"	96˚11'43.47"
2	Inside the factory building (Location 2)	16˚56' 42.10"	96˚11' 40.33"
3	Downwind of the project site (Location 3)	16˚56' 40.65"	96˚11' 46.11"
4	The project compound (Location 4)	16˚56' 40.34"	96˚11' 33.28"

1.2 Ambient noise monitoring instrument

Noise Monitoring

Noise monitoring (db(A)) was conducted at the ***selected location*** that can ***reflect the exposure*** of the nearest local community and sensitive locations and duration and frequency were ***24hr continuously for (three) consecutive days*** at each site respectively using the Sound level Meter (Model: SL-4023SD) along with SD card real time data recorder (USB/RS232)**.**

The monitoring procedures, data analysis and interpretation were carried out in accordance with the guidelines of USEPA and the operational manufacture.

References:

Noise measurement methodologies
https://www.ehp.qld.gov.au/licences-permits/.../noise-measurement-manual-em1107.p.

U.S. EPA BASE STUDY STANDARD OPERATING PROCEDURE, Environmental Health & Engineering, Inc. 60 Wells Avenue Newton, MA 02159-3210
US EPA, https://www.epa.gov/sites/production/files/2014-08/documents/indoor.pdf

1 Groundwater Sampling Methodology

1.1 Sampling Location

Baseline ground water sampling was conducted at three (3) locations of the proposed project site. The locations of monitoring sites are presented as follows:

Table-1.1 Water sample locations for the baseline survey

ID	Date	Coordinates	
		Northern	Eastern
GW-1	24.8.2018	16° 56' 42.22"	96° 11' 39.89"
GW-2	24.8.2018	16° 56' 42.98"	96° 11' 41.67"
GW-3	24.8.2018	16°56' 39.49"	96°11' 37.61"

1.2 Preparation before leaving for the field site.

Sample bottles and sampling dipper were washed and cleaned with purified water as well as deionized water for three times, filled preservatives if needed and capped securely. These procedures were unnecessary for the sample bottles sent by the international lab as all bottles were already prepared and sealed.

Prepare the one page check list for the list of water parameters to be tested, label sample parameters, site identification code and a field date and time on the bottles.

1.3 Sampling procedure and sampling device

In each location, one (1) sampling were carried out at approximately the same time to identify the variability in all sampling and analysis system.

Gloves and sampling dipper

In general, water samples were collected using clean sampling dipper in order to avoid sample contamination from other sources according to the standard operation procedures.

Before sample collection, appropriate measures including wearing of disposable and powder less gloves and rinsing of sampling dipper with native water were carried out so as to condition, or equilibrate to the sample environment and make sure that all cleaning-solution residues have been removed.

Ground-water-sampling is mainly based on site-specific conditions.

(a) Dug well

Firstly, dug well water was collected by a bucket being currently used in the well (metal, plastic, wood). Then water in the bucket was collected by sampling dipper and transferred into sample bottles.

(b) Tube well (Shallow well Deep well)

The sample was taken at the closest access to water from the well before the water enters any treatment and the distribution system. Water was collected at the outflow of a pressure and flushed (hand pump and compressor pump for shallow well and deep well respectively) for few

minutes prior to sampling in order to remove any stagnant water in the well casing and to ensure that at least 95 percent of the water sample originates from the aquifer formation being sampled. Then water was transferred to sampling plastic bucket and then filled into the bottles by using sampling dipper.

A hand-held, narrow mouth bottles

The sample bottles were partially filled and rinsed with the water to be sampled (rinse water). For bacteriological analysis, the preconditioned sterile glass bottles directly from the analytical laboratory were used.

Onsite water quality monitoring

Total dissolved solid (TDS), Conductivity, Chlorine, Salt, PH value, Temperature were measured on-site at the sampling locations according to the standard operation procedures.

Transportation (shipping) and storage of samples through cold chain till laboratory

After sample collection, sample bottles were kept in a cooling box with ice/ice packs/ice chests until the laboratory.

1.4 Water sample to be measured

Table-1.2 Laboratory services for water analysis provided to project

Laboratory	Parameters
Eco-Lab Laboratory	pH, Temperature, Color, Turbidity, Total dissolved solids, Conductivity, Iron, Hardness, Alkalinity, Chloride, Dissolved Oxygen , BOD_5, COD, Nitrate-Nitrogen, Arsenic, Copper, Cadmium, Zinc, Sulfate

References

Bartram, J., & Balance, R. (1996). Water Quality Monitoring - A Practical Guide to the Design and Implementation of Freshwater Quality Studies and Monitoring Programmes: CH 5 - Field Work and Sampling. United Nations Environment Programme & the World Health Organization ISBN 0 419 22320 7 (Hbk) 0 419 21730 4 (Pbk). Retrieved from http://www.who.int/water_sanitation_health/resourcesquality/waterqualmonitor.pdf

U.S. Geological Survey Techniques of Water-Resources Investigations: Book 9Handbooks for Water-Resources Investigations: CH A4.Collection of Water Samples (2006).US Geological Survey. Retrieved from http://pubs.water.usgs.gov/twri9A/

Water sampling and analysis - World Health Organization, www.who.int/water_sanitation_health/dwq/2edvol3d.pdf

Yeskis, D. * & Zavala, B. **, May 2002, Ground-Water Sampling Guidelines for Superfund & RCRA Project Managers: GROUND WATER FORUM ISSUE PAPER, EPA 542-S-02-001United States Environmental Protection Agency (USEPA). Retrieved from https://www.epa.gov/sites/production/files/2015-06/documents/gw_sampling_guide.pdf

1 Water Sampling Methodology

1.1 Sampling Location

Baseline water sampling was conducted at two (2) locations within of the proposed project site. The locations of monitoring sites are presented as follows:

Table-1.1 Water sample locations for the baseline survey

ID	Date	Coordinates	
		Northern	Eastern
SW-1	24.8.2018	16˚ 56' 42.22"	96˚ 11' 39.89"
SW-2	24.8.2018	16˚ 56' 40.31"	96˚ 11' 45.77"

1.2 Preparation before leaving for the field site.

For the sample bottles to be sent to the local lab, sample bottles and sampling dipper were washed and cleaned with purified water as well as deionized water for three times, filled preservatives if needed and capped securely. These procedures were unnecessary for the sample bottles sent by the international lab as all bottles were already prepared and sealed.

Prepare the one page check list for the list of water parameters to be tested, label the sample bottles with the sample parameters, site identification code and a field date and time.

1.3 Sampling procedure and sampling device

In each location, one (1) sampling were collected at approximately the same time to identify the variability in all sampling and analysis system.

Gloves and sampling dipper

In general, water samples were collected by using clean sampling dipper in order to avoid sample contamination from other sources according to the standard operation procedures.

Before sample collection, the appropriate measures including wearing of disposable and powder less gloves and rinsing of sampling dipper with native water were carried out so as to condition, or equilibrate to the sample environment and make sure that all cleaning-solution residues have been removed. The water sampling dipper is immersed approximately 1m depth into the flowing stream and then filled into the sample bottles.

Onsite water quality monitoring

Total dissolved solid (TDS), Conductivity, Chlorine, Salt, PH value, Temperature were measured on-site at the sampling locations according to the standard operation procedures.

A hand-held, narrow mouth bottles

The sample bottles were partially filled and rinsed with the water to be sampled (rinse water). In order to avoid suspended sand particles, water for rinsing was collected at the edge of the stream in an area of low-flow turbidity and then drained the rinse water.

Transportation (shipping) and storage of samples through cold chain till laboratory
After sample collection, sample bottles were kept in a cooling box with ice/ice packs untill the laboratory.

1.3 Water sample to be measured

Table-1.2 Laboratory services for water analysis provided to project

Laboratory	Parameters
Eco-Lab Laboratory	pH, Temperature, Color, Turbidity, Total dissolved solids, Conductivity, Iron, Hardness, Alkalinity, Chloride, Dissolved Oxygen , BOD_5, COD, Nitrate-Nitrogen, Arsenic, Copper, Cadmium, Zinc, Sulfate

References:

Bartram, J., &Balance, R. (1996). Water Quality Monitoring - A Practical Guide to the Design and Implementation of Freshwater Quality Studies and Monitoring Programmes:CH 5 - Field Work and Sampling. United Nations Environment Programme & the World Health Organization ISBN 0 419 22320 7 (Hbk) 0 419 21730 4 (Pbk). Retrieved from http://www.who.int/water_sanitation_health/resourcesquality/waterqualmonitor.pdf

Franceska D. W. (2004). U.S. Geological Survey Techniques of Water-Resources Investigations: Book 9Handbooks for Water-Resources Investigations: CH A3.Cleaning of equipment for water Sampling (Ed).US Geological Survey. Retrieved from http://pubs.water.usgs.gov/twri9A/

U.S. Geological Survey Techniques of Water-Resources Investigations: Book 9Handbooks for Water-Resources Investigations: CH A4.Collection of Water Samples (2006).US Geological Survey. Retrieved from http://pubs.water.usgs.gov/twri9A/

1 Soil Sampling Methodology

1.1 Soil Sampling Location

Baseline soil sampling was conducted at two (2) locations within the proposed project site. In the area covering 6 acres of land, two (2) soil samples were collected at each corner and at the center of the land respectively in accordance with the standard operation procedures. The locations of monitoring sites are presented as follows:

Table-1.1 Soil sample locations for the baseline survey

ID	Date	Coordinates	
		Northern	Eastern
S-1	24.8.2018	16° 56' 40.44"	96° 11' 36.53"
S-2	24.8.2018	16° 56' 40.04"	96° 11' 30.99"

1.2 Soil sampling procedure

Soil samples were collected from drill -holes dug approximately 1m depth by soil auger (hand auger drill). During sample collection, wear the glove, rinse glove and soil auger with clean water. Samples were transferred into wide-mouth glass bottles and sent to an accredited laboratory. Parameters tested included basic soil chemistry as well as metals. Soil samples were collected according to the standard procedure and kept in a cooling box at 4˚C till the respective laboratory.

1.3 Soil sample to be measured

Table-1.2 Laboratory services for soil analysis provided to project

Laboratory	Parameters
ALS Hong Kong Laboratory	PH, Moisture content, Cadmium, Copper, Lead, Iron

References

CarterM.R.,& GregorichE.G. (2006). Soil Sampling and Methods of analysis (2nded.). Taylor & Francis Group, LLC. Retrieved from

http://www.niordc.ir/uploads%5C86_106_Binder1.pdf

Midwest Laboratories, Inc. Soil Sampling. Omaha: 13611 B Street. Retrieved from http://agrienergy.net/docs/lab-information/soil-sampling.pdf

United States Department of Agriculture: Natural Resources Conservation Service. Sampling Soils for Nutrient Management. Retrieved from https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs144p2_051273.pdf

(1) Air Monitoring Raw Data

Main | Preferences | Header | Data | Report

Environmental Report

Record Cnt 1343

Start Date 5/15/2018 2:20:00 PM

End Date 5/16/2018 1:20:00 PM

	NH3 ppm	ARad CPM	CO2 ppm	CO mg/m3	H2S ppb	CH4 ppm	NO2 ug/m3	O3 ug/m3	PM10 uG/m3	PM25 uG/m3	RH %	SO2 ug/m3	TmpC Deg. C	VOCS ppb	WDir Deg.	WSpM kph	Pwr V
Ave	**9.83365**	**5.14892**	**314.828**	**.622695**	**75.9225**	**1123.65**	**88.0781**	**3.20476**	**90.4020**	**68.8116**	**78.7244**	**101.009**	**25.1965**	**3.42293**	**157.468**	**1.47900**	**12.0512**
Max	33.9	21	405	5.05	222	1636	189	25	236	214	100	408	30	103	360	13.4	12.8
Min	0	0	278	0	0	436.6	2	0	2	1	47	0	22	0	0	0	9.5

Comments

Environmental Report

Start: 5/15/2018 2:20 AM End: 5/16/2018 1:20 PM

Collected by:

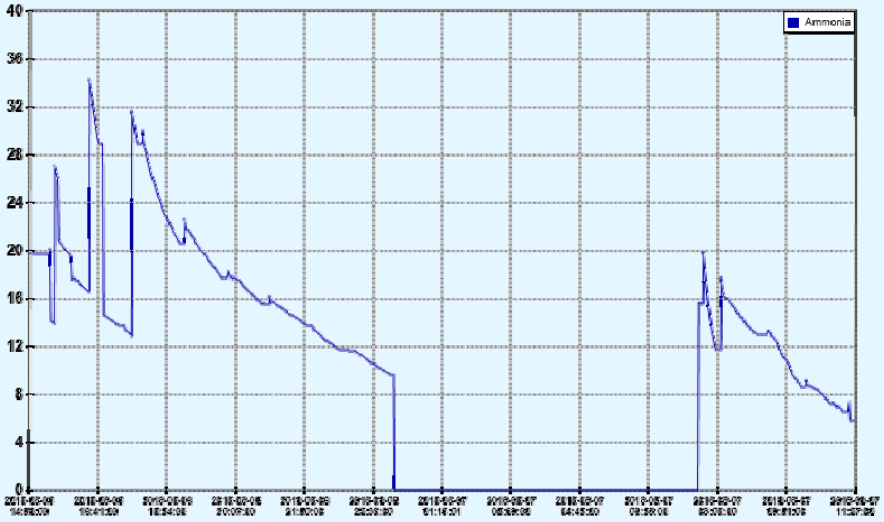
Logger ID 912005 Record Count 1343

Ammonia

Sensor ID

Range: 0 to 100 ppm

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	9.83365	33.9	ppm				

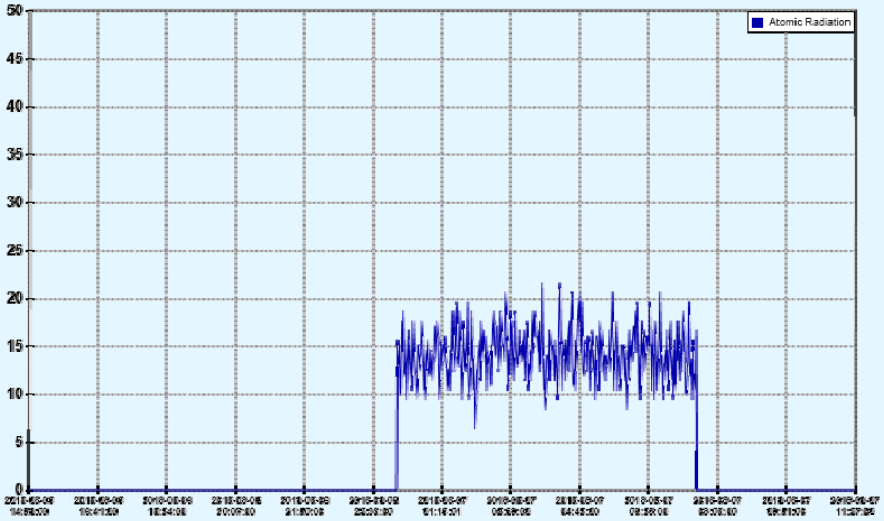


Atomic Radiation

Sensor ID

Range: 0 to 20000 CPM

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	5.14892	21	CPM				



Environmental Report

Start: 5/16/2018 8:05 AM End: 5/16/2018 12:42 PM

Collected by:

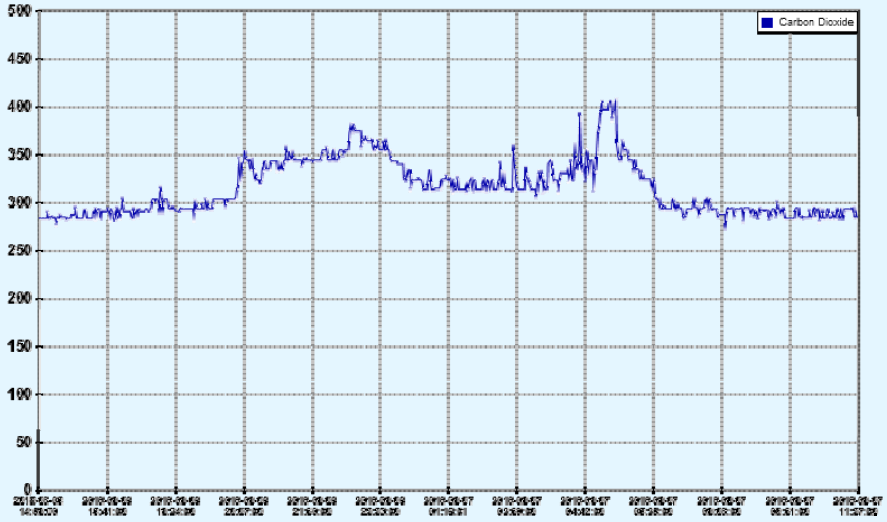
Logger ID 912005 Record Count 1343

Carbon Dioxide

Sensor ID

Range: 0 to 5000 ppm

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
278	314.828	405	ppm				

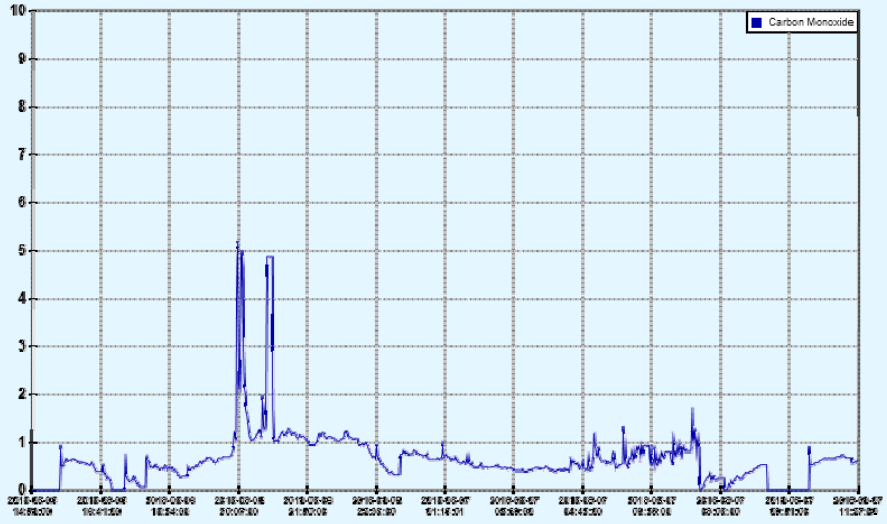


Carbon Monoxide

Sensor ID

Range: 0 to 114.5 mg/m3

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	.622695	5.05	mg/m3				



Environmental Report

Start: 5/16/2018 8:05 AM End: 5/16/2018 12:42 PM

Collected by:

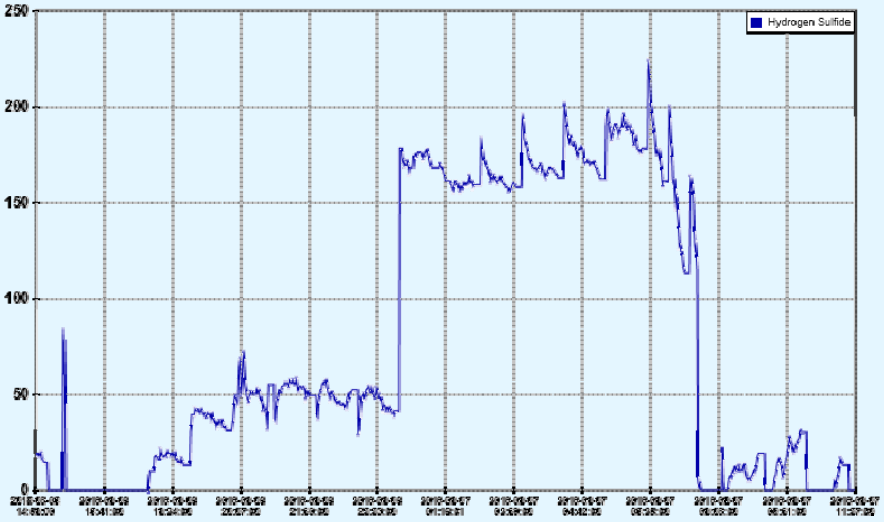
Logger ID 912005 Record Count 1343

Hydrogen Sulfide

Sensor ID

Range: 0 to 5000 ppb

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	75.9225	222	ppb				

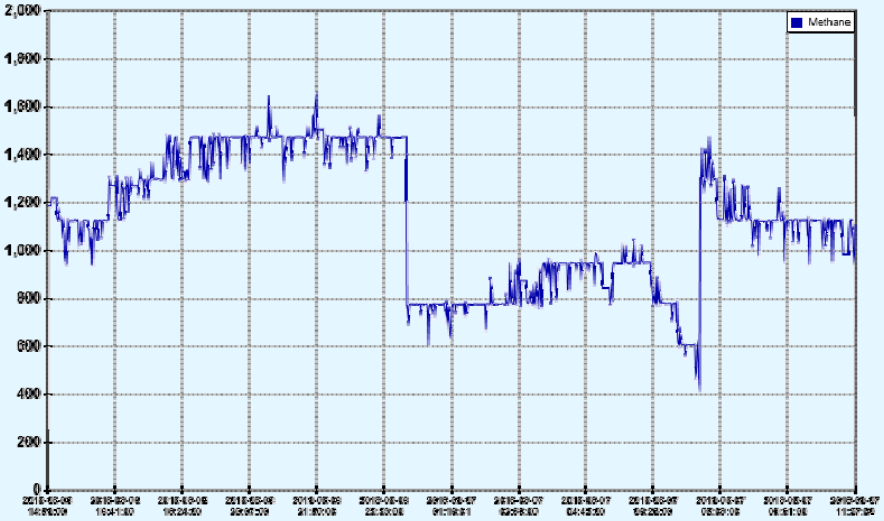


Methane

Sensor ID

Range: 0 to 10000 ppm

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
436.6	1123.65	1636	ppm				



Environmental Report

Start: 5/16/2018 8:05 AM End: 5/16/2018 12:42 PM

Collected by:

Logger ID 912005

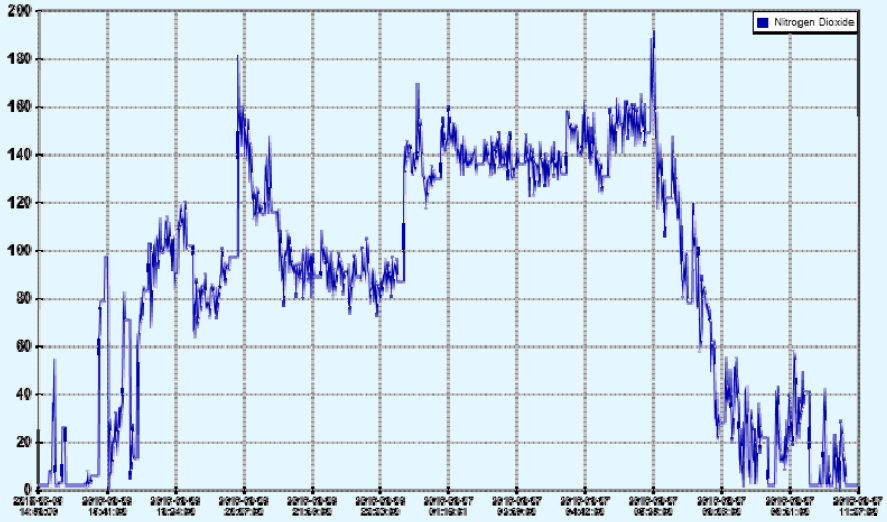
Record Count 1343

Sensor ID

Nitrogen Dioxide

Range: 0 to 18810 ug/m3

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
2	88.0781	189	ug/m3				

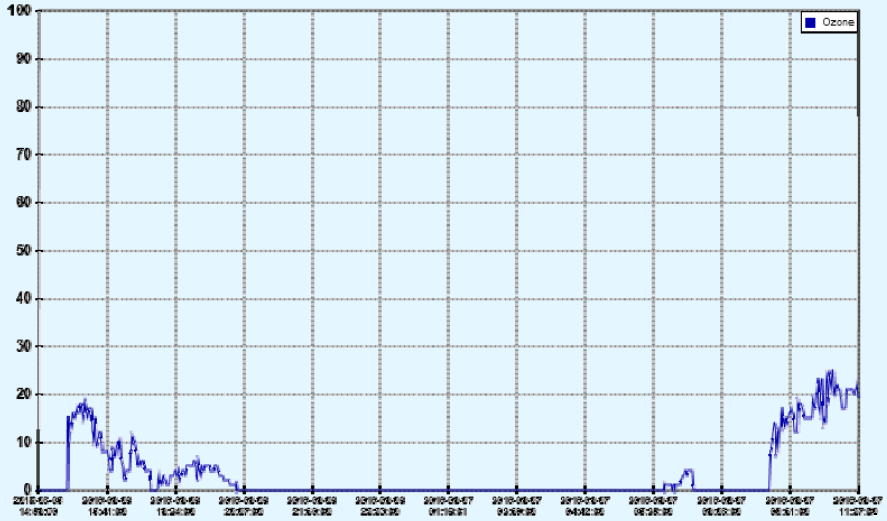


Sensor ID

Ozone

Range: 0 to 294.3 ug/m3

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	3.20476	25	ug/m3				



Environmental Report

Start: 5/16/2018 8:05 AM End: 5/16/2018 12:42 PM

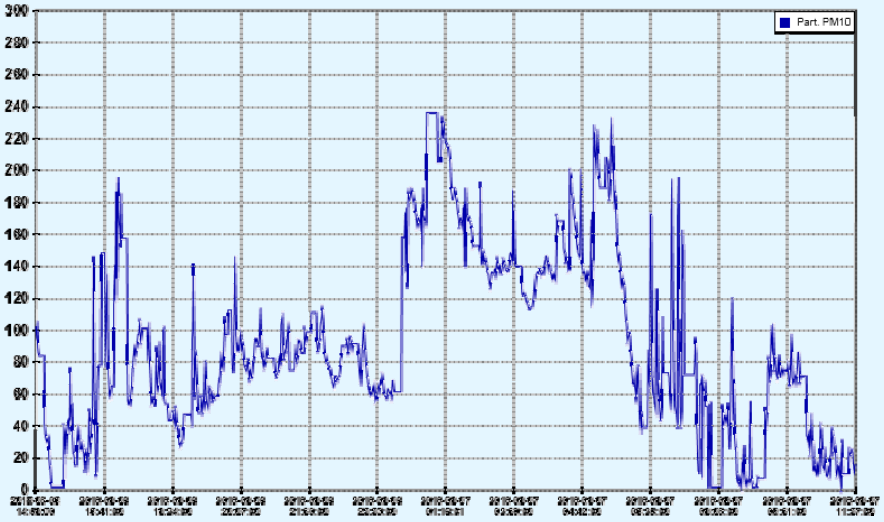
Collected by:

Logger ID 912005 Record Count 1343

Prt10 **Part. PM10** Prt10 Sensor ID

Range: 0 to 20000 uG/m3

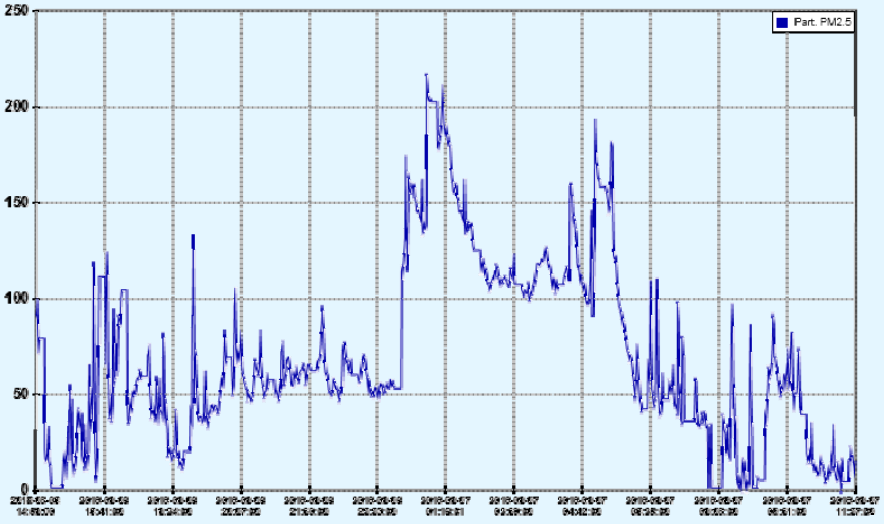
Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
2	90.4020	236	uG/m3				



Prt10 **Part. PM2.5** Prt10 Sensor ID

Range: 0 to 20000 uG/m3

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
1	68.8116	214	uG/m3				



Environmental Report

Start: 5/16/2018 8:05 AM End: 5/16/2018 12:42 PM

Collected by:

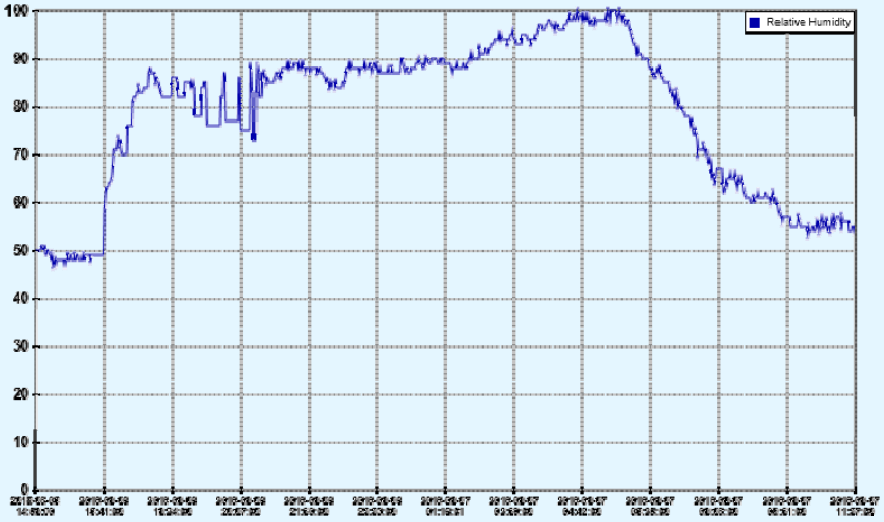
Logger ID 912005 Record Count 1343

Relative Humidity

Sensor ID

Range: 0 to 100 %

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
47	78.7244	100	%				

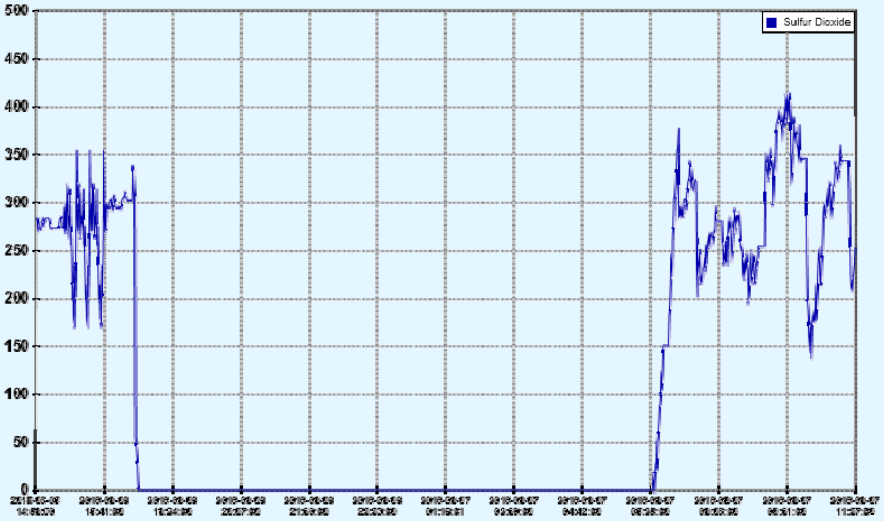


Sulfur Dioxide

Sensor ID

Range: 0 to 26190 ug/m3

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	101.009	408	ug/m3				



Environmental Report

Start: 5/16/2018 8:05 AM End: 5/16/2018 12:42 PM

Collected by:

Logger ID 912005 Record Count 1343

TEMP

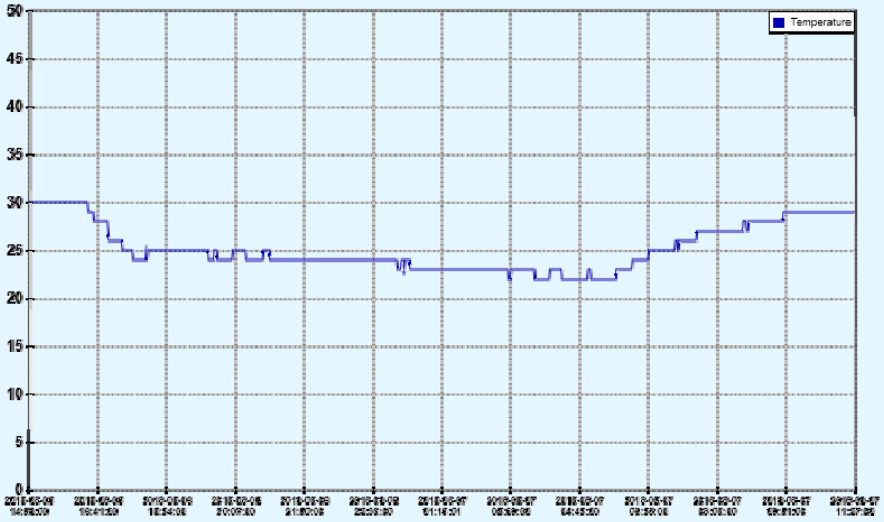
Temperature

TEMP

Sensor ID

Range: -20 to 60 Deg. C

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
22	25.1965	30	Deg. C				



VOCS

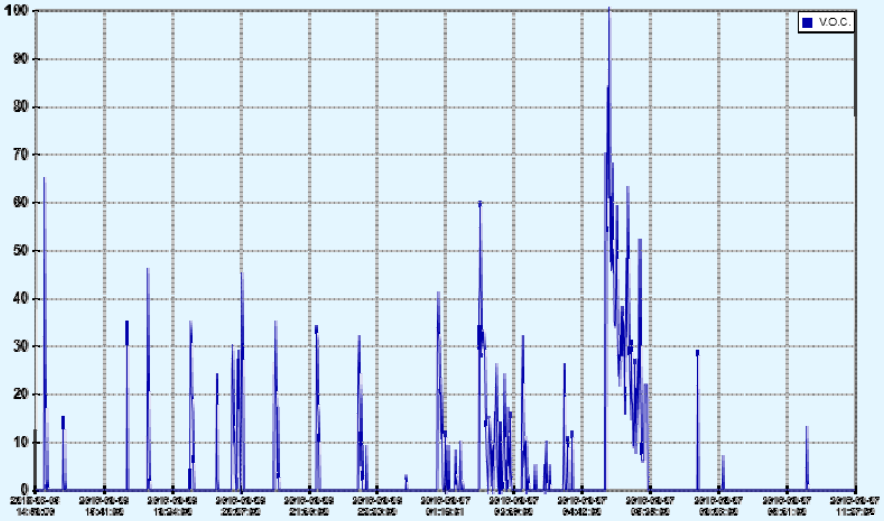
V.O.C.

VOCS

Sensor ID

Range: 0 to 50000 ppb

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	3.42293	103	ppb				



Environmental Report

Start: 5/16/2018 8:05 AM End: 5/16/2018 12:42 PM

Collected by:

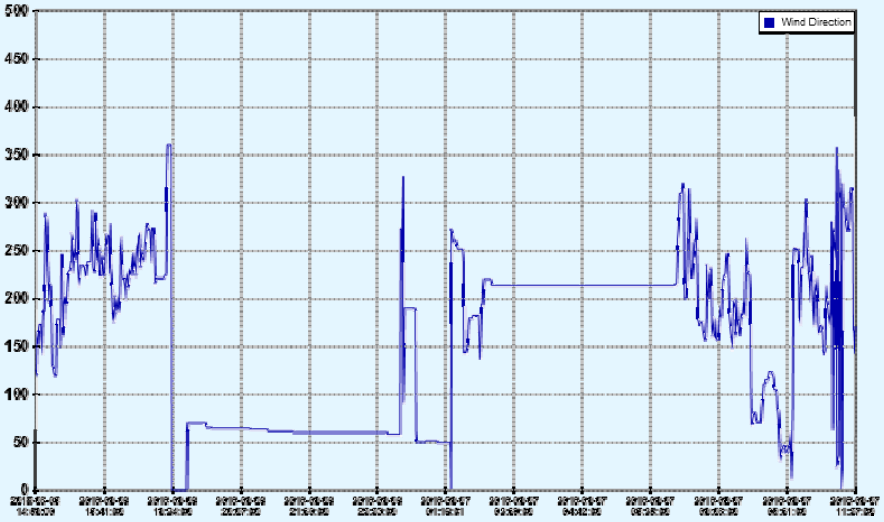
Logger ID 912005 Record Count 1343

Wind Direction

Sensor ID

Range: 0 to 359 Deg.

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	157.468	360	Deg.				

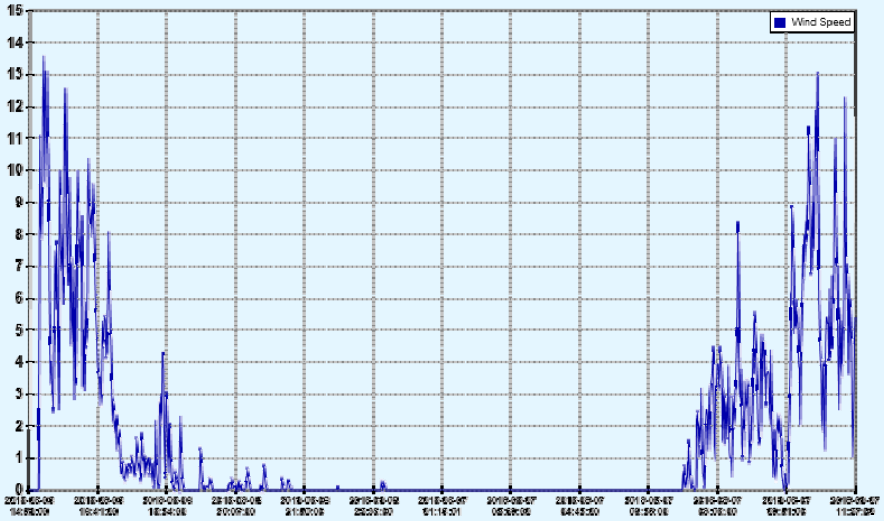


Wind Speed

Sensor ID

Range: 0 to 160 kph

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	1.47900	13.4	kph				



Environmental Report

Start: 5/16/2018 8:05 AM End: 5/16/2018 12:42 PM

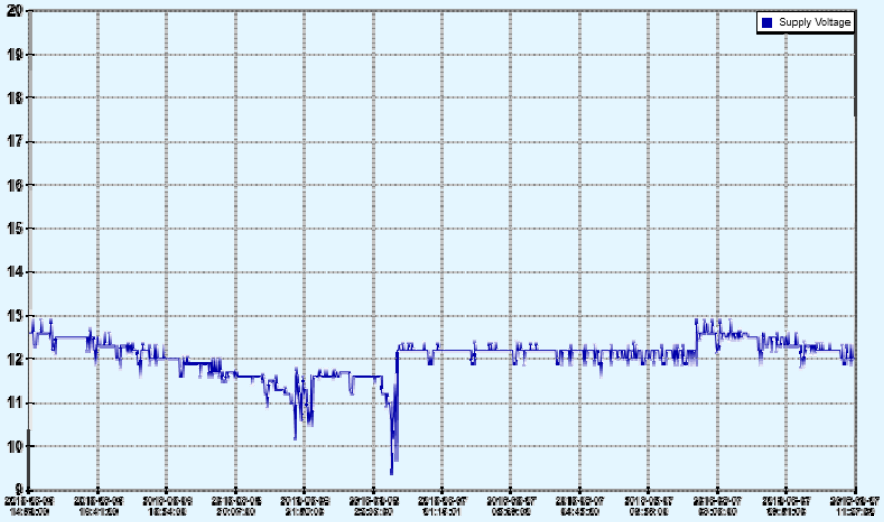
Collected by:

Logger ID 912005 Record Count 1343

Batt. Supply Voltage Batt. Sensor ID

Range: 10 to 16 V

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
9.5	12.0512	12.8	V				



Main | Preferences | Header | Data | Report

Environmental Report

Record Cnt 1380

Start Date 5/16/2018 2:45:00 PM

End Date 5/17/2018 1:45:00 PM

	NH3 ppm	ARad CPM	CO2 ppm	CO mg/m3	H2S ppb	CH4 ppm	NO2 ug/m3	O3 ug/m3	PM10 uG/m3	PM25 uG/m3	RH %	SO2 ug/m3	TmpC Deg. C	VOCS ppb	WDir Deg.	WSpM kph	Pwr V
Ave	**.517231**	**0**	**309.978**	**.710129**	**24.2472**	**1230.90**	**52.8839**	**6.88464**	**51.4981**	**32.5486**	**73.5674**	**55.9726**	**26.2905**	**1.60778**	**266.751**	**1.40865**	**12.1469**
Max	8.3	0	384	1.4	73	1544.	125	24	140	106	93	574	30	66	362	7.9	12.5
Min	0	0	204	.2	0	947	2	0	2	1	46	0	24	0	2	0	11.6

Comments

Environmental Report

Start: 5/16/2018 2:45 PM End: 5/17/2018 1:45 PM

Collected by:

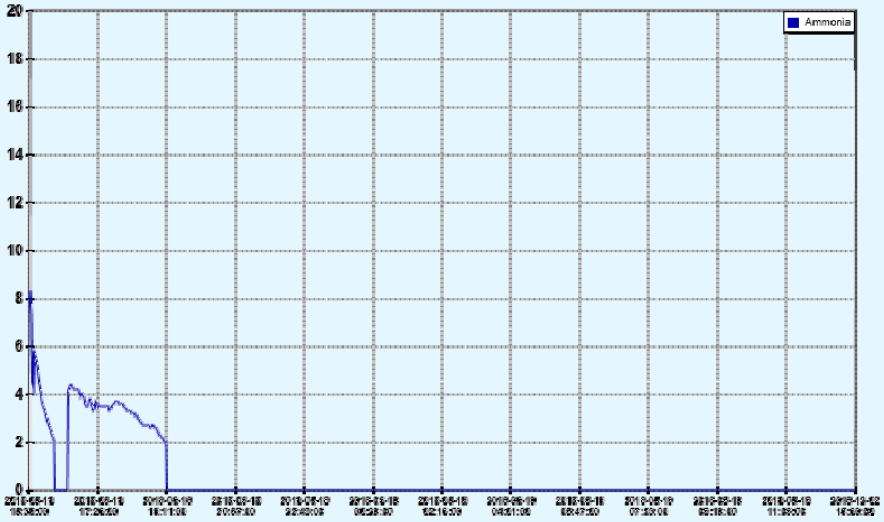
Logger ID 912005 Record Count 1380

Ammonia

Sensor ID

Range: 0 to 100 ppm

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	.517231	8.3	ppm				

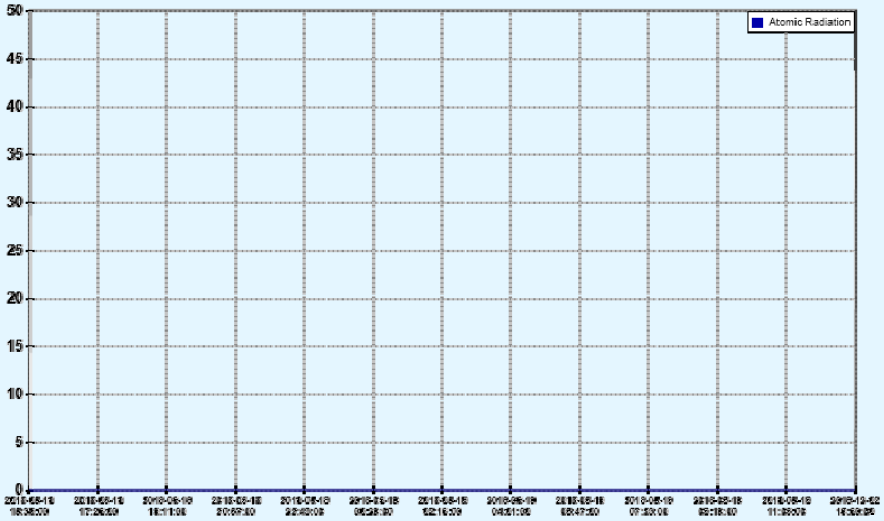


Atomic Radiation

Sensor ID

Range: 0 to 20000 CPM

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	0	0	CPM				



Environmental Report

Start: 5/16/2018 1:16 PM End: 5/17/2018 12:22 PM

Collected by:

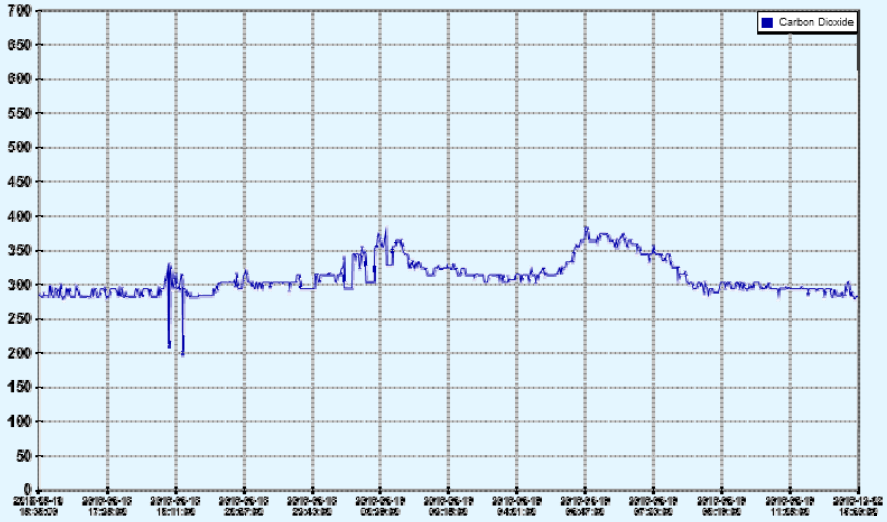
Logger ID 912005 Record Count 1387

Carbon Dioxide

Sensor ID

Range: 0 to 5000 ppm

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
204	309.978	384	ppm				

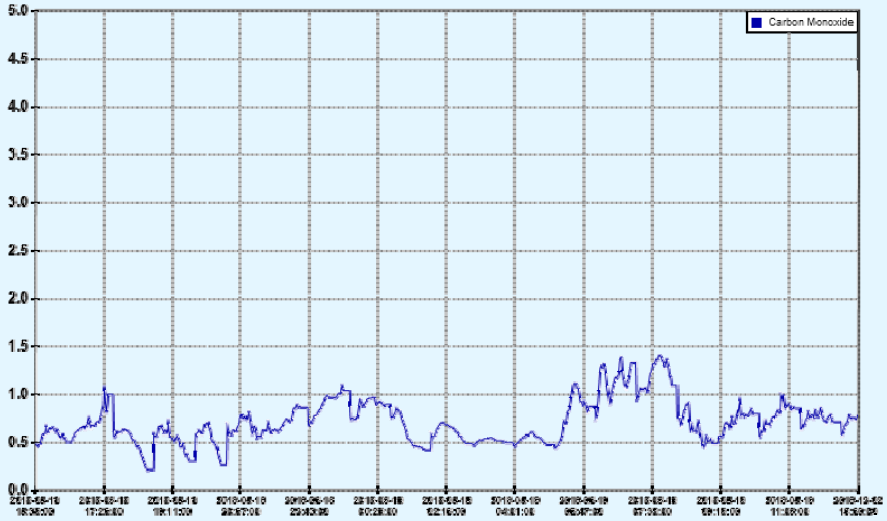


Carbon Monoxide

Sensor ID

Range: 0 to 114.5 mg/m3

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
.2	.710129	1.4	mg/m3				



Environmental Report

Start: 5/16/2018 1:16 PM End: 5/17/2018 12:22 PM

Collected by:

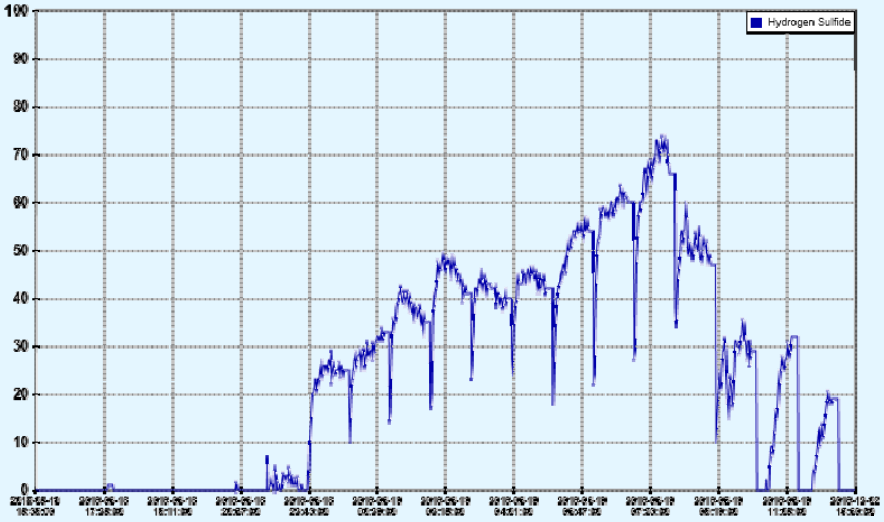
Logger ID 912005 Record Count 1387

Hydrogen Sulfide

Sensor ID

Range: 0 to 5000 ppb

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	24.2472	73	ppb				

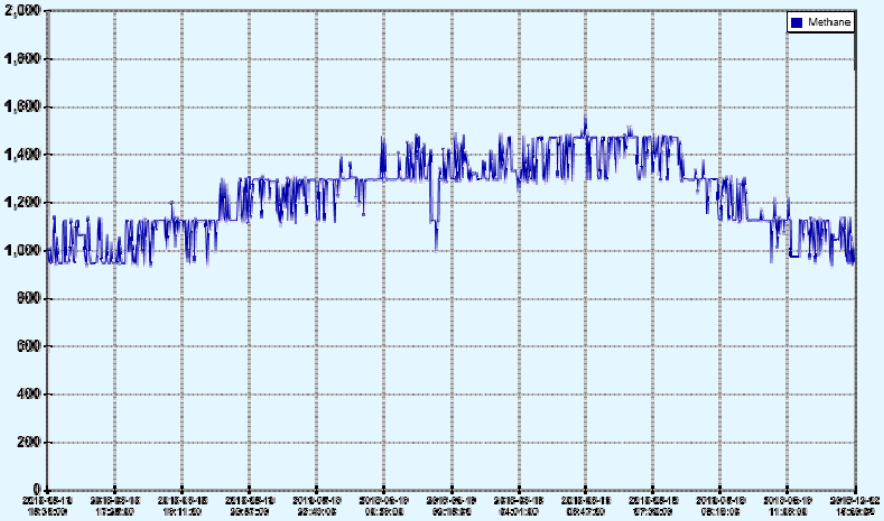


Methane

Sensor ID

Range: 0 to 10000 ppm

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
947	1230.90	1544.6	ppm				



Environmental Report

Start: 5/16/2018 1:16 PM End: 5/17/2018 12:22 PM

Collected by:

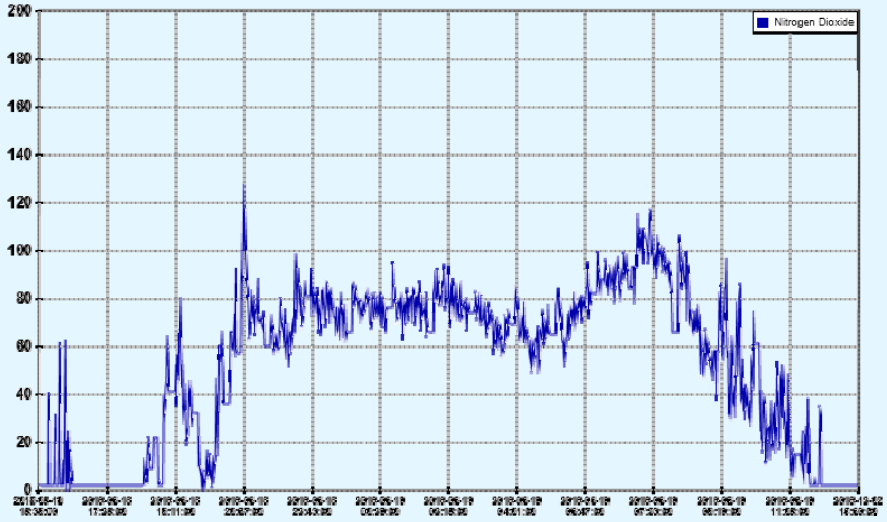
Logger ID 912005 Record Count 1387

Nitrogen Dioxide

Sensor ID

Range: 0 to 18810 ug/m3

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
2	52.8839	125	ug/m3				

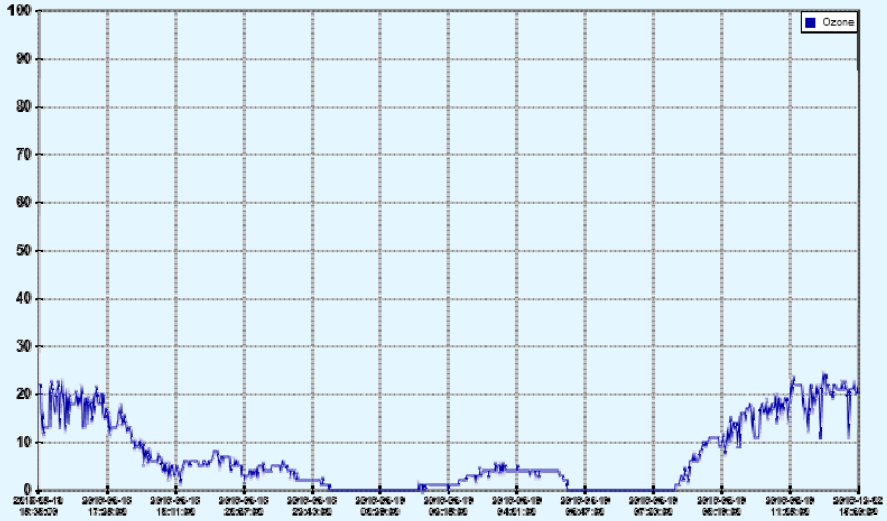


Ozone

Sensor ID

Range: 0 to 294.3 ug/m3

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	6.88464	24	ug/m3				



Environmental Report

Start: 5/16/2018 1:16 PM End: 5/17/2018 12:22 PM

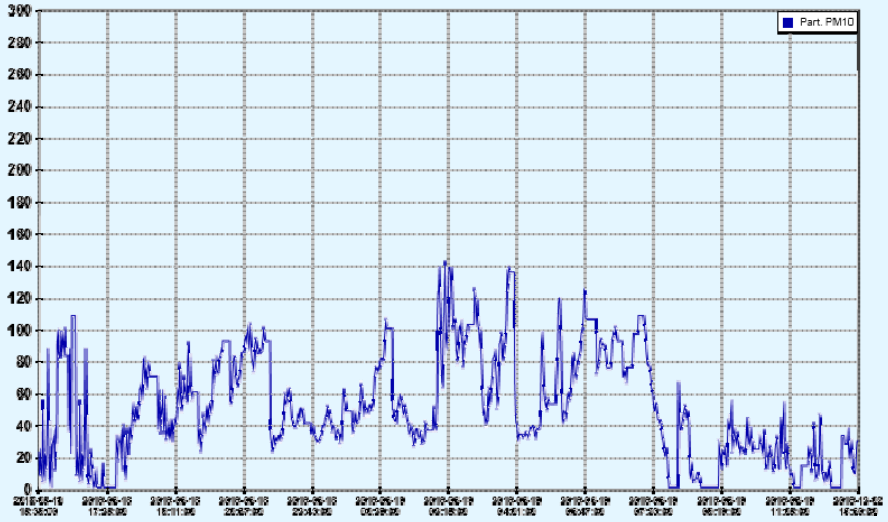
Collected by:

Logger ID 912005 Record Count 1387

Prt10 **Part. PM10** Prt10 Sensor ID

Range: 0 to 20000 uG/m3

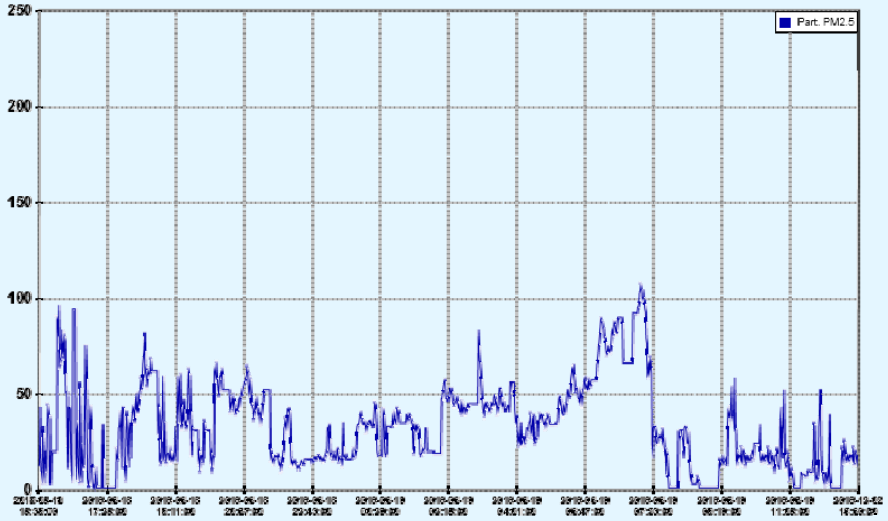
Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
2	51.4981	140	uG/m3				



Prt10 **Part. PM2.5** Prt10 Sensor ID

Range: 0 to 20000 uG/m3

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
1	32.5486	106	uG/m3				



Environmental Report

Start: 5/16/2018 1:16 PM End: 5/17/2018 12:22 PM

Collected by:

Logger ID 912005 Record Count 1387

R.H.

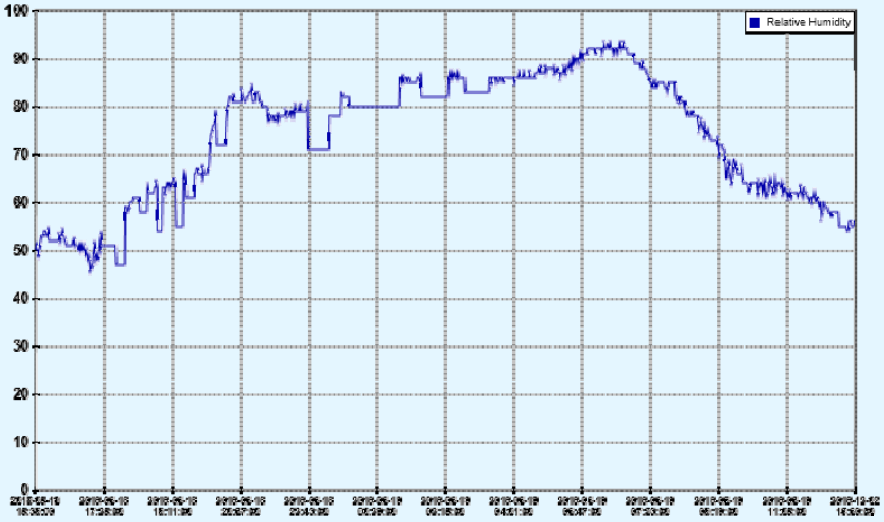
Relative Humidity

R.H.

Sensor ID

Range: 0 to 100 %

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
46	73.5674	93	%				



SO2

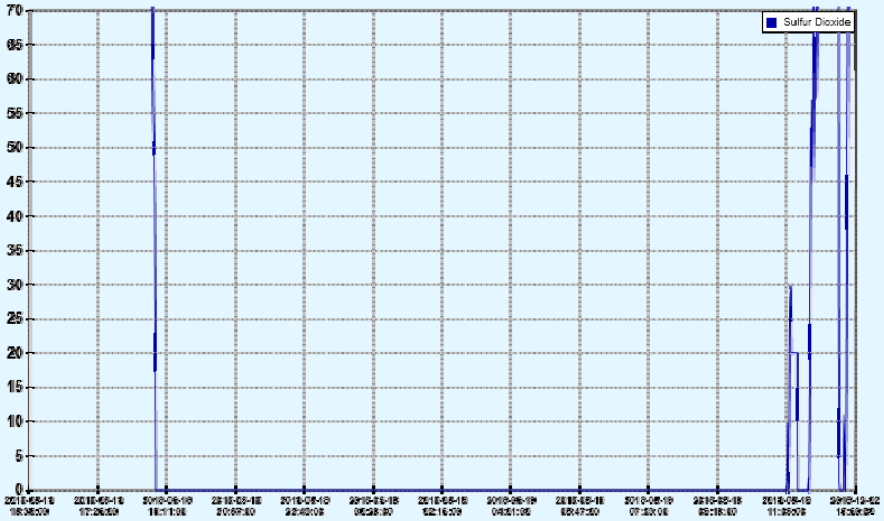
Sulfur Dioxide

SO2

Sensor ID

Range: 0 to 26190 ug/m3

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	55.9726	574	ug/m3				



Environmental Report

Start: 5/16/2018 1:16 PM End: 5/17/2018 12:22 PM

Collected by:

Logger ID 912005 Record Count 1387

TEMP

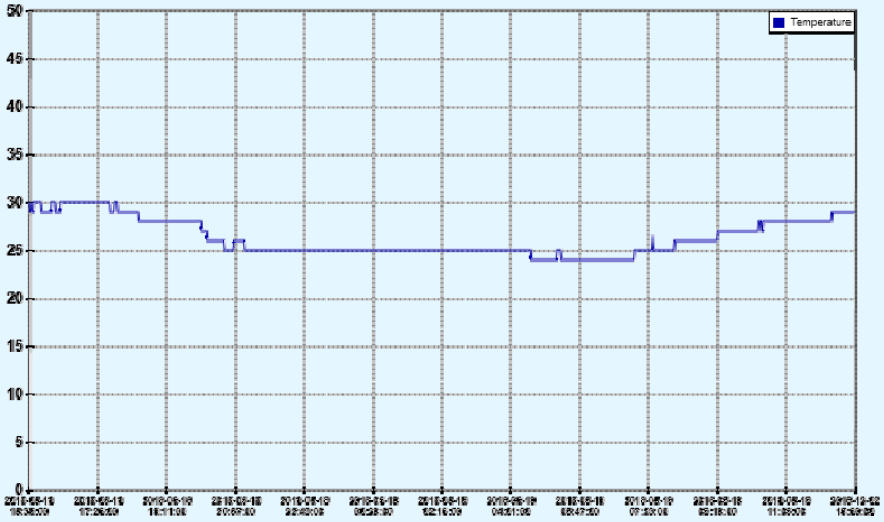
Temperature

TEMP

Sensor ID

Range: -20 to 60 Deg. C

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
24	26.2905	30	Deg. C				



VOCS

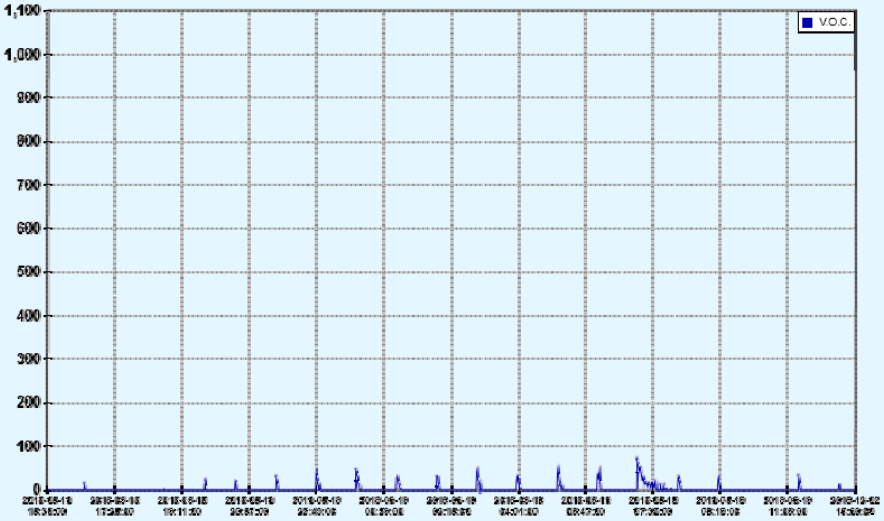
V.O.C.

VOCS

Sensor ID

Range: 0 to 50000 ppb

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	1.60778	66	ppb				



Environmental Report

Start: 5/16/2018 1:16 PM End: 5/17/2018 12:22 PM

Collected by:

Logger ID 912005 Record Count 1387

W. DIR. **Wind Direction** W. DIR. Sensor ID

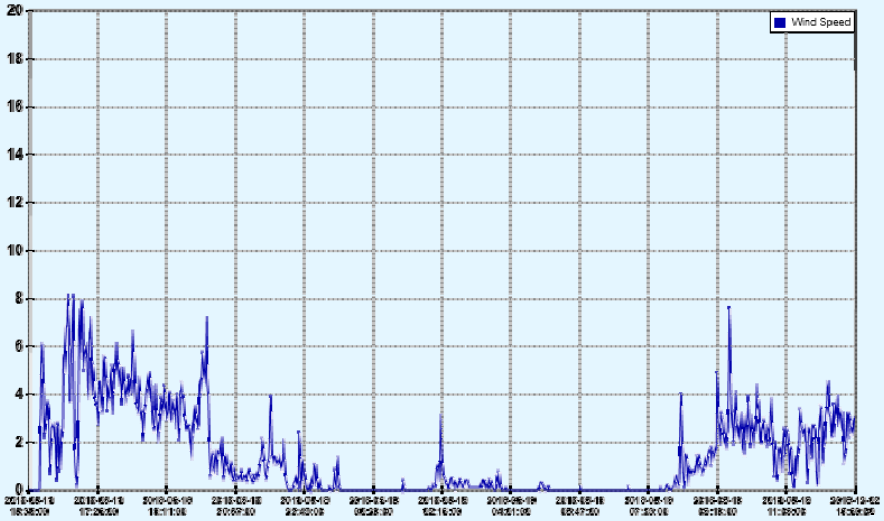
Range: 0 to 359 Deg.

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
2	266.751	362	Deg.				

W. SPD. **Wind Speed** W. SPD. Sensor ID

Range: 0 to 160 kph

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	1.40865	7.9	kph				



Environmental Report

Start: 5/16/2018 1:16 PM End: 5/17/2018 12:22 PM

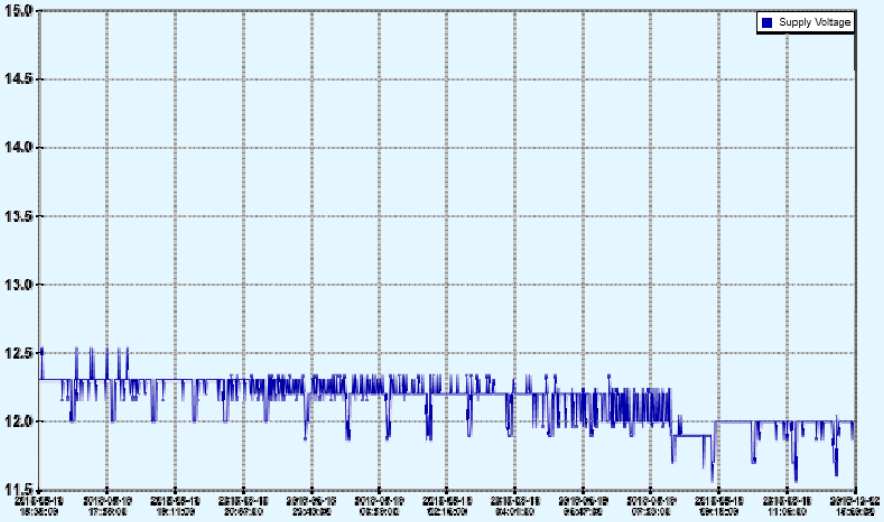
Collected by:

Logger ID 912005 Record Count 1387

Batt. Supply Voltage Batt. Sensor ID

Range: 10 to 16 V

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
11.6	12.1469	12.5	V				



Main | Preferences | Header | Data | Report

Environmental Report

Record Cnt 1375

Start Date 5/17/2018 3:10:00 PM

End Date 5/18/2018 2:10:00 AM

	NH3 ppm	ARad CPM	CO2 ppm	CO mg/m3	H2S ppb	CH4 ppm	NO2 ug/m3	O3 ug/m3	PM10 uG/m3	PM25 uG/m3	RH %	SO2 ug/m3	TmpC Deg. C	VOCS ppb	WDir Deg.	WSpM kph	Pwr V
Ave	**0**	**0**	**309.646**	**.736019**	**29.5194**	**1237.38**	**62.1434**	**5.92568**	**45.4407**	**30.1346**	**75.9595**	**58.0860**	**26.3156**	**.891096**	**171.412**	**1.17012**	**11.5500**
Max	0	0	405	1.43	84	1639.	123	23	150	121	96	501	30	53	359	5.4	12.2
Min	0	0	268	.38	0	919.7	1	0	2	1	49	0	24	0	0	0	11

Comments

Environmental Report

Start: 5/17/2018 3:10 PM End: 5/18/2018 2:10 AM

Collected by:

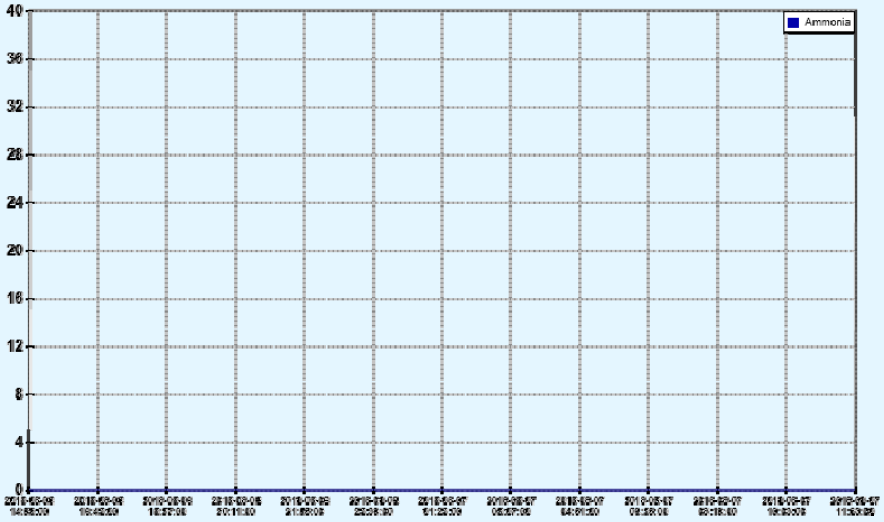
Logger ID 912005 Record Count 1375

Ammonia

Sensor ID

Range: 0 to 100 ppm

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	0	0	ppm				

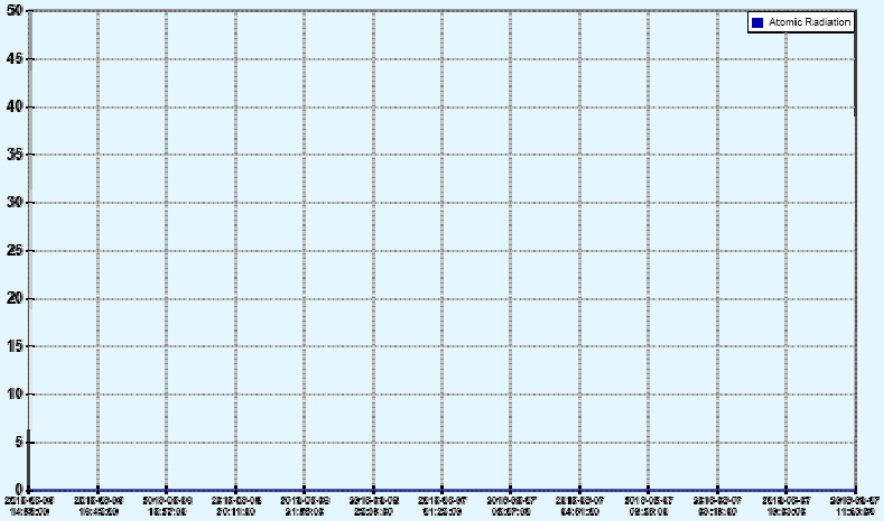


Atomic Radiation

Sensor ID

Range: 0 to 20000 CPM

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	0	0	CPM				



Environmental Report

Start: 5/17/2018 1:20 PM End: 5/18/2018 11:58 AM

Collected by:

Logger ID 912005 Record Count 1359

Carbon Dioxide

Sensor ID

Range: 0 to 5000 ppm

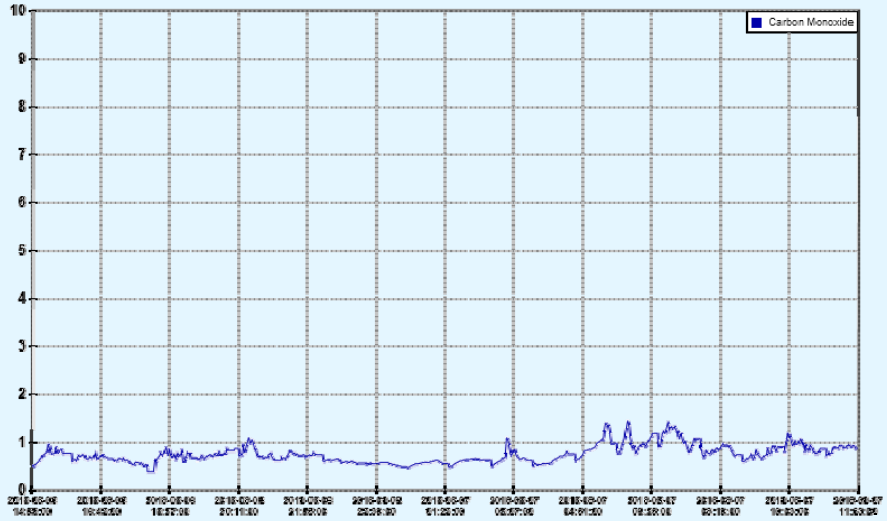
Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
268	309.646	405	ppm				

Carbon Monoxide

Sensor ID

Range: 0 to 114.5 mg/m3

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
.38	.736019	1.43	mg/m3				



Environmental Report

Start: 5/17/2018 1:20 PM End: 5/18/2018 11:58 AM

Collected by:

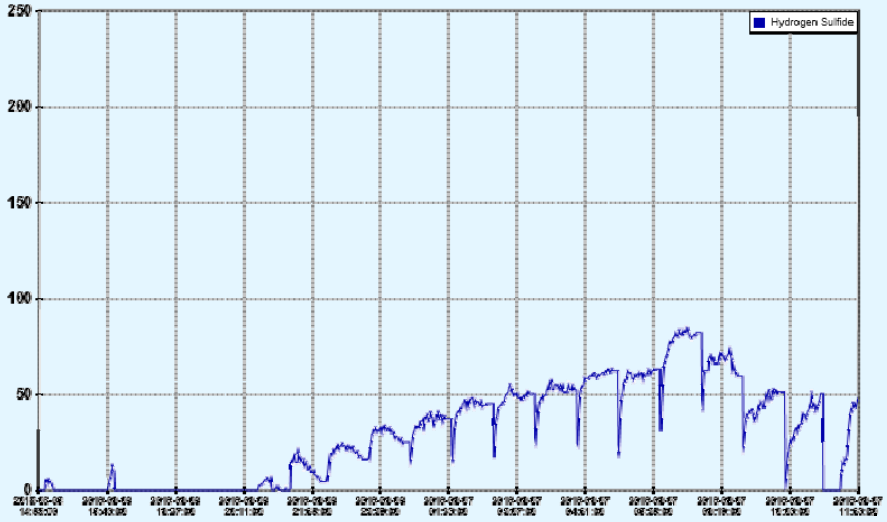
Logger ID 912005 Record Count 1359

Hydrogen Sulfide

Sensor ID

Range: 0 to 5000 ppb

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	29.5194	84	ppb				

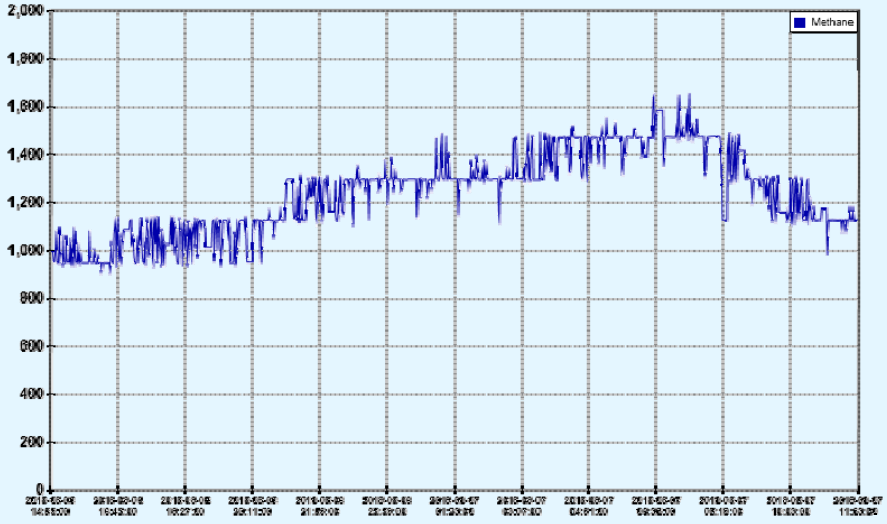


Methane

Sensor ID

Range: 0 to 10000 ppm

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
919.7	1237.38	1639.8	ppm				



Environmental Report

Start: 5/17/2018 1:20 PM End: 5/18/2018 11:58 AM

Collected by:

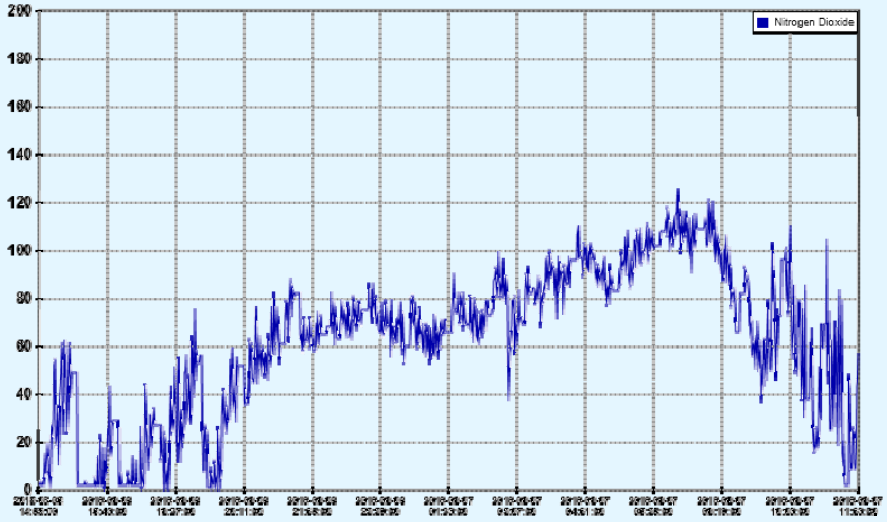
Logger ID 912005 Record Count 1359

Sensor ID

Nitrogen Dioxide

Range: 0 to 18810 ug/m3

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
1	62.1434	123	ug/m3				

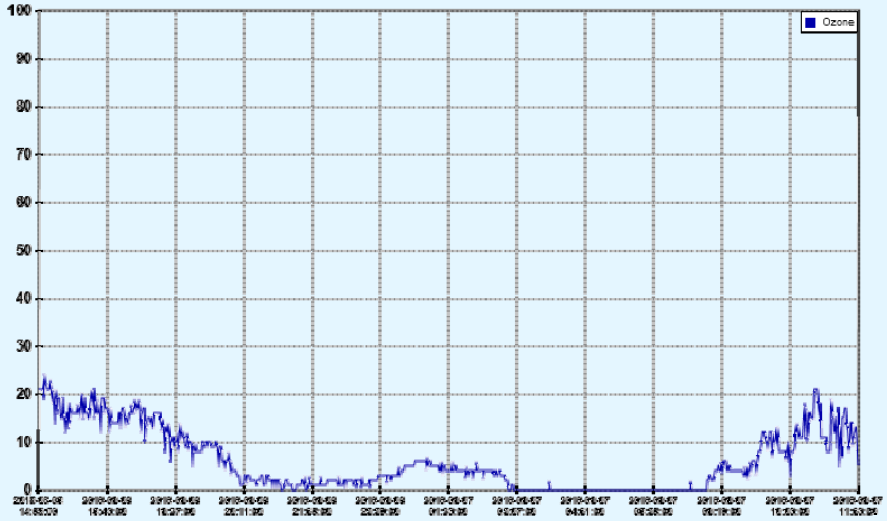


Sensor ID

Ozone

Range: 0 to 294.3 ug/m3

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	5.92568	23	ug/m3				



Environmental Report

Start: 5/17/2018 1:20 PM End: 5/18/2018 11:58 AM

Collected by:

Logger ID 912005 Record Count 1359

Prt10 **Part. PM10** Prt10 Sensor ID

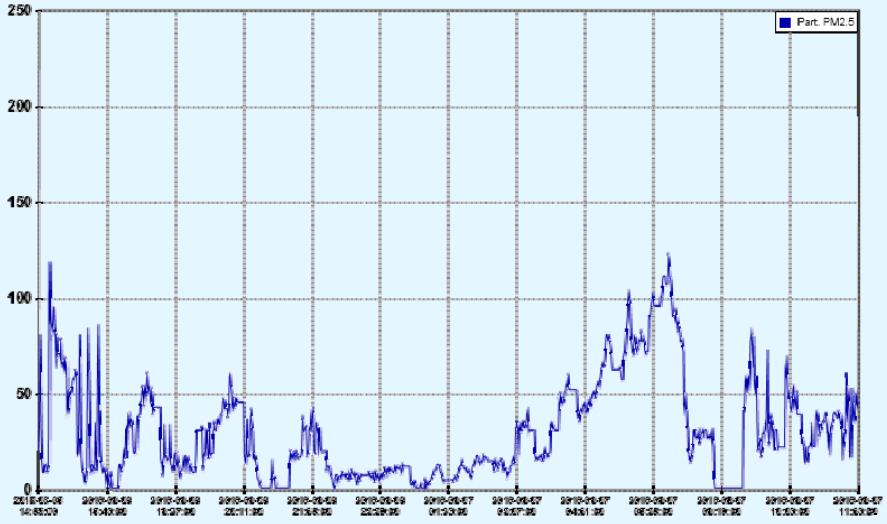
Range: 0 to 20000 uG/m3

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
2	45.4407	150	uG/m3				

Prt10 **Part. PM2.5** Prt10 Sensor ID

Range: 0 to 20000 uG/m3

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
1	30.1346	121	uG/m3				



Environmental Report

Start: 5/17/2018 1:20 PM End: 5/18/2018 11:58 AM

Collected by:

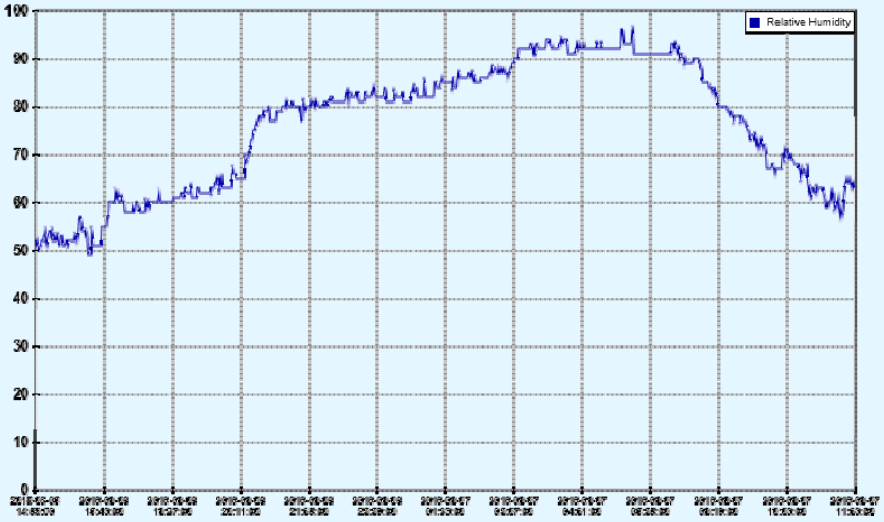
Logger ID 912005 Record Count 1359

Sensor ID

Relative Humidity

Range: 0 to 100 %

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
49	75.9595	96	%				

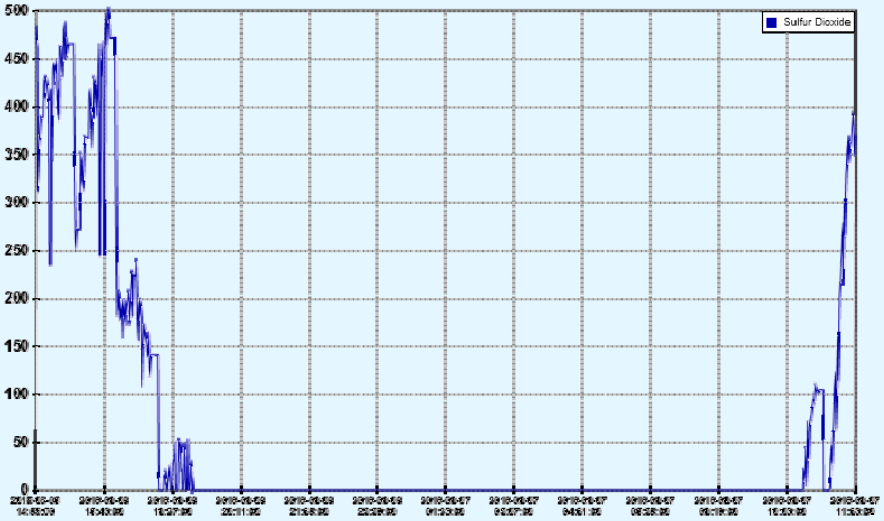


Sensor ID

Sulfur Dioxide

Range: 0 to 26190 ug/m3

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	58.0860	501	ug/m3				



Environmental Report

Start: 5/17/2018 1:20 PM End: 5/18/2018 11:58 AM

Collected by:

Logger ID 912005 Record Count 1359

TEMP

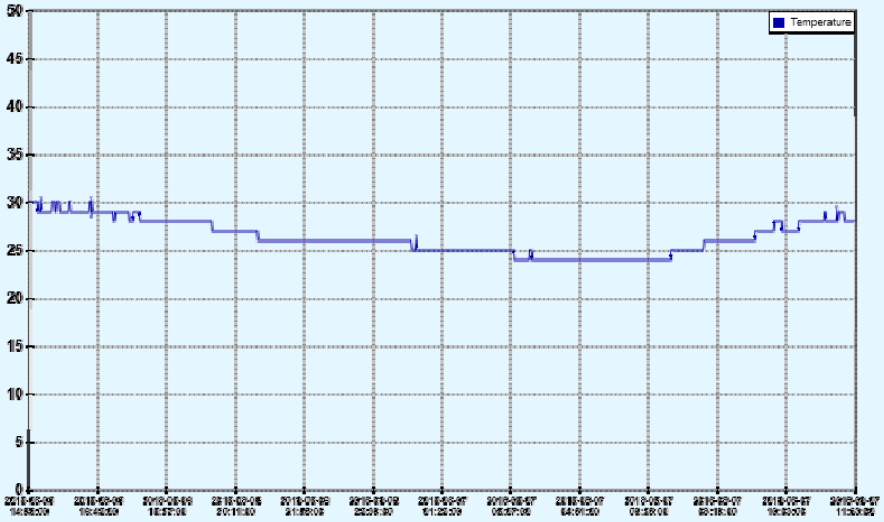
Temperature

TEMP

Sensor ID

Range: -20 to 60 Deg. C

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
24	26.3156	30	Deg. C				



VOCS

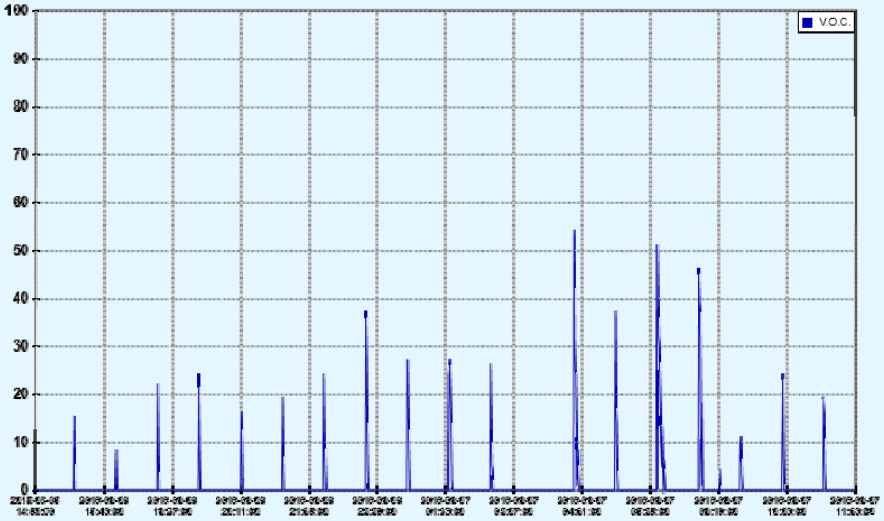
V.O.C.

VOCS

Sensor ID

Range: 0 to 50000 ppb

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	.891096	53	ppb				



Environmental Report

Start: 5/17/2018 1:20 PM End: 5/18/2018 11:58 AM

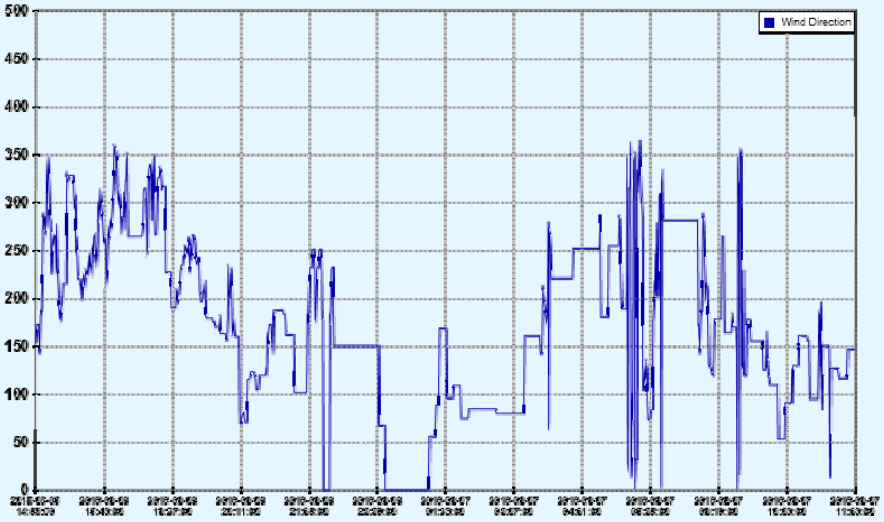
Collected by:

Logger ID 912005 Record Count 1359

W. DIR. **Wind Direction** W. DIR. Sensor ID

Range: 0 to 359 Deg.

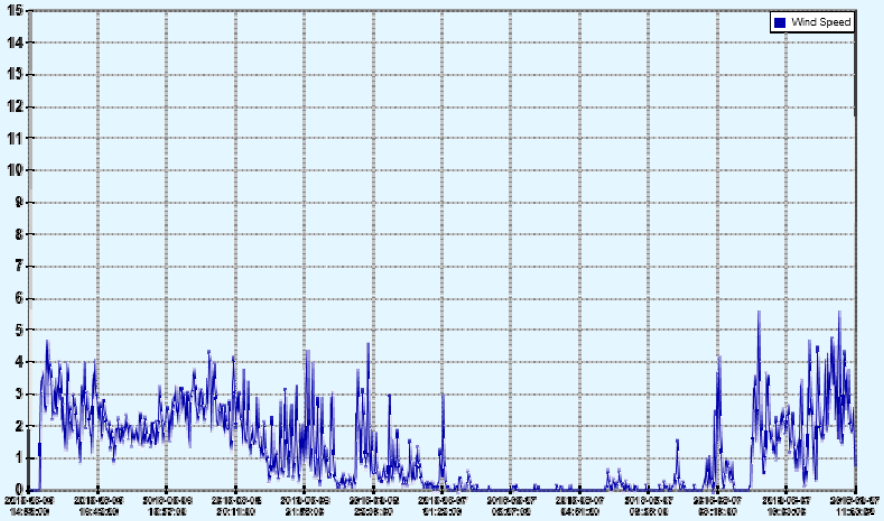
Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	171.412	359	Deg.				



W. SPD. **Wind Speed** W. SPD. Sensor ID

Range: 0 to 160 kph

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	1.17012	5.4	kph				



Environmental Report

Start: 5/17/2018 1:20 PM End: 5/18/2018 11:58 AM

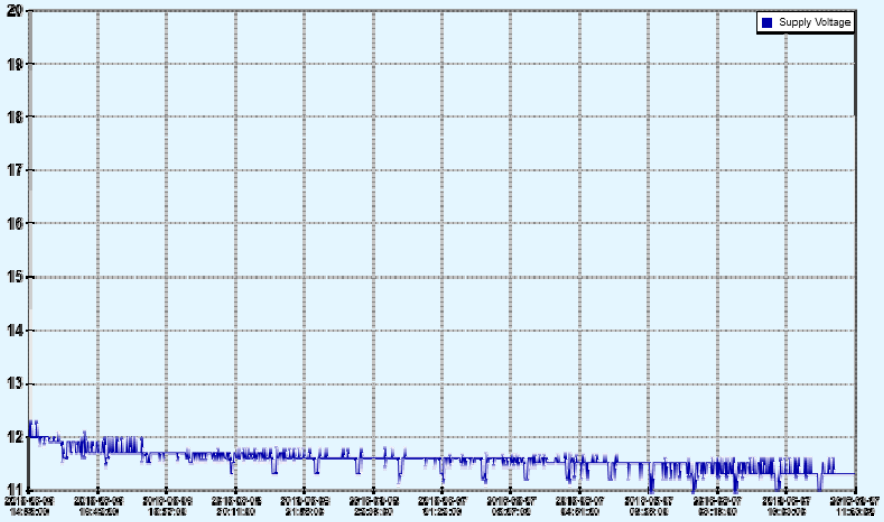
Collected by:

Logger ID 912005 Record Count 1359

Batt. Supply Voltage Batt. Sensor ID

Range: 10 to 16 V

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
11	11.5500	12.2	V				



Main | Preferences | Header | Data | Report

Environmental Report

Record Cnt 1370

Start Date 5/18/2018 3:35:00 PM

End Date 5/19/2018 2:30:00 PM

	NH3 ppm	ARad CPM	CO2 ppm	CO mg/m3	H2S ppb	CH4 ppm	NO2 ug/m3	O3 ug/m3	PM10 uG/m3	PM25 uG/m3	RH %	SO2 ug/m3	TmpC Deg. C	VOCS ppb	WDir Deg.	WSpM kph	Pwr V
Ave	**.012846**	**0**	**375.378**	**.276481**	**52.0255**	**267.940**	**25.1372**	**4.81532**	**41.2160**	**17.8065**	**66.1401**	**19.4540**	**25.6547**	**3.81240**	**151.750**	**1.07335**	**12.1456**
Max	5.1	0	566	.72	313	351	90	29	79	45	83	37	31	77	360	12.4	12.9
Min	0	0	273	0	0	38	2	0	13	2	47	9	23	0	0	0	11.5

Comments

Environmental Report

Start: 5/18/2018 3:35 PM End: 5/19/2018 2:30 PM

Collected by:

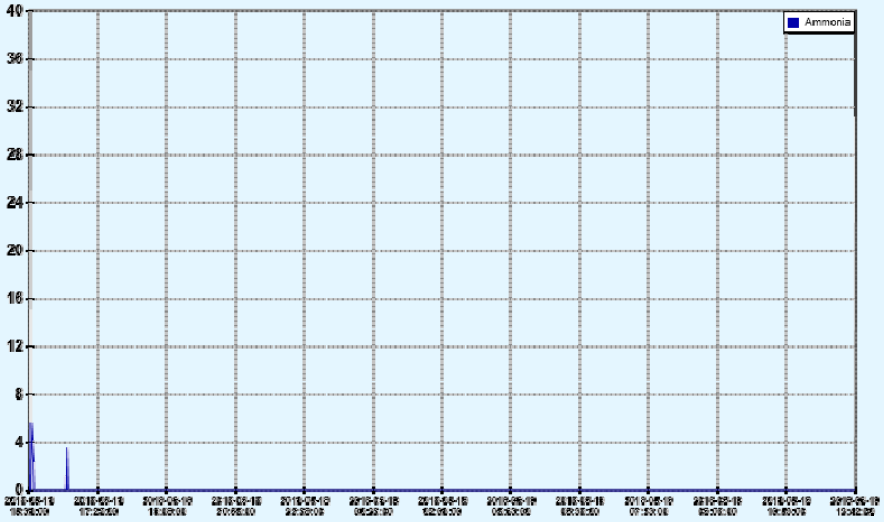
Logger ID 912005 Record Count 1370

Ammonia

Sensor ID

Range: 0 to 100 ppm

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	.012846	5.1	ppm				

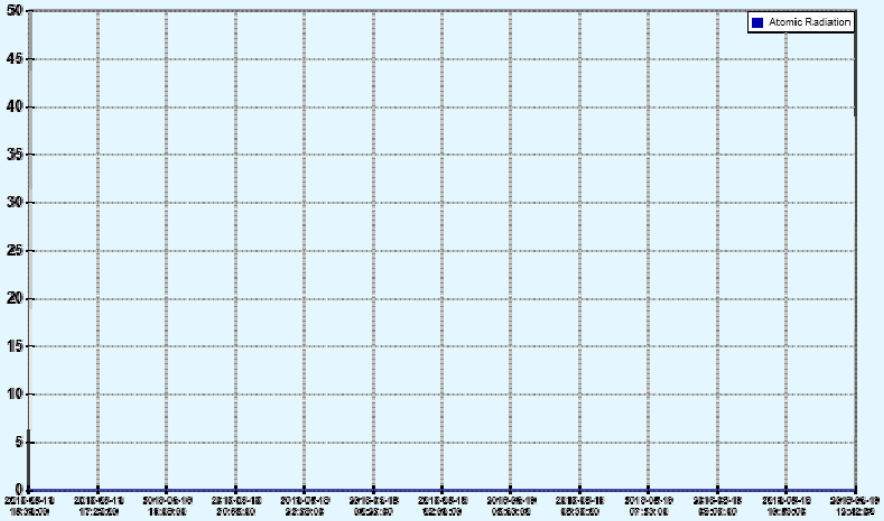


Atomic Radiation

Sensor ID

Range: 0 to 20000 CPM

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	0	0	CPM				



Environmental Report

Start: 5/18/2018 1:53 PM End: 5/19/2018 12:42 PM

Collected by:

Logger ID 912005 Record Count 1370

Carbon Dioxide

Sensor ID

Range: 0 to 5000 ppm

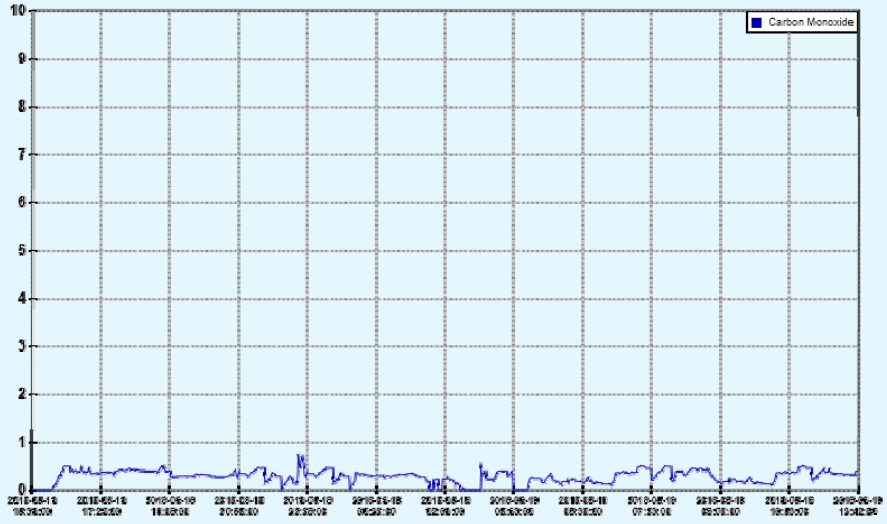
Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
273	375.378	566	ppm				

Carbon Monoxide

Sensor ID

Range: 0 to 114.5 mg/m3

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	.276481	.72	mg/m3				



Environmental Report

Start: 5/18/2018 1:53 PM End: 5/19/2018 12:42 PM

Collected by:

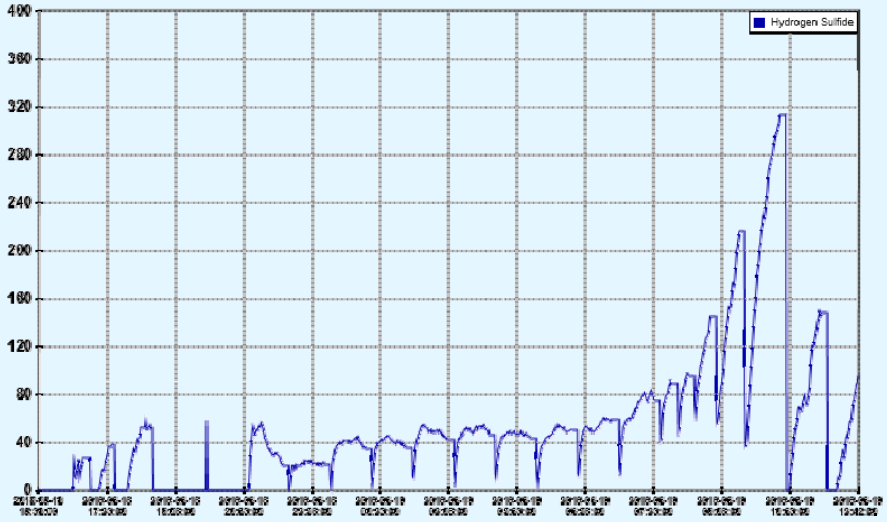
Logger ID 912005 Record Count 1370

Hydrogen Sulfide

Sensor ID

Range: 0 to 5000 ppb

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	52.0255	313	ppb				

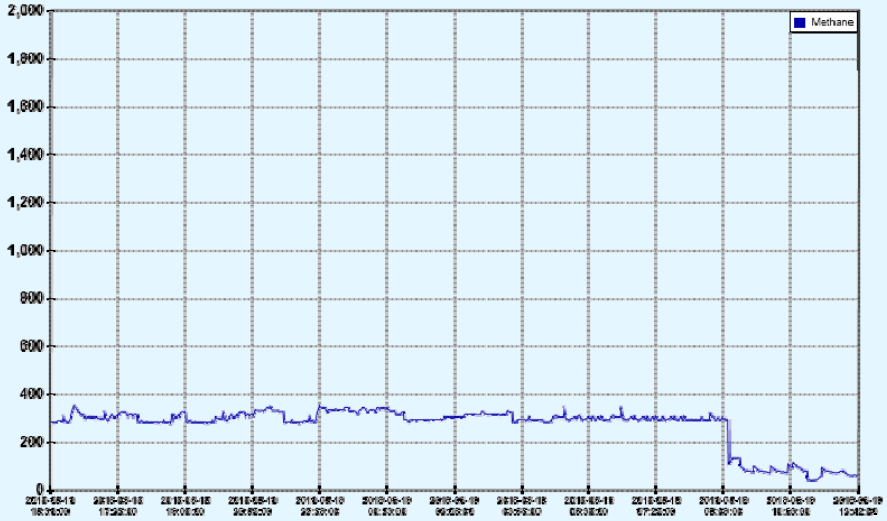


Methane

Sensor ID

Range: 0 to 10000 ppm

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
38	267.940	351	ppm				



Environmental Report

Start: 5/18/2018 1:53 PM End: 5/19/2018 12:42 PM

Collected by:

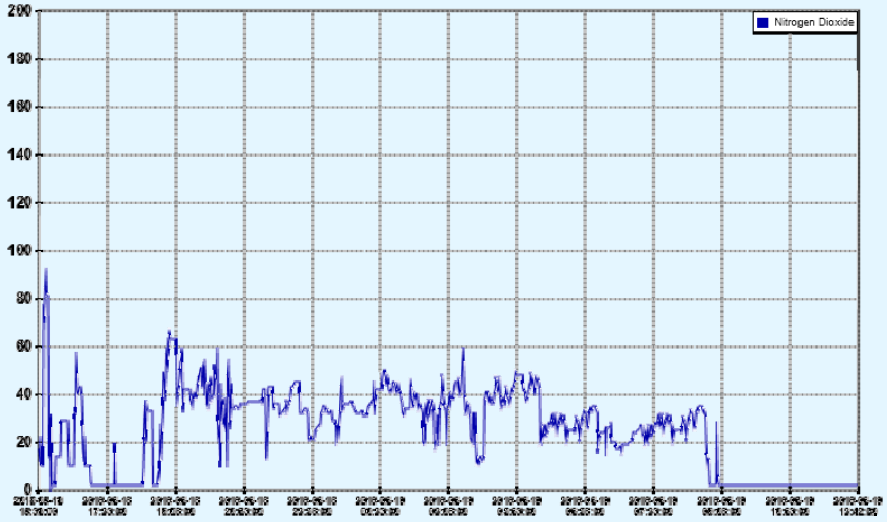
Logger ID 912005 Record Count 1370

Sensor ID

Nitrogen Dioxide

Range: 0 to 18810 ug/m3

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
2	25.1372	90	ug/m3				

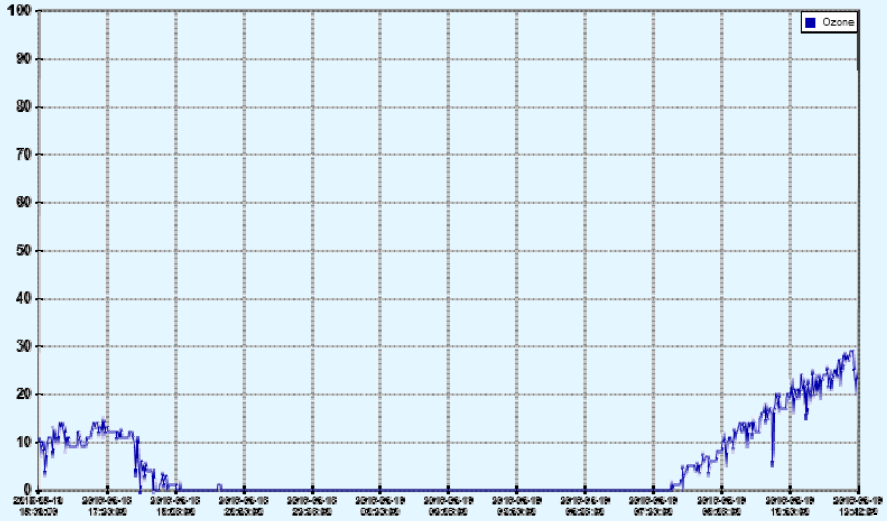


Sensor ID

Ozone

Range: 0 to 294.3 ug/m3

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	4.81532	29	ug/m3				



Environmental Report

Start: 5/18/2018 1:53 PM End: 5/19/2018 12:42 PM

Collected by:

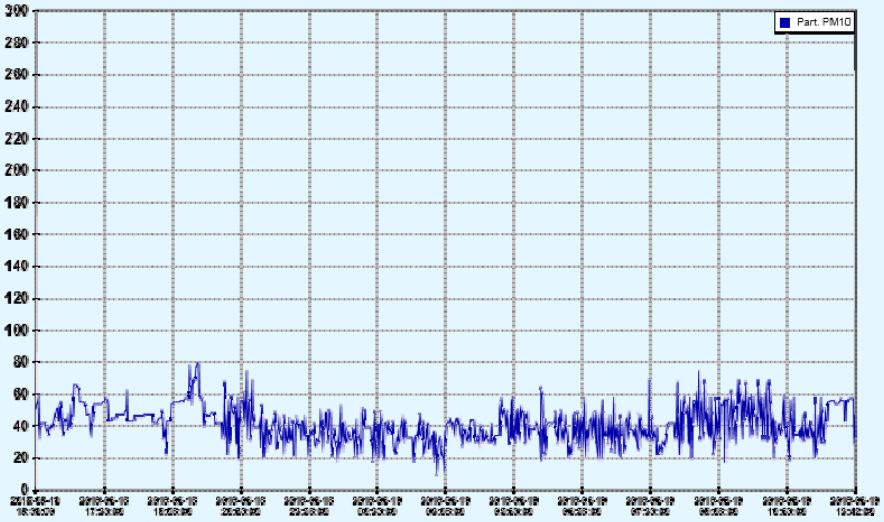
Logger ID 912005 Record Count 1370

Sensor ID

Prt10 **Part. PM10** Prt10

Range: 0 to 20000 uG/m3

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
13	41.2160	79	uG/m3				

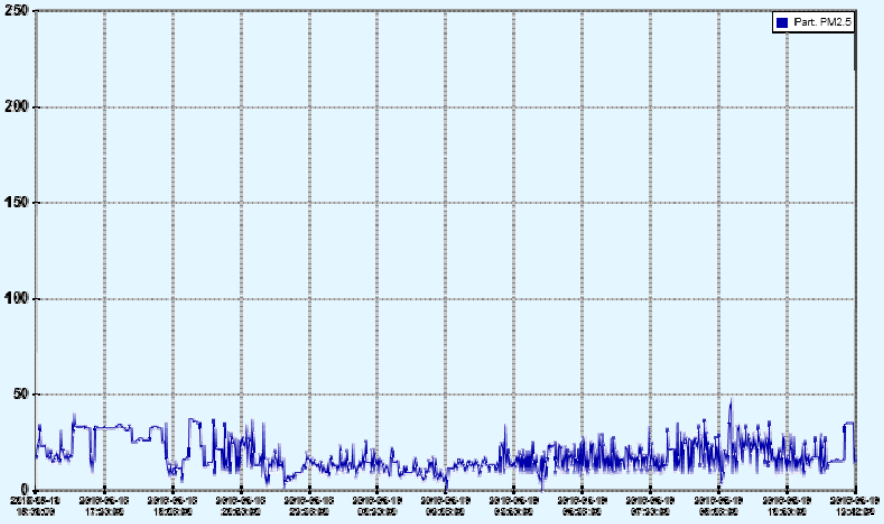


Sensor ID

Prt10 **Part. PM2.5** Prt10

Range: 0 to 20000 uG/m3

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
2	17.8065	45	uG/m3				



Environmental Report

Start: 5/18/2018 1:53 PM End: 5/19/2018 12:42 PM

Collected by:

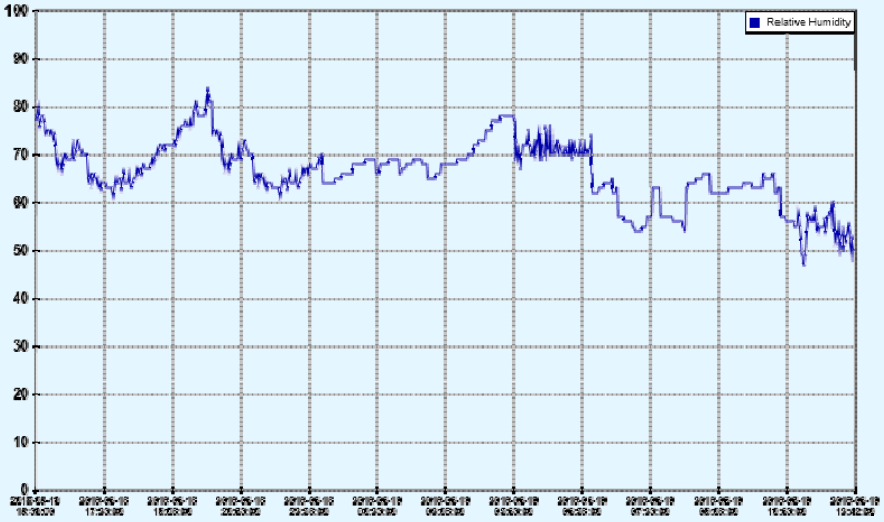
Logger ID 912005 Record Count 1370

Relative Humidity

Sensor ID

Range: 0 to 100 %

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
47	66.1401	83	%				

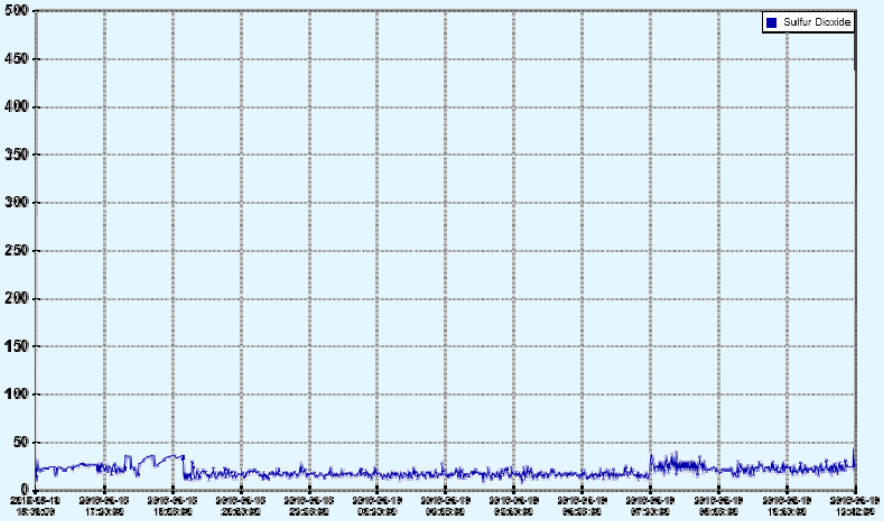


Sulfur Dioxide

Sensor ID

Range: 0 to 26190 ug/m3

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
9	19.4540	37	ug/m3				



Environmental Report

Start: 5/18/2018 1:53 PM End: 5/19/2018 12:42 PM

Collected by:

Logger ID 912005 Record Count 1370

TEMP

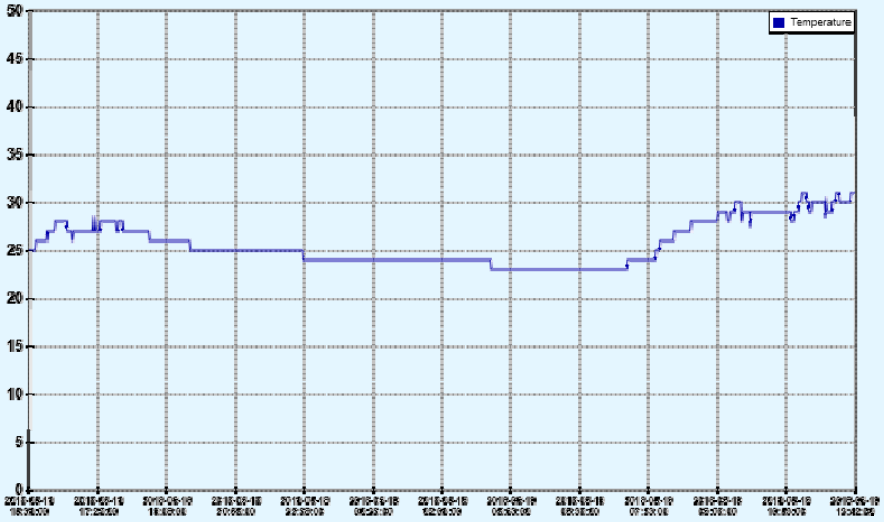
Temperature

TEMP

Sensor ID

Range: -20 to 60 Deg. C

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
23	25.6547	31	Deg. C				



VOCS

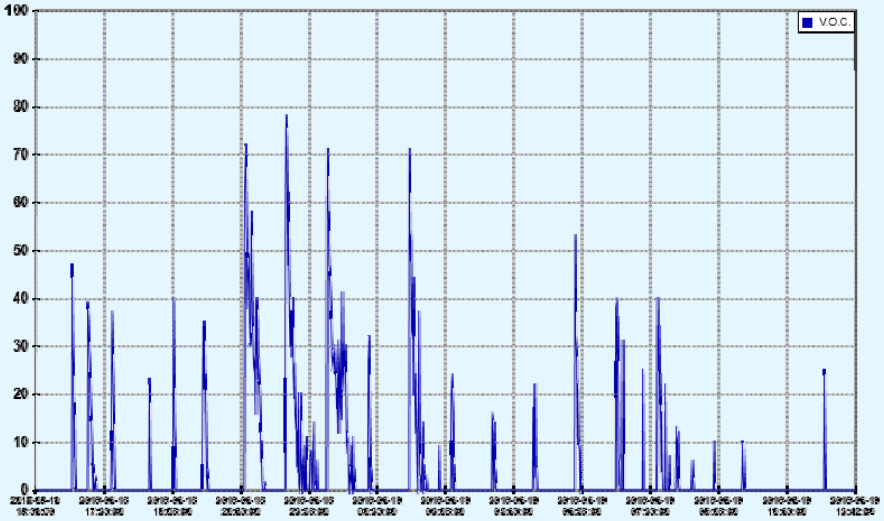
V.O.C.

VOCS

Sensor ID

Range: 0 to 50000 ppb

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	3.81240	77	ppb				



Environmental Report

Start: 5/18/2018 1:53 PM End: 5/19/2018 12:42 PM

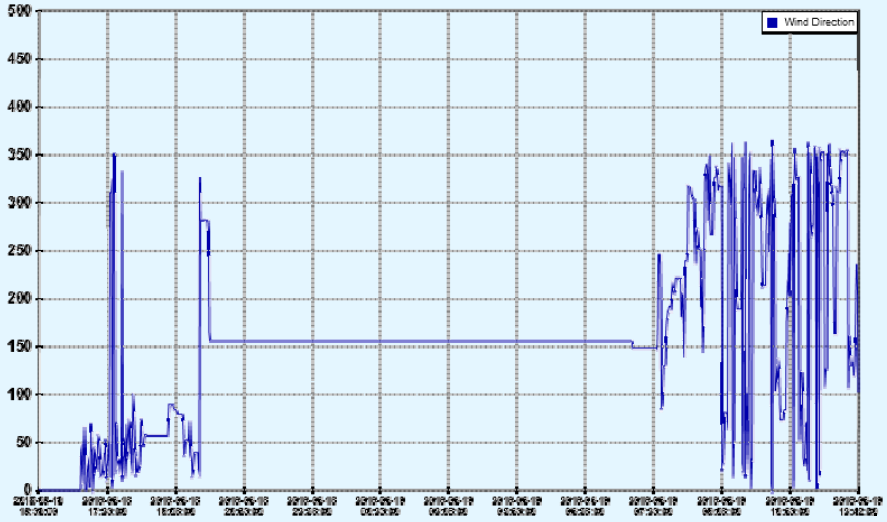
Collected by:

Logger ID 912005 Record Count 1370

W. DIR. **Wind Direction** W. DIR. Sensor ID

Range: 0 to 359 Deg.

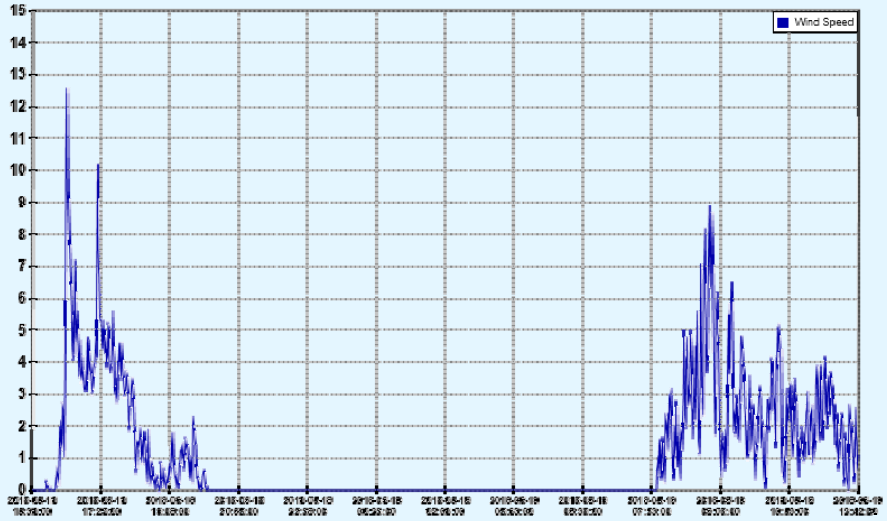
Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	151.750	360	Deg.				



W. SPD. **Wind Speed** W. SPD. Sensor ID

Range: 0 to 160 kph

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	1.07335	12.4	kph				



Environmental Report

Start: 5/18/2018 1:53 PM End: 5/19/2018 12:42 PM

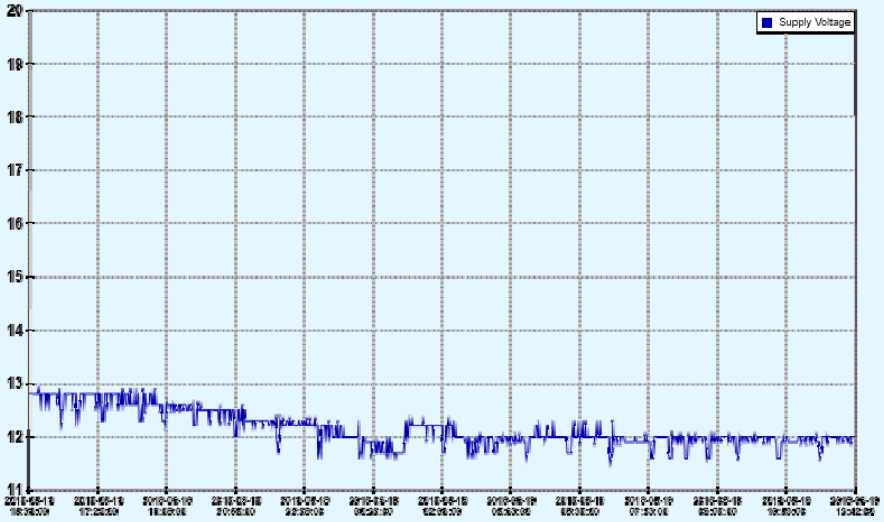
Collected by:

Logger ID 912005 Record Count 1370

Batt. Supply Voltage Batt. Sensor ID

Range: 10 to 16 V

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
11.5	12.1456	12.9	V				



(2) Laboratory Result Data

ပတ်ဝန်းကျင်ရေးရာဓာတ်ခွဲခန်း
Ecological Laboratory

စိမ်းလန်းအမိမြေဖွံ့ဖြိုးတိုးတက်ရေးအသင်း (Advancing Life and Regenerating Motherland, ALARM)

Reference Number/ စာအမှတ်: EL-R / 02587

Date / နေ့စွဲ: 30 August, 2018

Laboratory Analysis Report /ဓာတ်ခွဲစစ်ဆေးမှုအစီအရင်ခံစာ

Sample Profileနမူနာရာဇဝင်

နမူနာအမည် /Sample Name	Sample – 1 (Potable Water)	နမူနာအမှတ်/ Sample ID	4114	
နေရာ (မြို့နယ်) Location (Township)	မင်္ဂလာဒုံ	လတ္တီတွဒ် Latitude	-	
နေရာ (တိုင်း/ပြည်နယ်) Location (Division/State)	ရန်ကုန်	လောင်ဂျီတွဒ် Longitude	-	
ပေးပို့သူအမည် Sender Name	Environmental Quality Management (EQM)	နမူနာကောက်ယူချိန် (နေ့၊ နာရီ) Sampling Time (Date, Time)	24.8.2018	-
အဖွဲ့အစည်းOrganisation	-			
ဆက်သွယ်ရန် Contact	-	နမူနာရောက်ရှိချိန် (နေ့၊ နာရီ) Arriving Time (Date, Time)	24.8.2018	3:00 pm

(This laboratory analysis report is based solely on the sample submitted by the customer)

(ဤဓာတ်ခွဲစစ်ဆေးမှုအစီရင်ခံစာသည် ပေးပို့သူမှပို့ဆောင်ခဲ့သည့်နမူနာကိုသာအခြေခံထားပါသည်။)

Analysis Results စမ်းသပ်ချက်အဖြေ

စဉ် Sr.	အရည်အသွေးညွှန်းကိန်း Quality Parameter	ရလဒ် အဖြေ Results		နည်းစဉ် Method	စံသတ်မှတ်ချက် Drinking Standard	စွန့်ရေ စံနှုန်း Effluent Standard	မှတ်ချက် Remarks
၁	ချဉ်ဖန်ကိန်း (pH)	7.3		pH meters	6.5 – 8.5	6.0 – 9.0 *	Normal
၂	အပူချိန် (Temperature)	21.5	°C	Estimated by Eco-Lab with Jenway Dissolved Oxygen Meter (Model 970)	-	±3°C	-
၃	အရောင် (Colour)	18	HU	Lovibond SpectroDirect Method No. 203	-	-	-
၄	နောက်ကျိမှု (Turbidity)	7	FAU	Lovibond SpectroDirect Method No. 385	≤10 FAU	NG	Clear
၅	ပျော်ဝင်အနည်များ (Total dissolved solids)	213	mg/L	Consort Multi-parameters Conductivity meter	NG	≤2000 mg/l *	Normal
၆	လျှပ်စီးကိန်း (Conductivity)	0.4	mS/cm	Consort Multi-parameters Conductivity meter	≤2.5 mS/cm	NG	Normal
၇	သံ သတ္တုဓာတ် (Iron)	<0.1	mg/L	Lovibond SpectroDirect Method No. 220	≤ 0.2 mg/L	≤ 3.5 mg/L *	Normal
၈	အစေး အသွေး (Hardness)	460	mg/L	Lovibond SpectroDirect Method No. 200	≤60 mg/L	NG	Very Hard
၉	Alkalinity	148	mg/L	Lovibond SpectroDirect Method No. 30	-	-	-
၁၀	ကလိုရိုဒ် (Chloride)	75	mg/L	Lovibond SpectroDirect Method No. 90	≤ 250 mg/L	NG	Normal
၁၁	အောက်ဆီဂျင် ပျော်ဝင်မှု (Dissolved Oxygen)	4.90	mg/L	Jenway Dissolved Oxygen Meter (Model 970)	≥ 3 mg/L	NG	Normal

ပတ်ဝန်းကျင်ရေးရာဓာတ်ခွဲခန်း
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၁၂	ဇီဝဆိုင်ရာ အောက်ဆီဂျင်လိုအပ်ချက် (BOD_5)	<3	mg/L	Estimated by Eco-Lab with Jenway Dissolved Oxygen Meter (Model 970)	≤ 3 mg/L	≤ 50 mg/L *	Normal
၁၃	ဓာတုဆိုင်ရာ အောက်ဆီဂျင်လိုအပ်ချက် (COD)	<30	mg/L	Lovibond SpectroDirect Method No. 130, 131, 132	NG	≤ 250 mg/L *	Normal
၁၄	နိုက်ထြိုဒ် နိုက်ထရိုဂျင် (Nitrate-Nitrogen)	<0.5	mg/L	Lovibond SpectroDirect Method No. 265,267	≤ 10 mg/L	NG	Normal
၁၅	စိန်ဓာတ် (Arsenic)	0	mg/L	Lovibond Arsenic test kit code.no -400700	≤ 0.01 mg/L	≤ 0.1 mg/L *	Normal
၁၆	ကြေးနီ သတ္တုဓာတ် (Copper)	ND	mg/L	AAS, Shimadzu AA-6200 Cu (324.8 nm)	≤ 0.05 mg/L	≤ 0.5 mg/L *	Lower limit of detection=0.01 mg/L
၁၇	ကတ်ဒမီယမ် (Cadmium)	ND	mg/L	AAS, Shimadzu AA-6200 Cd (228.8 nm)	≤ 0.005 mg/L	≤ 0.1 mg/L *	Lower limit of detection=0.01 mg/L
၁၈	သွပ် သတ္တုဓါတ် (Zinc)	<0.02	mg/L	Lovibond SpectroDirect Method No. 400	-	≤ 2 mg/L *	Normal
၁၉	Sulfate	20.1	mg/L	Lovibond SpectroDirect Method No. 365	500 mg/L	-	Normal

* Myanmar Emission Guideline 2015 NG=No Guideline ND= Not Detected

စမ်းသပ်ပြီး Tested by

Daw May Myat Khine
Lab. Technician II
Ecological Laboratory
ALARM

တာဝန်ခံ Approved by

Dr. Aye Aye Win
Laboratory In-Charge
Ecological Laboratory
(ALARM)

ပတ်ဝန်းကျင်ရေးရာဓာတ်ခွဲခန်း
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စိမ်းလန်းအမိမြေဖွံ့ဖြိုးတိုးတက်ရေးအသင်း (Advancing Life and Regenerating Motherland, ALARM)

Reference Number/ စာအမှတ်: EL-R / 02588

Date / နေ့စွဲ: 30 August, 2018

Laboratory Analysis Report /ဓာတ်ခွဲစစ်ဆေးမှုအစီအရင်ခံစာ

Sample Profileနမူနာရာဇဝင်

နမူနာအမည် /Sample Name	Sample – 2 (Potable Water)	နမူနာအမှတ်/ Sample ID	4115	
နေရာ (မြို့နယ်) Location (Township)	မင်္ဂလာဒုံ	လတ္တီတွဒ် Latitude	-	
နေရာ (တိုင်း/ပြည်နယ်) Location (Division/State)	ရန်ကုန်	လောင်ဂျီတွဒ် Longitude	-	
ပေးပို့သူအမည် Sender Name	Environmental Quality Management (EQM)	နမူနာကောက်ယူချိန် (နေ့၊ နာရီ) Sampling Time (Date, Time)	24.8.2018	-
အဖွဲ့အစည်းOrganisation	-			
ဆက်သွယ်ရန် Contact	-	နမူနာရောက်ရှိချိန် (နေ့၊ နာရီ) Arriving Time (Date, Time)	24.8.2018	3:00 pm

(This laboratory analysis report is based solely on the sample submitted by the customer)

(ဤဓာတ်ခွဲစစ်ဆေးမှုအစီရင်ခံစာသည် ပေးပို့သူမှပို့ဆောင်ခဲ့သည့်နမူနာကိုသာအခြေခံထားပါသည်။)

Analysis Results စမ်းသပ်ချက်အဖြေ

စဉ် Sr.	အရည်အသွေးညွှန်းကိန်း Quality Parameter	ရလဒ် အဖြေ Results		နည်းစဉ် Method	စံသတ်မှတ်ချက် Drinking Standard	စွန့်ရေ စံနှုန်း Effluent Standard	မှတ်ချက် Remarks
၁	ချဉ်ဖန်ကိန်း (pH)	6.6		pH meters	6.5 – 8.5	6.0 – 9.0 *	Normal
၂	အပူချိန် (Temperature)	21.5	°C	Estimated by Eco-Lab with Jenway Dissolved Oxygen Meter (Model 970)	-	±3°C	-
၃	အရောင် (Colour)	0	HU	Lovibond SpectroDirect Method No. 203	-	-	-
၄	နောက်ကျိမှု (Turbidity)	<5	FAU	Lovibond SpectroDirect Method No. 385	≤10 FAU	NG	Clear
၅	ပျော်ဝင်အနည်များ (Total dissolved solids)	307	mg/L	Consort Multi-parameters Conductivity meter	NG	≤2000 mg/l *	Normal
၆	လျှပ်စီးကိန်း (Conductivity)	0.5	mS/cm	Consort Multi-parameters Conductivity meter	≤2.5 mS/cm	NG	Normal
၇	သံ သတ္တုဓာတ် (Iron)	<0.1	mg/L	Lovibond SpectroDirect Method No. 220	≤ 0.2 mg/L	≤ 3.5 mg/L *	Normal
၈	အစေး အသွေက် (Hardness)	450	mg/L	Lovibond SpectroDirect Method No. 200	≤60 mg/L	NG	Very hard
၉	Alkalinity	162	mg/L	Lovibond SpectroDirect Method No. 30	-	-	-
၁၀	ကလိုရိုဒ် (Chloride)	460	mg/L	Lovibond SpectroDirect Method No. 90	≤ 250 mg/L	NG	Above the limits
၁၁	အောက်ဆီဂျင် ပျော်ဝင်မှု (Dissolved Oxygen)	2.04	mg/L	Jenway Dissolved Oxygen Meter (Model 970)	≥ 3 mg/L	NG	Low level

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၁၂	ဇီဝဆိုင်ရာ အောက်ဆီဂျင်လိုအပ်ချက် (BOD_5)	3.5	mg/L	Estimated by Eco-Lab with Jenway Dissolved Oxygen Meter (Model 970)	≤ 3 mg/L	≤ 50 mg/L *	Above DW limit
၁၃	ဓာတုဆိုင်ရာ အောက်ဆီဂျင်လိုအပ်ချက် (COD)	<30	mg/L	Lovibond SpectroDirect Method No. 130, 131, 132	NG	≤ 250 mg/L *	Normal
၁၄	နိုက်ထြိုဒ် နိုက်ထရိုဂျင် (Nitrate-Nitrogen)	<0.5	mg/L	Lovibond SpectroDirect Method No. 265,267	≤ 10 mg/L	NG	Normal
၁၅	စိန်ဓာတ် (Arsenic)	0	mg/L	Lovibond Arsenic test kit code.no -400700	≤ 0.01 mg/L	≤ 0.1 mg/L *	Normal
၁၆	ကြေးနီ သတ္တုဓာတ် (Copper)	ND	mg/L	AAS, Shimadzu AA-6200 Cu (324.8 nm)	≤ 0.05 mg/L	≤ 0.5 mg/L *	Lower limit of detection=0.01 mg/L
၁၇	ကတ်ဒမီယမ် (Cadmium)	ND	mg/L	AAS, Shimadzu AA-6200 Cd (228.8 nm)	≤ 0.005 mg/L	≤ 0.1 mg/L *	Lower limit of detection=0.01 mg/L
၁၈	သွပ် သတ္တုဓါတ် (Zinc)	<0.02	mg/L	Lovibond SpectroDirect Method No. 400	-	≤ 2 mg/L *	Normal
၁၉	Sulfate	14.9	mg/L	Lovibond SpectroDirect Method No. 365	500 mg/L	-	Normal

* Myanmar Emission Guideline 2015 NG=No Guideline ND= Not Detected

စမ်းသပ်ပြီး Tested by

Daw May Myat Khine
Lab. Technician II
Ecological Laboratory
ALARM

တာဝန်ခံ Approved by

Dr. Aye Aye Win
Laboratory In-Charge
Ecological Laboratory
(ALARM)

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Reference Number/ စာအမှတ်: EL-R / 02589

Date / နေ့စွဲ: 30 August, 2018

Laboratory Analysis Report /ဓာတ်ခွဲစစ်ဆေးမှုအစီအရင်ခံစာ

Sample Profileနမူနာရာဇဝင်

နမူနာအမည် /Sample Name	Sample – 3 (Potable Water)	နမူနာအမှတ်/ Sample ID	4116	
နေရာ (မြို့နယ်) Location (Township)	မင်္ဂလာဒုံ	လတ္တီတွဒ် Latitude	-	
နေရာ (တိုင်း/ပြည်နယ်) Location (Division/State)	ရန်ကုန်	လောင်ဂျီတွဒ် Longitude	-	
ပေးပို့သူအမည် Sender Name	Environmental Quality Management (EQM)	နမူနာကောက်ယူချိန် (နေ့၊ နာရီ) Sampling Time (Date, Time)	24.8.2018	-
အဖွဲ့အစည်းOrganisation	-			
ဆက်သွယ်ရန် Contact	-	နမူနာရောက်ရှိချိန် (နေ့၊ နာရီ) Arriving Time (Date, Time)	24.8.2018	3:00 pm

(This laboratory analysis report is based solely on the sample submitted by the customer)

(ဤဓာတ်ခွဲစစ်ဆေးမှုအစီရင်ခံစာသည် ပေးပို့သူမှပို့ဆောင်ခဲ့သည့်နမူနာကိုသာအခြေခံထားပါသည်။)

Analysis Results စမ်းသပ်ချက်အဖြေ

စဉ် Sr.	အရည်အသွေးညွှန်းကိန်း Quality Parameter	ရလဒ် အဖြေ Results		နည်းစဉ် Method	စံသတ်မှတ်ချက် Drinking Standard	စွန့်ရေ စံနှုန်း Effluent Standard	မှတ်ချက် Remarks
၁	ချဉ်ဖန်ကိန်း (pH)	6.9		pH meters	6.5 – 8.5	6.0 – 9.0 *	Normal
၂	အပူချိန် (Temperature)	21.5	°C	Estimated by Eco-Lab with Jenway Dissolved Oxygen Meter (Model 970)	-	±3°C	-
၃	အရောင် (Colour)	24	HU	Lovibond SpectroDirect Method No. 203	-		-
၄	နောက်ကျိမှု (Turbidity)	<5	FAU	Lovibond SpectroDirect Method No. 385	≤10 FAU	NG	Clear
၅	ပျော်ဝင်အနည်များ (Total dissolved solids)	273	mg/L	Consort Multi-parameters Conductivity meter	NG	≤2000 mg/l *	Normal
၆	လျှပ်စီးကိန်း (Conductivity)	0.5	mS/cm	Consort Multi-parameters Conductivity meter	≤2.5 mS/cm	NG	Normal
၇	သံ သတ္တုဓာတ် (Iron)	<0.1	mg/L	Lovibond SpectroDirect Method No. 220	≤ 0.2 mg/L	≤ 3.5 mg/L *	Normal
၈	အစေး အသွေက် (Hardness)	1220	mg/L	Lovibond SpectroDirect Method No. 200	≤60 mg/L	NG	Very hard
၉	Alkalinity	155	mg/L	Lovibond SpectroDirect Method No. 30	-	-	-
၁၀	ကလိုရိုဒ် (Chloride)	99	mg/L	Lovibond SpectroDirect Method No. 90	≤ 250 mg/L	NG	Normal
၁၁	အောက်ဆီဂျင် ပျော်ဝင်မှု (Dissolved Oxygen)	3.41	mg/L	Jenway Dissolved Oxygen Meter (Model 970)	≥ 3 mg/L	NG	Normal

ပတ်ဝန်းကျင်ရေးရာဓာတ်ခွဲခန်း
Ecological Laboratory

စိမ်းလန်းအမိမြေဖွံ့ဖြိုးတိုးတက်ရေးအသင်း (Advancing Life and Regenerating Motherland, ALARM)

၁၂	ဇီဝဆိုင်ရာ အောက်ဆီဂျင်လိုအပ်ချက် (BOD_5)	<3	mg/L	Estimated by Eco-Lab with Jenway Dissolved Oxygen Meter (Model 970)	≤ 3 mg/L	≤ 50 mg/L *	Normal
၁၃	ဓာတုဆိုင်ရာ အောက်ဆီဂျင်လိုအပ်ချက် (COD)	<30	mg/L	Lovibond SpectroDirect Method No. 130, 131, 132	NG	≤ 250 mg/L *	Normal
၁၄	နိုက်ထြိုဒြ နိုက်ထရိုဂျင် (Nitrate-Nitrogen)	<0.5	mg/L	Lovibond SpectroDirect Method No. 265,267	≤ 10 mg/L	NG	Normal
၁၅	စိန်ဓာတ် (Arsenic)	0.01	mg/L	Lovibond Arsenic test kit code.no -400700	≤ 0.01 mg/L	≤ 0.1 mg/L *	Normal
၁၆	ကြေးနီ သတ္တုဓာတ် (Copper)	ND	mg/L	AAS, Shimadzu AA-6200 Cu (324.8 nm)	≤ 0.05 mg/L	≤ 0.5 mg/L *	Lower limit of detection=0.01 mg/L
၁၇	ကတ်ဒမီယမ် (Cadmium)	ND	mg/L	AAS, Shimadzu AA-6200 Cd (228.8 nm)	≤ 0.005 mg/L	≤ 0.1 mg/L *	Lower limit of detection=0.01 mg/L
၁၈	သွပ် သတ္တုဓါတ် (Zinc)	0.03	mg/L	Lovibond SpectroDirect Method No. 400	-	≤ 2 mg/L *	Normal
၁၉	Sulfate	12.2	mg/L	Lovibond SpectroDirect Method No. 365	500 mg/L	-	Normal

* Myanmar Emission Guideline 2015 NG=No Guideline ND= Not Detected

စမ်းသပ်ပြီး Tested by

Daw May Myat Khine
Lab. Technician II
Ecological Laboratory
ALARM

တာဝန်ခံ Approved by

Dr. Aye Aye Win
Laboratory In-Charge
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(ALARM)

ပတ်ဝန်းကျင်ရေးရာဓာတ်ခွဲခန်း
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Reference Number/ စာအမှတ်: EL-R / 02590

Date / နေ့စွဲ: 30 August, 2018

Laboratory Analysis Report /ဓာတ်ခွဲစစ်ဆေးမှုအစီအရင်ခံစာ

Sample Profileနမူနာရာဇဝင်

နမူနာအမည် /Sample Name	Sample – 4 (Wastewater, Drainage)	နမူနာအမှတ်/ Sample ID	4117	
နေရာ (မြို့နယ်) Location (Township)	မင်္ဂလာဒုံ	လတ္တီတွဒ် Latitude	-	
နေရာ (တိုင်း/ပြည်နယ်) Location (Division/State)	ရန်ကုန်	လောင်ဂျီတွဒ် Longitude	-	
ပေးပို့သူအမည် Sender Name	Environmental Quality Management (EQM)	နမူနာကောက်ယူချိန် (နေ့၊ နာရီ) Sampling Time (Date, Time)	24.8.2018	-
အဖွဲ့အစည်းOrganisation	-			
ဆက်သွယ်ရန် Contact	-	နမူနာရောက်ရှိချိန် (နေ့၊ နာရီ) Arriving Time (Date, Time)	24.8.2018	3:00 pm

(This laboratory analysis report is based solely on the sample submitted by the customer)

(ဤဓာတ်ခွဲစစ်ဆေးမှုအစီရင်ခံစာသည် ပေးပို့သူမပို့ဆောင်ခဲ့သည့်နမူနာကိုသာအခြေခံထားပါသည်။)

Analysis Results စမ်းသပ်ချက်အဖြေ

စဉ် Sr.	အရည်အသွေးညွှန်းကိန်း Quality Parameter	ရလဒ် အဖြေ Results		နည်းစဉ် Method	စံသတ်မှတ်ချက် Drinking Standard	စွန့်ရေ စံနှုန်း Effluent Standard	မှတ်ချက် Remarks
၁	ချဉ်ဖန်ကိန်း (pH)	7.3		pH meters	6.5 – 8.5	6.0 – 9.0 *	Normal
၂	အပူချိန် (Temperature)	21.5	°C	Estimated by Eco-Lab with Jenway Dissolved Oxygen Meter (Model 970)	-	±3°C	-
၃	အရောင် (Colour)	58	HU	Lovibond SpectroDirect Method No. 203	-	-	-
၄	နောက်ကျိမှု (Turbidity)	23	FAU	Lovibond SpectroDirect Method No. 385	≤10 FAU	NG	Turbid
၅	ပျော်ဝင်အနည်များ (Total dissolved solids)	251	mg/L	Consort Multi-parameters Conductivity meter	NG	≤2000 mg/l *	Normal
၆	လျှပ်စီးကိန်း (Conductivity)	0.4	mS/cm	Consort Multi-parameters Conductivity meter	≤2.5 mS/cm	NG	Normal
၇	သံ သတ္တုဓာတ် (Iron)	<0.1	mg/L	Lovibond SpectroDirect Method No. 220	≤ 0.2 mg/L	≤ 3.5 mg/L *	Normal
၈	အစေး အသွေက် (Hardness)	1430	mg/L	Lovibond SpectroDirect Method No. 200	≤60 mg/L	NG	Very Hard
၉	Alkalinity	169	mg/L	Lovibond SpectroDirect Method No. 30	-	-	-
၁၀	ကလိုရိုဒ် (Chloride)	139	mg/L	Lovibond SpectroDirect Method No. 90	≤ 250 mg/L	NG	Normal
၁၁	အောက်ဆီဂျင် ပျော်ဝင်မှု (Dissolved Oxygen)	2.67	mg/L	Jenway Dissolved Oxygen Meter (Model 970)	≥ 3 mg/L	NG	Low level

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၁၂	ဇီဝဆိုင်ရာ အောက်ဆီဂျင်လိုအပ်ချက် (BOD_5)	10	mg/L	Estimated by Eco-Lab with Jenway Dissolved Oxygen Meter (Model 970)	≤ 3 mg/L	≤ 50 mg/L *	Above DW limit
၁၃	ဓာတုဆိုင်ရာ အောက်ဆီဂျင်လိုအပ်ချက် (COD)	56	mg/L	Lovibond SpectroDirect Method No. 130, 131, 132	NG	≤ 250 mg/L *	Normal
၁၄	နိုက်ထြိုဒြဲ နိုက်ထရိုဂျင် (Nitrate-Nitrogen)	<0.5	mg/L	Lovibond SpectroDirect Method No. 265,267	≤ 10 mg/L	NG	Normal
၁၅	စိန်ဓာတ် (Arsenic)	0	mg/L	Lovibond Arsenic test kit code.no -400700	≤ 0.01 mg/L	≤ 0.1 mg/L *	Normal
၁၆	ကြေးနီ သတ္တုဓာတ် (Copper)	0.02	mg/L	AAS, Shimadzu AA-6200 Cu (324.8 nm)	≤ 0.05 mg/L	≤ 0.5 mg/L *	Normal
၁၇	ကတ်ဒမီယမ် (Cadmium)	ND	mg/L	AAS, Shimadzu AA-6200 Cd (228.8 nm)	≤ 0.005 mg/L	≤ 0.1 mg/L *	Lower limit of detection=0.01 mg/L
၁၈	သွပ် သတ္တုဓါတ် (Zinc)	0.16	mg/L	Lovibond SpectroDirect Method No. 400	-	≤ 2 mg/L *	Normal
၁၉	Sulfate	53.2	mg/L	Lovibond SpectroDirect Method No. 365	500 mg/L	-	Normal

* Myanmar Emission Guideline 2015 NG=No Guideline ND= Not Detected

စမ်းသပ်ပြီး Tested by

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ALARM

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စိမ်းလန်းအမိမြေဖွံ့ဖြိုးတိုးတက်ရေးအသင်း (Advancing Life and Regenerating Motherland, ALARM)

Reference Number/ စာအမှတ်: EL-R / 02591

Date / နေ့စွဲ: 30 August, 2018

Laboratory Analysis Report /ဓာတ်ခွဲစစ်ဆေးမှုအစီအရင်ခံစာ

Sample Profileနမူနာရာဇဝင်

နမူနာအမည် /Sample Name	Sample – 5 (Wastewater, Drainage)	နမူနာအမှတ်/ Sample ID	4118	
နေရာ (မြို့နယ်) Location (Township)	မင်္ဂလာဒုံ	လတ္တီတွဒ် Latitude	-	
နေရာ (တိုင်း/ပြည်နယ်) Location (Division/State)	ရန်ကုန်	လောင်ဂျီတွဒ် Longitude	-	
ပေးပို့သူအမည် Sender Name	Environmental Quality Management (EQM)	နမူနာကောက်ယူချိန် (နေ့၊ နာရီ) Sampling Time (Date, Time)	24.8.2018	-
အဖွဲ့အစည်းOrganisation	-			
ဆက်သွယ်ရန် Contact	-	နမူနာရောက်ရှိချိန် (နေ့၊ နာရီ) Arriving Time (Date, Time)	24.8.2018	3:00 pm

(This laboratory analysis report is based solely on the sample submitted by the customer)

(ဤဓာတ်ခွဲစစ်ဆေးမှုအစီရင်ခံစာသည် ပေးပို့သူမှပို့ဆောင်ခဲ့သည့်နမူနာကိုသာအခြေခံထားပါသည်။)

Analysis Results စမ်းသပ်ချက်အဖြေ

စဉ် Sr.	အရည်အသွေးညွှန်းကိန်း Quality Parameter	ရလဒ် အဖြေ Results		နည်းစဉ် Method	စံသတ်မှတ်ချက် Drinking Standard	စွန့်ရေ စံနှုန်း Effluent Standard	မှတ်ချက် Remarks
၁	ချဉ်ဖန်ကိန်း (pH)	11		pH meters	6.5 – 8.5	6.0 – 9.0 *	In Base Range
၂	အပူချိန် (Temperature)	21.5	°C	Estimated by Eco-Lab with Jenway Dissolved Oxygen Meter (Model 970)	-	±3°C	-
၃	အရောင် (Colour)	294	HU	Lovibond SpectroDirect Method No. 203	-	-	-
၄	နောက်ကျိမှု (Turbidity)	67	FAU	Lovibond SpectroDirect Method No. 385	≤10 FAU	NG	Turbid
၅	ပျော်ဝင်အနည်များ (Total dissolved solids)	523	mg/L	Consort Multi-parameters Conductivity meter	NG	≤2000 mg/l *	Normal
၆	လျှပ်စီးကိန်း (Conductivity)	0.9	mS/cm	Consort Multi-parameters Conductivity meter	≤2.5 mS/cm	NG	Normal
၇	သံ သတ္တုဓာတ် (Iron)	0.22	mg/L	Lovibond SpectroDirect Method No. 220	≤ 0.2 mg/L	≤ 3.5 mg/L *	Above DW limit
၈	အစေး အသွေက် (Hardness)	361	mg/L	Lovibond SpectroDirect Method No. 200	≤60 mg/L	NG	Very Hard
၉	Alkalinity	320	mg/L	Lovibond SpectroDirect Method No. 30	-	-	-
၁၀	ကလိုရိုဒ် (Chloride)	139	mg/L	Lovibond SpectroDirect Method No. 90	≤ 250 mg/L	NG	Normal
၁၁	အောက်ဆီဂျင် ပျော်ဝင်မှု (Dissolved Oxygen)	3.92	mg/L	Jenway Dissolved Oxygen Meter (Model 970)	≥ 3 mg/L	NG	Normal

ပတ်ဝန်းကျင်ရေးရာဓာတ်ခွဲခန်း
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၁၂	ဇီဝဆိုင်ရာ အောက်ဆီဂျင်လိုအပ်ချက် (BOD_5)	17	mg/L	Estimated by Eco-Lab with Jenway Dissolved Oxygen Meter (Model 970)	≤ 3 mg/L	≤ 50 mg/L *	Above DW limit
၁၃	ဓာတုဆိုင်ရာ အောက်ဆီဂျင်လိုအပ်ချက် (COD)	61	mg/L	Lovibond SpectroDirect Method No. 130, 131, 132	NG	≤ 250 mg/L *	Normal
၁၄	နိုက်ထြိုဒ် နိုက်ထရိုဂျင် (Nitrate-Nitrogen)	<0.5	mg/L	Lovibond SpectroDirect Method No. 265,267	≤ 10 mg/L	NG	Normal
၁၅	စိန်ဓာတ် (Arsenic)	0.01	mg/L	Lovibond Arsenic test kit code.no -400700	≤ 0.01 mg/L	≤ 0.1 mg/L *	Normal
၁၆	ကြေးနီ သတ္တုဓာတ် (Copper)	0.03	mg/L	AAS, Shimadzu AA-6200 Cu (324.8 nm)	≤ 0.05 mg/L	≤ 0.5 mg/L *	Normal
၁၇	ကတ်ဒမီယမ် (Cadmium)	ND	mg/L	AAS, Shimadzu AA-6200 Cd (228.8 nm)	≤ 0.005 mg/L	≤ 0.1 mg/L *	Lower limit of detection=0.01 mg/L
၁၈	သွပ် သတ္တုဓါတ် (Zinc)	<0.02	mg/L	Lovibond SpectroDirect Method No. 400	-	≤ 2 mg/L *	Normal
၁၉	Sulfate	34.6	mg/L	Lovibond SpectroDirect Method No. 365	500 mg/L	-	Normal

* Myanmar Emission Guideline 2015 NG=No Guideline ND= Not Detected

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Dr. Aye Aye Win
Laboratory In-Charge
Ecological Laboratory
(ALARM)

ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော်အစိုးရ
စိုက်ပျိုးရေး၊ မွေးမြူရေးနှင့် ဆည်မြောင်းဝန်ကြီးဌာန
စိုက်ပျိုးရေးဦးစီးဌာန
(မြေအသုံးချရေးဌာနခွဲ)
ရန်ကုန်မြို့

စာအမှတ် - ဓခ - ၂/(ဝ)၊ ၁၈ - ၁၉ (၃၀၈)
နေ့စွဲ၊ ၂၀၁၈ ခုနှစ်၊ စက်တင်ဘာလ (၂၆) ရက်

အကြောင်းအရာ ။ ။ **မြေနမူနာ** ခါတ်ခွဲအဖြေပေးပို့ခြင်း။

ရည်ညွှန်းချက် ။ ။ **Environmental Quality Management** မှ (24.8.2018) နေ့တွင် ပေးပို့သောနမူနာ။

အထက်အကြောင်းအရာပါ ကိစ္စနှင့်ပတ်သတ်၍ ရည်ညွှန်းစာဖြင့် ပေးပို့လာသော မြေနမူနာ (၂ - **မျိုး**) အား ခါတ်ခွဲစစ်ဆေးပြီးဖြစ်၍ ခါတ်ခွဲတွေ့ရှိချက် အဖြေများကို ဤစာနှင့်အတူ ပူးတွဲပေးပို့ပါသည်။

(ခင်ဝင်းမာ)
ဒုတိယညွှန်ကြားရေးမှူး
ခါတ်ခွဲခန်းတာဝန်ခံ
မြေအသုံးချရေးဌာနခွဲ

Environmental Quality Management

မိတ္တူကို
- ရုံးလက်ခံ

DEPARTMENT OF AGRICULTURE (LAND USE)
SOIL ANALYTICAL DATA SHEET

Division - Yangon

Township - မင်္ဂလာဒုံ

Environmental Quality Management (24.8.2018)

Sheet No. 1

Sr No. S 1-2/18-19

Sr No.	Sample plot	Moisture %	pH Soil : Water 1 : 2.5	Copper ppm	Iron ppm	Lead ppm	Cadmium ppm	SOIL INTERPRETATION OF RESULT
								pH
	မြေနမူနာ							
1	နမူနာ (၁) ၊ Soil-1	0.62	6.21	Not detected	85.08	1.55	Not detected	Slightly acid
2	နမူနာ (၂) ၊ Soil-2	0.63	6.01	Not detected	97.73	1.80	Not detected	Slightly acid

ခင်ဝင်းမာ
ဒု-ညွှန်ကြားရေးမှူး
ဓါတ်ခွဲခန်းတာဝန်ခံ
မြေအသုံးချရေးဌာနခွဲ

ANNEX (B)

Impact Assessment methodology

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:

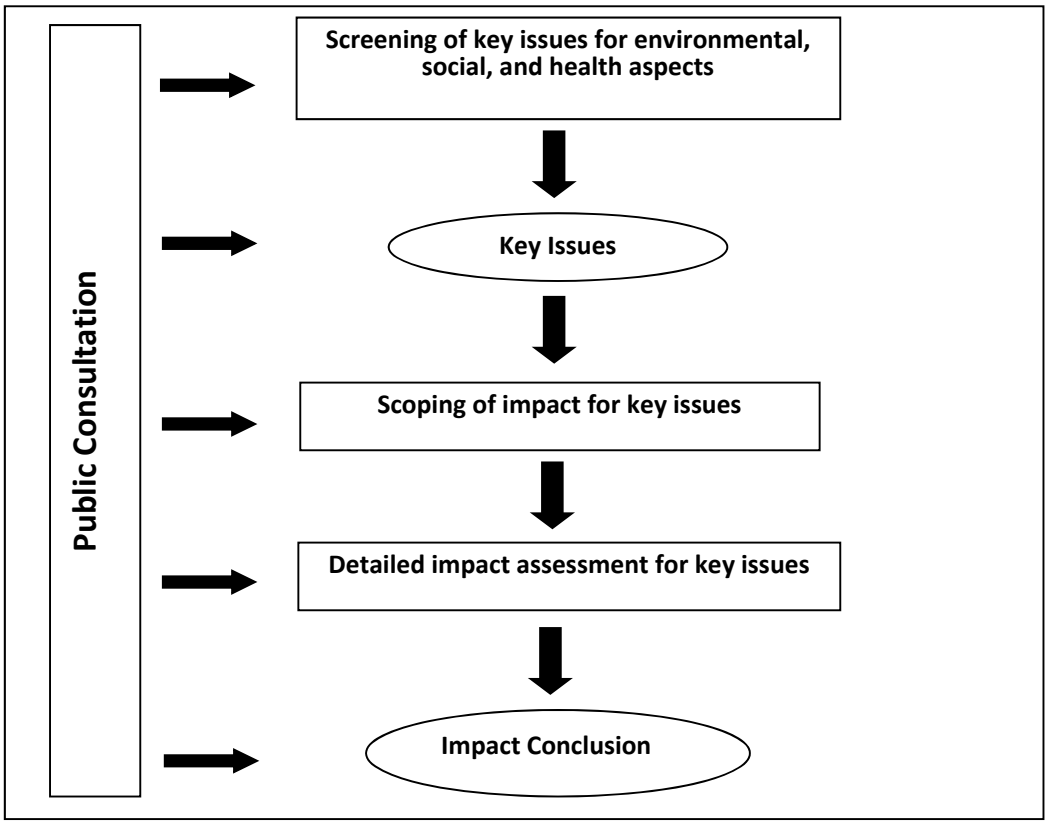
1) Understanding and developing a strategy for the regulatory process;
2) Developing a serious and effective public/stakeholders dialogue and consultation program to minimize potential conflicts that might arise during construction and operations;
3) Providing high-quality technical components such as 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.

Stage 2: 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.

Stage 3: **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 1-3** 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 1-4**.

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 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.

1.7 Methodology for 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.

To access for the public consultation and disclosure, questionnaire method has been used. The question in this survey has been covered by all the factors based on 12 different sections. These sections are

1. Demographic status
2. Household members characteristic
3. Health issues
4. Household structure
5. Livelihood aspect
6. Infrastructure
7. Natural Resources
8. Culture aspect
9. Natural Environment
10. Biodiversity
11. People attitude and
12. Perception on the proposed project

It 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 (community leader, teacher etc) and key government officials
- ***Stakeholders meeting/focus group discussions*** with community

Calculation method for Socio Economic survey

Based on the household population according to the ***Ministry of Labour, Immigration and Population, sample size is calculated.*** As Rocket Flour Milling factory is located along**,** the **Industrial Zone (1), Pyi Gyi Tagon Township, Mandalay,** interview survey had asked randomly to the communities from that townships.

Site selections

Based on the locations of Rocket Flour Milling factory, **Industrial Zone (1), Pyi Gyi Tagon Township, Mandalay** has been selected as a primary stage. After screening, in the Pyi Gyi Tagon Township, the nearest Htein Gone Block is selected.

Sample size calculation

In the following formula, it has been used for ***the sample size calculation***.

$$\boldsymbol{n = \frac{N}{1 + Ne^2}}$$

n= Sample size
N= Total populations

e=Confidents level

Based on the total households which have been included in that township, total households are 4000 households.
According to the sample size calculation formula, firstly, it has been set confidents level. If the confident level is 95%, the sample sizes will be shown in the following calculation.
So,

$$\boldsymbol{n = \frac{4000}{1 + (4000 * 0.05^2)}}$$

$$\boldsymbol{n = \frac{4000}{1 + 10}}$$

$$\boldsymbol{n = 363}$$

If the confident level was set 95%, the total sample sizes must be 363.

However, as a second stage, if confident level is 90%, the sample sizes will be shown in the following calculation.
So,

$$\boldsymbol{n = \frac{4000}{1 + (4000 * 0.1^2)}}$$

$$\boldsymbol{n = \frac{4000}{1 + 40}}$$

$$\boldsymbol{n = 98}$$

If the confident level was set 90%, the total sample sizes must be 98.

As our consultant team, we have selected ***(200) households***, which are the average between 95% confident and 90% confident level, it is exactly said that the 93% confident level. Thus, for the Rocket Flour Milling Factory projects, 200 households has been randomly selected and investigated for the public consultation and disclosure issues.

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

ANNEX (C)

Public Consultation Questionnaires

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 Confectionary Factory (Lluvia Co.,Ltd).

. The survey will be carried out in the households, which are located approximately 2 km from Confectionary Factory (Lluvia Co.,Ltd).

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 Confectionary Factory (Lluvia Co.,Ltd)

	11. STATE/DIVISION(ပြည်နယ်/တိုင်း)	__ | |
	12. Village/Township(ကျေးရွာ/မြို့နယ်) 1 2 3 4 5 6 7 8	____ | | | | | | | |
	13. SURVEY/HOUSEHOLD SAMPLE NUMBER ____	
	14. NAME Of HOUSEHOLD HEAD _____	
	15. NAME OF RESPONDENT _____	

I6	DATE OF VISITS:	| | / | | / **1| 5** |
I7	ENUMERATOR:_____	SUPERVISOR _____

Enumerator's Remark: :.....

Supervisor's Remark :.....

****** indicates the question has skip (>>).

Module A: Household Member Characteristics
အခန်း-(၁) အိမ်ထောင်စု အချက်အလက်များ

Question		Response categories	Skip to	Response
Name/Identification				
Household Member Characteristics				
A1	အိမ်ထောင်ဦးစီးနှင့် တော်စပ်ပုံ	ဦးစီး .....1 ဇနီး/ခင်ပွန်း .....2 သား/သမီး .....3 မိဘ/ ယောကျ်မ .....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		|_|_|

** indicates the question has skip (>>).

Module A: Household Member Characteristics

အခန်း-(၁) အိမ်ထောင်စု အချက်အလက်များ

Q		Response categories	Skip to	Response
Name/Identification				
Household Member Characteristics				
A7	လွန်ခဲ့သော ၇-ရက်အတွင်းက လုပ်ကိုင်ခဲ့သော အဓိကလုပ်ငန်းကို အမည်နှင့်တကွဖေါ်ပြပါ။	Worked to earn to income(လက်လုပ်လက်စား) 1 Helped household business (အိမ်အကူ) 2 Search for work…… (အလုပ်ရှာ) 3 Housework…… (အိမ်အလုပ်)……4 Fulltime learning……(အချိန်ပြည့် သင်ယူ) 5 Doing religious matters(ဘာသာရေးကိစ္စလုပ်) 6 Bad health/ disable (ကျန်းမာရေးဆိုး/မလုပ်နိုင်) 7 Pension/ support (not working) ပင်စင်စား 8 Not work/ not search for work(အလုပ်လက်မဲ့) 9		____ | | |
A8	အဓိကလုပ်ငန်းအမည် နှင့် တကွ ဖေါ်ပြပါ	Farmer…… လယ်သမား 1 Livestock worker…မွေးမြူရေးသမား…….. 2 Fisherman……. တံငါသည်…… 3 Forestry worker…သစ်တောလုပ်သား…… 4 Sale worker……အရောင်းအဝယ်……5 Service worker…ဝန်ဆောင်မှုအလုပ်…… 6 Skilled worker…ကျွမ်းကျင်လုပ်သား…… 7 Casual worker…ကျဘမ်းလုပ်သား…… 8 Unpaid family worker……မိသားစုအလုပ်…… 9 Other (Specify) အခြား 10		____ | | |
A9	သင်၏ တစ်နှစ်ဝင်ငွေ (ကျပ်)	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		| |_|
A10	ပြီးဆုံခဲ့သော ပညာရေး	KG - 1st std 0-1 2nd std.- 3rd std 2-3 4th – 9th std…… 4-9 10th std. passed……. 10 Graduate/ post grad (ဘွဲ့ရ/လွန်) 11 Under grad.Diploma ဒီပလိုမာ 12 Vocatio certificate သင်တန်းဆင်းလက်မှတ် 13 Monastery ဘုန်းကြီးကျောင်းသင် 14 Never attended school. ကျောင်းမနေ 15		____ | | |
A11	မိသားစုအတွင်း အမြင့်မားဆုံး ပညာရေး အရြေအနေ	KG - 1st std 0-1 2nd std.- 3rd std 2-3 4th – 9th std…… 4-9 10th std. passed…… . 10 Graduate/ post grad (ဘွဲ့ရ/လွန်) 11 Under grad.Diploma ဒီပလိုမာ 12 Vocation certificate သင်တန်းဆင်းလက်မှတ် 13 Monastery ဘုန်းကြီးကျောင်းသင် 14		| |_|

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Module B: Household Expenditures

အခန်း-(၂) အိမ်ထောင်စု အသုံးစရိတ်များ

	သုံးစွဲမှု အမျိုးအစားများ	(က)အသုံးစရိတ်(ကျပ်)	(ခ)ယူနစ် (သီတင်းပတ်၊ လ၊ နှစ်)	တစ်နှစ်အတွင်း ပုံမှန်မရှိသော အသုံးစရိတ်
B1	အစွန်			
B2	ထင်း၊မီးသွေး၊လောင်စာ			
B3	ပညာရေး			
B4	ဒီဇယ်၊ ဓာတ်ဆီ			
B5	သယ်ယူပို့ဆောင်ရေး			
B6	တယ်လီဖုန်း၊/မိုဘိုင်းဖုန်း			
B7	ဖျော်ဖြေရေး			
B8	ကျန်းမာရေးစောင့်ရှောက်မှု၊ ဆေးဝါးကုန်ကျစရိတ်			
B9	သွင်းအားစု/အရင်းအနှီး			
B10	နှစ်စဉ် အိမ်ပြင်ဆင်ထိန်းသိမ်းခြင်း			
B11	ချေးငွေ၊အတိုး			
B12	ယဉ်ကျေးမှု၊ဘာသာရေးဆိုင်ရာများ			
B13	ရိက္ခာ(စားစရိတ်)			
B14	အခြား			
B15	စုစုပေါင်း			

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Module C: Household health condition

အခန်း-(၃) အိမ်ထောင်စု ကျန်းမာရေး အခြေအနေ

Question		Response categories	Skip to	Response
Household Health Condition				
C1	မိသားစုအတွင်း ကိုယ်အင်္ဂါချို့ယွင်းမှု ရှိပါသလား။ (ရာသက်ပန် ချို့ယွင်းမှု)	No…… မရှိပါ 1 Mobility/walking လမ်းလျှောက်နိုင် 2 Loss of limb ခြေလက်အင်္ဂါ မစုံ 3 Blindness… မျက်စိမမြင် 4 Loss of hearing နားမကြား 5 Other…… .အခြား 6		____ | | |
C2	လွန်ခဲ့သော ၃ လ က မိသားစုအတွင်း မတော်တဆ ဖြစ်ပွားမှုရှိပါသလား။	No မရှိပါ 1 Occupational… အလုပ်နှင့်ဆိုင် 2 Non Occupational . အလုပ်နှင့်မဆိုင် 3		____ | | |
C3	လွန်ခဲ့သောလ က မိသားစု အတွင်း ၃ ကြိမ်နှင့် အထက် ဝမ်းလျှောမှု ရှိပါသလား။	No .....1 Yes 2		____ | | |
C4	လွန်ခဲ့သော လ က မိသားစု အတွင်းနေမကောင်း ဖြစ်ဟူမှုရှိခဲ့ပါသလား။	No .....1 Yes 2		____ | | |
C5	သင် မိသားစုအတွင်း အဖြစ်များဆုံး ရောဂါများအား အမည်နှင့်တကွဖေါ်ပြပါ	None ..... မရှိပါ 1 Malaria…… ငှက်ဖျား 2 Flu..... တုပ်ကွေး 3 Diseases of digestive system အစာအိမ် 4 Muscle pain… ကြွက်သားနာကျင် 5 Diseases of the skin . အရေပြားရောဂါ 6 Hypertension..... .သွေးတိုး 7 Ear, eye ,tooth disease မျက်စိ၊နား၊နာခေါင်း 8 Heart disease သွေးတိုး 9 Cancer ကင်ဆာ 10 Catch a cold အအေးမိ 11 Sexually Transmitted Disease 12 လိင်မှတဆင့်ကူးစက်နိုင်သောရောဂါ		____ | | |
C6	ကျန်းမားရေး စောင့်ရှောက်မှု မည်သူနှင့် ခံယူပါသလဲ။	Doctor ဆရာဝန် 1 Health Assistant ကျန်းမာရေးမှူး 2 Midwife/ LHV သာဖွား 3 AMW 4 CHW 5 Traditional healer ရိုးရာကုသမှု 6 Quack အပ်ပုန်း/ရမ်းကု 7 Self medication ကိုယ်တိုင်ကုသ 8 Other (Specify) အခြား 9		| _|
C7	ခြင်ထောင် နှင့် အိပ်ပါသလား။ (Last Night)	Yes .....1 No 2		| _|

** indicates the question has skip (>>).

Module D: Household structure and migration

အခန်း-(၄) အိမ်ထောင်စု ဖွဲ့စည်းပုံ နှင့် ပြောင်းရွှေ့နေထိုင်ခြင်း

	Question	Response categories	Skip	Response
House Structure				
D1	သင်နေထိုင်သောအဆောက်အအုံအမျိုးအစား	Two storey and above နှစ်ထပ်နှင့်အထက် 1 One storey house တစ်ထပ်အိမ် 2 Hut တဲ 3 Other (Specify) အခြား 4		| | |
D2	အိမ် အမိုးကို မည်သည့် ပစ္စည်းဖြင့် တည်ဆောက်ထားသနည်း။	Thatch/ large leaves/ Palm သက်ကယ်. 1 Bamboo ဝါး 2 Other unfinished roof 3 CGI 4 Tarpaulin မိုးကာဖျင် 5 Other finished roof 6 Other (Specify) အခြား 7		| |_|
Migration				
D3	သင့်၏ မိသားစု ဒီနေရာမှာနေတာ ဘယ်လောက်ကြာပြီလဲ။	Less than one year… တစ်နှစ်အောက် 1 One to three years… ၁ - ၃ နှစ် 2 Three to ten years ၃ - ၁၀ နှစ် 3 More than ten years… ၁၀ နှစ် အထက် 4		| |_|
D4	လွန်ခဲ့သော (၁၂)လအတွင်းက အလုပ်ရှားပါးမှုကြောင့် အခြားဒေသသို့ သွားရောက်အလုပ်လုပ်သူရှိပါသလား။ (အမည်ဖြင့် တကွ ဖော်ပြပေးပါ)	မရှိပါ 0 အိမ်ထောင်ဦးစီး 1 အခြားအရွယ်ရောက် ကျား (15+ year) .....2 အခြားအရွယ်ရောက် မ (15+ year).....3 ကျား (under 15 year) .....4 မ (under 15 year).....5	>>d1	| | |
D5	ဘယ်နှစ်လခန့် သွားရောက်ခဲ့ပါသလဲ။	1-3……1 3-6……2 6-12……..3		| |_|
D6	မည်သည့် ရာသီက သွားရောက်ခဲ့သလဲ။	Summer .....1 Rainy season .....2 Winter 3		| | |
D7	မည်သည့်အတွက် ကြောင့် သွားရောက်ခဲ့သလဲ။	အလုပ်……..….. 1 ပညာရေး……..…..,.... 2 အိမ်ထောင်ပြုခြင်း(သို့)မိသားစုနှင့်နေထိုင်ရန် 3 အခြား 4		—— | | |
D8	အလုပ်အတွက်ဆိုပါက မည်သည့် အလုပ်အမျိုးအစား သွားရောက်လုပ်ကိုင်ပါသလဲ။	Agriculture/fishery စိုက်ပျိုးရေး/ရေလုပ်ငန်း 1 Factory/production စက်ရုံ။ထုတ်လုပ်မှု 2 Domestic/house… အိမ်တွင်းမှုလုပ်ငန်း 3 Civil service… မြို့ပြဝန်ဆောင်မှု 4 Other…… အခြား 5 Oil and Gas စီမံကိန်းအလုပ်သမား 6		—— | | |
D9	လွန်ခဲ့သော (၁၂)လ အတွင်း မည်သည်နေရာသို့ ပြောင်းရွှေ့သွားပါသလဲ။	Within Township မြို့နယ်တွင်း 0 Within State/Division ပြည်နယ်/တိုင်းတွင်း 1 Within Country ပြည်တွင်း 2 Abroad နိုင်ငံရပ်ခြား 3		| |_|

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Module E: Livelihood
အခန်း-(၅) အသက်မွေးဝမ်းကျောင်း(စားဝတ်နေရေး)

Question		Response categories	Skip	Response
Land Ownership				
E1	မြေပိုင်ဆိုင်မှု / နေထိုင်မြေ ပိုင်ဆိုင်မှုရှိပါသလား။	Yes.....1 No 2		___
E2	ပိုင်ဆိုင်မှု အထောက်အထား ရှိပါသလား။	အထောက်အထား နှင့်တကွ 1 အထောက်အထားမရှိ/ခွင့်ပြု 2 အထောက်အထားမရှိ/ခွင့်မပြု 3		___

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****** indicates the question has skip (>>).

Question		Response categories	Skip	Response
Fishery (ရေလုပ်ငန်း)				
E3	လွန်ခဲ့သော (၁၂)လ ခန့်က မိသားစုအတွင်း ရေလုပ်ငန်း အလုပ်လုပ်ကိုင်သူ ရှိပါသလား။	Yes.....1 No.....2		| | |
E4	ငါး မွေးမြူရေး၊ပုစွန် မွေးမြူရေး လုပ်ကိုင်ပါသလား (ကိုယ်ပိုင်)	Not own.....2 Yes.....1		| |__|

Question		Response categories	Skip	Response
livelihood activities (အသက်မွေးဝမ်းကျောင်းအလုပ်)				
E5	အခြားမည်သည့် အလုပ်အကိုင်ကို လုပ်ကိုင်ပါသနည်း။	ကုန်သွယ်ခြင်း(ကုန်သည်) 1 လက်လီဈေးဆိုင် 2 လက်မွေ့/ပျဲကျ ဈေးသည် 3 အစိုးရ ဝန်ထမ်း 4 လှေ/ ကုန်းလမ်းသယ်ယူပို့ဆောင်ရေး 5 အိမ်တွင်းမှုလုပ်ငန်း.....6 ဥယျာဉ်ခြံလုပ်ငန်း .....7 ကုမ္ပဏီ ဝန်ထမ်း…….. 8		| | |

Question		Response categories	Skip	Response
Labor and Working condition အလုပ်သမားနှင့် လုပ်ငန်းအခြေအနေ				
E6	ကူညီလုပ်ကိုင်ပေမည့်လုပ်သားများလွယ်ကူစွာရနိုင်ပါသလား။ (မိသားစုဝင်မဟုတ်သည့်အချိန်းအလုပ်သမား)	Yes .....1 No 2	>>**e12**	| | |
E7	မည်သည့် နေရာမှလာရောက်လုပ်ကိုင်ပါသနည်း။	By hiring from other village.....1 Substitute with machine.....2 Other(Specify).....3		| |__
E8	ယခုစက်ရုံ တည်ထောင်ခြင်းအားဖြင့် မိရိုးဖလာ လုပ်ငန်းများအား ထိခိုက်မှု ရှိနိုင်ပါသလား။	Yes .....1 No 2		| | |
E9	သင့်၏တစ်နေ့ပုံမှန်ထင်ငွေ မည်မျှရှိပါသနည်း။	Below 500.....1 500 – 1,000.....2 1,000- 1,500 .....3 1,500 – 2,000…….4 2,000+.....5		|| | __
E10	မိသာစု၏လက်ရှိငွေကြေးအခြေအနေ၊စုဆောင်းနိုင်မှု ရှိပါသလား။	လုံလောက်မှုမရှိ 1 လုံလောက်/မှုဆောင်နိုင် 2 မလုံလောက်/မှုဆောင်နိုင် 3		| ||

Module F: Infrastructure, Resource and Services

အခန်း-(၆) အခြေခံအဆောက်အဦ၊ သယံဇာတနှင့် ဝန်ဆောင်မှုများ

Question		Response categories	Skip	Response
Health and Education (ကျန်းမာရေး နှင့် ပညာရေး)				
F1	ကျန်းမာရေးစောင့်ရှောက်ရန်ဆေးရုံဆေးခန်း ၊ ဆေးပေးခန်း ရှိပါသလား။	Yes .....1 No 2		| |__|
F2	ကျန်းမာရေး စောင့်ရှောက်မှုပုံစံ ပြောင်းလဲသွားခြင်း ရှိပါသလား။	Yes – Limited health Care……1 No – No problems……2 Better – Improved…….....3		| |__|
F3	အိမ်ထောင်စုအတွင်း ကျောင်းတက်နိုင်သူ ရှိပါသလား။	Yes.....1 No.....2		|__|__|

** indicates the question has skip (>>).

Energy (စွမ်းအင်)				
F4	လျှပ်စစ် (အလင်းစွမ်းအင်) ဘယ်ကရရှိပါသလဲ။	အများသုံးလျှပ်စစ် 1 အစုအဖွဲ့ ရေအားလျှပ်စစ် 2 Battery..... 3 ရေနံဆီ 4 ဖယောင်းတိုင် 5 အခြား 6		| |_|
F5	ဟင်းချက်ရာတွင်မည်သည့်(အဓိက)လောင်စာကအသုံးပြုသနည်း။	လျှပ်စစ် ..... 1 ဂက်စ်၊ရေနံဆီ၊ဒီဇယ်..... 2 မီးသွေး၊ထင်းအစားထိုး ..... 3 ထင်း ..... 4 အခြား _____ 5		| |_|
Question		**Response categories**	**Skip**	**Response**
Water, Sanitation and Hygiene (ရေ၊ ရေဆိုးနှတ်စနစ်၊ တစ်ကိုယ်ရေ နှင့် ပတ်ဝန်းကျင် သန့်ရှင်းရေး)				
F6	သင်၏မိသားစုအတွက် (အဓိက) သောက်ရေ ရရန် မည်သည့် အရင်းအမြစ်ကို သုံးပါသနည်း။ (လွန်ခဲ့သော ၁၂လ အတွင်း)	အများသုံးရေပိုက် 1 ရေတွင်း 2 ကာကွယ်ထားသော ရေတွင်း၊ရေကန်၊မိုးရေ 3 ကာကွယ်မထားသော ရေတွင်း၊ရေကန်၊မိုးရေ 4 မြစ်၊ချောင်း 5		| | |
F7	ရေရရှိဖို့အတွက် အကွာအဝေး မည်မျှ ရှိပါသနည်း။	¼ mile ..... 1 1 mile ..... 2 More than one mile 3		__ | | |. |
F8	ရေကို ပြုပြင်၍သောက်သုံးပါသလား။	Yes..... 1 No..... 2	>>**f11**	| |_|
F9	ရေသောက်သုံး ရာတွင် သန့်ရှင်းစေရန် မည်ကဲ့သို့ ဆောင်ရွက်ပါသနည်း။	Let it stand (sedimentation)အနည်ချ 1 Filtration (ceramic, sand)သဲဖြင့်စစ်ခြင်း 2 Boil ကျိုချက်ခြင်း 3 Chlorine.....ကလိုရင်းဖြင့်သန့်စင် .4 Other (specify) အခြား 5		| |_| ____
F10	အချိန်နှင့်အမျှ ရေ၏အရည်အသွေး ပြောင်းလဲမှုရှိပါသလား။	Yes..... 1 No..... 2		| | |
F11	ရေ ပမာဏ ပြောင်းလဲမှု ရှိပါသလား။	Yes..... 1 No..... 2		| |_|
F12	ရေဆိုးမြောင်း အိမ်အနီးတွင်းရှိသလား။?	Yes..... 1 No..... 2		| |_|
F13	အမှိုက်ပုံတွင် အမှိုက်ပုံပါသလား။	Yes..... 1 No..... 2		| |_|
Question		**Response categories**	**Skip**	**Response**
Transportation (သယ်ယူပို့ဆောင်ရေး)				
F14	အများဆုံးအသုံးပြုသော သယ်ယူပို့ဆောင်ရေး။	Walking… ခြေကျင် 1 Taxi/ Bus အငှားယာဉ်၊ ဘတ်စ် 2 Motorcycle မော်တော်ဆိုင်ကယ် 3 Bicycle/Trishaw စက်ဘီး၊ဆိုက်ကား 4 Bullock cart နွားလှည်း 5 Horse/pony cart မြင်းလှည်း 6 Ship/Boat လှေ၊သင်္ဘော 7		| |_|

** indicates the question has skip (>>).

Module G: Cultural Aspect

အခန်း-(၇) ယဉ်ကျေးမှုဆိုင်ရာရွေထောင့်

	Questio	Response categories	Ski	Response
Cultural Heritage (ယဉ်ကျေးမှု အမွေအနှစ်)				
G1	အရေးပါသော ဆုံဖြတ်ချက်များအား မည်သူကချမှတ်ပါသနည်း။	Village Leader အုပ်ချုပ်ရေးမှူး 1 ReligiousLeader. ဘာသာရေးခေါင်းဆောင် 2 Elder People အကြီးအကဲ၊နာယက 3 SmallGroupLeader အသင်းအဖွဲ့ခေါင်းဆောင် 4 Others(Specify) အခြား 5		| | |
G2	အရေးအပါဆုံး ယဉ်ကျေးမှု ထုံးတမ်းစဉ်လာ ဓလေ့စရိုက် ကို ဖေါ်ပြပါ။	ဘာသာ၊ စာပေ 1 ဓလေ့ထုံးတမ်း……..2 တားမြစ်ထားသောအရာ 3 ပွဲလမ်းသဘင် .4 ဘုရားကျောင်း၊ ယဉ်ကျေးမှုနယ်မြေ 5 အခြား 6		| |_|
G3	ရှေးဟောင်းအမွေအနှစ် နယ်မြေ များရှိပါသလား။	Yes ..... 1 No 2		| |_|
G4	၄င်းနေရာ ကိုလုံလောက်သော ကာကွယ် ေ စာင့်ရှောက်မှုပြုပြုင်မွမ်းမံမှုများ ရှိပါသလား။	Yes ..... 1 No 2		| |_|

Module H: Air, Water and Climate

အခန်း-(၈) လေ၊ ရေ၊ ရာသီဥတု

	Question	Response categories	Skip	Response
Air, Water and Soil (လေ၊ ရေ နှင့် ရာသီဥတု)				
H1	လေအရည်အသွေးပြောင်းလဲမှုရှိပါသလား။	Improved: …….. 1 Declined …….. 2 No Change……... 3		| |
H2	အရည်အသွေးပြောင်းလဲမှုရှိခဲ့လျှင် မည်သည့် ကိစ္စကြောင့် ဖြစ်ခဲ့ရပါသနည်း။	Industry… စက်ရုံ 4 Livestock Industry မွေးမြူရေး 5 Brush-burning/ Forest fire တောမီး 6		| |
H3	ရေအရည်အသွေး ပြောင်းလဲမှု ရှိပါသလား။	Improved: …… 1 Declined …….. 2 No Change…… 3		| |
H4	အရည်အသွေးပြောင်းလဲမှုရှိခဲ့လျှင် မည်သည့် ကိစ္စကြောင့် ဖြစ်ခဲ့ရပါသနည်း။	Industry……..…4 Livestock Industry……..……5 Brush-burning/ Forest fire…..……..6		| |
H5	အရင်ကနှင့်ယှဉ်ရင် ရာသီဥတု ပြောင်းလဲခဲ့မှု ရှိပါသလား။	Warmer..……..…1 Cooler……..2 Unchanged……..3		
H6	မည်သို့ပြောင်လဲသွားပါသနည်း။	Wetter… ……4 Drier…… ……5		

** indicates the question has skip (>>).

Module J: Household Attitudes

အခန်း-(၈) အိမ်ထောင်စု သဘောထားအမြင်များ

Question		Response categories	Skip	Response
Awareness and Attitude about the project (စီမံကိန်းအပေါ် သဘောပေါက်နားလည်မှုနှင့် သဘောထားအမြင်)				
J1	ယခုစက်ရုံ အကြောင်းကို သင်မည်မျှ သိပါသနည်း။	Nothing at all.....1 A little.....2 Some.....3 A lot.....4	>>**j3**	|__|
J2	ယခုစက်ရုံ ကို မည်သူဆီမှ သင်သိရှိပါသနည်း။	အစိုးရဌာနများ .....1 အစုအဖွဲ့ခေါင်းဆောင်များ .....2 သတင်းမီဒီယာ.....3 မိသားစုဝင်များ၊ မိတ်ဆွေများ .....4 မေးမြန်းစုံစမ်းသူ .....5 အခြား .....6 မသိပါ 7		|__|
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 မည်ကဲ့သို့သော စက်ရုံ (သို့)စီမံကိန်း များ တွေ့ကြုံဖူးပါသနည်း။	Please mention		
J5	ထို စက်ရုံ(သို့)စီမံကိန်း ကြောင့်လူမှုပတ်ဝန်းကျင်တွင် အကျိုးသက်ရောက်မှု(ကောင်းကျိုး/ဆိုးကျိုး)ရှိခဲ့ပါသလား။	Positive .....1 Negative.....2 No effect.....3		|__|
J6	ထို စက်ရုံ (သို့)စီမံကိန်း များမနစနာကြေးနင့်ပက်သက်ပြီးဆေးနွေးဖေးပါသလား	Yes .....1 No.....2		|__|
J8	ယခုစက်ရုံ၏ကောင်းသော အကျိုးသက်ရောက်မှုများ ကြောင့် သင်တို့အပေါ်မည်သည့်အရာများ စွမ်းဆောင်ပေး နင်မည်ဟု ထင်ပါသနည်း။ (အရေးကြီးဆုံးအချက်)	မသိပါ .....1 အလုပ်အကိုင် တိုးတက်လာခြင်း .....2 ဝင်ငွေ တိုးတက်လာခြင်း.....3 လူနေမှုအဆင့်အတန်းမြင့်မားလာခြင်း.....4 အခြေခံအဆောက်အဦများတိုး 5 မြေယာ ဈေးကြေးများ ရခြင်း 6 ပတ်ဝန်းကျင်တိုးတက်ကောင်းမွန်လာခြင်း.....7		|__| ____
J9	ယခုစက်ရုံ၏ တိုးတက်ဖွံ့ဖြိုးမှုအတွက် သဘောတူညီမှု ရှိပါသလား။	Yes.....1 No.....2 Not sure.....3		|_|_|

****** indicates the question has skip (>>).

K10. Perceptions on Impacts of the Project
စီမံကိန်း သက်ရောက်မှုအပေါ် သိမြင်နားလည်မှုများ

		Very negative	Negative	Slightly negative	No effect	Slightly positiv	Positive	Very positiv	
The effect on Physical Resources (ရုပ်ပိုင်းဆိုင်ရာ သယံဇာတများအပေါ် သက်ရောက်မှု)									
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(ဇီဝသယံဇာတများအပေါ် သက်ရောက်မှု)									
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(လူသားတို့အသုံးပြုမှုအပေါ် သက်ရောက်မှု)									
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(လူနေမှုဘဝ အရေအနေအပေါ် သက်ရောက်မှု)									
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(ယဉ်ကျေးမှုဆိုင်ရာ အမွေအနှစ်များအပေါ် သက်ရောက်မှု)									
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."

****** indicates the question has skip (>>).