MYANMAR ESIA & EMP STUDY FOR GREEN LAND WHEAT FLOUR MILLING FACTORY

Environmental and Social Impact Assessment
&
Environmental Management Plan

(EIA Review Final Report)

Prepared
By
Environmental Quality Management (EQM) Co., Ltd

Acronyms

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

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

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

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The Letter of Commitment

As per the Administrative Instruction of Environmental Impact Assessment procedure 2015, the Green Land International Ltd. required Environmental and Social Impact Assessment (ESIA) along with the Environmental Management Plan (EMP) for the Green Land Wheat Flour Milling Factory located in the East Dagon Industrial Zone to submit the report to the Environmental Conservation Department, Ministry of Natural Resources and Environmental Conservation Department (MONREC) for approval.

The proposed project is located at the No. 54/55/56, Quarter (113), Industrial Zone, East Dagon Township, Yangon, Myanmar.

This ESIA study has been completed in accordance with the following articles:
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 Green Land International Ltd. endorses and confirms to the Environmental Conservation Department, Ministry of Natural Resource and Environmental Conservation the following:

- The accuracy and completeness of the ESIA & EMP
- The ESIA 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 undersigned is authorized to issue this Letter of Commitment on behalf of the Green Land International Ltd., Yangon.

Yours sincerely,

SOE TINT
DIRECTOR
GREEN LAND INTERNATIONAL LIMITED.

Environmental
Quality
Management

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

Yours sincerely,

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

အခန်း (၁)
အကျဉ်းချုပ်အစီရင်ခံစာ

၁။ အနှစ်ချုပ် (Greenland)

၁-၁ နိဒါန်း

The Greenland Ltdသည် MC Food Holdings Asia Pte., Ltd. နှင့် Diamond Star Company တို့၏ အကျိုးတူပူးပေါင်းဆောင်ရွက်မှုဖြစ်ပြီး စက်မှုဇုံ၊ ဒဂုံမြို့သစ်အရှေ့ပိုင်း မြို့နယ်၊ ရန်ကုန်မြို့ တွင် တည်ရှိသည်။ ပတ်ဝန်းကျင်နှင့် လူမှုဆိုင်ရာ သက်ရောက်မှု အကဲဖြတ် စစ်ဆေးခြင်း (Environmental and Social Impact Asscessment, ESIA)နှင့်အတူ ပတ်ဝန်းကျင် ဆိုင်ရာ စီမံချက် (Environmental Management Plan, EMP) ကို အရှေ့ဒဂုံ စက်မှုဇုံရှိ The Greenland ဂျုံစက်ရုံအတွက် ဆောင်ရွက်ရေးဆွဲခဲ့သည်။

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

နယ်ပယ်အတိုင်းအတာသတ်မှတ်ခြင်းလုပ်ငန်းစဉ်နှင့်ပတ်သက်၍ The Green Land ဂျုံစက်ရုံ Project သည် Myanmar Environmental Impact Assessment Procedures (2015) မထုတ်ပြန်မီ ဆောင်ရွက်ခဲ့သောကြောင့် Scoping Report အား အတိအကျဆောင်ရွက်နိုင်ခဲ့ခြင်း မရှိပါ။ သို့ရာတွင် ဤ Report သည် ပြည်သူလူထု ပါဝင်မှု ကို အထူးပြုသော နယ်ပယ်အတိုင်း အတာသတ်မှတ်ခြင်း (Scoping Phase) အား ဆောင်ရွက်ထားရှိခဲ့ ပါသည်။

ထို့အပြင် စက်ရုံသည် စက်မှုဇုံအတွင်းတည်ရှိသဖြင့် Project Area ၏ (၂-၅) ကီလိုမီတာအတွင်း၌ အခြေခံ စစ်တမ်းကောက်ယူမှုများကိုဆောင်ရွက်ခဲ့ပါသည်။ လေတိုင်းတာခြင်း၊ ဆူညံသံတိုင်းတာ ခြင်းနှင့် ရေအရည် အသွေးတိုင်းတာခြင်းလုပ်ငန်းစဉ်များကို စက်ရုံနှင့် စက်ရုံ၏ အနီးတဝိုက်တွင် ဆောင်ရွက်ခဲ့ပါသည်။ အနီးအနား ပတ်ဝန်းကျင်သည် စက်ရုံ/အလုပ်ရုံများဖြစ်သည့်အတွက် ကပ်လျက်ဧရိယာတွင် ထိလွယ်ရှလွယ် သော Receptors များမရှိပါ။ အများသူငှာ တိုင်ပင်ဆွေးနွေးခြင်း နှင့် သတင်းအချက်အလက် ထုတ်ဖော်ခြင်းများ ပြုလုပ်သော အခြေခံစောင့်ကြည့်ခြင်းနှင့် ပြည်သူများ၏

သဘောထားထုတ်ဖော်မှုများအရ အခြားသော စက်ရုံ များ နှင့် နှိုင်းယှဉ်ပါက ပတ်ဝန်းကျင် အပေါ် ဆိုးရွားသောအကျိုးသက်ရောက်မှု နည်းပါးပါသည်။

စီမံကိန်း၏ အဓိကရည်ရွယ်ချက်များမှာ အောက်ပါတိုင်းဖြစ်ပါသည်။

၁။ စီမံကိန်းဧရိယာ၏ လက်ရှိ ပတ်ဝန်းကျင်အခြေအနေနှင့် လုပ်ဆောင်မှုများကို ဖော်ပြရန်၊

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

၃။ ဆိုးကျိုးသက်ရောက်မှုများရှိခဲ့ပါက ဆိုးကျိုးလျော့ပါးစေသော နည်းလမ်းများအသုံးပြုနိုင်ရန်

၄။ ကောင်းကျိုးသက်ရောက်မှုများရှိခဲ့ပါက ကောင်းကျိုးဖြစ်ထွန်းစေသော နည်းလမ်းများပိုမို အသုံးပြုနိုင်ရန်

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

ပတ်ဝန်းကျင်ဆိုင်ရာ အကြံပေးအဖွဲ့ Environmental Quality Monitoring Co. Ltd မှ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်းအစီရင်ခံစာအား ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် ထည့်သွင်း ရေးဆွဲမည်ဖြစ်ပါသည်။

ပတ်ဝန်းကျင်ဆိုင်ရာအတိုင်ပင်ခံကုမ္ပဏီ (EQM) သည် ကျွမ်းကျင်သော အတိုင်ပင်ခံများနှင့် နည်းပညာရှင်များ ဖြင့် ဖွဲ့စည်းထားပြီး ပတ်ဝန်းကျင်ဆိုင်ရာ အကဲဖြတ်ခြင်းနယ်ပယ်တွင် ခိုင်မာ သော နောက်ခံနှင့် အသိပညာများ ရရှိထားပြီး Environmental, Social and Health Impact Assessment (ESHIA) ကို 5 နှစ်ကျော်ကြာ ဆောင်ရွက်ထားရှိခဲ့ပြီး၊ နိုင်ငံအနှံ့ စီမံကိန်းများ ဆောင်ရွက်ခဲ့ပါသည်။ သဘာဝပတ်ဝန်းကျင်ဆိုင်ရာ စီမံကိန်း ၇၀ ခန့် (ESIA/IEE/EP၊ သဘာဝ ပတ်ဝန်းကျင် ဆိုင်ရာ အခြေခံစောင့်ကြည့်ရေး ပရောဂျက်များနှင့် နိုင်ငံတော်နှင့် ဌာနဆိုင်ရာ ပရောဂျက်များ အပါအဝင်) ကို

ပိုမိုကောင်းမွန်တိကျသော အကဲဖြတ်မှုဖြင့် ဆောင်ရွက်ခဲ့ပါသည်။ စီမံကိန်းလုပ်ငန်း ရင်းနှီးမြှုပ်နှံမှု စုစုပေါင်း အမေရိကန်ဒေါ်လာ (၁.၅) သန်း ၏ (၂%) အား ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်၏ အသုံးစရိတ်အဖြစ် ဆောင်ရွက်သွားမည်ဖြစ်ပါသည်၊

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

၁။ ဓာတ်ဆီနှင့် သဘာဝဓာတ်ငွေ့

၂။ မုန့် စက်ရုံ၊

၃။ ဆောက်လုပ်ရေးလုပ်ငန်းသုံး အမှုန့်စက်ရုံ

၄။ ဟိုတယ်စီမံကိန်း

၅။ ဂျုံမှုန့်

၆။ ဆိပ်ကမ်းလုပ်ငန်း

၇။ ဆပ်ပြာစက်ရုံ

၈။ ဆန်စက်စက်ရုံ၊

၉။ နှင့်ပတ်ဝန်းကျင်ဆိုင်ရာအခြေခံစစ်တမ်း စောင့်ကြည့်ရေး ပရောဂျက်များ

စီမံကိန်းနှင့် ပက်သက်သည့် အစိုးရဌာန၏ မှတ်ပုံတင်ခြင်း အတည်ပြုချက်မှာ အောက်ပါအတိုင်း ဖြစ်သည်။

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

The Green Land International Ltd ၏ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းလုပ်ငန်းစဉ်များ အတွက် လေ့လာဆန်းစစ်ခြင်းလုပ်ငန်းများဆောင်ရွက်ရာတွင် စီမံကိန်း၏ ရည်ရွယ်ချက်ပြည့်မီ ရန် လက်တွေ့အကောင် အထည်ဖော်ရန်အတွက် အောက်ပါ ဆောင်ရွက်ချက်များနှင့် နည်းလမ်း များကို အသုံးပြုပါသည်။

၁	ပတ်ဝန်းကျင်ဆိုင်ရာ ကုမ္ပဏီ မှတ်ပုံတင် အမှတ်	၂၆၉၀/၂၀၁၂-၂၀၁၃
၂	ပတ်ဝန်းကျင်ဆိုင်ရာ ကနဦးစစ်ဆေးမှု၊ ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံချက် ဆောင်ရွက်ရေးဆွဲရန် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး နှင့် သစ်တောရေးရာ ဝန်ကြီးဌာန ၏ ထောက်ခံချက် နေ့စွဲ	၂၆.၂.၂၀၁၅

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

၁-၂ မူဝါဒ၊ ဥပဒေဆိုင်ရာ နှင့် အဖွဲ့အစည်းဆိုင်ရာ မူဘောင်

ပတ်ဝန်းကျင်နှင့် လူမှုဆိုင်ရာသက်ရောက်မှု အကဲဖြတ်စစ်ဆေးခြင်း (ESIA) နှင့် ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံချက်ကို(EMP) ကို သက်ဆိုင်ရာ ဥပဒေများကို သုံးသပ်ဆောင်ရွက်ပါသည်။

အောက်ပါတို့သည် အကျုံးဝင်သည့် လမ်းညွှန်ချက်များ၊ စံနှုန်းများနှင့် စည်းမျဉ်းစည်းကမ်းများ ဖြစ်သည်။

- ပြည်ထောင်စုသမ္မတ မြန်မာနိုင်ငံတော် ဖွဲ့စည်းအုပ်ချုပ်ပုံ အခြေခံ ဥပဒေ ၂၀၀၈ အပိုဒ် ၃၇
- ကမ္ဘာ့ကျန်းမာရေးအဖွဲ့ (WHO)၊ အမေရိကန်ပြည်ထောင်စု ပတ်ဝန်းကျင် ထိန်းသိမ်းကာကွယ်ရေး အေဂျင်စီ (USEPA) နှင့် နိုင်ငံတကာ ငွေကြေး ကော်ပိုရေးရှင်း (IFC)အစရှိသည့် နိုင်ငံတကာ မူဝါဒများ၊ အခြေခံမူများနှင့် စံနှုန်းများ
- သက်ဆိုင်သည့် ဒေသတွင်း လုပ်ငန်းခွင် ကျန်းမာရေးနှင့် ဘေးကင်းလုံခြုံရေးဆိုင်ရာ ဥပဒေများနှင့် စည်းမျဉ်းများ
- ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး နှင့် သစ်တောရေးရာ ဝန်ကြီးဌာန၊ ပတ်ဝန်းကျင် ထိန်းသိမ်းရေးဌာန ၏ လက်မှတ်ရေးထိုးထားသည့် နိုင်ငံတကာ သဘောတူညီချက်များ၊ စာချုပ်များနှင့် သဘောတူညီချက် များ
- ပတ်ဝန်းကျင် ထိန်းသိမ်းကာကွယ်ရေး ဥပဒေ (၂၀၁၂)
- မြန်မာနိုင်ငံရင်းနှီးမြှုပ်နှံမှုဥပဒေ (၂၀၁၆)
- မြန်မာနိုင်ငံရင်းနှီးမြှုပ်နှံမှု နည်းဥပဒေများ (၂၀၁၇)
- ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးနည်းဥပဒေများ (၂၀၁၄)
- ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း (၂၀၁၅)
- အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များ (၂၀၁၅)
- တိုင်းရင်းသားလူမျိုးများ အခွင့်အရေး ကာကွယ်စောင့်ရှောက်ရေးဥပဒေ၊ (၂၀၁၅)
- မြန်မာ့အာမခံလုပ်ငန်းဥပဒေ (၁၉၉၃)
- ပုဂ္ဂလိကစက်မှုလုပ်ငန်းဥပဒေ (၁၉၉၀)
- မြန်မာ့မီးသတ်တပ်ဖွဲ့ဥပဒေ (၂၀၁၅)

- ရေနံနှင့် ရေနံထွက်ပစ္စည်းဆိုင်ရာဥပဒေ (၂၀၁၇)
- မော်တော်ယာဉ်ဥပဒေ (၂၀၁၅)
- စံချိန်စံညွှန်းသတ်မှတ်ခြင်းဆိုင်ရာဥပဒေ (၂၀၁၄)
- ယဉ်ကျေးမှုအမွေအနှစ်ဒေသများ ကာကွယ်ထိန်းသိမ်းရေးဥပဒေ (၁၉၉၈)
- ရှေးဟောင်းဝတ္ထုပစ္စည်းကာကွယ်ထိန်းသိမ်းရေးဥပဒေ (၂၀၁၅)
- မြန်မာအင်ဂျင်နီယာကောင်စီဥပဒေ (၂၀၁၃)
- ပို့ကုန်သွင်းကုန်ဥပဒေ (၂၀၁၂)
- အလုပ်သမားအဖွဲ့အစည်းဥပဒေ (၂၀၁၁)
- အလုပ်သမားအငြင်းပွားမှုဖြေရှင်းရေးဥပဒေ (၂၀၁၂)
- အလုပ်အကိုင်နှင့် ကျွမ်းကျင်မှု ဖွံ့ဖြိုးတိုးတက်ရေးဥပေဒ (၂၀၁၃)
- အနည်းဆုံးအခကြေးငွေဥပဒေ (၂၀၁၃)
- အခကြေးငွေ ပေးချေရေးဥပဒေ (၂၀၁၆)
- လူမှုဖူလုံရေးဥပဒေ (၂၀၁၂)
- Workmen Compensation Act, 1993
- အလုပ်ရုံများအက်ဥပဒေ (၁၉၅၁)
- ခွင့်နှင့် အလုပ်ပိတ်ရက်များဥပဒေ (၁၉၅၁)
- မြန်မာနိုင်ငံပြည်သူ့ကျန်းမာရေးဥပဒေ (၁၉၇၂)
- ကူးစက်ရောဂါများကာကွယ်နှိမ်နှင်းရေးဥပဒေ (၁၉၅၅)
- ဆေးလိပ်နှင့် ဆေးရွက်ကြီးထွက်ပစ္စည်း သောက်သုံးမှုထိန်းချုပ်ရေးဥပဒေ
- ရန်ကုန်တိုင်းဒေသကြီး စည်ပင်သာယာရေးအဖွဲ့များဥပဒေ (၂၀၁၈)
- ရန်ကုန်တိုင်းဒေသကြီး ရေချိုငါးလုပ်ငန်းဥပဒေ
- ရန်ကုန်တိုင်းဒေသကြီး ငါးလုပ်ငန်းဥပဒေ
- ရေအရင်းအမြစ်နှင့် မြစ်ချောင်းများ ထိန်းသိမ်းရေးဥပဒေ (၂၀၁၆)

၁.၃ စီမံကိန်း ဖော်ပြချက်နှင့် အခြားရွေးချယ်စရာများ

စက်ရုံတည်နေရာသည် အမှတ် (၂) အဝေးပြေးလမ်းမကြီးတွင် တည်ရှိသည်။ အကျယ်အဝန်းမှာ ၉၃၆၁ ကေဖြစ်ပြီး အမှတ် ၅၃၊ ၅၄၊ ၅၅၊ ၅၆၊ အကွက်အမှတ်(၁၁၃)၊ အရှေ့ဒဂုံစက်မှုဇုံ၊ ရန်ကုန်တိုင်းဒေသကြီးတွင် တည်ရှိသည်။ လုပ်ငန်းစု၏ စုစုပေါင်း ဂျုံစေ့ထုတ်လုပ်မှုစွမ်းအား သည် တစ်နှစ်လျှင် ၁၁၅၂၀၀ မက်ထရစ် တန်ဖြစ်သည်။ Green Land International Ltd. သည် Mitsubishi နှင့် Diamond Star ကုမ္ပဏီတို့ကြား ဖက်စပ်လုပ်ကိုင်သည့် ကုမ္ပဏီဖြစ်ပြီး မြန်မာနိုင်ငံတွင် ၎င်း၏ လုပ်ငန်းများကို တိုးချဲ့လုပ်ကိုင်နေသည့် ထိပ်တန်းစက်မှုလုပ်ငန်း အုပ်စုဖြစ်သည်။ ရင်းနှီးမြှုပ်နှံသူများသည် အရည်အသွေးမြင့် ဂျုံမှုန့်ထုတ်လုပ်မှု အတွက် ကျွမ်းကျင်မှုရှိသော နိုင်ငံတကာမိတ်ဖက်များနှင့် ပရောဂျက်များကို လည်ပတ်နိုင်သော အတွေ့အကြုံ ကောင်းများရှိပါသည်။

ဆောက်လုပ်ရေးအဆင့်တွင် စီမံကိန်းသည် မြေနေရာရှင်းလင်းခြင်းလုပ်ငန်းစဉ်အတွင်း ထွက်ရှိသော ဖုန့်မှုန့်များ လေအရည်အသွေးကျဆင်းခြင်း၊ လေထုညစ်ညမ်းခြင်း၊ ဆောက်လုပ် ရေးလုပ်သားများ၏ ယာယီ အဆောက်အဦမှ မိလ္လာ၊ ရေအညစ်များ၊ အိမ်သုံးရေအညစ်များ ထွက်ရှိခြင်း၊ အစိုင်အခဲ အမှိုက်များ ထွက်ရှိခြင်း၊ ဆောက်လုပ်ရေးလုပ်ငန်းစဉ်ကြောင့် မြေဆီလွှာပျက်စီးတို က်စားခံရခြင်း၊ အပင်နှင့်တိရစ္ဆာန် များ စားကျက် ပျောက်ဆုံးခြင်း နှင့် ဆောက်လုပ်ရေးလုပ်ငန်းအတွက် သဘာဝပေါက်ပင်များရှင်းလင်းရ သည့်အတွက် ဇီဝမျိုးစုံမျိုးကွဲများ လျော့ပါးခြင်းကဲ့သို့သော လူမှုဘဝနှင့် ဇီဝရုပ်ပိုင်းဆိုင်ရာ ပတ်ဝန်းကျင်သို့ အချို့သော ထိရောက်မှု နည်းပါးသည့် အကျိုးသက်ရောက်မှုများ ရှိနိုင်ပါသည်။

လုပ်ငန်းဆောင်ရွက်မှုအဆင့်တွင် တစ်ပတ်လျှင် ၅ ရက်၊ နေ့စဉ် ၃ ဆိုင်းဖြင့် အလုပ်ချိန် 8 နာရီ ဖြင့်ဆောင်ရွက် ပါသည်။ ပေါင်းစပ်ထုတ်လုပ်သော ဂျုံစက်ရုံ၏ စုစုပေါင်းကြိတ်ခွဲနိုင်မှုမှာ တစ်နှစ်လျှင် M.T 115,200 ထက်ပို သောပမာဏရှိပါသည်။ Green Land International Ltd. သည် တစ်ရက်လျှင် ဂျုံအကြမ်း 500 tonns ရင်းနှီး မြှုပ်နှံမည်ဖြစ်သည်။

ထုတ်လုပ်မှုလုပ်ငန်းစဉ်တွင် အဆင့်လေးဆင့်ပါဝင်ပါသည်။ ၎င်းတို့မှာ ၁) အကြို သန့်စင်ခြင်း ၂) သန့်စင်ခြင်း ၃) ကြိတ်ခွဲခြင်း နှင့် ၄) ထုပ်ပိုးခြင်းတို့ဖြစ်ပါသည်။ ကုန်ကြမ်းများကို USA နှင့် Austrilia တို့မှ တင်သွင်းပါသည်။ စက်ရုံတွင်းရှိ ရေတွင်းများမှ ရေ 15% ကို အစိုဓာတ် ရရှိစေရန်အတွက် ကြိတ်ခွဲရာတွင် အသုံးပြုပါသည်။ ဤဂျုံမှုန့်ကြိတ်ခွဲခြင်းတွင် ဂျုံစေ့၏ endosperm ကို စက်ဖြင့် ကြိတ်ခွဲကာ ဂျုံအစေ့အဆံ များအား ဂျုံမှုန့် ဖြစ်သည်အထိ ကြိတ်ခွဲသန့်စင်ပါသည်။ နောက်ဆုံးအဆင့်မှာ ဂျုံမှုန့်များကို ထုပ်ပိုးပြီး ဖောက်သည်များ ထံ ပေးပို့နိုင် ရန် ဂိုဒေါင်တွင် သိမ်းဆည်းထားခြင်း ဖြစ်သည်။

Green Land International Ltd အတွက် ကုန်ကြမ်းအရင်းအမြစ်မှာ ရိုးရှင်းပါသည်။ တစ်ခုတည်းသော ကုန်ကြမ်းမှာ ဂျုံစပါးဖြစ်ပြီး ရေ ၁၅% ကို ကြိတ်ခွဲခြင်းလုပ်ငန်းစဉ်တွင် အသုံးပြုပါသည်။ အဆိုပြုယူနစ် အတွက် စုစုပေါင်း လျှပ်စစ်ဓာတ်အားသည် တစ်ရက်လျှင် ၉၃၀၀ kW ဖြစ်သည်။

ဓာတ်အားလိုအပ်ချက်ကို အစိုးရလျှပ်စစ်ဓာတ်အားလိုင်းမှ ရရှိမည်ဖြစ်သည်။ သို့သော်လည်း 1000 MW ရှိသော စွမ်းအားရှိသော ဓာတ်အားပေးစက် ၄ လုံးကို အရေးပေါ် ဓာတ်အားလိုအပ်ချက်များနှင့် ထုတ်ကုန်များ၏ လိုအပ်ချက်အတွက် အသင့်အနေအထား အဖြစ် အသုံးပြုပါသည်။

စပါးကြိတ်ခွဲခြင်းနှင့် ရုံးရှိ (စားသောက်ကုန်နှင့် သန့်စင်ရေး) ကဏ္ဍ တို့တွင် အသုံးပြုရန် ရေလိုအပ်ပါသည်။ စုစုပေါင်းရေလိုအပ်ချက်မှာ တစ်ရက်လျှင် 32 m^3၊ canteen 27 m^3/day နှင့် အခြားအသုံးပြုမှုမှာ 13 m^3/day ဖြစ်သည်။

Green Land International Limited သည် ကြိတ်ခွဲစက်ရုံအတွင်း ပြန်လည် အသုံးပြုခြင်းလုပ်ငန်းစဉ် (Recycling Process) ကို လုပ်ဆောင်နေပါသည်။ Landfilling လုပ်ဆောင် ခြင်းထက် အမှိုက်ပြန်လည် အသုံးပြုခြင်း အလေ့အကျင့်ကြောင့် တစ်နှစ်လျှင် မက်ထရစ်တန် ၃,၀၈၅ ခန့် အမှိုက်ပမာဏ လျှော့ချနိုင် မည်ဖြစ်ပါသည်။

ဓာတုဗေဒပစ္စည်း လုံးဝမသုံးသော စိုက်ပျိုးရေးလုပ်ငန်းနှင့်သက်ဆိုင်သော လုပ်ငန်းဖြစ်သော ကြောင့် သဘာဝ ပတ်ဝန်းကျင်ကို ထိခိုက်မှုမရှိပါ။ ဂျုံအားအခြောက်ခံသန့်စင်၍ ဂျုံမှုန့်အဖြစ် ကြိတ်ခွဲထုတ်လုပ်သောကြောင့် အရည်အညစ်အကြေးထွက်ရှိခြင်းမရှိပါ။ Pneumatic air system (air

lock, jet filter) များအား ကုန်ပစ္စည်းသယ်ယူရာတွင် အသုံးပြုပါသည်။

လူမှုပတ်ဝန်းကျင်တွင် ကောင်းသော အကျိုးသက်ရောက်မှုများ ရှိလာမည်ဖြစ်ပြီး ဒေသတွင်း လူမှုအသိုင်း အဝိုင်းအတွက် အလုပ်အကိုင် အခွင့်အလမ်းများ၊ စီမံကိန်း Site တွင် အလုပ်လုပ် နေသူများ၏ ဝင်ငွေ တိုးလာမည်ဖြစ်သည်။

ဖျက်သိမ်းခြင်းအဆင့်တွင် အဆောက်အအုံဖြိုဖျက်ခြင်းမှ ဖုန်မှုန့်များ၊ ဖျက်သိမ်းခြင်း လုပ်ငန်း များ လုပ်ဆောင်နေသည့် အကြီးစားစက်ယန္တရားများမှ ဆူညံသံများထွက်ပေါ်လာခြင်းကြောင့် လေထုအရည် အသွေး အပေါ် ဆိုးရွားသော အကျိုးသက်ရောက်မှုများ ရှိလာနိုင်ပါသည်။

၁-၃-၁ တည်နေရာ၏ လက်ရှိအသုံးပြုမှု

ဂျုံမှုန့် ကြိတ်ခွဲစက်ရုံစီမံကိန်း၏ အဓိကအစိတ်အပိုင်းသည် အုပ်ချုပ်ရေးရုံး၊ လုပ်ငန်းလည် ပတ်သည့် အဆောက်အအုံ၊ စားသောက်ဆိုင်၊ သိုလှောင်ရုံများ၊ အခြားအဆောက်အအုံများနှင့် ဟင်းလင်းပြင် တို့ဖြစ်သည်။

စက်ရုံတွင်း ပံ့ပိုးမှု အင်္ဂါရုပ်များ

စဉ်	ပံ့ပိုးမှု	အကျယ်အဝန်း (စတုရန်းမီတာ)	ယူနစ်(%)
၁	အုပ်ချုပ်ရေးရုံး	၄၇၀	၀.၄
၂	ဂျုံကြိတ်ခွဲခြင်း	၁၈၂၃၄	၁၅.၉
၃	ကားပါကင် ခြံဝန်း	၆၃၀	၀.၅
၄	စားသောက်ဆိုင်	၂၁၀	၀.၂
၅	ဟင်းလင်းပြင်	၈၃၄၅၆	၇၂.၇
၆	ကုန်လှောင်ရုံ	၁၁၇၅၈	၁၀.၂
စုစုပေါင်း		၄၄၁၄၃	၁၀၀.၀

အဆိုပြုထားသည့် ဂျုံကြိတ်ခွဲစက်ရုံ စီမံကိန်းသည် လုပ်ငန်းလည်ပတ်သည့် အဆင့်တွင် တည်ရှိသည်။

၁-၃-၂ လုပ်ငန်း လည်ပတ်သည့် အဆင့်

ဤကဲ့ကြိတ်ခွဲလုပ်ငန်းသည် ကဲ့စေ့များ၏ အပြင်ဘက်အခွံခွာတ်ရန်အတွက် စက်အသုံးပြုကြိတ်ခွဲခြင်းများ ပါဝင်ပြီး အတွင်းဘက်ပိုင်း (စေ့တွင်းစာ)ကို သန့်စင်ချောမွေ့သည့် ကဲ့မှုန့်များ ရရှိသည်အထိ အမှုန့်ကြိတ်ရသည်။ ၁၅%အစိုဓာတ်ရရှိရန်နှင့် ကြိတ်ခွဲမှုလွယ်ကူချောမွေ့ စေရန်အတွက် ရေရောခြင်း ပြုရပါသည်။ နောက်ဆုံးအဆင့်သည် ကဲ့မှုန့်များထုတ်ပိုးခြင်းဖြစ်၍ ဝယ်ယူသူများထံသို့ ပေးပို့နိုင်ရန် သိုလှောင်ရုံများတွင် ထိန်းသိမ်းထားရှိသည်။

(က) ဓာတ်အား လိုအပ်မှု

အဆိုပြုထားသည့် သီးသန့်လုပ်ငန်းအတွက် လိုအပ်သည့် ဓာတ်အားစုစုပေါင်းသည် 9,300 kWh/month ဖြစ်သည်။ ဓာတ်အားလိုအပ်ချက်သည် အစိုးရ၏လျှပ်စစ် ဖြန့်ဖြူးမှုမှ ရယူရန် ဖြစ်သည်။ သို့ရာတွင် တစ်ခုလျှင် စွမ်းအား 1000MW စီရှိသည့် လျှပ်စစ်ဓာတ်အားပေးစက် လေးလုံးကို အရေးပေါ် ဓာတ်အားလိုအပ် သည့်အချိန် များတွင် အသုံးပြုသည်။ ရုတ်တရက် လျှပ်စစ်ဓာတ်အားပြတ်တောက်သွားသည့် အချိန်နှင့် ဖောက်သည်များထံ မှ ဝယ်လိုအားများ သည့် အချိန်များတွင် အသုံးပြုရန် ဖြစ်သည်။

(ခ) ရေ လိုအပ်မှု

ရေသည် ကြိတ်ခွဲမှုချောမွေ့လွယ်ကူစေရန် အစိုဓာတ်ထည့်ပေါင်းသည့်အခါနှင့် အိမ်တွင်းသုံး (စားသောက် ဆိုင်နှင့် သန့်စင်ရေး) တို့အတွက် လိုအပ်သည်။ စုစုပေါင်းရေလိုအပ်ချက်သည် တစ်နေ့လျှင် ၃၂ကုဗမီတာဖြစ်ပြီး စားသောက်ဆိုင်မှ ၂၇ ကုဗမီတာ အသုံးပြု၍ အခြားအသုံးပြုမှုမှာ ၁၃ကုဗမီတာ ဖြစ်သည်။

(ဂ) လုပ်အား လိုအပ်မှု နှင့် ဝန်ထမ်း အမျိုးအစားများ

အဓိကအားဖြင့် ဝန်ထမ်းအမျိုးအစား နှစ်မျိုးရှိသည်။ လခစား အမြဲတမ်းဝန်ထမ်းအုပ်စု (စာရင်းကိုင်၊ ပြုပြင်ထိန်းသိမ်းရေး ဝန်ထမ်းများ၊ အင်ဂျင်နီယာများ၊ ကုန်လှောင်ရုံ ဝန်ထမ်း များ၊ ထုတ်လုပ်ရေး ဝန်ထမ်းများ၊ ထောက်ပံ့ပို့ဆောင်ရေး၊ ယာဉ်မောင်းများ၊ ကောင်တာ၊ အုပ်ချုပ်ရေး ဝန်ထမ်းများ) နှင့် အချိန်ပိုင်းဝန်ထမ်းများ (ဂျုံအိတ်များ စုပုံခြင်း၊ လျှပ်စစ်ဓာတ် အား ပေးစက်များ မောင်းနှင်ခြင်း၊ အညစ်အကြေးများ ဖယ်ထုတ်သန့်စင် ခြင်း၊ လုံခြုံရေးဝန် ထမ်း၊ အစရှိသဖြင့်)။

ဂျူကြိတ်ခွဲသန့်စင် စက်ရုံ၏ ဝန်ထမ်းအင်အား

စဉ်	ဝန်ထမ်းအမျိုးအစား	ဝန်ထမ်းအရေအတွက်
၁	ယာယီဝန်ထမ်း	၃၃၁
၂	အမြဲတမ်း ဝန်ထမ်း	၆၀-၁၀၀

(ဃ) လုံခြုံရေး စီမံချက်များ

လုပ်ငန်းလည်ပတ်စဉ် ဝန်ထမ်းနှင့် အလုပ်သမားများအတွက် လုံခြုံရေးစီမံချက်များ အနေဖြင့် နားအကာလက်အိတ်၊ ဖိနပ်၊ ဖုံအကာ၊ ဦးထုပ်၊ လေကာ၊ရေကာ မျက်မှန်။

စက်ရုံအဆောက်အဦးများတွင် ခေတ်မီလျှပ်စစ်နှင့် ဆက်သွယ်ရေးစနစ်များ၊ မီးဘေးအန္တရာယ် ကာကွယ်ရေး စနစ်၊ ရေထောက်ပံ့မှုနှင့် မိလ္လာစနစ်၊ လေဝင်လေထွက်ကောင်းမွန်သည့် စနစ်များ ဖြင့် ဆောင်ရွက်ရန် စီစဉ် ထား ပါသည်။

၁-၃-၃ အခြား ရွေးချယ်စရာများ

Green Land Wheat Mill သည် ခေတ်မီနည်းပညာဖြင့် လည်ပတ်နေသော်လည်း အောက်ပါ လုပ်ငန်းစဉ် လုပ်ဆောင်မှု များသည် လုပ်ငန်းစဉ်လည်ပတ်မှုအတွက် အခြားဖြစ်နိုင်ခြေရှိသော အစားထိုးလေ့ လာမှုများ ဖြစ် သည်။

၁။ သန့်စင်ခြင်း

၂။ ကြိတ်ခြင်း။

၃။ ထပ်မံလုပ်ဆောင်မှုများ

၁) သန့်စင်ခြင်း လုပ်ငန်းစဉ်

သန့်စင်ခြင်းလုပ်ငန်းစဉ်တွင် စုပေါင်းသန့်စင်ခြင်းနည်းလမ်းအား စိစစ်ဖယ်ထုတ်ခြင်း (Screenig)၊ သန့်စင်ခြင်း ဖြင့် ခွဲခြားဖယ်ထုတ်ခြင်း (Aspiration Separation) ၊ သံလိုက်အားဖြင့် ခွဲခြားဖယ်ထုတ်ခြင်း၊ ကျောက်တုံးများ ဖယ်ရှင်းခြင်းတို့ပါဝင်သည်။ ဤနည်းလမ်းသည် လွယ်လင့်တကူ ထိန်းသိမ်းနိုင်ပါသည်။

၂) ကြိတ်ခွဲခြင်းအဆင့်တွင်၊ ခေတ်မီကြိတ်ခွဲခြင်းလုပ်ငန်းစဉ်သည် ဂျုံစေ့များကို ကြိတ်ခွဲခြင်းနှင့် ခွဲထုတ်ခြင်းအားဖြင့် ဂျုံစေ့/အဆံကောင်းများ စစ်ထုတ်ခြင်းဖြစ်ပါသည်။ ထုတ်ကုန်အရည် အသွေးမြင့်မားခြင်း၊ အထွက်နှုန်းမြင့်မားခြင်းနှင့် ပါဝါသုံးစွဲမှုနည်းပါးခြင်းတို့သည် ဤနည်းလမ်းကို အသုံးပြုခြင်း၏ရလဒ်များ ဖြစ် သည်။ ဤနည်းလမ်းအသုံးပြုခြင်းဖြင့် အရည်အသွေးကောင်းမွန်သော၊ ထွက်နှုန်းမြင့်မားသော၊ စွမ်းအင်သုံးစွဲမှု လျော့နည်းစေနိုင်သော ရလာဒ်များ ရရှိစေပါသည်။

၃) ထပ်မံဆောင်ရွက်သည့်လုပ်ငန်းစဉ်များတွင် ပိုးသတ်ဆေးအသုံးပြုခြင်း၊ ချိန်တွယ်ခြင်း၊ အစုလိုက်သို လှောင်ထား ရှိခြင်း အစရှိသည့် Post Treatment များ လိုအပ်ပါသည်။

၁.၃.၄.၁ အခြားရွေးချယ်စရာများ နှိုင်းယှဉ်ခြင်း

အဆိုပြုစီမံကိန်းအတွက် အခြားရွေးချယ်စရာများရှိသည့်အနက် ဤစီမံကိန်းသည် ပေါင်မုန့်/ကိတ်မုန့်ဖုတ်လုပ် ငန်းများ နှင့် ဒေသတွင်းမုန့်လုပ်ငန်းကဏ္ဍများတွင်အထောက်အပံ့ဖြစ်စေပြီး စီမံကိန်းနေရာနှင့်အနီးရှိဒေသခံ တို့ ၏ အလုပ်အကိုင်အခွင့်အလမ်းများကို တိုးတက်စေပါသည်။ အခန်း(၄) နှင့် အခန်း(၅) တွင် ဖော်ပြ ထား သည့် အကျိုးသက်ရောက်မှုများအကဲဖြတ်ခြင်းအရ ဖြစ်နိုင်ချေရှိသော အကျိုးသက်ရောက်မှုများ နည်းပါး သည် ကိုတွေ့ရှိရပါသည်။

၁.၃.၄.၂ မြေနေရာရွေးချယ်ခြင်း အခြားနည်းလမ်း

စီမံကိန်းတည်ရှိရာ စက်မှုဇုန်အား ပလတ်စတစ်နှင့်အိမ်သုံးပစ္စည်း၊ ဓာတုပစ္စည်း၊ လျှပ်စစ်ပစ္စည်း၊ အစား အသောက်၊ သစ်အခြေခံ၊ ဂိုဒေါင်နှင့် အထည်ချုပ်လုပ်ငန်းစသည်ဖြင့် အပိုင်းကဏ္ဍ (၇) ခုဖြင့်ခွဲခြားထားပါသည်။ စီမံကိန်းသည် ၎င်းကဏ္ဍ (၇) ခုထဲမှ အစားအသောက်ဇုံရိယာအောက်တွင် ရှိနေသောကြောင့် နေရာရွေးချယ်မှု မှန်ကန်ပါသည်။ စီမံကိန်းဇုံရိယာတွင် ဖြစ်ပေါ်နိုင်ချေရှိသော အကျိုးသက်ရောက်မှုများသည် စီမံခန့်ခွဲနိုင်ပြီး ယင်းအကျိုးသက်ရောက်မှုများကို ရှောင်ရှားနိုင်သည်။ ထို့အပြင် စက်မှုဇုန်နှင့် ဘတ်စ်ကားမှတ်တိုင်သည် (၅) မိနစ်မျှသာလမ်းလျှောက်ရသော အကွာအဝေးရှိ၍ ပို့ဆောင်ဆက်သွယ်ရေးအတွက် အဆင်ပြေပါသည်။ ထို့ကြောင့် အခြားမြေနေရာရွေးချယ်ရန် မလိုအပ်ပါ။

၁.၃.၄.၃ လုပ်ငန်းလည်ပတ်မှု ရွေးချယ်စရာများ

က) နည်းပညာ

Green Land ၏ ဂျုံမှုန့်ကြိတ်စက်သည် အလွန်မြင့်မားသော အလိုအလျောက်ဖြစ်ပြီး လုပ်ငန်းစဉ်၏ အစိတ် အပိုင်း အားလုံးကို ကွန်ပျူတာထိန်းချုပ်မှုတွင် အလွယ်တကူ လိုက်လျောညီထွေဖြစ်အောင် ပြုလုပ်ထားသည်။ စက်ရုံ၏ လက်ရှိနည်းပညာကို ကျင့်သုံးခြင်းသည် ထုတ်လုပ်သူများ၊ စားသုံးသူများနှင့် သဘာဝပတ်ဝန်းကျင်ကို တစ်နည်းမဟုတ်တစ်နည်း ကျေနပ်စေရန် ရည်ရွယ်ချက်ဖြင့် မြင့်မားသော အမြတ်အစွန်းကို ဖြစ်ပေါ်စေနိုင် သည်။ ထို့ကြောင့် လက်ရှိနည်းပညာသည် စက်ရုံလည်ပတ်ရန် လုံလောက်ပြီး ယခုအချိန်အထိ အခြားအစား ထိုးနည်း ပညာများ မလိုအပ်ပါ။

ခ) ကုန်ကြမ်း

ဂျုံမှုန့် အစားထိုးနည်းလမ်းများအသုံးပြုနိုင်သော်လည်း ကုမ္ပဏီသည် ဂျုံကိုသာ ကုန်ကြမ်းအဖြစ်သာ အသုံး ပြုမည်ဖြစ်သည်။ ရွေးချယ်ရန် အခြားရွေးချယ်စရာ မရှိနိုင်ပါ။

၈) စွမ်းအင်လိုအပ်ချက်

စက်ရုံအတွက် ဓာတ်အားလိုအပ်ချက်မှာ အစိုးရလျှပ်စစ်ဓာတ်အားလိုင်းမှ ရရှိမည်ဖြစ်သည်။ သို့သော်လည်း 1000 MW ရှိသော စွမ်းအားရှိသော ဓာတ်အားပေးစက် ၄ လုံးကို အရေးပေါ် ဓာတ်အားလိုအပ်ချက်များနှင့် ထုတ်ကုန်များ၏ လိုအပ်ချက်အတွက် အသင့်အနေအထားအဖြစ် အသုံးပြုပါသည်။ ထိုရွေးချယ်စရာနှစ်ခု အတွက် စက်ရုံက နေရာယူထားသောကြောင့် Green Land International Limited အတွက် ဓာတ်အား ထောက်ပံ့မှုသည် လုံလောက်ပါသည်။

၁.၃.၄.၄ လုပ်ငန်းရပ်စဲခြင်း

ဂျူကြိတ်ခွဲ သန့်စင်စက်ရုံ အတွက် လုပ်ငန်းရပ်စဲခြင်း (no development option) ပြုလုပ်မည် ဆိုပါက ထုတ်လုပ် မှုနှင့် ဖြန့်ဖြူးမှုကြောင့်ဖြစ်သော ပတ်ဝန်းကျင်နှင့် လူမှုဆိုင်ရာ သက်ရောက်မှုများကို တားဆီးနိုင် သည်။

သို့ရာတွင် စီမံကိန်းဆောင်ရွက်သူနှင့် ရပ်ကွက်လူထုအကြားတွင် ကောင်းမွန်သည့်ပူးပေါင်း ဆောင်ရွက်မှု ရှိမည် ဆို ပါက အချို့သော ပတ်ဝန်းကျင်နှင့် လူမှုအကျိုးကျေးဇူးများ တိုးပွားစေနိုင်ပါသည်။ အလုပ်အကိုင် အခွင့် အလမ်း များ၊ အခြေခံ အဆောက်အအုံ တိုးမြှင့်ခြင်းများ.နှင့် အခြားသော လူထုအကျိုးစီးပွားများကို စက်ရုံ လုပ်ငန်း လည်ပတ်မှု၏ ရလာဒ်အနေဖြင့် ရရှိနိုင်သည်။

စားသောက်ကုန်ပစ္စည်း ထုတ်လုပ်သည့် စက်ရုံဖြစ်သော ဂျူကြိတ်ခွဲစက်ရုံသည် အခြားသော ပတ်ဝန်းကျင် ညစ်ညမ်းပစ္စည်းထုတ်လုပ်သည့် စက်ရုံများနှင့် နှိုင်းယှဉ်လျှင် ဆိုးကျိုးသက်ရောက်မှု နည်းပါးကြောင်း ကျယ်ကျယ် ပြန့်ပြန့် အသိအမှတ်ပြုခြင်း ခံရလျက်ရှိသည်။

ထို့အပြင် စီမံကိန်းဆောင်ရွက်သူများသည် ပတ်ဝန်းကျင် ထိန်းသိမ်းရေး စီမံချက် (EMP) တွင် ပါဝင်သည့် သက်ရောက်မှုလျော့ပါးစေသည့်စီမံချက်များ နှင့် စီမံအုပ်ချုပ်မှု ကြိုတင်ကြံဆချက်များ (mitigation measures and management plan) နှင့်အညီ လုပ်ဆောင်မည် ဆိုပါက

ပတ်ဝန်းကျင်သက်ရောက်မှု နည်းပါးသည်ဟု ခြုံငုံသုံးသပ်နိုင်ပါသည်။

နှိုင်းယှဉ်မှု၊ ပရောဂျက်ရွေးချယ်မှုများနှင့် သီးခြားရွေးချယ်မှုများအကြောင်း အသေးစိတ်အချက်အလက်များကို အခန်း (၄)၊ အစားထိုးရွေးချယ်မှုတွင် ဖော်ပြထားပါသည်။

၁.၄ ပတ်ဝန်းကျင်၊သက်ရောက်မှုနှင့်အန္တရာယ်အကဲဖြတ်စစ်ဆေးခြင်း နှင့် လျော့ပါးစေသည့် စီမံချက်များ

၁.၄.၁ ပတ်ဝန်းကျင် လေအရည်အသွေး

လက်ရှိ အခြေခံ ပတ်ဝန်းကျင် လေအရည်အသွေး နှင့် ဒေသတွင်းမိုးလေဝသ စောင့်ကြည့်မှတ်သား စစ်ဆေးမှုကို Green Land ဂျုံကြိတ်ခွဲစက်ရုံနှင့် ပတ်ဝန်းကျင်ဒေသများတွင် ၂၀၁၅ခုနှစ် မေလ (နွေရာသီ) ကတည်းက ဆောင်ရွက်ပြီးဖြစ်သည်။

ထို့အပြင် သက်ဆိုင်ရာ စံနှုန်းများကို နှိုင်းယှဉ်ရန်အတွက် တင်ပြ အသုံးပြုခဲ့သည်။ စောင့်ကြည့် မှတ်သား စစ်ဆေး မှုတွင် စောင့်ကြည့် မှတ်သား လေ့လာသည့် နေရာတွင်ရှိ အမှုန်များ (PM10 နှင့် PM2.5)၊ ကာဗွန်မိုနောက်ဆိုဒ် (CO)၊ မတည်မြဲသော အော်ဂဲနစ် ဒြပ်ပေါင်းများ(VOC) ၊ ဆာလ်ဖာဒိုင် အောက်ဆိုဒ် (SO2)၊ နိုက်ထြိုဂျင် ဒိုင်အောက်ဆိုဒ် (NO2) ၊ အမိုးနီးယား (NH3) ၊ မီသိန်း(CH4) ၊ အိုဇုန်း(O3) ၊ မိုးလေဝသဆိုင်ရာ ဓာတ်ရောင်ခြည်များ၏ ၂၄နာရီစာ ပျမ်းမျှခြင်း ပါဝင်သည်။

ဤတိုင်းတာမှု သတ်မှတ်ချက်ဘောင်များမှ စက်ရုံ၏ ထုတ်လုပ်မှု လုပ်ငန်းစဉ်မှ အဓိကထုတ်သည့် အမှုန်များ (PM10 နှင့် PM2.5) သည် အဓိက ညစ်ညမ်းစေသည့်အရာများ ဖြစ်သည်။ ယေဘူယျအားဖြင့် (PM10 နှင့် PM2.5) အမှုန်များ စုစုပေါင်း ထုတ်လုပ်မှု ၂၄နာရီပျမ်းမျှ သည် 70µg/m3 နှင့် 45µg/m3 အသီးသီး ဖြစ်ကြသည်။ PM10 ထုတ်လွှတ်မှုသည် WHO guildlines (50µg/m3 for PM10) ထက်ပိုလျက်ရှိပြီး PM2.5 ထုတ်လွှတ်မှုသည် WHO guildlines (25µg/m3 for PM2.5) အောက် လျော့နည်းနေသည်။

အခြားသော ထုတ်လွှတ်မှုများသည့် ညစ်ညမ်းစေသည့်အရာများမှာ SO2 (107ppb) နှင့် NO2 (59ppb) ဖြစ်ပြီး WHO guildlnes ထက်သာလွန်နေကြောင်း တွေ့ရှိရသည်။ (20ppt for SO2 and 40ppt

for NO2) ၊ SO2သည် စက်ရုံလုပ်ငန်းမှ ထုတ်လွှတ်သည့် အဓိက လေညစ်ညမ်း စေသည့်အရာဖြစ်ပြီး NO2 သည် လျှပ်စစ်ဓာတ်အား ပေးစက်များ အသုံးပြုရာမှ ထုတ်လွှတ်သည်ဟု ယူဆရသည်။ သို့ရာတွင် ပတ်ဝန်းကျင်သက်ရောက်မှု အကဲဖြတ် ခြင်း (Impact assessment) အရ လေထုညစ်ညမ်းစေသည့် အရာအားလုံးသည် လျော့နည်းသည့် အဆင့်တွင် ရှိသည်။ လေထုအရည်အသွေးဆိုင်ရာ တွေ့ရှိချက်များ၏ အသေးစိတ်အချက်အလက်များကို နောင်လာမည့် အပိုင်းတွင် ဆက်လက်တင်ပြ ပါမည်။

ထို့အပြင် ထုတ်လုပ်မှုလုပ်ငန်းစဉ်မှ ထွက်ရှိလာသော လေထုအမှုန်များနှင့် ထိတွေ့မှုမှ ကာကွယ် ရန် ထုတ်လုပ်မှုလုပ်ငန်းစဉ်တွင်ပါဝင်သော အလုပ်သမားများသည် သင့်တော်သည့် အလုပ် အလေ့အထကောင်း တစ်ခုအနေဖြင့် ဖုံအကာ ကို တပ်ဆင်ရပါမည်။ လေထု စောင့်ကြည့် မှတ် သား စစ်ဆေးမှု စီမံချက်ကို နှစ်စဉ်ဆောင်ရွက်သင့်သည်။ အထူးသဖြင့် စက်ရုံတွင်း စက်ကိရိယာသစ်များ ပြောင်းလဲတပ်ဆင်သည့် အခါများတွင် ပိုမိုလိုအပ်ပါသည်။ သက်ရောက်မှု လျော့ပါး စေသည့် စီမံချက်များကို သက်ဆိုင်ရာ အပိုင်းကဏ္ဍ များတွင် အသေးစိတ်ဖော်ပြ ထားသည်။

အခြေခံလေအရည်အသွေး စောင့်ကြည့်မှတ်သားလေ့လာစဉ်တွင် လေအရည်အသွေးကို သက် ရောက်မှုရှိနိုင် သည့် ရာသီဥတုအခြေအနေ သာယာလျက်ရှိသည်ကို တွေ့ရသည်။

၁.၄.၂ အခန်းတွင်း လေ

Green Land ၏ အခန်းတွင်းလေ စောင့်ကြည့် မှတ်သား စစ်ဆေးမှုကို အုပ်ချုပ်ရေးရုံးခန်းနှင့် ဓာတ်ခွဲခန်းတွင် ဆောင်ရွက်ပါသည်။ အခန်းတွင်းလေ တိုင်းတာမှု သတ်မှတ်ချက်များတွင် အခန်းတွင်း လေ ညစ်ညမ်းမှု၏ အဓိက အစိတ်အပိုင်းများဖြစ်သည့် ဇီဝဆိုင်ရာ(ဘက်တီးရီးယားနှင့် မှို) လေ အရည်အသွေး၊ အမှုန်များနှင့် ဓာတ်ငွေ့များ ပါဝင်သည်။ ဤအခန်းတွင်း လေတိုင်းတာမှုတွင် ရုပ်ပိုင်းဆိုင်ရာ အခန်းတွင်းလေ (အခန်းနှင့် နံရံအပူချိန်၊ လေရွှေ့လျားမှုနှင့် စီးကြောင်း) တို့ ပါဝင်သည်။ ယင်းတို့သည် ရုံးတွင်း ပိုးမွှားပေါက်ဖွားမှုနှင့် လုပ်ငန်းဆောင်ရွက်သူများ၏ ကျန်းမာရေးကို လွှမ်းမိုးနိုင်သောကြောင့် ဖြစ်သည်။ အခန်းတွင်း လေအရည် အသွေး သည် လုပ်ငန်းခွင် ဘေးကင်းရေးနှင့် ကျန်းမာရေး အဖွဲ့ (OSHA) ၏ သတ်မှတ်ချက်နှင့် ကိုက်ညီ ပါသည်။

၁.၄.၃ ကာဗွန် ထုတ်လုပ်မှု

Green Land စက်ရုံသည် စက်အစားထိုးအသုံးပြုမှု အလွန်မြင့်မားပြီး လုပ်ငန်းစဉ်၏ အစိတ်အပိုင်းအားလုံး သည် ကွန်ပျူတာ ထိန်းချုပ်မှုဖြင့် အလွယ်တကူ အသားကျပြီး ဖြစ်သည်။ ကုန်စျေးနှုန်းအလွန်မြင့်မား သော်လည်း ဤနည်းပညာအသုံးပြုမှုသည် ကြိတ်ခွဲစက် ရုံကို စက်ကိုင်တွယ်အသုံးပြုသူမရှိဘဲ အချိန်တိုးမြှင့် လည်ပတ်စေနိုင်သည်။ ဥပမာ ညအိပ် ချိန်နှင့် အားလပ်ရက်များတွင်ဖြစ်သည်။ ထို့အပြင် Green Land စက်ရုံသည် လုပ်ငန်းစဉ် အားလုံးအတွက် အစိုးရမှပေးသည့် လျှပ်စစ်ကို အသုံးပြုလျက်ရှိသည်။

အဓိကအသုံးပြုလျက်ရှိသော ဓာတ်ငွေ့ထုတ်လွှတ်ရန် အလားအလာရှိသည့် လျှပ်စစ်ဓာတ် အားပေးစက်များကို လစ်လျူရှုနိုင်သည်ဟု ယူဆသည်။ လျှပ်စစ်ဓာတ်အားအသုံးပြုမှုမှ ထွက်ရှိသော ကာဗွန်ဒိုင်အောက်ဆိုဒ်ပမာဏ သည် 4,285 matric tons ဖြစ်ပြီး သယ်ယူပို့ ဆောင်ရေးကဏ္ဍမှ တစ်နှစ်လျှင် 365.461 matric tons ထုတ်လွှတ်သည်။ ကာဗွန်ဒိုင် အောက်ဆိုဒ် ထုတ်လွှတ်မှု စုစုပေါင်း တစ်နှစ်လျှင် 3,085 matric tons ကို မြေဖို့ခြင်းအစား အမှိုက်သရိုက် ပြန်လည်အသုံးပြုနိုင်ရန်စီမံခြင်းနည်းဖြင့် လျော့ချနိုင်ပါသည်။ ထို့ကြောင့် Green Land စက်ရုံ၏ နှစ်စဉ် စုစုပေါင်း ကာဗွန်ဒိုင်အောက်ဆိုဒ် ထုတ်လွှတ်မှုသည် 1,565 matric tons ဖြစ်သည်။

၁.၄.၄ ဆူညံသံ

Green Land ဂျုံကြိတ်ခွဲစက်ရုံ၏ ဆူညံသံ အဆင့်သတ်မှတ်ချက်ကို အဓိကကျသည့် နေရာဒေသ အမျိုးမျိုး (အုပ်ချုပ်ရေးရုံး၊ သိုလှောင်သည့် နေရာ၊ ထုတ်ပိုးသည့် နေရာ နှင့် လျှပ်စစ်ဓာတ်အားပေးစက်တည်နေရာ) တို့တွင် တိုင်းတာပါသည်။ ဤနေရာများအနက် သိုလှောင်ရေးနှင့် လျှပ်စစ်ဓာတ်အားပေးစက်နေရာများသည် ထိန်းချုပ်ရန်လိုအပ်သည့် အဓိကနေရာများ ဖြစ်ကြသည်။ ကြိတ်ခွဲစက်ရုံ၏ ထုတ်လုပ်မှုလုပ်ငန်းစဉ်တွင် အသုံးပြုသော ကြီးမားလေးလံသည့် စက်များနှင့် ကိရိယာများမှ ဆူညံသံရော တုန်ခါမှုပါ ထုတ်လုပ် လျက် ရှိသည်။ နေ့အချိန် (93.56 dB) နှင့် ညအချိန်(95.74 dB)၏ ပျမ်းမျှ ဆူညံသံ အဆင့်သည် EQG ၏ ပတ်ဝန်းကျင် အရည်အသွေး လမ်းညွှန်ချက်(70dB for industrial) ထက်ကျော်လွန်နေသည်ကို တွေ့ရသည်။

သို့ရာတွင် အနီးပတ်ဝန်းကျင် ဆူညံသံ သက်ရောက်မှု အကဲဖြတ်ခြင်း အရ လျော့နည်း သည်ဟု အကြမ်းဖျင်း သတ်မှတ်နိုင်သည်။ ထို့အပြင် Green Land စက်ရုံ၏ ထုတ်လုပ်မှု လုပ်ငန်းစဉ်အတွင်း ဆူညံသံမှ ကာကွယ်ရန် အလုပ်သမားများနှင့် ဝန်ထမ်းများသည် လုပ်ငန်းခွင် အလေ့အထကောင်း တစ်ခုအနေဖြင့် နားအဆို့ကို တပ်ဆင် သင့်ပါသည်။ ဆူညံသံ စောင့်ကြည့် မှတ်သား စစ်ဆေးမှု စီမံချက်ကို နှစ်စဉ်ဆောင်ရွက်သင့်သည်။ အထူးသဖြင့် စက်ရုံတွင်း စက်ကိရိယာသစ်များ ပြောင်းလဲတပ်ဆင်သည့် အခါများတွင် ပိုမိုလိုအပ်ပါသည်။ သက်ရောက်မှုလျော့ပါးစေသည့် စီမံချက်များကို သက်ဆိုင်ရာ အပိုင်းကဏ္ဍများတွင် အသေးစိတ်ဖော်ပြထား သည်။

၁.၄.၅ မြေအမျိုးအစား

တည်နေရာဖော်ပြသည့်ပုံ ၂.၂ တွင်ဖော်ပြထားသည့်အတိုင်း စီမံကိန်းနေရာသည် စက်ရုံ အဆောက်အအုံများနှင့် ဖွဲ့စည်းထားပြီး စက်မှုဇုံသည် ၁၀နှစ်ကျော် သက်တမ်းရှိပြီးဖြစ်သည်။ မြေနေရာသည် စိုက်ပျိုးထွန်ယက်ခြင်း မပြုနိုင်သည့် ဆင်ခြေဖုံးမြေပြန့်ဒေသ ဖြစ်သည်။ (စက်မှုဇုံအတွင်း မြေနေရာ၏ ၉၀% ခန့်သည် ကွန်ကရစ် ဖြစ်သည်။ ကျန်ရှိသော မြေနေရာ၏ ပုံသဏ္ဌာန်သည် ထွန်ယက်စိုက်ပျိုးရန် လွယ်ကူသည့် သဲမြေကြမ်း ဖြစ်သည်။ အမြစ် အလွယ်တကူ ကြီးထွားနိုင်ရန် လွှသွားပုံများစွာရှိပြီး လွယ်ကူစွာ စိုစွတ်အောင် ပြုလုပ်နိုင် သည်။ သို့သော် ယင်းသည် အခြောက်မြန်သဖြင့် အပင်ရှိ အဟာရဓာတ်များကို ရေနှင့်တိုက်စားပြီး ဆုံးရှုံးသွားစေနိုင်သည်။
လက်တွေ့ကွင်းဆင်းလေ့လာချက်အရ စက်မှုဇုံနှင့် အနီးပတ်ဝန်းကျင်သည် ထွန်ယက်စိုက်ပျိုး သည့် အလေ့အထ နည်းပါးပြီး မြို့ပြဖွံ့ဖြိုးမှုကြောင့် ဖြစ်ဖွယ်ရှိသည်။

၁.၄.၆ ဒေသရင်း အပင်နှင့် တိရစ္ဆာန်များ

ဧဝမျိုးကွဲလေ့လာမှုကို စီမံကိန်းဧရိယာတွင် အဓိကထားလုပ်ဆောင်သည်။ Green Land ဂျုံကြိတ်ခွဲစက်ရုံအပါ အဝင် စက်မှုဇုံတစ်ခုလုံးတွင် ထိန်းသိမ်းကာကွယ်ထားသော ဧရိယာ၊ အရေးကြီးဧဝမျိုးကွဲ ဧရိယာ၊ နိုင်ငံတော်နှင့် ဒေသတွင်း အဆင့် အရေးကြီးသော ဧဝမျိုးကွဲ ဧရိယာများနှင့် ထိခိုက်လွယ်သော ဧရိယာများ မတွေ့ရှိရပေ။

အရှေ့ဒဂုံ စက်မှုဇုံကို ၂၀၀၂ ခုနှစ်လောက်ကတည်းက စတင်တည်ထောင်ခဲ့ပြီး စီမံကိန်း ဧရိယာတွင် မြို့ပြဖွံ့ဖြိုး မှုများ အခြေတည်ခဲ့သည်မှာ ၁၃နှစ်ခန့် ရှိပြီဖြစ်သည်။ သမရိုးကျ ဇီဝမျိုးကွဲဆိုင်ရာ အသိပညာ စစ်တမ်းအရ စက်မှုဖွံ့ဖြိုးမှုများကြောင့် သဘာဝပတ်ဝန်းကျင်၊ ဒေသတွင်း တိရစ္ဆာန်များ၊ အပင်များနှင့် စားကျက်မြေများ စသည်တို့အပေါ်တွင် ဆိုးကျိုးရော ကောင်းကျိုး သက်ရောက်မှု မရှိကြောင်း တွေ့ရှိရသည်။

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

၁.၄.၇ အမှိုက်

လူတို့လှုပ်ရှားမှုများနှင့် စက်ရုံလုပ်ငန်းစဉ်အရ ထွက်ရှိလာသော အိမ်တွင်းနှင့် လုပ်ငန်းသုံး အမှိုက်များကို နောက်ဆုံးထွက်ရှိလာသော လမ်းကြောင်းမှ စစ်ဆေးသည်။ ဂျုံကြိတ်ခွဲသည့် စက်ရုံအတွက် အမှိုက်စစ်ဆေး မှုကို နိုင်ငံတကာစံနှုန်းစစ်ဆေးမှုကို အသုံးပြုဆောင်ရွက်ပါ သည်။ အိမ်တွင်း အမှိုက်နှင့် ပက်သက်၍ နှစ်စဉ် တန်ချိန် ၁၉တန် ထုတ်လုပ်ပြီး နေ့စဉ်ထုတ်လုပ်မှုမှာ ၀.၀၇ ကီလိုဂရမ် ရှိသည်။ အဓိက အမှိုက်အမျိုးအစား များမှာ စားသောက်ကုန်မှ ထွက်ရှိသည့် အမှိုက်များ၊ ခြံထွက် အမှိုက်များ၊ ပလက်စတစ်၊ စက္ကူ၊ သားရေ အထည်အလိပ် ရာဘာ၊ ဖန် သတ္တုနှင့် အလူမီနီယံ (သံဘူးများ)၊ အန္တရာယ်ရှိသည့် ပစ္စည်းများ လျှပ်စစ် ပစ္စည်း၊ (ဆေး၊ ဓာတ်ခဲအဟောင်းများနှင့် အိမ်သုံးလျှပ်စစ်နှင့် လျှပ်စစ်ဆိုင်ရာ စက်ပစ္စည်း အမှိုက်များ)၊ အမျိုးသမီး လစဉ်သုံးပစ္စည်းများနှင့် အခြား အမှိုက်သရိုက်များ ပါဝင်သည်။ စားသောက်ကုန် အမှိုက်များသည် အများဆုံး (၈၅.၂%) ဖြစ်ပြီး ထုတ်ပိုး ပစ္စည်းများသည် (၇%) ဖြင့် ဒုတိယနေရာတွင် ရှိသည်။

စက်ရုံနှင့် ပက်သက်သည့် အမှိုက်များသည် နှစ်စဉ် ၁၇တန်သာ ထွက်ရှိသည်။ အများအားဖြင့်ထွက်ရှိသည့် အမှိုက်အမျိုးအစားနှစ်မျိုးသာရှိပြီး ယင်းတို့မှာ ကြိတ်ခွဲခြင်း လုပ်ငန်းစဉ်ကြောင့် ထွက်ရှိသည့် ဖုန်မှုန့်များ (၇၃.၉၁%)နှင့် ကျောက်တုံးကျောက်ခဲများ (၂၆.၁၉%) ဖြစ်သည်။ ကြိတ်ခွဲလုပ်ငန်း၏ ကုန်ကြမ်းအနေဖြင့် အသုံးပြုသောပစ္စည်းများ၏ ၀.၀၃%ကိုသာ

အမှိုက်အဖြစ် စည်ပင်သာယာသို့ စွန့်ပစ်သည်။

လက်ရှိကာလ Green Land ၏ ထုတ်လုပ်မှုစနစ်တွင် အမှိုက်ခွဲခြားစွန့်ပစ်သည့်စနစ် ကျင့်သုံးခြင်း မရှိသေးပါ။ အမှိုက်အားလုံးကို အမှိုက်ပုံးများထဲသို့ထည့်၍ အမှိုက်ခေတ္တသို လှောင်သည့် အဆောက်အအုံအတွင်း စည်ပင်သာယာသို့ နောက်ဆုံးအဆင့် မစွန့်ပစ်မီ ယာယီ သိုလှောင်ထားရှိသည်။ အမှိုက်ပြန်လည် အသုံးပြုမှုနှင့် ပက်သက်၍ စုစုပေါင်းအမှိုက်၏ ၉၆%သည် မတူညီသော နေရာများမှ ထုတ်လုပ်ပြီး ပြန်လည်အသုံးပြုနိုင်စေရန် ဆောင်ရွက်မှုလုပ်ငန်းစဉ်ကို စက်ရုံ အတွင်းတွင်သာ ဆောင်ရွက် လျက် ရှိသည်။

အမှိုက်သရိုက်နှင့် ပက်သက်၍ သက်ရောက်မှု စစ်ဆေးအကဲဖြတ်ခြင်းကို ထည့်သွင်းစဉ်းစား ရာတွင် ကမ္ဘာ့ကျန်းမာရေးအဖွဲ့၏ ဖွံ့ဖြိုးဆဲနိုင်ငံများ၏ အမှိုက်ထုတ်လုပ်နှုန်းထက် လျော့နည်းသဖြင့် စက်ရုံအမှိုက် ထုတ်လုပ်မှုသည် လျော့နည်းသည်ဟု သတ်မှတ်နိုင်သည်။ သို့ရာတွင် အမှိုက်အနည်းဆုံးသို့ လျော့ချခြင်းနှင့် အမှိုက်လုံးဝမရှိစေရန် ပြုလုပ်ခြင်း တို့အတွက် အမှိုက်သရိုက်ဆိုင်ရာစီမံချက် နှစ်ခုနှင့် အမှိုက်လျော့ချရန် နည်းလမ်းများ အကြံပြု နိုင်ပါသည်။ အမှိုက်စိုနှင့် ခွဲခြားစွန့်ပစ်သည့်နည်းနှင့် စက်ရုံထုတ်အမှိုက်များမှ ဖြစ်ပေါ် လာ သည့် အော်ဂဲနစ်အမှိုက်ဆွေးများကိုပါ ခွဲခြားစွန့်ပစ်ရန် ဖြစ်သည်။

၁.၄.၈ သောက်ရေ နှင့် ညစ်ညမ်းရေ

ဂျုံမှုန့် ကြိတ်ခွဲသည့်လုပ်ငန်းစဉ်တွင် ဂျုံစေ့များကြိတ်ခွဲသည့်အခါတွင် ချောမွေ့လွယ်ကူစေ ရန်အတွက် ရေကို ၂၄နာရီပတ်လုံး အသုံးပြုရသည်။ ထို့အပြင် ရေကို အိမ်တွင်းအသုံးပြုမှု အဖြစ် စားသောက်ဆိုင်လုပ်ငန်းစဉ်များ အတွက် အဓိက အသုံးပြုသည်။ ရေအရင်းအမြစ်သည် တွင်းရေဖြစ်သည်။ ဂျုံမှုန့်ကြိတ်ခွဲသည့် လုပ်ငန်းစဉ် အတွက် တစ်နေ့တာ ရေအသုံးပြုမှုသည် ၃၈.၁ကုဗမီတာ ဖြစ်ပြီး ကြိတ်ခွဲလုပ်ငန်း၊ ရုံးသုံးနှင့် စားသောက်ဆိုင် စသည့် မတူညီသော အဓိက လုပ်ဆောင်ချက်များအတွက် အသုံးပြုသည်။

သောက်သုံးရေ စစ်ဆေးတိုင်းတာသည့် သတ်မှတ်ချက်ဘောင် ၁၉ ခု (ဓာတုဆိုင်ရာ၊ ရုပ်ပိုင်းဆိုင်ရာနှင့် ဇီဝဆိုင် ရာ)တို့ ပါဝင်ပြီး ယင်းတို့သည် လူ့ကျန်းမာရေးနှင့် နေထိုင်ရာ ပတ်ဝန်းကျင်အတွက်အလွန် အရေးပါ သည်။ ညစ်ညမ်းရေနှင့် ပက်သက်၍ သတ်မှတ်ချက် ဘောင် ၁၃ခု

(ဓာတုနှင့် ရုပ်ပိုင်းဆိုင်ရာ) ကို စစ်ဆေးစမ်း သပ် သည်။ စမ်းသပ်ချက်အားလုံးကို အသိအမှတ်ပြုထားသော ဓာတ်ခွဲခန်းများမှ စံချိန်စံနှုန်းနှင့် ကိုက်ညီသည့် နည်းလမ်းများဖြင့် ပြုလုပ်ဆောင်ရွက်ပါသည်။

သောက်သုံးရေ၏ သတ်မှတ်ချက်ဘောင်များသည် ကမ္ဘာ့ကျန်းမာရေးအဖွဲ့ ၏ လမ်းညွှန်ချက် (WHO guildline)၊ အမေရိကန်ပြည်ထောင်စု သဘာဝပတ်ဝန်းကျင် ထိန်းသိမ်းကာကွယ်ရေး အေဂျင်စီ၏ လမ်းညွှန် ချက် (USEPA guildlines) နှင့် နိုင်ငံတော ငွေကြေးပူးပေါင်းဆောင် ရွက်ရေး အဖွဲ့၏ စွန့်ထုတ်ရေ လမ်းညွှန် ချက်(IFC **Effluent guildlines)** တို့နှင့် ကိုက်ညီသည်ကို တွေ့ရှိရသည်။ ထို့ကြောင့် သောက်သုံးရေကြောင့် ပတ်ဝန်းကျင်ဆိုးကျိုး သက်ရောက်မှုကို လျော့နည်းသည် ဟု သတ်မှတ်သည်။

ညစ်ညမ်းသည့် ရေတွင် စစ်ဆေးတိုင်းတာသည့် သတ်မှတ်ချက်ဘောင်များ ဖြစ်သည့် pH, Total Suspended Solid, Ammonia Nitrogen, Oil and Grease, Phosphorus, BOD, COD and Coliform တို့ကို စစ်ဆေးရာ တွင် BOD, COD နှင့် TSS တို့သည် သတ်မှတ်ချက် ကျော်လွန် နေသည်ကို တွေ့ရှိရသည်။ ထို့ကြောင့် ညစ်ညမ်း ရေ ၏ ပတ်ဝန်းကျင်အပေါ် သက်ရောက်မှုကို မတူညီသည့် သတ်မှတ်ချက်ဘောင်များ၏ ရလဒ်များအတွင်းမှ မြင့်မားသည် သို့မဟုတ် ကိုက်ညီ သည် ဟုသတ်မှတ်နိုင်သည်။

ထို့ကြောင့် ရေရောခြင်း (ဓာတ်လျော့ခြင်း)ဖြင့် စွန့်ပစ်ခြင်း၊ အရည်စစ်ထုတ်ခြင်းနှင့် မြေကြီး တွင်းသို့ စိမ့်ဝင်စေ ခြင်း နည်းလမ်းများကို ဆိုးကျိုးသက်ရောက်မှု နည်းပါးစေသည့် နည်းလမ်းများအဖြစ် အကြံပြုနိုင်ပါသည်။

၁.၅ စုပေါင်း သက်ရောက်မှု စမ်းသပ်စစ်ဆေးခြင်း

ဤကဏ္ဍတွင် Green Land ဂျုံကြိတ်ခွဲစက်ရုံမှ လေထုတွင်း ထုတ်လွှတ်သည့်အရာများ၊ ဆူညံသံ၊ ညစ်ညမ်း သည့်ရေ စွန့်ထုတ်ခြင်း နှင့် အမှိုက်သရိုက်များ၏ ပတ်ဝန်းကျင်အပေါ် သို့ စုပေါင်း သက်ရောက်မှု များကို အကဲ ဖြတ် စစ်ဆေးမည်ဖြစ်သည်။ ယင်းသည် စက်ရုံ၏ အမျိုးမျိုးသော လှုပ်ရှားဆောင်ရွက်မှုများ

ကြောင့် တိုးပွား လာ သည့် သက်ရောက်မှုများကို စစ်ဆေးအကဲဖြတ် သည့် လုပ်ငန်းဖြစ်သည်။

လူထုတွင်း ကွင်းဆင်းခြင်းနှင့် မေးမြန်းခြင်းများအရ Green Land စက်ရုံ၏ အနီးပတ်ဝန်းကျင်ရှိ စက်ရုံအများစု သည် စားသောက်ကုန်စက်ရုံများဖြစ်သည့် ခေါက်ဆွဲစက်ရုံ၊ မုန့်ဖုတ်လုပ်ငန်းနှင့် ရေသန့်လုပ်ငန်းနှင့် အချို့ စက်ရုံများမှာ လျှပ်စစ်ပစ္စည်းစက်ရုံများ၊ စက္ကူထုပ်ပိုးပစ္စည်းစက်ရုံ များနှင့် အထည်အလိပ်စက်ရုံများ ဖြစ်ကြ သည်။

ဒေသတွင်းအဆင့်တွင် ဖော်ထုတ်နိုင်သည့် စုပေါင်းသက်ရောက်မှု အကဲဖြတ်ခြင်းအဆင့်သည့် အလယ်အလတ် ရှိသည်။ နိုင်ငံနှင့် ဒေသတွင်း အဆင့်များတွင်မူ စက်ရုံအများစုသည် ဓာတ်ငွေ့ နှင့် ညစ်ညမ်းလေ ထုတ်လုပ် သည့် စက်ရုံများမဟုတ်ဘဲ အထည်အလိပ်စက်ရုံများသာဖြစ်သဖြင့် စက်ရုံများ၏ စုပေါင်းသက် ရောက်မှု အကဲဖြတ်ခြင်းသည် သိသာထင်ရှားသည့် သက်ရောက်မှု မရှိပေ။

ရွှေ့လျားနေသော ဖုံမှုန့်နှင့် လေညစ်ညမ်းစေသည့် အရာများ

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

ဆူညံသံ

စက်ရုံပတ်ဝန်းကျင်ရှိ လက်ရှိအခြေခံ ဆူညံသံအဆင့်သည် လက်ရှိယာဉ်အသွားအလာများ၊ လျှပ်စစ်ဓာတ်အား ပေးစက်များ အသုံးပြုခြင်းနှင့် အနီးစပ်ဆုံး စက်ရုံအလုပ်ရုံများမှ စက်ပစ္စည်းများအသုံးပြု၍ လုပ်ငန်းလည် ပတ်မှု များကြောင့် တိုးပွားလာနိုင်ပါသည်။

မျက်နှာပြင်နှင့် မြေအောက်ရေ အရည်အသွေး

စက်ရုံမှ မပါဝင်သင့်သော Biochemical Oxygen Demand (BOD) ပါဝင်သည့် ညစ်ညမ်းရေကို အများဆိုင် ရေနုတ်မြောင်းထဲသို့ စွန့်ထုတ်လိုက်ခြင်းကြောင့် အခြားစက်ရုံများမှ စွန့်ထုတ်သည့်

အခြားသော စွန့်ပစ်ပစ္စည်းများနှင့် စုပေါင်း သက်ရောက်မှုများ ရှိနိုင်ပါသည်။

၁.၆ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်အကျဉ်းချုပ်

ဆောက်လုပ်ရေးအဆင့်၊ လည်ပတ်ခြင်းအဆင့်နှင့် ဖျက်သိမ်းခြင်း အဆင့်တစ်လျှောက်တွင် ဆောင်ရွက်ရမည့် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်တွင် အဆိုပြုထားသည့် လျော့ပါးသက်သာစေရေး အစီအမံများနှင့် အတူ လေထုညစ်ညမ်းမှု ထိန်းချုပ်ရေး၊ ဆူညံသံ၊ မြေဆီလွှာ၊ ရေအရင်းအမြစ်၊ အမှိုက်၊ ရေဆိုး၊ ဂေဟဗေဒ ကျန်းမာရေးနှင့် လုံခြုံရေးဆိုင်ရာကိစ္စရပ်များအတွက် အစီရင်ခံမှု စနစ်တို့ အားဆောင်ရွက်ပါသည်။

ပရောဂျက်၏ တည်ဆောက်ရေးကာလမှာ တစ်နှစ်နီးပါးဖြစ်သည်။ စက်ရုံအား ရင်းနှီးမြှုပ်နှံမှုကာလ ၃၅ နှစ် အတွင်း လည်ပတ်မည်ဖြစ်သည်။ Green Land စက်ရုံသည် EMP ကုန်ကျစရိတ်အတွက် ရင်းနှီးမြှုပ်နှံမှု ပမာဏ၏ 2% ကို အသုံးပြုမည်ဖြစ်သည်။ ရင်းနှီးမြှုပ်နှံမှုပမာဏမှာ တစ်သန်းတွင် နိုင်ငံခြားသုံးငွေ USD 1,500,000 ဖြစ်သည်။ သဘာဝပတ်ဝန်းကျင် စီမံခန့်ခွဲမှုအစီအစဉ်တစ်ခုအတွက် တစ်နှစ်လျှင် လျာထားချက် အသုံးစရိတ်မှာ USD 30,000 ဖြစ်သည်။ စုစုပေါင်း ၆၀ ရာခိုင်နှုန်းကို သဘာဝပတ်ဝန်းကျင် လျော့ပါးစေရေး အတွက် အသုံးပြုမည်ဖြစ်ပြီး ကျန် ၄၀ ရာခိုင်နှုန်းကို စောင့်ကြည့်ရေး အစီအစဉ်များအတွက် အသုံးပြုမည် ဖြစ်သည်။

Green Land သည် ISO 2200 အသိအမှတ်ပြု လက်မှတ်ရရှိထားသောကြောင့် ISO လမ်းညွှန်ချက်များ နှင့် အညီ Food Safety Management Team (FSMS Team) ကို ဖွဲ့စည်းထားပါသည်။ FSMS သည် သူ/သူမ၏ အဓိကအလုပ်ဖော်ပြချက်နှင့်အတူ ပတ်ဝန်းကျင်စောင့်ကြည့်ရေး အစီအစဉ် အတွက် တာဝန်ရှိပါသည်။

ယင်းနှင့်စပ်လျဉ်း၍ စက်ရုံပိုင်ရှင်သည် HSE အစီအစဉ်များကို စီမံခန့်ခွဲနိုင်သော မန်နေဂျာ အား ဆုချီးမြှင့် ခြင်းဖြင့် စက်ရုံ၏ သဘာဝပတ်ဝန်းကျင်ဆိုင်ရာ လုပ်ဆောင်မှုများကို ဆောင် ရွက်စေသည်။

HSE မန်နေဂျာသည် ပတ်ဝန်းကျင်ဆိုင်ရာ ပြဿနာများနှင့် စောင့်ကြည့်ရေး အစီအစဉ်များ (လေ/ရေ/ဆူညံသံ စောင့်ကြည့်ခြင်း အလေ့အထများကို ၆ လတစ်ကြိမ် ပြုလုပ်နေပြီး ECD သို့ အစီရင်ခံသည်) နှင့် စက်ရုံ၏ လုပ်ငန်းစဉ်နှင့် လုပ်ဆောင်ချက်များနှင့် ဆက်စပ်နေပြီး စက်ရုံအတွက် HSE မူဝါဒနှင့် အစီအစဉ်များကို သတ်မှတ်ပေးပါသည်။ HSE မန်နေဂျာသည် EMP တွင် သတ်မှတ်ထားသည့် လိုအပ်သည့် လုပ်ဆောင်ချက် များနှင့်အညီ ပတ်ဝန်းကျင်ဆိုင်ရာ ပြဿနာအားလုံးကို အကောင်အထည် ဖော်ဆောင်ရွက်ပါသည်။

HSE မန်နေဂျာသည် အစိုးရဘက်မှ စစ်ဆေးရေး အဖွဲ့ သို့မဟုတ် NGO များ ရောက်ရှိလာပြီး HSE အစီအစဉ်များနှင့်အတူ စက်ရုံလုပ်ငန်းစဉ်နှင့် လုပ်ဆောင်ချက်များကို စစ်ဆေးသည့် အခါတိုင်း ညှိနှိုင်း ဆောင်ရွက် ပေးပါသည်။ HSE မန်နေဂျာသည် သက်ဆိုင်ရာ တာဝန်ဝတ္တရား များကို သိရှိနားလည်ပြီး HSE မူဝါဒနှင့် အစီအစဉ်များနှင့်အညီ လုပ်ဆောင်ရမည့် အလုပ်သမားများအား သင်တန်းပေးသည်။

၁.၆.၁ လေအရည်အသွေးနှင့် ပက်သက်သည့် ပတ်ဝန်းကျင် ထိန်းသိမ်းရေး စီမံချက်

အဓိက ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး စီမံချက်အနေဖြင့် လေထုညစ်ညမ်းမှုနှင့် ပက်သက်သည့် စီမံချက်ကို အမှုန် ထုတ်လုပ်မှု မြင့်မားသည့် မသန့်စင်မီနှင့် သန့်စင်သည့် လုပ်ငန်းစဉ်များတွင် အဓိကဆောင်ရွက်ရန် လိုအပ် သည်။ မသန့်စင်မီဆောင်ရွက်သည့် လုပ်ငန်းစဉ်များတွင် ကုန်ကြမ်း များရယူခြင်းနှင့် ကုန်ကြမ်းများကို သိုလှောင် ကန် (silo)သို့ ပို့ဆောင်ခြင်းတို့ ပါဝင်သည်။ Green Land ကြိတ်ခွဲစက်ရုံ၏ မသန့်စင်မီဆောင်ရွက် သည့် လုပ်ငန်းစဉ်များတွင် သန့်စင်သည့် ဂျူစေ့ ကုန်ကြမ်းများမှ ဂျူရိုးများ၊ ဖုံမှုန့်များနှင့် အခြားပေါ့ပါးသည့် ညစ်ညမ်းမှုန်များ ဖယ်ရှားရန်အတွက် လေဖိ အားသုံး ဖုံမှုန့် ထိန်းချုပ်သည့်စက် (pneumatic dust controller) ကို ကတော့အဝတွင် တပ်ဆင်သင့်သည် ဟု အဆိုပြုထားသည်။

လက်ရှိတွင် ဖုန်စုပ်စက်မှလက်ဖြင့်ပြောင်းလဲတပ်ဆင်ရသည့် အိတ်များကို fabric filter bags များပါဝင်သည့် အလိုလျောက်ထိန်းချုပ်စနစ် automatic control system ကို အစားထိုး

အသုံးပြုသင့်ပါသည်။

သန့်စင်သည့် လုပ်ငန်းစဉ်တွင် လက်ရှိအနေဖြင့် သိုလှောင်ကန်များမှ ကုန်ကြမ်းပစ္စည်းများကို ကြိတ်ခွဲစက်များ သို့ ပို့ဆောင်ပြီး ယင်းတို့တွင် အောက်ပါ လုပ်ငန်းယူနစ်များ ပါဝင်သည်။

- ဂျုံစေ့ထက်ပို၍ကြီးသော သို့မဟုတ် သေးငယ်သော အမှုန်များတိုက်ချသည့် ဇကာများ
- ကျောက်ခဲကဲ့သို့ လေးလံသည့် အမှိုက်များကို ဖယ်ရှားသည့်အရာ (destoner)
- ဂျုံစေ့ထက်ပို၍ကြီးသော သို့မဟုတ် သေးငယ်သော အမှုန်များပြာသည့် ပြာစက် (cockle cylinder)
- လေစီးကြောင်းအသုံးပြုသည့် သေးငယ်သည့် အမှုန်များ ဖယ်ရှားသည့်စက် (polishing machine)

ဤသန့်စင်သည့် လုပ်ငန်းစဉ်များတွင် ဇကာနှင့် ပြာစက်များတွင် အမှုန်နှင့် အခြားညစ်ညမ်းပစ္စည်းများ ထိန်းချုပ်မှု စနစ်တိုးတက်စေရန်အတွက် fabric filter များတပ်ဆင်သင့်ပါသည်။

Green Land စက်ရုံ၏ ပတ်ဝန်းကျင် ထိန်းသိမ်းရေးဆိုင်ရာ စီမံချက် (EMP) သည် စက်ရုံလုပ်ငန်းလည်ပတ်မှုမှ ထုတ်လွှတ်သည့် အမှုန်များကို ရှောင်ရှားရန် အဓိကထားသဖြင့် အမှုန်များနှင့် အများဆုံးထိတွေ့နိုင်သည့် အလုပ်သမားများသည် အလုပ်အလေ့အထကောင်းတစ်ခုအနေဖြင့် အလုပ်လုပ်ချိန်တိုင်း ဖုံအကာကို တပ်ဆင်သင့်ပါသည်။

လေထုညစ်ညမ်းမှုထိန်းသိမ်းရေးစီမံချက်ဆိုင်ရာ တာဝန်ရှိအသင်းအဖွဲ့အနေဖြင့် စက်ရုံဝန်ထမ်းများ ဖြင့် ဖွဲ့စည်းခြင်း များပြုလုပ်သင့်သည်။ အသေးစိတ် အချက်အလက်များကို သက်ဆိုင်ရာ ကဏ္ဍများတွင် ဖော်ပြပါ မည်။ ထို့အပြင် ပတ်ဝန်းကျင်နှင့် စက်ရုံတွင်း လေစောင့်ကြည့် မှတ်သား စစ်ဆေးခြင်းကို နှစ်စဉ် ပြုလုပ်သင့်ပါ သည်။

၁.၆.၂ ဆူညံသံနှင့် ပက်သက်သည့် ပတ်ဝန်းကျင်ဆိုင်ရာ ထိန်းသိမ်းရေး စီမံချက်

ဆူညံသံ စောင့်ကြည့်မှတ်သားစစ်ဆေးခြင်းကို သက်ဆိုင်ရာ အချက်အလက်များရရှိရန်အတွက် စက်ရုံတစ်ခု လုံး တွင် ၂၄နာရီ ကြာ အဆက်မပြတ် ဆောင်ရွက်ခဲ့သည်။ ရရှိလာသော အချက်အလက်များသည် ပတ်ဝန်း ကျင်ထိန်းသိမ်းရေးဌာန(ECD) ၏ ပတ်ဝန်းကျင် အရည်အသွေး လမ်းညွှန်ချက်များ(EQG) ထက်အနည်းငယ် ကျော်လွန်နေသည်ကို တွေ့ရှိရသည်။

ယေဘူယျအားဖြင့် ဆူညံသံဆိုင်ရာ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး စီမံချက်သည် လုပ်ငန်းဌာန အသီးသီး၏ နံရံများတွင် အသံတားဆီးသည့်ကိရိယာများ(sound barriers) တပ်ဆင်သင့်သည် ဟု လမ်းညွှန်ထားသည်။ ဆူညံသံနှင့်ပက်သက်သည့် သက်ရောက်မှုများမှ ကာကွယ်ရန် အခြားနည်း လမ်းတစ်ခုမှာ လုပ်ငန်းခွင်လုပ်ငန်း လည်ပတ်စဉ် တစ်လျှောက်လုံး အလုပ်သမားများ သည် အသံညစ်ညမ်းမှု၏ ဆိုးကျိုးများမှ ကာကွယ်ရန် သင့်လျော်သည့်နားအဆို့ ကို တပ်ဆင်ထားရန် ဖြစ်သည်။ ထို့အပြင် တာဝန်ရှိပုဂ္ဂိုလ်များ အနေဖြင့် လုပ်ငန်းပတ်ဝန်းကျင်ရှိ ဆူညံသံရင်းမြစ်အားလုံးတွင် သတ်မှတ်ချက်များနှင့် ကိုက်ညီမှု ရှိမရှိနှင့် ကိရိယာသစ်များ တပ်ဆင် ရန် လိုအပ်မှုရှိမရှိကို နှစ်စဉ် စောင့်ကြည့် မှတ်သား စစ်ဆေးခြင်း ပြုလုပ်ရပါမည်။

၁.၆.၃ အမှိုက်နှင့် ပက်သက်သည့် ပတ်ဝန်းကျင်ဆိုင်ရာ ထိန်းသိမ်းရေး စီမံချက်

အမှိုက်နှင့် ပက်သက်သည့် ပတ်ဝန်းကျင်ဆိုင်ရာ ထိန်းသိမ်းရေး စီမံချက်သည် စက်ရုံလုပ်ငန်းစဉ်ကြောင့် သဘာဝပတ်ဝန်းကျင်နှင့် လူမှုပတ်ဝန်းကျင် သက်ရောက်မှုများကို ထိန်းချုပ်ကန့်သတ်ရန် အခြေခံသဘော တရားများ၊ ချဉ်းကပ်ပုံများနှင့် နည်းလမ်းများကို အသုံးပြုသည်။

သတ်မှတ်ထားသည့် ပြီးမြောက်အောင်မြင်မှုရရှိရန်အတွက် ရုပ်ပိုင်းဆိုင်ရာ လက္ခဏာများပေါ် အခြေခံ၍ အမှိုက်စစ်ဆေးခြင်း ပြုလုပ်သင့်ပါသည်။ သို့ရာတွင် ဓာတ်သဘောစစ်ဆေးမှုများကို တစ်နှစ်လျှင်လေးကြိမ် ပြုလုပ်သင့်သည်။ ပတ်ဝန်းကျင်ဆိုင်ရာ ထိန်းသိမ်းရေး စီမံချက်သည် လုပ်ငန်းလည်ပတ်မှုလုပ်ငန်းစဉ်စံနှုန်း standard operation procedure (SOP) နှင့်အညီ

ကြပ်မတ်ထားသည့် စာရွက်စာတမ်းများ ထားရှိရမည် ဖြစ်ပြီး အစီရင်ခံရမည့် အကြောင်းအရာ သို့မဟုတ် အချိန်နှင့် တပြေးညီသည့် အစီအစဉ်နှင့်အညီ နှစ်စဉ် ဖြည့်စွက်မွမ်းမံမှုရှိရမည်။

ဇယား ၁.၃ အမှိုက်သရိုက်နှင့်ပက်သက်သည့် စီမံချက်

စွန့်ထုတ်မှု သတ်မှတ်ချက် မူဘောင်	အမှိုက်အရင်းမြစ်	စီမံချက်နှင့် လုပ်ဆောင်ရမည့် အရာများ	အတိုင်းအတာ ပမာဏ	အကျုံးဝင်သည့် သတ်မှတ်ချက် မူဘောင်
အမှိုက်စွန့်ထုတ်နှုန်း	ထုတ်လုပ်မှုလုပ်ငန်းစဉ်နှင့် အိမ်တွင်း အမှိုက်သရိုက် အစရှိသည့် အမှိုက်ရင်းမြစ် အားလုံး	တစ်ပတ်တစ်ကြိမ်စက်အသုံးပြုချင်တွယ်ခြင်း ရုပ်ပိုင်းဖွဲ့စည်းမှု နှင့် ဖြစ်နိုင်လျှင် ဓာတ်သဘော ဖွဲ့စည်းမှုကိုပါ အမေရိကန် ဒြပ်ပစ္စည်း စစ်ဆေးမှုအဖွဲ့(ASTM)၏ စံနှုန်းနှင့် အညီ တစ်လတစ်ကြိမ် ဆောင်ရွက်ရန် လိုအပ်သည်။	လူတစ်ဦး တစ်နေ့ ထုတ်လုပ်သည့် ကီလိုဂရမ်	ဖွံ့ဖြိုးဆဲနိုင်ငံများ၏ အမှိုက်စွန့်ထုတ်မှုနှုန်း သတ်မှတ်ချက်
အမှိုက် စစ်ဆေးခြင်း			ရုပ်ပိုင်းဖွဲ့စည်းမှု(%) နှင့်	ပတ်ဝန်းကျင် ထိန်းသိမ်းရေးဌာန

			ဓာတ်သဘော ဖွဲ့စည်းမှု (%)	(ECD) နှင့် ကမ္ဘာ့ကျန်းမာရေးအဖွဲ့ (WHO)၏ ဖွံ့ဖြိုးဆဲနိုင်ငံများတွင် အမှိုက်ဖွဲ့စည်းမှု သတ်မှတ်ချက်
ပမာဏများ စွာ အမှိုက်စုပုံမှု		ASTM ၏ စံနှုန်းနှင့် အညီ တစ်လတစ်ကြိမ် စစ်ဆေးခြင်း	တစ်ကုဗမီတာ လျှင် ရှိသည့် ကီလိုဂရမ်	ECD နှင့် WHO၏ ဖွံ့ဖြိုးဆဲနိုင်ငံများ၏ ပမာဏများစွာ အမှိုက်စုပုံမှု သတ်မှတ်ချက်

၁.၆.၄ သောက်ရေ၊ ညစ်ညမ်းရေနှင့် ပက်သက်သည့် ပတ်ဝန်းကျင်ဆိုင်ရာ ထိန်းသိမ်းရေး စီမံချက်

စစ်ဆေးစမ်းသပ်မှုရလဒ်များအရ ညစ်ညမ်းရေတွင် BOD နှင့် COD ပါဝင်မှုကြောင့် ပတ်ဝန်းကျင်အပေါ် သက်ရောက်သည့် ဆိုးကျိုးသက်ရောက်မှုသည် မြင့်မားသည်၊ အလယ်အလတ်တွင်ရှိသည် စသဖြင့် အသီးသီး သတ်မှတ်နိုင်သည်။ ထို့ကြောင့် ညစ်ညမ်းရေနှင့် ပက်သက်သည့် သက်ရောက်မှုလျော့ချရေးနှင့် စီမံချက်ကို အဆိုပြုထားသည့် ကြိတ်ခွဲစက်ရုံအတွက် တင်ပြထားသည်။ အခြားသော ဖြစ်နိုင်သည့် နည်းလမ်းများအနေဖြင့် ဓာတ်လျော့ခြင်းနည်းဖြင့် စွန့်ပစ်ခြင်း နှင့် စိမ့်မြေများ တည်ဆောင်ခြင်း နည်းလမ်းများကိုလည်း သက်ရောက်မှု လျော့နည်းစေသည့် စီမံချက်များအဖြစ် အကြံပြုထားသည်။

စီမံခန့်ခွဲရေး စနစ်နှင့် ပက်သက်၍ ရေအရင်းအမြစ်အားလုံး (သောက်ရေနှင့် ညစ်ညမ်းရေ)ကို တစ်လလျှင် တစ်ကြိမ် စစ်ဆေးရန်လိုအပ်သည်။ ထို့နောက် ကမ္ဘာ့ကျန်းမာရေးအဖွဲ့၏ သောက်ရေ

စံချိန်စံနှုန်းနှင့် စက်ရုံမှ စွန့်ထုတ်သော ညစ်ညမ်းရေ စံချိန်စံနှုန်းများနှင့် နှိုင်းယှဉ်သင့်ပါသည်။ အမှိုက်သရိုက် စီမံခန့်ခွဲရေး၏ စံနှုန်းများကိုလိုက်နာခြင်းအားဖြင့် စံနှုန်းစနစ်သတ်မှတ်ချက်များနှင့် သေချာပေါက် ကိုက်ညီမည် ဖြစ်သည်။

ပတ်ဝန်းကျင် ထိန်းသိမ်းရေး စီမံချက်၏ အောင်မြင်မှုတွင် အဓိကအကြောင်းရပ်အနေဖြင့် စက်ရုံတွင်းအလုပ် သမားများ ၏ ထိရောက်သည့်အရည်အသွေး တည်ဆောက်ခြင်းပေါ်တွင် မူတည်နေသည်။ ဤ ကြိုးပမ်းမှုကို ပြင်ပမှ အကြံပေးများ၏နည်းပညာဆိုင်ရာ အကူအညီနှင့် အကောင်အထည်ဖော်ဆောင်ရွက်ရန် ပံ့ပိုးပေးမည် ဖြစ်သည်။

ပတ်ဝန်းကျင်ဆိုင်ရာ ထိန်းသိမ်းရေး စီမံချက်သည် ထိန်းသိမ်းထားသည့် စာရွက်စာတမ်းများကို အစီရင်ခံ တင်ပြရမည့် အကြောင်းအရာများနှင့် အချိန်နှင့် တပြေးညီသည့် စီမံကိန်းများနှင့် အညီ နှစ်စဉ်တည်းဖြတ်မှု ပြုမည်ဖြစ်သည်။

၁.၇ ကျန်းမာရေး ဘေးအန္တရာယ် အလားအလာ အကဲဖြတ်စစ်ဆေးခြင်း

၁.၇.၁ PM2.5 ကျန်းမာရေး ဘေးအန္တရာယ် အလားအလာ အကဲဖြတ်စစ်ဆေးခြင်း

ကျန်းမာရေး ဘေးအန္တရာယ် အလားအလာ အကဲဖြတ်စစ်ဆေးခြင်းသည် ပတ်ဝန်းကျင်ရှိ ညစ်ညမ်းမှုများနှင့် ထိတွေ့ခြင်းကြောင့် ရရှိနိုင်သည့် လူသားများ၏ကျန်းမာရေး အန္တရာယ်ကို ခန့်မှန်းရန်အတွက် အသုံးဝင်သည့် ကိရိယာတစ်ခုဖြစ်သည်။ စာအုပ်စာတမ်းပါ အကြောင်းအရာ များကို ပြန်လည်သုံးသပ်ချက်အရ PM2.5 သည် အဓိကကျသည့် အန္တရာယ်ရှိသောပစ္စည်း ဖြစ်ရုံသာမက ကြာရှည်ထိတွေ့ခြင်းဖြင့် နှလုံးသွေးကြောနှင့် အသက်ရှူလမ်းကြောင်း ဆိုင်ရာ ရောဂါများနှင့် အဆုတ်ကင်ဆာဖြစ်ခြင်းမှ သေဆုံးသည်အထိ ဖြစ်စေနိုင်သည့် ကျန်းမာရေး အန္တရာယ် ရှိပါသည်။ စက်ရုံတွင်းနှင့် စက်ရုံပတ်ဝန်းကျင်တွင် စောင့်ကြည့် မှတ်သား စစ်ဆေး ထားသော အချက်အလက်များကို PM2.5 နှင့် ထိတွေ့မှုအဆင့်များအရ စက်ရုံအလုပ်သမား များနှင့် လူထု၏ လူမှုဘဝကို မည်မျှပြင်းပြင်းထန်ထန် သက်ရောက်မှုရှိနိုင်ကြောင်း ခန်းမှန်းရာတွင် အသုံးပြုမည် ဖြစ်သည်။

စက်ရုံဝန်ထမ်းအရေအတွက် ၃၉၁-၄၃၁ ယောက်သည် ကမ္ဘာ့ကျန်းမာရေးအဖွဲ့၏ သတ်မှတ်ချက် ထက်ကျော် လွန်ပြီး ပတ်ဝန်းကျင်လေအရည်အသွေး စံချိန်စံနှုန်း (NAAQS) ထက်လျော့နည်းသည့် အဆင့်ကိုထိတွေ့မှု ရှိသည်ဟု သတ်မှတ်ထားသည်။

PM2.5 ပါဝင်သည့်လေကိုရှူရှိုက်မိပါက Green Land ဂျုံကြိတ်ခွဲစက်ရုံရှိ လူအရေအတွက်သည် PM2.5နှင့် ထိတွေ့ရန်အလားအလာရှိသည့်ပမာဏဖြစ်သဖြင့် ယင်းကို တွက်ချက်တိုင်းတာရန် အတွက် အမေရိကန် ပြည်ထောင်စု ပတ်ဝန်းကျင်ထိန်းသိမ်းကာကွယ်ရေး အေဂျင်စီ (USEPA) ၏ ညီမျှခြင်း (equation) ကို အသုံး ပြုပါသည်။

အဆိပ်ဖြစ်စေမှုနှင့် ပက်သက်သည့် အန္တရာယ်တွင် Green Land စက်ရုံ၏ မတူညီသည့်နေရာများ (လျှပ်စစ် ဓာတ်အားပေးစက်မှလွဲ၍) တွင် ၁ ထက်ပိုသည်။ ထိုသို့သော အလုပ်နေရာများတွင် အလုပ်သမားများသည် နှစ်ပေါင်း ၃၀ ကြာ အလုပ်လုပ်မည်ဆိုပါက PM2.5 ကြောင့်ဖြစ်သော ပြင်းထန်သည့် ကျန်းမာရေး အန္တရာယ်များကို ခံစားရဖွယ်ရှိပြီး ယင်းတို့တွင် အသက်ရှူလမ်း ကြောင်း ဆိုင်ရာ ရောဂါလက္ခဏာများ ဖြစ်သည့် လည်ချောင်းနာခြင်း၊ ချောင်းဆိုးခြင်း သို့မဟုတ် အသက်ရှူကြပ်ခြင်း တို့ကို တိုးပွားစေခြင်းနှင့် ရင်ကြပ်ခြင်းကို တိုးပွားစေခြင်းနှင့် အဆုတ်၏ လုပ်ငန်းဆောင်တာများကို နှေးကွေးစေပါသည်။

၁.၇.၂ PM10 ကျန်းမာရေး ဘေးအန္တရာယ် အလားအလာ အကဲဖြတ်စစ်ဆေးခြင်း

ဘေးအန္တရာယ်ကို ခွဲခြမ်းစိတ်ဖြာခြင်းနှင့် ထိတွေ့မှုကို စစ်ဆေးအကဲဖြတ်ခြင်းမှ ရရှိလာသော သတင်းအချက် အလက် များကို အသုံးပြု၍ လူသားများ၏ကျန်းမာရေးကို တစ်စုံတစ်ရာ ထိခိုက်စေနိုင်သည့် PM10ပါဝင်မှုကို ခန့်မှန်းတွက်ချက်ပါသည်။

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

ထိတွေ့မှု ရှိသည်ဟု ယူဆသော ဝန်ထမ်းအရေအတွက် ၃၉၁-၄၃၁ ယောက်သည် ကမ္ဘာ့ကျန်းမာရေးအဖွဲ့၏ လမ်းညွှန်ချက်ထက်ကျော်လွန်သော်လည်း အမေရိကန် ပြည်ထောင်စု ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး အေဂျင်စီ ၏ ပတ်ဝန်းကျင်လေအရည်အသွေး စံချိန်စံနှုန်း (NAAQS) ထက်လျော့နည်းသည်ကို တွေ့ရှိရသည်။ ယင်းသည် ဝန်ထမ်များ၏ ကျန်းမာရေးကို ဆိုးကျိုးသက်ရောက် မှုများ ရှိနိုင်သည်။ လေရှူရှိုက်ခြင်းသည် ထိတွေ့မှု၏ အရေးအပါဆုံးသောလမ်းကြောင်းဖြစ်ပြီး ယင်းအလုပ်သမားများသည် တစ်နေ့လျှင် ၈နာရီ ထိတွေ့မှုရှိသည်။

အမေရိကန်ပြည်ထောင်စု ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး အေဂျင်စီ (USEPA)၏ ညီမျှခြင်းကို လုပ်ငန်းခွင် နေ့စဉ် ပျမ်းမျှထိတွေ့မှုပမာဏ ကိုတွက်ချက်ရန် အသုံးပြုပြီး ယင်းသည် PM10ကို ရှူသွင်းမိသည့်အခါ ထိတွေ့မှုရှိနိုင် သည့် Green Land စက်ရုံ၏ ဝန်ထမ်းအရေအတွက် ပင်ဖြစ်သည်။

Green Land စက်ရုံ၏ မတူညီသည့် နေရာ ၄ နေရာ (လျှပ်စစ်ဓာတ်အားပေးစက်မှလွဲ၍) မှ ကျန်းမာရေး အန္တရာယ်အလားအလာသည် ၁.၁ မှ ၁၀ ကြားတွင် ရှိသည်။ ယင်းသည် ထိုအလုပ်နေရာများတွင် လုပ်ကိုင် လျက်ရှိသော အလုပ်သမားများသည် နှစ်ပေါင်း၃၀ခန့် ဆက်လက်လုပ်ကိုင်ပါက PM10ကြောင့် ကျန်းမာရေး ထိခိုက် နိုင်မှုအလားအလာသည် အလယ်အလတ် အဆင့်တွင်ရှိသည် ဟုဆိုလိုသည်။

၁.၈ အများပြည်သူထံ တိုင်ပင်နှီးနှောခြင်းနှင့် ဖွင့်လှစ်ဆွေးနွေးခြင်း

လူမှုပတ်ဝန်းကျင် သက်ရောက်မှု အကဲဖြတ်ခြင်း၏ ရည်ရွယ်ချက်သည် သတင်းအချက်အလက် ဖြန့်ဖြူးခြင်း အား ဖြင့် စီမံကိန်းအကြောင်း လူထုကပိုမိုနားလည်သိရှိစေရန်နှင့် စီမံကိန်းဆောင်ရွက် ချက်များကြောင့် တိုက်ရိုက်ဖြစ်စေ၊ သွယ်ဝိုက်၍ဖြစ်စေ ဖြစ်နိုင်ချေရှိသည့် သက်ရောက်မှုများကို စီမံကိန်းဆောင်ရွက်သူများနှင့် လူထုအကြား ဖလှယ်ရန် ဖြစ်သည်။

ဤ ခဲ့ထွင်ထားသော အနှစ်ချုပ်သည် လူမှုပတ်ဝန်းကျင် သက်ရောက်မှု အကဲဖြတ်ခြင်းကို ထည့်သွင်း ဆွေးနွေး မည်ဖြစ်ပြီး အခြေခံကျသည့် ကဏ္ဍလေးရပ်ပါဝင်မည် ဖြစ်သည်။

- လူမှုပတ်ဝန်းကျင် သက်ရောက်မှု အကဲဖြတ်ခြင်းပညာ၏ သွင်ပြင်လက္ခဏာကို ဖော်ဆောင်ခြင်း
- လူမှု အဖွဲ့အစည်း အသီးသီးရှိ အဓိကသတင်းပေးသူများ (ဘုန်းတော်ကြီး၊ ရပ်ကွက်အုပ်ချုပ်ရေးမှူးနှင့် ဆရာမ၊ အစရှိသဖြင့်) နှင့် အစိုးရ အရာရှိများနှင့် မေးမြန်းဆွေးနွေးခြင်း
- စီးပွားရေးပူးပေါင်းဆောင်ရွက်သူများ (အစုရှယ်ရာဝင်များ) အစည်းအဝေးနှင့် လူထုနှင့် အုပ်စုတွင်း ဆွေးနွေး ခြင်းများ
- အိမ်ထောင်စု ၁၀၀၏ လူမှုစီးပွားနှင့် သဘောထားအမြင် စစ်တမ်း

ရလဒ်များအား SPSS version 21ကိုအသုံးပြု၍ စိစစ်လေ့လာမည် ဖြစ်သည်။

ဒေသတွင်း လူမှုဖြစ်ရပ်အထွေထွေနှင့် ပက်သက်သည့် လေ့လာမှုများတွင် စက်မှုဇုံပတ်ဝန်းကျင်တွင် နေထိုင်ကြသည့်လူထု၏ ယေဘူယျ အထောက်အပံ့ပစ္စည်းများသည် များစွာ တိုးတက်လာခြင်းမရှိသည်ကို တွေ့ရှိရသည်။ ပညာရေးနှင့် ပက်သက်၍ ဤရပ်ကွက်အတွင်း စာသင် ကျောင်းမရှိသည်ကို တွေ့ရသည်။ ကလေးအများစုသည် ကျောင်းတက်ရန်အတွက် ကီလိုမီတာ ၂၀ခန့် သွားရလေ့ရှိသည်။ ကျန်းမာရေး ထောက်ပံ့ မှုအနေဖြင့် လူနေရပ်ကွက်အနီး ကိုယ်ပိုင်ဆေးပေးခန်းတစ်ခု ဖွင့်လှစ်ထားရှိသည်ကို တွေ့ရသည်။ စစ်တမ်း မေးခွန်းလွှာများတွင် ဖြေကြားသောအချက်အလက်များအရ လူအများစုသည် ငှက်ဖျား၊ တီဘီ၊ ဝမ်းလျော ရောဂါနှင့် ဝမ်းကိုက်ရောဂါစသည့် အဓိကကျန်းမာရေးပြဿနာများ မရှိသည်ကို တွေ့ရသည်။

အခြေခံ အဆောက်အအုံနှင့်ပက်သက်၍ ၆၆ ရာခိုင်နှုန်းသော လူများစုသည် တစ်ထပ် ပျဉ်ထောင် အိမ်များတွင် နေထိုင်ကြသည်။ လမ်းအခြေအနေနှင့် ပက်သက်၍ ရပ်ကွက်တွင်း လမ်းများမှာ လမ်းခင်းထားခြင်းမရှိ သော်လည်း အဓိကလမ်းမသည် ကွန်ကရစ်လမ်းဖြစ်သည်။ သယ်ယူပို့ ဆောင်ရေးနှင့် ပက်သက်၍ အများသုံးသယ်ယူပို့ဆောင်ရေးကိုသာ အသုံးပြုကြသည်။ သို့ဖြစ်၍ အခြေခံအဆောက်အအုံသည် ကောင်းစွာ ဖွံ့ဖြိုးခြင်းမရှိသေးဘဲ အမှိုက်နှင့် ရေဆိုး

စနစ်တကျစွန့်ပစ်သည့်စနစ်လည်း မရှိသည်ကို တွေ့ရသည်။

လူများစု (စုစုပေါင်း ဖြေကြားသူ၏ ၃၇%)သည် အသက်၃၀ မှ ၄၀ အရွယ် သက်လတ်ပိုင်းများ ဖြစ်ကြပြီး ဖြေကြားသူစုစုပေါင်း၏ ၁%သည် ၁၅နှစ်မှ ၂၀အတွင်း ရှိကြသည်။ ပညာရေးနှင့် ပက်သက်၍ စစ်တမ်းမေးခွန်း ဖြေကြားသူများ၏ အများစု (၅၀% နီးပါး)သည် အခြေခံပညာ အလယ်တန်း အောင်မြင်ပြီးဖြစ်၍ ၁%သော လူနည်းစုသည် စာမတတ်သူများ ဖြစ်ကြသည်။

ဖြေကြားသူ၏ လူများစု (၄၄%)သည် လက်လုပ်လက်စားများ ဖြစ်ကြပြီး ၁%သော လူနည်းစုသည် လယ် သမားများဖြစ်ကြသည်။

နှစ်စဉ် ဝင်ငွေရရှိမှုအနေဖြင့် ဤဒေသတွင် နေထိုင်သူအများစုသည် ယေဘူယျအားဖြင့် ဝင်ငွေနည်းပါးသူများ ဖြစ်ကြသည်။ လူများစု (၃၆%)သည် တစ်နှစ်လျှင် ၁ ၀၀၀ ၀၀၁ မှ ၂ ၀၀၀ ၀၀၀ ကျပ်အတွင်း ရရှိကြသည်။ သို့ရာတွင် ဖြေကြားသူစုစုပေါင်း၏ ၆%၏ ဝင်ငွေအဆင့်သည် ၃၀၀၀၀၀ မှ ၅၀၀၀၀၀၀ အတွင်းတွင် ရှိသည်။ ယင်းသည် ဤအနီးပတ်ဝန်းကျင်တွင် နေထိုင်ကြသူများ၏ ဝင်ငွေအဆင့်သည် နည်းပါးသည် ဟုဖော်ပြနေသည်။

စမ်းသပ်စစ်ဆေးမှုရလဒ်များအရ အိမ်ထောင်စု စုစုပေါင်း၏ ၁၀၀% နီးပါးသည် အရွေ့ဒဂုံ စက်မှုဇုံ စီးပွားရေးအကျိုးတူလုပ်ငန်းအကြောင်း သိရှိကြသည်။ ယင်းတို့အနက် အိမ်ထောင်စု စုစုပေါင်း၏ ၇%သာလျှင် တို့သည် Diamond Star ဂျုကြိတ်ခွဲလုပ်ငန်းအပါအဝင် စက်မှုအကျိုးတူလုပ်ငန်း အကြောင်း ကောင်းစွာ သိရှိကြသည်။လူများစုဖြစ်သည့် ၈၃%သည် စက်မှုဇုံကို သိရှိသော်လည်း အကျိုးတူဆောင်ရွက်မှုတွင်ပါဝင်သည့် စက်ရုံတစ်ခုစီအကြောင်းကို မသိရှိကြပေ။ ကျန်ရှိသည့် ၁၀%သည် စက်မှုအကျိုးတူလုပ်ငန်းနှင့်ပတ်သက် သည့် အချက်အလက် အနည်းငယ်သာလျှင် သိရှိကြသည်။

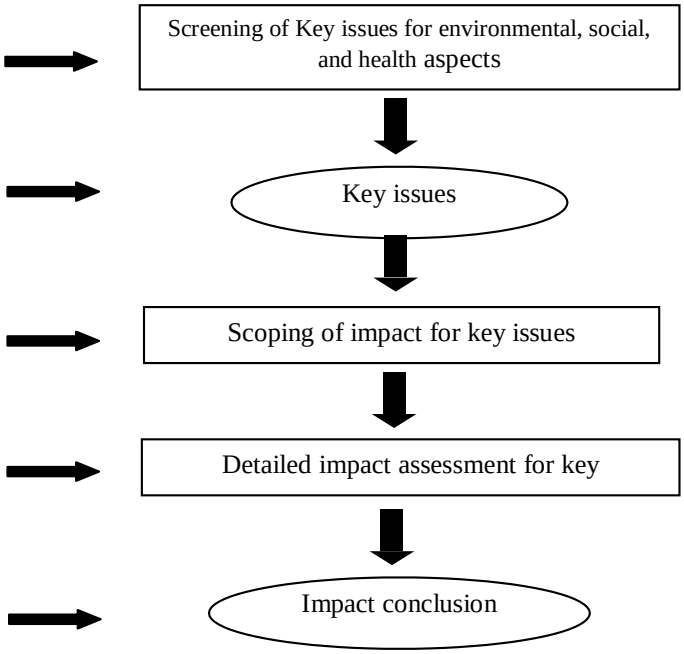
စက်ရုံ ဖွံ့ဖြိုးရေးနှင့်ပက်သက်၍ အိမ်ထောင်စု စုစုပေါင်း၏ ၅၇%သည် စက်ရုံဖွံ့ဖြိုးတိုးတက်မှုကို အားပေး ထောက်ခံကြသော်လည်း ၄%သော အိမ်ထောင်စုတို့သည် ဖွံ့ဖြိုးရေးလုပ်ငန်းကို

ကန့်ကွက်ကြသည်။ ကျန်ရှိ သည့် ၃၉% သည် စက်ရုံဖွံ့ဖြိုးတိုးတက်ရေးကို စိတ်ဝင်စားမှု မရှိသည်ကို တွေ့ရှိရသည်။

တွေ့ရှိချက်များအပေါ် အခြေခံ၍ လူထု၏အမြင်သဘောထားကို လေ့လာရာတွင် စက်ရုံ၏ဆောင်ရွက်ချက် များကြောင့် အနီးပတ်ဝန်းကျင် လူမှုစီးပွားရေးကို ကောင်းကျိုးရော ဆိုးကျိုးပါ သိသာထင်ရှားသည့် သက် ရောက် မှုမရှိကြောင်း တွေ့ရှိရသည်။ ရေရှည်ပြည်သူလူထုအကျိုးပြု လုပ်ငန်းစဉ်များ (CSR program) အား ကုမ္ပဏီမှ နှစ်စဉ် CSR ရံပုံငွေအဖြစ် ခွဲဝေထားရှိပါသည်။ စီမံကိန်းသည် အသားတင်အကျိုးအမြတ်၏ (၂%) အား CSR ရံပုံငွေအဖြစ် ခွဲဝေထားရှိပါသည်။

အသေးစိတ်ဆွေးနွေးချက်များနှင့် ရလဒ်များကို အစီရင်ခံစာ၏ စာကိုယ်တွင် ဖော်ပြပါမည်။

နအချုပ်အားဖြင့် ဤအစီရင်ခံစာသည် မြန်မာနိုင်ငံပတ်ဝန်းကျင်ဆိုင်ရာ နည်းဥပဒေများ၊ စည်းမျဉ်းစည်းကမ်း များ၊ ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှုအစီအစဉ်၊ လျော့ချရေးနည်းလမ်းများနှင့် စောင့်ကြည့် စစ်ဆေးမှုလုပ်ငန်းစဉ်များ နှင့် အညီဆောင်ရွက်ကာ အလုပ်သမားများကို လုပ်ငန်းခွင် အန္တရာယ်များမှ ကင်းလွတ်စေပြီး ရေရှည်တည်တံ့ သော အစိမ်းရောင်ဖွံ့ဖြိုးတိုးတက် မှုကို ထိန်းသိမ်းနိုင်ရန်အတွက် Green Land ကုမ္ပဏီတွင် ခွဲစက်ရုံလုပ်ငန်း ဆောင်ရွက်သူများကို လမ်းညွှန် ချက်နှင့် မူဘောင်များကို ချမှတ်ပေးပါသည်။



ပုံ ၁-၁ EIA အဆင့်တစ်ခုစီတွင် လူထုပါဝင်မှုအရေးပါမှုအားပြပုံ

Chapter 1

Executive Summary

1. Executive summary (Green Land)

1.1 Introduction

The Green Land Ltd is a joint venture between MC Food Holdings Asia Pte., Ltd and Diamond Star Company which is situated in No. 54/55/56, Quarter (113), Industrial Zone, East Dagon Township, Yangon, Myanmar. The Environmental and Social Impact Assessment (ESIA) along with the Environmental Management Plan (EMP) were conducted for the Green Land Wheat Flour Milling Factory located in the East Dagon Industrial Zone.

For the scoping phase, the Green Land wheat flour mill project was carried out before Myanmar Environmental Impact Assessment Procedures (2015) were issued. However, the public consultation meetings and socioeconomic surveys along with socioeconomic impact assessment were conducted emphasizing on public involvement. Furthermore, an environmental baseline survey was conducted within 2-5 km of the project area although the factory is located within the industrial zone. Impact assessment including air, noise and water monitoring were conducted within nearby area and inside the factory. According to the baseline monitoring and public perception conducted through public consultation, it was presumed that there was neither positive nor negative impact on the environment and community. .

The main objectives of this project are as follows;
1) To reveal the existing baseline environment and project activities. 2) To assess the impacts of the project on neighboring environment including air atmosphere, water bodies, soil, community , infrastructure, flora and fauna .
3) To propose the mitigation measures where adverse effects may have occurred as well as where beneficial effects from the project are detected;
5) To set up an environmental management plan that will govern all activities of the factory for the sustainability..

The consultant team of ***Environmental Quality Management Co., Ltd*** had carried out ESIA with EMP for the factory.
The Consultancy firm has been organized with environmental health consultants and technicians along with strong background and knowledge in the area of Environmental Assessment, and a track record of over 5 years for conducting studies of Environmental, Social and Health Impact Assessment (ESHIA) for development projects across the country. About more than 20 environmental projects were conducted (including ESIA/IEE/EP, environmental baseline monitoring projects and national and departmental projects) were carried out with better precise assessment. For the implementation of the EMP, the project will use the 2% of the total investment (USD 1,500,000 in million).

Previous projects implemented by EQM for EIA coverage fall under the following categories:
1) Oil and Gas
2) Confectionery Factory
3) Building Powder Production Factory
3) Hotel project
4) Flour Mill
5) Port and Terminal
6) Detergent Factory

7) Rice Mill Factory
8) And Environmental Baseline monitoring projects

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

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

The main aim of this work is *to reduce adverse impacts* of the factory and its activities on the health and environment together with the promotion of *factory's sustainable development.*

During the project analysis for EIA implementation of The Green Land International Ltd, the following study are conducted in order to meet the objectives.

- ***Literature review*** on the documents related to policies, laws and regulations of both national and international level
- ***Interviews*** with people concerned with the factory as well as the respective government bodies (Socio-demographic of the community, Perception of community on the project, Socio-economic study in and around the project area including Effects on the human use, Effects on the quality of life, Effects on cultural heritage)
- Both ***primary and secondary data*** collection
- ***Environmental baseline*** monitoring (air, water, waste, soil and flora and fauna), Environmental Management Plan (EMP) along with mitigation measures and monitoring plan for the factory.
- ***Stakeholders consultation and disclosure*** through Social Impact Assessment (SIA) survey process including focus group meetings, Key Informant Interviews and door to door household surveys)
- ***Reporting*** back

1.2 Policy, legal and institutional framework,

The ESIA 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 Environmental Conservation and Forestry (MOECAF)
- Foreign Investment Law (2013)
- Environmental Conservation Law (2012)

- Environmental Conservation Rules (June 2014)
- Myanmar Investment Law (2016)
- Myanmar Investment Rules (2017)
- Environmental Conservation Rules (June 2014)
- Environmental Impact Assessment Procedure (2015)
- National Environmental Quality (Emission) Guideline (2015)
- Ethnic Right Protection Law, 2015
- Myanmar Insurance Law, 1993
- Private Industrial Enterprise Law, 1990
- The Myanmar Fire Force Law, 2015
- The Petroleum and Petroleum Products Law, 2017
- The Motor Vehicles Law, 2015
- The Law on Standardization, 2014
- The Protection and Prevention of Cultural Heritage Regions Law, 1998
- The Protection and Prevention of Antique Objective Law, 2015
- The Protection and Prevention of Ancient Monument Law, 2015
- Myanmar Engineering Council Law, 2013
- Import and Export Law, 2012
- Labor Organization Law, 2012
- Settlement of Labor Dispute Law, 2012
- Employment and Skill Development Law, 2013
- Minimums Wages Law, 2013
- Payment of Wages Law, 2016
- Social Security Law, 2012
- The Workmen Compensation Act, 1923
- The Factories Act, 1951
- Leaves and Holidays Act, 1951
- Public Health Law, 1972
- The Prevention and Control of Communicable Disease Law, 1995
- The Control of Smoking and Consumption of Tobacco Product Law, 2006
- Yangon City Development Committee Law, 2018
- Freshwater Fisheries Law, 1991
- Myanmar Marine Fisheries Law, 1990
- Conservation of Rivers, Creeks and Water Resources Law, 2006

1.3 Project description and alternatives selection

1.3.1 Project Description

The factory plot is situated by the No.2 Highway Road. The boundary of the project Area is 9.361 Acre within the East Dagan Industrial Zone and location is at No- 53, 54, 55, 56. Block No (113), Yangon Region. The coordinate point of the factory is 16 °53' 44.04" N and 96 °13' 58.93" E. The Green Land International Ltd. is a joint venture between Mitsubishi and Diamond Star Company and is the leading industrial group with its operations extended in Myanmar. The investors have good experiences in operating the projects with international partnerships with seasoned skills for production of high-quality flour.

In the construction phase, being industrial zone already developed, the project will have some marginal impacts on the socio-economical and biophysical environment such as the degradation of air quality by the dust emitted during the site clearing, effects of air pollution, sewage, effluent and domestic wastewater from temporary worker camp for construction, effects of generated solid wastes, risk of excess soil being eroded and deposited on the site.

During operation phase, the operation will be operating 8hours per day with 3 shift and fulltime employees are required to work daily, 6days per week. The combined grain milling capacity of the group is in excess of 115,200 M.T per annum. The Green Land International Ltd. is to invest 500 tonns of raw wheat grains per day.

The Manufacturing process involves four stages: 1) Precleaning 2) Cleaning 3) Milling and 4) Packing. Raw Materials are only imported from USA and Australia. 15% of water from the factory's wells is being used to have good moisture and smooth grinding. This Flour Milling involves mechanical breakdown of any wheat grain to separate the outer covering of the grain and grinding the inner endosperm to fine flour particles and then destined and cleaned. The final stage is packaging of the flour and stored in the warehouse in order to dispatch to customers.

Resources for raw materials for Green Land International Ltd is quite simple. The only raw material is wheat grain and just 15% of the water available is used in the milling process. The total power required for the proposed unit is 9,300 kW/day.

The power requirement will be from the government electricity grid. However, 4 power generators set having capacity of 1000 MW with are used as standby for the emergency power requirements and the demand of the products.

Water is required for the addition of moisture to smooth in grain milling and domestic use (canteen and sanitation). The total water requirement is 32 m3/day, canteen is 27 m3/day and other usage is 13 m3/day.

The Green Land International limited is conducting recycling process within the milling factory. About 3,085 metric ton per year can be reduced due to the practice of waste recycling in the factory instead of land filled.

There will be no negative impact on environment as it is an agro-processing industry which does not use any chemical. The grain is dry cleaned and hence no effluent. Pneumatic air system (air lock, jet filter) is being used for conveying the materials.
There will be positive impacts on the human environment such as job opportunities to local community, the increase in the income of the population working on the site.

In the decommissioning phase, it will be expected to have some adverse effects on air quality due to the dust from demolition of the building, noise generation from heavy machineries running for dismantling activities.

1.3.2 Current use of the location

The main part of the project of the wheat flour milling factory is being occupied by the buildings, parking yard, canteen, warehouse and open spaces and there are some crops cultivated for the workers to consume in the canteen.

Table 1-1 Plant facilities

No	Plant Facility	Area ($m^{2)}$	Unit %
1	Administration block	470	0.4
2	Flour milling	18234	15.9
3	Car parking yard	630	0.5
4	Canteen	210	0.2
5	Open Space	83456	72.7
6	Warehouse	11758	10.2
	Total	**44143**	**100.0**

1.3.3 Operation Phase

This flour milling involves ***mechanical breakdown of any wheat grain to separate*** the outer covering of the grain and grinding the inner part (endosperm) to fine flour particles and then destined and cleaned. Addition of water so as to be 15% ***moisturized, and smooth grinding*** is continued. The final stage is ***packaging*** of the flour and stored in the warehouse in order to dispatch to customers.

(a) Power requirement

The total power required for the proposed unit is ***9,300 kW/day***. The power requirement will be from the ***government electricity grid***. However***, 4 power generators sets*** having capacity of ***1000 MW*** with are used as ***standby*** for the emergency power requirements and the demand of the products.

(b) Water requirement

Water is required for the addition of moisture to smooth in grain milling and domestic use (canteen and sanitation). The ***total*** water requirement is ***32 m^3/day***, ***canteen is 27 m^3/day*** and ***other*** usage is ***13 m^3/day***.

(c) Workforce requirement and staff categories

There are mainly two categories of staff: the ***permanent staff*** (accountants, maintenance staff, engineers, warehouse staff, production staff, logistic, drivers, counter, administration staff) and the ***part time staff*** (people for piling stacks, running generators, separation for impurities, security men, etc) .

Table 1-2 The capacity of staff in wheat flour mill

Type of staff	Number of staff
Temporary staffs	331
Permanent staffs	60-100

(d) Safety measures

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

- Earmuffs
- Gloves
- Boots
- Dust Masks
- Helmets
- Eye goggles

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

1.3.4 Alternatives selection

Although Green Land Wheat Mill has operated with the modernized technology, the following specific process flow are the possible alternatives study for the operation process.

1)Cleaning
2) Milling
3) Further Processing

In the cleaning stage, Combined Cleaning Methods are used to remove impurities to the maximum extent by means of screening, aspiration separation, magnetic separation, stone removal, wheat scouring, optical sorting and so on. This method can be done with easy maintenance.

In the milling stage, the modern milling process is a gradual reduction of the wheat kernels through a process of grinding and sifting. High product quality, high yield and lower power consumption are the results of using this method.

On further processing, it needs post treatment including collecting, blending, bulk storage, weighing and insecticides.

1.3.4.1 Comparison of Alternatives

Under the proposed project alternative, the project has been increasing and supporting bakery and pastry sector around the project area and in local bakery sector, trigger job creation in and around the area. According to the evaluation of the impacts {described in chapter (4) and (5)}, most of the probable impacts are within managed range that low and severity minor.

1.3.4.2 Site Selection Alternatives

The East Dagon Industrial zone is divided into 7 parts such as Plastic and Household goods,

Chemical products, Electronic goods, foodstuff, wood – base, warehouse and garment respectively. The proposed site is the best suitable one because the project is wheat flour mill factory, and the site is located under the category of the boundary of foodstuff area. At the proposed site, still the predicted impacts from the proposed facility are manageable and can be avoided altogether. Furthermore, , it only takes 5 minutes' walk from industrial zone to the bus stop which is convenient for transportation. Hence, seeking for another site will not be required.

1.3.4.3 Operation Alternatives

a) Technology

Wheat flour mill of Green Land is very highly automated and all parts of the process are easily adapted to computer control. Adoption of current technology of the plant can lead to more output and high profitability with the aim of satisfying the producers, consumers, and the environment in one way or the other. Therefore, the current systematic technology has sufficient to run the plant and there needs no other alternative technology so far.

b) Raw Materials

Even though there may be wheat flour substitutes, the company will only be used wheat as the only raw materials. And there may be no other option to choose.

c) Power Requirement

The power requirement for the plant will be from the government electricity grid. However, 4 power generators set having capacity of 1000 MW with are used as standby for the emergency power requirements and the demand of the products. Owing to the factory is occupying for those two options, the power supply for Green Land International limited is good enough.

1.3.4.4 No development Option

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

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

It is widely recognized that ***being the food industry***, wheat flour milling 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 ESIA accordingly, the overall impacts become rated as ***low.***

The more detailed about comparison, project alternatives and discrete alternatives are described in chapter (4), Alternatives selection.

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

1.4.1 Ambient air quality

The existing baseline ambient air quality along with the local climate monitoring was conducted in May, 2015 (summer season) in Green Land flour milling factory and surrounding areas.

Additionally, applicable standards are presented and used for comparison.

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

Among these parameters, the major pollutants are particulate matters ***(PM_{10} and $PM_{2.5}$)*** which are mostly emitting from the production process of milling. The total emissions of PM_{10} and $PM_{2.5}$ for averaged 24-hours are 70µg/m^3 and 45µg/m^3 which are ***higher than WHO guidelines*** (50µg/m^3 for PM_{10} and 25µg/m^3 for $PM_{2.5}$).

Another high emission pollutant is ***SO_2 (107ppb)*** and NO_2 (59ppb) which are ***higher than the WHO guidelines*** (20ppb for SO_2 and 40ppb for NO_2). SO_2 is the major air pollutant of industry process and NO_2 is must be released by generators usage. However, it was found out that the ***impacts of all air pollutants emissions*** were rated as ***low according to the impact assessment***. The detail information of air quality findings are presented in the following section.

Moreover, to protect air pollutants mainly in particulates from milling process, the workers and staffs must wear ***appropriate masks*** *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.
The weather situation is generally fine which can affect the air quality situation was observed during the baseline air monitoring period.

1.4.2 Indoor air

The indoor air monitoring was conducted in the Green Land ***(Admin Office) and laboratory*** as well. The indoor air parameters include ***biological (Bacteria and Fungus) air quality, particulate matters*** and ***gases*** which are the key elements of indoor air pollution. This air monitoring also included measurement of the ***physical indoor air (Room and Wall Temperature, Air movement/flow) and the Moisture (ceiling and wall)*** since these parameters can influence not only microbial growth in the office but also employees' health. The ***results of both bacteria and fungus are acceptable*** which is under the limit of OSHA guideline.

1.4.3 Carbon emission

Wheat flour mill of Green Land is ***very highly automated*** and all parts of the process are easily adapted to computer control. Although very costly, this technology enables the mill to operate for the extended periods without continuous on-site operator presence or intervention, e.g.,

throughout the night or during weekends. The Green Land flour mill is utilizing the ***government electricity*** for its all process.

Being the main use of electricity, potential gas emissions source from ***generators*** which are only ***standby*** has been considered as negligible. The ***emission of CO_2 from electricity is 4,285 metric tons*** and from ***transportation sector is 365.461 metric tons per year.*** Among them, ***3,085 metric ton per year*** can be ***reduced due to the practice of waste recycling in the factory*** instead of land filled. Thus, the ***total annual CO_2 emission*** of the wheat flour mill is ***1,565 metric tons***.

1.4.4 Noise

The noise level of Green Land mill was measured at the ***main different locations (admin office, storage area, packing area and during generator operation***). Among these areas, ***storage area and generator area*** are the main areas ***needed to be controlled.*** The production process of proposed mill is generating both noise and vibration from heavy plant and equipment. The noise levels of ***day time (93.56dB)*** and ***night time (95.74dB)*** which ***exceeded the noise standard level 70dB*** by Environmental Quality Guideline (EQG) by Environmental Conservation Department.

However, according to the ***impact assessment of noise on surrounding***, generally it is rated as ***low***. Moreover, to protect noise from milling process, the workers and staffs 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.

1.4.5 Soil

The project area as shown in Figure 2.2 Location map, includes mostly the industries already for 10 years. The area is ***suburban flat area along with rare cultivated*** (about ***90% of land*** is ***concrete*** in the industrial zone). The physical appearance of the remaining soil is ***Coarse sandy soil.*** Which is easy to cultivate, has plenty of serration for good root growth, and is easily wetted, but it also dries rapidly and easily looses plant nutrients, which are drained away rapidly with the water.

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

1.4.6 Flora and fauna

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

The East Dagon Industrial Zone has established since about 2002 that is around 3 years after the new urban developments have been settled down around the project area.
According to the traditional biodiversity related knowledge survey, there is ***no both negative and positive impact on the nature, local animals, plants and pasture*** etc. due to the industrial developments.

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

1.4.7 Solid Waste

Both ***domestic and industrial solid waste*** were examined from the final waste stream and analyzed. ***Waste audit*** was conducted using the international standard test in the wheat flour milling factory. Regarding the ***domestic waste***, and ***annual basis*** from the domestic usage generates ***19 tonnes*** of solid waste and the ***generation per capital per day*** is ***(0.07) kg.*** The main categories of waste are 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. ***Food waste*** is the ***highest composition (85.2%),*** followed by ***packaging waste (7%).***

In terms of ***industrial solid waste***, only ***17 tonnes*** are as an annual basis. Mostly there are only two items of the waste which are ***fine dusts and stone*** generated from the Milling process. The ***fine dust generation is 73.91%*** and ***stone*** generation is ***26.19%.*** The amount of waste ***sent to the Municipal*** is only ***0.03%*** of the usage of raw materials from the Milling process.

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

Looking at waste recycling, up to nearly 96% of total waste are generating from the different sources. The ***recycling process is being carried*** out within the milling factory.

Considering the impact assessment of the solid waste, the ***impact of solid waste*** generated from the Milling is ***rated as low*** since it is ***under the WHO waste generation rate for developing country.*** However, in order to approach waste minimization or zero waste, there will be ***two waste management plans and minimization methods*** are recommended. These are ***segregation between wet and dry household waste*** and ***organic waste composting of industrial wastes***.

1.4.8 Potable water and waste water

In the wheat flour mailing process, ***water is added for 24 hour for the moisture content*** of the wheat to be convenient in grinding. , In addition, water is used for the ***domestic use*** particularly in the factory's canteen activities.. The water source is from the ***tube well***. For the process of wheat flour milling system, the amount of ***water usage per day*** is around ***30.1m^3*** for the three different factory's main activities as such ***milling process, office*** and ***canteen***.

In the ***potable water analysis***, around ***19 (chemical, physical and biological) parameters*** which are significantly important for the human health and surrounding environment were analyzed. In the ***waste water***, there are around ***13 parameters (chemical and physical***) analyzed. All analysis was conducted according to the standardized methods in the accredited laboratories.

It was found out that both ***potable water parameters meet WHO guidelines***, USEPA guidelines and IFC Effluent guidelines accordingly. Thus, the ***impact of potable water*** on the environment

was rated as ***low***.

However, in the waste water, among the parameters analyzed (pH, Total Suspended Solid, Ammonia Nitrogen, Nitrate Nitrogen, Oil and Grease, Phosphorus, BOD, DO, COD and coliform), BOD, COD and TSS exceeded the guidelines. Thus, the impact of waste water on the environment generally rated as high and median respectively.

Therefore, some of the possible methods were recommended as mitigation measures as such ***Disposal by Dilution Method and Constructed Wet-land Method***.

1.5 Cumulative impact assessment

According to the onsite surveys and interviews with public, most of the factories around the wheat flour milling factory are ***food related factories*** as such noodle, bakery, drinking water and some of them are electronic factory, package paper box factories and garment factory etc.

The cumulative effects from the factory's activities in relation to existing activities at the local environment were reviewed and assessed for significance. At the ***local level, cumulative impacts*** identified were of ***medium significance*** and are summarized below. ***No significant cumulative impacts*** on the environment were found at the ***national and regional levels***.

(i) Fugitive dust and air pollutants

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

(ii) Noise

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

(iii) Surface water and ground water quality

Discharge of wastewater with ***not allowable BOD*** by the factory into the common drainage could ***compound any impact*** that occurs from ***other effluents*** from the other industries.

1.6 Summary of 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, 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 35-year investment period of the Myanmar Investment Commission.

The Green Land Factory will use ***2% of the investment amount*** for the EMP cost. The investment amount is Foreign Currency USD 1,500,000 in Million.The target expenditure is USD 30,000 in

million 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.

Green Land has established Food Safety Management Team (FSMS Team) in accordance with ISO guidelines owing to the factory is already accredited and ISO 2200 certified. FSMS is responsible for the environmental monitoring plan together with his/her primary job description.

In this regard, the factory owner arranges the responsibility of the environmental performance of the factory by awarding manager who can manage the HSE plans. The HSE manager is conducting the responsibilities of all environmental issues and monitoring programs (Air/water/noise monitoring practices are conducting every 6 months and report to ECD) related to the factory process and activities and define the HSE policy and plans for the factory. HSE manager implements all environmental issues in accordance with the actions needed to be taken defined in the EMP.

HSE manager coordinates whenever the inspection team from Government sides or NGOs comes and inspects the factory process and activities along with the HSE plans. HSE manager gives training to the workers who should be aware of the respective responsibilities and work in accordance with HSE policy and plans.

1.6.1 EMP on air quality

Major environmental management plan for air pollution is needed to operate particularly at the factory's unit operation of ***pre-cleaning and cleaning processes*** which emitted higher emission of particulate matters. Pre-cleaning process included raw material receiving and transporting the raw material to silos. The hopper outlet of pre-cleaning process from Green Land mill is ***proposed to install pneumatic dust controller*** to separate wheat straw, dust and other lighter impurities from the raw wheat.

The dust controller currently run with bags by manually are replaced with ***automatic control system with fabric filter bags control system*** and PCL control system.

Cleaning process is currently operated by transporting the raw materials from silos to milling operating machines which include the following unit operations;

- Sieves for the removal of impurities larger or smaller than wheat;
- Destoner for the removal of heavy impurities such as stone;
- Cockle cylinder for the removal of larger or smaller impurities than wheat; and
- Polishing machine, using air currents, for the removal of lighter impurities.

In these cleaning processes, sieves and cockle cylinder are needed to be upgraded by installing ***fabric filters to improve the control process of particulate matters and other pollutants.***

Environmental management plan of Green Land mill mainly focus to avoid the emission of particulate matters form milling operations, all workers who nearly exposed to the emissions should wear ***suitable masks*** in every working hour as ***a good working practice***.

The factory staff shall be organized as the ***responsible team for the air pollution control management*** so that they can implement accordingly. Details are presented in the respective section. ***Ambient and indoor air monitoring*** shall be scheduled ***annually.***

1.6.2 EMP on noise quality

Noise monitoring is operated at ***both the whole proposed mill and admin office*** for 24hr continuously to achieve the representative data. The ***24hr average monitoring*** results for whole mill are ***slightly higher than the level of EQG*** (environmental quality guideline) particularly near to the operation machine.

Therefore, environmental management plan of proposed mill should mitigate the level of noise pollution by ***installing sound barrier on the wall of operation units***. Another mitigation plan for workers working near to the operation shall ***use suitable ear muffs*** for whole working hours to prevent the effect of noise pollution. Moreover, ***responsible person should monitor annually and when new equipments are installed in the factory*** from all the noise sources whether comply with the prescribed limits in the work area.

1.6.3 EMP on solid waste management

The Environmental Management Plan (EMP) for solid waste from wheat flour milling project identifies the principles, approach, procedures and methods that will be used to control and minimize the environmental and social impacts of all construction and operational activities associated with the project. It is proposed to complement the project Supplementary Environmental and Social Impact Assessment (SESIA).

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

Table 1- 3 Management plan for solid waste

Sr	Generated Parameter	Waste Source	Management plans and actions to be taken	Unit	Applicable Parameter
1	Waste Generation rate	All sources	Once a eek by using weighting machine	kg/person/day	ECD/WHO Guidelines of Waste generation rate in Developing country.

2	Waste Auditing	of waste, such as Milling System and Domestic Solid Waste	Physical Composition and if possible, it is needed to do chemical composition once a month by using the standard Method of ASTM.	Physical Composition (%) Chemical Composition (mg/kg)	ECD/WHO Guidelines of Waste composition in Developing country.
3	Bulk Density		Once a month by using the standard Method of ASTM.	kg/m^3	ECD/WHO Guidelines of Bulk Density in Developing country.

1.6.4 EMP on potable water and waste water

According to the analytical result, the ***impact of waste water of BOD and COD*** on the environment generally rated as ***high and median*** respectively. Therefore, waste water mitigation and management plan are introduced to this milling system. Some of the possible methods were recommended as mitigation measures as such ***Disposal by Dilution Method and Constructed Wet-land Method.*** For the improvement of management plan the additional. For the ***potable water treatment***, ***Filtration Method, Reverse Osmosis Method, Boiling water, and Disinfection (Chlorination***) are proposed so that the laboratory can use the acceptable water condition.

For the management system, it is needed to examine all sources of water ***(both potable water and waste water) once a month***. And then compare with potable water standard and effluent water standard by WHO guidelines respectively. By doing standard system of waste management system, it surely comply the standard levels.
As the key component of EMP success depends on ***effective capacity building of the workers*** in the Milling system, these efforts will also be ***assisted by the implementation of technical assistance by outside consultants***.

The ***EMP*** shall be set out with a controlled ***document and should be updated annually***, following ***a reportable incident or plan update***. A number of additional studies, complementary to the EMP, are proposed including further monitoring, sampling and investigations of water quality associated with the implementation approach.

1.7 Health risk assessment (HRA)

1.7.1 $PM_{2.5}$ health risk assessment

Health Risk Assessment (HRA) is a useful tool to estimate human health risks posed by exposure to a given environmental pollutant. According to the literature review, $PM_{2.5}$ is identified as a major hazard as well as the kind of health risk due to its long term exposure leading to mortality from cardiovascular and respiratory diseases and from lung cancer.
$PM_{2.5}$ data monitored in and around the factory were used to estimate how the different levels of exposure to $PM_{2.5}$ can impact on the likelihood and severity of health effects.
It was postulated that the staff population of 391-431 was exposed to levels exceeding the WHO guideline but lower than the NAAQS. This may have a negative impact on their health.

It was assumed that inhalation was the most important route of exposure and those workers were exposed for 8 hours per day.

The USEPA equation was used to calculate the potential dose of $PM_{2.5}$, which is the dose the population in Green Land may be exposed to when inhaling $PM_{2.5}$ concentrations.

The USEPA equations were used to calculate the potential dose of $PM_{2.5}$, which is the dose the population in Green Land may be exposed to when inhaling $PM_{2.5}$ concentrations.

The Health Risks from almost ***all different places in Green Land (except near generator) were >1 mean that $PM_{2.5}$ Hazards*** that cause the adverse health effects such as increased respiratory symptoms, such as ***irritation of the airways, coughing or difficulty breathing, aggravated asthma, decreased lung function*** if they are continuously working in that works place ***for 30 years***.

1.7.2 PM_{10} health risk assessment

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

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

It was postulated that the staff population of 391-431 was exposed to levels exceeding the WHO guideline but lower than the NAAQS. This may have a negative impact on their health. It was assumed that inhalation was the most important route of exposure and those workers were exposed for 8 hours per day.

The USEPA equation was used to calculate the Field Average Daily Dose (FADD), which is the dose the population in Green Land may be exposed to when inhaling PM_{10} concentrations.

The Health Risks from **4 different places (except near generator) in Green Land were between 1.1 and 10** and it means that the population inside Green Land were at **moderate risk of negative health** effects from exposure to PM_{10}.if they are continuously working in that works place ***for 30 years***.

1.8 Public consultation and disclosure

Public involvement, in the form of stakeholder consultation and disclosure, is a critical component of an ESIA. Similarly, socio economic structure is one of the most important issues of the Social Impact Assessment (SIA) because public participation along with public perception significantly relies on the issue of development project.

Besides, the SIA's 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.

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

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

The results are analyzed using the ***SPSS version 21.*** In the issue of the demographic feature, the ***common facilities*** of the community who lives around the industrial zone are ***not much improved***. In the ***education*** aspect, there is ***no school*** within that quarter areas. Most of the children travel around 20 kilometers to attend the school. In the health facilities, ***one private clinic*** is opening daily near to the residential areas. Based on their information on the questionnaire, majority of the community has no major health
problems like malaria, TB, diarrhoea and dysentery etc.

In the issue of the infrastructure, the ***majority 66%*** is staying in the one storey particularly in ***huts*** and minor group of housing structure is two storey wooden buildings. For the road status, the road condition ***within the quarter is unpaved*** roads though; the ***main road is concrete*** road. For the transportation issue, they only depend on ***public transportation***. Thus, it can be found that the ***infrastructure is not well improved and lack of sanitation***.

A majority of the community is ***middle age*** which is in the range of 30-40 years old, around ***37% of total respondent***s; however, the minority group for the respondent is in the range of 15-20 years only 1% of the total respondent. In the issue of Education, the ***majority group*** of total respondent can access ***secondary school education level*** which is nearly 50% of total respondent, but the minor group is ***illiterate which around 10%*** of total respondent is.
The ***majority*** group of respondents is ***service and causal workers***, around 44% of the total respondents and the minor group is 1% which is working as a farmer.

In the ***income level***, the ***majority*** of income level is in the ***range of 1,000,001 - 2,000,000*** per month which is 36% of respondents, however, the minor group of income level is in the range of 3,000,001- 5,000,000 which is 6% of respondents. It is pointed out that the income level for the people who live in those surrounding areas are in ***low income level.***

Based on the analytical result, generally, almost nearly ***100% of the total households*** are ***aware of the East Dagon industrial estate***. Among them, only ***7%*** of the total households ***know well*** all about the industrial estate including the Diamond Star wheat flour milling factory***, majority 83%*** said that they know the industrial zone but ***do not know each industry*** in this estate, and the remaining ***10% know less information*** about the industrial estate.

In the development issue of the industry, up to ***57%*** of the total household said that they ***agree with the development,*** but ***4%*** of the household ***disagree to the development project*** on the industry. Then, the ***remaining 39% of household*** said that they are ***not much interested i***n the issue of the development of industry.
Overall result based on the findings, it was found out that there are ***no significant both positive and negative socio eco impacts likely affected by the factory's activities*** on the nearest community. The Company has allocated CSR budget annually to support sustainable CSR program. The allocates CSR program budget of 2% of the net profit. The details discussions and results are shown in the main context of this report.

In conclusion, this report gives the guidance and framework the Green Land wheat flour milling 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 programmes.

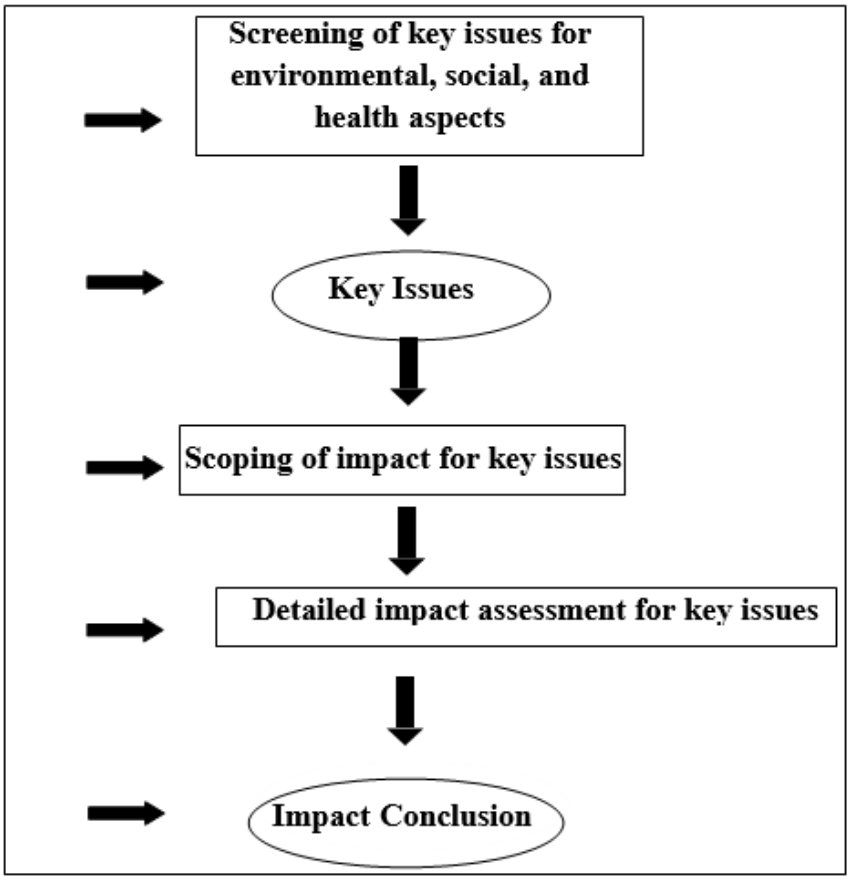


Figure 1. 1 Illustrates the importance of public involvement in each key EIA step

Chapter 2

Introduction

2. Chapter-2 Introduction

2.1 Background

The Green Land International Ltd. has acquired land at No. 54/55/56, Quarter (113), Industrial Zone, East Dagon Township, Yangon, Myanmar. The plot is about 9.361 Acres. The Green Land International Ltd. is a joint venture between Mitsubishi and Diamond Star Company and is the leading industrial group with its operations extended in Myanmar.

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

The contact details of the project proponent are as follows:

- Company name - Green Land International Ltd. (Joint venture with Mitsubishi and Diamond Star)
- Investor name - U Ko Ko Gyi (a) U Soe Naing
- Type of Business - manufacturing and distribution (wheat flour)
- Investment location -No. 54/55/56,Quarter(113), Yaw Ah Twin Wun U Phoe Hlaing St., Industrial Zone, East Dagon Township, Yangon, Myanmar.
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This study consists in assessing the Environmental and Social Impacts (ESIA) for the project operation along with the Environmental Management Plan (EMP) of the grain milling factory located in the East Dagon Industrial Zone.

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

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

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The information of contact person_

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2.2 Declaration of EIA team

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

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

- Environmental Quality Management Co.Ltd
- Dr. Ohnmar May Tin Hlaing, Managing Director & Environmental Consultant
- 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 EIA team consisted of the individuals described in Table 2-1.

Table 2- 1 EIA Assessment Team

No	Name	Background/ Expertise	Experience	Responsibility
1	Dr. Ohnmar May Tin Hlaing	2004 -2006, M.Sc in Environmental Engineering and Management, Asian Institute of Technology, Thailand 1986-1996, Bachelor of Medicine and Bachelor of Surgery, Institute of Medicine, Myanmar	Dr.Hlaing has 14 years working experience in the environmental and public health field. Dr.Hlaing's worked the National Government in the public health sector before becoming a consultant. Her direct experience includes chemical and pharmaceutical toxicology as well as poison control. Dr. Ohnmar May Tin Hlaing is as an Environmental Health Consultant as well as Managing Director working on the environmental related projects particularly in Environmental, Social and Health Impact Assessments (ESHIA) projects as well as ambient and indoor air quality	Senior Environmental & Health Expert / Local Coordinator

			monitoring projects in Myanmar.	
2	Daw Myat Myitzu	2013, University of Forestry, Bachelor of Science in Forestry 2018, Yangon Technological University, Postgraduate Diploma in Environmental Planning and Management	Myat Myitzu has 5 years of experience in environmental field. She is a graduate of University of Forestry with a Bachelor of Forestry covering environmental conservation. She is also a graduate of Yangon Technological University with a Postgraduate Diploma in Environmental Planning and Management. She is also skilled at environmental and socio-economic surveys and organizing stakeholder/public consultation meetings. Her job description also includes report preparation and translation of project related documents.	Associate Environmental Consultant
3	Daw No No Lwin	2014, Myanmar Maritime University, B.E (Naval Architecture)	No No Lwin has got about 4 years of experience as an environmental technician working in environmental related projects. She is a graduate of Myanmar Maritime University with a Bachelor of Engineering in Naval Architecture covering environmental engineering. She is also skilled at environmental and socio-economic surveys and organizing stakeholder/public consultation meetings. Her job description also includes report preparation and translation of project related documents.	Associate Environmental Consultant
4	U ThihaHtut	2012, Dagon University, Microbiology 2018, Dagon University,	Thiha has over 6 years experiences coordinating socioeconomic programs and stakeholder engagement in local and international joint EMP, IEE and ESIA projects	Project Coordinator

		Postgraduate Diploma in Geographic Information System	in Myanmar. His role was leading socioeconomic surveys, coordinating the Governmental Departments in Environmental and Social Considerations of the projects.	
5	U Aung Zin Min	2016, University of Forestry, Bachelor of Science in Forestry 2018, Dagon University, Postgraduate Diploma in Geographic Information System	Aung Zin Min has 2 years working experience in the environmental field such as biodiversity survey, forest inventory, air and noise monitoring, water and soil sampling and also waste management. He has experience in biodiversity survey in onshore block RSF-5 (ENI).	Forestry & Biodiversity Survey
6	U Ye Naung Htun	2013, University of Forestry, Bachelor of Science in Forestry 2018, Yangon University, Postgraduate Diploma in Geographic Information System	Mr. Ye Naung Htun graduated from the University of Forestry, Yezin, Nay Pyi Taw, Myanmar on 2013. He has 2 years working experience on Air and Noise quality monitoring, waste management surveying, Biodiversity surveying and also had 2 years working experience on Forest plantation as a Plantation Assistant (Rakhine and Ayeyarwaddy Division) from 2013 to 2015.	Air / Noise
7	U Soe Thu Aung	2015, B.Sc (Geology)	Mr. Soe has 1 year experience in the environmental field such as water and soil sampling, air and noise monitoring and social survey. He graduated from the Mgway University.	Water and Soil Sampling
8	Thet Paing Phyoe	2013, University of Forestry, Bachelor of Science in Forestry	Thet Paing Phyoe has got about 4 years of working experience in environmental related projects. He is a graduate of University of Forestry with a Bachelor of Science in Forestry covering environmental conservation.	Socio-economic

			He is also skilled at environmental and socio-economic surveys and organizing stakeholder/public consultation meetings.	

Table 2- 2 Summary of experiences of EQM team

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

Sr	Project name	Year	Client	Remark
	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	ıngon 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
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

Sr	Project name	Year	Client	Remark
12	Block-M11,12,13,14	2018	Petronas Oil and gas company	Public Consultation of scoping stage and EIA stage, Socio economic survey
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

Sr	Project name	Year	Client	Remark
22	Yangon 300 MW Project	2017		Baseline Ambient air monitoring, noise monitoring, water 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 Production Facility,	2013		Baseline Air monitoring & Air Impact Assessment

Sr	Project name	Year	Client	Remark
	Mawlamyaing, Myanmar			
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
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)	

Sr	Project name	Year	Client	Remark
	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
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	2016-2017	ECD, Institute for Global	Local Consultant for development

	Waste Management Strategy project for (2016-2017)		Environmental Strategies (IGES, Japan) center collaborating with UNEP)	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

2.3 Government registrations/approvals for the project status

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

Table 2- 3 Company registration details

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

2.4 Objectives of the project

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

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

There are two categories in this ESIA objective.

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

The main objectives of this project are the following:

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

project for the better protection of the environment.

2.5 Methodology for the study

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

a) **Literature review**: Documentation on policies, laws, regulations and guidelines related to environmental impact assessment process and management, industry sector, waste management, land use etc, at the national level as well as the international level have been done.

b) **Interviews**: The consultants have interviewed people in the area of the factory as well as in the Ministries and other governmental institutions related to this project.

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

d) **Stakeholders consultation**: the consultants conducted stakeholder meetings and focus group meetings and door to door household questionnaire surveys on the neighbouring communities, to find out their perception on this project.

e) **Environmental baseline monitoring** on air, water, waste soil and flora and fauna

f) **Reporting:** the data and information collected were organized and compiled in areport.

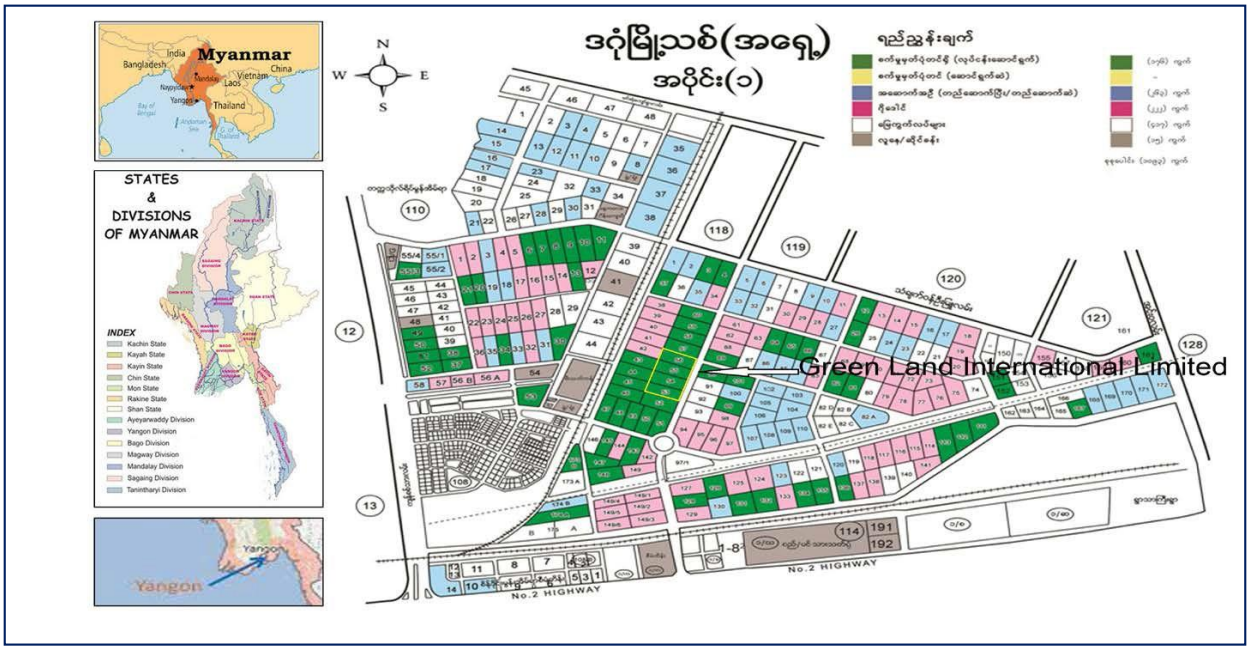


Figure 2.1 Location map of Green Land mill

Chapter 3

Policy, Legal and Institutional Framework

3. Chapter-3 Policy, legal and institutional framework

This chapter provides the key information of national and international environmental legislations, regulations, conventions and standards applicable to the project of Green Land wheat and flour mill project.

The objectives of this section are:

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

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

- Policy & Legal Framework (Section 3.1)
- Contractual and other Commitments (Section 3.2)
- Institutional framework for environmental management (Section 3.3)
- Project's Environmental, Social and Health Standards (Section 3.4)

3.1 Policy and legal framework

3.1.1 Environmental policy and 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);
- Myanmar Environmental Conservation Laws (2012);
- Environmental Conservation Rules (2014);
- Environmental Impact Assessment Procedure (2015);
- National Environmental Quality (Emission) Guideline (2015).

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

In consideration of The Constitution of the Republic of the Union of Myanmar (September, 2008) as amendment to date,

Article 37 (a) and 45 states that The Union is the ultimate owner of all lands and all natural resources above and below the ground, above and beneath the water and in the atmosphere in the Union and The Union shall protect and conserve natural environment respectively.

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

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.

(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
The investor:

a) may appoint of any citizen who is a qualified person as senior manager, technical and operational expert, and advisor in his investment within the Union in accordance with the Laws;

b) shall appoint them to replace, after providing for capacity building programs in order to be able to appoint citizens to different level positions of management, technical and operational experts, and advisors;

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:

f) shall not make any significant alteration of topography or elevation of the land on which he is entitled to lease or to use, without the approval of the Commission;

g) shall abide by 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;

h) shall list and keep proper records of books of account and annual financial statement, and necessary financial matters relating to the investments performed by permit or endorsement in accordance with internationally and locally recognized accounting standards;

i) shall close and discontinue the investment only after payment of compensation to employees in accordance with applicable laws for 23 Official Translation 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 their 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 are 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 permit or 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, and

shall submit the situation of environmental and social impact assessment to the Commission along the period of activities of the investments which obtained permit or endorsement of the Commission.

Chapter (17) Insurance Section 73: The investor shall insure the types of insurance stipulated in the provision of the rules at any insurance enterprise which is entitled to carry out insurance businesses within the Union.

3.1.2.3 Myanmar Investment Rules (2017)

Section 202. The Investor must comply with the conditions of the Permit and other applicable laws when making an Investment.

Section 203. The Investor shall fully assist while negotiating with the Authority for settling the grievances of the local community that have been effected due to Investments.

Section 206. If the Investor is desirous to appoint a foreigner as senior management, technician expert or consultant according to section 51 (a) of the Law, it shall submit such foreigner's passport, expertise evidence or degree and profile to the Commission Office for approval.

Section 212. Every Investor that holds the Permit or Tax Incentives must have taken out the relevant insurance out of the following types of insurance at any insurance business that holds the license in the Union based on the nature of the business:

a) Property and Business Interruption Insurance ;
b) Engineering Insurance ;
c) Professional Liability Insurance;
d) Professional Accident Insurance;
e) Marine Insurance; and
f) Workmen Compensation Insurance.

3.1.2.4 The Environmental Conservation Law (2012)

The Republic of the Union of Myanmar has enacted 61 legislations concerning of environmental conservation and protection and then in the time of New Government, the Pyidaungsu Hluttaw passed the Environmental Conservation Law on 30th March, 2012. Moreover, the Cabinet passed Environmental Conservation Rules of Law on 13 June 2013.

This Law recognizes the responsibility of the Environmental Conservation Committee with the Union Minister for the Union Ministry assigned by the Union Government as the Chairman and with suitable members to conserve the environment of the Republic of the Union of Myanmar.

This environmental conservation committee will advise the government on environmental matters. The committee is also made responsible for making rules for industry and for setting various environmental quality standards.

Among the statements contained in the law, this report extracts only those which concern with the scope of work of the project.

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.

The Key sections of importance are 7 (o), 14, 15, 24, and 29 related to pollution control and penalties:
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;
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 24. The Ministry may, in issuing the prior permission, stipulate terms and conditions relating to environmental conservation. It may conduct inspection whether or not it is performed in conformity with such terms and conditions or inform the relevant Government departments, Government organizations to carry out inspections.
Section 29. No one shall violate any prohibition contained in the rules, notifications, orders, directives and procedures issued under this Law.

3.1.2.5 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 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.

3.1.2.6 Environmental Impact Assessment Procedure (2015)

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. The key sections are paragraph 102-110, 113, 115, and 117.

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.

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

3.1.2.7 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. h

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

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

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

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

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

Section 12. Air emissions, noise, odor, and liquid / effluent discharges will be sampled and

measured at points of compliance as specified in the project EMP and ECC.

3.1.3 Project- related laws

The Myanmar Environmental Conservation Law, Environmental Conservation Rules, Environmental Quality (Emission) Standards are the first step to address all the complex environmental and social management issues faced by Myanmar. A number of other laws 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:

- Ethnic Right Protection Law, 2015
- Myanmar Insurance Law, 1993
- Private Industrial Enterprise Law, 1990
- The Myanmar Fire Force Law, 2015
- The Petroleum and Petroleum Products Law, 2017
- The Motor Vehicles Law, 2015
- The Law on Standardization, 2014 (Section 17, 19, 26)
- The Protection and Prevention of Cultural Heritage Regions Law, 1998
- The Protection and Prevention of Antique Objective Law, 2015
- The Protection and Prevention of Ancient Monument Law, 2015
- Myanmar Engineering Council Law, 2013
- Import and Export Law, 2012
- Labor Organization Law, 2012
- Settlement of Labor Dispute Law, 2012
- Employment and Skill Development Law, 2013
- Minimums Wages Law, 2013
- Payment of Wages Law, 2016
- Social Security Law, 2012
- The Workmen Compensation Act, 1923
- The Factories Act, 1951
- Leaves and Holidays Act, 1951
- Public Health Law, 1972
- The Prevention and Control of Communicable Disease Law, 1995
- The Control of Smoking and Consumption of Tobacco Product Law, 2006
- Yangon City Development Committee Law, 2018
- Freshwater Fisheries Law, 1991
- Myanmar Marine Fisheries Law, 1990
- Conservation of Rivers, Creeks and Water Resources Law, 2006

3.1.3.1 Ethnic Right Protection Law, 2015

Section 5. The matters of projects shall completely be informed, coordinated and performed with the relevant local ethnic groups in the case of development works, major projects, businesses and extraction of natural resources will be implemented within the area of ethnic groups.

3.1.3.2 Myanmar Insurance Law, 1993

Require any business which may pollute the environment to effect compulsory general liability insurance.

Section 15. Owners of motor vehicles shall effect compulsory Third Party Liability Insurance with the Myanma Insurance.

Section 16. An entrepreneur or an organization operating an enterprise which may cause loss to State-owned property or which may cause damage to the life and property of the public or which may pollution to the environment shall effect compulsory General Liability Insurance with the Myanma Insurance.

3.1.3.3 Private Industrial Enterprise Law, 1990

Chapter 3 Registration of Private Industrial Enterprises, Section 4

(a) Any person desirous of conducting any private industrial enterprise;

(b) Any person conducting any private industrial enterprise on the day this Law is enacted; by using any type of power which is three horsepower and above or manpower of ten wage-earning workers and above shall register under this Law.

Chapter 4 Duties and Rights of Entrepreneur, Section 13

The duties of the entrepreneur are as follows:-

(b) shall abide by the terms and conditions of the registration certificate;

(f) shall shift the place of enterprise, change the nature of enterprise, amalgamate enterprises and split up enterprises only with the approval of the Directorate;

(g) shall abide by the orders and directives issued from time to time by the Ministry and the Directorate;

Section 15. The entrepreneur has the right to carry out the followings:-

(a) appointing foreign exports and technicians with the approval of the Ministry;

(b) carrying out change of the name of enterprise, transfer of ownership, temporary suspension or permanent closing down of the enterprise in the manner prescribed and with the approval of the Directorate.

3.1.3.4 The Myanmar Fire Force Law, 2015

Section 25.

Industry, factory, bus station, airport, port, hotel, motel, guest house, community infrastructure, market, office, organization or business which has fire hazard or anyone-

a) No absence for organizing separate fire force
b) No absence to set ready for fire safety equipment

3.1.3.5 The Petroleum and Petroleum Products Law, 2017

The Petroleum and Petroleum Products Law (the "PPPL") 2017 was enacted by Pyaydaungsu Htuttaw as Pyaydaungsu Htuttaw Law No. 20/2017 on 1st August 2017 to repeal the Petroleum Act 1934. The PPPL contains the provisions on import and export, transportation, storage, refinery, distribution, inspection and testing of petroleum and petroleum products and issuance of relevant licenses.

Section 9. The Ministry of Transport and Communications shall carry out the following functions relating to any petroleum and petroleum product;

(a) issuing license to vehicles, vessels and barges that carry any petroleum and petroleum product;

(e) determining procedures and conditions to be abided by in carrying out transport business except transport by pipeline.

Section 10. The Ministry of Natural Resources and Environmental Conservation shall carry out the following functions relating to any petroleum and petroleum product;

a) issuing licence for the right to store for the storage tanks and warehouses;
b) issuing transport permit for the vehicles, vessels and barges that shall carry any petroleum and petroleum product;
c) determining the period, form and terms and conditions, manners of applying licence, permitting authority and fees to be assessed, for licence under subsection (a) and permit under subsection (b);
d) if it occurs environmental impacts in carrying out petroleum and petroleum product business activities, taking action, as necessary , in accordance with the existing laws of on-site inspection;

Section 11. On all receptacles containing any dangerous petroleum and petroleum product, the warning sign of danger by stamping, embossing, painting, printing or any other means shall be expressed. If it is impossible to express as such, similar warning signs of the nature of danger of gasoline, spirit or petroleum shall be expressed in writing at the ostensible place in salient words or signs near the receptacle.

3.1.3.6 The Motor Vehicles Law, 2015

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.

3.1.3.7 The Law on Standardization, 2014

Section 17. A person desirous of obtaining certificate of certification shall apply to the department and organization which has obtained the accreditation.
Section 19. The Committee may, if it is found out that holder of certificate of certification violates any term or condition contained in the relevant recommendation, pass any of the following administrative orders:

a) warning;
b) suspending the certificate of certification for limited period;
c) cancelling the certificate of certification

Section 26. If any person who obtained certificate of certification uses standardization mark on the product which is not in conformity with the relevant standard or relating to service shall be punished with imprisonment for a term not exceeding one year or with fine not more than one million Kyats or with both.

3.1.3.8 The Protection and Prevention of Cultural Heritage Regions Law, 1998

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.

3.1.3.9 The Protection and Prevention of Antique Objective Law, 2015

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.

3.1.3.10 The Protection and Prevention of Ancient Monument Law, 2015

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 15. Every person desirous to engage in the following within the area of certain ancient monuments has to apply for the permission of the administration department:

a) expanding a city, village or township;
b) constructing, expanding or renovating a hotel, motel, guest house, lodging house or industrial building or extending the boundary of the enclosure of the building;
c) digging for petroleum, natural gas or minerals; developing oil and gas pipelines; constructing, extending or renovating towers, bridges, airports or irrigation canals;
d) constructing underground works related with electricity and communication;
e) digging a well, pond or fish-breeding pond;
f) mining for gold, producing sand, digging stones, brickworks and other works which can impact the soil density and ground structure;
g) placing an ancient monument inside the area of a public building or extension of the boundary of the building's enclosure into an ancient monument zone;
h) constructing buildings near an ancient monument if this violates the structural rules approved by the ministry.

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;

3.1.3.11 Myanmar Engineering Council Law, 2013

Section 34. The Executive Committee may, if it finds the violation of any of the provisions of this Law, or any prohibition of rules, orders and directives issued under this Law, or any condition mentioned in the register certificate by any person who has obtained the register certificate, impose any of the following administrative penalties against him/her:

a) warning;
b) causing to pay the stipulated fine;
c) suspending the register certificate for a limited period;
d) cancelling the register ceftificate

Section 37. Any person without the register certificate issued by the Council, except engineering civil service personnel appointed at the Government departments and Government organizations carrying out the public works, shall not practice engineering and technical works which may endanger the public safety and which are stipulated under the rules made under this Law.

3.1.3.12 Import and Export Law, 2012

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

3.1.3.13 Labor Organization Law, 2012

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.

3.1.3.14 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.

3.1.3.15 Employment and Skill Development Law, 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; other matters;
19. specifying the regulation of the agreement, amending and supplementing;
20. 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.

3.1.3.16 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.

3.1.3.17 Payment of Wages Law, 2016

Table 3- 1 Payment of Wages Law (No 17/2016) covers the following requirements:

Chapter (2)	**Section (3-a), Section (4-a, b, Cc-i, c-ii, d, e, f, g) Section (5), (6)**	**It is covered all the issue of strategies for payment and timeline between Employer and Employee.**
Chapter (3)	Section (7-a, b, c, d) Section (8) Section (9), Section (10-a, b, c, d, e, f, g, h, i, j,), Section (11- a, b), Section	It is covered all the issue of deducted salary based on different categories.

	(12-a, b) Section (13)	
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

3.1.3.18 Social Security Law, 2012

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

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

Section 16. (a) The following employers shall affect insurance for the workers working at their establishments by compulsorily registering at the relevant township social security office and contribute to the social security fund contained in clauses (1), (3), (4), and (5) of sub-section (a) of **section 15** in accord with the stipulations to enable to enjoy social security benefits:

1. employers of establishments;
2. employers of establishments employing the number of workers, including the relatives of the employers except at least one worker and their wife, husband, children and parents depending upon them, under sub-section(a) of section 11;
3. employers of unpaid apprentices and trainees.

Section 48 (a) The employer shall affect insurance by registering for employment injury benefit

insurance system contained in section 45 at the relevant township social security office and pay contribution to employment injury benefit fund in accord with stipulations in order that workers applied to provisions of compulsory registration may obtain the employment injury benefits
Section 51. The employer:

(a) shall pay contribution monthly to Employment Injury Benefit Fund at the rates stipulated under section 50. Moreover, he shall also bear the expenses for paying as such;

(b) shall pay defaulting fee stipulated under section 88, in addition to the contribution if fails to **contribute after effecting insurance for employment injury benefit.**
Section 54

(a) The employer shall report to the relevant township social security office immediately if a serious employment accident occurs to his insured worker. There shall not be any delay without sufficient cause to report as such.

(b) A team of officers and other staff who inspect the establishments, if it is found out the employment injury, death, and contracting disease, shall report to the relevant township social security office in accord with the stipulations.

3.1.3.19 The Workmen Compensation Act, 1923

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.

3.1.3.20 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.

3.1.3.21 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.

3.1.3.22 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

3.1.3.23 The Prevention and Control of Communicable Disease Law, 1995

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;
(c) 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;

3.1.3.24 The Control of Smoking and Consumption of Tobacco Product Law, 2006

Section 9. The person-in-charge shall:

a) keep the caption and mark referring that it is a non-smoking area at the place mentioned in section 6 in accordance with the stipulations.
b) arrange the specific place where smoking is allowed as mentioned in section 7, and keep the caption and mark also referring that it is a specific place where smoking is allowed, in accordance with the stipulations.
c) supervise and carry out measures so that no one shall smoke at the non-smoking area.
d) accept the inspection when the supervisory body comes to the place for which he is responsible.

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.

3.1.3.25 Conservation of Rivers, Creeks and Water Resources Law, 2006

Section 8. No person shall:

(a) carry out any act or channel shifting with the aim to ruin the water resources and rivers and creeks

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.

c) dispose of disposal soil and other materials from panning for gold, gold mineral dredging or resource production in the river and creek, into the river and creek or into the water outlet gully which can flow into the river and creek.

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 22. No one shall, without the permission of the Directorate, pile sand, shingle and other heavy materials for business purposes in the bank area and waterfront area.

Section 24. No one shall:

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

3.1.4 International Environmental Conventions/ Protocols/ Agreements signed/ Ratified by Myanmar

Myanmar has ratified several international and regional conventions. Those relevant to the project are provided in Table 3.1.

Table 3- 2 International Environmental Conventions/Protocols/Agreements Signed/Ratified by Myanmar

International Environmental Conventions/Protocols/Agreement	Date of Signature	Date of Ratification	Date of Member	Cabinet Approval Date
1.Kyoto Protocol to the Convention on Climate Change, Kyoto, 1997		13-8-2003 (Accession)		26/2003 (16-7-2003)
2.ASEAN Agreement on Transboundary Haze Pollution	10-6-2002	13-3-2003 (Ratification)		7/2003 (27-2-2003)

3.The International Tropical Timber Agreement, Geneva, 1994		31.1.1996 (Ratification)		
4.United Nations Framework Convention on Climate Change, New York, 1992 (UNFCCC)	11-6-1992	25-11-1994 (Ratification)		41/94 9-11-1994
5. London Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer, London, 1990		24-11-1993 (Ratification)	22-9-1994	46/93
6.Montreal Protocol on Substances that Deplete the Ozone Layer, Montreal, 1987		24-11-1993 (Ratification)	22-9-1994	46/93
7.Vienna Convention for the Protection of the Ozone Layer, Vienna, 1985		24-11-1993 (Ratification)	22-9-1994	46/93
8.International Convention for the Prevention of Pollution from Ships, London, 1973 and its Protocol of 1978		(Accession)		
9.ICAO ANNEX 16 to the Convention on International Civil Aviation Environmental Protection Vol. II Aircraft Engine Emission		(Accession)		

3.1.5 Myanmar Laws and Regulations Related to Air Pollution and Climate Change Control

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

3.1.5.1 The Penal Code

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

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

Moreover, section 285 of the Penal Code provides for the offence of negligent conduct with respect to fire or combustible matter. It provides that whoever does with fire or any combustible matter any act so rashly or negligently as to endanger human life, or to be likely to cause hurt or injury to any other person., or knowingly or negligently omits to take such order with any fire or any combustible matter in his possession as is sufficient to guard against any probable danger to human life from such fire or combustible matter, shall be punished with imprisonment

of either description for a term which may extend to three years, and shall also be liable to fine. Though offence under section 278 is non-cognizable, offence under section 285 is cognizable by police according to the Code of Criminal Procedure.

3.1.5.2 The Yangon Police Act, 1899

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

3.1.5.3 The Police Act, 1945

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

3.1.5.4 The City of Yangon Municipal Act, 1922

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

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

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

3.1.5.5 The City of Yangon Development Law, 1990

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

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

following paragraph.

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

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

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

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

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

Section 33(a), prescribes proper management of pollution from motor vehicles, industries, and area sources. Rule 27 recognizes the responsibility of the Committee to regulate pollution emitted from any construction, business, mill or factory. Rule 30 empowers the Committee to control vehicle emissions such as excessive smoke;

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

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

At present, Yangon City Development Committee Law, 2013 including the environmental pollution control and management (air water, waste, etc.) for the Yangon region has been approved by Yangon Region Parliament, the Republic of the Union of Myanmar.

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. Green Land International Limited makes the following commitments:

- The project will comply with commitments, mitigation measures and management plans stated in the EIA 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 for environmental management

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

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

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

At the local level, the city development committees have a critical role. **Yangon City Development Committee (YCDC)**, for instance, is responsible for planning, development, and general management of the city and is the authorized body for urban environmental management of Yangon. It has responsibilities for the provision of municipal services to the 33 townships making up the city area. **The Environmental Conservation and Sanitation Department of YCDC** used to conduct environmental inspections on the factories operating in the industrial zones in Yangon region and evaluate the industries' adherence to the regulations regarding disposal of waste water and other waste products in Yangon's 18 industrial zones.

In addition, **Directorate of Industrial Supervision and Inspection (DISI), Ministry of**

Industry undertakes the development of the private industries, registration in accord with the existing laws and regulations and inspection on the environmental impacts likely affected by the factories.

3.4 Project's Environmental, Social and Health Standards

MONREC has established environmental and health quality standards, the National Environmental
Quality (Emission) (NEQG) Guidelines [Legal Reference: ECL 2012 (Article 2c) and NEQG 2015] were promulgated on December 29th, 2015. The Guidelines are largely based on International Finance Corporation (IFC) Environmental Health and Safety (EHS) Guidelines, and contain regulations and control of various environmental parameters, including noise and vibration, air emissions, and effluent discharges, from various sources and activities. The following are some of the National and International environmental standards related to Environmental, Health and Safety guidelines generally accepted in Myanmar.

3.4.1 Air Emissions

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

Table 3- 3 International Ambient Air Quality Standards/Guidelines

Pollutant	Averaging Period	Limit/Guideline Value/ Standards (µgm-^{3})	Relevant Standards/Guidelines
NO_2 (ppb)	1 year	40	WHO Guideline
	1 hour	200	
SO_2(ppb)	1 year	50	WHO Guideline
	24 hours	20	WHO Guideline
CO (ppm)	8 hour	10,000	WHO Guideline
	1 hour	30,000	WHO Guideline
$PM_{2.5}$ (µg/m^3)	1 year	10	WHO
	24 hour	25	WHO
PM_{10}	24 hour	50	WHO
TSPM	24 hour	100	WHO
CO (ppm)	8hr	9 ppm (8hr)	USEPA (NAAQ)
Atomic Radiation		Normal background radiation (25-75) CPM (USEPA)	
Ozone	8hr	100 ug.m^3 (8hr)	WHO
	8hr	0.075ppm (8hr)	USEPA (NAAQ)

3.4.2 Waste Water

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

Table 3- 4 : Indicative Guideline for Treated Sanitary Sewage Discharges1

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

[a] MPN = Most Probable Number

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

3.4.3 Dairy Processing

Table 3- 5 Effluent Levels

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

[a] At the edge of a scientifically established mixing zone which takes into account ambient water quality, receiving water use, potential receptors and assimilative capacity

[b] MPN = Most Probable Number

3.4.4 Food and Beverage Processing

Table 3- 6 : Effluent Levels

Parameter	Unit	Guideline Value
5-day Biochemical oxygen demand	mg/L	50
	etermined on a case specific basis	
Chemical oxygen demand	mg/L	250
Oil and grease	mg/L	10
pH	S.U.	6-9
Temperature increase	°C	<3[a]
Total Coliform bacteria	MPN[b] /100 ml	400
Total nitrogen	mg/L	10
Total phosphorus	mg/L	2
Total suspended solids	mg/L	50

[a] At the edge of a scientifically established mixing zone which takes into account ambient water quality, receiving water use, potential receptors and assimilative capacity

[b] MPN = Most Probable Number

3.4.5 Air Emissions

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

3.4.6 Noise

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

Table 3- 7 Noise Standard Value of Environmental Quality Guideline (EQG)

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

3.4.7 Health Guidelines

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. 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).

Table 3- 8 : 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 emission	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. Chapter-4 Description of the project and alternatives selection

4.1 Project Description

This section presents the overview of background information of Green Land wheat and flour milling operation and activities with analyzing the current technologies.

The Green Land International Ltd. is a joint venture between Mitsubishi and Diamond Star Company and is the leading industrial group with its operations extended in Myanmar. Since 2015, the wheat flour business has been operating under Lluvia Limited ("Lluvia"), a joint venture between CDSG and Mitsubishi Corporation. Lluvia is leveraging the expertise and experience of CDSG and Mitsubishi Corporation with the aim of becoming the leader in wheat flour as well as other food businesses in Myanmar. Diamond Star, Capital Diamond Star Group (CDSG)predecessor, first embarked on its journey in the wheat flour business when it established its first mill in Mandalay, only capable of producing 1-ton per day, in 1980. Today, its mills in Yangon and Mandalay have a combined capacity of 1,160 tons per day, making it the largest flour miller in Myanmar. It had taken the founders of Diamond Star almost four decades to build its market leading wheat flour business which remains the cornerstone of CDSG.

The Green Land International Ltd. mainly provides Flour Manufacturers and Distributors. It has acquired land at No. 54/55/56, Quarter (113), Industrial Zone, East Dagon Township, Yangon, Myanmar. The plot is about 9.361 Acres. Raw material is available in and around the country side for The Green Land International Ltd. Wheat flour mill factory. People looking for quality food material are residing everywhere. Hence, The Green Land International Ltd. is supposed to provide enough market potential for standardized food products.

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

Moreover, The Green Land International Ltd is providing the employees 2 dormitories who work from far away. The company provides breakfast, lunch, and dinner (3) meals for the employees in the dormitory and is being responsible for catering. For the employees to relax during their work breaks, The Green Land International Ltd arrages a TV room (Skynet), basketball court, soccer field and table tennis court.

The contact details of the project proponent are as follows:

- Company name - Green Land International Ltd. (Joint venture with Mitsubishi and Diamond Star)
- Investor name - U Ko Ko Gyi (a) U Soe Naing
- Type of Business - manufacturing and distribution (wheat flour)
- Investment location -No. 54/55/56,Quarter(113), Yaw Ah Twin Wun U Phoe Hlaing St., Industrial Zone, East Dagon Township, Yangon, Myanmar.
- Telephone -01 2585107, 01 2585108, 01 2585109
- Fax- 2585107, 2585108

Table 4- 1 Company registration details

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

Table 4- 2 Investment Form

Name of Project	Manufacturing and Distribution of Wheat Flour
Capital Investment	Foreign Currency USD 1,500,000 in Million
Name of Company	The Green Land Myanmar International Ltd
Investment Type	100% Foreign Investment

Table 4- 3 The project is undergone as project timeline as follows:

Project Name	**Construction Start Date-End Date**	**Operation Running Date**	**Decommission Phase**
Green Land Wheat Flour Mill Factory	2012-2013	2015-Current 2022 (7 Years)	2015-2065 Total Expected years covers about 50 years period of Myanmar Investment Commission

The factory has been operating under the following:
Table 4- 4 Operation Schedule

Operating Time	**Operation Hours**	**Operation Days**
2015-Current 2022 (7 Years)	8 Hours per day with 3 shift	6 Days per week

4.2 Plot Description and geographic localization of the project

Area: 9.361 Acre

Location: the project site is located in No- 53, 54, 55, 56. Block No (113), East Dagan Industrial Zone, Yangon Region.

The plot for the factory is situated by the No.2 Highway road.

The combined grain milling capacity of the group is in excess of 115,200 M.T per annum. The Green Land International Ltd. is to invest 500 tonns of raw wheat grains per day. This Flour Milling involves mechanical breakdown of any wheat grain to separate the outer covering of the grain and grinding the inner endosperm to fine flour particles.

The coordinate point of the factory is 16 °53' 44.04" N and 96 °13' 58.93" E. The detailed coordinate points inside factory are as follows:

Table 4- 5 Coordinate Point of Green Land Flour Mill

Points	Locations	Coordinates	
		N	E
1	Green Land packing place (Location 1)	16` 53' 44.8"	096` 14' 1.9"
2	Green Land storage place (Location 2)	16` 53' 45.5"	096` 13' 58.4"
3	Office building (Location3)	16` 53' 43.4"	096` 13.59.0"
4	Generator (Location 4)	16` 53' 44.0"	096` 14' 1.7"

4.3 Current use of the location

The main part of the project of the wheat flour milling factory is being occupied by the buildings, parking yard, canteen, warehouse and open spaces. Inside the factory compound, there are some crops such as bean, roselle, lady fingers, mango, drum sticks, jackfruit, etc for the workers to consume in the canteen.

Figure 4. 1 Green Land factory front view

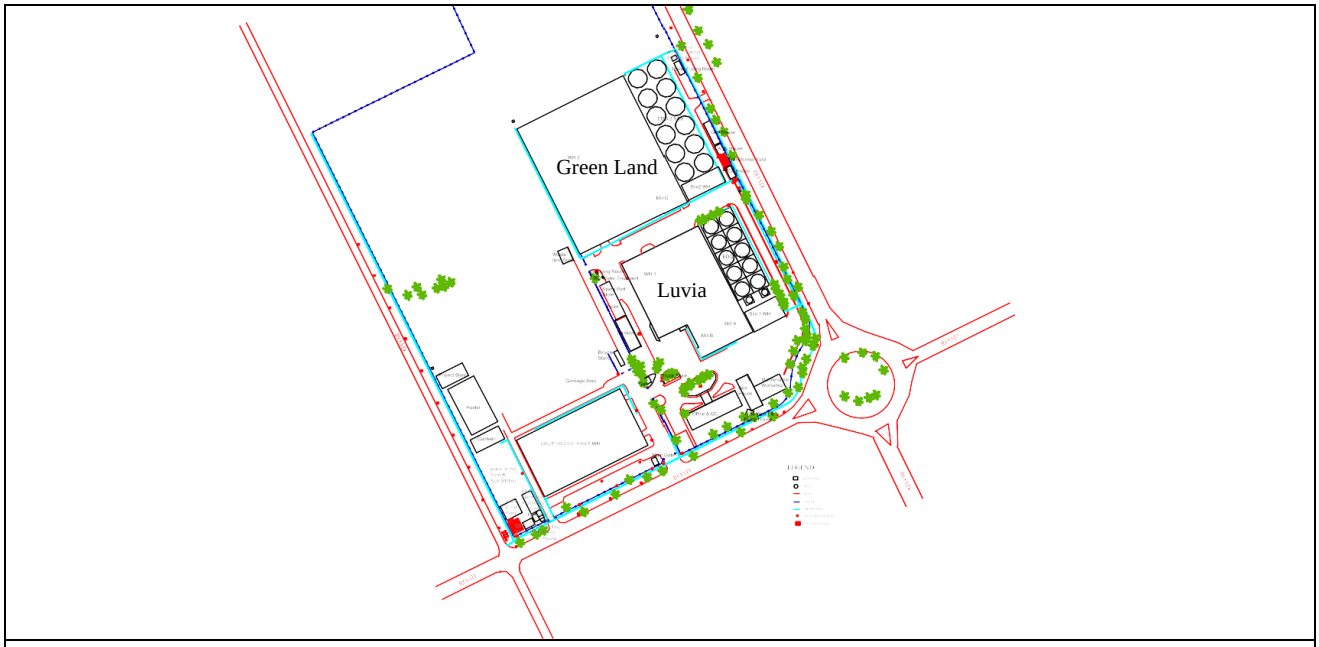


Figure 4. 2 The Green Land Myanmar International Ltd Project site Layout Plan

Table 4- 6 Area size of different plant's units

No	Plant Facility	Area (m^2)	Unit %
1	Administration block	470	0.4
2	Flour milling	18234	15.9
3	Car parking yard	630	0.5
4	Canteen	210	0.2
5	Open Space	83456	72.7
6	Warehouse	11758	10.2
	Total	44143	100.0

The project of the establishment of a flour milling factory is at the Operation Phase.

4.4 Construction Phase

The construction phases for this project have lasted for **12 months**. The construction process involves site preparation, erecting fences around proposed area, levelling, construction of storage, temporary workers camp and provision of raw materials to the site. Setting up a foundation was conducted to support the grinding machines which was done as per normal construction technique. No special purpose engineering does not require for this process.

The following equipment were used for the construction phase:

- Cement mixture machines
- Welding machines
- Mobile Crane
- Bulldozer and Earth leveler
- Wheelbarrows
- General tools and tackles
- Shuttering material
- Generator
- Water pump
- Vibrator and compactor for concrete

In the construction phase, the safety and security of all employees and workers on the construction site was conducted a priority. All the workers were well-equipped with construction site PPE. Water was used from tube well inside the construction site for this phase.

4.5 Operation phase

During operation phase, the operation will be operating for 8hours per day with 3 shift and fulltime employees are required to work daily, 6 days per week. The combined grain milling capacity of the group is in excess of 115,200 M.T per annum. The Green Land International Ltd. is to mill 500 tonns of raw wheat grains per day and 385 tons of finished products are produced per day.

The necessary raw materials are imported from abroad (Australia and the USA) by barge shipment. The raw materials are stored directly through the ship as raw storage silos in IBTT after berthing at the IBTT port in Thilawa Industrial Zone. From the time the raw materials are stored on the ship, they are loaded into the project factory in 20'fet open top containers and moved and stored like the Green Land Raw Storage Silos in the project site. Green Land has 12 silos, each of which can store 3200 tons and a total of 38400 metric tons.

The unit operation for the proposed milling process of wheat flour consists of four major operations:

- Wheat Intake and Pre-Cleaning,
- Wheat Cleaning and preparation,
- Milling, and
- Packing and Dispatching

- List of the machines used throughout the operation process are mentioned as below.
  - Intake Scale
  - Separator
  - Bucket Elevator
  - Conveyor and raw wheat bins
  - Combine cleaner
  - Cockle cylinder
  - Wheat Sourcer
  - Moisture Controller
  - Turbolizer
  - Conveyor For Conveying & Tempering Bins
  - Destoner
  - 1st break scale
  - Roller Mill
  - Pneumatic Fan & Jet Filter
  - Impact Detacher & Drum Detacher
  - Air Lock
  - Plansifter For Sieving
  - Bran Finisher
  - Purifier For Sieving
  - Flour Conveyor and Control Sifter For Sieving
  - Flour Scale
  - Insect Destroyer
  - Flour Storage Bins
  - Tubular Conveyor & Blower For Conveying
  - Flour Scale & Mixer
  - Sterilizer
  - Control Sifter For Sieving
  - Auto Packaging Machine

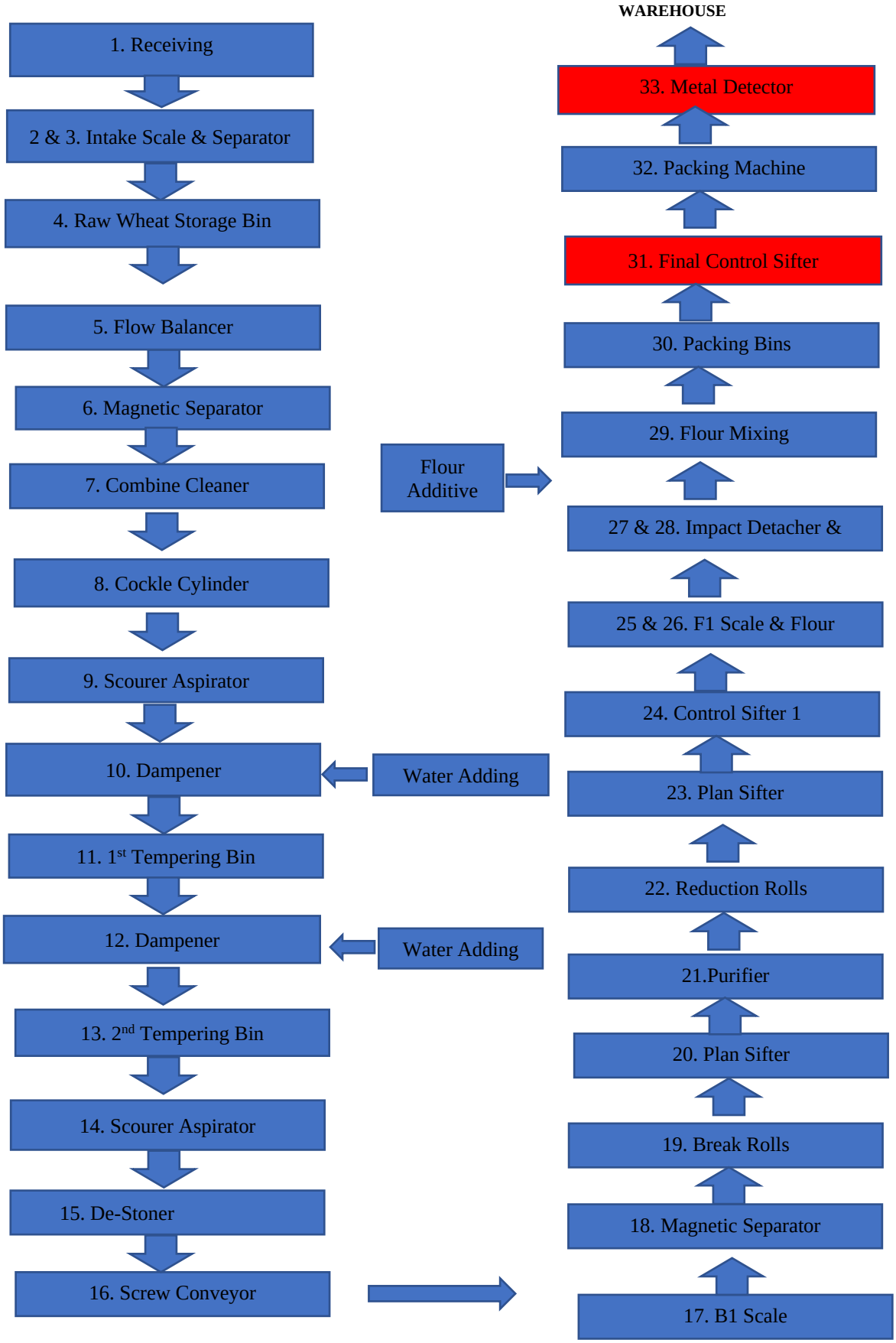


Figure 4. 3 PROCESS FLOW CHART OF PROCESS

Table 4-7 Daily Working Process

Number	Process Procedures	Procedure of Working and Controlling
Receiving		
1	Raw Receiving	After received production plan, production staff request require wheat from silo department according to recipe.
2	Intake Scale 	After received of every type of wheat took scale reading record with production staff and silo responsible person.
3	Separator 	During the receiving time, production staff checks the type of wheat and impurities. 
4	Raw Storage Bin 	After wheat receiving into bins, Check bin stock
1st Cleaning		
5	Flow Balancer	After received of raw wheat, make ratio of different type what of flow balancer according to related grist's.
6	Flow Magnet	Check ferrous impurities at during the 1st cleaning.

7	Combine cleaner 	Check impurities such as straw stone and sand, at during the 1st cleaning. 
8	Cockle cylinder 	Check impurities such as round grain, long grain and broken wheat at during the 1st cleaning.  
9	Scourer Aspirator 	Check impurities such as lighter dust and broken wheat at during the 1st cleaning.
10	Dampener 	Add amount of water which calculated based on raw wheat moisture content and necessary target moisture. 
11	1st tempering bins	After 1st cleaning into condition bins, check bin stock.

		
2nd Dampening		
12	Dampener	Add amount of water which calculated based on FTA (First Tempering After) moisture content and necessary target moisture
13	2nd Tempering Bins	After 2nd Dampening into condition bins, check bin stock.
2nd Cleaning		
14	Scourer Aspirator	Check impurities such as lighter dust and broken wheat at during the 2nd cleaning.
15	Destoner	Check impurities such as stone, wheat straw, small grain and sand, at during the 2nd cleaning.
16	Conveyor 	Add amount of water which calculated based on 1st Break moisture content and necessary target moisture at third stage by using Buhler methods.  Stone & Mud
Milling		
17	B1 scale  ***1st Break Scale***	Make process control chart of quantity according to scale reading Check result of process control actions for adjustments if necessary.
18	Flow magnet	Check ferrous impurities at during the milling.
19	Break Rolls	Shall make adjustment to specific rollers and testing of break release

	 ***Roller Mill***	At specific ratio if necessary, need to readjustment of rolls.
20	Plansifter	Check the each Plansifter compartments of sieves cover leakage individual flour streams. (Pneumatic Fan & Jet Filter)
21	Purifier 	Shall make the setting of purifiers and air setting adjustment as per requirements
22	Reduction Rolls	Shall make adjustment to specific rollers and testing of granulation of reduction rolls at specific ratio if necessary, need to readjustment of rolls.
23	Plan sifter 	Check the each Plansifter compartments of sieves cover leakage individual flour streams. ***Plansifter For Sieving***
24	Control Sifter 	Check the flour pekar test with water and sieves cover leakage. ***Flour Conveyor and Control Sifter For Sieving***
25	F1 Scale 	Make process control chart of by product and flour output quality and quantity etc. according to scale reading Check result of process control actions for adjustments if necessary.

	 ***Flour Scale***	
26	Flow Magnet	Check ferrous impurities at during the milling time.
27	Impact Detacher  	To lift the flour and destroy the insect and insect egg.
28	Flour Storage bin 	Should be write into the log book (starting time, stopping time, RPM and total ton), after transfer (or) blending to packing bins.
Flour Mixing		
29	Flour Mixing 	

	 ***Flour Scale & Mixer***	
30	Packing Bin	Check Bins Stock
Packaging & Finished Good		
31	Final Control Sifter	Check sieve cover leakage and record to machine operation check sheet.
32	Packing Machine  ***Auto Packaging Machine***	Give instructions flour packaging based on types of wheat flour to production staff make sure packaging according to instruction of finished goods products, Check bags of Brand Name, weight and Sewing machine seam
33	Metal Detector	Detect of metal contamination every bag.
	Transfer W.H	After packing, production staff transfer to W.H Finished Good and by products  ***Using Palletizing For Storage***

Bucket Elevator

MYFC(Moisture Controller)

Turbolizer

Sterilizer

Pneumatic Fan & Jet Filter

Air Lock

Bran Finisher

Insect Destroyer

Tubular Conveyor & Blower For Conveying

Figure 4. 4 : Production Machine of Green Land Flour Mill

- **Pre-cleaning and cleaning**

  Firstly, wheat grains are delivered to the site by container trucks through a grid below the hopper outlet. The hopper outlet should be installed with pneumatic dust collector to separate wheat straw, dust, and other lighter impurities from the raw wheat. The grain will be dry cleaned with the use of separator, de-stoned in enclosed cleaning machineries (cockle cylinder) to remove stone, dirt, and other seeds. The cleaned grain is conditioned by addition of water to soak for a period (24 hour) to make grinding easy and reduce power used to grind.

  Currently, for the unit operations before milling process, pneumatic controller which collects the dust and impurities with bags by manually are replaced with automatic control system with fabric filter bags control system and PCL control system.

  Next, wheat grains are transported with bucket conveyer elevator system into twelve silos to storage. Wheat would be taken from the raw wheat silos, weighed, and then passed through various cleaning operations as follows:

- Sieves for the removal of impurities larger or smaller than wheat.
- Destoner for the removal of heavy impurities such as stone.
- Cockle cylinder for the removal of larger or smaller impurities than wheat; and
- Polishing machine, using air currents, for the removal of lighter impurities.

- **Milling**

The milling will be done using Roller mills for grinding, Purifiers and Plan sifters for sieving. Pneumatic air system (air lock, jet filter) is being used for conveying the materials.

- **Packing**

Packing is being used with automatic packing Machine. Packed flour will be stored in warehouse awaiting dispatch to customers. Conveyors are being used in distributing the material inside the industrial process.

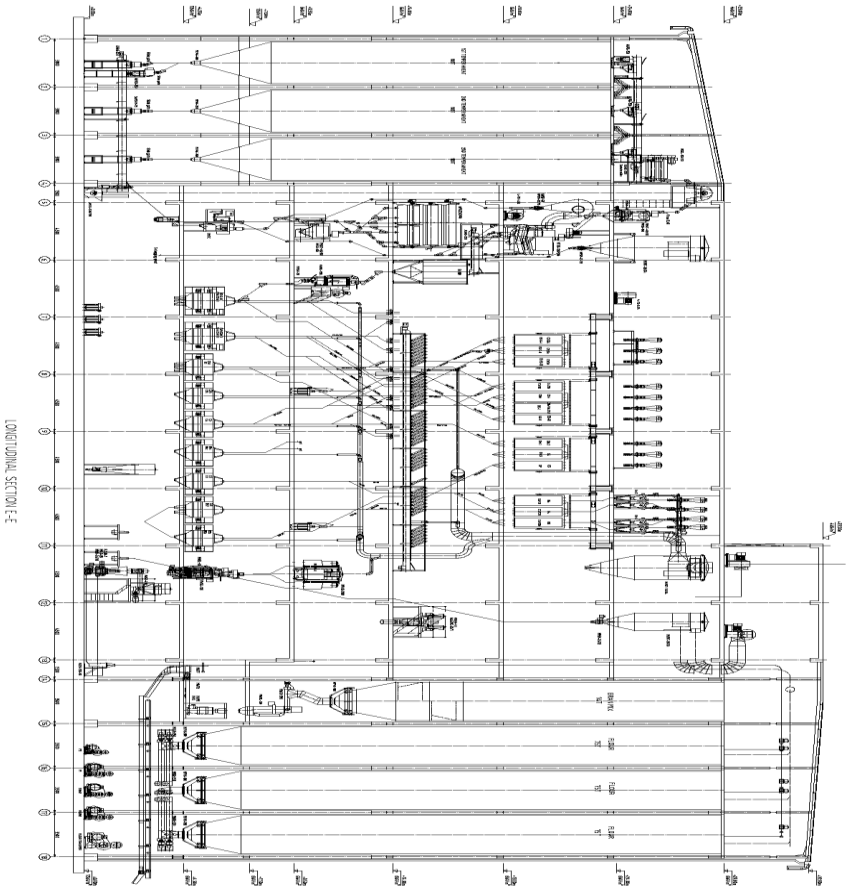


Figure 4.5 Design& Schematic/ Cross Section Diagram

- **Distribution**

For the distribution of products, products are directly distributed to Yangon, Mandalay and nearby places with company-owned vehicles to the shops and factories. In addition to this, The Green Land Myanmar has their own garages in Pathein, Sittwe, Monywa, Pyin Oo Lwin, Lashio, Myeik, and Myitkyina in order to make it easy for consumers to purchase from other parts of Myanmar, and distribute what consumers need over time.

- **Transportation**

For the delivery of finished products, the factory is using 42 vehicles, including trucks and container cars of their own groups around Yangon and Mandalay according to the customer's demand per week. For those who are from remote areas outside of Yangon city, the factory delivers the products to nearest bus terminals and shipment overtime.

- **Power requirement**

The total power required for the proposed unit is 9,300kW/day. The power requirement will be from the government electricity grit. However, 6 power generators set having capacity of 500 MW with are used for the emergency power requirements if the electricity cut off and there is much demand from customers. There is less supply of electricity usually during March and April. In case of main's power failure these generators will run and supply power to the emergency loads.

- **Water requirement**

Water is required in the proposed plant for the addition of moisture to smooth in grain milling. Ground water is the main water source for water consumption. As an alternative, if water is distributed from municipalities, YCDC to industrial zones, there is a plan to use it instead. In addition, water is used for canteen purpose and sanitation. The total water requirement of the plant is 32 m3/day, for the canteen is 27 m3/day and for the other water usage is 13 m3/day.

- **Workforce requirement and staff categories**

There are mainly two categories of staff: the group of permanent staff who is paid monthly and the group of temporary staff who is on his or her daily wages. The group of permanent staff includes accountants, maintenance staffs, engineers, warehouse staff, production staffs, logistic, drivers, counter, administration staffs, etc. The temporary staff includes the people for piling stacks, running generators, separation for impurities, security men, etc.

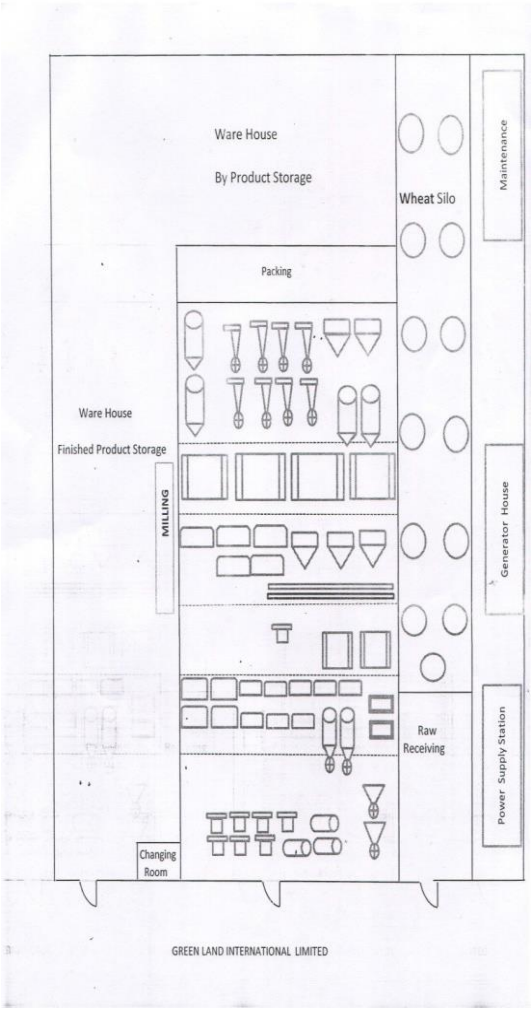


Figure 4. 6 Green Land Wheat Flour Operation Layout Plan

Table 4- 8 The capacity of staff in wheat flour mill

Type of staff	Number of staff
Temporary staffs	331
Permanent staffs	60-100

- **Safety measures**

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

- Earmuffs
- Gloves
- Boots
- Dust Masks
- Helmets
- Eye goggles

4.5.1 Emission from transportation during operation phase

The following impacts are predicted for transportation of raw materials and distribution of the finished products.

Noise emission may cause due to the source of transportation activities of vehicles including staff transportation, raw materials, and finished products transportation during operation hours. The noise impact is expected as low significant.

Road accidents and traffic congestion may be increased for transportation whereas accidents hazards might be occurred.

Due to the plant is built with concrete road facilities implemented at the project site which can mitigate soil pollution from transportation. There is no significant impact on land for fuel leakage/spillage due to transportation of raw materials and distribution finished products.

Air pollution may be occurred from the combustion of fossil fuels such as gasoline and diesel to transport people and goods is the second largest source of CO2 emissions. The plant has operated with light-duty trucks and cube van including pickup trucks, and minivans which are the largest sources of transportation-related greenhouse gas emissions.

Transportation and distribution systems of proposed flour mill are maximized in each geographic area – private cars for usage of staff, trucks which deliver raw materials to a plant, pick up finished product at the same location, then transport the product to a distribution center or directly to a customer. 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. The amount of fuel consumption was based on the following assumptions.

Table 4- 9 Characteristics of distribution trucks from Green Land mill

No.	Type of car	Type of fuel	Quantity of car	Fuel usage per year (gallon)	Kilometer travelled pe
1	Truck (≤ 3 tons)	Diesel	10	9276	220020
2	Truck (3~9 tons)	Diesel	8	8160	174324
3	Truck (≥ 10 tons)	Diesel	3	4764	51684
Total			21	22200	446028

The container cars transporting the numbers of raw material also used diesel fuel. These container cars are 4,608 in numbers for annual. Container vehicles used to transport the raw material from Thilawar harbour to Green Land 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 13,824 gallons per annual.

Total amount of fuel consumption from transportation sector is 36,024 gallons (136,366 liter) of diesel fuel per year.

To obtain the number of grams of CO_2 emitted per gallon of gasoline combusted, the heat content of the fuel per gallon is multiplied by the kg CO_2 per heat content of the fuel.

Gallon of gasoline = 8.887×10^{-3} metric tons CO_2

This value assumes that all the carbon in the gasoline is converted to CO_2 (IPCC 2006).

1Litre of Diesel = 2.68 kg of CO_2

A few percentages of vehicles used natural gas instead of gasoline or diesel as a fuel.

Therm = 0.005302 metric tons CO_2

1 Therm = 0.1 mmbtu

1mmbtu = 14.46 kg carbon

The total emission of CO_2 from transportation sector is 365,461 kg (365.461 metric tons) of CO_2.

4.5.2 Generator usage

The proposed mill would use generators when the electricity generation is cut off from government. Green Land wheat and flour mill has four generators with the 1100KVA MDU+KHOLER specification types and used diesel fuel to generate electricity. There are (4) storage tanks and a total of 7000 gallons of diesel is stored. If it needs to use the generator according to the power requirement, the generator from the storage tank is driven and operated like as the build in tanks.

Power generators set having capacity of 1,000KVA of four generators with acoustic enclosure 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. However, the total usage of generator for one year is only 43 hours. The amount of fuel (diesel) usage for generators is 604 gallons (2286.4 liters) per year.

1 Liters of Diesel = 2.68 kg of CO_2

Total amount of CO_2 emission from generator is 6127.6 kg of CO_2/ year (6.1276 metric tons of CO_2/ year).

Figure 4.7 Diesel Storage Tank

4.6 Existing situation of solid waste generation

4.6.1 Introduction

As the result of industrialization, urbanization, and globalization, one of the major environmental problems come across in the country's big cities in Municipal, industrial, healthcare and hazardous solid wastes management. Municipal Solid Waste Management (MSWM) is a major responsibility of local governments which typically consuming between 20 and 50 percent of municipal budgets in developing countries (Peter et al., 1996).Among all of the different kinds of waste, industrial and hazardous waste management is one of the greatest important issues as the result of improper planning, and management. Solid waste is one of the greatest barriers of the sustainable urbanization and globalization (de Vega et al., 2008). Solid waste management is a major issue not only at government and state levels but also at the institutional level. In Asia, the problem of solid waste management is increasing as the continent is urbanizing. Currently, waste generation in Asia is around 3.5 million tons per day, however, it is estimated to almost double by 2025 (World Bank, 2012)

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

Moreover, in order to determine the most appropriate methods of treatment, handling and disposal, it will also be important to understand the nature and composition of the waste, in particular whether the waste materials are inert or contaminated. Wastes generated during the operational phase have also been considered within this assessment. Impacts on water quality from the generation of waste waters and proposed mitigation measures are discussed.

It is aimed at investigating the waste quantity and characteristics, as well as exploring the existing waste management practices in Milling System. The outcome of the study was to propose suitable 3R strategies for sustainable solid waste management plan and estimated Environmental Impact. To address these research objectives, following research methodology was adopted **(Figure 5.10).**

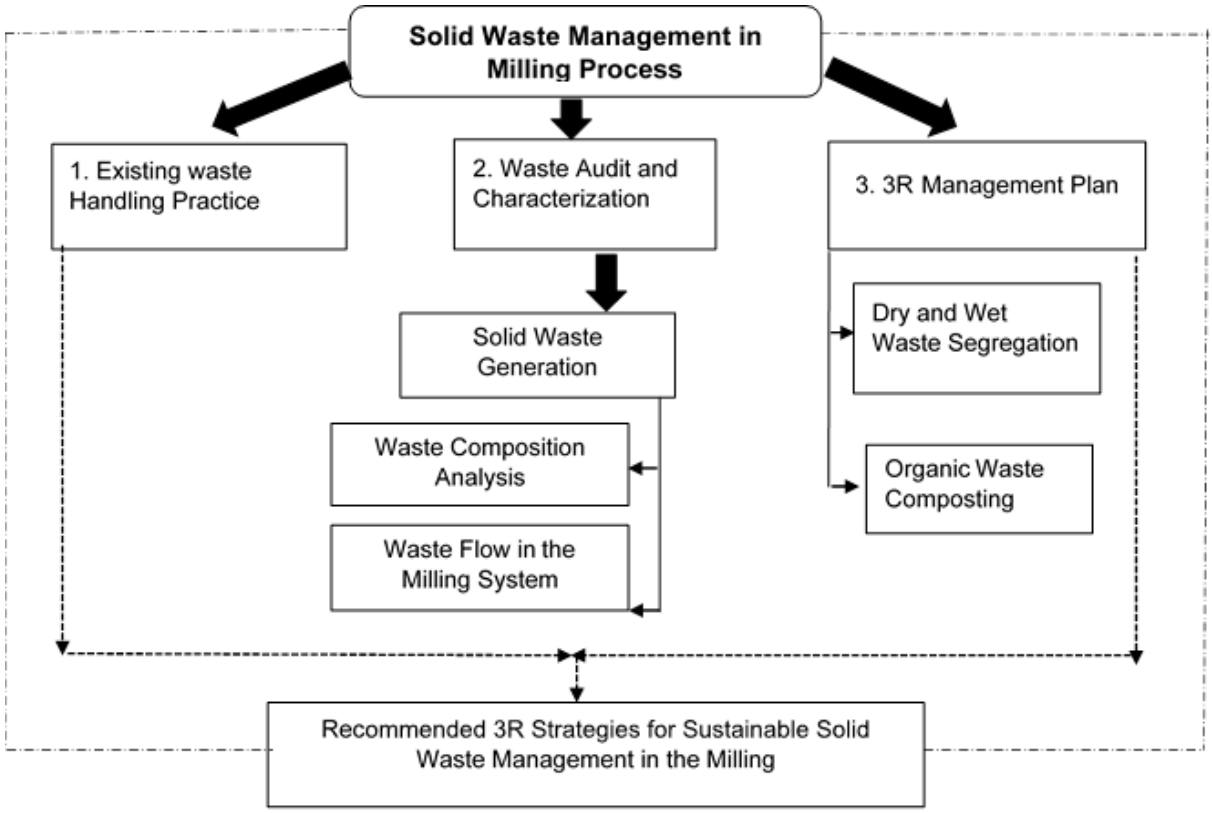


Figure 4. 8 Overall Frame Work

Waste generation is one of the major parameter of waste audit. It is very important to know how much of waste is generated, which then will help planning the proper waste management.

$$\text{Per Capita Waste Generation rate}\left(\frac{kg}{\frac{capita}{day}}\right) = \frac{\text{Quatity of Solid Waste}\left(\frac{\text{kg}}{\text{day}}\right)}{\text{Population (Capita)}}$$

4.6.2 Waste composition analysis

Quartering and coning technique was used for the physical composition analysis of solid wastes of both industrial and domestic waste generated from the mill.

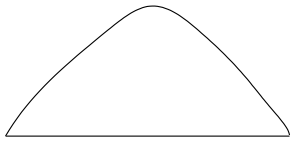
Waste composition samplings were conducted in accordance with the American Society for Testing and Materials (ASTM International) Standard Test Method which is for Determination of the Composition of Unprocessed Municipal Solid Waste [ASTM D5231-92(2003)]. Physical composition analysis were carried out with coning, quartering, and manual sorting of waste components.

$$C = \frac{(Wi \times 100)}{W}$$

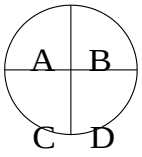
Where,C: Percentage of each waste composition

Wi: Weight of the component/material in waste

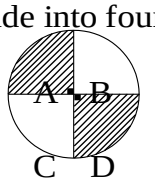
W: Weight of the mixed waste



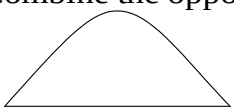
① 200-300 kg of MSW: side view



② Divide into four equal sections: top view



③ Combine the opposite two sections (A & D) and mix



④ 91-131 kg of MSW

Figure 4. 9 Quartering sampling method

(a) Domestic solid waste generation from the milling process

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

Domestic solid waste generated from the Green Land wheat flour milling was measured by manually weighing the waste from entire compound for a day at the final stage.

According to the manual weighting analysis, waste generation from Greenland Flour Milling is 52 kg/day which is approximately 19 tonnes per year coming from the office areas, residential units and kitchen. Thus, from the total population 780, waste generation per capital per day is (0.07) 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, it was significantly less than the national rate of waste generation from developing country.

(b) Industrial waste generation from the Green Land wheat flour mill

Industrial waste generation from the Green Land International wheat flour mill is 46 kg per day which is proximately 17 tonnes per year, which is sent to the municipal. According the amount of usage of raw materials, the total amount of raw materials utilized in this industry is around 315 tonnes per day. This means that only 0.01% of the total usage of raw material was sent to municipal. The main cause of reduction of industrial waste is due to the recycling within the milling compound.

(c) Physical composition of domestic solid waste from the milling compound

Physical composition analysis of solid waste in wheat flour milling was 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 4.9 shows the physical composition of domestic solid waste that produce from the compound.

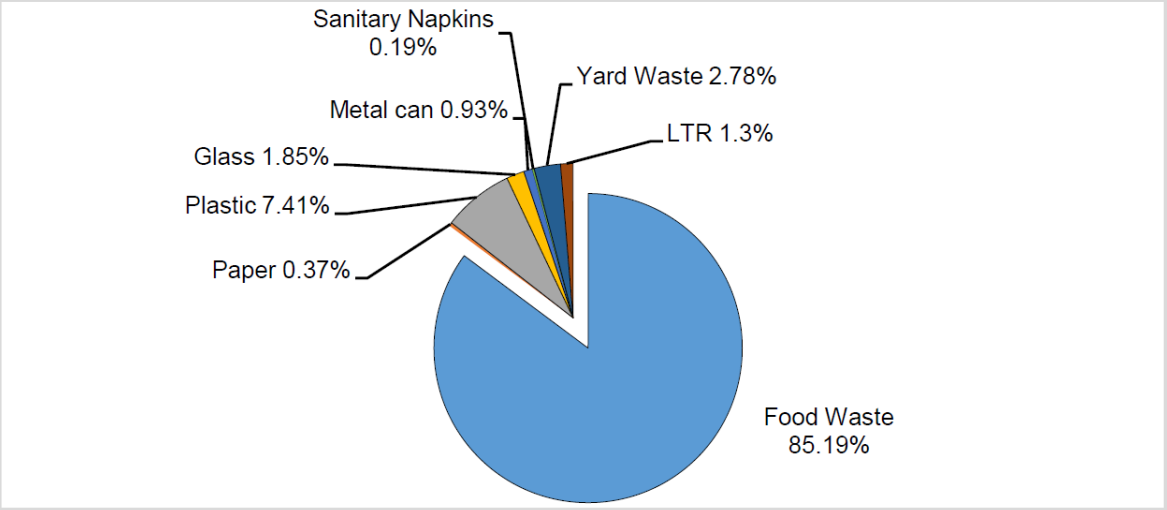


Figure 4. 10 Physical composition of domestic solid waste

Figure 4.10 shows percentage (%) of domestic solid waste from the milling compound weight basis.

The top waste components are identified as; food waste (85.19%) and the combination of others waste are less than 15% of the total domestic waste. Among 15%, plastic is around 7.41%, paper is only 0.37%, glass is around 1.85%, metal can is 0.93%, sanitary napkins is 0.19%, yard waste is 2.78% and LTR is 1.3%.

(d) Physical composition of industrial solid waste from Green Land International

Like the domestic solid waste, physical composition of industrial solid waste was also carried randomly. According to the survey and analysis, there are only two types of waste has been sent to the Municipal. Others are ended in the recycling activities. The two main types of waste are dust and stone. In the following figure 5.13 show the percentage of dust and stone generate from the industry.

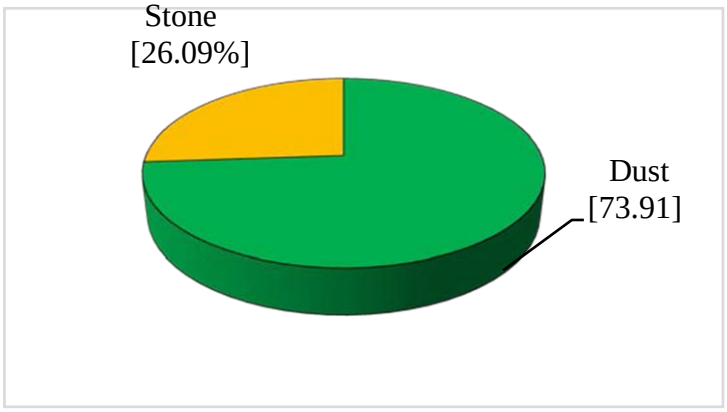


Figure 4. 11 Physical composition of industrial solid waste

Figure 4.10 shows percentage (%) of industrial solid waste from the Green Land International milling.

As the result of weight basis result, generation of fine dust and stone waste are more or less the same. Stone waste is around 26.09 % and fine dust is 73.91%. Mostly all the wastes are end at the recycling activities.

4.6.3 Existing waste handling in the milling process

Green Land International wheat flour company ltd is combined with two sections which is industrial and residential parts. Thus, from this industry, both industrial and domestic solid wastes are generated every day. Main sources of solid wastes from the grinding machines in the milling process are mainly organic wastes such as wheat residues from sieves, fine dusts, stones. Wastes from grain processing are considered to be nonhazardous wastes due to the factory is an agro-processing factory. By products and residues from cleaning section are products that can be sold for animals' feed. Hence, they are properly stored and merchandising to market. Within the industry, all the waste generated is cleaned everyday by the workers and collected in one storage place at the back of industry before sending to dumping site.

All the wastes generating from the industry have been taken by the municipal under Yangon City Development Committee, (YCDC).

Before waste were collected from the municipal, all the wastes from both household areas were disposed in the one bin provided by the YCDC. As mentioned in the first paragraph, the factory is an agro-processing factory and hence there needs no special treatment for all types of wastes both from industry and domestic wastes and the process of waste disposal is lack of segregation and all of mixed waste is being put in all bins. This practice is due to only one bin system which is currently practiced in the factory.

Figure 4. 12 Storage of the industrial wastes at the back of industry

Figure 4. 13 The process of doing waste auditing

Figure 4. 14 Sample of industrial waste produced from the milling system

4.7 Alternatives selection

4.7.1 Comparison Results for the Project Alternatives

Under the proposed project alternative, the project has been increasing and supporting bakery and pastry sector around the project area and in local bakery sector, trigger job creation in and around the area. According to the evaluation of the impacts {described in chapter (4) and (5)}, most of the probable impacts are within managed range that low and severity minor.

This analysis was studied to consider environmental and social impacts in and vicinity of the project area to operate the process with the minimum impacts. This study includes site selection alternatives, operation alternatives to meet the objectives of the project.

4.7.2 Site Selection Alternatives

The zone is divided into 7 parts such as Plastic and Household goods, Chemical products, Electronic goods, foodstuff, wood – base, warehouse and garment respectively. The proposed site is the best suitable one because the project is wheat flour mill factory, and the site is located under the category of the boundary of foodstuff area. At the proposed site, still the predicted impacts from the proposed facility are manageable and can be avoided altogether. What's more, it only takes 5 minutes' walk from industrial zone to the bus stop which is convenient for transportation. Hence, seeking for another site will not be required.

The site has the following advantages:

- ✓ Being located in the industrial zone will have direct access to electrical connection, water source and administrative zone;
- ✓ Accessible transportation of raw material and finished product because the proposed project is located within the industrial zone and rather near to No.2 Highway Road.
- ✓ Other wheat-based pastry and bakery factories are readily available raw materials from factory-made finished wheat products.

- ✓ There needs not to consider on biodiversity.
- ✓ There are no resettlement plan and compensation plan included.
- ✓ The plant is an agro-processing industry with minimal impacts within the boundary of industrial zone. As a result, the negligible impacts may be localized and does not affect those beyond the scope of the project.

4.7.3 Operation Alternatives

a) Technology

Wheat flour mill of Green Land is very highly automated, and all parts of the process are easily adapted to computer control. The factory has been operating the process very costly, using those modernized technology which are capable the mill to operate for the extended periods without continuous on-site operator presence or intervention and that has minimal impacts on the environment.

Adoption of such technology can lead to more output and high profitability with the aim of satisfying the producers, consumers, and the environment in one way or the other. Therefore, the current systematic technology has sufficient to run the plant and there needs no other alternative technology so far.

b) Raw Materials

Even though there may be wheat flour substitutes, the company will only be used wheat as the only raw materials. And there may be no other option to choose. Raw materials are 100% imported from abroad such as USA and Australia.

c) Power Requirement

One of the alternative options taken in account is using so is harnessing the sun's energy to partially power. Installing solar panels for the plant to take advantage of solar power can be a long-term investment and greener living. Solar energy systems reap the benefits in climates that have abundant sunshine. Therefore, it can be an alternative solution for the sunny place like Yangon.

Another consideration is that if the plant is not fully supplied with electricity, using industrial power inventors may be one of the solutions. However, more costs, leakage of oil storage tanks and spillage on ground while filling should be taken into consideration.

In this regard, the power requirement for the plant will be from the government electricity grid. However, 6 power generators set having capacity of 1000 MW with are used as standby for the emergency power requirements and the demand of the products. Owing to the factory is occupying for those two options, the power supply for Green Land International limited is good enough.

4.7.4 No development Option

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

However, if there is a good cooperation between the project proponent and the community, there will be specific environmental and social benefits such as increased employment opportunities, infrastructure upgrades, and other community benefits would occur as a result of the factory development. It is widely recognized that being the food industry, wheat flour milling factory has less negative impact on the environment compared to other factories which significantly emit and release the pollutants into the environment. From an environmental point of view, the environmental conditions of the proposed area will remain the same and there will be no significant impact. Moreover, if the project proponent recognizes and complies with the mitigation measures and management plan described in the ESIA accordingly, the overall impacts become rated as low.

4.7.5 Discrete Alternatives

Incremental alternatives, arise during the assessment of this project in order to address the potential environmental impacts that have been identified.

Nevertheless, the identification of the impacts of the project on the environment showed that there will be no significant negative impact on environment because it is an agro-processing industry which does not use any chemical. Some negligible impacts such as noise pollution for running the machine may be affected but it is localized and not beyond the scope of the project.

There will be an important number of positive impacts on the human environment such as the improved employment opportunities to the population of the zone, the increase in the income of the population working on the site and availability of wheat flour for other wheat-based pastry and bakery factories.

Green Land Wheat Mill also committed that to follow up regular monitoring for impacts measures and different mitigation measures for these negative impacts have been proposed to reduce to the minimum their effects on the socio-economic environment as well as on the biophysical environment.

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 available data. More detailed and in-depth analysis will be provided in a future step of the production, though specific environmental, social and health surveys, contacts and interviews with public and local stakeholders.

5.1 Scope of the study

The proposed project is located in the developed industrial zone and therefore the environmental setting of the project consists of physical (air, water, noise, etc) and human components. The human component includes socio- economic, cultural and quality of life aspects. The study is focused on the conditions found within the project area and in the surrounding environment of the project compound.

Figure (5-1) shows the scoping map for EIA study of Greenland wheat flour milling factory. For the human components, the study was conducted within 2 km radius of the project location.

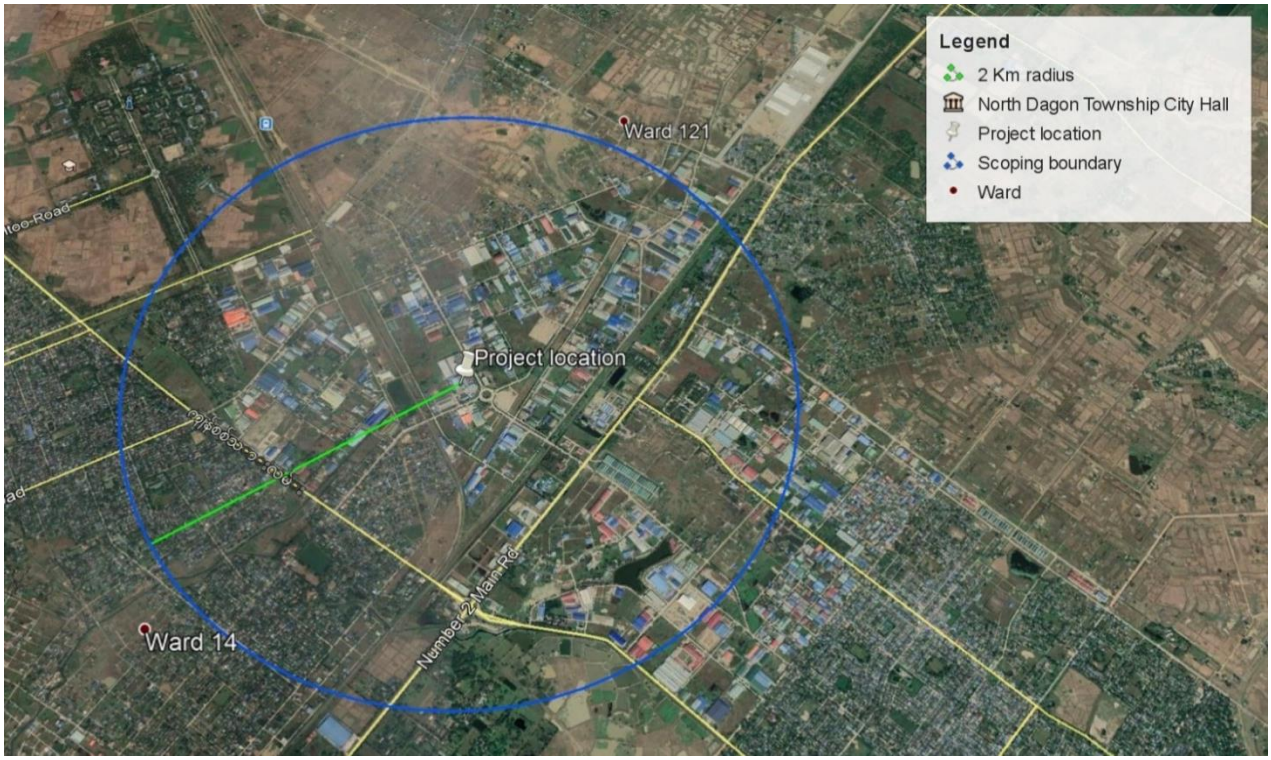


Figure 5.1 Scoping map for Greenland wheat flour milling factory

5.2 Existing air quality

Air sampling in the indoor environment of Green Land (Yangon Office) was conducted in July, 2015 in order to determine the existing indoor air quality. This proposed project will conduct the indoor air monitoring of the Green Land (Yangon office) where people are spending several hours working in enclosed spaces every weekdays. Air velocity/Flow, Room Temperature, Relative Humidity and Microbiological quality (bacteria and fungus/mold) influencing employees' health and physical condition were monitored.

Furthermore, correction of the conditions via natural ventilation (i.e. opening a window) is no longer possible as the reason of energy saving and contribute to the buildup of indoor air

contaminants (OSHA, n.d.)

In terms of indoor air contaminants, Biological aerosols have been the predominant cause of complaints in 1-5% of problem office building investigated by the US. National Institute of Occupation Safety and Health (NIOSH).

Microbial pollution of indoor air comes from hundreds of species of bacteria, fungi and moulds that grow indoors when sufficient moisture is available. Exposure to microbial contaminants is clinically associated with respiratory symptoms, allergies and asthma, and can affect the immunological system. Preventing or minimizing persistent damp and microbial growth on interior surfaces and building structures is the most important means of avoiding harmful effects of indoor air on health.(WHO, n.d.)

Indoor air quality is a major concern to employees because it can impact the health, comfort, well being, and productivity of building occupants.

Therefore, the survey will focus on the biological indoor air monitoring along with the moisture, air movement and temperature conditions of the rooms.

5.2.1 Ambient air monitoring locations

Locations of air sampling stations are listed in **Table 5-1.** The air quality sampling methodology used for this project is described in the subsection which follows.

Figure 5.2 Map for baseline air sampling locations in operation phase

Table 5-1 Air sampling locations for baseline survey

Points	Locations	Coordinates		Start	End Date
		N	E		
1	Green Land packing place(Location 1)	16` 53' 44.8"	096` 14' 1.9"	30.4.2015	1.5.2015
2	Green Land storage place(Location 2)	16` 53' 45.5"	096` 13' 58.4"	2.5.2015	3.5.2015
3	Office building (Location3)	16` 53' 43.4"	096` 13.59.0"	3.5.2015	4.5.2015
4	Generator (Location 4)	16` 53' 44.0"	096` 14' 1.7"	4.5.2015	4.5.2015

5.2.1.1 Existing baseline ambient air quality

The averaged 24-hour air parameters at the selected monitoring location are summarized as follows:

Table 5-2 The averaged 24-hour air parameters at the selected location

Air Monitoring Location	CO (ppm)	VOC (ppm)	NO_2 (ppb)	SO_2 (ppb)	NH_3 (ppm)	CH_4 (ppm)	O_3 (ppm)	PM_{10} (ug/m^3)	$PM_{2.5}$ (ug/m^3)
Green Land	**0.12**[a]± 0.04[b] **0.2**[c](0.01[d]-0.23[e])	**0.62**[a]**± 0.18**[b] **0.57**[c](0.02[d]-1.5[e])	**59**[a] **±6**[b] **54**[c](39[d]-89[e])	**107**[a] **88**[c](13[d]-281[e])	**1**[a]**±0.2**[b] **0.9**[c](0[d]-1.7[e])	**6161**[a]**±186**[b] **6400**[c](5113[d]-6492[e])	**1.4**[a]**±0.2**[b] 1.4[c](1[d]-2[e])	**70**[a]**± 6**[b] 70[c](41[d]-91[e])	**45**[a] **±6.2**[b] 52[c](17[d]-64[e])
WHO	**NA**	**NA**	40[1]	20[2]			100ug/m3 (8hr)	50[2]	25[2]
USEPA (NAAQS)	**9 ppm (8hr)**	NA	100[2]	80[2]			0.075ppm (8hr)	1502	35[2]
NEQG	30,000 µg/m3 (one hr) µg/m3 µg/m3 (8 hr)	NA	40 µg/m3 (annual) /200 µg/m3	20 µg/m3 (24 hour)	NA	NA	100ug/m3 (8hr)	50 µg/m3	25 µg/m3

[1] Annual mean,[2] 24hr average,NA – not available [a] Average[b] SE [c]Median [d]Min [e]Max

The existing baseline levels of CO (1,327 ppm) is extremely higher than the USEPA guideline of 9 ppm. NO_2 and SO_2 gases are higher than the WHO guideline but below the USEPA guideline. Dust (respirable PM_{10} and $PM_{2.5}$) in all selected sites were approximately 8-12 times higher than WHO guideline respectively.

In general, the results of the air pollutants monitored over 24hr (for six days) around the wheat flour mill project *did not meet the international guidelines*.

According to the observations, these air pollutants mainly come from *fugitive dust of local activities* and *mobile emissions*.

(a) Point (1) Green Land packing place (Location-1) Lat 16` 53' 47.6" & Long 096` 13' 59.0"

A NO_2 baseline gas concentration was found to be above the WHO guideline (updated 2005) and below the National Ambient Air Quality Standards (NAAQS, set by USEPA 1990) and the World Bank guideline. SO_2 Baseline gas concentrations was found to be above the WHO guideline (updated 2005), the National Ambient Air Quality Standards (NAAQS, set by USEPA 1990) and the World Bank guideline (**Table 5-3**).

Table 5- 3 Baseline air monitoring at packing place (Location-1)

Substance ($\mu g/m^3$)	Date	Green Land Packing Place (Location-1)	WHO Guideline	NAAQS (USEPA)	World Bank Guideline	NEQG µg/m3
NO_2 (ppb)	Start-28.4.2015	**49**[a](27[b]-184[c])	40[1]	100[2] ppb	150[2] ppb	40 $\mu g/m^3$ (annual) /200 $\mu g/m^3$ (one hour)
SO_2(ppb)	End-29.4.2015	**147**[a](1[b]-1342[c])	20[2]	80[2] ppb	125[2] ppb	20 $\mu g/m^3$
CO (ppm)		**0.04**[a](0.001[b]-0.7[c])	NA	9ppm(8hr) 35 ppm (1hr)	NA	30,000 $\mu g/m^3$ (one hr) 10,000 $\mu g/m^3$ (8 hr)
VOC(ppm)		**0.002**[a](0.001[b]-	NA	9 ppm (8hr)	NA	NA
NH_3(ppm)		**0.02**[a](0[b]-3.1[c])			NA	NA
CH_4(ppm)		**6,492**[a](5743[b]-			NA	NA
O_3(ppm)		**0.001**[a](0[b]-0.02[c])	100ug/m3m (8hr)	0.075ppm (8hr)	NA	100
Remark						
Weather- Fine						

[1] Annual mean,[2] 24hr average,NA – not available,[a] Average[b] Min [c] Max

Figure 5.3 Ambient air monitoring station at Green Land packing place (Location-1)

(b) Point (2) Green Land storage place(Location-2) (16` 53' 47.5" N, 096` 13.59.4"E)

NO_2 Baseline gas concentrations was found to be above the WHO guideline (updated 2005) and below the National Ambient Air Quality Standards (NAAQS, set by USEPA 1990) and the World Bank guideline. SO_2 Baseline gas concentrations was found to be above the WHO guideline (updated 2005), the National Ambient Air Quality Standards (NAAQS, set by USEPA 1990) and the World Bank guideline (**Table 5-4**).

Table 5- 4 Baseline air monitoring at storage place (Location-2)

Substance (µg/m^3)	Date	Green Land Storage place (Location-2)	WHO Guideline	NAAQS (USEPA)	World Bank Guideline	NEQG µg/m3
NO_2 (ppb)	Start-29.4.2015 End-30.4.2015	**54**^{d}(1^b-205^c)	40[1]	100[2] ppb	150[2] ppb	40 µg/m^3 (annual) /200 µg/m^3 (one hour)
SO_2(ppb)		**281**^{d}(1^b-6983^c)	20[2]	80[2] ppb	125[2] ppb	20 µg/m^3
CO (ppm)		**0.2**^{a}(0.001^b-2.5^c)	NA	9ppm (8hr) 35 ppm (1hr)	NA	30,000 µg/m^3 (one hr) 10,000 µg/m^3 (8 hr)
VOC(ppm)		**0.6**^{d}(0.001^b-5.3^c)	NA	9 ppm (8hr)	NA	NA
NH_3(ppm)		**0.9**^{a}(0^b-10.2^c)			NA	NA
CH_4(ppm)		**6474**^{a}(6020^b-			NA	NA
O_3(ppm)		**0.001**^{a}(0^b-0.001^c)	100ug/m3m (8hr)	0.075ppm (8hr)	NA	100
Remark						
Weather- Fine						

Figure 5.4 Ambient air monitoring station at Green Land storage place (Location-2)

(c) Point (3) Office building (16` 53' 43.4" N, 096` 13.59.0"E) Green Land wheat flour

NO_2 Baseline gas concentrations was found to be above the WHO guideline (updated 2005) and below the National Ambient Air Quality Standards (NAAQS, set by USEPA 1990) and the World Bank guideline. SO_2 Baseline gas concentrations was found to be above the WHO guideline (updated 2005), the National Ambient Air Quality Standards (NAAQS, set by USEPA 1990), but below the World Bank guideline (**Table 5-5**).

Table 5- 5 Baseline air monitoring at office building (Location 3)

Substance ($\mu g/m^3$)	**Date**	**Office Building**	**WHO Guideline**	**NAAQS (USEPA)**	**World Bank Guideline**	**NEQG µg/m3**
NO_2 (ppb)	Start- 3.5.2015 End- 4.5.2015	**58**[a](37[b]-115[c])	40[1]	100[2] ppb	150[2] ppb	40 $\mu g/m^3$
SO_2(ppb)		**88**[a](1[b]-1105[c])	20[2]	80[2] ppb	125[2] ppb	20 $\mu g/m^3$
CO (ppm)		**0.2**[a](0.001[b]-1.2[c])	NA	9ppm (8hr) 35 ppm (1hr)	NA	30,000 $\mu g/m^3$ (one hr) 10,000
VOC(ppm)		**1**[a](0.001[b]-1.5[c])	NA	9 ppm (8hr)	NA	NA
NH_3(ppm)		**1.1**[a](0[b]-4.9[c])			NA	NA
CH_4(ppm)		**6099**[a](4649[b]-6865[c])			NA	NA
O_3(ppm)		**0.001**[a](0[b]-0.02[c])	100ug/m3m (8hr)	0.075ppm (8hr)	NA	100
Remark						
Weather- Fine						

Figure 5. 5 Ambient air monitoring station at Diamond Star office building

(d) Point (4) Generator (16` 53' 51.0" N, 096` 13' 59.2"E) Green Land wheat flour

NO_2 Baseline gas concentrations were found to be above the WHO guideline (updated 2005) and below the National Ambient Air Quality Standards (NAAQS, set by USEPA 1990) and the World Bank guideline. SO_2 Baseline gas concentrations were found to be above the WHO guideline (updated 2005) and below the National Ambient Air Quality Standards (NAAQS, set by USEPA 1990) and the World Bank guideline (**Table 5-6**).

Table 5- 6 Baseline air monitoring near generator (Location 4)

Substance (µg/m^3)	**Date**	**Generator**	**WHO Guideline**	**NAAQS (USEPA)**	**World Bank Guideline**	**NEQG µg/m3**
NO_2 (ppb)	Start-4.5.2015 End-4.5.2015	**89**^{a}(70^b-108^c)	40[1]	100[2] ppb	150[2] ppb	40 µg/m^3 (annual) /200 µg/m^3 (one hour)
SO_2(ppb)		**39**^{a}(1^b-251^c)	20[2]	80[2] ppb	125[2] ppb	20 µg/m^3
CO (ppm)		**0.001**^{a}(0.001^b-0.001^c)	NA	9ppm (8hr) 35 ppm (1hr)	NA	30,000 µg/m^3 (one hr) 10,000 µg/m^3 (8 hr)
VOC(ppm)		**0.6**^{a}(0.001^b-7^c)	NA	9 ppm (8hr)	NA	NA
NH_3(ppm)		**0**^{a}(0^b-0^c)			NA	NA

CH_4(ppm)		**5113[a]**(4650[b]-5764[c])			NA	NA
O_3(ppm)		**0.002[a]**(0[b]-0.01[c])	100ug/m3 m (8hr)	0.075ppm (8hr)	NA	100
Remark						
Weather- Fine						

[1] Annual mean,[2] 24hr average,NA – not available,[a] Average[b] Min [c] Max

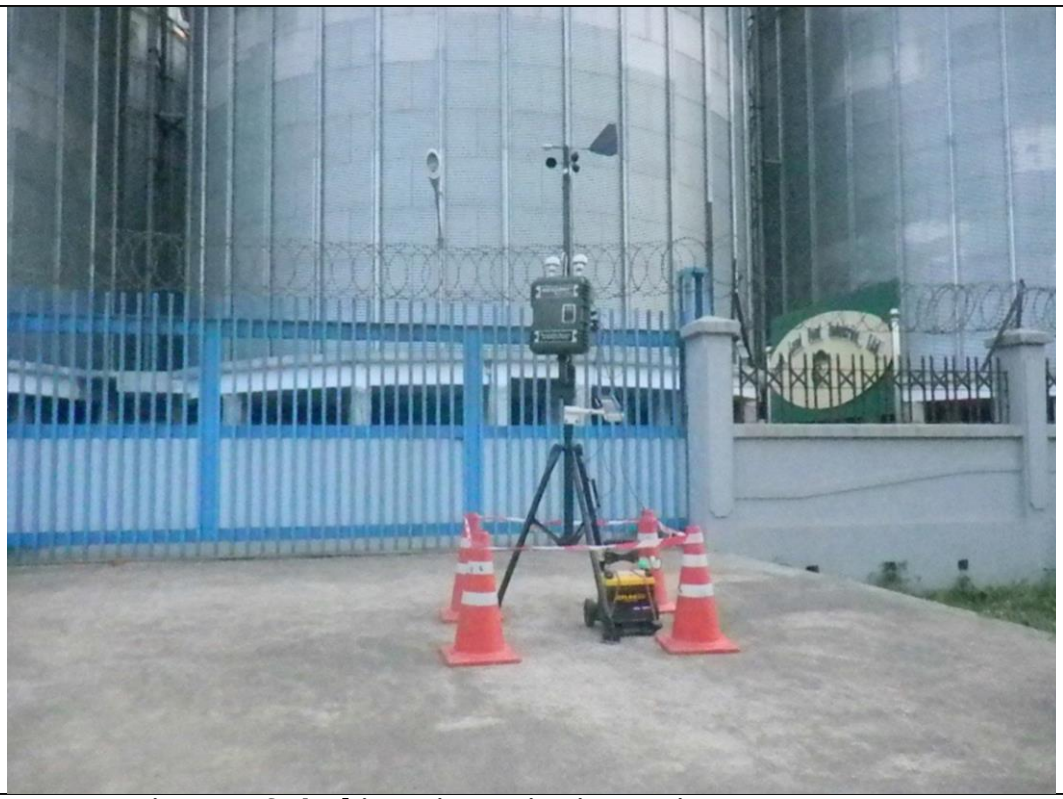


Figure 5. 6 Ambient air monitoring station near generator

5.2.1.2 Baseline gas quality

Table 5- 7 Baseline gas quality in Green Land flour mill

Substance (µg/m^3)	Green Land Flour Mill	WHO Guideline	NAAQS (USEPA)	World Bank Guideline	NEQG µg/m3
NO_2 (ppb)	**63[a] ±7[b]** **56[c]**(49[d]-89[e])	40[1]	100[2] ppb	150[2] ppb	40 µg/m^3 (annual) /200 µg/m^3 (one hour)
SO_2(ppb)	**139[a] ±40[b]** **118[c]**(39[d]-281[e])	20[2]	80[2] ppb	125[2] ppb	20 µg/m^3
CO (ppm)	**0.1[a]±0.04[b]** **0. 1[c]**(0.001[d]-0.2[e])	NA	9ppm (8hr) 35 ppm (1hr)	NA	30,000 µg/m^3 (one hr) 10,000 µg/m^3

VOC (ppm)	**0.5[a]± 0.1[b]** **0.6[c]**(0.002[d]-1[e])	NA	9 ppm (8hr)	NA	NA
NH_3 (ppm)	**0.5[a]±0.2[b]** **0[c]**(0[d]-1.1[e])			NA	NA
CH_4 (ppm)	**6045[a]±245[b]** **6287[c]**(5113[d]-6492[e])			NA	NA
O_3 (ppm)	**0.001[a]±0.0002[b]** 0.001[c](0.001[d]-	100ug/m^3(8 hr)	0.075ppm (8hr)	NA	100

[a] Average[b] SE [c]Median [d]Min [e]Max

5.2.1.3 Air pollutants (particulates)

Table 5.8 presents the results of dust concentrations with the EPAS air monitoring station over a 24hr period.

Baseline levels of PM_{10} did not meet the WHO guideline but meet with the USEPA guideline while $PM_{2.5}$ level did not meet both WHO guideline and USEPA guideline.

Table 5- 8 Baseline PM_{10} and $PM_{2.5}$ concentrations at Green Land wheat flour

Location	PM_{10} 24-hr avg (range) µg/m^3	$PM_{2.5}$ 24-hr avg (range) µg/m^3	Remarks
Green Land packing place (Location-1)	**86[a]**(15[b]-554[c])	**64[a](1[b]-728[c])**	Fine weather
Green Land storage place (Location-2)	**76[a]**(3[b]-348[c])	**52[a]**(1[b]-501[c])	Fine weather
Office buildin	**70[a]**(27[b]-260[c])	**33[a]**(1[b]-380[c])	Fine weather
Generator (Location-	**41[a]**(23[b]-72[c])	**17[a]**(1[b]-52[c])	Rainy
Average	**68[a]± 7[d]** 73[e](41[b]-86[c])	**42[a] ±8[d]** 43[e](17[b]-64[c])	
WHO guideline[1]	50	25	
NAAQS (USEPA)[1]	150	35	

Bold Higher than WHO air quality guidelines

[a] Average[d]SE[b] Min [c] Max [e]Median

5.3 Local climate

The onsite meteorology data measured by the EPAS monitoring station indicates Temperature, Relative Humidity, Wind speed and Wind direction. Table 5-9 presents that the wind direction generally comes from the South at the concerned regions.

Table 5- 9 Meteorology data obtained from air quality sampling stations at Green Land wheat flour

Location	Temperature (Degree C)	Wind Speed (kph)	Wind Direction (Degree from North)	Relative Humidity (%)
Green Land packing place (Location-1)	**42**^{a}(38^{b}-49^{c})	**0.3**^{a}(0^{b}-9.7^{c})	**SSW**	**43**^{a}(31^{b}- 51^{c})
Green Land storage place (Location-2)	**43**^{a}(1^{b}-49^{c})	**0.3**^{a}(0^{b}-10.6^{c})	**SSE**	**42**^{a}(32^{b}- 90^{c})
Office building (Location-3)	**43**^{a}(33^{b}-62^{c})	**3.8**^{a}(0^{b}-12.8^{c})	**S**	**49**^{a}(18^{b}- 66^{c})
Generator (Location-4)	**62**^{a}(5^{b}-68^{c})	**5**^{a}(0^{b}-15.2^{c})	**S**	23^{a}(19^{b}- 29^{c})

5.3.1 Temperature and precipitation

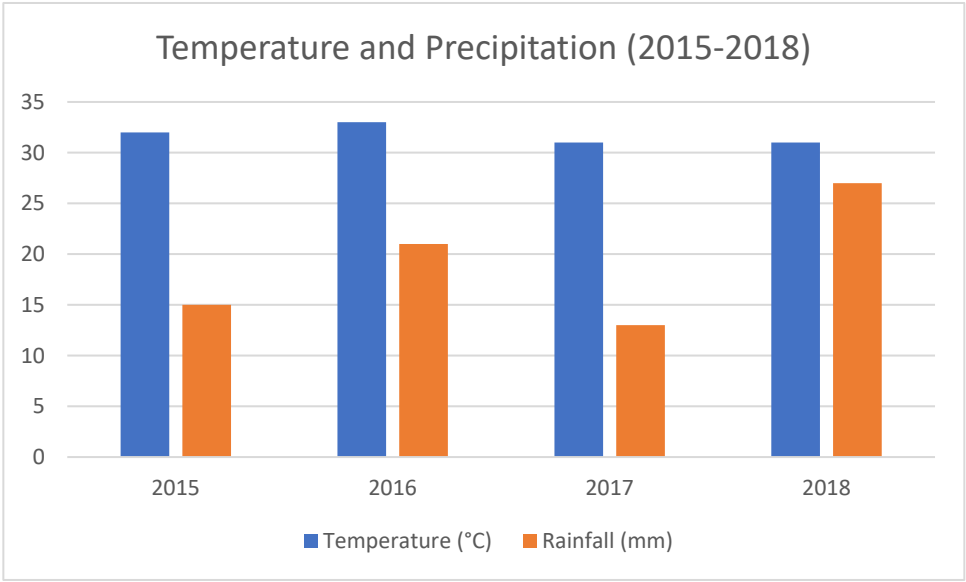


Figure 5.7 Annual average temperature and precipitation in Yangon City (2015-2018)

Figure 5-7 shows the annual average temperature and precipitation in Yangon City from 2015 to 2018. The average temperature during this 4 years has no significance change, but the rainfall in 2018 increased into above 25 mm.

5.3.2 Wind speed and relative humidity

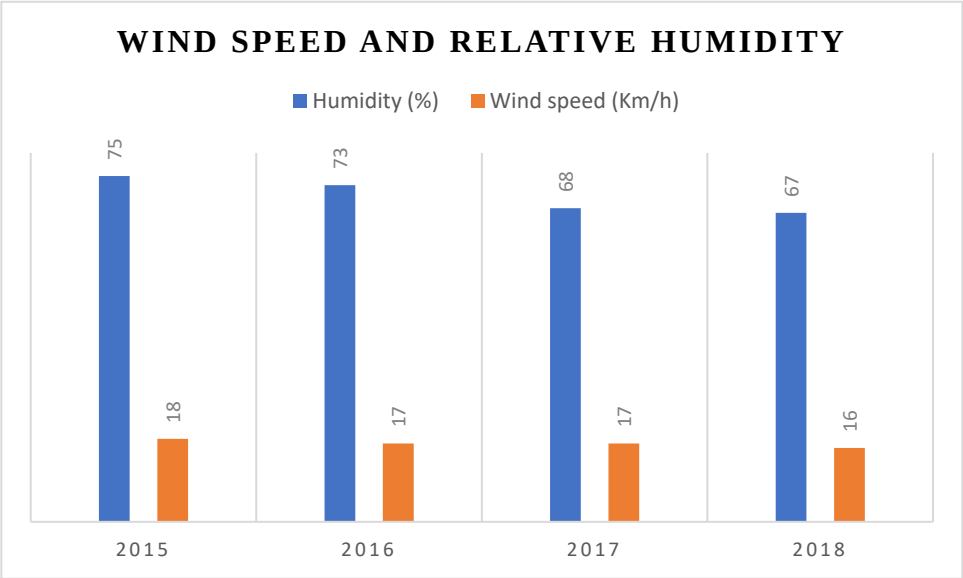


Figure 5. 8 Annual average wind speed and relative humidity in Yangon City (2015-2018)

The figure 5.8 shows the average annual wind speed and relative humidity in Yangon city during 2015-2018.

5.4 Existing situation of working places

5.4.1 Introduction

Air sampling in the indoor environment of Green Land (Yangon office) was conducted in July, 2015 in order to determine the existing indoor air quality. This proposed project will conduct the indoor air monitoring of the Green Land (Yangon office) where people are spending several hours working in enclosed spaces every weekdays. Air velocity/flow, room temperature, relative humidity and microbiological quality (bacteria and fungus/mold) influencing employees' health and physical condition were monitored.

Step 1. Site Visits and Identification of Sampling Sites

↓

Step 2. Air Sampling Points (2 samples)

5.4.1.1 Laboratory QC Room
5.4.1.2 Meeting Room

↓

Step 3. Indoor Air Quality Monitoring

I.Physical Air Monitoing: Room Moisture (Roof & Walls)

Indoor Air Velocity

↓

Step 3. Laboratory analysis (samples for Bacteria and Fungus) **and data interpretation**

↓

Step 4. Provision of the necessary recommendations

Physical Air Monitoring
Moisture

Wall Moisture

Ceiling Moisture

Figure 5. 9 Meeting room temperature & moisture

Figure 5. 10 Biological indoor air monitoring in laboratory

Figure 5. 11 Air velocity indoor monitoring in laboratory

5.4.1.1 Indoor air monitoring in Green Land

Table 5- 10 Summary of the indoor air parameters of Green Land ground floor (laboratory for food samples) and first floor (meeting room)

Indoor Air Parameters	Laboratory (QC room)	Meeting room	Guideline OSHA
Room Temperature	25	25	20-24.4°C
Air Velocity (at vent) m/s	0.3	0.3	<0.25 m/s
Relative Humidity (*wall*) %	44	43	20-60 %
Relative Humidity (ceiling) %	48	46	20-60 %
Total Bacteria Count	145	-	1,000 CFU/m^3
Total Fungus Count	29	-	Normal Growth <250 cfu/m^3 Moderate mold growth - 250-1,000 cfu/m^3 Active mold growth >1,000 cfu/m^3

In terms of the physical parameters of both the meeting room and the laboratory, room temperature, air velocity and relative humidity of wall and ceiling meet the OSHA guidelines.

Based on the findings, the ***indoor microbial air quality status*** of the laboratory was recognized as clean air quality.

Thus, ***no serious threat*** to ***employees' health***; was found regarding the indoor air quality. However, these air contaminations should be ***controlled within the acceptable limits***.

(a) Indoor air monitoring in Green Land meeting room

Table 5- 11 Air sampling locations for baseline survey

Points	Locations	Coordinates		Start Date	End Date
		N	E		
1.	Meeting Room	16` 53' 44.4"	096` 13.59.5"	29.7.2015	29.7.2015

Table 5- 12 Physical parameters of meeting room

Physical parameters	Temperature (°C)	Relative Humidity (%)			at HVAC supply vent
		Ceiling	Wall- 1	Wall -2	Air Velocity(m/s)
	25.1	**46**	**86**	**45**	**0.2**
Guideline	20-24.4°C	20-60%			< 0.25 m/s

(b) Baseline air monitoring at meeting room (116` 53' 44.4" N, 096` 13.59.5"E)

SO_2 Baseline gas concentration was found to be above the WHO guideline (updated 2005) and below the National Ambient Air Quality Standards (NAAQS, set by USEPA 1990) and the World Bank guideline (**Table 5.16**).

Table 5- 13 Baseline air monitoring at meeting room

Substance ($\mu g/m^3$)	**Date**	**Green Land Meeting Room**	**WHO Guideline**	**NAAQS (USEPA)**	**World Bank Guideline**	**NEQG µg/m3**
NO_2 (ppb)	Start-29.7.2015	**36**[a](1[b]-44[c])	40[1]	100[2] ppb	150[2] ppb	40 $\mu g/m^3$ (annual) /200 $\mu g/m^3$ (one hour)
SO_2(ppb)	End-29.7.2015	**83**[a](1[b]-182[c])	20[2]	80[2] ppb	125[2] ppb	20 $\mu g/m^3$
CO (ppm)		**1**[a](1[b]-1[c])	NA	9ppm (8hr) 35ppm(1hr)	NA	30,000 $\mu g/m^3$ (one hr) 10,000 $\mu g/m^3$ (8 hr)
VOC(ppm)		**1**[a](1[b]-1[c])	NA	9 ppm (8hr)	NA	NA
NH_3(ppm)		**0.1**[a](0[b]-1.3[c])			NA	NA
CH_4(ppm)		**22**[a](0[b]-86[c])			NA	NA
O_3(ppm)		**2**[a](0[b]-4[c])	100ug/m^3 (8hr)	0.075ppm (8hr)	NA	100
ARad(CPM)		**18[a](8[b]-31[c])**				
Remark						
Weather- Fine.						

[1] Annual mean,[2] 24hr average,NA – not available,[a] Average[b] Min [c] Max

Figure 5. 12 Ambient air monitoring station in the meeting room

Table 5- 14 Baseline PM_{10} and $PM_{2.5}$

Location	PM10 24-hr avg (range) µg/m^3	PM2.5 24-hr avg (range) µg/m^3	Remarks
Green Land Meeting Room	19[a](2[b]-50[c])	11[a](1[b]-616[c])	Fine weather
WHO guideline[1]	50	25	
NAAQS (USEPA)[1]	150	35	

Bold Higher than WHO air quality guidelines

[a] Average [d]SE [b] Min [c] Max [e]Median

Baseline levels of PM_{10} meet the WHO guideline and USEPA guideline while $PM_{2.5}$ level meet both WHO guideline and USEPA guideline

(c) Indoor air monitoring in Green Land laboratory (QC room)

Table 5- 15 Physical parameters of QC room

Physical Parameters	Temperature (ºC)	Relative Humidity (%)			at HVAC supply vent
		Ceiling	Wall-1	Wall-2	Air Velocity(m/s)
	24.6	**48**	**0**	**84**	**0.2**
Guideline	20-24ºC	20-60%			<0.25 m/s

Remark: High Ceiling Moisture, High One Wall Moisture

Remark : High Temperature, High Ceiling Moisture, High One Wall Moisture, Vent Velocity

(d) Biological indoor air quality measurement in laboratory

Table 5- 16 Biological indoor air quality measurement (QC room)

Bacteria			Fungus		Guideline (OSHA)
Microscopy	Culture	Total CFU/m	Fungal species	Total CFU/m	
Measured on 29.7.2015 QC Room					
Gram positive cocci in pairs & group, Gram positive bacilli.	Coagulase negative Staphylococcus (2 type) Bacillus (1 types)	145	Aspergillus flavus, Aspergillus fumigates, Mycelia sterile, Penicillium species and Cladosporium species	29	1,000 CFU/m^3

Bacteria :QC Room in Bacterial count is less than the OSHA guideline of 1,000 CFU/m^3.

Fungus: In this room fungal count is less than the OSHA guideline.

Coagulase-negative staphylococci are normal flora on skin, respiratory & gastrointestinal system of human & animals, also in food.

Bacilli cause from ear infections to meningitis, & urinary tract infections to septicemia. Mostly they occur as secondary infections in immune deficient hosts,& may exacerbate previous infection by producing tissue-damaging toxins that interfere with treatment

Cladosporium: grow at relative humidity 80-90% & is found in soil, on decaying plant & as plant pathogens. It is not human pathogens except in immune-compromised patients. It can trigger allergic to sensitive individuals. It can cause allergy and asthma.

Penicillium: grow humidity <80% and found in soil, decaying plant debris, compost piles and fruit rot. In indoors, they are on water damaged building materials & on food items. It can cause hay fever, asthma, hypersensitivity pneumonitis

Aspergillus flavus: grow at relative humidy 80-90%. It produces aflatoxin, a contaminant in foods (eg nuts)

Aspergillus fumigatus is tertiary colonizers which grow at relative humidity >90%& in decomposing organic material & causes allergic reactions.

(e) Local climate

The onsite meteorology data measured by the EPAS indicated temperature, relative humidity, wind speed and wind direction.*

Table 5- 17 Meteorology data obtained from air quality sampling in the meeting room

Location	Temperature (Degree C)	Wind Speed (kph)	Relative Humidity (%)
Green Land meeting room	$25^a(20^b\text{-}37^c)$	$0^a(0^b\text{-}0^c)$	$80^a(61^b\text{-}91^c)$

a Average b Min c Max

In general, physical parameters: Temperature and RH were acceptable for the office staff. The results of the gas parameters monitored over 8hr in the meeting room meet the international guidelines except SO_2 level. Particulate matters were found to be below the standards.

5.4.2 Ambient air monitoring

The ambient air monitoring had been conducted in the vicinity within 2 km around the proposed factory located at No. 54/55/56, Quarter (113), Industrial Zone, East Dagon Township, Yangon, Myanmar.

5.4.2.1 Objective

It was aimed to reveal the existing baseline ambient air quality at and around the project site.

5.4.2.2 Ambient air monitoring locations

Locations of air sampling stations are listed in **Table 5.18.** The air quality sampling methodology used for this project is described in the annex.

Point 1 – Near Production area
Point 2 – Near Residential area

Table 5.18 Air sampling locations for baseline survey, August, 2022

Points	Locations	Coordinates		Start Date	End Date
		N	E		
1	Near Production area	16.896601	96.232926	11.8.2022	12.8.2022
2	Near Residential area	16.895460	96.232748	12.8.2022	13.8.2022

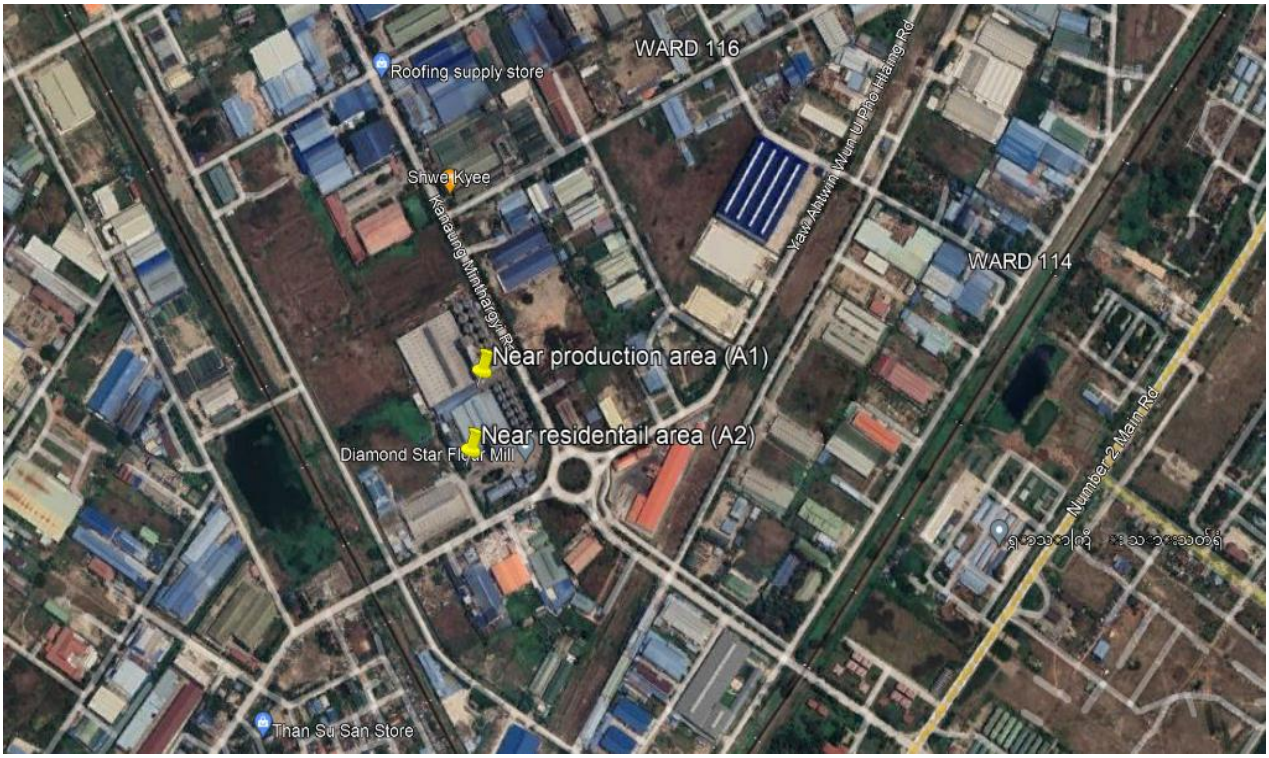


Figure 5.13 Map of air monitoring locations

5.4.2.3 Point (1): Near Production area

Figure 5.14 Map of ambient air monitoring near production area

Figure 5.15 Ambient air monitoring at point (1), near production area (Day time)

Figure 5.16 Ambient air monitoring at point (1), near production area (Night time)

The point 1 is located near the production area. Regarding particulates, Table 5.19 presents both the levels of PM10 (38 µg/m^3) and PM 2.5 (21 µg/m^3) met the EQEG guidelines (ECD). In terms of gases level, one-hour average level of NO2 (110 µg/m3), one-hour average level of CO (1,145 µg/m3), eight hours average level of CO (369 µg/m3), eight hours average level of O_3 (72 µg/m3) and 24hr average level of SO2 (14 µg/m3) met the guidelines.

The meteorology findings (Temperature, Relative Humidity, Wind Speed, Wind Direction) during the monitoring were presented below. (Table 5.19)

Table 5.19: Ambient air monitoring at point (1), Near production area

Parameters	Concentration (24hr average) except some Gases (NO2, CO and O3)*	National Environmental Air Quality Guideline (ECD)/WHO Guideline (24hr average)
PM10	38[a](2[b]-56[c]) µg/m^3	50 µg/m^3
PM 2.5(µg/m^3)	21[a](1[b]-42[c]) µg/m3	25 µg/m^3
NO_2*	58[a](2[b]-138[c]) µg/m3 (24 hr) 110µg/m^3 (one hr)	40 µg/m^3 (annual) /200 µg/m^3 (one hour)
SO_2	14[a](5[b]-27[c]) µg/m3	20 µg/m^3
CO *	0.3[a](0[b]-1.5[c]) mg/m3 / 300[a](0[b]-1500[c]) µg/m3 (24hr) 1.145 mg/m^3 (one hr)/1145 µg/m3 0.369 mg/m^3 (8 hr) /369 µg/m3	30,000 µg/m^3 (one hr) 10,000 µg/m^3 (8 hr)
O_3*	60[a](44[b]-180[c]) µg/m3 (24hr) 72 µg/m^3 (8 hr)	100 µg/m^3 (8hr)

H2S	$25^a(0^b\text{-}137^c)$ ppb	NA
CO2	$383^a(321^b\text{-}412^c)$ ppm	NA
VOC	$25^a(0^b\text{-}70^c)$ ppb	NA
NH_3	$9^a(4^b\text{-}16^c)$ppm	NA
CH_4	$156^a(107^b\text{-}200^c)$ppm	NA
Meteorology		
T (Degree C)		$26^a(25^b\text{-}28^c)$
RH		$87^a(64^b\text{-}100^c)$
Wind Speed (kph)		$2.7^a(0^b\text{-}6^c)$
Wind Direction (Degree from North)		217(SW)
Remark:		
There were vehicles, machine and human activities. There was raining in the evening and night time.		

^{a} *Average* ^{b} *Min* ^{c}*Max*

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)

5.4.2.4 Point (2): Near Residential area

Figure 5.17 Map of ambient air monitoring near residential area

Figure 5.18 Ambient air monitoring at point (2), near residential area (Day time)

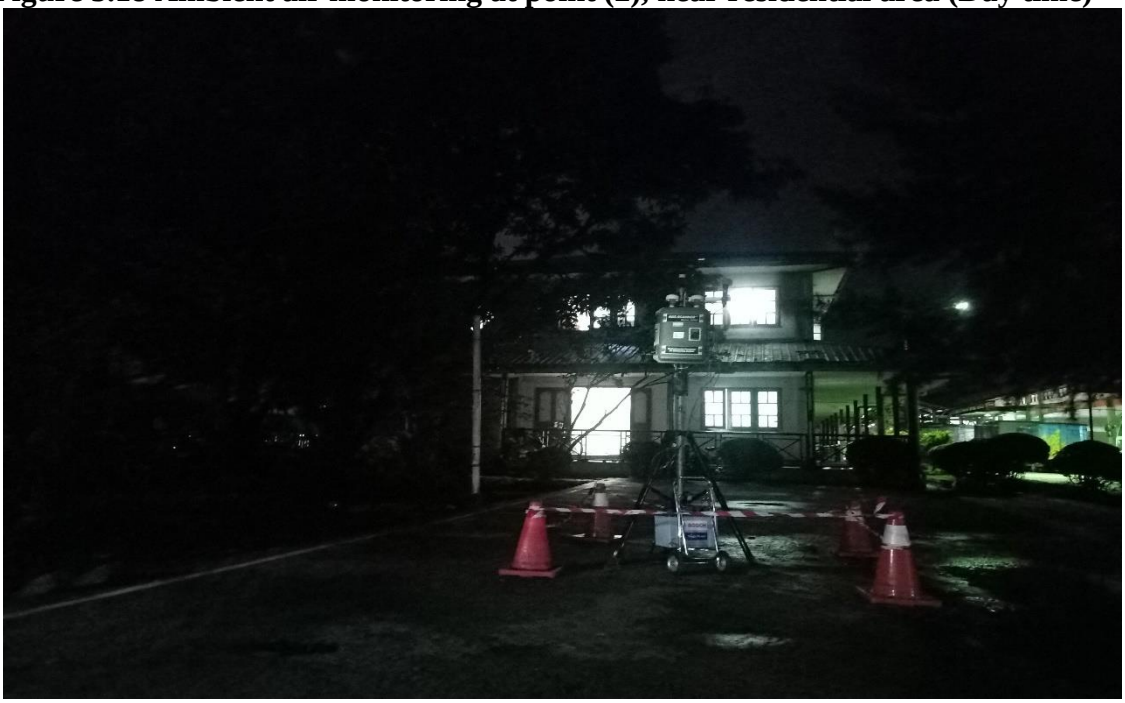


Figure 5.19 Ambient air monitoring at point (2), near residential area (Night time)

The point 2 is located near the residential area. Regarding particulates, Table 5.20 presents both the levels of PM10 (31 µg/m^3) and PM2.5 (15 µg/m^3) met the EQEG guidelines (ECD). In terms of gases level, one-hour average level of NO2 (83 µg/m^3), one-hour average level of CO (600 µg/m^3), eight hours average level of CO (260 µg/m^3), eight hours average level of O_3 (52 µg/m^3) and 24hr average level of SO2 (10 µg/m3) met the guidelines.

The meteorology findings (Temperature, Relative Humidity, Wind Speed, Wind Direction) during the

monitoring were presented below. (Table 5.20)

Table 5.20: Ambient air monitoring at point (2), Near residential area

Parameters	Concentration (24hr average) except some Gases (NO2, CO and O3)*	National Environmental Air Quality Guideline (ECD)/WHO Guideline (24hr average)
PM10	$31^a(2^b\text{-}60^c)$ µg/m^3	50 µg/m^3
PM 2.5(µg/m^3)	$15^a(1^b\text{-}25^c)$ µg/m3	25 µg/m^3
NO_2*	$49^a(2^b\text{-}98^c)$ µg/m3 (24 hr) 83µg/m^3 (one hr)	40 µg/m^3 (annual) /200 µg/m^3 (one hour)
SO_2	$10^a(3^b\text{-}17^c)$ µg/m3	20 µg/m^3
CO *	$0.2^a(0^b\text{-}1.06^c)$ mg/m3 / $200^a(0^b\text{-}1060^c)$ µg/m3 (24hr) 0.6 mg/m^3 (one hr) / 600 µg/m3 0.26 mg/m^3 (8 hr) / 260 µg/m3	30,000 µg/m^3 (one hr) 10,000 µg/m^3 (8 hr)
O_3*	$46^a(2^b\text{-}109^c)$ µg/m3 (24hr) 52 µg/m^3 (8 hr)	100 µg/m^3 (8hr)
H2S	$16^a(0^b\text{-}70^c)$ ppb	NA
CO2	$397^a(326^b\text{-}479^c)$ ppm	NA
VOC	$21^a(0^b\text{-}38^c)$ ppb	NA
NH_3	$8^a(2.5^b\text{-}8.8^c)$ppm	NA
CH_4	$116^a(55^b\text{-}200^c)$ppm	NA
Meteorology		
T (Degree C)		$26^a(25^b\text{-}28^c)$
RH		$87^a(0^b\text{-}100^c)$
Wind Speed (kph)		$0.9^a(0^b\text{-}5^c)$
Wind Direction (Degree from North)		101.23 (E)
Remark:		
The monitoring station is near the residential area. There was heavy raining in the evening and night time.		

[a] Average [b] Min [c] Max

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)

5.5 Existing noise quality

5.5.1 Introduction

Industrial Noise refers to noise that is created in the factories which is jarring and unbearable. Sound becomes noise only when it becomes unwanted and if it becomes more than that it is referred to as "noise pollution". The problem has been viewed and analyzed from all the perspectives but the solution probably is not so easy to achieve since there is a lot of contradiction between legislation, guidance and documents. Industrial Noise resulting to noise pollution has many reasons such as industries being close to human habitats which prevent the noise from decaying before it reaches human ear. The purpose of this study was to ascertain industrial noise pollution and its impact on the immediate workers and nearby local community.

5.5.2 Noise Levels

The table 5.21 shows the potential sources of noise from milling machinery, raw material conveying form silos and generators. The vibration of proposed mill is acceptable level.

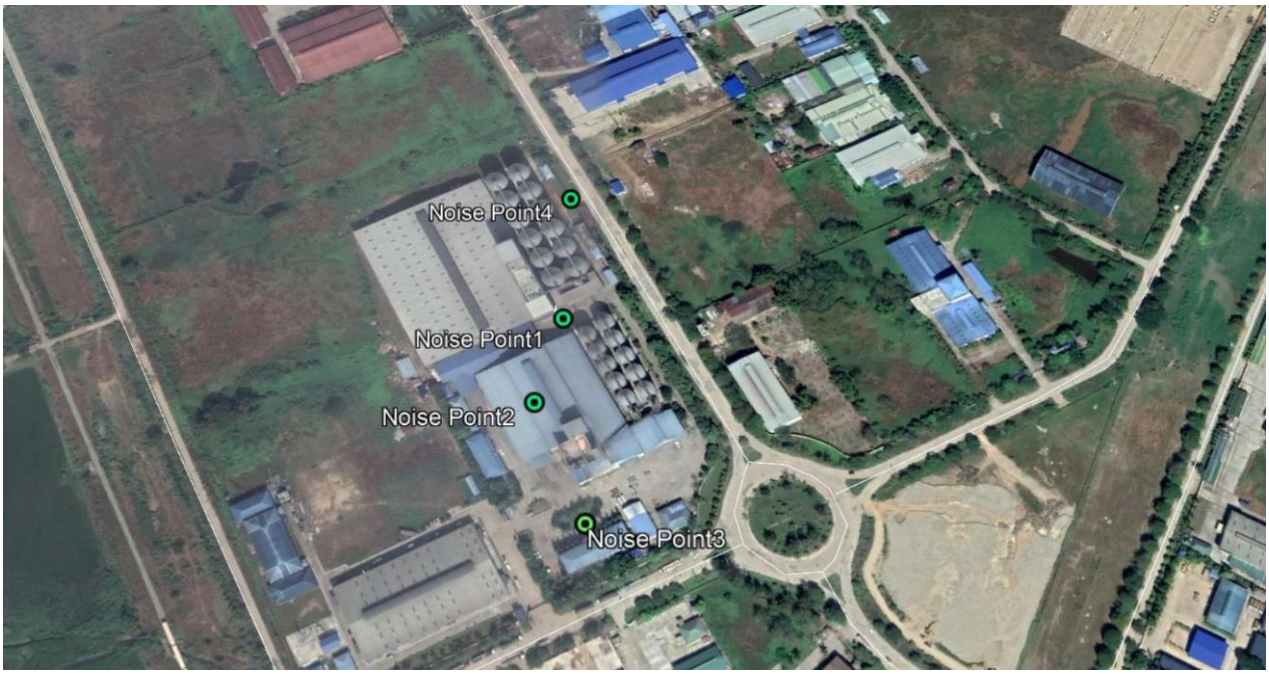


Figure 5.20 Map for noise point location

Table 5- 21 Base line noise data of proposed mill for both day and night time

Area	Noise Generating Activity	Source of Noise	Day Time Noise Level (dB)	Night Time Noise Level (dB)	Coordinates		Noise standard value of
					N	E	
Admin Office	Working of office staffs	Office staffs	$45.56^{a}\pm0.63^{b}$ $42.7^{c}(33.5^{d}$- $75.4^{e})$	$37.98^{a}\pm0.36^{b}$ $36.6^{c}(34.1^{d}$- $55.5^{e})$	16` 53' 43.4"	096` 13.59.0"	70
Green Land Storage Area	Conveying raw material to silo and transport to milling	Milling machines and conveyers	**$93.56^{a}\pm0.52^{b}$ $95.7^{c}(58.2^{d}$- $97.7^{e})$**	**$95.74^{a}\pm0.4^{b}$ $96.2^{c}(60.9^{d}$-$97.7^{e})$**	16` 53' 45.5"	096` 13' 58.4"	
Green Land Packing Area	Packing of flour from flour bin	Packing machine and workers'	$62.62^{a}\pm0.25^{b}$ $62.9^{c}(49.9^{d}$-$76^{e})$	$65.14^{a}\pm0.25^{b}$ $64.7^{c}(61.4^{d}$- $74.9^{e})$	16` 53' 44.8"	096` 14' 1.9"	
Green Land Generator	Operating generator	Generator	**$80.53^{a}\pm0.08^{b}$v $80.4^{c}(79.9^{d}$- $82.8^{e})$**	**$80.53^{a}\pm0.08^{b}$ $80.4^{c}(79.9^{d}$- $82.8^{e})$**	16` 53' 44.0"	096` 14' 1.7"	

Bold Higher than EQG noise standard level

[a] Average[b] Standard Error [c]Median [d]Min [e]Max

Figure 5.21 Noise meter and noise data monitoring

5.5.3 Introduction

The ambient noise level monitoring was carried out for 24hr continuously at the factory as well as nearby community located at the East Dagon township, Yangon region, Myanmar where people are spending several hours working in weekdays and weekends.

5.5.3.1 Objective

It was aimed to reveal the existing baseline ambient noise level.

5.5.3.2 Ambient noise monitoring locations

Locations of noise sampling stations are listed in **Table 5-22.**

- Point 1 near production area
- Point 2 near residential area

Table 5-22 Noise sampling locations for baseline survey, August, 2022

Points	Locations	Coordinates		Start Date	End Date
		N	E		
1	Near production area	16.896601	96.232926	11.8.2022	12.8.2022
2	Near residential area	16.895460	96.232748	12.8.2022	13.8.2022

The following tables (5-23 to 5-24) show the noise level measured around the factory area as well as nearby community. Being situated around the industrial area, the findings were compared with the applicable noise level guideline for industrial by Environmental Quality (Emission) Guideline by Environmental Conservation Department (ECD).

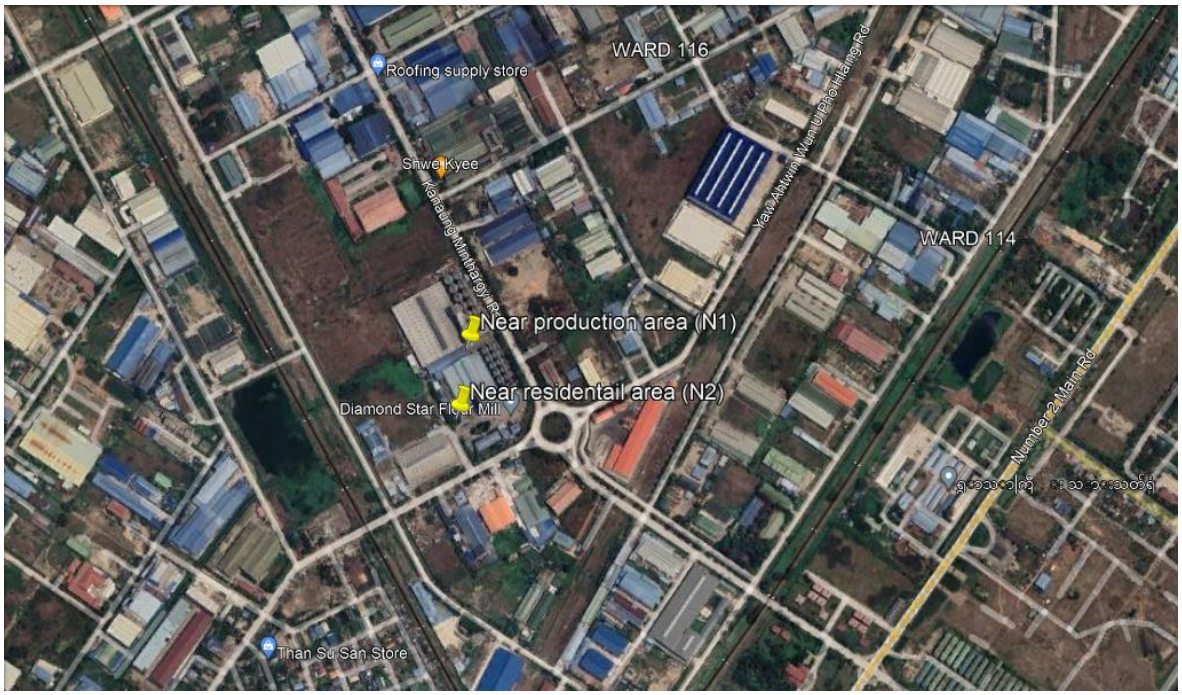


Figure 5.22 Map of noise monitoring locations

5.5.3.3 Point (1) The existing baseline ambient noise monitoring location (1), Near production area

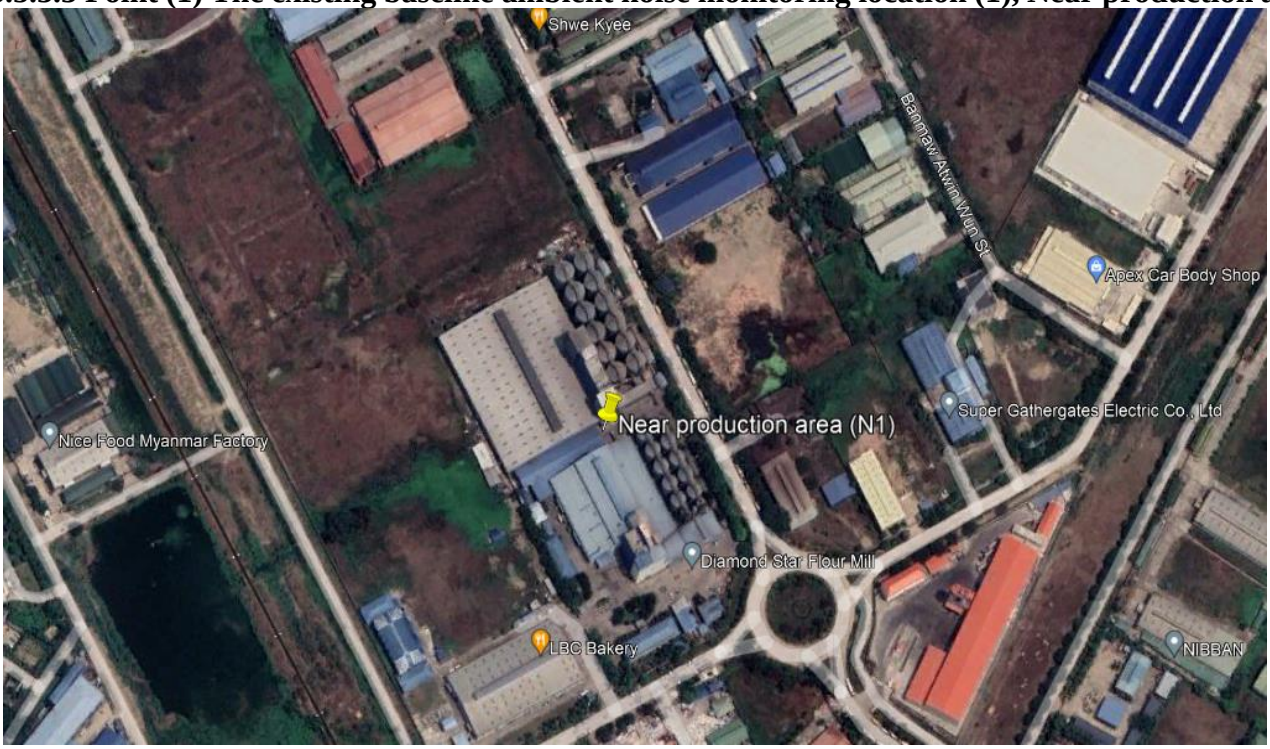


Figure 5.23 Map of ambient noise monitoring at point (1), Near production area

Figure 5.24 Noise monitoring station at Point (1) Near production area (Day time)

Figure 5.25 Noise monitoring station at Point (1) Near production area (Night time)

Table 5-23 The 24hr average noise level at point 1

Area	Whole Day Average Noise Level (dB)	Day Time Noise Level (dB)	Noise standard value of EQEG for Industrial (Day Time)
Near production area	$63^{a}\pm0.1^{b}$ $60^{c}(45^{d}\text{-}83^{e})$	$63^{a}\pm0.16^{b}$ $59^{c}(45^{d}\text{-}83^{e})$	70
		Night Time Noise Level (dB)	**Noise standard value of EQEG for Industrial (Night Time)**
		$63^{a}\pm0.13^{b}$ $60^{c}(56^{d}\text{-}76^{e})$	70

[a]Average[b] Standard Error [c]Median [d]Min [e]Max

Based on the findings, the average noise levels (both day and night time) at the point 1 met EQEG. Generally, these levels were mainly captured from vehicles (Cars and Trucks), generator and people activities. There was heavy raining in the evening and night time.

5.5.3.4 Point (2) The existing baseline ambient noise monitoring location (2), Near residential area

Figure 5.26 Map of ambient noise monitoring at point (2), Near Community

Figure 5.27 Noise monitoring station at point (2) Near Community (Day Time)

Figure 5.28 Noise monitoring station at point (2) Near Community (Night time)

Table 5-24 The 24hr average noise level at point 2

Area	Whole Day Average Noise Level (dB)	Day Time Noise Level (dB)	Noise standard value of EQG for Industrial (Day Time)
Near residential area	57[a]±0.1[b] 55[c](42[d]-78[e])	58[a]±0.1[b] 56.7[c](42[d]-78[e])	70
		Night Time Noise Level (dB)	**Noise standard value of EQG for Industrial (Night Time)**
		53[a]±0.12[b] 52[c](43.5[d]-67.5[e])	70

[a]Average[b] Standard Error [c]Median [d]Min [e]Max

Based on the findings, the average noise levels (both day and night time) at the point 2 met EQEG. Generally, these levels were mainly captured from vehicles (cars and trucks), machine, generator and people activities. There was heavy raining at night.

5.6 Soil

The project area as shown in Figure 2.2 Location map, includes mostly the industries already for 10 years. The area is suburban flat area along with rare cultivated (about ***90% of land*** is ***concrete*** in the industrial zone). The physical appearance of the remaining soil is ***Coarse sandy soil.*** Which 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.

5.7 Flora and fauna

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

The East Dagon Industrial Zone has established since about 2002 that is around 3 years after the new urban developments have been settled down around the project area.

According to the traditional biodiversity related knowledge survey, there is ***no both negative and positive impact on the nature, local animals, plants and pasture*** etc. because of the industrial developments.

Thus, it can be assumed that there is less impact on the biological environment by the industry and its activities. According to screening and scoping results, there is no specific biodiversity assessment required.

5.8 Existing situation of portable water quality

5.8.1 Introduction

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 kind of contaminant which contaminate the surface water, ground water and soil. Water is one of the essential needed for the industrialization process and human health.

Currently, water population is expected to exceed nine billion people by 2050 at global situation. The main sources of pollution are happened in developing countries, particularly in urban areas that already have inadequate wastewater infrastructure. Besides, in the developing country, there is no enough fiancé situation on infrastructure. As the result of some problems such as financial, environmental and social costs are projected to increase dramatically unless wastewater management receives urgent attention.

Waste management plans have a key role to play in achieving sustainable waste management. Their main purpose is to give an outline of waste streams and treatment options. More specifically they aim to provide a planning framework to improve management system. Besides, water treatment is one of the main important factors for both saving environment and economic valuable in the near future. Many diseases and premature deaths can be prevented by adequate care of our environment.

This analysis was carried out to determine the pollution load or processing industry and to compare the concentrations of each pollutant with national and international wastewater or effluent standards and emission guidelines.

5.8.2 Tube well water

In the milling process, the main sources of potable water come from the tube well. Filtration method for water treatment is utilized before distribution to industrial use and domestic use as well. According to the information, the water usage for this milling is around 30.1m^3/day from the three different main sources such as milling process, canteen and others activities.

In the following table 5.19 shows the amount of water usage from the Green Land Wheat Flour Milling System. In the potable water analysis, there are around 19 parameters which are vital for the human health and surrounding environment. All the analysis is based on Gravimetric Analysis Method.

Table 5- 25 Amount of water usage from three different sources

No	Water Usage	Water Source	Amount (m^3/day)
	Milling process	Tube Well	13.5
	Canteen		11.4
	Other Activity		5.7
Total			**30.1**

Figure 5.29 Water sample collection from tube well

Table 5-26 The results and the permissible limits for current potable water

No.	Test Parameter	Unit	Tube Well	WHO guideline	USEPA guideline	IFC Effluent Guideline	NDWQS	Remarks
1.	Ammonia Nitrogen		ND	1.5	N/A	N/A	1.5	
2.	Chloride	mg/l	174.4 1 mg/l	250	N/A	N/A	250	
3.	Manganese	mg/l	ND	0.1	50 ug/l	N/A	0.4	
4.	pH		7.7	6.5~8.5	6.5-8.5	6-9	6.5-8.5	
5.	Iron	mg/l	0.20	<0.3	300 ug/l (0.3 mg/L)	N/A	1	
6.	Total Dissolved Solid	mg/l	**910**	1000	500	N/A	1000	High dissolved solids may affect the taste of water.
7.	Conductivity	mg/l	1,256	N/A	N/A	N/A	1500	
8.	Turbidity	FTU	0	<5	N/A	N/A	5	
9.	Total Alkalinity	mg/l $CaCO_3$	135	N/A	N/A	N/A	30-250	
10.	Total Hardness	mg/l as $CaCO_3$	150	N/A	N/A	N/A	N/A	

No.	Test Parameter	Unit	Tube Well	WHO guideline	USEPA guideline	IFC Effluent Guideline	NDWQS	Remarks
11.	Chloride	mg/l	184	250	250	N/A	250	
12.	Magnesium	mg/l	14	150	N/A	N/A	150	
13.	Calcium	mg/l	40	200	N/A	N/A	200	
14.	Sulfate	mg/l	96	250	250	N/A	250	
15	Zinc	mg/l	0.028	3	5,000 µg/L(5 mg/L)	N/A	3	
16.	Colour	Pt-Co	0	15 cu	NA	N/A	15	
17.	Arsenic	mg/l	0.001	0.01	10 µg/L (0.01 mg/L)	N/A	0.05	
18.	Copper	mg/l	0.037	1-2	1,300 µg/L (1.3 mg/L)	N/A	N/A	

No.	Test Parameter	Unit	Tube Well	WHO guideline	USEPA guideline	IFC Effluent Guideline	NDWQS	Remarks
19	Total Coliforms	MPN/100 ml	**>16**	0	0	400	0 in 100 ml	Coliforms are naturally present in the environment. Total Coliform is used as an indicator that other potentially harmful bacteria may be presented.

The results were compared with three different guidelines such as WHO guidelines, USEPA, IFC Effluent Guidelines and National Drinking Water Quality Standard (NDWQS)
According to the drinking water guidelines, the important parameters such as both physical and chemical parameter which can affect on not only human health but also environment are analyzed in this study. All the different parameters can be divided into four Ammonia Nitrogen, Chloride, Manganese, pH, Iron, Total Dissolved Solid, Conductivity, Turbidity, Total Alkalinity, Total Hardness, Chloride, Magnesium, Calcium, Sulfate, Zinc, Color, Arsenic, Copper, and Total Coliforms.

According to the findings, physical parameter such as pH, color, turbidity, pH is in the range of 7.7, Color is 0 Pt-co, Turbidity is 0 FTU were much lower than not only WHO guidelines but also USEPA and IFC guidelines.

The result of TDS is 910 mg/L which is slightly less than WHO guidelines, however; according to the water standard TDS, it should be around 500 to 520 mg/L. It can lead to aesthetic problem for the people using this water. Besides, it can change the taste of the water.

Regarding the biological parameter, total Coliforms were being found in the potable water Total Coliform is used as an indicator that other potentially harmful bacteria may be presented.

5.9 Existing situation of waste water

5.9.1 Introduction

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 kind of contaminant which contaminate the surface water, ground water and soil. Water is one of the essential needed for the industrialization process and human health.

Currently, water population is expected to exceed nine billion people by 2050 at global situation. The main sources of pollution are happened in developing countries, particularly in urban areas that already have inadequate wastewater infrastructure. Besides, in the developing country, there is no enough fiancé situation on infrastructure. As the result of some problems such as financial, environmental and social costs are projected to increase dramatically unless wastewater management receives urgent attention.

Wastewater management plans have a key role to play in achieving sustainable wastewater management. Their main purpose is to give an outline of waste streams and treatment options. More specifically they aim to provide a planning frameworkto improve management system. Besides, water treatment is one of the main important factors for both saving environment and economic valuable in the near future. Many diseases and premature deaths can be prevented by adequate care of our environment. Therefore, this analysis was carried out to determine the pollution load or processing industry and to compare the concentrations of each pollutant with national and international wastewater or effluent standards and emission guidelines.

5.9.2 Waste water parameters

In the wheat flour mailing system, the main sources of wastewater come from the domestic usage and waste water from the toilet. According to the existing system, there are two drain systems. The figure 5.16 shows the taking waste water sample from different drainage.

Figure 5.30 Water sample collection from drainage 1 and drainage 2

The hazards of the waste water discharged from the wheat flour milling factory can be minimal due to the fact that no chemical is used in the milling process and dry cleaning is mostly and usually employed in the process. There is only waste water effluents from bathing, canteen and run-off water which flow into the public drainage. There is no any treatment for the wastewater discharge in the factory. Looking at waste water analysis, both physical and chemical characteristics are analyzed. The parameters were selected mainly based on National Environmental Quality Guidelines by Environmental Conservation Department (ECD). These are pH, Total Suspended Solid, Ammonia Nitrogen, Nitrate Nitrogen, Oil and Grease, Phosphorus, BOD, COD and coliform.T. The table 5.22 presents the results and the permissible limits for water discharges.

Table 5-27 Environmental requirements for industrial wastewater effluent

No.	Test Parameter	Unit	Drainage 1	Drainage 2	WHO guideline	USEPA guideline	IFC Efflue	Remark
1	pH	S.U.	7.48	6.65	NA	6.5-8.5	6-9	
2	Total Suspended Solid (TSS)	mg/l	30	**94.3**	NA	NA	50	High TSS leads to increase
3	Ammonia	mg/l	0.441	ND	1.5	NA	NA	
4	Nitrate Nitrogen	mg/l	2.1	15.68	50	NA	NA	
5	Oil and Grease		ND	8.4	NA	NA	10	
6	Phosphorus	mg/l	0.644	2.1	NA	NA	2	Phosphates can contribute
7	DO	ppm	3.6	3.6		> 1ppm(YCDC)		
8	**BOD**	**mg/l**	**35**	**334**	**NA**	**NA**	**50**	**Wheat Starch leads to high BOD. High BOD can cause lower oxygen which is needed for the aquatic organisms to survive**

9	COD	mg/l	57	**396**	NA	NA	250	Wheat Starch leads to high COD. High COD can cause lower oxygen which is needed for the

ND=Non Detected

Based on the findings, the effluent pH from the drainage 1 and 2 is 7.5 and 6.6 respectively, when it is compared with effluent guidelines, pH was in the range of from 6-9. Thus, it is considered that effluent water pH is within the range. Besides, the analytical result of oil and grease and ammonia nitrogen, nitrite nitrogen from both two drainages are under the guidelines.

However, in the drainage (2), total suspended solid, phosphorous, BOD and COD, did not meet the guidelines. These impacts can affect the pipe lines systems, river water body and aquatic organisms.

5.9.3 Storm water sampling

BOD and COD meet the guidelines except from the Total Coliform and Oil&Grease. These impacts can lead to environmental degradation.

Table 5-28 Storm water sampling locations

Points	Locations	Coordinates	
		N	E
1	Greenland Storm water	16.896918°	96.233440°

Figure 5.31 Map of Storm water sampling

Figure 5.32 Storm water sampling

Table 5-29 The results of the storm water

Report Number: EQM-	**Date: 22.8.2022**
Client Information Client Name: **Greenland Factory** Registration Time: 13.8.2022 Contact : U Tin Lin Zaw Testing Purpose : Monitoring Plan	**Sample Information** Sample ID : 001 Sample Name **:** storm water Sample Type/ Source : Effluent Drains Sampling Date & Time : 13.8.2022 Sample Location : 16.896991 N, 96.233361E

Sr.	Quality Parameters	Results	Units	Standard	Remark
1.	BOD	36	mg/L	50 mg/L	**Normal**
2.	COD	< 200	mg/L	250 mg/l	**Normal**
3.	Total Phosphorus	0.168	mg/L	2 mg/l	**Normal**
4.	Suspended solid	119	mg/L	50 mg/l	**High**
5.	Total Nitrogen	3.19	mg/L	10 mg/l	**Normal**
6.	Oil & Grease	12	mg/L	≤ 10[d]	**High**
7.	Total Coliform	>1100		400	**High**

Tested by	**Checked by**	**Approved by**
Soe Thu Aung Lab Technician	Tin Nwe Htwe Lab Consultant	Ohnmar May Dr. Tin Hlaing Environmental Consultant

NG = No Guideline LOD = Limit of detection ND = Not Detected
[a] Standard Unit

Table 5-30: Onsite Storm water Sampling Data

No.	Name	Time	pH(pH)	ORP (mvORP)	DO (%)	EC (µS/cm)	TDS (ppm)	Salinity (PSU)	Turbidity (FNU)	Temp (Deg C)	Pressure (Psi)
1	Storm Water	10:35 Am	7.12	169.5	5.6	107	54	0.05	105	25.83	14.626

5.10 Cultural heritage and ancient monuments

The proposed project is located in the industrial zone and there is no cultural heritage and ancient monuments that have more than 100 years old near the project. Therefore, the impact significance on cultural heritage and ancient monuments by the proposed project is negligible.

Chapter 6

Impact and Risk Assessment and Mitigation Measures

6. Impact and risk assessment and mitigation measures

6.1 Introduction

The identification and assessment of the Green Land wheat and flour mill's environmental and social impacts has been conducted in a phased approach applied through all the different phases of the proposed mill as follows:

- Overvie
- Impact identification and assessment
- Mitigation measures analysis
- Conclusio
  n
  The impact assessment has been performed for the following components:
- Environmental
  - Air
  - Noise and vibration emission
  - Solid waste
  - Water and wastewater
- Social
- Cultural heritage

6.2 Impact, risk assessment and mitigation measures in construction phase

6.2.1 Impact, risk assessment and mitigation measures for air quality

6.2.1.1 Scope of assessment

Resource/ Receptor	Project Phase	Activity	Impact
Air Quality	Construction	• Excavation, earth work and vehicle	Air quality degradation

6.2.1.2 Impact on air quality

Air quality impacts associated with construction of the proposed project would include fugitive dust and emissions from fossil-fuel-fired construction equipment, open burning and temporary fuel transfer systems and associated storage tanks. There may also be gaseous emissions including 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.

6.2.1.3 Impact significance on air quality

a) Impact significance on air quality by particulates

The construction activities may lead to abundant of particulate matters such as the dusts from the transportation of materials and concrete particles used in construction.

The magnitude of impact on air quality by particulates was "High".
The area of impact will be not only within the area of construction activities but also in the vicinity area according to wind direction. Therefore, the extent of the air quality impact from particulates was "Medium".

The period of impact occurrence will be within the construction period and the duration of the impact by particulate matters through construction was considered as "Low".

According to magnitude, extent and duration of the impact, the impact characteristics will be "Medium".
Particulate matter is directly linked to the potential for causing health problems. The importance of the impact on air was considered as "Medium".

Therefore, the impact from particulate matters by the Green Land wheat milling 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

Characteristic					
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		2 (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 Green Land wheat milling 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 Green Land wheat milling 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		2 (Medium)

6.2.1.4 Mitigation measures for air quality

During the construction phase, the following mitigation measures are recommended to minimize ambient air quality impacts.

- Wind breaks should be constructed around the main construction activities and in the locality of potentially dusty works.
- Avoid excavation works in extremely dry weathers.
- Prohibit open burning of any waste at project site.
- Soil erosion and dust control management measures also assist in the management of air pollution from construction operations.
- Air pollution from vehicles will be minimized by using low emission equipment and vehicles.
- Ensure that all construction equipment and vehicles are maintained in accordance with the manufacture's recommendations.
- Minimizing the movement of vehicles and construction machineries particularly outside the premise of the project site to avoid further destruction.
- Fuel efficient stoves and cooking equipment will be provided to reduce emission from food processing at the site during construction activities.
- Turn equipment off when not in use.
- Vehicle idling time shall be minimized.
- Alternatively, fueled construction equipment shall be used where feasible.
- Sprinkle water on graded access routes when necessary to reduce dust generation by construction vehicles.
- Construction materials on site to be covered to prevent to be blown off by wind.
- Stockpiling of material, for example, rocks, sand and soils should be minimized.
- Stockpiles should be located as far away from receptors as possible.
- Vegetation of stockpiles should be used where a stockpile is not to be used for a month to stabilize the surface and prevent dust generation.
- Pave, apply water when necessary, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas and staging areas at construction sites.
- Visual monitoring of dust deposition onto surfaces on and off-site should be regularly conducted.
- Ensure strict enforcement of on-site speed limit regulations.

After mitigation measure, the impact on air quality will become less significant.

after mitigation measures, impact significance on air quality during construction period

Characteristics					
Magnitude	Extent	Duration			
1 (Low)	1 (Low)	1 (Low)	Equivalent Characteristics	Importance	
Characteristics = 1+1+1 = 3			1 (Low)	2 (Medium)	Significance
			Significance = Characteristics x Importance		1 (Low)

6.2.2 Impact, risk assessment and mitigation measures for noise quality

6.2.2.1 Scope of assessment

Resource/ Receptor	Project Phase	Activity	Impact
Noise Quality	Construction Phase	• Mobilization and operation of construction machines	Increasing noise level

6.2.2.2 Impact on noise quality

The construction works on site will most likely result in noise nuisance due to mobilization and operation of construction machines (mixers, tippers, cranes, backhoe), incoming vehicles to deliver construction materials, and communicating workers.

Construction noise levels are rarely steady in nature, but instead fluctuate depending on the number and type of equipment in use at any given time. There would be times when no large equipment is operating and noise would be at or near ambient levels.

Earthworks, pounding and impacting, shouting, loud radios, foundation and other normal construction activities all cause noise and vibration. Construction noise impact is short term pollution to local ambient noise quality. Noise and vibration would affect natural vegetation, animals, workforce, and communities in the areas.

Noise impacts would be considered significant if the project would result in the following: -

- Exposure of person to, or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.
- Exposure of person to, or generation of, excessive ground-borne vibration or ground-borne noise levels.
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

6.2.2.3 Impact significance on noise quality

Noisy activities on construction sites include use of jackhammers, dump trucks, cement mixers, cement cutters, electric saws, tamping machines and welding machines, as well as noise generated from hand tools such as sledgehammers and drills. The magnitude of impact from noise was “Medium”

The area of impact will be not only within the factory but also in the vicinity area. Therefore, the extent of the impact on noise and vibration was “Medium”.

The period of impact occurrence will be within the construction period. The construction workers and people in the vicinity area will have impact from noise and vibration of the proposed project and the duration of the impact from noise and vibration were considered as "Low".

According to magnitude, extent and duration of the impact, the impact characteristics will be "Medium". The importance of the impact was "Medium".
Therefore, the impact noise and vibration by Green Land wheat milling 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		2 (Medium)

6.2.2.4 Mitigation measures on noise quality

During proposed project construction, the following mitigation measures are recommended to minimize noise impact on individuals, sensitive areas and livestock.

- 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.

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		1 (Low)

6.2.3 Impact, risk assessment and mitigation measures for water quality

6.2.3.1 Scope of assessment

Resource/ Receptor	Project Phase	Activity	Impact
Water Quality	Construction phase	• Erosion and leakage	Quality degradation for groundwater and surface water

6.2.3.2 Impact on water quality

In the Construction phase, removal of vegetation, top soil level and ground surface for the proposed factory facilities and staff houses can cause sedimentation, and erosion to the nearby water courses. Sedimentation as a result of the erosion will reduce to water clarity and quality. In addition, potential sources of impacts to water during the construction phase include:

- Constructing landforms that change water flow paths
- Chemicals/Oil spills from the storage, use of diesel and hazardous materials that lead to contamination of water resources
- Release of suspended soil to the water flows
- Leaks from on-site power generation facilities
- Improper solid waste and wastewater management in the construction site
- Improper wastewater disposal from cleaning vehicles and equipment and
- Poor sanitation facilities that may result into surface water pollution through improper sewage management.

The proposed project will create increased water demand during construction phase for site preparation, dust spraying, construction activities, curing, domestic and other water requirements for labor and staff onsite. Increase in site runoff may also be ensued.

6.2.3.3 Impact significance on water quality

a) Impact significance on surface water quality

According to the result, the magnitude of the impact of physical, chemical and biological result of the surface water was considered as “Low”.

The area of the potential impact will be within the immediate area of project activities and factory community however the result was not much higher than the standard guidelines except hardness.

The extent of all parameters for physical, chemical and biological results are noted as “Low” level.

The period of potential impact duration can be long term duration. The duration of the impact for surface water was set as “Low”.

Therefore, the characteristic of surface water impact by the proposed project was rated as “Low”.

The impact is expected to cause some disturbances potentially affecting communities locally and surrounding water bodies. The importance of the impact on surface water was set as “Medium”.

The significant rating of impact was set as “Low”.

Table 6- 4 Impact significance on surface water during construction phase

Characteristics					
Magnitude	Extent	Duration			
1 (Low)	1 (Low)	1 (Low)	Equivalent Characteristics	Importance	
Characteristics = 1+1+1 = 3			1 (Low	2 (Medium)	Significance
			Significance = Characteristics x Importance		1 (Low)

b) Impact significance on ground water quality

According to the result, the magnitude of the impact of physical, chemical and biological result of the ground water was considered as “Low”.

The area of the potential impact will be within the immediate area of project activities and factory community however the result was not much higher than the standard guidelines except hardness.

As the analytical result, the extent of all parameters for physical, chemical (except hardness) and biological results are noted as “Low” level.

The period of potential impact duration can be long term duration. The duration of the impact for ground water was set as “Low”.

Therefore, the characteristic of ground water impact by the proposed project was rated as “Low. The impact is expected to cause some disturbances potentially affecting communities locally and surrounding water bodies. The importance of the impact on ground water was set as “Low”.

The significant rating of impact was set as “Low””.

Table 6- 5 Impact significance on ground water during construction phase

Characteristics					
Magnitude	Extent	Duration			
1 (Low)	1 (Low)	1 (Low)	Equivalent Characteristics	Importance	
Characteristics = 1+1+1 = 3			1 (Low)	1 (Low)	Significance
			Significance = Characteristics x Importance		1 (Low)

6.2.3.4 Mitigation measures on water quality

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.

6.2.4 Impact, risk assessment and mitigation measures for waste disposal

6.2.4.1 Scope of assessment

Resource/ Receptor	Project Phase	Activity	Impact
Waste	Construction phase	• Substantial amounts of wastes from waste disposal	Negative impact on health and environment

6.2.2.2 Impact by waste disposal

The construction activities generate substantial amounts of solid wastes including excavated materials from the earth work, bricks, concrete and other masonry materials, rock, wood, paints, treated and coated wood and wood products, land clearing debris and plaster.

In addition, lubricants and petroleum wastes, containers, cement paper bags and other packaging materials, scrap metal, glass, plastic containers and food remains will be created due to the construction activities. Filth generation can occur if waste/garbage generated during construction period is not handling.

6.2.4.2 Impact significance by waste disposal

In construction phase of Green Land wheat milling 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 Green Land wheat milling factory during construction phase was less and the significance of the impact was considered as "Medium"

Table 6- 6 Impact significance on waste disposal during construction period

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		2 (Medium)

6.2.4.3 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.

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		1 (Low)

6.2.5 Impact, risk assessment and mitigation measures on human environment

6.2.5.1 Scope of assessment

Resource/ Receptor	Project Phase	Activity	Impact
Human environment	Construction phase	• Construction phase activities	Accidents and negative impacts on human health S

6.2.5.2 Impact on human environment

a) Impacts on occupational health and safety

During construction of the proposed project, it is expected that construction workers are likely to have accidental injuries and hazards as a result of accidental occurrences, handling of hazardous waste, lack or negligence of the use of protective wear etc.

Significant hazards can be occurred due to the potential fall of materials or tools as well as temporary hazards such as physical hazards, dust emission and noise pollution. Moreover, accidents and injuries to workers can be caused by the heavy vehicle movement for the transport of construction materials and equipment. Workers are also likely to be exposed to diseases from contact with potentially harmful building materials.

The proposed project will appoint a lot of construction workers in construction phase. A potential social impact both during construction and operation of the project will be on the occupational health and Safety of the staff.

Mitigation measures are described in the next sections and on their working conditions. Before the construction activities, there is need for the materials to be well inspected and harmonized to the occupational health and safety standards.

b) Impacts on Socio- economic

One of the main positive impacts during projects construction phase is the availability of employment opportunities especially to casual workers and several other specialized workers. Employment opportunities are of benefit both economically and in a social sense. In the economic sense it means abundant unskilled labors will be used in construction hence economic production.

Several workers including casual laborers, masons, carpenters, joiners, electricians and plumbers are expected to work on the site from start to the end. Apart from casual labor, semi-skilled and unskilled labor and formal employees are also expected to obtain gainful employment during the period of construction. There may not have several informal businesses which come up during the construction periods of such projects, because the proposed project is located in the industrial zone.

Through the use of locally available materials during the construction phase of the project including cement, concrete and ceramic tiles, timber, sand, ballast electrical cables etc., the project will contribute towards growth of the economy by contributing to the gross domestic product.

6.2.5.3 Impact significance on human environment

a) Impact significance on occupational health and safety

There will be impact on health and safety and the magnitude of impact during construction phase of the factory was “Medium”.

The impact of the project can affect health and safety of the workers and people in the vicinity area, but the factory is located 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 Green Land wheat milling factory will be less and the significance of the impact would be “Medium”.

Table 6- 7 Impact significance on occupational health and safety during construction period

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		2 (Medium)

b) Impact significance on socio- economic

Green Land wheat milling factory bisis 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.

6.2.5.4 Mitigation measures for human environment

The project will implement the following mitigation measures for Occupational Health and Safety:

- Suitable overalls, safety footwear, dust masks, gas masks, respirators, gloves, ear protection equipment etc. should be made available and construction personnel must be trained to use the equipment.
- Necessary health and safety rules shall be enforced by the site foreman to ensure that all staff members adhere to the standards and are thus safe.
- All workers will be provided with personal protection equipment (PPE) and will be obliged to wear them in work zones.
- Training to personnel will be imparted to generate awareness about effects of noise and importance of using PPEs.
- Adequate collection and storage of waste on site and safe transportation to the disposal sites and disposal methods at designated areas shall be provided.
- Particular works shall strictly follow work permit scheme.
- Promote safe and healthy working environment, health, and well-being of all employees.
- Implement all necessary measures to ensure health and safety of workers.
- Well stocked first aid box which is easily available and accessible should be provided.

After mitigation measure, the impact on occupational health and safety will become less significant.

after mitigation measures, impact significance on occupational health and safety during construction period

Characteristics					
Magnitude	Extent	Duration			
1 (Low)	1 (Low)	1 (Low)	Equivalent Characteristics	Importance	
Characteristics = 1+1+1 = 3			1 (Low)	2 (Medium)	Significance
			Significance = Characteristics x Importance		1 (Low)

6.3 Impact, risk assessment and mitigation measures in operation phase

6.3.1 Impact, risk assessment and mitigation measures for air quality

6.3.1.1 Carbon Emission

Carbon dioxide (CO_2) is the primary greenhouse gas emitted through human activities. Many industrial processes emit CO_2 through fossil fuel combustion. Several processes also produce CO_2 emissions through chemical reactions that do not involve combustion, for example, the production and consumption of mineral products such as cement, the production of metals such as iron and steel, and the production of chemicals. The main human activity that emits CO_2 is the combustion of fossil fuels (coal, natural gas, and oil) for energy and transportation, although certain industrial processes and land-use changes also emit CO_2.

The electricity sector of Green Land mill does not directly produce the emission of CO_2 and GHG. The electricity is directly consumed by the proposed mill from government. However, when the electricity is cut off, proposed mill used generators to generate electricity. This generation of electricity produced CO2 and GHG by using diesel fuel. Transportation sector is the major sources of emission CO_2 and GHG by using diesel fuel in transportation trucks for transportation raw materials to proposed mill and distribution products to consumers. Waste recycling sector instead of landfill is to equivalent the CO_2 emission from proposed mill.

The main sources of CO_2 emissions are described below.

Emission from electricity

Electricity is a significant source of energy and is used to power homes, business, and industry. The combustion of fossil fuels to generate electricity is the largest single source of CO_2 emissions. The type of fossil fuel used to generate electricity by using generator which will emit different amounts of CO_2, when lack of electricity from government. This flour mill factory is based on the government electricity and therefore indirectly causes the greenhouse gas emissions (GHG) emissions from the electricity production. Emissions from the wheat flour proposed mill increase substantially when emissions from electricity are included, due to their relatively large share of electricity consumption (e.g., lighting and appliances). Total annual electricity usages of the proposed mill are 6,205 MWh.

Carbon dioxide (CO_2) makes up the vast majority of greenhouse gas emissions from the sector, but smaller amounts of methane (CH_4) and nitrous oxide (N_2O) are also emitted. These gases are released during the combustion of fossil fuels, such as coal, oil, and natural gas, to produce electricity. The proposed milling factory uses the diesel generators as standby when the current is cut off.

(a) Plant and equipment power requirement

Carbon emissions from the proposed flour mill would be predominantly associated with the electrical energy required for the operation of the plant and equipment. The proposed mill would also not utilize steam (boiler) during the process, and would not directly combust gas or any other fuels. Electricity would be mainly used on site to operate processing and equipment.

The electrical energy is required to operate the equipment, conveyers and machinery in the proposed mill. 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 plant and equipment was based on the following assumptions.

- All plant and equipment would operate 24 hours per day, 365 days per year, except during maintenance and cleaning shut downs.
- Maintenance shutdowns would be scheduled every Weekend (four time per month), for the whole day (a total of 2,496 hours per year).
- The plant would operate for 6,264 hours per year with a corresponding annual electricity consumption of approximately 1,974 MWh.

(b) Lighting power requirements

Lighting systems:

The electricity required for lighting was calculated based on the following assumptions:

- The typical lighting requirement for industrial or factory buildings, of 3 W/m^2 of floor area.
- Total floor area of proposed mill is approximately 206,398 m^2 which containing two stories building of admin office, six floors of mill, car parking, canteen area, warehouse and open space.
- The open space area is 83,456 m^2 which is not required to use electricity.
- The net area of electricity required is only 122,942 m^2.
- 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, 365 days per year equates to a total of 8,760 hours annually, with an electricity requirement of close to 3,231 MWh calculated as:

Lighting Power (MWh) = (Floor area x lighting requirement x hours/year) / 1,000,000

Lighting requirement (W/sq.m) = Total System Input Wattage (W) ÷ Total Area (Square meter)

The other electricity annual usage (refrigerators, air conditions, computers, etc.) for proposed mill is assumed as 1,000 MWh.

(c) Generator usage

The proposed mill would use generators when the electricity generation is cut off from government. Green Land wheat and flour mill has two generators and used diesel fuel to generate electricity. Power generators set having capacity of 1,000KVA of six generators with acoustic enclosure 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. However, the total usage of generator for one year is only 43 hours. The amount of fuel (diesel) usage for generators is 604 gallons (2286.4 liters) per year.

1 Liters of Diesel = 2.68 kg of CO_2

Total amount of CO_2 emission from generator is 6127.6 kg of CO_2/ year (6.1276 metric tons of CO_2/ year).

(d) Electricity energy usage to carbon emission

To convert reductions of kilowatt-hours into avoided units of carbon dioxide emissions, the Greenhouse Gas Equivalencies Calculator uses the Emissions & Generation Resource Integrated Database (eGRID) U.S. annual non-baseload CO_2 output emission rate.

kWh = 6.89551×10^{-4} metric tons CO_2

(eGRID, U.S. annual non-baseload CO_2 output emission rate, year 2010 data)

The annual emission of CO_2 from electricity usage of lighting system, other usage of proposed mill and plant equipments are 4,279 metric tons of CO_2. The emission of CO_2 from generators is 6.1276 metric tons of CO_2. Total emission of CO_2 from electricity sector is 4,285 metric tons of CO_2.

Emission from transportation

The increase of population growth, economic growth, urban sprawl, and low fuel prices lead to the higher number of vehicles and traveled miles. The combustion of fossil fuels such as gasoline and diesel to transport people and goods is the second largest source of CO_2 emissions. The largest sources of transportation-related greenhouse gas emissions include passenger cars and light-duty trucks, including sport utility vehicles, pickup trucks, and minivans.

Transportation and distribution systems of proposed flour mill 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 at the same location, then transport the product to a distribution center or directly to a customer. 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. The amount of fuel consumption was based on the following assumptions.

Table 6- 8 Characteristics of distribution trucks from Green Land mill

No.	Type of car	Type of fuel	Quantity of car	Fuel usage per year (gallon)	Kilometer Travelled per year
1	Truck (≤ 3 tons)	Diesel	10	9276	220020
2	Truck (3~9 tons)	Diesel	8	8160	174324
3	Truck (≥ 10 tons)	Diesel	3	4764	51684
Total			21	22200	446028

The container cars transporting the numbers of raw material also used diesel fuel. These container cars are 4,608 in numbers for annual. Container vehicles used to transport the raw material from Thilawar harbour to Green Land 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 13,824 gallons per annual. Total amount of fuel consumption from transportation sector is 36,024 gallons (136,366 liter) of diesel fuel per year.

To obtain the number of grams of CO_2 emitted per gallon of gasoline combusted, the heat content of the fuel per gallon is multiplied by the kg CO_2 per heat content of the fuel.

Gallon of gasoline = 8.887×10^{-3} metric tons CO_2

This value assumes that all the carbon in the gasoline is converted to CO_2 (IPCC 2006). 1Litre of Diesel = 2.68 kg of CO_2
A few percentages of vehicles used natural gas instead of gasoline or diesel as a fuel.

Therm = 0.005302 metric tons CO_2

1 Therm = 0.1 mmbtu 1mmbtu = 14.46 kg carbon
The total emission of CO_2 from transportation sector is 365,461 kg (365.461 metric tons) of CO_2.

Emission from waste

Currently, wastes released from the factory are being recycled Instead of Landfill
To develop the conversion factor for recycling rather than landfill waste, emission factors from EPA's Waste Reduction Model (WARM) were used (EPA 2012). These emission factors were developed following a life-cycle assessment methodology using estimation techniques developed for national inventories of greenhouse gas emissions.

According to WARM, the net emission reduction from recycling mixed recyclables (e.g., paper, metals, plastics), compared with a baseline in which the materials are landfilled, is 0.73 metric tons of carbon equivalent per short ton. This factor was then converted to metric tons of carbon dioxide equivalent by multiplying by 44/12, the molecular weight ratio of carbon dioxide to carbon. Total ton of waste instead of landfill from the proposed mill is 1105.7 ton/year.

Ton of waste recycled instead of landfill = 0.76 metric tons of **CO_2 E** × 44 kg CO_2/12 kg C

Ton of waste recycled instead of landfill = 2.79 metric tons CO_2 equivalent

The equivalent of CO_2 from waste recycled instead of landfill is 3,085 metric ton per year.

Total CO_2 emission from all sectors

Total emission of CO_2 from proposed mill of all of the sectors (electricity, transportation and waste recycle) are 1,565 metric tons of CO_2.

6.3.1.2 Scope of Assessment

Resource/ Receptor	Project Phase	Activity	Impact
Air quality	Operation Phase	• Particulate matters from Milling process • Gas emission from machines and vehicles	Deterioration of air quality and human health

6.3.1.3 Impact on air quality (particulate matter)

The unit operation of proposed milling process of wheat flour consists of four major operations:-

- Wheat Intake and Pre-Cleaning,
- Wheat Cleaning and preparation,

- Milling, and
- Packing and Dispatching.

In grain handling, cleaning and storage process, grain is usually received in the un-cleaned state and contains a variety of different types of materials including grain bran, chaff, rust, weed seeds, various types of pollens, different mold spores, pieces of grain, dirt, and insect parts. Unloading and loading of grain are the dustiest operations that occur throughout the grain industry. Air contaminants (PM_{10} and $PM_{2.5}$) would primarily be dust emissions caused by the unloading, cleaning, and sizing and movement of the raw grains.

6.3.1.4 Impact significance on air quality (particulate matter)

Pollution emitted from wheat flour milling factories is measured in terms of volume of dust particulates emitted. Air pollutants in the atmosphere cause concern primarily because of their potential adverse effects on human health. Other potential adverse impacts of air pollution include damage to animal life, vegetation and buildings, and the degradation of visibility.

The workers from the proposed mill of raw material receiving and pre-cleaning operations are expected to be affected by production multi-pollutants.

The magnitude of the impact from air to the immediate workers and local community was "High".

The area of potential impact will be within the area of production activities. The extent of the impact from air was considered as "Medium".

The period of potential impact covers the operation period which is running for nearly 24 hour. Thus, the duration of the impact from air was considered as "Medium".

Therefore based on the above findings, the importance of the impact on air was considered as "Medium". The air impact characteristic on workers is expected to be "High".

Generally, the air emission level generated by the storage area and generators of flour mill machinery could give rise to the potential impact to workers and rated as Median**.**

Table 6- 9 Impact significance of air from pollutants emission

Characteristics					
Magnitude	**Extent**	**Duration**	**Equivalent Characteristics Score**	**Importance**	
3 (High)	2 (Medium)	2 (Medium)			
Characteristics = 3 + 2 + 2 = 7			3 (High)	2 (Median)	**Significance Rating**
			Significance = Characteristics x Importance		2 (Median)

6.3.1.5 Mitigation measure on air quality (particulate matter)

During proposed project operations, the following mitigation measures will be complied in order not to exceed the limit of National Environmental Quality (Emission) Guidelines (not exceed 50 $mg/Nm^{3)}$ for PM_{10}.

- To use cyclone dust separator which is the main dust collecting device used for control of particulate air pollution from the grain industry.
- For long time control of dust emissions from the grain industry, cloth filters should be used.
- Proper exhaust hooding of dusty operations is necessary for dust control
- For the collection of dust laden air, baffling of exposed grain drops, negative pressures in bins, rail cars, and conveyors, and local exhaust hoods at emission points should be used at the necessary locations.
- install extra control systems such as install the fabric filter at the end of raw material cleaning operations and packaging process
- Separation of dust from the air stream is best accomplished by the use of bag collectors.
- Use of air ventilation in packing areas.
- Ensure that all machines are maintained in accordance with manufacturer's recommendations.
- Use of dust extraction and recycling systems to remove dust from work areas, especially in grinding mills.
- 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.
- Spray water onto the ground to control dust.

After the above mitigation measure, the air emission level generated by the storage area and generators of flour mill machinery could give rise to the potential impact to workers and rated as Low.

after mitigation measures, Impact significance of air from pollutants emission

Characteristics					
Magnitude	**Extent**	**Duration**			
2 (Medium)	2 (Medium)	2 (Medium)	**Equivalent Characteristics Score**	**Importance**	
Characteristics = 2 + 2 + 2 = 6			2 (Medium)	1 (Low)	**Significance Rating**
			Significance = Characteristics x Importance		1 (Low)

6.3.1.6 Impact on air quality (Gas Emission)

Gas pollutants are emitted from some operation of wheat flour milling factory, generators and transportation. These pollutants in the atmosphere lead the potential adverse effects on human health. Other potential adverse impacts of gas emission include damage to animal life, vegetation and buildings, and the degradation of visibility.

GHG emissions including fugitive methane emissions would arise from energy consumption for the production process, transportation, and generator operations.

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

The workers working around near generator and transportation are expected to be affected by multi-pollutants. 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.

6.3.1.7 Impact significance on air quality (Gas Emission)

The magnitude of the impact from gas to the immediate workers and local community was "High".

The area of potential impact will be within the area of production activities. The extent of the impact from gas emission was considered as "Medium".

The period of potential impact covers the operation period which is running for nearly 24 hour. Thus, the duration of the impact from air was considered as "Medium".

Therefore based on the above findings, the importance of the impact on air was considered as "Median". The air impact characteristic on workers is expected to be "High".

Generally, the gas emission level generated by operation area, transportation and generators of flour mill machinery could give rise to the potential impact to workers and rated as Median.

Table 6- 10 Impact significance of air from gas emission

Characteristics					
Magnitude	**Extent**	**Duration**	**Equivalent Characteristics Score**	**Importance**	
3 (High)	2 (Medium)	2 (Medium)			
Characteristics = 3 + 2 + 2 = 7			3 (High)	2 (Median)	**Significance Rating**
			Significance = Characteristics x Importance		2(Median)

6.3.1.8 Mitigation measure on air quality (Gas Emission)

The emission of some gas pollutants from proposed mill is over the standard of WHO and USEPA. Major gas pollutant is SO_2 which is industrial emission gas by burning fuel.

During proposed project operations, the following mitigation measures will be complied in order not to exceed the limit of National Environmental Quality (Emission) Guidelines (not exceed 50 $mg/Nm^{3)}$ for PM_{10}.

- Reduce the amount of SO_2 released from the combustion process can be achieved by switching to a fuel that has lower sulphur content
- Prohibit open burning of any waste at project site.
- Careful use of energy efficient equipment and tools.
- Ensure that all machines are maintained in accordance with manufacturer's recommendations.
- Consider the use of low-emission generator engines.
- 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 the above mitigation measure, the gas level generated by the generators and transportation could give rise to the potential impact to workers and rated as Low.

after mitigation measures, Impact significance of air from pollutants emission

Characteristics					
Magnitude	**Extent**	**Duration**			
2 (Medium)	2 (Medium)	2 (Medium)	**Equivalent Characteristics Score**	**Importance**	
Characteristics = 2 + 2 + 2 = 6			2 (Medium)	1 (Low)	**Significance Rating**
			Significance = Characteristics x Importance		1 (Low)

6.3.2 Health risk assessment on particulate emission

6.3.2.1 PM2.5 health risk assessment

Health Risk Assessment (HRA) is a useful tool to estimate human health risks posed by exposure to a given environmental pollutant. According to the literature review, $PM_{2.5}$ is identified as a hazard as well as the kind of health risk due to its exposure. The measured levels of $PM_{2.5}$ were compared with WHO and NAAQS.

The hazard identification and the exposure assessment were used to estimate the concentrations of $PM_{2.5}$ that are likely to cause significant health risks in humans. $PM_{2.5}$ monitored data were used to estimate how the different levels of exposure to $PM_{2.5}$ can impact on the likelihood and severity of health effects.

It was postulated that the staff population of 391-431 was exposed to levels exceeding the WHO guideline but lower than the NAAQS. This may have a negative impact on their health. It was assumed that inhalation was the most important route of exposure and those workers were exposed for 8 hours per day.

The USEPA equation was used to calculate the potential dose of $PM_{2.5}$, which is the dose the population in Green Land may be exposed to when inhaling $PM_{2.5}$ concentrations.

6.3.2.2 Potential dose of $PM_{2.5}$

$$I = C_A \times \frac{IP \times FR \times FA \times ET \times EF \times ED}{BW} \times \frac{1}{AT}$$

Where,
I = Potential Dose (µg/kg.day)
CA = Concentration of PM2.5 (µg/m^3)

IP= Inhalation Rate (m^3/day) = 21.4 m^3/day (It was assumed that the 95th percentile inhalation rates for long-term exposures for adults)

FR=Factor of Retention =1 (This value was assumed as 1 representing the worst-case scenario and potential impact on people's health)

FA= Factor of Absorption This value was assumed as 1 representing the worst-cases cenario and potential impact on people's health

ET= Exposure Time=8 hrs/day

EF = Exposure Frequency (days/year) = 269 days (365 days- 96 days (2 holidays per week x 4 weeks x 12 months)

ED = Exposure Duration (years) = 30 years (national upper-bound time (90th percentile) at one residence; EPA 1989d)
AT: Pathway-specific period of exposure for no carcinogenic effects (i.e., ED x 365 days/year).
Body weight- Being Asian, 50kg was assumed.

Table 6- 11 Potential dose of $PM_{2.5}$

Location	CA ($\mu g/m^3$)	IP (m^3/day)	FR	FA	ET (hrs/day)	EF (days/year)	ED (years)	BW (kg)	AT (EDx365)	Potential Dose (µg/kg.day)
Green Land packing place(Location 1)	64	21.4	1	1	8	269	30	50	10950	162
Green Land storage place(Location 2)	52	21.4	1	1	8	269	30	50	10950	131
Office building (Location3)	33	21.4	1	1	8	269	30	50	10950	83
Generator Location 4)	17	21.4	1	1	8	269	30	50	10950	43
Average	42	21.4	1	1	8	269	30	50	10950	106

6.3.2.3 Toxicological risk

$$RQ = \frac{I}{RfD}$$

Where,

RQ= The Risk Quotient
I= Potential Dose (µg/kg.day)
RfD= Reference Dose (µg/kg.day)

Table 6-12 Reference dose of $PM_{2.5}$

	CA(µg/m^3)	IP(m^3/day)	FR	FA	ET(hrs/day)	EF(days/year)	ED(years)	BW(kg)	AT(EDx365)	RfD (µg/kg.day)
RfD	25	21.4	1	1	8	269	30	50	10,950	63

(RQ) estimated was appointed as

RQ<1 – Hazards that are not considered a threat to public health

RQ>1 – Hazards that cause the adverse health effects and are a detriment to Public health

Table 6- 13 Intake and risk significance of Green Land

Location	Intake(µg/kg.day)	RfD(µg/kg.day)	RQ	Risk Significance
Green Land packing place(Location 1)	162	63	2.6	Hazards cause adverse health effects
Green Land storage place(Location 2)	131	63	2.1	Hazards cause adverse health effects
Office building (Location3)	83	63	1.3	Hazards cause adverse health effects
Generator (Location 4)	43	63	0.7	Hazards don't cause adverse health effects
Average	106	63	1.7	Hazards cause adverse health effects

6.3.3 PM10 health risk assessment

Health Risk Assessment (HRA) is a useful tool to estimate human health risks posed by exposure to a given environmental pollutant. The formal identification of PM_{10} is as a hazard as well as the types of health risks that may occur because of exposure to PM_{10}.

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

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

It was postulated that the staff population of 391-431 was exposed to levels exceeding the WHO guideline but lower than the NAAQS. This may have a negative impact on their health. It was assumed that inhalation was the most important route of exposure and those workers were exposed for 8 hours per day.

The USEPA equation was used to calculate the Field Average Daily Dose (FADD), which is the dose the population in Green Land may be exposed to when inhaling PM_{10} concentrations.

FADD = C × IR × EF x ED/ BW × AT= µg/kg/day.

Where,

C = $\mu g/m^3$ = the average concentrations (C) of P PM_{10} monitored in Green Land company

IR = the Inhalation Rate = 21.4 m^3/day (It was assumed that the 95th percentile inhalation rates for long-term exposures for adults)

EF =Exposure Frequency = 269 days (365 days- 96 days (2 holidays per week x 4 weeks x 12 months)

ED = Exposure Duration (years) = 30 years (national upper-bound time (90^{th} percentile) at one residence; EPA 1989d)

BW = Body weight= 50 kg

AT: Pathway-specific period of exposure for noncarcinogenic effects (i.e., ED x 365 days/year)

Table 6-14 Potential dose of PM_{10}

Location	C ($\mu g/m^3$)	IR (m^3/day)	EF (days)	ED (years)	BW (kg)	AT (days/year)	FADD (µg/kg/day)
Green Land packing place(Location 1)	**86**	21.4	269	30	50	10950	27
Green Land storage place(Location 2)	**76**	21.4	269	30	50	10950	24
Office building (Location3)	**70**	21.4	269	30	50	10950	22
Generator (Location 4)	**41**	21.4	269	30	50	10950	13
Average	**68**	21.4	269	30	50	10950	21

The Safe Average Daily Dose (SADD) is the dose that the population of Green Land may be exposed to without suffering negative health risks, expressed in µg/kg/day. In this case the concentration C represents the 24-h standard in WHO guideline for PM_{10} expressed in 50 $\mu g/m^3$.

SADD = C × IR × EF x ED/ BW × AT =16 µg/kg/day

The risks caused by exposure to PM_{10} were characterized in terms of the potential risk to illness or symptoms in the exposed population. The potential health risks in the exposed population, expressed as a Hazard Quotient (HQ).

Q = FADD / SADD

HQ <0.1: no hazard exists;

HQ 0.1-1.0: the hazard is low;

HQ 1.1-10: the hazard is moderate; and

HQ >10: hazard is high

Table 6-15 Health risk significance of Green Land

Location		FADD (µg/kg/day)	SADD (µg/kg/day)	HQ	Risk Significant
1	Green Land packing place (Location 1)	27	16	1.7	moderate
2	Green Land storage place (Location 2)	24	16	1.5	moderate
3	Office building (Location 3)	22	16	1.4	moderate
4	Generator (Location 4)	13	16	0.8	low
	Average	21	16	1.3	moderate

The Health Risks from **4 different places (except near generator) in Green Land were between 1.1 and 10** and it means that the population inside Green Land were at **moderate risk of negative health** effects from exposure to PM_{10}.if they are continuously working in that works place for 30 years.

6.3.4 Impact, risk assessment and mitigation measures for Noise Quality

6.3.4.1 Scope of assessment

Resource/ Receptor	Project Phase	Activity	Impact
Noise Quality	Operation Phase	• Milling process and other machines	Increasing noise level

6.3.4.2 Impact on Noise Quality

Noise pollution is the disturbing or excessive acoustic emission that may harm the activities or balance of human and animal life. Sound becomes unwanted when it either interferes with normal activities such as sleeping, conversation, or disrupts or diminishes one's quality of life as well as health.

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:

- Grinding and mixing of raw materials
- 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.

6.3.4.3 Impact Significance on noise quality

(a) The noise from the whole milling factory

The impact assessment on noise quality likely affected by the whole process of the milling factory was assessed as follows:

The impact of noise and vibration of proposed mill will depend on the siting of plant, and the process and installations of equipment, compounds, and machinery. The magnitude of the impact from noise was "Low".

The area of potential impact will be within the area of production activities. The extent of the impact from noise was considered "Low".

The period of potential impact duration covers the operation period which will be 24 hour. The duration of the impact from noise was considered "Medium".

The importance of the impact on noise was considered Low. The noise impact characteristic on workers is expected to be "Medium".

The noise level generated by the storage area and generators of flour mill machinery could give rise to the potential impact to workers and rated as Low.

Table 6-16 Impact significant of noise from whole mill

Characteristics					
Magnitude	**Extent**	**Duration**			
1 (Low)	1(Low)	2 (Medium)	**Equivalent Characteristics Score**	**Importance**	
Characteristics = 1 + 1 + 2 = 4			2 (Medium)	1 (Low)	**Significance Rating**
			Significance = Characteristics x Importance		1 (Low)

(b) The noise impact by the milling factory process

The Workers working at the storage area are expected to be affected by production noise because they are the closest to the noise sources. The magnitude of the impact from noise was "High".

The area of potential impact will be within the area of production activities. The extent of the impact from noise was considered "Low".

The period of potential impact duration covers the operation period. The duration of the impact from noise was considered "Medium".
The importance of the impact on noise was considered "Low". The noise impact characteristic on workers is expected to be "Medium".

The noise level generated by the storage area of flour mill machinery could give rise to the

potential impact to workers and rated as Low.

Table 6-17 Impact significant of noise on the immediate workers

Characteristics					
Magnitude	**Extent**	**Duration**	**Equivalent Characteristics Score**	**Importance**	
3 (High)	1(Low)	2 (Medium)	2 (Medium)	1 (Low)	**Significance Rating**
Characteristics = 3 + 1 + 2 = 6			Significance = Characteristics x Importance		1 (Low)

(c) The noise impact on the staff and other workers

The workers from the package area and the office staff are expected to be affected by production noise. The magnitude of the impact from noise was "Low".

The area of potential impact will be within the area of production activities. The extent of the impact from noise was considered "Low".

The period of potential impact duration covers the construction period. The duration of the impact from noise was considered "Medium".

The importance of the impact on noise was considered "Low". The noise impact characteristic on workers is expected to be "Medium".

In the absence of mitigation measures, the noise level generated by the storage area and generators of flour mill machinery could give rise to the potential impact to workers and rated as Low.

Table 6-18 Impact significance of noise on the staff and other worker

Characteristics					
Magnitude	**Extent**	**Duration**	**Equivalent Characteristics Score**	**Importance**	
1 (Low)	1(Low)	2 (Medium)	2 (Medium)	1 (Low)	**Significance Rating**
Characteristics = 1 + 1 + 2 = 4			Significance = Characteristics x Importance		1 (Low)

6.3.4.4 Mitigation Measures on noise quality

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.
- Proper maintenance procedures must be enforced to ensure noise levels do not increase over time.
- 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.

6.3.5 Impact, risk assessment and mitigation measures for solid waste

6.3.5.1 Scope of assessment

Resource/ Receptor	Project Phase	Activity	Impact
Solid waste	Operation Phase	• Solid waste form milling process	Deterioration of environment and negative impact to human health

6.3.5.2 Impact of solid waste

Grain was usually received in the un-cleaned state and contains a variety of different types and sizes of foreign material including grain bran, chaff, rust, and weed seeds, various types of pollens, different mold spores, and pieces of grain, dirt and insect parts. Whenever grain is handled and strike against each other it tends to rub off small particles of chaff and to fragment some kernels. In this manner waste was continuously generated and the grain was never absolutely clean. Solid wastes were produced in to tow main sections of flour processing section. Generally 96% of clean wheat and 4% of solid wastes were produced.

The second source of solid wastes is milling section. Thus, at the milling department of the production section 76% of flour, 4% of solid waste and 20% of bran and other by products were generated. Therefore 8% of total solid wastes were produced from raw materials and manufactured products.

Solid wastes from the grinding machines are mainly organic waste such as wheat residues from sieve i.e. impurities smaller or larger than wheat. Wastes from grain processing are considered to be nonhazardous wastes.

Impact prediction calculated based on the analyzing results is the most important issue for the future environment management plan. According to the impact analysis, it is needed to know impact significance. As the result of the solid waste generation rate from the Green Land Wheat Flour Milling, it has been predicted the impact for this issue. The impact significance was evaluated based on the methodology described. The area of potential impact will be within the immediate area of project activities.

6.3.5.3 Impact significance of solid waste

According to the result monitored, the magnitude of the impact from domestic solid waste was considered as low. The area of potential impact will be within the immediate area of project activities. The extent of the impact for solid waste impact is noted as low level.

The period of potential impact was the short duration. Thus, the duration of the impact from solid waste was set as low. Therefore, the characteristic of solid waste impact was rated as low.

The impact is expected to cause some potential disturbances on communities locally and regionally. The importance of the impact on solid waste was set as medium.

The impact of solid waste would likely to be less impact on residences and the potential impact was rated as low. It has been seen that the impact from solid waste is less significance and less effect on the environment.

Table 6-19 Impact significance of solid waste from domestic waste

Characteristics					
Magnitude	**Extent**	**Duration**	**Equivalent Characteristics Score**	**Importance**	
1(low)	1 (Low)	1(Low)	1 (Low)	2 (Medium)	**Significance Rating**
Characteristics = 1 + 1 + 1 = 3			Significance = Characteristics x Importance		1 (Low)

Table 6-20 Impact significance of solid waste from the industrial solid waste from milling system

Characteristics					
Magnitude	**Extent**	**Duration**	**Equivalent Characteristics Score**	**Importance**	
1(low)	1 (Low)	1(Low)	1 (Low)	2 (Medium)	**Significance Rating**
Characteristics = 1 + 1 + 1 = 3			Significance = Characteristics x Importance		1 (Low)

6.3.5.4 Mitigation measures for solid waste

General mitigation practices and principles that could apply to the operation phase of wheat flour mill project include:

- Waste segregation
- Practice of proper waste management system particularly in handling, transportation before final disposal
- Usage of insect killer systematically in the temporary transfer station until the municipal
- collection
- Bran, by product generated from milling department, should be used as animal food.
- 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.
- 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.

6.3.6 Impact, risk assessment and mitigation measures on water quality

6.3.6.1 Scope of assessment

Resource/ Receptor	Project Phase	Activity	Impact
Water Quality	Operation Phase	• Runoff and drainage	Potential contamination from spill or wastewater drainage to nearby water bodies

6.3.6.2 Impact on water quality

(a) Impact of total dissolved solid (TDS)

In the tube water TDS was being found and can be affecting on the taste and odor of water. This leads to Aesthetic Problem in drinking water.

(b) Impact of Total Coliforms

Moreover, total Coliforms were found out leading to waterborne diseases with the following signs and symptoms such as nausea, vomiting, and diarrhea.

(c) Environmental impact prediction

Impact prediction is one of most important issues for the future sustainable environment. The impact significance was evaluated based on the methodology described. The area of potential impact will be within the immediate area of project activities.

6.3.6.3 Impact significance on water quality

(a) Impact significance on total dissolved solid

The equation of impact significant is
Equation 1- Impact Significant= Characteristic x Important

To get the Characteristic, it is needed to combine magnitude, extent and duration according to the
Equation 2 - Characteristic = magnitude+ extent+ duration

In the following tables show impact significant of TDS and Total Coliforms.

Table 6-21 Impact significance of TDS in potable water

Characteristics			Equivalent Characteristics Score	Importance	
Magnitude	Extent	Duration			
3(High)	1 (Low)	3 (High)			
Characteristics = 3 + 1 + 3 = 7			3 (High)	2 (Medium)	Significance Rating
			Significance = Characteristics x Importance		2 (Medium)

According to the monitored result, the magnitude of the impact from TDS was considered as high. The area of potential impact will be within the immediate area of project activities. The extent of the impact for TDS is noted as medium level. The period of potential impact duration can be long-term duration. The duration of the impact from TDS was set as High. Therefore, the characteristic of the TDS impact was rated as high.

The impact is expected to cause some disturbances potentially affecting communities locally and surrounding water bodies. The importance of the impact on TDS was set medium.

(b) Impact significance on total coliforms

Table 6-22 Impact significance of total Coliforms in potable water

Characteristics			Equivalent Characteristics Score	Importance	
Magnitude	Extent	Duration			
2(Medium)	2 (Medium)	3(High)			
Characteristics = 2 + 2 + 3 = 7			3 (High)	2 (Medium)	Significance Rating
			Significance = Characteristics x Importance		2 (Medium)

According to the result monitored, the magnitude of the impact from total Coliforms was considered as medium. The area of potential impact will be within the project site. The extent of the impact of total Coliforms is noted as medium. The period of potential impact duration can be long-term duration. The duration of the impact from total Coliforms was set as High. Therefore, the characteristic of the total Coliforms impact was rated as high.

The impact is expected to cause some disturbances potentially affecting communities occasionally. The importance of the impact on total Coliforms was set as medium.

6.3.6.4 Mitigation measures for water quality

(a) Mitigation measures for TDS

To reduce the amount of TDS impact from the potable water

1. It is needed to use filtration method at the source before the distribution. Therefore, the magnitude for the possible impact significance will become low and also the risk of impact will be decreased.
2. Another treatment method is using either reverse osmosis membrane treatment system or coagulation (lime or lime soda ash) and resulting in the amount of TDS in water is significantly less and the impact will be decreased.
3. Raw materials should be properly stored under the roof to prevent dumping into the water courses in the rainy season.
4. Treat drainage system for sediment control.

5. Store, dispose and clean up all diesel and hazardous materials according to the procedures.
6. Preventing leaks and spills.
7. 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.

after mitigation measure, the impact significance on TDS in portable water

Characteristics			Equivalent Characteristics Score	Importance	
Magnitude	Extent	Duration			
1(Low)	1 (Low)	3 (High)			
Characteristics = 1 + 1 + 3 = 5			2 (Median)	1 (Low)	Significance Rating
			Significance = Characteristics x Importance		1 (Low)

(b) Mitigation measures for total coliform

To reduce total coliform in the portable water_

1. To reduce the amount of total Coliform in the potable water, it is needed to boil with high temperature before using. Total Coliform will be killed with high temperature and the magnitude of Total Coliforms in will be decreased. As this action, impact significance also becomes low.
2. Another treatment method is disinfection like proper chlorination method. If it is used, the amount of TDS in water is significantly less and the impact will be decreased.
3. developing and implementing a catchment management plan, which includes control measures to protect surface and groundwater sources;
4. Promoting awareness in the community of the impact of human activities on water quality.

after mitigation measure, the impact significance on total coliform

Characteristics			Equivalent Characteristics Score	Importance	
Magnitude	Extent	Duration			
1(Low)	1 (Low)	3 (High)			
Characteristics = 1 + 1 + 3 =5			2 (Median)	1 (Low)	Significance Rating
			Significance = Characteristics x Importance		1 (Low)

6.3.7 Impact, risk assessment and mitigation measures on waste water

6.3.7.1 Scope of assessment

Resource/ Receptor	Project Phase	Activity	Impact
Waste water	Operation Phase	• Runoff and drainage	Potential contamination to nearby water bodies

6.3.7.2 Impact of waste water

The following parameters will impact on the surrounding water bodies.

Possible environmental impact of BOD, COD, Phosphorus, Total Suspended Solid,

- Taste of water, odor of water,
- Aesthetic problem in drinking water
- High TSS leads to increase water turbidity
- Bacteria, viruses, and parasites in drinking water
- Microbial contaminated in the water flow
- High eutrophication condition in water
- High BOD can cause lower oxygen which is needed for the aquatic organisms to survive

- High COD can cause lower oxygen which is needed for the aquatic organisms to survive

Impact prediction is one of the most important issues for the future environment. Impact prediction is calculated based on the result. According to the impact analytical methodology, it is needed to know impact significance. According to the result of effluent waste water analysis, the parameters which are already higher than the effluent guidelines are needed to be estimated. The impact significance was evaluated on the methodology described.

6.3.7.3 Impact Significance of waste water impact

The equation of impact significant is

Equation 1- Impact Significant= Characteristic x Important

To get the Characteristic, it is needed to combine magnitude, extent and duration according to the

Equation 2 - Characteristic = magnitude+ extent+ duration

The following table shows the impact significance of BOD and CO, Phosphorus and TSS,

(i) BOD

According to the result monitored, the magnitude of the impact from BOD was considered as high. The area of potential impact will be in the immediate area of project activities and can also impact on the surrounding water bodies. The extent of the impact for BOD is noted as High. The period of potential impact can be long-term duration as long as the effluent is being released. The duration of the impact from BOD was set as High. Therefore, the characteristic of the BOD impact was rated as high.

The importance of the impact on BOD was set as high. Therefore, the impact significance of BOD in the effluent waste water from the Milling system was set as High.

Table 6-23 Impact significance of BOD in effluent waste water

Characteristics					
Magnitude	**Extent**	**Duration**			
3(High)	3(High)	3 (High)	**Equivalent Characteristics Score**	**Importance**	
Characteristics = 3 + 3 + 3 = 9			3 (High)	3 (High)	**Significance Rating**
			Significance = Characteristics x Importance		3 (High)

(ii) COD

According to the result monitored, the magnitude of the impact from COD was considered as medium. The area of potential impact will be in the immediate area of project activities and can also impact on the surrounding water bodies.

The extent of the impact for COD is noted as medium. The period of potential impact duration will be long-term duration as long as the effluent is being released into the drainage without treatment. Thus, the duration for the impact is set as high. As the analytical result, the impact characteristic was set as high.

The importance of the impact on COD was set as medium. Therefore, the impact significance of COD in the effluent waste water from the Milling system was set as medium level.

Table 6-24 Impact significance of COD in effluent waste water

Characteristics					
Magnitude	**Extent**	**Duration**	**Equivalent Characteristics Score**	**Importance**	
2(Medium)	2(Medium)	3(High)			
Characteristics = 2+ 2+ 3 = 7			3 (High)	2 (Medium)	**Significance Rating**
			Significance = Characteristics x Importance		2 (Medium)

(i) Phosphorus

According to the chemical analysis, the magnitude of the impact from Phosphorus was considered as medium. The area of potential impact will be within the immediate area and certain impact on the surrounding water bodies. The extent of the impact for phosphorus is noted as medium. The period of potential impact can be long-term as long as the effluent is being released. However, in this effluent, phosphorus amount is not much higher. Therefore, the duration of the impact from phosphorus was set as medium. Thus, the characteristic of the Phosphorus impact was rated as Medium.

The impact is expected to cause some disturbances potentially affecting communities occasionally. The importance of the impact on Phosphorus was set as medium. Therefore, the impact significance of Phousphrous in the effluent waste water from the Milling system was set as medium level.

Table 6-25 Impact significant of Phosphorus in effluent waste water

Characteristics					
Magnitude	**Extent**	**Duration**	**Equivalent Characteristics Score**	**Importance**	
2(Medium)	2 (Medium)	2 (Medium)			
Characteristics = 2 + 2 + 2 = 6			2 (Medium)	2 (Medium)	**Significance Rating**
			Significance = Characteristics x Importance		(Medium)

(i) Total suspended solid

According to the result, the magnitude of the impact from TSS was considered Medium. The area of potential impacts can be the immediate area and certain impact on the surrounding water bodies. The extent of the impact for TSS is noted as medium level. The period of potential impact duration can be mid-term duration. The duration of the impact from TSS was set as Medium. Therefore, the characteristic of the Phosphorus impact was rated as medium.

The impact is expected to cause some disturbances potentially affecting communities occasionally. The importance of the impact on TSS was set as medium.

Table 6-26 Impact significant of TSS in effluent waste water

Characteristics					
Magnitude	**Extent**	**Duration**	**Equivalent Characteristics Score**	**Importance**	
2(Medium)	2 (Medium)	2 (Medium)			
Characteristics = 2 + 2+ 2 = 6			2 (Medium)	2 (Medium)	**Significance Rating**
			Significance = Characteristics x Importance		2 (Medium)

6.3.7.4 Mitigation measures for wastewater impact

To reduce the significant impacts, the following mitigation measures are needed to conduct:

- Wastewater discharged by dilution method before it was disposed into the drainage. It is the simple method of discharging wastewater into the surface water such as a river, lake, ocean, estuaries or wetlands. It is needed to add pure water into waste water before discharged. This can be resulting in reduction of the amount of pollutants in the waste water and the impacts on the natural environmental will be decreased.
- And then, it is needed to grow wet land plant which is called wet-land constructed near the drainage. The purpose of wet-land is the roots of wet-land will surely absorb the pollutants from the waste water and it will also provide the aesthetic effect.
- Conducting regular training, monitoring, and inspection schemes together with keeping track of water uses minimizes waste and leaks from faulty connections and faucets.

after mitigation measures, impact significance for TSS, BOD, COD and Phosphrous

Characteristics					
Magnitude	**Extent**	**Duration**	**Equivalent Characteristics Score**	**Importance**	
1(Low)	1 (Low)	1 (Low)			
Characteristics = 1 + 1+ 1 = 3			1 (Low)	2 (Medium)	**Significance Rating**
			Significance = Characteristics x Importance		1 (Low)

6.3.8 Impact on human environment

a) Potential impact by occupational health and safety

The Green Land Wheat Flour Milling Factory project will use wheat raw materials. It also uses water as an important input. Workers at flour milling companies are exposed to considerable hazards like manual handling, inhalable dust, noise, working confined spaces mainly silos as well as slip, trip and falls. Most of the workers involved in loading and offloading can experience occupational health and safety problems.

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

During the operation phase, maintenance of the facility, employment opportunities created by the project will have social benefit besides the expected economic benefit. Employment income from the project will have a substantial role for social livelihood improvement in the project area. These will involve other sources of employment such as direct service provision to the domestic sector e.g. traders, office operators, engineers, security personnel etc. There will be positive gain for the revenue system arising from the tax being paid by the proponent to the government and other lead agencies.

6.3.8.1 Impact significance on human environment

a) Impact significance on occupational health and safety

There will be impact on health and safety and the magnitude of impact during operation phase of the factory was "Medium".

The impact of the project can affect health and safety of the workers. Therefore, the extent of the impact was "Low".

The period of impact occurrence will be within the operation period and the duration of the impact on 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 Green Land Flour Milling Factory will be less and the significance of the impact would be "Low".88

Table 6-27 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)	1 (Low)	Significance
			Significance = Characteristics x Importance		1 (Low)

b) Impact significance on socio- economic

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.

6.3.8.2 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 particulate matters.
- Wear alkali-resistant gloves, coveralls with long sleeves and full-length pants, waterproof boots and eye protection.
- Avoid working beneath conveyor belts and stacker machinery.
- Provide PPEs (Personal Protective Equipment), particularly masks to protect dust and air particulate matters from the atmosphere.
- Be sure that trucks and other vehicles are in good working order.
- Regular inspection and maintenance of pollution control systems.
- The fire and safety equipment should be properly utilized and maintained regularly.
- Well stocked first aid box which is easily available and accessible should be provided within the building.

Well-designed waste management system and storm water drainage systems have to be put in place so as to ensure that breeding grounds of disease carrying vectors such as rats, flies, mosquitoes, cockroaches etc are effectively controlled in work area.

6.4 Impact, risk assessment and mitigation measures in decommissioning phase

6.4.1 Impact, risk assessment and mitigation measures for air quality

6.4.1.1 Scope of assessment

Resource/ Receptor	Project Phase	Activity	Impact
Air quality	Decommissioning Phase	• Particulate matters from demolition activities • Gas emission from machines and vehicles	Deterioration of air quality and human health

6.4.1.2 Impact on air quality

During this phase, the operation of vehicles for facilities and decommissioning activities can also release dust particles and gaseous emissions which can affect the ambient air quality for the short periods. There may also be gaseous emissions from diesel generators and combustion of fuel for vehicle movements. Generally, this will adversely affect localized air quality for a short period.

Criteria air pollutant and air emissions that would arise from the demolition of the proposed project are quantified and summarized below.

- Heavy machinery /vehicles such as diesel-powered bulldozers and loaders would be used throughout the entire decommissioning phase
- Vehicle traffic on paved and unpaved roads
- Demolition activities, earth work
- Worker accommodation

Adjacent to the demolition site and along the transportation route, natural habitat, residents, and construction crew will be potentially affected by the air pollution.

6.4.1.3 Impact significance on air quality

In demolition phase, there may have temporary impacts on air quality. The breaking down of the building can emit large amount of dusts but can vary depending on activities. There may also have gaseous emissions from diesel generators and fuel combustion.

The magnitude of impact on air quality will be "Medium".

The area of impact will be not only within the area but also in the vicinity area according to wind direction. Therefore, the extent of the air quality impact from particulates was "Medium".

The period of impact occurrence will be within the demolition phase and the duration of the impact by demolition activities will be considered as "Low".

According to magnitude, extent and duration of the impact, the impact characteristics will be "Medium". The importance of the impact on air will be considered as "Medium".

Therefore, the impact from particulate matters and gaseous emission by the proposed project demolition will be a little high and the significance of the impact would be "Medium".

Table 6-28 Impact significance on air quality during decommissioning phase

Characteristics					
Magnitude	**Extent**	**Duration**			
2 (Medium)	2 (Medium)	1 (Low)	**Equivalent Characteristics Score**	**Importance**	
Characteristics = 1 + 1+ 1 = 3			2 (Medium)	2 (Medium)	**Significance Rating**
			Significance = Characteristics x Importance		2 (Medium)

6.4.1.4 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.

After mitigation measures, impact significance on air quality

Characteristics					
Magnitude	**Extent**	**Duration**			
1 (Low)	1 (Low)	1 (Low)	**Equivalent Characteristics Score**	**Importance**	
Characteristics = 1 + 1+ 1 = 3			1 (Low)	2 (Medium)	**Significance Rating**
			Significance = Characteristics x Importance		1 (Low)

6.4.2 Impact, risk assessment and mitigation measures for noise and vibration

6.4.2.1 Scope of assessment

Resource/ Receptor	Project Phase	Activity	Impact
Noise and vibration	Decommissioning Phase	• Noise and vibration from building demolition activities and vehicles	Impact to human health and surrounding environment.

6.4.2.2 Potential impacts on noise and vibration level

The demolition works will lead to significant deterioration of the acoustic environment within the project site and the surrounding areas. It will involve less noise generation due to the absence of operational equipment. But there will be some noise generated from heavy machineries running for dismantling activities. The decommissioning noise impact is the short term pollution to local ambient noise quality. Noise and vibration affect natural vegetation, animals, workforce, and communities from the areas. This will be as a result of the noise and vibration that will be experienced as a result of demolishing the proposed project.

6.4.2.3 Impact significance on noise and vibration

In decommissioning phase, noise and vibration will be experienced as a result of demolishing the proposed project. The demolition works will lead to significant deterioration of the acoustic environment within the project site and the surrounding area.

The magnitude of impact from noise will be “Medium”.

The area of impact will be not only within the milling factory but also in the vicinity area. Therefore, the extent of the impact noise and vibration will be “Medium”.

The period of impact occurrence will be within the demolition period. The construction workers and people in the vicinity area will have impact from noise and vibration of the demolition processes and so the duration of the impact from noise and vibration was considered as “Low”.

According to magnitude, extent and duration of the impact, the impact characteristics will be “Medium”.

The importance of the impact will be considered as “Medium”.

Therefore, the impact noise and vibration by demolition of the proposed project will be a little high and the significance of the impact would be "Medium".

Table 6-29 Impact significance on noise and vibration

Characteristics					
Magnitude	**Extent**	**Duration**			
2 (Medium)	2 (Medium)	1 (Low)	**Equivalent Characteristics Score**	**Importance**	
Characteristics = 1 + 1+ 1 = 3			2 (Medium)	2 (Medium)	**Significance Rating**
			Significance = Characteristics x Importance		2 (Medium)

6.4.2.4 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.

After mitigation measure, impact significance on noise and vibration

Characteristics					
Magnitude	**Extent**	**Duration**			
1 (Low)	1 (Low)	1 (Low)	**Equivalent Characteristics**	**Importance**	
Characteristics = 1 + 1+ 1 = 3			1 (Low)	2 (Medium)	**Significance Rating**
			Significance = Characteristics x Importance		1 (Low)

6.4.3 Impact, risk assessment and mitigation measures on water quality

6.4.3.1 Scope of assessment

Resource/ Receptor	Project Phase	Activity	Impact
Water quality	Decommissioning Phase	• Runoff and drainage	Deterioration of water quality nearby area

6.4.3.2 Potential impact on water quality

In the decommissioning phase, the materials generated by the decommissioning activities such as clay, plaster, limestone, concrete, mercury containing light bulbs, old batteries can be accumulated in nearby water courses due to runoff of these materials during the rainy season. It may lead to degradation of groundwater quality.

6.4.3.3 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 6-30 Impact significance on water quality

Characteristics					
Magnitude	**Extent**	**Duration**			
1 (Low)	1 (Low)	1 (Low)	**Equivalent Characteristics**	**Importance**	
Characteristics = 1 + 1+ 1 = 3			1 (Low)	1 (Low)	**Significance Rating**
			Significance = Characteristics x Importance		1 (Low)

6.4.3.4 Mitigation measures for impact on water quality

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.

6.4.4 Impact, risk assessment and mitigation measures for waste disposal

6.4.4.1 Scope of assessment

Resource/ Receptor	Project Phase	Activity	Impact
Waste	Decommissioning Phase	• Disposing waste	Large amount of solid waste from demolition of the buildings

6.4.4.2 Potential impact by waste disposal

Demolition of the proposed project and related infrastructure will result in large quantities of solid waste. The waste will contain the various materials including concrete, drywall, wood, glass, paints, pipe and metals, garbage, containers, fluorescent light, carpeting, furniture, tires, drums, and any containers with residues remaining on the bottom and fuel tanks.

In addition to solid waste, lubricants and fuel from vehicles and machines and liquid wastes can

cause contamination into the surrounding environment particularly air, water and soil. The generation of sanitary wastewater discharges has no significant adverse impacts on surrounding environment.

6.4.4.3 Impact significance on waste disposal

Solid Wastes from demolition include concrete, brick and clay tile, steel, drywall and wood products. But, some of these wastes have the potential to recycle in other construction. However, solid waste from demolition waste may still remain as large amount than other phases, construction and operation phase.

The magnitude of impact from solid waste during demolition phase will be "High".

The area of impact will be only within the area of milling factory compound. Therefore, the extent of the impact by solid waste during demolition will be "Low".

The period of impact occurrence will be within the proposed mill demolition period and the duration of the impact by solid waste will be considered as "low".

According to magnitude, extent and duration of the impact, the impact characteristics will be "Medium". The importance of the impact was considered as "Medium".

Therefore, solid waste impact by the proposed project demolition will be less and the significance of the impact would be "Medium".

Table 6-31 Impact significance of solid waste during decommissioning phase

Characteristics					
Magnitude	Extent	Duration			
3 (High)	1 (Low)	1 (Low)	Equivalent Characteristics	Importance	
Characteristics = 3+1+1 = 5			2 (Medium)	2 (Medium)	Significance
			Significance = Characteristics x Importance		2 (Medium)

6.4.4.4 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.

After mitigation measure, impact significance on waste disposal

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		1 (Low)

6.4.5 Impact, risk assessment and mitigation measures for human environment

6.4.5.1 Scope of assessment

Resource/ Receptor	Project Phase	Activity	Impact
Human environment	Decommissioning Phase	• Demolition activities	Potential of accidental case and health affect from pollution

6.4.5.2 Potential impact on human environment

a) Potential impacts on occupational health and safety

Significant hazards can be occurred due to potential fall of materials or tools as well as temporary hazards such as physical hazards, dust emission and noise pollution. Moreover, accidents and injuries to workers can be caused by heavy vehicle movement for transport of materials and equipment in the demolition phase.

The proposed project will appoint some workers in decommissioning phase. A potential social impact during the decommissioning phase of the project will be on the occupational health and Safety of the staff. Mitigation measures are described in the next sections and on their working conditions.

b) Potential impacts on social benefits

For demolition to take place properly and in good time, several people will be involved. As a result, several employment opportunities will be created for the workers who will work for demolition during the demolition phase of the proposed project.

6.4.5.3 Impact significance on human environment

a) Impact significance on occupational health and safety

During decommissioning phase, there may have impact on occupational health and safety for breaking down the infrastructure or some other decommissioning activities. The magnitude of the impact will be “Medium”.

The area of impact will be only within the decommissioning area and therefore, the extent of the impact on occupational health and safety will be “Low”.

The period of impact occurrence will be within the demolition process and the duration of the impact will be considered as “Low”.

According to magnitude, extent and duration of the impact, the impact characteristics will be “Medium”. The importance of the impact will be considered as “Medium”.

Therefore, the impact on occupational health and safety by Green Land Wheat Flour Milling factory demolition would be "Medium".

Table 6-32 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		2 (Medium)

6.3.5.4 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.

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		1 (Low)

6.5 Summary of residual significance/ risk ranking

6.5.1 Summary of residual significance/ risk ranking during construction phase

Table 6-33 Residual significance/ risk ranking during construction phase

Environmental Factors/ Events	Activity	Potential Impacts	Potential Risk	Mitigation Measures	Residual Risk
a) Physical Environment					
1. Air Quality	• Construction activities	• Increasing particulate matter and lead to air quality degradation	Medium	• Construct wind breaks around the main construction activities and in the locality of potentially dusty works • Sprinkle water on graded access routes when necessary to reduce dust generation by construction vehicles.	Low
	• Open burning and temporary fuel transfer	• Gaseous emission and air quality degradation		• Minimize air pollution from vehicles by using low emission equipment and vehicles. • Prohibit open burning of any waste at project site	
	• Diesel generators and combustion of fuel for vehicles	• Gaseous emission and air quality degradation		• Ensure that all construction equipment and vehicles are maintained in accordance with the manufacture's recommendations	
2. Noise and vibration	• Noise nuisance due to mobilization and construction machines	• A substantial permanent increase in ambient noise levels in the project	Medium	• Use quiet equipment (i.e. equipment designed with noise control elements)	Low

Environmental Factors/ Events	Activity	Potential Impacts	Potential Risk	Mitigation Measures	Residual Risk
		vicinity		• Construction machinery and vehicles will undergo periodic maintenance to keep them in good working condition. • Turn equipment off when not in use.	
3. Water Quality	• removal of vegetation, top soil level and ground surface for the • Constructing landforms that change water flow paths	• Release of suspended soil to the water flows • Improper wastewater disposal from cleaning vehicles and equipment • Poor sanitation facilities that may result into surface water pollution through improper sewage management.	Medium	• Soil erosion and sediment control mechanisms will add positive effects on mitigation matters for water pollution. • Cover open stockpiles of construction materials or construction wastes on-site with tarpaulin or similar fabric during rainstorms • Provide measures to prevent the washing away of construction materials, soil, silt or debris into any drainage system of open stockpiles of construction materials.	Low
4. Waste disposal	• Solid waste generated from construction activities	• Contaminate to the environment (surface and ground water), and may be vector for disease	Low	• Managed construction materials in a way to avoid over-ordering, poor storage and maintenance, mishandling as well as improper operation procedures • Separate construction wastes	Low

Environmental Factors/ Events	Activity	Potential Impacts	Potential Risk	Mitigation Measures	Residual Risk
				into reusable items and materials to be disposed of or recycled whenever possible.	
b) Human environment					
5. Occupational Health and safety	• Considerable hazards like manual handling, inhalable dust, noise, working confined spaces as slip, trip and falls	• Adverse effect on employee's health	Medium	• Providing personal protective equipment suitable for the workplace • Be sure that vehicles and machines are in good working order • Regular inspection and maintenance of pollution control systems	Low
6. Socio- economic	• Project operation activities	• job opportunities for local people • Increasing government revenue	Positive	•	Positive

6.5.2 Summary of residual significance/ risk ranking during operation phase

Table 6-34 Summary of residual significance/ risk ranking during operation phase

Environmental Factors/ Events	Activity	Potential Impacts	Potential Risk	Mitigation Measures	Residual Risk
a) Physical Environment					
1. Air Quality	• Wheat Intake and Pre-Cleaning,	• Deterioration of air quality due to particulate matter	Medium	• Installing cyclone dust separator • Installing extra control systems such as fabric filter	Low
	• Wheat Cleaning and preparation,	• Deterioration of air quality due to particulate matter		• Installing cyclone dust separator • Installing extra control systems such as fabric filter	
	• Milling, Packing and Dispatching.	• Deterioration of air quality due to particulate matter		• Installing cyclone dust separator • Installing extra control systems such as fabric filter	
	• Generators	• Greenhouse gas emission		• Using of low-emission generator engines	
	• Machines and vehicle use	• Greenhouse gas emission		• Ensure all vehicles and machines used in milling operation are in good condition.	
2. Noise and vibration	• Some operation liked grinding, mixing and material handling equipment	• Increase in noise level during operation process	Low	• Using low noise equipment and machines	Low
				• Carryout regular maintenance of the equipment to minimize the noise level	
				• Using personal protective equipment	
	• Generator and vehicles	• Increase in noise level during operation process		• Using enclosure for all generator sets	

Environmental Factors/ Events	Activity	Potential Impacts	Potential Risk	Mitigation Measures	Residual Risk
				• Strictly enforce traffic control measures	
3. Solid Waste	• Solid waste from raw materials and factory operation, packaging	• Contaminate to the environment (surface and ground water), and may be vector for disease	Low	• Source segregation into wet waste and dry waste	Low
				• Wastes (by products) such as bran will be used as animal food or used in composting.	
	• Domestic waste from canteen	• Contaminate to the environment (surface and ground water), and may be vector for disease		• Food waste (organic waste) will be used as animal food or used in composting.	
4. Water Quality	• Runoff and drainage	• Contamination of surface water	Medium	• Using filtration method at the source before the distribution.	Low
				• Properly storing raw materials under the roof to prevent dumping into water courses in the rainy season.	
				• Treat drainage system for sediment control	
				• Conducting regular training, monitoring, and inspection schemes together with keeping track of water uses minimizes waste and leaks from faulty connections and faucets	
				• Comply EQEG guideline for effluent water	

Environmental Factors/ Events	Activity	Potential Impacts	Potential Risk	Mitigation Measures	Residual Risk
b) Human environment					
5. Occupational Health and safety	• Considerable hazards like manual handling, inhalable dust, noise, working confined spaces mainly silos as well as slip, trip and falls	• Adverse effect on employee's health	Low	• Providing personal protective equipment suitable for the workplace • Regularly checked the health of the workers • Be sure that vehicles and machines are in good working order • Regular inspection and maintenance of pollution control systems	Low
6. Socio- economic	• Project operation activities	• job opportunities for local people • Increasing government revenue	Positive	_	Positive

6.5.3 Summary of residual significance/ risk ranking decommissioning phase

Table 6-35 Summary of residual significance/ risk ranking during decommissioning phase

Environmental Factors/ Events	Activity	Potential Impacts	Potential Risk	Mitigation Measures	Residual Risk
a) Physical environment					
1. Air Quality	• Demolition activities	• Deterioration of air quality due to particulate matter	Medium	• Avoid demolitions works in extremely dry weathers	Low
				• Demolished materials on site to be covered to prevent to be blown off by wind	
				• Minimizing dust from material handling sources by using covers	
	• Heavy machinery/ vehicles such as bulldozers and loaders	• Deterioration of air quality due to greenhouse gas emission		• Using low emission equipment and vehicles.	
				• Optimize vehicle movements to eliminate unnecessary vehicle movements.	
				• Ensure strict enforcement of on-site speed limit regulations	
2. Noise and Vibration	• Demolition activities	• Pollution to local ambient noise and vibration level	Medium	• switching off engines of vehicles or machinery not being used	Low
				• Schedule noisy decommission activities and transportation during day-time hours	
				• Used good condition and	

Environmental Factors/ Events	Activity	Potential Impacts	Potential Risk	Mitigation Measures	Residual Risk
				insulated demolition machineries and equipment • Providing PPE, particularly hearing protection devices for those working in noisy areas	
3. Water Quality	• Demolition activities	• Accumulating the demolition materials which cause deterioration of water quality (such as clay, plaster, limestone, concrete, mercury in the nearby water course)	Low	• Efficiently using water at the site for carrying out decommissioning activities in order to avoid irresponsible water use • Developing Soil erosion and sediment control mechanisms • Properly management for solid wastes	Low
4. Waste Disposal	• Resulting demolition materials such as concrete, drywall, wood, glass, paints, pipe and metals and garbage, etc.	• Contaminate to the surrounding environment	Medium	• Strictly avoid dumping the wastes into the drain • Providing separate bins for food waste, metal and other waste at the temporary camp and other facilities on site • Removing fuel storage facilities immediately upon completion of decommissioning phase. • Recycling or disposing at the landfill • Dispose the hazardous wastes with proper disposal method	Low

Environmental Factors/ Events	Activity	Potential Impacts	Potential Risk	Mitigation Measures	Residual Risk
				and caution	
b) Human environment					
5. Occupational Health and safety	• Demolition activities	• Injuries by potential fall of materials or tools • Accidents and injuries to workers by heavy vehicle movement for transport of materials and equipment	Low	• Offering relevant job trainings for the workers • Providing personal protective equipment suitable for the workplace • Providing first aid box and medicines	Low
6. Socio- economic	• Project demolition activities	• Job opportunities for local people	Positive	_	Positive

6.6 Unplanned events residual risk ranking

Table 6-36 Unplanned events residual risk ranking

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Schedule	Residual Risk
1. Fire	• Fuel storage and ignition sources	• Possible explosion of fuel storage area or fire of the milling factory	• Installing and maintenance in good condition for fire alarm and fire-fighting equipment • Developing Emergency fire/ explosion response plan • Ensuring the availability of adequate information on the emergency situations through a good communication system	All project phases	Medium
2. Transportation Accidents	• Vehicle, equipment and machines use	• Possible injury or death to personnel	• Ensure all vehicles and machines used in milling operation are in good condition. • Drivers must be healthy, have vilid licenses and by no means allowed to drink alcohol or take forms of medicine or illicit drugs that can affect performance. • Strictly follow limit	All project phases	Medium
3. Fuel/ chemical Spill	• Storage of fuel	• Potential risk of spills to the environment affecting physically, biologically and people	• Check for oil leak from vehicles and machines regularly and fix them promptly	All project phases	Medium

			• Control measures for fuel/ chemical storage area		
4. Occupational hazard	• Workplace accidents	• Possible injury or death to personnel	• Providing first aid training for the worker • Providing medicines and materials needed in case of emergency • Collecting the information of the hospitals near the proposed project for serious case • Developing and implementing medical emergency response plan • Providing personal protective equipment suitable for the workplace	All project phases	Medium
5. Earthquake	• Physical shifting of earth's surface	• Potential physical disruption cause building collapse, fire or spills	• Providing personal protective equipment to evacuate during an emergency • Be ready for appropriate controls and protective equipment for natural hazard • Developing emergency evacuation plan	All project phases	Low

Chapter 7

Cumulative Impact Assessment

7 Cumulative impact assessment

According to the onsite surveys and interviews with public, most of the factories around the wheat flour milling factory are ***food related factories*** as such noodle, bakery, drinking water and some of them are electronic factory, package paper box factories and garment factory etc.

The cumulative effects from the factory's activities in relation to existing activities at the local environment were reviewed and assessed for significance. At the ***local level,*** cumulative impacts identified were of ***medium significance*** and are summarized below. ***No significant cumulative impacts*** on the environment were found at the ***national and regional levels***.

(i) Fugitive dust and air pollutants

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

(ii) Noise

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

(iii) Surface water and ground water quality

Discharge of wastewater with not allowable BOD by the factory into the common drainage could compound any impact that occurs from other effluents from the other industries.

Chapter 8

Environmental Management Plan

8 Environmental Management Plan (EMP)

8.1 Introduction

This chapter provides Environmental Monitoring, actions to be taken and management plan to reveal the negative environmental impacts of the flour milling factory during its operation, to improve the factory benefits, and to introduce standards of good practice to be practiced for all factory activities and process as well. Proper implementation of a comprehensive Environmental Management Plan (EMP) will ensure that the proposed Green Land Wheat Flour Milling Factory company 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 decommissioning 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 Green Land Wheat Flour Milling Factory company 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 operation 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 tables [**Table 8.3** for construction phase, **Table 8.4** for operational phase, **Table 8.5** for decommissioning phase] for all three phases are recommended for the impacts specified for the project.

8.3 Policies, legal compliance and institutional Framework

At each stage of the project cycle, relevant responsibilities must be assigned to stakeholders involved in achieving the environmental management plan. In order to ensure the effectiveness of the project, the environmental performance taken by the project proponent has to comply with existing environmental rules, laws, policies and procedures. The Green Land Myanmar Ltd has to assign HSE team to accomplish environmental controls, mitigation, measures and monitoring process throughout the entire project. The detailed responsible stakeholders for the activities of EMP are described in Figure 8.1.

8.3.1 Health and Safety Policy

a) Purpose

This policy applies to all personnel in Green Land Wheat Flour Milling factory.

b) Scope

This policy applies to all Green Land Wheat Flour Miling facilities, operations, employees, general workers, and product including those facilities indirect contact with the product.

c) Responsibility

It is responsible for all staffs in company to follow guideline and keep their relevant work environment clean and in good conditions.

HR is responsible in fulfilling required actions in maintaining safe & good working environment.

d) Standard

(1) Work Environment

House Keeping

It is essential that good housekeeping is maintained throughout the period of work both in the office, around office, around the warehouse and around the factory. All employees are responsible to keep their working environment clean and tidy. Janitors are appointed for cleaning office and it surrounding in daily basis.

Electricity and Lighting

It is responsibilities of the individual to ensure the lighting is adequate at working area. Report to HR Department immediately for bulbs/ tubes replacement when found faulty in order to maintain proper lighting.

And the safety guard lighting service for the round of the factory, office and warehouse responsibility and checking HR, and then report to Maintenance Department for repair service.

(2) Ventilation

Green Land International Limited warehouse and office are equipped with air-conditioners and stand/exhaust fans for proper

air-circulation systems . In case of out of order, HR shall take necessary actions.

(2) Drinking Water

RO purify drinking water shall be provided to all departments.

Sanitary conveniences

Sufficient and suitable sanitary conveniences are provided with well maintenance.

First Aid Kits / Emergency cases

The first aid kits are available at every department

HR Office : 1Kit

Security : 1 Kit

Production : 1 Kit

Warehouse : 1Kit

QC : 1Kit

Maintenance : 1Kit

As detail below to be used for urgent relevant minor cases contact list

Central Fire Station (YGN)	- 01 384420
Central Fire Station	- 01 252011, 01 252022
Fire Station (East Dagon)	- 01 2585460
Fire Station (South Dagon)	- 01 590071
Fire Station (North Dagon)	- 01 584060
Police Station (East Dagon)	- 01 3585187, 01 3585191
Government Hospital (North Dagon)	- 01 584071
Yazardhirit Hospital (East Dagon)	- 09 255807680, 09 5118023
HR/Admin Manager	- 09 250504103
Factory Manager	- 09 960444104

Office Security guard is appointed to monitor the access of visitors entering to the office. He has responsibility to make enquiry, issue visitor card and keep proper records. Visitors have to return their visitor card upon their departure from office. Night Security guard is responsible for the security of office after office hours and keeps records of visitor's arrivals on weekends. Every employee has to tag their employee's ID card during office hours and department personnel must ensure to lock the doors of their respective work place before leaving. One duplicate of all office keys is put in key box which is controlled by HR. All key holders shall sign in the Key control distribution list kept by HR.

The Company notifies that any staff found under the influence of alcohol or drugs while at work will have his employment contract terminated with immediate effect.

(3) Work Environment Safety for accident/incident

Every employee shall be committed to followed HSE guideline. HSE team shall monitor effectiveness of the status of Quality, Health, Safety and Environmental issues to take proper actions upon needed.

Accident/incident report shall be submitted to relevant department manager on a monthly basis. In case of urgent matters, the frequency shall be raised.

Health and Safety manager has responsible to take proper actions reported by department if necessary.

e) References

Fire extinguishers layout and Hydrant plans, Assembly Point, Factory Layout Plan, Pre-employment & Routine Medical Screening test, Accident/incident Register, Department Safety Procedure

8.4 Organizational structure and responsibilities

This section defines the roles and responsibilities of various entities for the Green Land flour milling factory.

The essential features of the organizational responsibilities are described as follows:

(i) Main responsibility

Green Land has established Food Safety Management Team (FSMS Team) in accordance with ISO guidelines owing to the factory is already accredited and ISO 2200 certified. FSMS is responsible for the environmental monitoring plan together with his/her primary job description. In this regard, the factory owner arranges the responsibility of the environmental performance of the factory by awarding manager who can manage the HSE plans. The HSE manager is conducting the responsibilities of all environmental issues and monitoring programs (Air/water/noise monitoring practices will be conducting annually and report to ECD) related to the factory process and activities and define the HSE policy and plans for the factory.

The factory owner is communicating with the respective government departments like Environmental Conservation Department (ECD), Ministry of Environmental Conservation and Forestry (MOECAF) etc and other stakeholders through the HSE manager.

(ii) Onsite monitoring

HSE manager implements all environmental issues in accordance with the actions needed to be taken defined in the EMP.

HSE manager coordinates whenever the inspection team from Government sides or NGOs comes and inspects the factory process and activities along with the HSE plans.

HSE manager give training to the workers who should be aware of the respective responsibilities and work in accordance with HSE policy and plans.

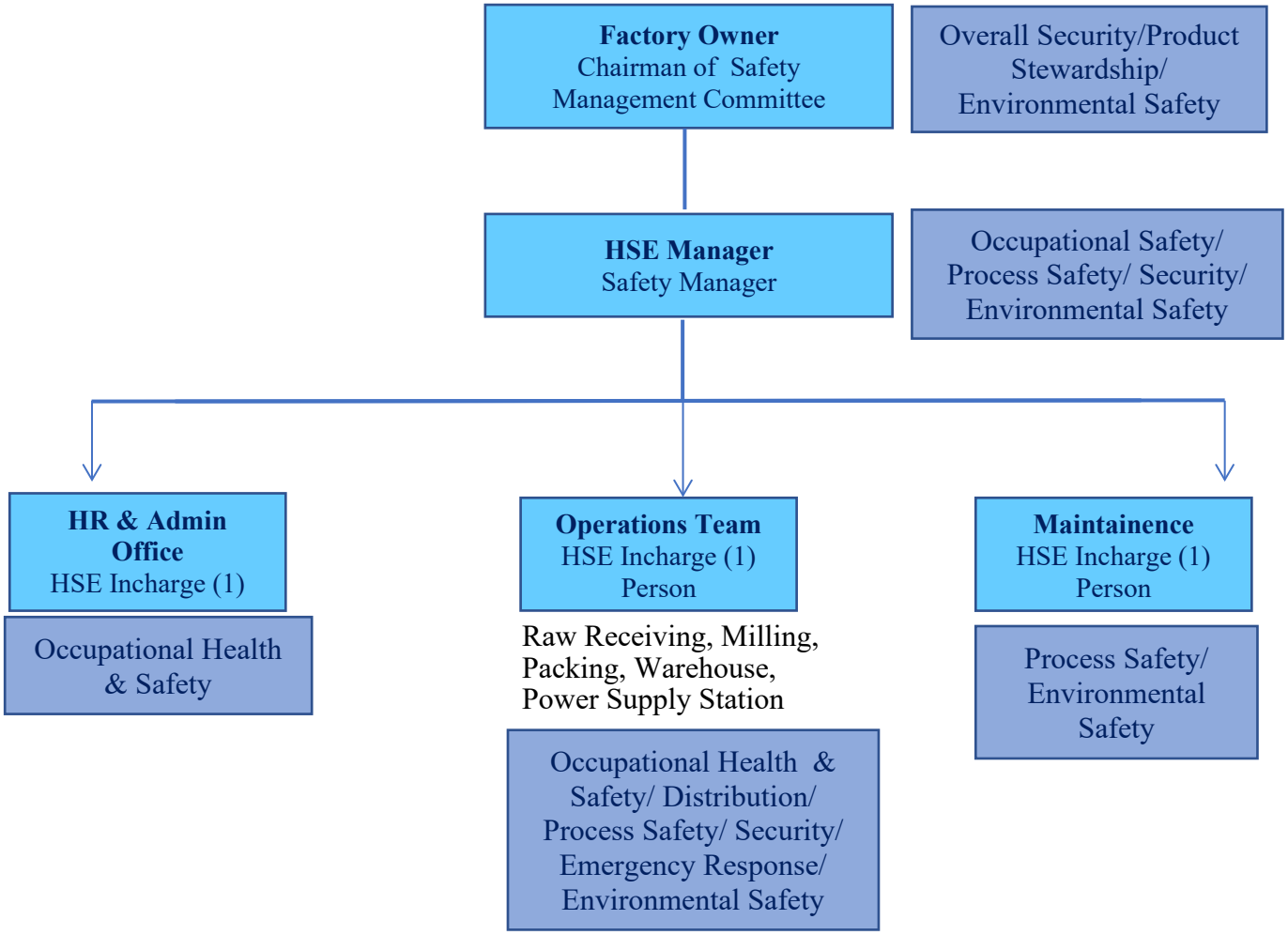


Figure 8. 1 HSE Team of The Green Land International Ltd

8.4 Environmental and social management plan

Environmental and Social Management Plan Measures are prepared by the following three tables: **Table 8.3** for construction phase, **Table 8.4** for operational phase, **Table 8.5** 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.

8.4.1.1. Objective

To identify the potential impacts likely affected by the activities carried out throughout the construction phase.

The EMP is prepared focusing on international and Myanmar environmental regulations and standards for the food industry projects and HSE policy.

It also sets out the necessity emergency response requirements required to minimize potential for pollution in the event of an emergency arising during the operation.

8.5 Environmental management and monitoring plan for air quality

The potential impacts on air quality and mitigation measures are described in section 6.2.

8.5.1 Air pollution protection measures and actions to be taken

The major industrial gas pollutant of the wheat flour milling is sulfur dioxide (SO_2) which is over the limit of both WHO and USEPA standards. Emission source of sulfur dioxide (SO_2) comes from the wheat flour milling activities. The emission of SO_2 can be from motor vehicle emission of the vehicles which are running in and out of the milling factory as well.

Generally, the emission of gas pollutants is difficult to control. However, particulate emission pollutants can be controlled with suitable control systems. The major unit operations of pollutant emission are dumping, conveying, weighing, pre-cleaning and conveying to storage silos or transferring to the working bins of the cleaning room. These unit operations are major emission points of air pollution.

There is a wide range of dust control processes and equipments to choose. Depending on the volume and composition of potential dust, cyclones and fabric filters can be used as the pollutant controllers.

In terms of the factory process, the emissions of dumping, conveying, and weighing are before milling process and pre-cleaning and conveying to storage silos or transferring to the working bins are mill process unit operations.

The first step of cleaning wheat taken from silos is sieving which is removed wheat stew and other impurities.

Looking at the existing situation of sieving, destoning and pre cleaning procedures of the mill,

(i) **Sieving** the impurities are removed from sieves by using manual force. To improve the process, the proposed mill should install ***pneumatic impurities collector*** to collect the impurities from sieves.

(ii) **De-stoner machine** can continue along with the existing process.

(iii) **Cockle cylinder** used to also remove the dust and impurities

- **Milling process**

  Milling is the close type and there is no emission during process.
- **Packaging process**
- Automatic packaging process are using to mitigate the emission

Cockle cylinder and **polishing machine** should use the fabric filter. The reasons are detailed as follows:

The following typical collection efficiency curves figure 8.1 shows the various types of particulate collectors for the type of appropriate PM controller.

Fabric filter should be chosen to control emission of PM_{10} from cockle cylinder and polishing machine according to the results of typical collection efficiency curves.

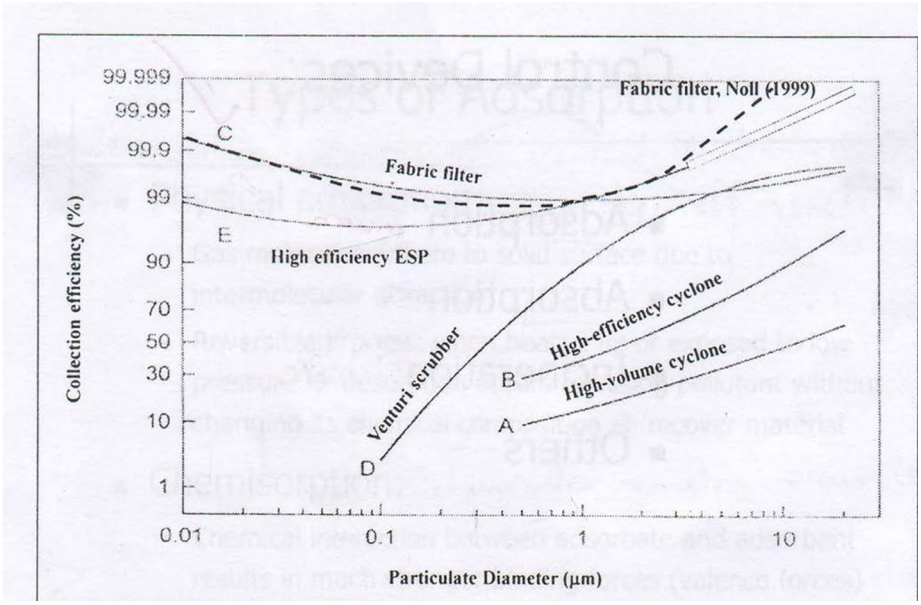


Figure 8.2 Typical collection efficiency curves for various types of particulate

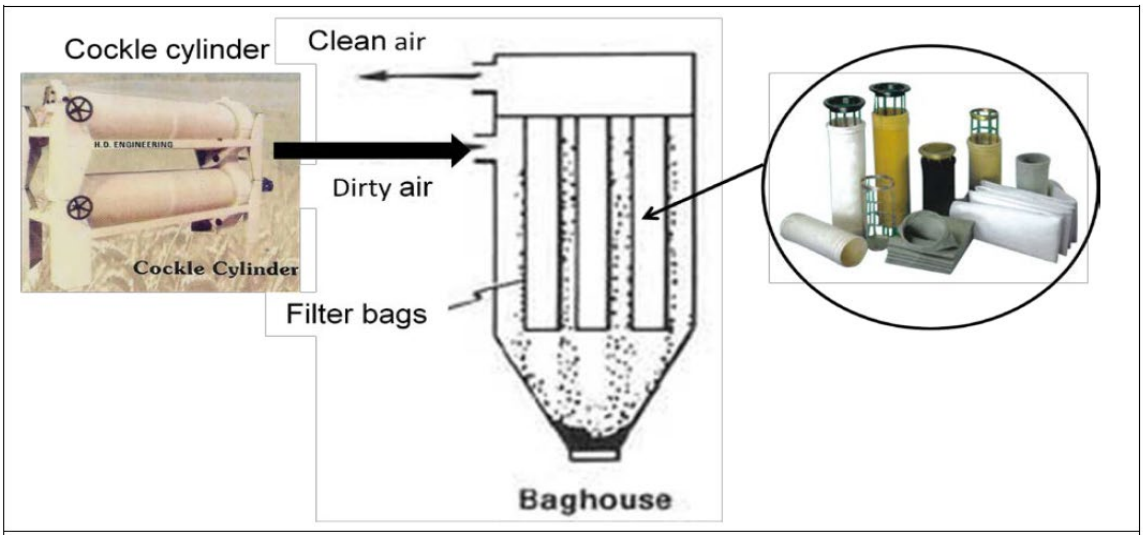


Figure 8. 3 Installation of fabric filter baghouse

8.5.1.1 Air quality monitoring program

The highest pollutant emission level of proposed mill is assessed at the raw material receiving and pre cleaning process. To mitigate of air emission level from those areas, particulate collectors should be installed at each activity.

(a) Air monitoring program

Source maintenance and operation monitoring are important parameters significantly affecting emission. Moreover, the type and the quality of the raw materials used are intimately related to the types and the quantities of pollutants emitted. Therefore, air monitoring should be conducted all operational phases (e.g., normal operation, start-up, shutdown, abnormal operation, commissioning) for 24 hours.

This monitoring should be conducted regularly such as annually. When the process system is changed or the raw materials are changed, air monitoring should be conducted to reveal the impact of the changes on the surrounding environment.

Responsibility

Company shall assign and train a team of company staff to implement the following action plans.

(OR)

Company shall award the environment consultant to implement the following action plans.

Table 8-1 Air quality indicators mainly monitored in the milling factor

Pollutant	Averaging Period	Limit/Guideline Value/ Standards (μgm^{-3})	Relevant Standards/Guidelines	Monitoring Frequency
NO_2 (ppb)	1 year	40	WHO	- Annual (24 hour) - Preferable period (dry weather)
	1 hour	200		
SO_2(ppb)	1 year	50	WHO	
	24 hours	20	WHO	
CO (ppm)	8 hour	10,000	WHO	
	1 hour	30,000	WHO	
$PM_{2.5}$($\mu g/m^3$)	1 year	10	WHO	
	24 hour	25	WHO	
PM_{10}	24 hour	50	WHO	
TSPM	24 hour	100	WHO	
CO (ppm)	8hr	9 ppm (8hr)	USEPA (NAAQS)	
Atomic Radiation		Normal background radiation (25-75) CPM (USEPA)		
Ozone	8hr	100 $ug.m^{-3}$ (8hr)	WHO	
	8hr	0.075ppm (8hr)	USEPA (NAAQS)	

Figure 8.4 :Air monitoring process

(b) Good working practice

All workers must wear suitable mask at their working activities.

All workers and staff particularly the immediate workers working around the exposed area should wear the suitable respirator masks to prevent both particulates and gases.

Figure 8.5 Masks

8.6 Environmental management and monitoring plan for noise quality

The potential impacts on noise quality and mitigation measures are described in section 6.4.

8.6.1 Noise pollution protection measures and actions to be taken

Governing parameter

Governing parameter of noise is only common at milling operation, storage area, packaging area and parking area of proposed mill based on the results measured with noise meter.

The production process of proposed mill would generate both noise and vibration from heavy plant and equipment. Thus, the following measures will be needed for noise and vibration of proposed mill:

- Appropriate sitting of plant, equipment, compounds, and machinery to minimize noise impacts. , and
- Noise monitoring to monitor whether comply with the noise limits.

The main reasons of noise emission are that at the storage place is near to the milling process which is producing the noise by crushing the wheat grains into flour and is conveying the raw materials from silo to milling machines.

Regardless of the other noise source comes from 500 KVA six generators, these noise levels were lower than the Environmental Quality Guideline (EQG) stated by Environmental Conservation Department (ECD).

The noise levels of other areas: packing area of proposed mill and admin office were under the level of EQG guideline for both day time and night time.

The highest noise level of proposed mill is assessed at the storage area. To mitigate of noise level from that area, there should be used insulations material to capture the sound. All workers must wear suitable ear muffs at their working duties.

Figure 8. 6 Insulation barriers of sound control and ear muffs

8.6.1.1 Noise quality monitoring program

The noise control procedures are outlined in order to protect noise produced during operation activities. This plan should include, but is not limited to, as discussed below.

- Identify procedures of both area for monitoring noise emissions and vibrations.
- Provide a description of control system devices used to control noise in both storage area and generators.
- Maintaining the spacing between noise sources and operators.
- Regulating the noise sources by a sound reducing structure that resents air- borne transmission.
- Damping of the vibrating metal structures or by replacement with material such as the wood.
- Reducing reflected noise by use of the absorbent materials on surfaces such as floors, roofs, and walls.

(a) Noise monitoring plan

To estimate proposed mill noise exposures by using a sound level meter with several measurements at different locations within the workplace.

Therefore, admin office, storage area, packing area and generator area of the wheat flour mill shall be measured by using noise meter for 24 hour per annum. The monitoring program should be as follows:

- Noise level at the site boundary collected in decibels during the hours of 07:00 to 22:00 and 22:00 to 07:00.
- Noise level measured at identified sensitive areas near the production site particularly in

  1) The storage area which is the place of raw material storage and near the milling machine and conveyers which is transporting raw material from silos to milling machines. Receiving raw materials from the container trucks is also take place in the storage area of proposed mill which produced higher noise level.
  2) The packing place which is the last stage of proposed mill and only emits the noise from packing flour and storage

- Noise monitoring should be conducted all operational phases (e.g., normal operation, start-up, shutdown, abnormal operation, commissioning).

After appropriate sound level meter readings are obtained, keep in an excel file of the sound levels within different areas of the workplace. This measurement method is generally referred to as "area" noise monitoring.

Responsibility

Company shall assign and train a team of company staff to implement the following action plans.

(OR)

Company shall award the environment consultant to implement the following action plans.

This following table presents the monitoring plan of noise pollution.

Receptor	One Hour LAeq (dBA)		Monitoring Frequency
	Daytime 07:00 – 22:00	Nighttime22:00 – 07:00	
Residential, institutional, educational	55	45	Annual
Industrial, commercial	70	70	
Remark	When new equipment installation occur, noise monitoring should operate		

Figure 8. 7 Noise data monitoring with noise meter

(b) Good working practice

All staff on site should be equipped with suitable working mufflers. In the event of a muffler fails, it will be replaced immediately.

(c) Capacity development and training

The staff of proposed mill should be trained to use ear muffs in working duties. Moreover, responsible person should monitor one time per annual of total noise emissions from all the noise sources below the prescribed limits in the work area.

8.7 Environmental management and monitoring plan for waste management

The potential impacts of waste and mitigation measures are described in section 6.5.

8.7.1 Waste management measures and actions to be taken

8.7.1.1 Source segregation

According to the observation and analysis, the most suitable management system is source segregation. Source segregation is the most significant feature of any waste handling, management, and recovery strategies. Source separation comprises of separating waste components, and this can happen in many ways. One of the simplest source segregation practices is to segregate waste into dry waste and wet waste at the source of waste generation.

(a) Wet wastes

Generally they include organic wastes which are wet, such as leftover food waste, food processing waste etc.

(b) Dry wastes

On the other hand, these wastes include reusable packaging waste plastic bottle, glass bottle, metal can, dry paper, dry plastic etc.

Such waste segregation activity is also useful in making the consumers aware of the quantity and types of waste they produce.

Dry Waste at Yellow Bin

Wet Waste at Green Bin

Figure 8.8 Action plan for sources segregation

8.7.2 Composting of solid waste

Another option for the environmental management plan is organic waste to compost. This is also one of the best techniques for the waste minimization process. According to the result, the typical type of waste that sent to Municipal is organic food waste and dust. If that amount of waste can be recycled, it is very effective to become zero waste.

For this issue, organic waste composter is the best. Ideally, composting will enhance the usefulness of organic by-products as fertilizers, privately and commercially. Composting is receiving increased attention as an alternative manure management practice due to increased pressures from society to reduce the impact on the environment.

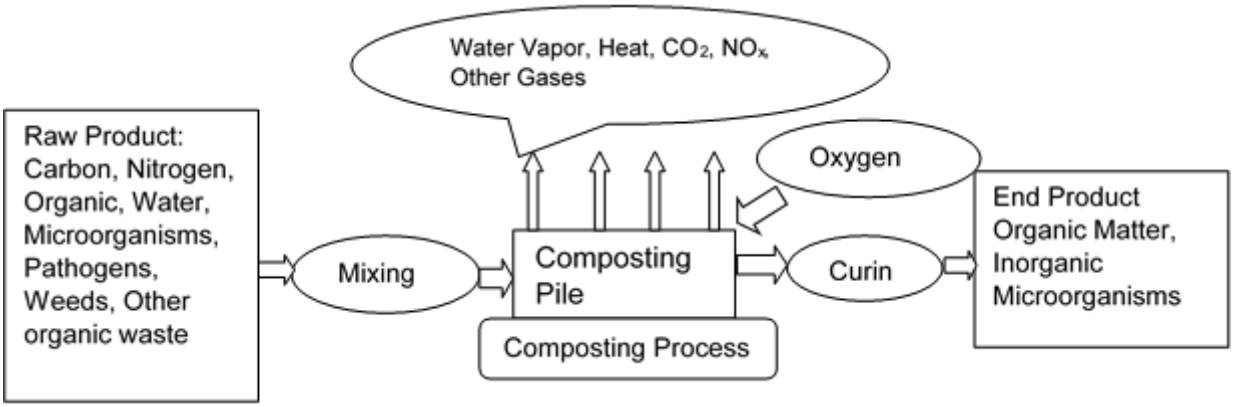


Figure 8. 9 Material flows for the conventional composting process

Responsibility

Company shall assign and train a team of company staff to implement the following action plans.

(OR)

Company shall award the environment consultant to implement the following action plans.

8.7.3 Waste management plan

Sr	Generated Parameter	Waste Source	Management plans and actions to be taken	Unit	Applicable Parameter
1	Measuring Waste Generation rate	All sources of waste, such as Milling System and Domestic Solid Waste	One a week by using weighting machine	kg/person/day	ECD/WHO Guidelines of Waste generation
2	Waste Auditing		Physical Composition and if possible it is needed to do chemical composition once a month by using the standard Method	Physical Composition (%) Chemical Composition (mg/kg)	ECD/WHO Guidelines of Waste composition in Developing country.
3	Bulk Density		Once a month by using the standard Method of ASTM.	kg/m3	ECD/WHO Guidelines of Bulk Density in Developing country

a) Bin System is needed to be improved to segregate in both color and
b) Waste composting should be practiced
c) Need to practice recycling activities in organic waste
d) Waste auditing biannually

8.8 Environmental management and monitoring plan of potable water and waste water

The potential impacts of waste and mitigation measures are described in section 6.6.

Potable water and waste water management measures and actions to be taken Environmental management plan is one of the main purposes for greening environment for the surrounding areas of the industries. The flour milling factory's environmental management performance will become improve the more the workers are aware of their responsibilities. The factory provides awareness raising training program to be practiced in relation to environmental monitoring program.

1) Improve efficiency and profitability by promoting reuse, recycling and recovery of waste, rather than disposal.

2) Reduce fly-tipping by keeping a full audit trail of waste removed from sites and complying with waste duty of care regulations

3) Increase environmental awareness of the workforce and management –

4) Give education along with training on the workers about site waste management plan information and induction training as the part of environmental awareness campaign.

In this milling system, the six main types of water management plans are recommended to improve potable water quality and effluent water conditions.

Those six techniques are Filtration Method, Reverse Osmosis Method, Boiling water, Disinfection, Disposal by Dilution Method and Constructed Wet-land Method.

Responsibility

Company shall assign and train a team of company staff to implement the following action plans.

(OR)

Company shall award the environment consultant to implement the following action plans.

This following table presents the monitoring plan of noise pollution.

Sr	Parameters	Unit	Sampling Sources	Legislation limit	Applicable standards
1	Ammonia Nitrogen		Tap, and water tank from the whole factory	Annual	WHO, USEPA, IFC
2	Chloride	mg/l			
3	Manganese	mg/l			
4	pH				
5	Iron	mg/l			
6	Total Dissolved Solid	mg/l			
7	Conductivity	mg/l			
8	Turbidity	FTU			
9	Total Alkalinity	mg/l $CaCO_3$			
10	Total Hardness	mg/l as $CaCO_3$			
11	Chloride	mg/l			
12	Magnesium	mg/l			
13	Calcium	mg/l			
14	Sulfate	mg/l			
15	Zinc	mg/l			
16	Colour	Pt-Co			
17	Arsenic	mg/l			
18	Copper	mg/l			
19	Total Coliforms	MPN/100 ml			

This following table present the wastewater management plan for milling system.

Sr	Parameters	Unit	Sampling Sources	Legislation limit	Applicable standards
1	pH	S.U.	Effluent Drainage from the factory	Annual	WHO, USEPA, IFC
2	Total Suspended Solid (TSS)	mg/l			
3	Ammonia Nitrogen	mg/l			
4	Nitrate Nitrogen	mg/l			
5	Oil and Grease				
6	Phosphorus	mg/l			
7	BOD	mg/l			
8	COD	mg/l			

8.8.1 Filtration at the source of potable water

If all the water has been passed filter before using, it is sure to reduce the amount of Total Suspended Solid (TSS) and Total Dissolved Solid (TDS) dissolved in the water. Therefore, it would be much better if not only start from the main sources but also at the all the tap must be put filter to reduce the amount TSS and TDS.

The following figure 8.9 shows the Filtration machine. Generally, filtration is a combination between physical and chemical processes. Mechanical straining removes some particles by trapping them between the grains of the filter medium (such as sand). These filters form a filter skin containing microorganisms that trap and break down algae, bacteria, and other organic matter before the water reaches the filter medium itself.

Figure 8. 10 The machine of filtration

8.8.2 Reverse Osmosis (RO) method for the potable water

Many decades ago, scientists noted that water molecules would spontaneously migrate through certain membranes that were separating a dilute solution from a concentrated solution. This phenomenon is called osmosis. To remove Total Dissolved Solid from the potable the method of reverse osmosis method is one of the best methods to recommend and to use in this milling system as well.

Looking at the performance of RO membrane systems, water quality and plant performance can be enhanced with the careful selection and application of advanced treatment chemicals designed specifically for such water purification facilities and their sensitive membranes.

Where only a small volume of treated water is needed, approximately 0-10 gallons per day (gpd), RO is typically the most flexible and cost efficient treatment process available for domestic use.

Devices treating small volumes of water are often called "under-the-sink" or "point-of-use" (POU) sized treatment devices. Treatment devices which purify all water used in a home are commonly called "whole house" or "point-of-entry" sized water treatment devices.

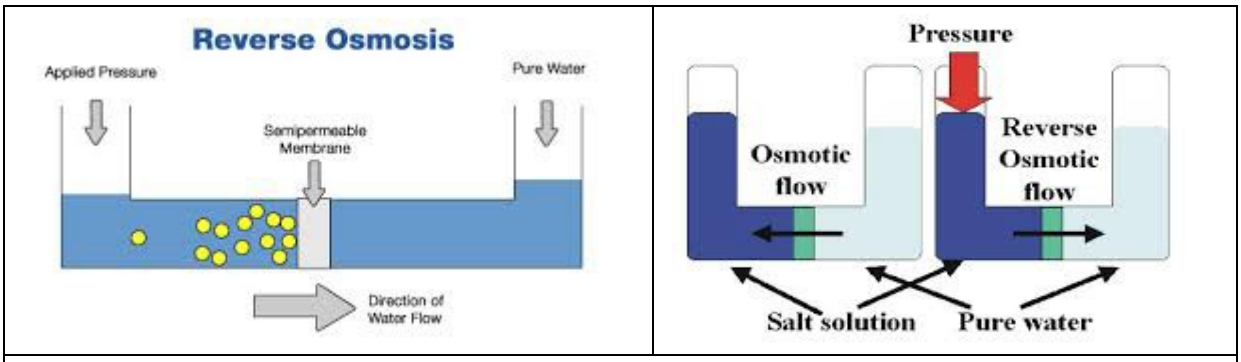


Figure 8. 11 The process of Reverse Osmosis

8.8.3 Boiling water before using

Boiling is the most certain way of killing all microorganisms. According to the analysis method and experiment result from Wilderness Medical Society.

Water temperature at 160° F (70° C) kills all pathogens within 30 minutes.

Water temperature above 185° F (85° C) kills all pathogens within a few minutes.

So in the time it takes for water to reach the boiling point (212° F or 100° C) all pathogens will be killed, even at high altitude. The moment the drinking water reaches a rolling boil, the water has already become safe to drink**.**

8.8.4 Disinfection method for safe potable water

There are many different types of disinfection method to safe from the waterborne disease and water-wash disease. In this milling system, it is recommended that Chlorination along with proper dose and timing is the best suitable method among the others.

Water chlorination is the process of adding chlorine (Cl_2) or hypochlorite to water. This method is used to kill certain bacteria and other microbes in tap water as chlorine can kill the microorganisms; however; it should be proper dose and timing are very essential not to cause harm on human beings. In particular, chlorination is used to prevent the spread of waterborne disease such as cholera, dysentery, typhoid etc.

This is also a method of treatment which has been employed for many purposes in all stages in wastewater treatment, and even prior to preliminary treatment. It involves the application of chlorine to the wastewater for the following purposes:

-Disinfection or destruction of pathogenic organisms.

-Prevention of wastewater decomposition: (a) odor control, and (b) protection of plant structures.

-Aid in plant operation: (a) sedimentation, (b) trickling filters, (c) activated sludge bulking.

-Reduction or delay of biochemical oxygen demand (BOD).

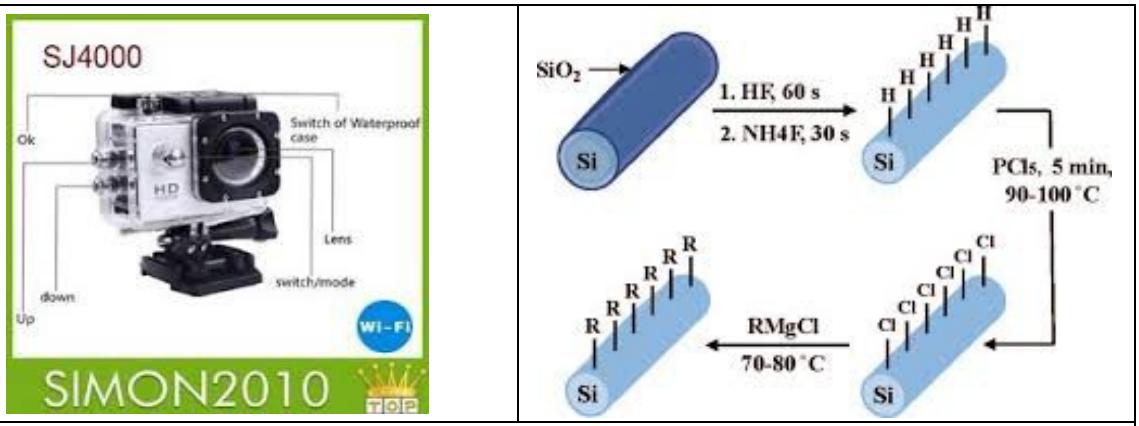


Figure 8. 12 The method of chlorination

8.8.5 Using dilution method to reduce the amount of pollution

According to the experiment analysis, and water auditing result, the amount of waste water discharge is not as high as to build waste water treatment plant. Thus, in this situation, it must be recommended that Disposal by dilution method is one of the preferable methods for this milling system.

Disposal by Dilution method is one of the former method that had been used in the past both developed and developing country. As the amount of waste water produced from this industry is not much higher, it is no need to do others higher method. However, it is recommended that before discharge waste water to the drainage, firstly it should be needed to add pure water into waste water. By doing this, the amount of waste pollution will be reduced.

By doing disposal by dilution method, it has been actually affective to reduce pollutants. This is the simple method of discharging wastewater into surface water such as a river, lake, ocean, estuaries or wetlands.

This can result in the pollution of the receiving water as well. The degree of pollution depends on the dilution, volume and composition of the wastewater compared to the volume and quality of the water with which is mixed. When the volume and organic content of the wastewater is small, compared with the volume of the receiving water, the dissolved oxygen present in the receiving water is adequate to provide for aerobic decomposition of the organic solids in the wastewater so that nuisance conditions do not develop.

In spite of the continued aerobic status of the receiving water, microbial pollution remains a health menace and floating solids in the wastewater, if not removed, these can be visible as evidence of the pollution.

8.8.6 Constructed wetland

Constructed wetland is one of the techniques to reduce pathogens and bacteria from the waste water. This is very effective method for the environmental health and sanitation system. Constructed wetlands have only recently been developed for storm water and wastewater treatment. Wetlands, either constructed or natural, offer a cheaper and low-cost alternative technology for wastewater treatment. A constructed wetland system that is specifically engineered for water quality improvement as a primary purpose is termed as a 'Constructed Wetland Treatment System' (CWTS).

It is one of the environmental sound waste management systems. When it is compared with others treatment system, it is a cheaper alternative for wastewater treatment system by using local resources. Aesthetically, it is a more landscaped looking wetland site compared to the conventional wastewater treatment plants. This system promotes sustainable use of local resources, which is a more environment friendly biological wastewater treatment system.

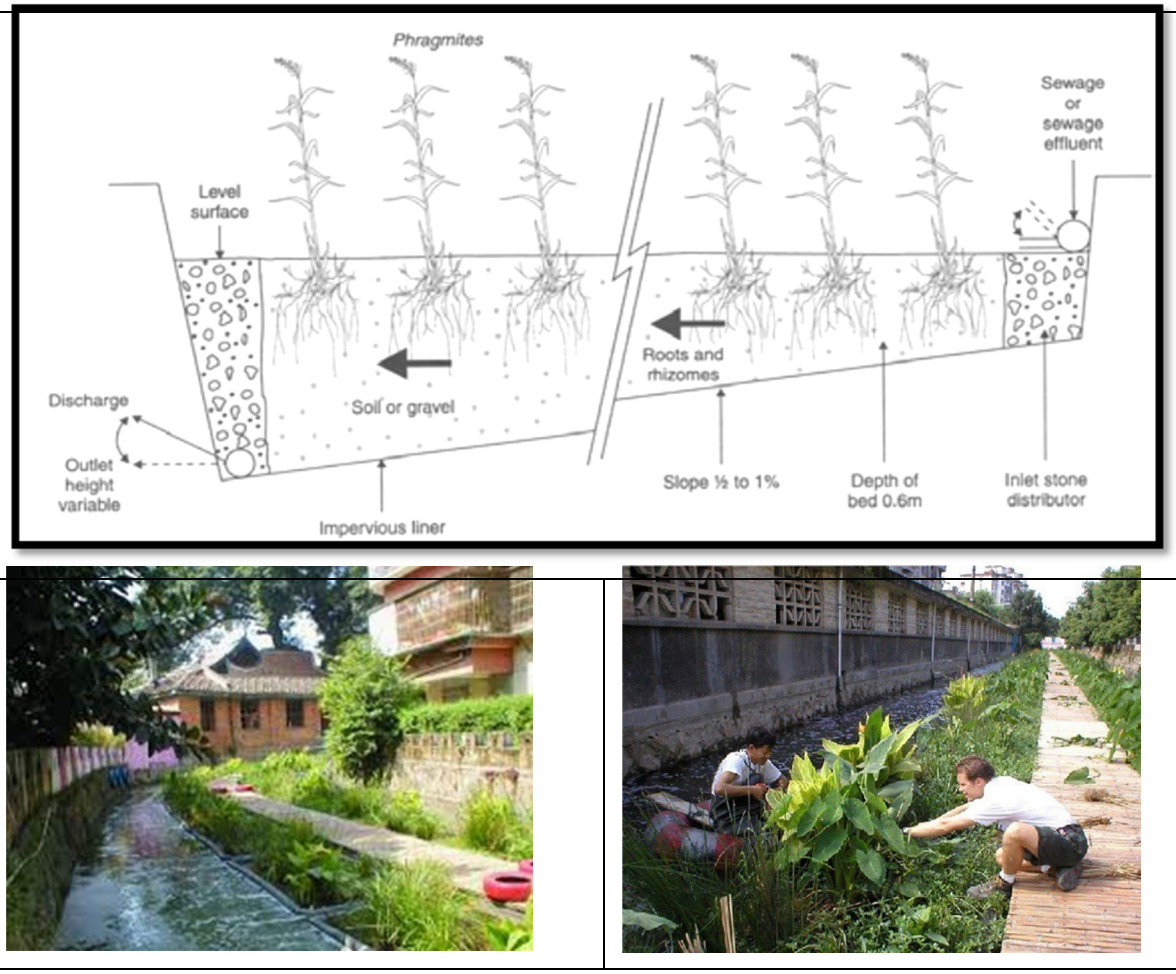


Figure 8.13 Schematic of a constructed wetland system

Wastewater flows through the soil. Plants growing on the soil assimilate the nutrients of the wastewater and soil bacteria mineralize nutrients.

Disadvantages _ High space requirements

- ✓ _ Costly (gravel)
- ✓ _ Great care required during construction (pervious liner, etc.)
- ✓ _ Intensive maintenance during the first 2 years

Advantages _ High treatment efficiency, up to 95 % COD removal

- ✓ _ No wastewater aboveground
- ✓ _ No nuisance of odour
- ✓ _ Good nutrient removal

Table8-2 Recommended methods for each parameter

No	Pollutant/Parameter	Control Options / Principle	Common End of Pipe Control Technology
1	TSS - Settleable	Settling, Size Exclusion	Sedimentation basin, clarifier, centrifuge, screens
2	TSS - Non-Settleable	Floatation, Filtration - traditional and tangential	Dissolved air floatation, Multimedia filter, sand filter, fabric filter, ultrafiltration microfiltration
3	BOD	Biological - Aerobic, Facultative	Suspended growth, attached growth, hybrid
4	COD	Oxidation, Adsorption, Size Exclusion	Chemical oxidation, Thermal oxidation, Activated Carbon, Membranes
5	Total Dissolved Solid	Concentration, Size Exclusion	Evaporation, crystallization, Reverse Osmosis

Rainwater collection

It should be kept so as to supply the plant's water requirements, especially in activities like cleaning, toilets operation or green spaces irrigation.

8.9 Environmental, social and health mitigation measures

A summary of the mitigation measures and specific action commitments for operation phase and decommissioning phase and unplanned events are presented in Table 8-4 to Table 8-6.

Table8-3 Mitigation measures and required action plan during construction phase

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
a) Physical Environment								
1. Air Quality	• Construction activities	• Increasing particulate matter and lead to air quality degradation	• Construct wind breaks around the main construction activities and in the locality of potentially dusty works • Sprinkle water on graded access routes when necessary to reduce dust generation by construction vehicles.	Low	• Construct wind breaks around the main construction activities and in the locality of potentially dusty works • Sprinkle water on graded access routes when necessary to reduce dust generation by construction vehicles.	Construction team and/or HSE team	Throughout the construction phase	Monitoring Report
	• Open burning and temporary fuel transfer	• Gaseous emission and air quality degradation	• Minimize air pollution from vehicles by using low emission equipment and vehicles. • Prohibit open burning of any		• Minimize air pollution from vehicles by using low emission equipment and vehicles. • Prohibit open burning of any			

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
			waste at project site		waste at project site			
	• Diesel generators and combustion of fuel for vehicles	• Gaseous emission and air quality degradation	• Ensure that all construction equipment and vehicles are maintained in accordance with the manufacture's recommendations		• Ensure that all construction equipment and vehicles are maintained in accordance with the manufacture's recommendations			
2. Noise and vibration	• Noise nuisance due to mobilization and construction machines	• A substantial permanent increase in ambient noise levels in the project vicinity	• Use quiet equipment (i.e. equipment designed with noise control elements)	Low	• Use quiet equipment (i.e. equipment designed with noise control elements)	Construction team and/or HSE team	Throughout the construction phase	Monitoring Report
			• 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.			
			• Turn equipment		• Turn equipment			

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
			off when not in use.		off when not in use.			
3. Water Quality	• removal of vegetation, top soil level and ground surface for the • Constructing landforms that change water flow paths	• Release of suspended soil to the water flows • Improper wastewater disposal from cleaning vehicles and equipment • Poor sanitation facilities that may result into surface water pollution through improper sewage management.	• Soil erosion and sediment control mechanisms will add positive effects on mitigation matters for water pollution.	Low	• Soil erosion and sediment control mechanisms will add positive effects on mitigation matters for water pollution.	Construction team and/or HSE team	Throughout the construction phase	Monitoring Report
			• Cover open stockpiles of construction materials or construction wastes on-site with tarpaulin or similar fabric during rainstorms		• Cover open stockpiles of construction materials or construction wastes on-site with tarpaulin or similar fabric during rainstorms			
			• Provide measures to prevent the washing away of construction		• Provide measures to prevent the washing away of construction			

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
			materials, soil, silt or debris into any drainage system of open stockpiles of construction materials.		materials, soil, silt or debris into any drainage system of open stockpiles of construction materials.			
4. Waste disposal	• Solid waste generated from construction activities	• Contaminate to the environment (surface and ground water), and may be vector for disease	• Managed construction materials in a way to avoid over-ordering, poor storage and maintenance, mishandling as well as improper operation procedures	Low	• Managed construction materials in a way to avoid over-ordering, poor storage and maintenance, mishandling as well as improper operation procedures	Construction team and/or HSE team	Throughout the construction phase	Monitoring Report
			• 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.			

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
5. Occupational Health and safety	• Considerable hazards like manual handling, inhalable dust, noise, working confined spaces as slip, trip and falls	• Adverse effect on employee's health	• 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
			• Be sure that vehicles and machines are in good working order		• Be sure that vehicles and machines are in good working order			
			• Regular inspection and maintenance of pollution control systems		• Regular inspection and maintenance of pollution control systems			
6. Socio-economic	• Project operation activities	• job opportunities for local people • Increasing government revenue	•	Positive	• Community meetings	Construction team and/or HSE team	Throughout the construction phase	Meeting notes

Table8-4 Mitigation measures and required action plan during operation phase

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
a) Physical Environment								
1. Air Quality	• Wheat Intake and Pre-Cleaning,	• Deterioration of air quality due to particulate matter	• To install cyclone dust separator • To install extra control systems such as fabric filter	Low	Installing cyclone dust separator Installing extra control systems such as fabric filter	Project Management Team, Workers and/or HSE Team	Throughout the operation Phase	Monitoring Report
	• Wheat Cleaning and preparation,	• Deterioration of air quality due to particulate matter	• To install cyclone dust separator • To install extra control systems such as fabric filter		Installing cyclone dust separator Installing extra control systems such as fabric filter			
	• Milling, Packing and Dispatching.	• Deterioration of air quality due to particulate matter	• To install cyclone dust separator • To install extra control systems such as fabric filter		Installing cyclone dust separator Installing extra control systems such as fabric filter			
	• Generators	• Greenhouse gas emission	• To use of low-emission generator engines		Using of low-emission generator engines			

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
	• Machines and vehicle use	• Greenhouse gas emission	• Ensure all vehicles and machines used in milling operation are in good condition.		Ensure all vehicles and machines used in milling operation are in good condition.			
2. Noise and vibration	• Some operation liked grinding, mixing and material handling equipment	• Increase in noise level during operation process	• To use low noise equipment and machines	Low	Using low noise equipment and machines	Project Management Team, Workers and/or HSE Team	Throughout the operation Phase	Monitoring Report
			• Carryout regular maintenance of the equipment to minimize the noise level		Carryout regular maintenance of the equipment to minimize the noise level		Throughout the operation Phase	
			• Using personal protective equipment		Using personal protective equipment		Throughout the operation Phase	
	• Generator and vehicles	• Increase in noise level during operation process	• Using enclosure for all generator sets		Using enclosure for all generator sets		Throughout the operation Phase	
			• Strictly enforce traffic control		Strictly enforce traffic control		Throughout the operation	

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
			measures		measures		Phase	
3. Solid Waste	• Solid waste from raw materials and factory operation, packaging	• Contaminate to the environment (surface and ground water), and may be vector for disease	• Source segregation into wet waste and dry waste	Low	Source segregation into wet waste and dry waste	Project Management Team, Workers and/or HSE Team		Monitoring Report
			• Wastes (by products) such as bran will be used as animal food or used in composting.		Wastes (by products) such as bran will be used as animal food or used in composting.			
	• Domestic waste from canteen	• Contaminate to the environment (surface and ground water), and may be vector for disease	• Food waste (organic waste) will be used as animal food or used in composting.		Food waste (organic waste) will be used as animal food or used in composting.			
4. Water Quality	• Runoff and drainage	• Contamination of surface water	• Using filtration method at the source before the distribution.	Low	Using filtration method at the source before the distribution.	Project Management Team, Workers and/or HSE Team	Throughout the operation Phase	Monitoring Report

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
			• Properly storing raw materials under the roof to prevent dumping into water courses in the rainy season.		Properly storing raw materials under the roof to prevent dumping into water courses in the rainy season.		Phase	
			• Treat drainage system for sediment control		Treat drainage system for sediment control		Throughout the operation Phase	
			• Conducting regular training, monitoring, and inspection schemes together with keeping track of water uses minimizes waste and leaks from faulty connections and faucets		Conducting regular training, monitoring, and inspection schemes together with keeping track of water uses minimizes waste and leaks from faulty connections and faucets		Throughout the operation Phase	
			• Comply EQEG guideline for effluent water		• Comply EQEG guideline for effluent water		Throughout the operation Phase	

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
5. Occupational Health and safety	• Considerable hazards like manual handling, • inhalable dust, • noise, • working confined spaces mainly silos as well as slip, trip and falls • Car/Truck/ Vehicles accident	• Adverse effect on employee's health	• Providing personal protective equipment suitable for the workplace	Low	• Providing personal protective equipment suitable for the workplace	Project Management Team, Workers and/or HSE Team	Throughout the operation Phase	Incident Record
			• Regularly checked the health of the workers		• Regularly checked the health of the workers			
			• Be sure that vehicles and machines are in good working order/ Careful aware of the car accidents in line with Vehicle Safety and Motor Vehicle Management Law		• Be sure that vehicles and machines are in good working order			
			• Regular inspection and maintenance of pollution control systems • One room in the		• Regular inspection and maintenance of pollution control			

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Records
			office building is to be used as a rest room for sick persons and for dispensaries. • First-Aid Kid provided in all the building		systems			
6. Socio-economic	• Project operation activities	• job opportunities for local people • Increasing government revenue	_	Positive		Community meetings	Throughout the operation Phase	Meeting notes

Table8-5 Mitigation measures and required action plan during decommissioning phase

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Record
a) Physical environment								
1. Air Quality	• Demolition activities	• Deterioration of air quality due to particulate matter	• Avoid demolitions works in extremely dry weathers	Low	• Avoid demolitions works in extremely dry weathers	Construction team and/or HSE team	Throughout project duration	Monitoring report
			• Demolished materials on site to be covered to prevent to be blown off by wind		• Demolished materials on site to be covered to prevent to be blown off by wind			
			• Minimizing dust from material handling sources by using covers		• Minimizing dust from material handling sources by using covers			
	• Heavy machinery / vehicles such as bulldozers and loaders	• Deterioration of air quality due to greenhouse gas emission	• Using low emission equipment and vehicles.		• Using low emission equipment and vehicles.		Throughout project duration	
			• Optimize vehicle movements to eliminate unnecessary vehicle movements.		• Optimize vehicle movements to eliminate unnecessary vehicle movements.			
			• Ensure strict enforcement of on-site speed limit regulations		• Ensure strict enforcement of on-site speed limit regulations			
2. Noise and Vibration	• Demolition activities	• Pollution to local ambient	• switching off engines of vehicles or	Low	• switching off engines of vehicles	Construction team and/or	Throughout project	Monitoring report

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Record
		noise and vibration level	machinery not being used		or machinery not being used	HSE team	duration	
			• Schedule noisy decommission activities and transportation during day-time hours		• Schedule noisy decommission activities and transportation during day-time hours			
			• Used good condition and insulated demolition machineries and equipment		• Used good condition and insulated demolition machineries and equipment			
			• Providing PPE, particularly hearing protection devices for those working in noisy areas		• Providing PPE, particularly hearing protection devices for those working in noisy areas			
3. Water Quality	• Demolition activities	• Accumulating the demolition materials which cause deterioration of water quality (such	• Efficiently using water at the site for carrying out decommissioning activities in order to avoid irresponsible water use	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

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Record
		as clay, plaster, limestone, concrete, mercury in the nearby water course)	• Developing Soil erosion and sediment control mechanisms		• Developing Soil erosion and sediment control mechanisms			
			• Properly management for solid wastes		• Properly management for solid wastes			
4. Waste Disposal	• Resulting demolition materials such as concrete, drywall, wood, glass, paints, pipe and metals and garbage, etc.	• Contaminate to the surrounding environment	• Strictly avoid dumping the wastes into the drain	Low	• Strictly avoid dumping the wastes into the drain	Construction team and/or HSE team	Throughout project duration	Monitoring report
			• 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			
			• Removing fuel storage facilities immediately upon completion of decommissioning phase.		• Removing fuel storage facilities immediately upon completion of decommissioning phase.			
			• Recycling or disposing at the landfill		• Recycling or disposing at the landfill			

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Record
			• Dispose the hazardous wastes with proper disposal method and caution		• Dispose the hazardous wastes with proper disposal method and caution			
b) Social Environment								
5. Occupational Health and safety	• Demolition activities	• Injuries by potential fall of materials or tools • Accidents and injuries to workers by heavy vehicle movement for transport of materials and equipment	• Offering 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
			• Providing personal protective equipment suitable for the workplace		• Providing personal protective equipment suitable for the workplace			
			• Providing first aid box and medicines		• Providing first aid box and medicines			
6. Socio-economic	• Project demolition activities	• Job opportunities for local people	_	Positive	_	Community meetings	Throughout project duration	Meeting note

Table8-6 Mitigation measures and required action plan for unplanned events

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Record
1. Fire	• Fuel storage and ignition sources	• Possible explosion of fuel storage area or fire of the milling factory	• Installing and maintenance in good condition for fire alarm and fire-fighting equipment • Developing Emergency fire/ explosion response plan • Ensuring the availability of adequate information on the emergency situations through a good communication system	Medium	• Installing and maintenance in good condition for fire alarm and fire-fighting equipment • Developing Emergency fire/ explosion response plan • Ensuring the availability of adequate information on the emergency situations through a good communication system	Factory Emergency Team trained and experienced with fire drill	All project phases	Incident record
2. Transportation Accidents	• Vehicle, equipment and machines use	• Possible injury or death to personnel	• Ensure all vehicles and machines used in milling operation are in good condition. • Drivers must be healthy, have vilid licenses and by no means allowed to drink alcohol or take	Medium	• Ensure all vehicles and machines used in milling operation are in good condition. • Drivers must be healthy, have vilid licenses and by no means allowed to drink alcohol or	Emergency response team	All project phases	Incident record

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Record
			forms of medicine or illicit drugs that can affect performance. • Strictly follow limit		take forms of medicine or illicit drugs that can affect performance. • Strictly follow limit			
3. Fuel/ chemical Spill	• Storage of fuel	• Potential risk of spills to the environment affecting physically, biologically and people	• Check for oil leak from vehicles and machines regularly and fix them promptly • Control measures for fuel/ chemical storage area	Medium	• Check for oil leak from vehicles and machines regularly and fix them promptly • Control measures for fuel/ chemical storage area	Emergency response team	All project phases	Incident record
4. Occupational hazard	• Workplace accidents	• Possible injury or death to personnel	• Providing first aid training for the worker • Providing medicines and materials needed in case of emergency • Collecting the information of the hospitals near the proposed project for serious case • Developing and implementing	Medium	• Providing first aid training for the worker • Providing medicines and materials needed in case of emergency • Collecting the information of the hospitals near the proposed project for serious case • Developing and implementing	Emergency response team	All project phases	Incident record

Environmental Factors/ Events	Activity	Potential Impacts	Mitigation Measures	Residual Risk	Specific Action	Responsibility	Schedule	Record
			medical emergency response plan • Providing personal protective equipment suitable for the workplace		medical emergency response plan • Providing personal protective equipment suitable for the workplace			
5. Earthquake	• Physical shifting of earth's surface	• Potential physical disruption cause building collapse, fire or spills	• Providing personal protective equipment to evacuate during an emergency • Be ready for appropriate controls and protective equipment for natural hazard • Developing emergency evacuation plan	Low	• Providing personal protective equipment to evacuate during an emergency • Be ready for appropriate controls and protective equipment for natural hazard • Developing emergency evacuation plan	Emergency response team	All project phases	Incident record

Table8-7 Waste management action plan for the proposed factory

Waste type	Generation	Treatment	Management Actions	Disposal/ Transportation
Solid Wastes				
General waste	Solid wastes from raw materials, grain bran, domestic wastes and wastes from parking materials.		***(1) Waste reduction before waste generation*** In general, • Evaluation of waste production processes and identification of potentially recyclable materials • Use reusable items, recycled paper, glass recovered materials instead of disposable ones ***(2) Waste separation at the source of waste generation*** In order to avoid or minimize generation waste materials, as far as practicable, waste separation should be practiced. • There should be at least one set of two garbage bins with different colors (either green and yellow or blue and black) for Dry waste (cans, aluminum foils, plastics, metals, glass, paper, batteries, dried plant etc.) and Wet waste (food stuff, vegetable peels, etc.) respectively. • On the garbage bins, types of dry wastes such as papers, plastics, glasses, aluminum and tins should be mentioned in pictures or writing. ***(3) Temporary waste storage site/Material Recovery Facility(MRF)*** It is the temporary collection of waste onsite level before final disposal. • The waste collected should be stored in the proper separated containers. • One for recyclable wastes and other one for non-recyclable wastes.	To designated waste bins in factory and then municipal landfill sites.

Waste type	Generation	Treatment	Management Actions	Disposal/ Transportation
			(4) Waste Recycle Recyclable wastes can be used by the factory itself if beneficial or contact with the respective sectors including individuals who will buy the wastes (i.e. waste bran can be used as animal food.) that is readily usable by a manufacturer or end-use market. Investigation of external markets for recycling by other industrial processing operations located in the neighborhood or region of the facility (e.g., waste exchange) ***(5) Final disposal*** • Dispose non-recyclable wastes at permitted facilities specially designed to receive the waste • Contact with the respective municipal authority/ private company • Own incinerator designed for the respective type of waste;	
Food wastes	Food wastes from canteen	-	Food waste should be managed according to applicable local regulations (such as National Environmental Quality Emission Guidelines- NEQG) intended to protect human and animal health. Local requirements may include rendering, incineration, or landfilling of food waste and mixed waste containing food waste. ***Collection/ Storage*** Food wastes from Green Land milling factory will be collected and stored in specified bins (for wet wastes). Two types of bins will be located near the canteen area. ***Recycling*** Food wastes from canteen can be used as	To dispose in designated area or contact with the respective municipal authority

Waste type	Generation	Treatment	Management Actions	Disposal/ Transportation
			• Animal feed • composting	
Operational wastes	Most of the wastes generated during operation phase are waste bran and packaging materials.	-	• In operation phase, bran generate in large amount than other wastes • Types of wastes from packaging processing are boxes, pallets, crates, labels, containers, bags and sacks, tape and materials for wrapping, binding and trying. ***Collection/ Storage*** • At least one set of two garbage bins will be located with different colors (either green and yellow or blue and black) for Dry waste (cans, aluminum foils, plastics, metals, glass, paper, batteries, dried plant etc.) and Wet waste (food stuff, vegetable peels, etc.) respectively at each working site of the project. • Wastes will be stored in temporary storage container. **Recycling** • For wheat bran, contact with the respective sectors including individuals who will buy the wastes or sell as animal food. • Investigation of external markets for recycling by other industrial processing operations located in the neighborhood or region of the facility (e.g., waste exchange)	To dispose in designated area or contact with the respective municipal authority

Waste type	Generation	Treatment	Management Actions	Disposal/ Transportation
			• For packaging materials, using recyclable materials.	
Waste Water				
General waste water	Waste water from basin and kitchen sinks.	Dilution Method	• Manage recovered, contaminated solids or liquids in accordance with the general and hazardous waste guidance in the General EHS Guidelines. • Avoid installing storm drainage catch basins that discharge directly into surface waters; • Install filter mechanisms (e.g., draining swabs, filter berms, drainage inlet protection, sediment traps and sediment basins) to prevent sediment and particulates • Install oil/grit or oil/water separators in all runoff collection areas; • Regularly maintain oil/water separators and trapping catch basins;	To discharge as effluent if the applicable regulations are met.
Sewage	Sewage from factory	Sewage can be treated with three principal methods: mechanical, chemical and biological. The treatment of sewage includes the following stages: • Wastewater accumulation		Municipal Facilities

Waste type	Generation	Treatment	Management Actions	Disposal/ Transportation
		• Wastewater pre – treatment • Wastewater oxidation • Wastewater clarification and filtration • Wastewater disinfection • Sludge treatment		
Storm-water	Caused by storms and rain.	• Installation of filter mechanisms (e.g., draining swabs, filter berms, drainage inlet protection, sediment traps and sediment basins) • Oil/water separators		To discharge as effluent if the applicable regulations are met.

8.9.1 Environmental, Social, and Health Impacts and Monitoring Measures

A summary of EHS impact and monitoring measures for the onshore exploration drilling are shown in Table 8.8.

Table 8-8 Monitoring plan for environmental, social and health impact

Factors	Index/Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location	Responsible Person
Air Quality	• PM-10 • PM-2.5 • NOx, • SOx, • CO_x • VOC • NH_3 • CH_4 • Ozone	Method • Myanmar National Environmental Quality (Emission) Guidelines, Effective since 2015 in accordance with The Environmental Conservation Law, 2012, and • WHO Air quality guideline (2006) and amendment.	**Duration:** 24 hr continuously **Frequency: Annually** • Once during operation and decommissioning phase • As within 1 km of a community regular monitoring will be required. • In case of any complaint regarding air quality, an additional air quality measurement may be conducted in response to specific complaints (if necessary)	Nearest sensitive receptor or downwind of complaint area (if necessary)	• HSE Incharge • of (Green Land Wheat Flour Milling Factory) 3rd party
Noise	• L_{eq}24 hr. • L_{max} • L_{dn}	Method • Myanmar National Environmental Quality (Emission) Guidelines, Effective since 2015 in accordance with The Environmental Conservation Law, 2012, and	**Duration:** 24hr continuously **Frequency: Annually** • Once during operation and decommissioning phase • If within 1 km of a community regular monitoring will be required • In case of a complaint regarding noise from project site, an	100 meter from the noise source	• HSE Incharge (• • 3rd party

Factors	Index/Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location	Responsible Person
		• Following the Guidelines for Community Noise, World Health Organization (WHO), 1999	additional noise measurement may be conducted (if necessary)		
Effluent	Physical parameters: • pH • Temperature • TDS Chemical Parameters: • BOD • COD • Total Phosphorus • TSS • Total Nitrogen • Oil and grease Biological parameters: • TCB	<u>Method</u> • Analytical Methods followed to Standard Methods for the Examination of Water and Wastewater, recommended by National Environmental Quality (Emission) Guideline (NEQG) • World Health Organization's (WHO) Guidelines for drinking-water quality (DWQ)	• During operation phase • Annually	• Near effluent source	• HSE Incharge • Or 3rd party
Hazardous and Non-hazardous waste	• Manifest Disposal and Tracking Report	• Track waste volume by type and disposal location daily	• During operation phase	• At all project locations	• HSE Incharge • 3rd party •
Social	• Complaint • Monitoring and solving	• Record complaint	• Throughout all phases	• Project area, community around project area,	• HR of the factory Milling Factory

Factors	Index/Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location	Responsible Person
		• Monitor, investigate and implement suitable solutions		and transportation route	
Public and Occupational health and safety	• Accidental statistics (strips/falls/accidents in the processing of machines such as injuries and other minor accidents in short term) • {Occupational respiratory diseases • And noise exposure in long run cause Noise Induced Hear Loss (NHL) and other physiological effects} • Mitigation measures	• Conduct summary report for accident investigation • Regularly assessed the information of workers' health by in charge person of the team • Medical Check-up periodically • Community Consultation • Information disclosure to public altitude • Emergency response training to inform in the event of accidents and minor accidents / Health and Safety Training and Submission of accident reports • Regular trainings regarding health and safety aspects by HSE Coordinator.	• Throughout all phases Frequency: Monthly • During Operation Phase Frequency: Occasionally Frequency: Monthly Frequency: Occasionally • Duration – 1 Day Frequency: Annually Duration – 1 or 2 Day Frequency: Annually Duration – 1 or 2 Day Frequency: Periodically Duration: Based on the modified environmental plan.	• Project area, community around project area, and transportation route • Project area and exposed area	• HSE incharge

Factors	Index/Parameter	Procedure	Proposed Duration and Frequency of Monitoring	Location	Responsible Person
		• Scrutinize the current environmental plan			

8.10 Standard Operation Procedure for Workplace health and safety

8.10.1 Objective

- To protect the health, safety, psychological and social well-being of employees.
- To provide a safe and healthy workplace by implementing the highest possible standards.
- To identify potential hazards in the workplace, prevent them from occurring and reduce the potential for them to occur.
- To create a workplace that helps manage, improve and reduce health and safety issues.

8.10.2 Human Resource and Admin Department's Guidelines

- The HR department must ensure that employees comply with health and safety regulations.
- Conduct health and safety training, first aid and emergency procedures to educate employees on regulations.
- Having skilled and knowledgeable staff can reduce accidents and better prevent violations.
- Placement of Safety Signage in potentially dangerous areas.
- Open communication between managers and employees can make safety issues known in a timely manner and increase trust between management and employees. Increase productivity and improve teamwork.

8.10.3 Safety Standards and Guidelines during working hours

The Green Land Wheat Flour Milling factory is prescribing the safety standards and guidelines for all the operation employees as follows:

a) Silo

- To ensure safety, it must wear Safety Shoes with points, while working at the silo and protection from fall.
- To work only in long pants (uniform) when walking on equipment parts and conveyors.
- To make Equipment repair Choke, if the load reduction of elevators and conveyors is done, and make sure to put down the relevant breakers, to hang lock out / tag out on the control panel.
- To open the CTN tailgate so that workers are not injured while opening it.
- All workers and employees who are receiving with Overhead Crane must wear Helmet.
- While lifting the container with a crane, workers must not enter under the container
- Clean the bin and drive the auger (over) carefully so that the workers are not harmed.
- Sample taking; sending wheat seeds to Mill during pest control and Silo level adjustment and not accept wheat seeds.
- Stock picking time; when entering the silo during bin adjustment, workers must wear a safety belt and life line. (If working at height, wear a safety belt.)
- Car loading activities; workers must take care not to cause the pile to collapse if they do the pile pouring work. Pile stacking operations shall not exceed 25 layers.
- Electric cable, light switch, Breaker Junction boxes must always be kept clean. If it breaks down, workers must notify the maintenance department to repair it in a timely manner.

b) Production

- Must wear the uniform specified in the production line.
- Operating machines should not be modified from required settings.
- Operating machine parts enclosures must be in good condition.

- If there is a choke in the process line, workers must keep the local switch of the relevant machine in the off position. If necessary, they must trip the breaker and hang a warning tag on the breaker.
- Workers must not place limbs between moving machine parts.
- If there is a place where workers need to use a ladder, they must only climb the height with someone who handles the ladder carefully.
- If production stops and the factory is closed, they must notify the supervisor and ask them to turn off the power supply main breaker.
- If the factory is closed for a long time, workers must check whether the process line is clean or not, and then clean it again.
- Workers must use a winch and cage to go down to clean the wheat seed tank and wheat flour tank and wear a safety belt. Before going down, they must check whether the winch and cage are strong or not.
- If the repair department comes to repair the machine, they must restart the device after being notified that it has been repaired and turned on.

c) Engineering & Maintenance

- When carrying out maintenance activities, workers must wear the specified uniform, safety shoes, and helmet to enter the workplace.
- Welding face shield and welding gloves must be worn if doing electric welding job.
- Goggle must be worn when handling grinding machines.
- A safety belt must be worn when working at height.
- If the operation is to perform machine maintenance, workers must turn off the local switch corresponding to that machine. If there is no local switch, they should turn off the corresponding breaker and hang a warning tag.
- After preparing the machine, the relevant workers must keep the remaining hand tools and the waste material. The maintenance employees must notify the concerned department of completion.
- If the maintenance employees conduct machine maintenance, they must do it with at least two (2) employees.
- When doing hot work in a dusty area, workers should be careful to ensure good ventilation and keep fire extinguishers nearer.
- Workers must work with at least two (2) attendants to hold the ladder firmly in work that requires the use of a ladder.
- Workers must not use damaged tools
- Workers must not block anything in front of the Electric Panel.
- The Workshop Area must not be cluttered.
- Engine oil and diesel must not be leaking or spilled in Generator Houses.
- Transformer Yard must be kept clean.

d) Warehouse

Forklift Truck Safety

- Must wear helmet when driving a forklift. reflective jacket andfull PPE including shoes.
- Must not drive with a traditional cloth (Longyi).
- Before driving, must check the surrounding equipment and people.
- Must check forward and backward, fork up and down left and right after checking brakes etc.
- Must remove the belt from the forklift.

- Must not ride with more people besides the driver.
- Must not talk on the phone while driving the forklift.
- Bag of wheat (load) can not exceed one pallet.
- If the front view is not clear, should drive backwards and honk the horn.
- Should take care when cornering and crossing the road and honk the horn.
- Must pay attention to the direction of travel.
- Make sure to clear of the latter before turning in curves.
- Must not make sudden jumps, stops, or sudden turns.
- Must not drive on soft surfaces.
- Must not miss up, down, side, left or right at the entrances and exits of the building.
- Must not drive to another place while the load is not loaded at height.
- Must not use forklift for pushing or pulling work.
- No person shall enter under the pallet while it is in motion.
- Must not lift or lower the pallet.
- Must not lean forward during the load
- While driving the forklift, the pallet or fork must be between 6 inches and 8 inches above the floor.
- Must not drive more than 5 KM/Hr.
- Must not use bad pallets.
- When parked, it must plant the fork to the floor, pull the hand brake, take out the key and keep it.
- Must not stop on the downhill.
- When charging the battery, it must install the battery plugs carefully and then install the breaker and press the Start Button on the Charger.
- After charging the battery, it must press the Stop Button and then turn off the Breaker.

e) Piling, Loading and unloading

- Must not stack more than 4 pallets of wheat bags.
- Pallets with wheat bags must not be stacked in a slanted position. They must be stacked evenly.
- No more than 25 layers of bags shall be placed on the piles to be flat piling.
- Must not allow people to enter under high pallets.

f) Others

- WH Staff All day laborers must wear trousers and traditional longyi, tights, and shorts are not allowed.
- Must not run and play inside the Warehouse.
- Must not touch painted property pictures.

g) QC Lab, Bakery and R & D

QC Lab

- Must not eat food inside the lab room.
- Lab coat, gloves, eye protection and appropriate PPE must be worn.
- Must wear PPE properly. If one has long hair, keep it tied back.
- Must not directly smell or breathe chemicals, hands, face, skin, clothes Do not touch the

shoes directly.
- Must use hazardous chemicals according to instructions.
- Must wash hands after handling lab chemicals.
- Must wash hands thoroughly with soap and water before eating and leaving the lab.
- Must keep your equipment separate from the lab work.
- Containers made of materials that do not react to chemicals. Must be stored in containers.
- Store flammable solvents such as acid in separate cabinets and 6 meters apart.
- Many flammable chemicals must be stored in a heat-resistant box.
- Separate and store reactive chemicals.
- Containers containing chemicals; Label the containers.
- If using a new chemical, carefully read the MSDS before use.
- Store hazardous and moisture absorbing chemicals in safe safety bags.
- Must not use the mouth when filling liquid into the pipette. A pipette bulb or other liquid filling device must be used.
- Must not work alone.
- Must train all lab staff to use safety equipment.
- Must know the location of the nearest fire extinguisher and first aid kit.
- Must place the equipment on a surface with a secure base and adequate surface area.
- Must be careful not to accidentally hit the equipment.
- Must maintain equipment in good condition.
- Must provide safe training to employees on how to use and clean equipment safely.

h) Bakery
- Must be careful while transporting hot food (Bakery Tested breads).
- No spilled food or oil on the floor.
- Must wear bakery PPE.
- Must handle fragile items with care.
- Must check the gas lines for gas leaks. Must not use if there is a leak.
- Must not insert the fingers while the dough break machine and mixer are running.
- When repairing dough break machine, mixer, oven, proofer, put down the corresponding breaker.

i) Pest Control
- When performing fumigation, spraying and spraying, the specified PPE must be worn.
- Must store pesticides according to manufacturer's instructions.
- Medicine bottles, Label containers must be stored in an orderly manner and lock the storage room to prevent easy access.
- Must work according to the specified Work Instruction.
- If the owners of wheat seeds and wheat flour are coated with a drug, a warning message must be displayed.
- After 30 minutes, turn over the coated plastic sheet and handle the bags of wheat seeds and flour.

8.12 Budgets and responsibilities for environmental monitoring

Table 8-9 Budgets and responsibilities for environmental monitoring

Environmental Factors	Index/ Parameters	Responsibility	Estimated Budget (USD)
Operation phase			
Air Quality	• PM-10 • PM-2.5 • NOx, • SOx, • CO_x • VOC • NH_3 • CH_4 • Ozone	3rd party Environmental Consultant	**USD 2,000/ air monitoring**
Noise	• L_{eq}24 hr. • L_{max} • L_{dn}	3rd party Environmental Consultant	**USD 800/ noise monitoring**
Effluent	Physical parameters: • pH • Temperature • TDS Chemical Parameters: • BOD • COD • Total Phosphorus • TSS • Total Nitrogen • Oil and grease Biological parameters: • TCB	3rd party Environmental Consultant	**USD 1,000/ effluent monitoring**
Hazardous and Non-hazardous waste	• Manifest Disposal and Tracking Report	3rd party Environmental Consultant	**USD 1,000**
Social	• Complaint • Monitoring and solving	3rd party Environmental Consultant	**USD 5000**
Public and Occupational health and safety	• Accidental statistics • cause of accidents • Mitigation measures	3rd party Environmental Consultant	**USD 5000**

8.11 Grievance Redressed Mechanism

The grievance mechanism is prepared to define the procedure for managing stakeholder concerns and complaints/ grievances in a planned, timely, and respectful manner.

The objectives of the grievance mechanism are to:

- Provide accessible avenues for all external stakeholders to contact factory authority
- Provide a mechanism for stakeholder concerns to be addressed effectively, in a timely manner;
- Identify and monitor stakeholder concerns to support effective stakeholder and risk management;
- Enhance factory reputation as a transparent company and,
- Meet requirements of national laws and best practice.

Grievance Mechanism Process

The key tasks that have to be done for implementing the grievance mechanism are described below_

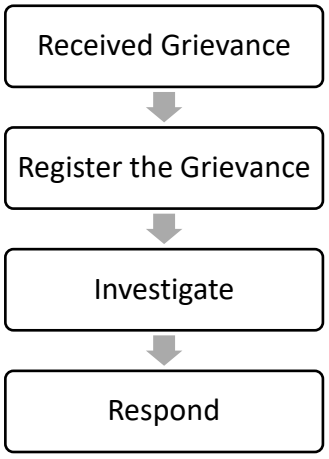


Figure 8. 14 Grievance mechanism process

1. Receiving the grievance

If stakeholders believe that their human rights, environmental and socio- economic have been, adversely impacted by proposed project working activities, grievances can be submitted through in person, via e-mail or telephone/ letter. Complaint can be submitted by Myanmar or English language.

- In person:To Factory Authority
- Complaints can be sent through Suggestion Box
- Via telephone- Complaints can contact via telephone to 09 960444104 (Factory Manager)
- By letters: Name of person

Green Land Wheat Milling Factory

Address-

- For the complaints and grievance at the factory, Green Land systematically organized Employers' group and employee's group for the grievance redressed mechanism complied with Ministry of Labour Affairs. Contact number of Local Labour affairs department are publicly provided at the notice board for any grievances and complaints.Suggestion Boxes are provided for those who are living near the project area and stakeholder and any complaints are fully addressed by top management committee including responsible in charge of The Green Land International Ltd, ward administrator and representative of GAD of East Dagon Township.

2. Registering grievances

Grievances will be register within 7 days of receiving the grievance. And the in charge grievance officer will delegate responsibilities to relevant staff for_

- Investigating the grievance
- Consulting relevant departments or persons of the factory
- Defining and implementing resolution actions
- Tracking progress of individual grievances.
- Aggregating and forwarding feedback to Complainants.
- Documenting resolution actions.

3. Investigate the grievance

The grievance officer will investigate and, if necessary, internal staff meeting, collecting current data (air, noise, water, soil, etc), consultation with external stakeholder, and other activities depending on the compliant matter.

4. Respond

The grievance officer responds the solution for the compliant within 7 days every week with the suggestion box provided and discloses to the relevant stakeholders.

8.12 EMP Budget for the mitigation measures

The management plan will use the 2% of the total investment (USD 1,500,000 in million).
Among the budget plan, the estimated costs for the Mitigation measure will be (60%) of the total.
These include the following costs:

a) Supervision on environment
b) Engineering supervision cost
c) Institutional Strengthening, Training and Capacity Building
d) Development of Manual of functions and procedures including HSE procedures
e) Equipment and logistics
f) The social welfare programs for the employees and the nearby community who needs

Additionally, (40%) will be for the management plan accordingly.

8.13 Corporate Social Responsibility

The Green Land Factory implements Corporate Social Responsibility (CSR) plan together with

EMP during the operation period. The objective of CSR plan is to conduct the business in a way that is ethical, society friendly and beneficial to community in terms of development.

The project proponent is contributing 2% of the net profit (MMK 204,394,157) for (CSR) for the development of local communities. On the 2 % of the net profit of the project, 0.5% amount should be used for the community development such as transportation, 1% should be intended for the local's health and education and the remaining 0.5% of the net profit should be for the donation of pagodas and monasteries.

Chapter 9

Emergency Plan

9. Emergency plan

9.1 Introduction of emergency plan

This chapter describes the strategy how to manage all possible emergencies along with actions required, written procedures to be carried out in order to respond the major hazards.

Thus, an Emergency Response Plan (ERP) will be established for emergency situations that may arise during the factory's activities. Moreover, it will give guidance on actions and lines of communication in the event of an emergency and outline the respective responsibilities of Green Land and HSE contractor/Manager.

The objective is to prepare the resources (personnel and equipment) available to respond accidents and emergency situations which can be come out from the factory process and activities as well. This will lead to identification of potential accidents along with limitation of its consequences as well as high level of prevention of the potential negative consequences on humans and environment.

- In the factory, Emergency Response Team for the emergencies and the team are prepared as follows
    - Training of the team members along with their responsibility and equipped with the emergency materials
    - Establishment and provision of the written emergency procedures
    - Description and Availability of the Emergency Response Plan (ERP) in all employees and site workers and there should be documented and posted
    - Identification of the locations of the emergency evacuation muster points
    - Provision of alarm system and firefighting 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

9.2 Emergency policy

Green Land Grain Milling 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.

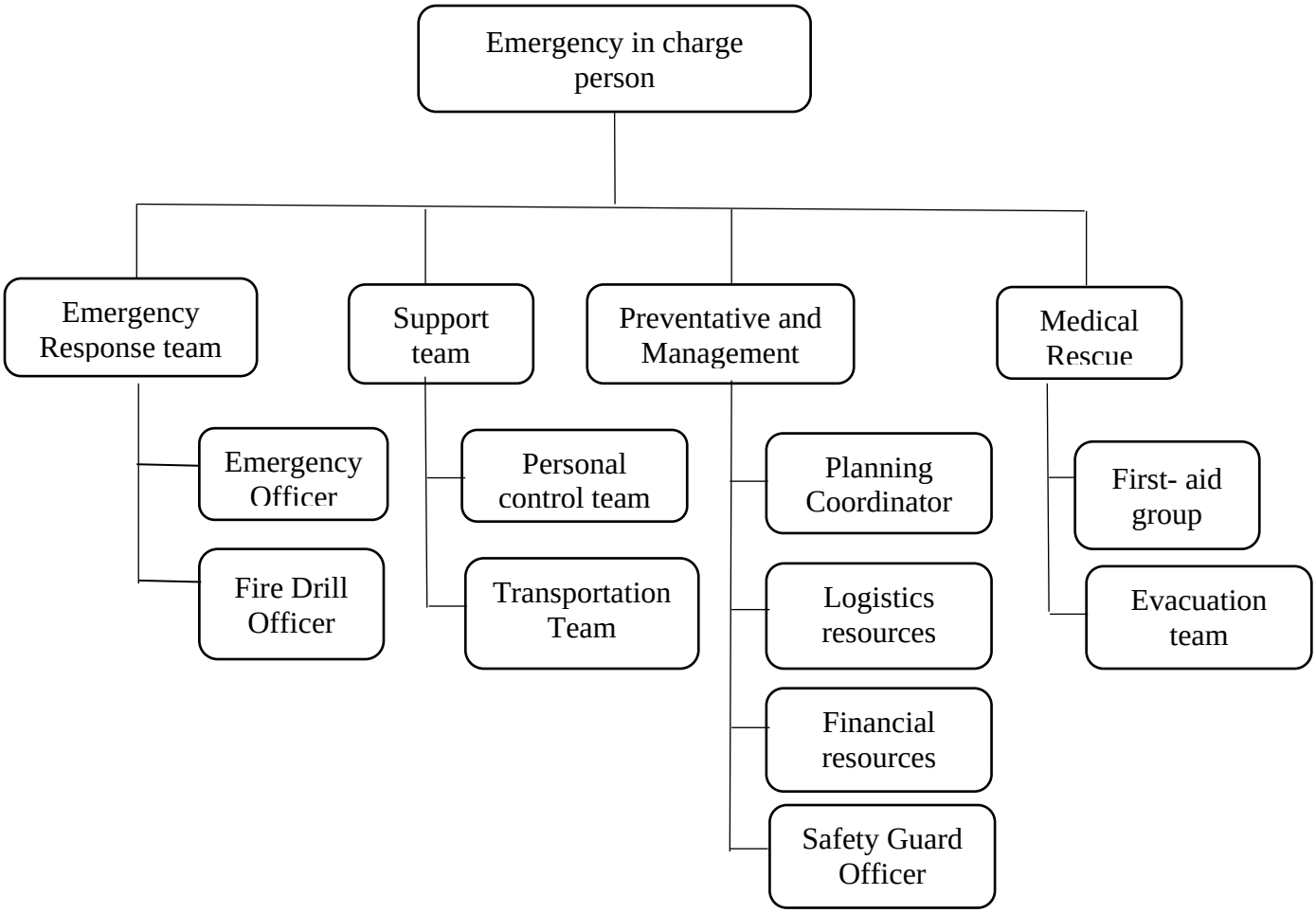


Figure 9. 1 Organization chart for emergency team

9.4 Risk Management Plan

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. Therefore, the risks set out below are considered the most relevant potential risks of The Green Land International Ltd.

1) Risk of Chronic respiratory diseases

2) Risk of Fire

3) Risk of occupational accident

The Green Land International Ltd overcomes this risk by setting up responsible care initiative, plan, system and committee to sustainable progress for environmental protection. The Green Land International Ltd.'s compromises Global Directives for Health and Safety (EHS) in a responsible care management system including standards and procedures for Environmental protection.

The Green Land International Ltd develops and applies (Standard Operating Procedure) and Code of Conduct (COC) according to the manufacturing process in relation to Responsible Care Management which involve the following codes and standards.

1) Emergency response procedure, 2) Project Implementation Safety 3) Hazzard Identification and Risk Assessment 4) Emergency response plan 5) Preventative measures for fire explosion 6) Natural diaster response plan 7) Workplace' accident and worker's healthcare 8) Preventive Measures for workplace accidents 9) Providing Special Equipment for Safety in workplace 10) Emergency evacuation plan 11) Medical emergency response plan.

9.4.1 Emergency response procedure

The emergency procedure of the project provides an appropriate and proportionate response to this situation.

9.4.1.1 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. Industrial Zone, east Dagon Township, Yangon, Myanmar.
    c. describe nature of the case, i.e. fire 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 are 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

9.4.2 Project Implementation Safety

Process safety would be taken into account all actions are taken to avoid any injury or damage resulting from work-related activities. The Green Land International Limited may need to follow the required law and procedures after prescribing law and procedures issued by ECD in 2012 and 2015 throughout the construction and operation phase.
In the operation phase, The Green Land Wheat flour mill is very highly automated and all parts of the process are easily adapted to computer control. Although very costly, this technology enables the mill to operate for the extended periods without continuous on-site operator presence or intervention, e.g., throughout the night or during weekends without occurrence of any occupational hazards. Prevention plans that consider environmental and social (health and safety) protection have developed for the possible risks and hazards.

9.4.3 Hazzard Identification and risk assessment

By identifying the hazards of the workplaces and conducting risk assessments, The Green Land International Limited supports employees to become aware of potential hazards and reduce risks.
The following risks are observed in the operation intervals of the project.

It may occur chronic respiratory syndrome in the workplace environment of flour mills as fine organic flour dust gets airborne in the indoor environment of the flour mills. The present work was undertaken to study the health problems related to the workplace environment of flour mill workers.

According to the nature of wheat flour, it is highly flammable as well as explosive in nature because its main component is starch, a type of carbohydrate. When particles of flour are suspended freely in

the air, they can catch fire in the presence of heat, burn instantly and transfer heat to nearby particles, relatively quickly. This type of explosion is known as a dust explosion.
A flour dust explosion can cause major damage to structures, equipment, and a person, depending upon the quantity of grain in the cloud. A huge amount of energy is released in the form of flame which can harm any unprotected person nearby. It can cause skin burns, itching, and even asphyxiation (in a closed space) when oxygen level drops below the required to breathe.

9.5 Emergency fire response plan

The possibility of fire occurrence is mostly associated with "Negligence". However, the probability of a fire cannot be ruled out completely. For fire safety plan in one of emergency plan of Green Land Wheat Flour Mill Factory include providing of firefighting training, fire drills, sufficient numbers of fire extinguishers, and iron hook and water storage tank, fire alarm systems, signs, and posters for directions for evacuation routes and emergency contact numbers are well placed in case of fire according to their emergency respondence plan.

9.5.1 Fire extinguishers and fire drills

Fire extinguishers: The factory provide firefighting training to the employee on how to properly use a fire extinguisher.

Fire drills: Fire drills are held at least once per year to determine effectiveness of this emergency procedure. A written record of the drill is kept on file at the facility by human resources.

The firefighting equipment are available at all workshops and warehouses of the factory and kept in good working state. The personnel technician in charge of the maintenance and plant management regularly checks this equipment and ensure that they are always ready to be used. Moreover, the fire alarm system is installed both in the factory and admin office. Floor plan along with the emergency **exits are allocated.**

Figure 9. 2 Firefighting equipment and fire alarm system

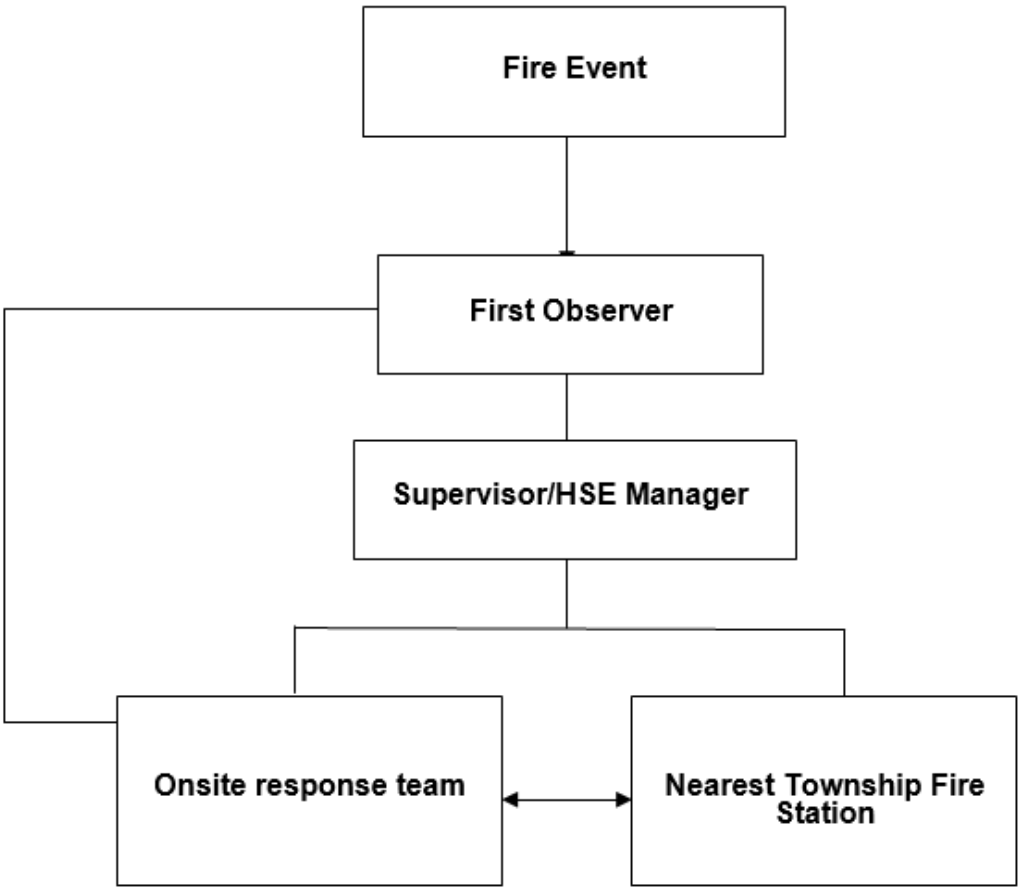


Figure 9. 3 Fire response communication plan

9.5.2 Preventive Measures for fire/ explosion

Responsible Person	Preventive Measures
Anyone who notices fire	**The factory give awareness to all the employees for the event of fire as follows:** **Someone who firstly notice** must immediately Inform factory manager available in shift and/or trained or experienced with environmental management issues along with the details of the information: fire source, the nature of fire etc. OR Inform directly to relevant department, such as Police Station or Fire Force near East Dagon Industrial Zone. **Nearest police station** 1. East Dagon Police Station Address: Min Ye Kyaw Swar Rd., Ward (156), East Dagon Township

	Phone: 01-3585187 2. South Dagon Police Station Address: No. (2) Main Road, Corner of Aung Zeya Street, Ward (26), South Dagon Township Phone: 01-590093, 01-590070 **Nearest Fire Station** 1. Fire station, East Dagon Township, 01-2585460, 09-455121461 2. Pale Volunteer Fire Brigade, 09 431 80200 3. North Dagon Fire Station, 01-584060 4. South Dagon Fire Station, 01-590071
Emergency in charge person	**For the event of fire, the emergency in charge person are given training under the following:** On receiving the information of an emergency, the Factory Manager immediately proceed to the scene of the incident to assess the seriousness of the emergency. If an emergency is confirmed, he shall: ➢ Immediately raise the alarm and inform all employees as follows: • Location of fire • Type of fire • Seriousness of fire ➢ Immediately inform emergency service in charge
Onsite emergency response team & Nearest township fire station	**Onsite emergency response team of factory are undertaken the following duties in the event of fire.** • Start the actions and activate Emergency Action Plan in consultation with Emergency response in charge and use proper personnel protective equipment • Carry out the required firefighting emergency action as directed by Emergency Response Team leader/ in charge person. • Water borne firefighting equipment such as firefighting tugs with fire monitors, lifesaving equipment and medical equipment shall be available • Based on the type of factory area involved initiate relevant response • Use proper personal protection and extinguishing media • Assess the situation from time to time and use appropriate strategy • Remove unaffected containers/goods from the area if possible • Medical rescue team must be stand by for personal injury in case. ***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

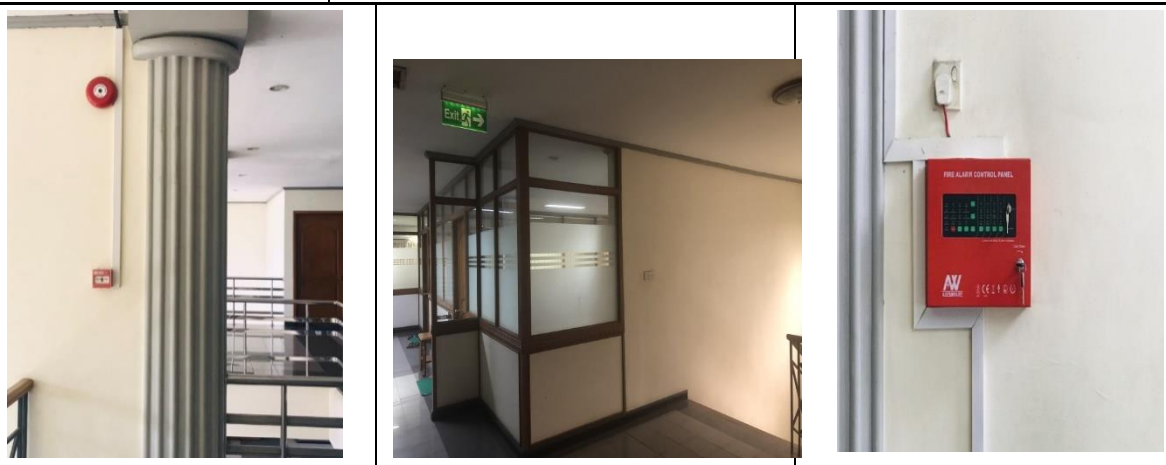


Figure 9. 4 Office Fire Alarm System

Figure 9. 5 Production Fire Alarm System


Figure 9.6 Installation of fire extinguishers Warehouse


Figure 9. 7 Installation of fire extinguishers Production & Office


Figure 9. 8 Fire Drilling

9.6 Natural disasters response plan

Based on the baseline data information of East Dagon (Myothit) township, project may suffer from flooding in raining season due to the nearest Nga Moe Yeik creek. However, the factory do not discharge any hazard chemicals, there will be no significant impacts to environment and the community. But the factory provided the contingency plan to prevent unusual event like natural disaster.

- Planning of evacuation routes

- Installing of emergency equipment

9.7 Workplace accident and Workers' health care

All of the workers for the operation of Green Land 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 major industrial gas pollutant of the wheat flour milling is sulfur dioxide (SO2) which is over the limit of both WHO and USEPA standards. Emission source of sulfur dioxide (SO2) comes from the wheat flour milling activities. The emission of SO2 can be from motor vehicle emission of the vehicles which are running in and out of the milling factory as well. All workers and staff particularly the immediate workers working around the exposed area should wear the suitable respirator masks to prevent both particulates and gases. **??????????**

Hence, the factory provides all workers suitable mask at their working activities. Moreover, the factory designed with good ventilation to protect suffocation.

The factory may need to provide medical check periodically for every workers in the factory.

The factory establishes 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.

9.7.1 Preventive Measures for workplace accidents

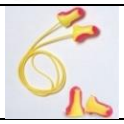
Responsible Person	Preventive Measures
Nearby person (or) Colleague	The factory noticed to the employee according to the following if any undesirable accidents occurred in the workplace. • Immediately inform the emergency service in charge • In serious case, call doctor at once or transport to doctor or hospital. Hospitals near the project are as follows (**Open 24 hours**) ✓ Dagon Myothit Hospital (East Dagon), Min Ye Kyaw Swar Street, (122) Ward, Eas Dagon Township, Yangon Telephone – 01-585195, 01585195 ✓ 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	The factory plan to implement for contingency case as follows: • 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.

9.7.2 Special Equipment for Safety in workplace

Factory provides employees personal protective equipment to evacuate during an emergency. Personal protective equipment is based on the potential hazards in the workplace and the appropriate controls and protective equipment for those hazards. Personal protective equipment provided by factory 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 9-1 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	

9.8 Community Health and Safety

There may have no impact to community nearby areas because the factory is situated inside the industrial zone.

Significant anticipated negative impacts to neighborhood during operation are expected to include noise pollution and flour dust.

According to the baseline data information, every stage of the milling process does not that pose health risks to employees, neighbors due to proper flour milling process, systematic final products collection system.

According to noise quality measurements, the 24hr average monitoring results for whole mill are slightly higher than the level of EQG (environmental quality guideline) particularly near to the operation machine. It may be nuisance to neighboring to some extent. Therefore, environmental management plan of proposed mill mitigates the level of noise pollution by installing sound barrier on the wall of operation units. Another mitigation plan for workers working near to the operation is using suitable ear muffs for whole working hours to prevent the effect of noise pollution. Moreover, responsible person is monitoring annually and when new equipment are installed in the factory from all the noise sources whether comply with the prescribed limits in the work area.

According to the baseline monitoring survey concerned with the health condition of the community, up to 97% of the total respondents are good in health and also all the family members and there is no disable person among the family. Only 3% of the household have the problem in legs but not related to accidents and injury.

For the infectious disease such as diarrhea, only 10% of the household have been suffered from diarrheas are 90% of the household are rarely suffered. Besides, among the 100% of the household, only 22% of the household has health problem within their family. Others 78% of the household is in good in health. 22% of health problem is only Flu. Therefore, the major diseases occurring in and around the proposed project area are common diseases and the proposed project does not cause major health impacts.

9.9 Emergency evacuation plan

Green Land Factory prepares 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.

Figure 9. 9 Signs, and posters for directions for evacuation routes

9.10 Medical emergency response plan

Green Land factory provides First Aid, Emergency Treatment, and Administration of medication for the factory workers during the working activities.

9.10.1 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 adopt the position that workers administer medications

at home whenever possible.

3) The factory recognize that accidents and medical emergencies can happen during working hours; therefore, factory adopt guidelines to prepare staff members to provide first aid and emergency care during these unexpected events.

9.10.2 First aid emergency treatment

1. First aid is being provided to factory admin staff, and workers.
   - Either any factory staff member or licensed medical professional designated by the factory to render care that complete training in CPR and First Aid provided by the nationally recognized training organization.
   - First aid supplies are 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)" and the relevant authority of the factory will make a record in the case of emergency.
   - Any worker can contact the Emergency medical treatment place whereas in charge HSE person bear and submit the medical record to factory manager.
   - Either factory member or licensed medical professional at the factory trains to administer emergency procedures needed in life-threatening situations.

9.10.3 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.

9.10.4 Occupational Health Care Facilities

The Dagon Myothit (Eastern) Public Hospital and Ywar Thar Gyi Mental Health Hospital are the closest hospitals to project area for unexpected major accidents. Moreover, the project authority liaises with Township Health Department for Occupational Health for all employees working in this project on a regular basis. For those who directly involved in production are provided annual medical inspection in line with ISO 22000 Food Safety Management System.

Warning signs or symbols and Do and Don't Signs are clearly displayed at the factory. Training programs for industrial vehicles operators such as forklifts, including safe loading/unloading, load limits are provided and the related HSE assess and evaluates regularly performances and skills for handling the tools, heavy machines and vehicles to the respective employees. First aid kits are being provided in every department, and there is a factory clinic for emergency health problem. Annual medical check-ups are supported to all employees. For private emergencies, stand-by vehicles for health emergency, nearby hospitals and clinics and dispensary phone numbers are being implemented in line with factory's guidelines.

Figure 9. 10 First aid kit

9.11 Roles and Responsibilities of Safety Officer

The safety officer is an internal employee who is assigned to prevent accidents, respond to emergencies and evaluate the effectiveness of the company's safety programs. A safety officer identifies safety hazards, investigates them thoroughly, and controls them before someone gets hurt. They verify that everyone on the site is following safe work practices and doing their jobs safely. Safety officers must create a safe environment by making sure they have all the necessary equipment for their team. Safety officers are also responsible for organizing their workload so that no harm will come to them or anyone else during their work activities. They are responsible as follows:

- Identify and assess hazards, risks and control measures for a specific operation or process.
- Conduct ongoing review of operations and processes to identify potential hazards, risks and control measures that should be implemented to reduce these risks, including all costs involved in implementing such measures.
- Assess and document hazards, risks and controls in a manner consistent with established procedures and practices.
- Set up and supervising temporary work areas.
- Supervise the safe handling, storage & disposal of hazardous materials.
- Supervise the operation of any potential hazards in the workplace.
- Improve workplace safety and employee productivity by transitioning from manual safety procedures to digital safety management systems.
- Ensure that all company employees meet all OSHA requirements.
- Provide OSHA training if necessary.
- Ensure that health, safety, and environmental policies are followed.
- Investigate workplace accidents and injuries and refer them to the proper authorities.

9.12 Emergency response plan for chemical exposure

Regarding the chemical exposure issue, if the factory uses some kinds of soft chemicals used in milling 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. In this regard, the hazard chemical risk will be minimal due to the fact that wheat flour mill use no chemical in the milling process and dry cleaning is mostly and usually employed in the process.

Figure 9. 11 Emergency eye wash station

9.13 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.

9.13.1 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.

9.13.2 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.

9.13.3 Water Quality

9.13.3.1 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.

9.13.3.2 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.

9.13.3.3 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.

9.13.3.4 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.

9.14 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 licences/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

9.15 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

9.16 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.

9.17 Capacity building and training program

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. Therefore, Green Land Factory has formed crisis management team and let the factory employees to educate 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 in accordance with ISO implementation with the help and guidance of Fire force department. Green Land also developed emergency plan in advance for fire/flooding under Crisis Management team. The size of the workplace and workforce, processes used, materials handled, and the availability of onsite or outside resources determine the training requirements.

Training includes practicing evacuations, identifying assembly points, location of emergency equipment, first aid arrangements and how to safely shut down machinery.

In determining training requirements, the following facts were 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 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.

9.18 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 of public consultation and disclosure

Chapter 10 provides the stakeholder engagement program undertaken as the part of ESHIA process for the Green Land flour milling factory. The key elements of the program consisted of providing relevant information to local regulatory authorities and communities about the activities of Green Land flour milling factory along with industrial zone, and engaging with them on the potential impacts and associated mitigation measures.

The key elements of the impact assessment related consultation are concentrated around ensuring that stakeholders are fully informed of the flour milling factory activities and that their views are taken into account where relevant.

The overall objective is to ensure the assessment is robust, transparent and has considered the full range of issues or perceptions, and to an appropriate level of detail.

The specific targets and objectives of the Green Land"s stakeholder consultation program included the following:

- Identification of potential communities likely affected by the factory's activities;
- Seeking input in the identification of key environmental, social, health and economic issues which need to be considered;
- Gaining an understanding of local communities, their assets, rights, priorities, concerns, needs, expectations and perceptions; and
- Where relevant, identifying and considering potential environmental and social performance indicators, which have relevance for both communities and the factory owner.

The stakeholder engagement for this ESIA study consisted of four key activities, namely focus group meetings, key informant interviews, household socio-economic and attitude surveys, and traditional ecological knowledge surveys. This section outlines how the consultation process was conducted and presents the key findings.

To reveal peoples' knowledge, attitude, on the Wheat Flour factory, Industrial Estate, a set of socio eco survey was conducted. The survey areas are the surrounding areas nearest to the East Dagon industrial estate where the Green Land flour milling factory located.

10.2 Objectives of the study

The main objectives of the Socio Economic study for this research is shown in follow.

1. To investigate people perception on the Milling System and how it can effect for their lifestyles
2. To investigate and study the general social health and lifestyles condition of surrounding areas
3. Access the condition of the positive and negative impact on the socio economic status and to propose better suggestions and minimize the negative effects

10.3 Key informant interviews

Key informant interview was conducted with three persons who are the Monks, 100 household leader and Township head leader. Targeted subsets of the socio-economic and attitude survey questions were used as a basis for interviews testing.
Targeted subsets of the socio-economic and attitude survey questions were used as a basis for Key Informant Interviews.

The analysis of the information gathered has shown the data collection from key informants was consistent with the socio economic and attitude collected from the districted areas. The key informant interviews (50%) had previously been made aware of the planned milling process survey activities and acknowledged that this project would be important to the community. On the basis of the information received, the key informants expressed support for the projects.

The majority of key informants considered road transport (25%), education (25%), health (25%) and the remaining 25% are natural environment.

It should be noted that the development of milling system have been carried out in this areas for a long time. Because of this action plans, some of the local communities have been subjects to direct and or indirect impacts associated with this. The focus groups stated their support for direct and ongoing engagement with the community, and highlighted that this was an important factors in gaining community support for any projects.

Figure 10. 1 Key informant interviews

10.3.1 Socio-economic, health and option surveys

Total 100 household socio-economic, health and opinions surveys were conducted in the nearly surrounding areas.
Questionnaire collected socio-economic, health and opinions information as well as the opinions and understanding of Wheat Flour Milling development issue. The surveys were conducted subsequent to the focus group meetings.

The socio-economic survey was designed to focus on gaining household member information and attitudes on:

- The structure and demographics of the households
- Household living standards, employment, income, social and economic conditions
- Household and individual health

- Information on the natural environment and human use for the environment, including information on local fisheries
- Attitudes on the potential impacts of the projects should lead to not only current condition of the milling system and future development for the Milling production.

10.3.2 People perception on the socio economic impact on key informant interview

From the key informant survey, firstly it focused on infrastructure, resources and services such as health and education, water sanitation and hygiene and transportation. According to the result, there is no health care available near the community areas and health care availability no changes since in the past up to now. In the community, the number of people who can access to education are few. In the usage of energy, most of people are using public electricity for lighting but for cooking process in community, most of the people have to use Charcoal and firewood substitute.

In the usage of water, the main source of drinking water comes from tube well by near the surrounding areas. Most of the household, they treated water before using, and their treatment method is boiling. But from the past to until now, water quality, water amount are not changed.

They said that there is no water drainage system near their surrounding areas. Besides, also there is no waste disposal areas in the community areas. According to the interview, they said that almost all the people are using public transportation.

10.3.3 Analysis of climate condition and environmental aspects

a) Air, water and soil quality analysis

As the interview testing from the stakeholders, they said that water quality, soil quality and air quality did not change since in the past to until now. All the condition of natural environment are normal situation. Thus, it is noted that natural environment conditions are not significantly impacts by the effect of industrial process.

b) Aspect of wildlife and wild plant flora and fauna

For the wild life, in the 10 year periods, there is no significantly changed and it remain the same condition. For the rats and mice, they said that they have seen that rats and mice in their community. But it is not much common. In the 10^{th} year period, the numbers of rats and mice are remained at the same level. There is no significantly impact by industrial process. Besides, it is said that they talked about the mosquitoes in their areas. It is said that mosquitoes are common insect for their community with high number. Within these years, the number of mosquitoes are become higher day by day with the same species.

10.3.4 Analyzing result for the information related with industry

In the information related with Industry, they said that they really know about the industry estate from the community leader. However, it is said that this industry is not much effective on the local community and it is just normal condition. They said that they have only seen the camping and project activities of Rubber Industry and Coconut Industry. There is no any discussion related with compensation. But they would like to the development condition of industrial improvement.

Besides, they finally said that for their community, the improvement of health, education, marketing place and monastic and religious building are very important to improve.

10.4 Socio- Demographic of the community

Among the household block selected, around 100 respondents were randomly interviewed in this survey. Among these respondents, the numbers of male respondents were 45 and the remaining 55 were female. These respondents were approached with a structured questionnaire for door-to-door household survey. Mostly, the respondents are head of household and wife, but a few amounts are sons/daughters. In response to the follow up question, almost all the household aside surrounding areas are Buddhism. Their family size is in the range of 4 to 8 members and the number of different age level are also shown in the figure below.

Figure 10. 2 Lifestyle of the community selected for the Survey

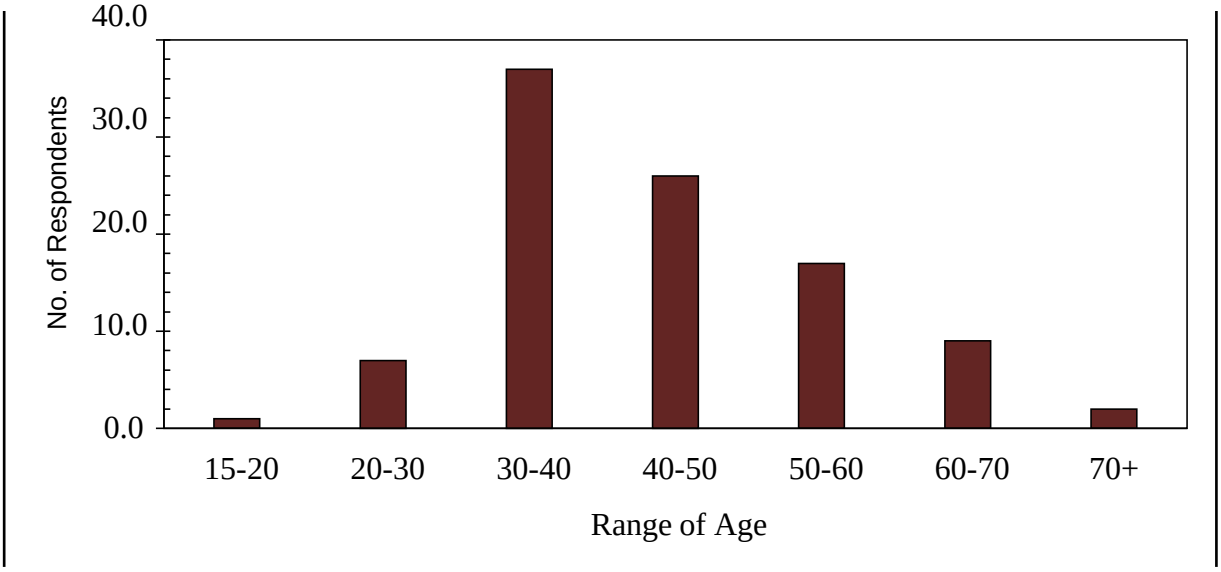


Figure 10. 3 Respondents' age level

10.4.1 Occupation

When it was investigated about the survey of household characteristics, , there are 63% of the respondents are working for income, 17% is doing housework, 13% is helping the household business, 4% is searching for work, 3% is pensions people and only one person is without working. Thus, it is noted that more than 65% of total population is working for annual income. Around 44% of respondents are service workers and causal workers. Farmer is only 2% and doing not usual work is 28%. The remaining respondents are sale worker 10%, fisherman 3%, and forestry worker 4%, skill worker 7%, livestock worker 2% and farmer 1% etc.

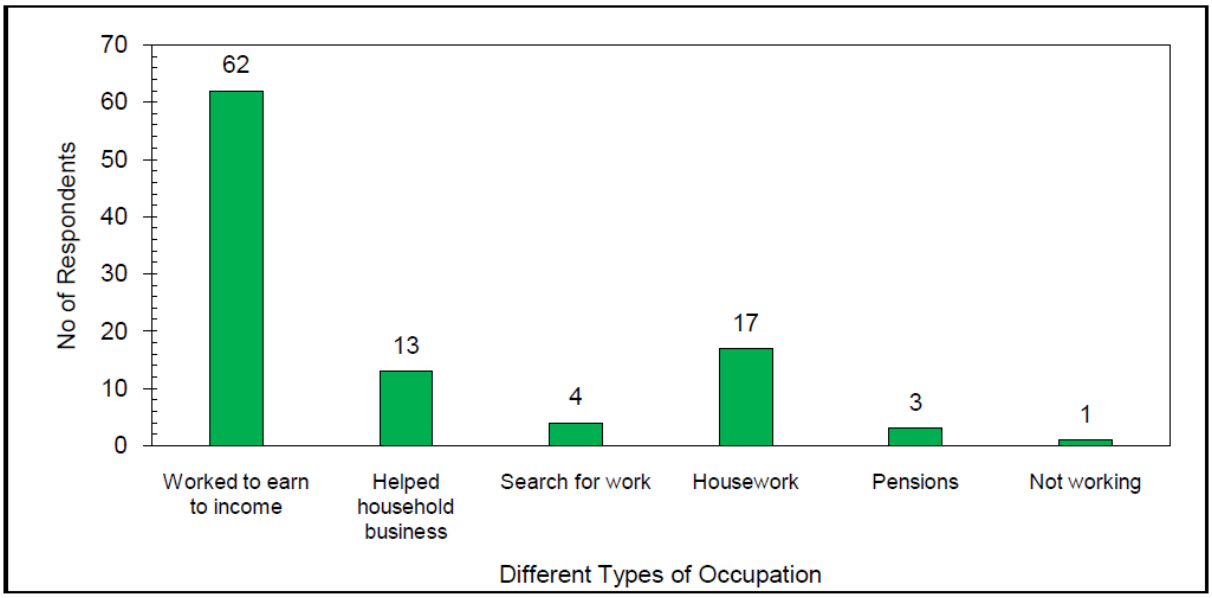


Figure 10. 4 No.of respondents in different types of occupation

10.4.2 Income

The highest annual income is in the range of 1,000,001 - 2,000,000 by 36% of respondents. The second largest is in the range of 500,001 -1,000,000 which is around 21% of respondents. Around 14% only get below 500,000. It is rare household which has more than 5,000,000 and above. In the figure below show that the percentage of income level in the community level.

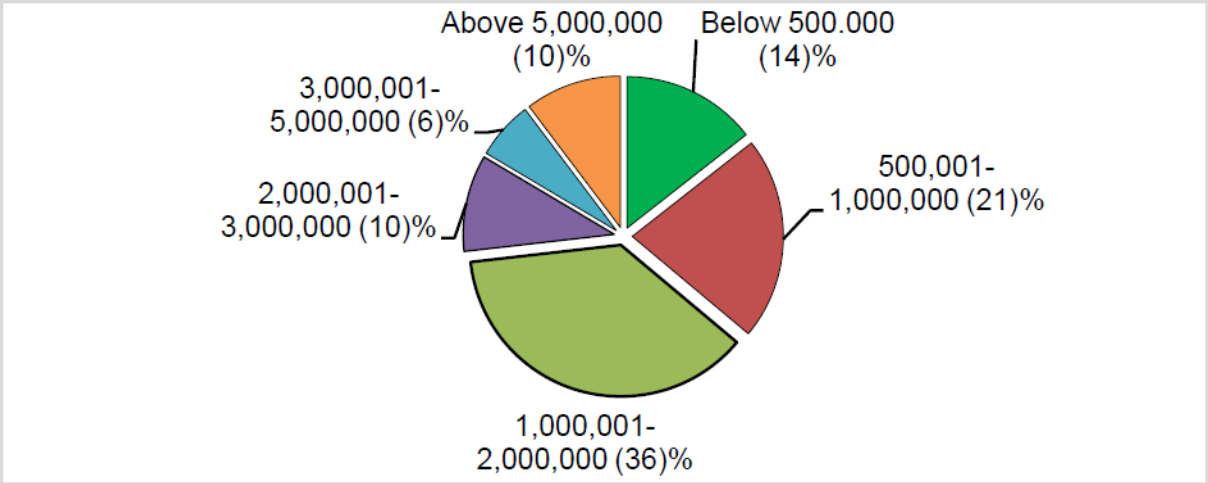


Figure 10. 5 Percentage of income level at community

Figure 10. 6 Household structure of the surrounding areas during interview survey

10.4.3 Education

In the Education status, not only respondents but also the household member, nearly 50% of people only get secondary level education. Even though the Government gives the opportunities for free education for primary and secondary level of education, they can't get chances. There is around 18% only gets higher education level. To be noted that the education level in those areas are quite low. Currently, there are 67% of total household members have the children going to government school. But 32% of household do not have the children going to school and only 1% goes to Monastic Education. 32% is without attending school due to some of the families cannot afford to send to school because they need to work.

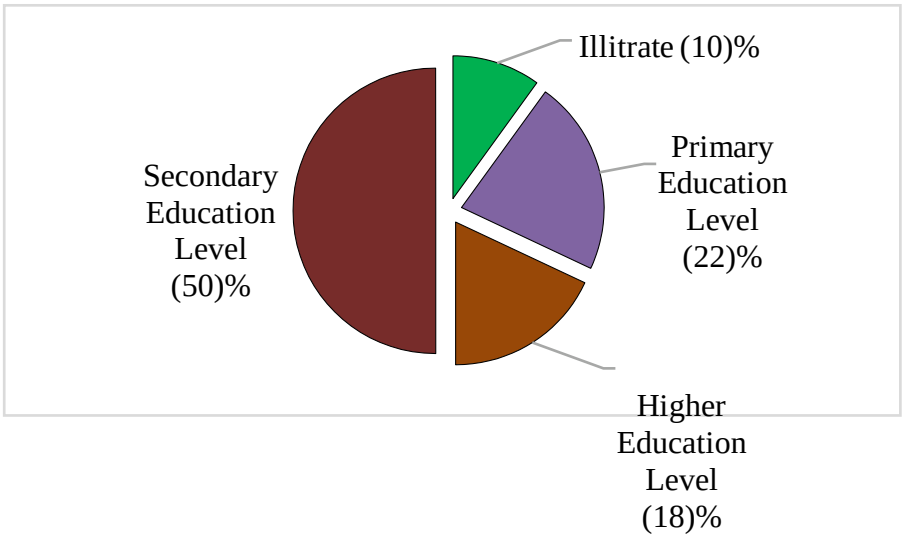


Figure 10. 7 Percentage of education level

10.4.4 General health, infectious and communicable disease problem in the community

To know general health and transmitted disease problem in the residents, there were some of the questions have been requested to the residents. Currently, up to 97% of the total respondents are good in health and also all the family members and there is no disable person among the family. Only 3% of the household have the problem in legs but not related to accidents and injury.

For the infectious disease such as diarrhea, only 10% of the household have been suffered from diarrheas are 90% of the household are rarely suffered. Besides, among the 100% of the household, only 22% of the household has health problem within their family. Others 78% of the household is in good in health. 22% of health problem is only Flu.

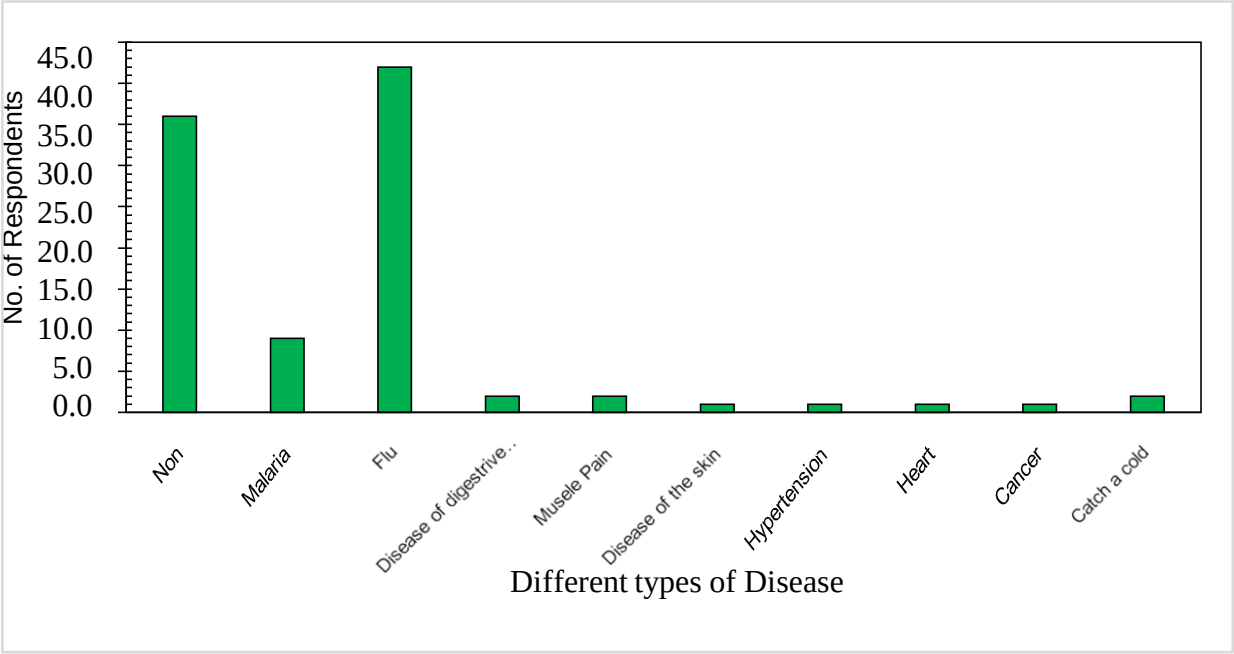


Figure 10. 8 Level health problem in different types of disease

10.4.5 Health care

For the health care, 87% of total household see the doctor if they have health problem, 7% go to midwife and other 8% uses self-medicine. According to observation, there is a clinic near surrounding areas and open daily. The condition of doctor and patient relationship, 4% of the household said that health care condition is improved but 8% said that there are some limitations. Others 88% of household said that there is no problem with clinic and them. For the Malaria disease, there is no incidence of that kind of disease and likely due to using mosquitoes net. 99% of the total household use mosquitoes net and only 1% do not use it.

10.4.6 Livelihood, infrastructure and resources

In terms of the household structure, water sources, waste, and others infrastructures, 66% of the houses are one story wooden house and 27% are a kind of hut. Only 6% are two story mixed brick and wooden houses. For the land property, more than 55% of residents do not have own land. Less than 45% of the residents possess own land. Among the own land 45%, 26% of the households have with approval documents but others are without official approval documents. All of the people who live in those areas are especially service worker. But, previously,

some of the people used to be farmers. Around 80% of total population migrants from others places for livelihood and to get better life.

Looking at the issue of the infrastructures and resources, the findings are shown in the following section.
Firstly, regarding about the sources of electricity usage, Figure 10.9 shows the percentage of usage of electricity in the community areas.

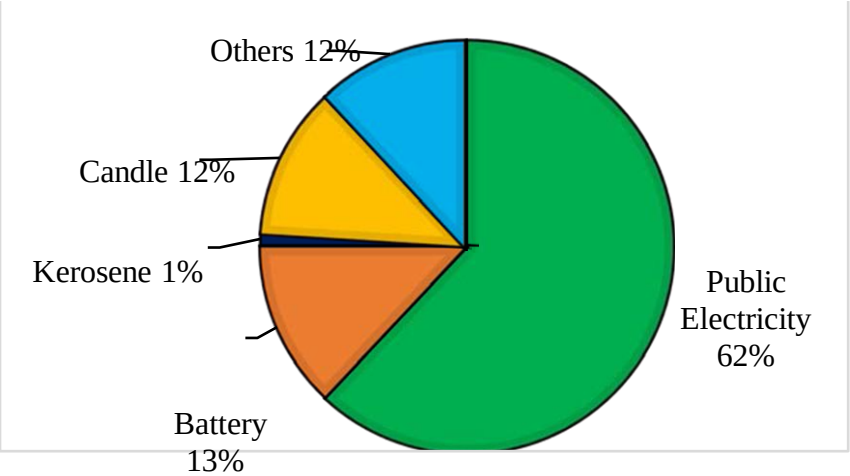


Figure 10. 9 Percentage of the usage of electricity

According to the results, 62% are using public electricity. Thus, it is noted that the usage of public electricity is quite improving in those areas. Then, out of 38%, 13% of the household is using Battery to light, 1% is used kerosene, 12% is candle and 12% is from others sources. Then, Figure 10.10 presents the percentage of energy usage in cooking of the community.

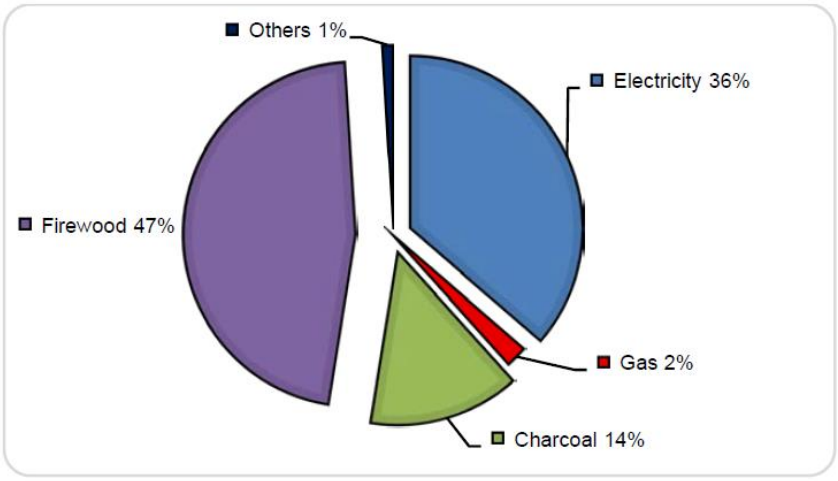


Figure 10. 10 Percentage of the energy usage in cooking

According to the survey results, the highest % of energy usage in cooking is firewood which is 47% and followed by electricity which is 36%. Then, followed by charcoal for cooking 14%, gas usage is 2% and others is only 1%. Thus, it has been noted that residents who live in those areas cannot use electricity for cooking. They have to use especially firewood as energy for cooking.
Regarding water usage, the following figure 10.11 presents water usage of the surrounding areas.

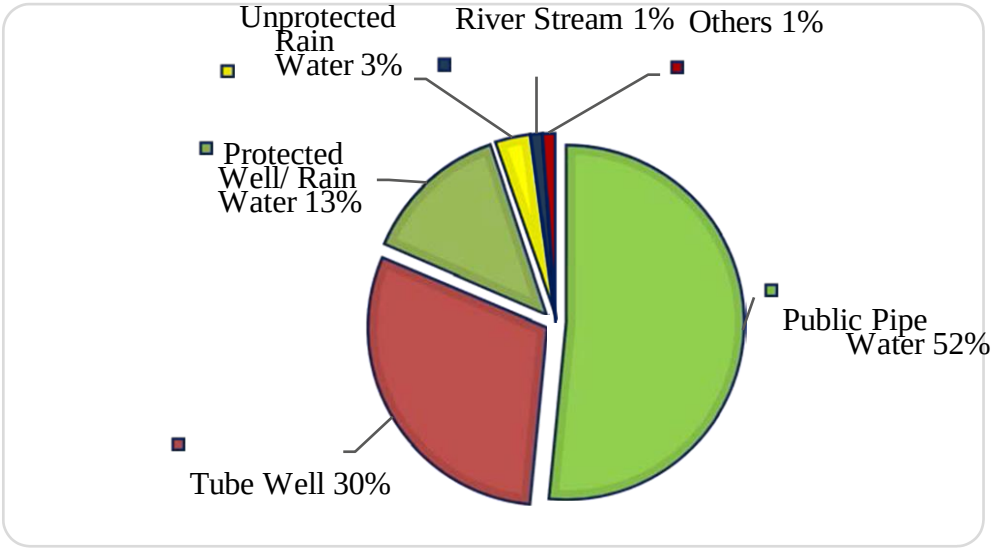


Figure 10. 11 Percentage of sources of water for the community

For the water source, more than half of the population, 52% of the total household access public pipe water. Then 30% said they have to buy water from the tube well however, 16% of the total household said that they use water from the dug well. Among 16%, 13% of the household said that they use protected dug well with rain water but the remaining 3% use the water from the unprotected dug well. And then, 1% of the household use river water and 1% of the household get water from others sources the distance of the water source is not far away from their houses and use with pipe line to get water. Not only observation but also analysis, the color of the water is clear and its color has not changed up to now. Thus, it is said that water quality is quite good. However, they get used to do water cleaning system. According to survey result, more than 60% of the household do boiling water before drinking. The remaining 40% households do not use any type of technique for treatment. But till now, there is no evidence of transmitted diseases from water.

10.5 General environment

To explore the existing situation of the surrounding environment of the industry. The questions related to the natural habits, wildlife decreased, population status, weather condition, food and income were analyzed. The following figure 10.12 shows the general issues related to the environment.

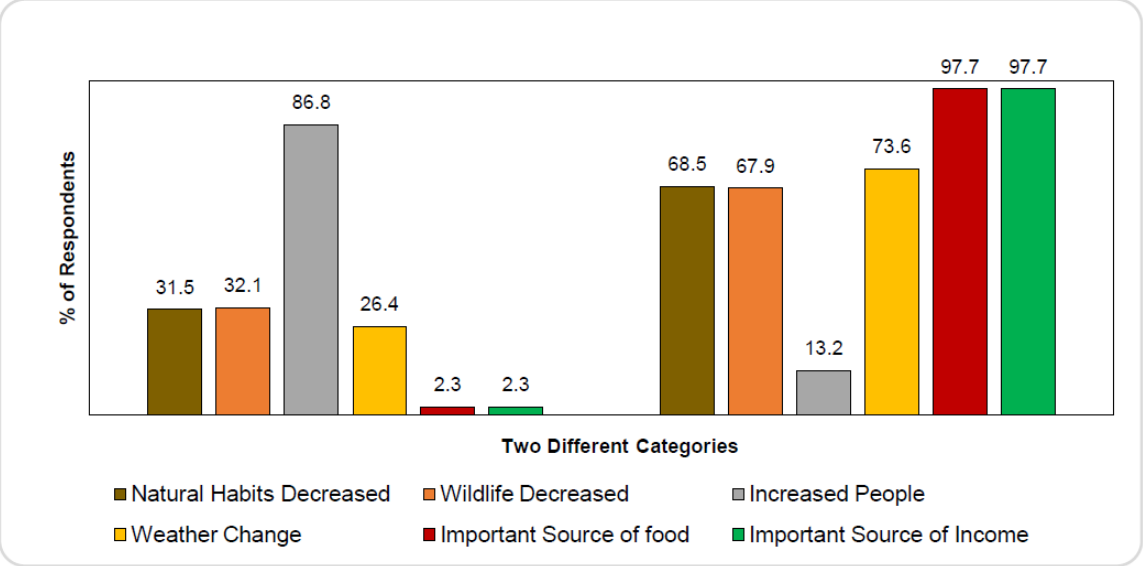


Figure 10. 12 Percentage (%) the issues of general environment

It was found out that. 31.5% of total household said that the natural habitants become decreased within ten years. However, the remaining 68.5% of the household answered that the natural habits were not significantly decreased with ten years. Therefore, it seems that the natural habitants did not change significantly. For, the issue of wildlife, similarly, the % of who said the wildlife decreased is around 32%, 68% responded that wildlife condition had not changed and decreased. Therefore, it appears that there is less impacts of the industrial zone on the wildlife of the surroundings.

In terms of population status the number of total people population become increased within ten years by nearly 87% of household, the only 13% of the household said that the number of total population are not significantly increased. But according to the data, the number of total population become increased as the result of migrating for life-style.

Considering on the after local climate in that region, around 26% of the total household said that within these years, they become experienced with heavily rain in these year. However, the remaining 74% of the total household said that the weather condition in this region does not significantly change in the past up to now. Thus, the local climate does not change within these years.

Reviewing the wild plant and animals related to the food source in this local environment, up to 97.5% of the total household said that local wild life and animals are not related to the important of sources of food. Only 2.5% of the household said that it is a little bit related to food source. According to this result, it can be concluded that local wildlife is not significantly related to the food sources.

For the issue of the wild plant and animals in this local environment and income, up to 97.5% of to the total household said that their income do not come from the local wildlife and animals. But, around 2.5% of the total household said that the local wildlife and animals are a little bit related to source of income. Thus, it is noted that there is no significant relationship between local wildlife, animals and income.

Based on the findings of within 10 years, the condition of the natural environment is not

significantly affected by the activities of the industry zone and the people who rely on those areas.

10.6 Perception of community on Diamond Star wheat flour milling

In this section, various questions which reveal community's perception, knowledge and awareness on the Diamond Star wheat flour Milling situated in the industrial zone are used for interviews on the selected household areas.

10.6.1 Awareness on the Diamond Star wheat flour milling factory

There are four different levels regarding the awareness on the wheat flour milling. More than 53% of the total household do not know about the Diamond star wheat flour milling factory. 10% of the total households know a little about the factory. But 30% of the households know about the wheat flour milling. Among them, only 7% know very well about the factory. Through their family members and friends.

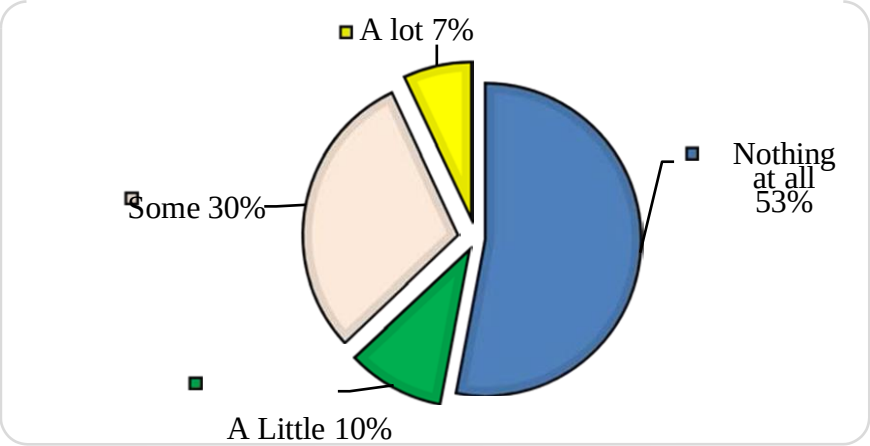


Figure 10. 13 Awareness of the community on the wheat flour milling

10.6.2 Perception on importance of the industry

Then, perception on the importance of the industry in the community level was analyzed. The figure 10.14 shows that the percentage of the level of importance of r the industry on the community.

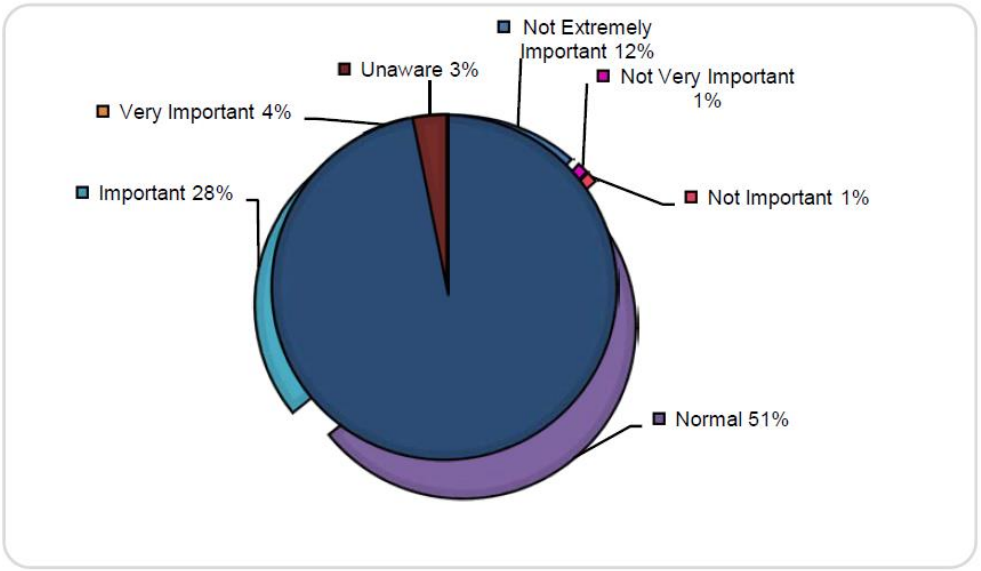


Figure 10. 14 Percentage of the level of importance of the industry on the community

Based on the findings, among the households, about 65% have no specific impact on their livelihood. However, 32% of the total households rely on the industry zone. The rest 3% are even unaware of the industrial zone.

10.6.3 Impact on the livelihood by the industry

For the issue of effect on the natural environment by the industry. The figure 10.15 below shows community's perceptions of the impact on the environment by the industry zone.

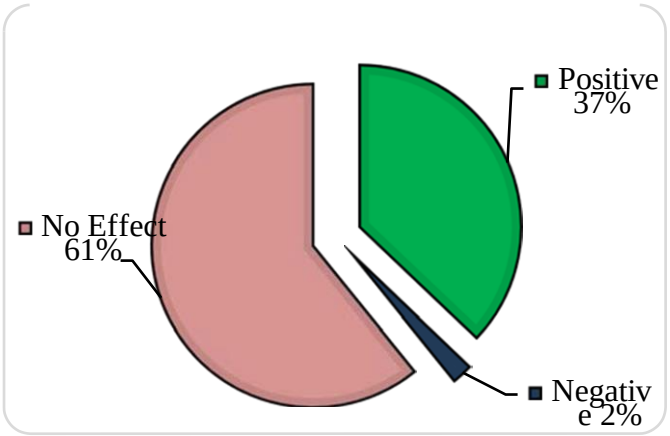


Figure 10. 15 Percentage of impact on the livelihood

It was found out that there are three levels of answers based on the collected data. Among the total household, 37% of the household said that there is the positive impact on the environment by the industry. However, 2% of the household said that it has negative impact on the environment. Then, up to 61% of the total household said that there is neither positive nor negative impact on the environment because of this industry project.

And then analysis of the issue of the good factors that the industry gives to the community and what kinds of the improvement were continued. Figure 10.16 presents the percentage of the improvement

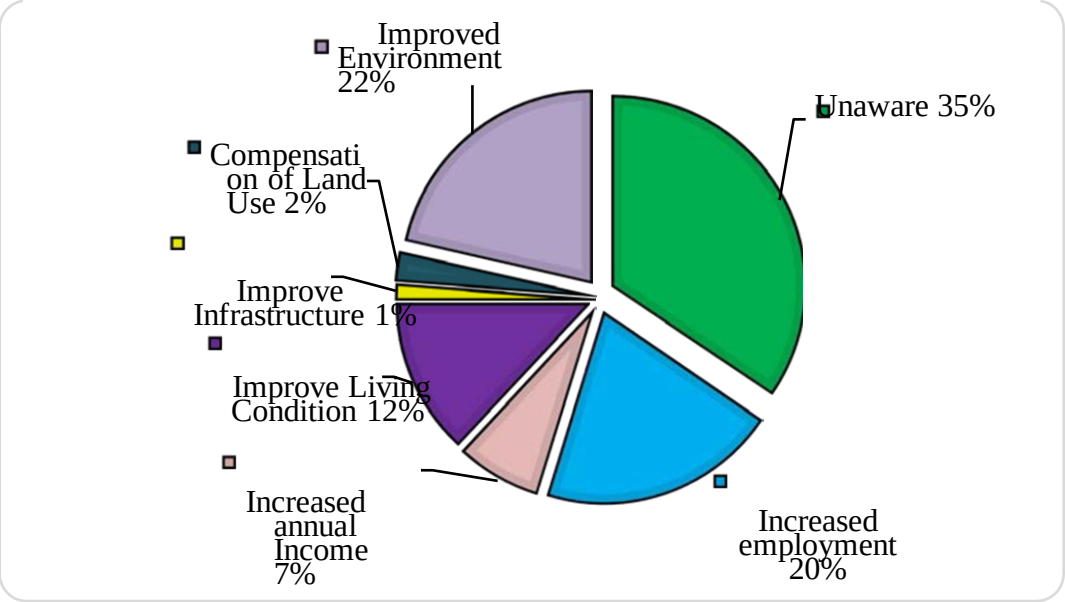


Figure 10. 16 Perception on the impact by the industry

In the issue of improvement and development of environment impact, this question was investigated all the respondents. Above figure shows the percentage of positive impact in the community. According to the analytical results, the total 65% of the total household said that there are some of the positive impacts in different sectors. It showed that 20% said they have seen improvement in increasing employment, 7% shows in annual income, 12% shows in living condition, 22% shows the condition of natural environment and the remaining 3% said that it is improved in the compensation of land use and infrastructure. However, 35% of the household showed that they are not aware the industry how much it gives any improvement for their lives and for their income.

10.6.4 Perception on the development of the project

Finally it is needed to know community's perceptions on the development of the industries. . Figure 10.17 shows the percentage of the respondents on the development of the industry.

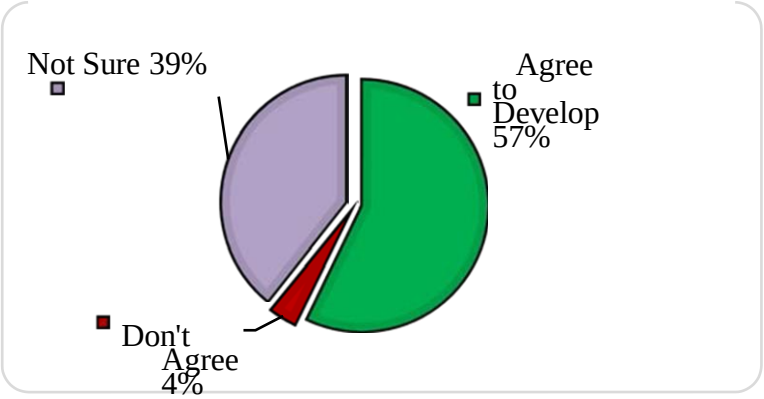


Figure 10. 17 Respondents on the development

More than 57% of the total household said that they agree with the new development of the industrial zone because of the good opportunities of more income and more job opportunities. But 39% of the household said that they are not sure in the development issue of the industry because this developing issue is much affected on their lifestyle and agreement is depended on the stakeholders. Only 4% do not agree in the project of develop issue on the industrial process.

In terms of the impact of the industry on the community, most of the residents explore the positive perception.

10.7 Perception on the socio-eco impacts by the industry

It can be found out that there are five different categories such as the effects of physical resources, biological resources, human use, quality of life and cultural heritage. All the data will be analyzed by seven levels such as very negative, negative, slightly negative, no effect, slightly positive, positive and very positive.

10.7.1 Physical Resource

Physical resource is one of the main impotent factors for all living organisms. It is included five main different categories which are soil quality, surface water quality, ground water quality, air quality, and noise level. For all these different categories, the following figure shows the outcomes.

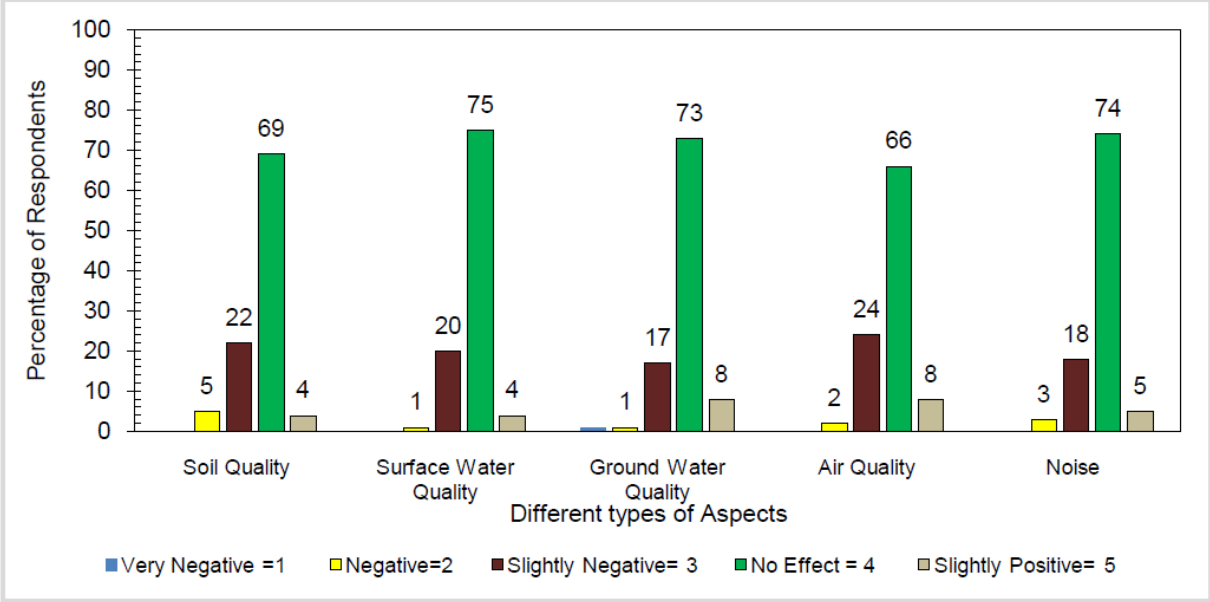


Figure 10. 18 Perception on the impact on physical resources

10.7.1.1 Soil quality

Firstly, soil quality is discussed based on people perception and attitude there are only four levels of response. Only 5% of the total household said that soil quality was negatively affected. 22% of the total household said that there is a slight negative impact by the development projects but 4% of the total household said that soil quality becomes slight positive. However, up to 69% of the household mentioned there is no effect on the soil quality by the industry.

10.7.1.2 Surface water quality

Secondly the issue of surface water quality was analyzed. There are four levels of response. Only 1% of the total household said that surface water quality was negatively affected. Around 20% of the total household said that a slight negative impact because of the action of development projects but 4% of the total household said that surface water quality becomes a slight positive. However, up to 75% of the household mentioned there is no effect on the surface water quality by the industrial activities.

10.7.1.3 Ground water quality

There are four types of response. Only 1% of the household said that the ground water quality was very negatively affected by industrial activities and another 1% of the total household said that ground water quality was negatively affected and 17% of the total household said that slightly negative impact by the development projects. However, 8% of the total household said that ground water quality becomes slight positive and then, up to 73% of the household mentioned responded that there is no effect on the ground water quality by the industry.

10.7.1.4 Air quality

In the air quality, there are four different levels of response. Only, 2% of the total household said that air quality was negatively affected and 24% of the total household said that a slight negative impact. But 8% of the total household said that air quality becomes slight positive. However, up to 66% of the household mentioned responded there is no effect on the air quality by the industry.

10.7.1.5 Noise quality

There are only four levels of response. Only, 3% of the total household said that noise level was negatively affected and 18% of the total household said that a slight negative impact by the development projects but 5% of the total household said that noise level becomes slight positive. However, up to 74% of the household mentioned there is no effect on the noise quality by the industry.

Therefore, according to the above findings, all the environmental parameters as such soil, surface water, ground water, air and noise qualities were not being significantly affected.

10.7.2 The effects biological resources

Biological Factors are one of the main impotent factors in the planet...It is composed of five main different categories which are Forestry, Agriculture, Local animals, Pasture and Aquatic animals. For all these different categories, the following figure (10.19) shows the findings.

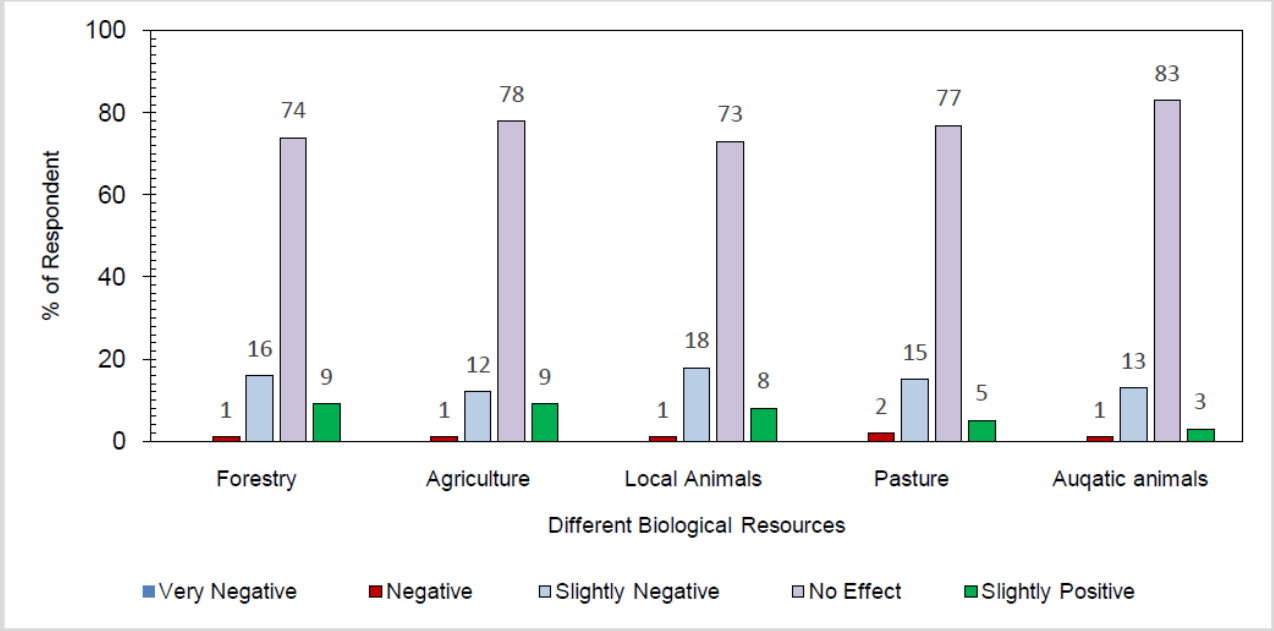


Figure 10. 19 Perception on the impacts on biological resources

10.7.2.1 Natural forest

First and foremost, natural forest condition is discussed based on people perception and attitude. In the natural forest, as the analyzing result, there are only four level. According to the observation result, 1% of the household said that natural forest was negative effect and 16% of the total household said that it has a slight negative impact by the development projects. However, up to 74% of the household mentioned there is no effect on the natural forest by the industry but 9% of the total household said that natural forest move to as a slight positive. If it is compare that the highest % of the household said that because of industry, there is no effect on the natural forest areas. Thus, it can be said that there is no both negative and positive impact because of milling system.

10.7.2.2 Agriculture

In the issue of agriculture system, land and land used. There are four levels of response. According to analyzing Only 1% of the total household said that agriculture land and land used was negatively affected and around 12% of the total household said that slight negative impact because of the action of development projects but 9% of the total household said that agriculture land and land used become slight positive. On the other hand, up to 78% which is the highest number of the household mentioned there is no effect on the agriculture land by the industrial process.

10.7.2.3 Local animals

In the issue of local animals, there are four types of response. . Only 1% of the total household said that local animals were negatively affected. 18 % of the total household said that a slight negative impact by the development projects. However, 8% of the total household said that local animals become slight positive and then, up to 73% of the household mentioned that there is no effect on the local animals by the industry. If it is compared all level of the result, the highest % of the household said that because of the industrial process there is neither negative nor

positive impact on local animals.

10.7.2.4 Pasture

Another biological parameter is pasture which is really important for the lives of the community. There are four different levels of response. Only, 3% of the total household said that pasture was negatively affected and 15% of the total household said that a slight negative impact. But 5% of the total household said that pasture becomes slight positive. However, up to 77% of the household mentioned that there is no effect on the pasture by the industrial process.

10.7.2.5 Aquatic animals

In the issue of aquatic animals, there are four levels of response. Only , 1% of the total household said that aquatic animals was negatively affected and 13% of the total household said that a slight negative impact by the development projects but 3% of the total household said that aquatic animals becomes slight positive. However, up to 83% of the household mentioned that there is no effect on the aquatic animals by the industry.

Therefore, according to the people perception, less than 20% of total household said that biological condition are negatively affected by the industrial process however, above 73% of the total household said that there is no effects on the natural environment. Thus, it can be assumed that there is less impact on the biological environment by the industry and its activities.

10.8 Effects of the human use

Human factor is the main issue in the social impact assessment. In terms of human used based on people perception, the main eight different categories such as local fisheries, local livestock, local vegetation, local industry, local transportation, local price, recreation and local economy were focused. The figure 10.20 shows the outcome.

10.8.1 Local fisheries

Firstly, it was discussed the issues of local fisheries based on people perception and attitude. To the findings, livelihood on fisheries is rare the area near to the industry. There are only three levels of response. According to the observation result, 15 % of the household said that local fisheries is slight negatively impacted by the development projects as an contrast around 8% of the total household said that local fisheries becomes slightly positive level. However, up to 77% of the household mentioned that there is no effect on the local fisheries by the industry. Moreover, the highest % of the household said that because of industry, there is no effect in the local fisheries. Thus, it can be said that there is neither negative nor positive impact by the industry.

10.8.2 Local livestock

In local livestock issue, there are three different levels of response. Around 17% of the total household said that there is slight negative impact because of the action of development projects but 10% of the total household said that local livestock becomes slight positive. On the other hand, up to 73% which is the highest number of the household mentioned that there is no effect on the local livestock by the industrial process.

10.8.3 Local vegetation

In local vegetation, there are only three different types of response. 15 % of the total household said that local livestock is slight negatively impacted by the development projects however, 11% of the total household said that local livestock becomes slight positive. On the other hand, up to 74% of the household mentioned there is no effect on the local livestock by the industry. If it is compared with all level of the result, the highest % of the household responded that there is neither negative nor positive impact on local livestock.

10.8.4 Livelihood and income

In livelihood and income issue only 1% of the total household said that local industry was negatively affected and 16% of the total household said that there is a slight negative impact. But 13% of the total household said that local industry becomes slight positive. However, up to 70% of the household mentioned that there is no negative impact by the industrial process.

10.8.5 Local transportation

Most of the people who live in the nearby area of the industry are used to depend on public transportation for the longer distance. Generally, they are used to walk and cycle within their quarter. Regarding of the perception on local transportation related to the industry, there are four different responses. . Only, 2% of household said that local transportation was negatively affected and 15% said that there is a slight negative impact by the industry. But 10% of the total household said that local transportation becomes slight positive. However, up to 72% of the household mentioned that there is no effect on local transportation by the industry.

10.8.6 Local price

Being important for local human and economic status, the issue of local price was analyzed. There are three different responses... 14% of the total household said that local price is has a slight negatively impacted by the industry. However, 9% of the total household said that local price has a slight positive. However, up to 77% of the household mentioned that there is no effect on the local price by the industry.

10.8.7 Recreation

Recreation factor is also discussed as one of the important factors. 11% of the total household said that it is slight negatively impacted by the industry. 7% of the total household said that recreation condition becomes slight positive. Majority 83% of the household mentioned that there is no effect on the recreation for the local community by the industry.

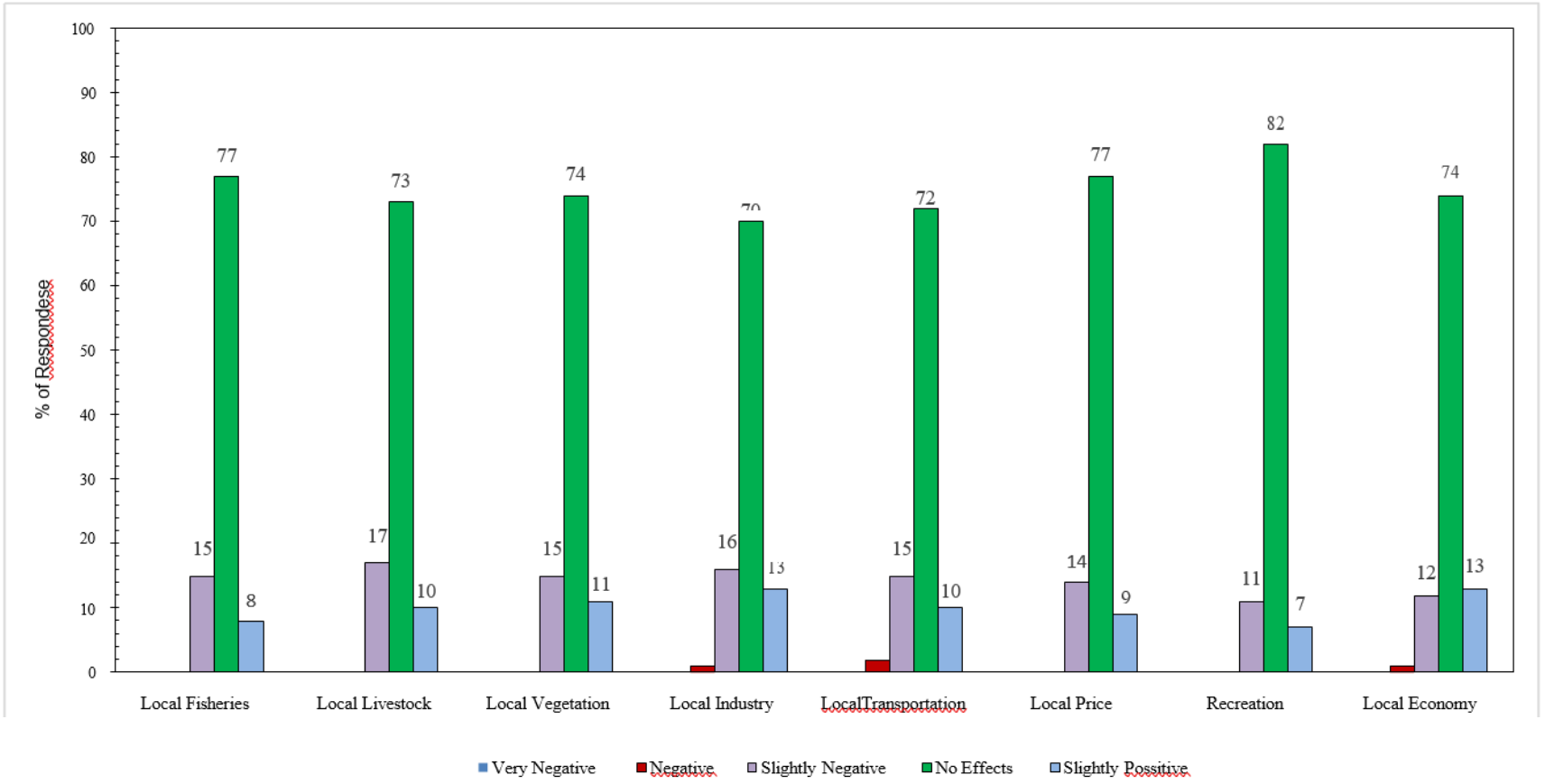


Figure 10. 20 Perception on impact of human use by the industry

10.8.8 Local economy

Lastly the issue of local economy was analyzed as a part of human used. 13% of the total household said that it is slight negatively impacted by the industry., but, another 13% of the total household said that local economy becomes improved and slight positive. Continuously, up to 74% of the household mentioned that there is no effect on the local economy for the local community by the industry. Thus, it can be assumed that local economy does not change due to the industry for those surrounding environment.

Reviewing back the findings, over all different parameter based on human used, under 18% of the total household said that there are some of the negative impact on the community and human used by the industry. At the same time, 13% of the total household said that their lifestyles and economic status become slightly improved due to the industry. But, the largest amount of the household said that there is no impact on their human use. Thus, it can be assumed that the industry has neither negative nor positive impact on the nearby community.

10.9 The Effect on the quality of life

In the perception of the impact on the development project, the quality of life is one of the important vital issues and also one of the social impact parameters. In the issue of the quality of life, there are 11 different parameters in this section. These are housing, health, education, spiritual, safety, crime, family structure, job opportunities, income, scenery and local culture. The figure 10.21 shows the all findings.

10.9.1 Housing condition

In the condition of housing of the community, around 10% of the household responded their housing condition is slightly negatively worse. However, 23% of the household said that they get better condition of housing. Besides, the remaining 67% of the household said that there is neither negative nor positive effect doe to the industry. Thus, it is assumed that industry cannot affect both negative and positive impact on the housing condition of the nearby community.

10.9.2 Health impact

People perception on health impact is analyzed. Around 13% of the household responded that their health care condition becomes worse. However, 20% of the household said that they get better health care during these years. Besides, the remaining 67% of the household said that there is neither negative nor positive impact due to the industry. According to the above findings, it can be found out that there is no significant relationship between the healthcare of the nearby community and the industry.

10.9.3 Education status

69% of the total household said that there is neither negative nor positive impact on Education by the industry. But 19% of household said that they can more provide the education from the income from the industry. 12 % of the household said that their education condition becomes slightly negative. Based on the findings, the industry does not significantly effect on the community's education.

10.9.4 Spiritual condition

In the spiritual condition of the household, it is said that around 9% of the household responded their spiritual become is slightly moved to negatively impact. However, 82% of the household said that there is no changed to both negative and positive effect because of the industry. Besides, the remaining 9% of the household said that their spiritual condition is slightly moved to positive. Thus, it is mentioned that industrial process cannot be pointed out both negative and positive impact in spiritual life for the people.

10.9.5 Safety

Safety is also one of the main parameters of the social impact. Around 17% of the household responded that their safety condition is slight negatively affected but another 9% of the household said that safety becomes positive. The remaining 74% of the household said that there is no change due to the industry. Thus, it appears that there is no significant impact on safety issue of the residents due to the industry.

10.9.6 Crime

Moreover, the crime problem is one of the issues of the quality of life. Around 16% of household replied that some of the crime problems used to happen among their community. Thus, they said that crime problem become slightly worse. . Then, another 8% of the household said that there is no crime within these days. However, the total 76% of household said that there is no change and effect on crime because of the industry. Thus, it appears that the industry has no impact on their lifestyle related to crime.

10.9.7 Family structure

73% of the total household said that there is neither negative nor positive effect on family structure due to the industry. But 14% of household said that their family structure become slightly improved because of the effect of industry. 13 % of the household said their family structure is slightly negative. Due to the mentioned above, the industry does not significantly change on the family structure of the nearby community.

10.9.8 Job opportunity

Job opportunity is one of the main important factors to change the quality of life. 66% of the total household said that there is neither negative nor positive effect on job opportunities by industry. But 16% of household said that they have more chance for job opportunities because of the industry However, 14 % of the household said that their job opportunities become less... Based on the above findings, it appears that the industry cannot give more chance of job opportunities for the nearby community.

10.9.9 Income

In the issue of income, 68% of the total household said that there is neither positive nor negative effect on income level by the industry. But 16% of household said that they can earn more income because of the effect of industry. However, 15 % of the household said their income level becomes slightly negative. Based on the mentioned above, the industry does not significantly change on the income of the local people but it has a slight deviation.

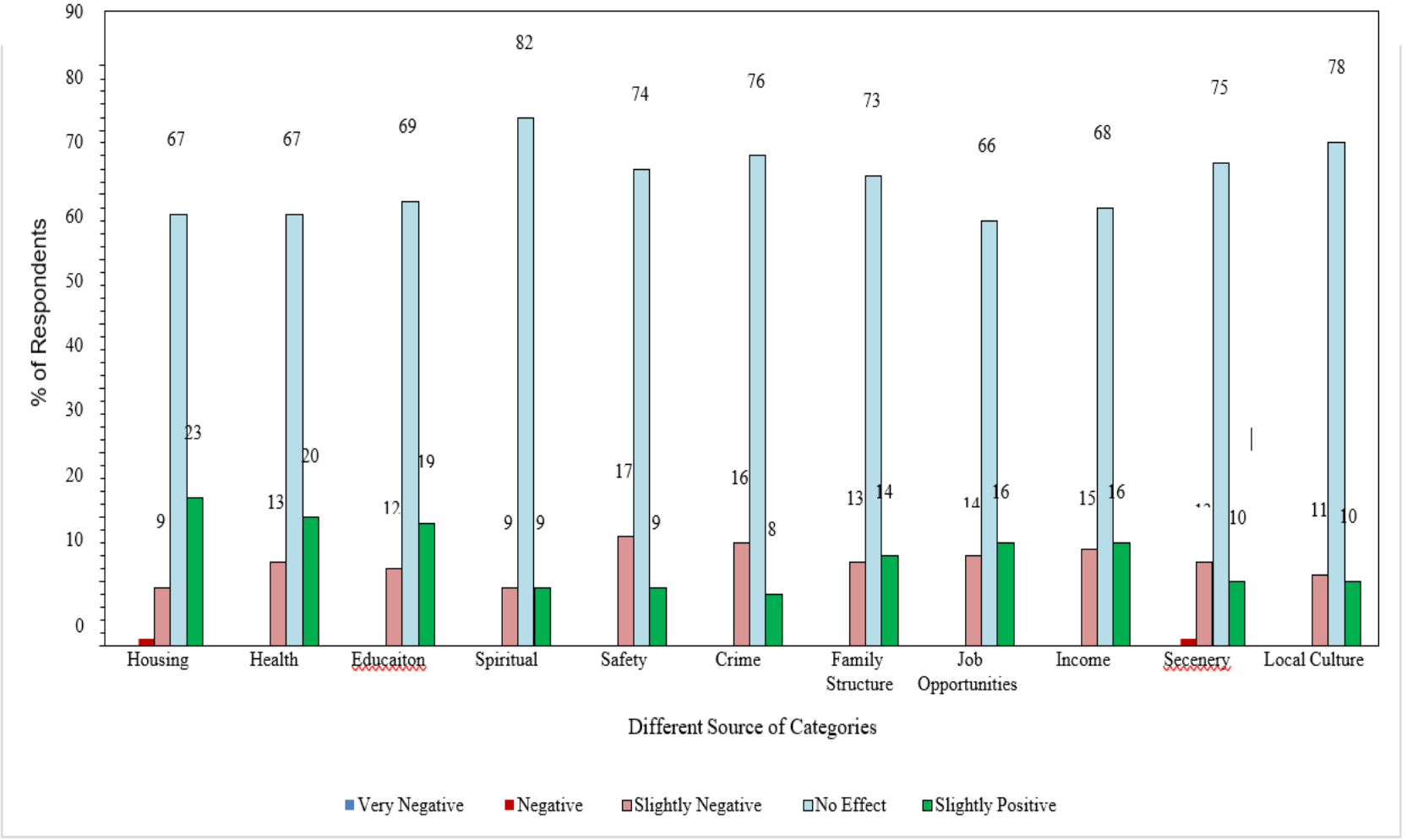


Figure 10. 21 Perception of the quality of life

10.9.10 Scenery

In this issue, the highest % of household which is 75% said that their surrounding areas are neither positive nor negative impact by the industry. Around14% of household said that their surrounding areas become bad situation within these years. However, 10 % of the household said their scenery quite becomes very nice situation. According to the analysis, it shows that there is no significantly relationship between and the industry and the impact on the scenery.

10.9.11 Local culture

According to the data, 11% of the total household said that l industry has slight negative effect but 10% of the total household said that local industry changed to slight positive. Up to 78% of the household mentioned that there is no effect on the local culture by the industry.
Reviewing back all findings for the quality of life, the range of household from 10-13% said that there is no improvement and there are some of the negative impacts as well on their quality of life. However, in the range of 10% to 23% of the total household said that their quality of life becomes slightly improved as the result of the industry. But,the largest amount of the household said that there is no effect by the industry. Thus, it appears that the industry has neither positive nor negative impact on the community's quality of life.

10.10 The effect on cultural heritage

10.10.1 Religious building

The effect on cultural heritage is also included as a common factor for the impact by the industry. In the issue of the cultural heritage, the main three different parameters such as Religious Building, Cemetery, and Historic Building were analyzed. The figure 10.23 shows the community perception on the cultural heritage and impact by the industry.

Religious buildings are very important for all religion of the people. Thus, its issue was included a part of the cultural heritage. Only, 2 % of the total household said that religious building becomes slight negative impact by the industry. But, 7% of the total household said that religious building becomes slight positive. However, the large population which is 90% of the household mentioned that there is no effect on religious building by the industry. Thus, it appears that the religious buildings do not t significantly change because of the industry.

10.10.2 Cemetery

Cemetery is also discussed in one of the important factors as a part of cultural heritage although 3% of the total household said that it has slight negative impact by the industry, 7% of the total household said that the situation of cemetery becomes slight positive. Up to 89% of the household mentioned that there is no effect on the Cemetery of the local community by the industry. Therefore, it can be assumed that there is no significantly change on cemetery due to the effect of industry.

Figure 10. 22 Religious building

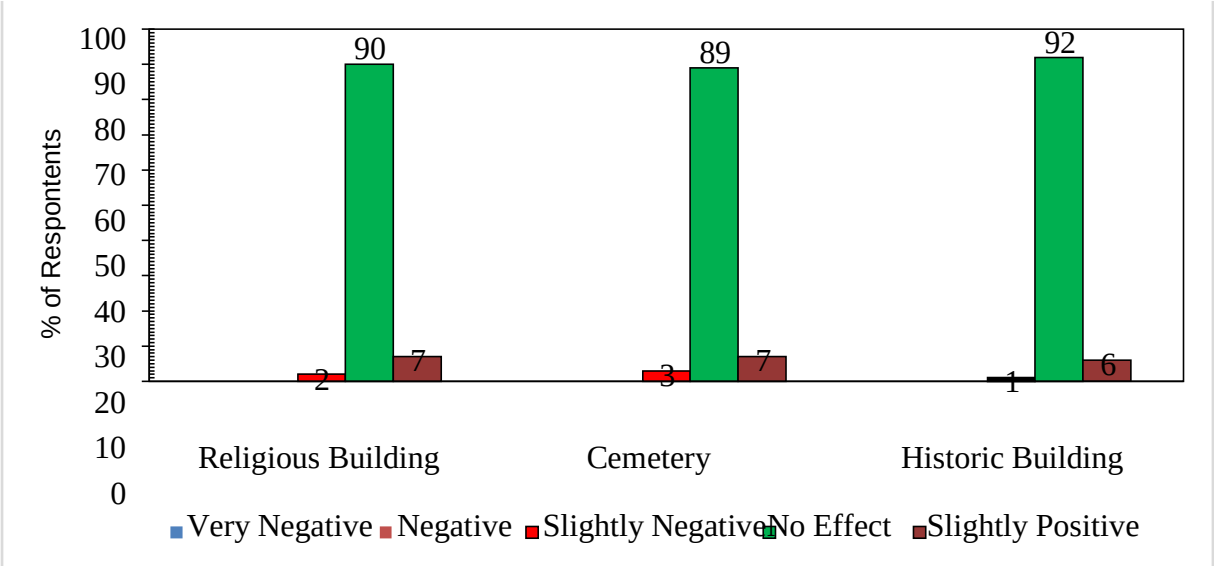


Figure 10. 23 Perception of the impact on cultural heritage

10.10.3 Historic building

In the issue of Historic Building, only 1% of the household said that the industry has slight negative impact on historic building 6% of the total household said that historic buildings become improved a slight positive. Up to 92% of the household mentioned that there is no effect on historic building for the local community by the industrial process. Thus, it can be said that historic buildings around have no impact by the industry.

Looking back to all findings related to cultural heritage, , less than 3% of household said that there are some of the negative impacts on the cultural heritage for community however, 7% of the total household said that their cultural heritage becomes slightly improved as the result of the industry. But, the largest amount of the household said that there is no effect on that. Thus, it can be concluded that the industry has neither positive nor negative impact on the cultural heritage of the nearby community.

10.11 Socio-eco impact assessment (SIA) survey process

Starting in August 2015, a SIA survey program was conducted by EQM SIA consultant team including (13) team members leaded by as follows:

- One Senior Socio-economic expert,
- Two Environmental consultants,
- One Public health doctor
- One trained Biodiversity technician
- One trained Cultural surveyor
- Seven socio-economic technicians trained by EQM.

Focus group meetings were held in the Block 108, East Dagon which is peri-urban and nearest to the East Dagon industrial area where Green Land flour milling factory located and included Key Informant Interviews, Socio-economic surveys and Traditional Ecological Knowledge surveys.
Moreover, a detailed door to door socio-economic survey was completed 100 households across the household block area in the East Dagon Township. In this way they could be considered typical and representative of the community which may potentially affected by the industrial activities.

Three Key Informant Interviews were conducted with Monk, Head of household tract, and a respective Teacher with the objective of obtaining relevant information on local community.

10.12 Corporate Social Responsibility (CSR) of Green Land Flour Milling

Corporate Social Responsibility (CSR) are formulated and to be implemented by Green Land 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. Green Land appointed to the nearest community as a first prioritize for employment. Green Land use **(????)%** of the net profits of the company.

Table 10- 1 CSR Plan of Green Land Flour Mill

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

Chapter 11

Conclusion

11. Conclusion

The ESIA for Green Land wheat flour milling factory has defined all environmental and social impacts associated with the project. For those aspects defined as significant appropriate mitigation measures and environmental monitoring plans were developed. All other aspects are managed through standard operating procedures.

In conclusion, EQM considers that:

- The prevention and mitigation measures outlined in this ESIA are capable of providing the appropriate management measures to ensure that environmental and social impacts are prevented or minimized
- The appropriate monitoring measures outlined in this EMP are capable of detecting and solving significant environmental impacts

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Annex (A)

Methodology for Environmental Sampling

Certificate TH17/10297

The management system of

LLUVIA LIMITED

No. 50-56 Kanaung Min Thar Gyi Road, East Dagon Industrial Zone (1), East Dagon Township, Yangon, Myanmar

has been assessed and certified as meeting the requirements of

GHPs – The General Principles of Food Hygiene: Good Hygiene Practices (CXC 1-1969, Latest Revised 2020)

For the following activities
The Manufacturing of Wheat Flour in plastic bag

Food Category: CIV - Processing of ambient stable products

This certificate is valid from 23 May 2022 until 11 July 2023 and remains valid subject to satisfactory surveillance audits.
Issue 3. Certified since 11 July 2017.

Authorised by

SGS (Thailand) Limited
100 Nanglinchee Road Chongnonsee Yannawa, Bangkok 10120 Thailand
t +66 (0)2 678 1813 - www.sgs.com

Certificate TH17/10298

The management system of

LLUVIA LIMITED

No. 50-56 Kanaung Min Thar Gyi Road, East Dagon Industrial Zone (1), East Dagon Township, Yangon, Myanmar

has been assessed and certified as meeting the requirements of

HACCP(GHPs) – The General Principles of Food Hygiene: The Hazard Analysis and Critical Control Point (CXC 1-1969, Latest Revised 2020)

For the following activities
The Manufacturing of Wheat Flour in plastic bag

Food Category: CIV - Processing of ambient stable products

This certificate is valid from 23 May 2022 until 11 July 2023 and remains valid subject to satisfactory surveillance audits.
Issue 3. Certified since 11 July 2017.

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100 Nanglinchee Road Chongnonsee Yannawa, Bangkok 10120 Thailand
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Certificate TH17/10298

The management system of

LLUVIA LIMITED

No. 50-56 Kanaung Min Thar Gyi Road, East Dagon Industrial Zone (1),
East Dagon Township, Yangon, Myanmar

has been assessed and certified as meeting the requirements of

HACCP Codex Alimentarius

Hazard Analysis and Critical Control Point (HACCP) System and Guidelines for Its Application
Annex to CAC/RCP-1-1969, Rev.4 (2003)

For the following activities

The Manufacturing of Wheat Flour in plastic bag.

Further clarifications regarding the scope of this certificate and the applicability of HACCP requirements may be obtained by consulting the organization

This certificate is valid from 17 August 2020 until 11 July 2023 and remains valid subject to satisfactory surveillance audits.
Re certification audit due before 07 June 2023
Issue 2. Certified since 11 July 2017

The audit leading to this certificate commenced on 27 July 2020
Previous issue certificate validity date was until 11 July 2020

Authorised by

SGS (Thailand) Limited
100 Nanglinchee Road, Chongnonsee, Yannawa, Bangkok 10120, Thailand
t +66 (0)2 678 18 13-43 **f** +66 (0)2 678 06 20 www.sgs.com

1. **Purpose**

This policy applies to all personnel in Lluvia Limited.

2. **Scope**

This policy applies to all Lluvia Flour Mills facilities, operations, employees, general workers, and product including those facilities indirect contact with the product.

3. **Responsibility**

It is responsible for all staffs in company to follow guideline and keep their relevant work environment clean and in good conditions.

HR is responsible in fulfilling required actions in maintaining safe & good working environment.

4. **Standard**

(1)Work Environment

House Keeping

It is essential that good housekeeping is maintained throughout the period of work both in the office, around office, around the warehouse and around the factory. All employees are responsible to keep their working environment clean and tidy. Janitors are appointed for cleaning office and it surrounding in daily basis.

Electricity and Lighting

It is responsibilities of the individual to ensure the lighting is adequate at working area. Report to HR Department immediately for bulbs/ tubes replacement when found faulty in order to maintain proper lighting.

And the safety guard lighting service for the round of the factory, office and warehouse responsibility and checking HR, and then report to Maintenance Department for repair service.

Ventilation

Lluvia Limited warehouse and office are equipped with air-conditioners and stand/exhaust fans for proper air-circulation systems . In case of out of order, HR shall take necessary actions.

Drinking Water

RO purify drinking water shall be provided to all departments.

Sanitary conveniences

Sufficient and suitable sanitary conveniences are provided with well maintenance.

First Aid Kits / Emergency cases

The first aid kits are available at every department

HR Office : 1Kit

Security : 1 Kit

Production : 1 Kit

Warehouse : 1Kit

QC : 1Kit

Maintenance : 1Kit

As detail below to be used for urgent relevant minor cases contact list

Central Fire Station (YGN) = 01 384420

Central Fire Station = 01 252011, 01 252022

Fire Station (East Dagon) = 01 2585460

Fire Station (South Dagon) = 01 590071

Fire Station (North Dagon) = 01 584060

Police Station (East Dagon) = 01 3585187, 01 3585191

Government Hospital (North Dagon) = 01 584071

Yazardhirit Hospital (East Dagon) = 09 255807680, 09 5118023

HR/Admin Manager = 09 250504103

Factory Manager = 09 960444104

Office Security guard is appointed to monitor the access of visitors entering to the office. He has responsibility to make enquiry, issue visitor card and keep proper records. Visitors have to return their visitor card upon their departure from office. Night Security guard is responsible for the security of office after office hours and keeps records of visitor's arrivals on weekends. Every employee has to tag their employee's ID card during office hours and department personnel must ensure to lock the doors of their respective work place before leaving. One duplicate of all office keys is put in key box which is controlled by HR. All key holders shall sign in the Key control distribution list kept by HR.

The Company notifies that any staff found under the influence of alcohol or drugs while at work will have his employment contract terminated with immediate effect.

Work Environment Safety for accident/incident

Every employee shall be committed to followed HSE guideline. HSE team shall monitor effectiveness of the status of Quality, Health, Safety and Environmental issues to take proper actions upon needed.

Accident/incident report shall be submitted to relevant department manager on a monthly basis. In case of urgent matters, the frequency shall be raised.

Health and Safety manager has responsible to take proper actions reported by department if necessary.

5. References

Fire extinguishers layout and Hydrant plans, Assembly Point, Factory Layout Plan, Pre-employment & Routine Medical Screening test, Accident/incident Register, Department Safety Procedure

Certificate TH13/6856

The management system of

Lluvia Limited

Head Office: No. 9 (C-2) Yaw Min Gyi Street, Dagon Township, Yangon, Myanmar

has been assessed and certified as meeting the requirements of

ISO 9001:2015

For the following activities
The Manufacturing of Wheat Flour

This certificate is valid from 30 January 2022 until 30 January 2025 and remains valid subject to satisfactory surveillance audits.
Issue 7. Certified since 30 January 2013.
Certified activities performed by additional sites listed on subsequent pages.

Authorised by

SGS United Kingdom Ltd.
Rossmore Business Park, Ellesmere Port, Cheshire, CH65 3EN, UK
t +44 (0)151 350-6666 - www.sgs.com

Lluvia Limited

ISO 9001:2015

Issue 7
Sites
Lluvia Limited Head Office: No. 9 (C-2) Yaw Min Gyi Street, Dagon Township, Yangon, Myanmar
Lluvia Limited Factory: No. 50-56, Corner of Kanaung Minthar Gyi Street and Yaw A Twin Wun U Poe Hlaing Street, East Dagon Industrial Zone, East Dagon Township, Yangon, Myanmar

Certificate TH17/10296

The management system of

LLUVIA LIMITED

No. 50-56 Kanaung Min Thar Gyi Road, East Dagon Industrial Zone (1),
East Dagon Township, Yangon, Myanmar

has been assessed and certified as meeting the requirements of

ISO 22000:2018

For the following activities

The Manufacturing of Wheat Flour in plastic bag.

Food Category: CIV - Processing of ambient stable products.

This certificate is valid from 17 August 2020 until 11 July 2023 and remains valid subject to satisfactory surveillance audits.
Re-certification audit due 60 days prior to expiry date
Issue 3. Certified since 11 July 2017

The audit leading to this certificate commenced on 27 July 2020
Previous issue certificate validity date was until 11 July 2020

Authorised by

SGS United Kingdom Ltd
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HC SGS 22000 2018 0819

Objective

- ဝန်ထမ်းများ၏ကျန်းမာရေး၊ဘေးကင်းရေး၊စိတ်ပိုင်းဆိုင်ရာနှင့်လူမှုဘဝသာယာရေးတို့ကိုကာကွယ်ရန်။
- ဖြစ်နိုင်ခြေရှိသောအမြင့်ဆုံးစံချိန်စံညွှန်းများကိုအကောင်အထည်ဖော်ခြင်းဖြင့်ကျန်းမာရေးနှင့်ဘေးအန္တရာယ်ကင်းရှင်းသော လုပ်ငန်းခွင်ကိုပံ့ပိုးပေးနိုင်ရန်။
- လုပ်ငန်းခွင်တွင်ဖြစ်နိုင်သောအန္တရာယ်များကိုဖော်ထုတ်၍မဖြစ်အောင်တားဆီးရန်နှင့်ဖြစ်တန်စွမ်းကိုလျော့ချရန်။
- ကျန်းမာရေးနှင့်ဘေးကင်းရေးဆိုင်ရာပြဿနာများကိုဖြေရှင်းနိုင်မှုမြှင့်တင်ရန်နှင့်လျော့ချရန်၊စီမံခန့်ခွဲရာတွင်ကူညီပံ့ပိုးပေး သည့်လုပ်ငန်းခွင်ကိုဖန်တီးနိုင်ရန်။

HR/Admin Guideline

- HR ဌာနသည်ဝန်ထမ်းများအားကျန်းမာရေးနှင့်ဘေးကင်းရေးစည်းကမ်းများနှင့်အညီသေချာစွာလုပ်ဆောင်ရမည်။
- ဝန်ထမ်းများစည်းမျဉ်းစည်းကမ်းများကိုအသိပညာပေးနိုင်ရန်ကျန်းမာရေးနှင့်ဘေးကင်းရေးသင်တန်းပေးခြင်း၊ရှေးဦးသူနာပြုစုနည်းများနှင့်အရေးပေါ်အစီအစဉ်များကဲ့သို့သောသင်တန်းများကိုပို့ချပေးခြင်းတို့ကိုလုပ်ဆောင်ရမည်။
- ကျွမ်းကျင်သော၊တတ်သိနားလည်သောဝန်ထမ်းများရှိခြင်းသည်မတော်တဆမှုများကိုလျော့ပါးစေပြီးစည်းကမ်းချိုးဖောက်မှုများကိုပိုမိုကောင်းမွန်စွာကာကွယ်ပေးနိုင်ပါသည်။
- အန္တရာယ်ဖြစ်စေနိုင်သောနေရာများတွင် Safety Signage များထားရှိခြင်း။
- မန်နေဂျာများဝန်ထမ်းများကြားပွင့်လင်းစွာပြောဆိုဆက်ဆံမှုသည်ဘေးကင်းရေးဆိုင်ရာပြဿနာများကိုအချိန်နှင့် တပြေးညီသိစေနိုင်ပြီး Management နှင့်ဝန်ထမ်းများကြားယုံကြည်မှုပိုမိုလာခြင်း၊ ကုန်ထုတ်လုပ်မှုမြှင့်မားလာခြင်းနှင့်အဖွဲ့လိုက်လုပ်ဆောင်မှုကိုတိုးတက်စေပါသည်။

Silo

1. Silo walkway ပေါ်သို့ တက်လျှင် ချော်လဲခြင်း၊ ချော်ကျခြင်း မဖြစ်စေရန် ဂရုစိုက်၍ point ပါသော ဖိနပ်များ စီးနင်းပြီးမှ တက်ရန်။
2. စက်ပစ္စည်းအစိတ်အပိုင်းများ နှင့် conveyor များပေါ်သို့ ဖြတ်သန်းသွားလာခြင်းပြုလုပ်ရာတွင် ဘောင်းဘီအရှည် (uniform) ဖြင့်သာ ဝတ်ဆင် အလုပ်လုပ်ရန်၊
3. စက်ပစ္စည်းများ ပြုပြင်ခြင်း၊ Choke ဖြစ်၍ elevator, conveyor များကို load လျော့ခြင်းများပြုလုပ်လျှင် သက်ဆိုင်ရာ breaker များချခြင်း၊ control panel တွင် lock out/ tag out များချိတ်ဆွဲထားခြင်း ပြုလုပ်ရန်။
4. CTN နောက်ပိတ်တံခါးဖွင့်စဉ် လုပ်သားများ မထိခိုက်မိအောင်ကြိုးချည်ပြီး ဖွင့်ရန်။
5. Overhead Crane ဖြင့် Receiving ပြုလုပ်ရသော လုပ်သား/ဝန်ထမ်းများ အားလုံး Helmet ဆောင်းရန်။
6. Container ပုံးကို crane ဖြင့် မြောက်နေစဉ်အတွင်း လုပ်သားများ ပုံးအောက်သို့ ဝင်ရောက်ခြင်း၊ ဖြတ်သန်းသွားလာခြင်း မပြုရန်။
7. Bin ရှင်း၍ Auger (လွန်) မောင်းလျှင် လုပ်သားများ ထိခိုက်မှု မရှိစေရန် ဂရုစိုက်ပြောကြားရန်။
8. Sample ယူခြင်း၊ ပိုးစစ်ဆေးခြင်း နှင့် Silo level ညှိချိန်တို့တွင် Mill သို့ ဂျုံစေ့ပေးပို့ခြင်း၊ ဂျုံစေ့လက်ခံခြင်း မပြုလုပ်ရ။
9. Stock ကောက်ချိန်၊ Bin ညှိချိန်တို့တွင် Silo ထဲသို့ဝင်လျှင် Safety belt, Life line ကြိုးချည်နှောင်ဝတ်ဆင်ပြီးမှ ဝင်ရမည်။ (အမြင့်တက်ရမည့်လုပ်ငန်းများလုပ်ဆောင်ပါက Safety belt ဝတ်ဆင်ပါ။)
10. ကားတင်လုပ်ငန်းများ၊ ဇလားလောင်းလုပ်ငန်းများ ပြုလုပ်လျှင် pile ပြိုခြင်း မဖြစ်ပေါ်အောင် ဂရုစိုက်ရန်။ Pile ထပ်ခြင်းလုပ်ငန်းများတွင် ၂၅ လွှာထက် ပိုမထပ်ရ။
11. လျှပ်စစ်ကြိုး၊ မီးခလုတ်ခုံ၊ Breaker ၊ Junction box များကို အမြဲသန့်ရှင်းအောင်ထားရမည်။ ပျက်လျှင် အချိန်နှင့် တပြေးညီ ပြုပြင်ရန် ပြင်ထိန်းဌာနသို့ အသိပေးရမည်။

Production

1. Production Line တွင် သတ်မှတ်ထားသော Uniform ပြည့်စုံစွာ ဝတ်ဆင်ရမည်။
2. လည်ပတ်နေသောစက်များကို လိုအပ်သည့် Setting မှလွဲ၍ချိန်ညှိပြင်ဆင်ခြင်း မပြုလုပ်ရ။
3. လည်ပတ်နေသည့်စက်အစိတ်အပိုင်း အကာအရံများသည် ကောင်းမွန်သော အခြေအနေတွင်ရှိရမည်။
4. Process line တွင် choke ဖြစ်ပါက သက်ဆိုင်ရာစက်၏ Local switch အား off position ထားပါ။ လိုအပ်ပါက breaker ချပါ။ Breaker တွင် Warning tag ချိတ်ဆွဲထားပါ။
5. လည်ပတ်နေသည့်စက်အစိတ်အပိုင်းများကြားသို့ ခြေလက်များမထည့်ရ။
6. လှေကားသုံး၍ လုပ်ဆောင်ရမည့်နေရာများရှိပါက လှေကားကို သေချာစွာကိုင်တွယ်ပေးသူရှိမှ အမြင့်ကိုတက်ပါ။
7. Production ရပ်၍ စက်ရုံပိတ်ပါက ပြင်ထိန်းသို့ အကြောင်းကြား၍ Power supply main breaker ကို ချခိုင်းပါ။
8. စက်ရုံရက်ရှည်ပိတ်၍ ပြန်လည်ပါက Process line အတွင်း ရှင်းလင်းမှုရှိ/မရှိ အရင်စစ်ဆေးပြီး ရှင်းလင်းပါမှ ပြန်လည်ပါ။
9. ဂျုံစေ့ကန်၊ဂျုံမှုန့်ကန်အတွင်းသို့သန့်ရှင်းရေးပြုလုပ်ရန်ဆင်းပါက winch, cage သုံး၍ဆင်းပါ။ Safety belt ပတ်ပါ။မဆင်းခင် winch, cage ကိုကြိုခိုင်မှုရှိမရှိ၊အသုံးပြု၍ရမရစစ်ပါ။
10. ပြင်ထိန်းဌာနမှ စက်လာရောက်ပြုပြင်ပါက ပြုပြင်ပြီးကြောင်း၊ လည်၍ရပြီဖြစ်ကြောင်း အကြောင်းကြားမှ စက်ပြန်လည်ပါ။

Engineering & Maintenance

1. Maintenance လုပ်ငန်းများဆောင်ရွက်ချိန်တွင် သတ်မှတ် Uniform ,Safety Shoes, Helmet တို့ကို ပြည့်စုံစွာ ဝတ်ဆင်၍ လုပ်ငန်းခွင်သို့ဝင်ရန်။
2. Electric welding job ပြုလုပ်ပါက Welding face shield နှင့် Welding gloves တို့ကို မဖြစ်မနေဝတ်ဆင်ရန်။
3. Grinding machine များကိုင်တွယ်အသုံးပြုချိန်တွင် Goggle အားဝတ်ဆင်ရန်။
4. အမြင့်တက်ရမည့်လုပ်ငန်းများလုပ်ဆောင်ချိန်တွင် Safety belt အားဝတ်ဆင်ထားပါ။
5. Operation မှစက်များပြုပြင်ထိန်းသိမ်းလုပ်ငန်းများလုပ်ဆောင်ပါက ၎င်းစက်နှင့်သက်ဆိုင်သော Local switch အားပိတ်ပါ။ Local switch မရှိပါက သက်ဆိုင်ရာ Breaker အားချ၍ Warning tag ချိတ်ဆွဲထားပါ။
6. စက်ပြင်ဆင်ပြီးစီးပါက Hand tools များ၊ စွန့်ပစ်ပစ္စည်းများကိုသိမ်းဆည်းပါ။သက်ဆိုင်ရာဌာနအားပြီးစီးကြောင်း အကြောင်းကြားပါ။
7. စက်ပြုပြင်ထိန်းသိမ်းမှုပြုလုပ်ပါက အနည်းဆုံးဝန်ထမ်း(၂)ဦးဖြင့်ပြုလုပ်ပါ။
8. Hot work များပြုလုပ်ပါ Fire extinguisher များအနီးတွင်ထားရမည်။
9. အမှုန်အမွှား(Dust) ထူထပ်သောနေရာတွင် Hot work များလုပ်ပါကလေဝင်ထွက်ကောင်းစေရန် သတိပြုပါ။
10. လေခါးအသုံးပြုရမည့်အလုပ်များတွင် အနည်းဆုံးဝန်းထမ်း(၂)ယောက်ဖြင့် လေခါးကိုမြဲမြံစွာထိန်း၍ လုပ်ဆောင်ပါ။
11. ပျက်စီးနေသော Tool များမသုံးရ
12. Electric Panel ရှေ့တွင်မည်သည့်ပစ္စည်းမှပိတ်ဆို့မထားရ။
13. Workshop Area သည်ရှုပ်ပွနေခြင်းမရှိရ။
14. Generator House များတွင် Engine oil, diesel များယိုစိမ့်နေခြင်း၊ဖိတ်စင်နေခြင်းမရှိရ။
15. Transformer Yard သည်ရှင်းလင်းနေရမည်။

Warehouse

Forklift Truck Safety

1. Forklift မောင်းနှင်ပါက Helmet ၊ ရောင်ပြန်အင်္ကျီ၊ Shoes စသည့် PPE အပြည့်အစုံဝတ်ပါ။
2. ပုဆိုးဖြင့် မမောင်းရ။
3. မမောင်းမီ ဘေးပတ်လည်ပစ္စည်း၊လူ ရှင်း/မရှင်းကြည့်ပါ။
4. ရှေ့တိုးနောက်ဆုတ်၊ Fork အပေါ်အောက်၊ ဘေးဘယ်ညာ၊ အပေါ်ထောင်အောက်ငိုက်၊ ဘရိတ် စသည်တို့ကို စစ်ဆေးပြီးမှ မောင်းပါ။
5. Forklift မှ ခါးပတ်ကိုပတ်ပါ။
6. မောင်းသူအပြင် လူပိုမစီးရ။
7. Forklift မောင်းစဉ် ဖုန်းမပြောရ။
8. ကျဲ့အိတ်ပါ (ဝန်ပါ) Pallet ကိုတစ်ခုံထက်ပို မ မရ။
9. ရှေ့မြင်ကွင်းမရှင်းပါကနောက်ဆုတ်မောင်းပါ။ဟွန်းတီးပါ။
10. လမ်းထောင့်ချိုးလမ်းကူးတို့တွင်ဂရုစိုက်ပါ။ဟွန်းတီးပါ။
11. မောင်းနှင်ရာလမ်းကြောင်းရှေ့တူရွှကိုဂရုပြုပါ။
12. အကွေ့များတွင်မကွေ့မီ နောက်ပိုင်းနှင့်လွတ်မလွတ်သေချာကြည့်ပါ။
13. ရုတ်တရက်ဆောင့်ထွက်ခြင်း၊ဆောင့်ရပ်ခြင်း၊ချိုးကွေ့ခြင်းမလုပ်ရ။
14. အောက်ခံမျက်နှာပြင်ပျော့သောနေရာများတွင်မမောင်းရ။
15. အဆောက်အဦးအဝင်အထွက်များတွင်အပေါ်အောက်၊ဘေးဘယ်ညာလွတ်မလွတ်ကြည့်ပါ။
16. အမြင့်တွင်ဝန်မတင်ထားစဉ်အတွင်းအခြားတနေရာသို့မမောင်းရ။
17. Forklift တွန်းခြင်း၊ဆွဲခြင်းအလုပ်များတွင်မသုံးရ။
18. Pallet မနေစဉ်အတွင်းဂွင်းအောက်သို့မည်သူမှမဝင်ရ။
19. Pallet အားဆတ်ကနဲမတင်ခြင်း၊ချခြင်းမလုပ်ရ။
20. ဝန် မ နေစဉ်အတွင်းဒေါက်တိုင်အားရှေ့မငိုက်ရ။
21. Forklift မောင်းနှင်နေစဉ် Pallet or Fork သည်ကြမ်းပြင်မှ 6 လက်မနှင့် 8 လက်မကြားအမြင့်တွင်ရှိရမည်။

22. 5 KM/Hr နှုန်းထက်ပိုမမောင်းရ။
23. မကောင်းသော Pallet များကိုမသုံးရ။
24. ရပ်ထားသည့်အခါ Fork ကိုကြမ်းပြင်သို့စိုက်ထားပါ။ Hand brake ဆွဲပါ။သော့ကိုနှုတ်၍သိမ်းပါ။
25. ကုန်းဆင်းတွင်မရပ်ရ။
26. Battery အားသွင်းသောအခါ Battery Plug များကိုသေချာစွာတပ်ဆင်ပြီးမှ Breaker တင်ပါ။ Charger မှ Start Button အားနှိပ်ပါ။
27. Battery အားသွင်းပြီးသောအခါ Stop Button ကိုနှိပ်ပြီးမှ Breaker ချပါ။

Piling, Loading and unloading

1. ဂျုံအိတ်ပါ Pallet များကို ၄ ခုံထက်ပိုမထပ်ရ။
2. ဂျုံအိတ်ပါ Pallet များကိုရွှေ့စောင်းအနေအထားနှင့်မထပ်ရ။ညီညာစွာထပ်ရမည်။
3. Flat piling ပြုလုပ်မည့် Pile များတွင် အိတ်အလွှာ 25 လွှာထက်ပိုမထပ်ရ။
4. အမြင့်တင်နေသော Pallet များအောက်သို့ လူမဝင်စေရ။

Others

1. WH Staff ၊ နေ့စားလုပ်သားများအားလုံးဘောင်းဘီရှည်ဝတ်ဆင်ရမည်။ ပုဆိုး၊လုံချည်၊ဘောင်းဘီတိုများခွင့်မပြု။
2. Warehouse အတွင်းပြေးလွှားဆော့ကစားခြင်းမပြုလုပ်ရ။
3. ဆေးအုပ်ထားသောပိုင်ပုံများကိုမထိမိစေရ။

QC Lab, Bakery and R & D

QC Lab

1. Lab အခန်းအတွင်းတွင် အစားအသောက်များ မစားရ။
2. Lab coat, gloves, eye protection စသည့် သင့်လျော်သည့် PPE များ ဝတ်ဆင်ရမည်။
3. PPE ဝတ်စုံများကိုသေသပ်စွာဝတ်ဆင်ပါ။ဆံပင်ရှည်ရှိပါကနောက်ဘက်တွင်သပ်ရပ်စွာစီးထားပါ။
4. Chemical များအားတိုက်ရိုက်အနံ့ခံခြင်း၊ရှူခြင်းမပြုလုပ်ရ။လက်၊မျက်နှာ၊အရေပြား၊ အဝတ်အစား၊ ဖိနပ်တို့တိုက်ရိုက်မထိတွေ့ရ။
5. အန္တရာယ်ဖြစ်စေနိုင်သော Chemical များကိုညွှန်ကြားချက်အတိုင်းအသုံးပြုပါ။
6. Lab Chemical များကိုင်တွယ်ပြီးပါက လက်ဆေးပါ။
7. အစားမစားမီနှင့် Lab မှ မထွက်ခွာခင် လက်ကိုဆပ်ပြာ၊ရေတို့ဖြင့်သေချာစွာဆေးကြောပါ။
8. မိမိအသုံးအဆောင်ပစ္စည်းများကို Lab လုပ်ငန်းခွင်နှင့် ခွဲခြားထားပါ။
9. Chemical ပစ္စည်းများကို ဓာတ်ပြုမှုမရှိသော Materials ဖြင့် ပြုလုပ်ထားသည့် ပုံးများ၊ ဘူးများဖြင့် သိမ်းဆည်းရမည်။
10. လောင်ကျွမ်းစေတတ်သော အက်စစ်ကဲ့သို့ပျော်ရည်များကိုသီးခြား Cabinet များနှင့် 6 meter ခွာ၍သိုလောင်ထားပါ။
11. မီးလောင်လွယ်သော Chemical ပစ္စည်းအများအပြားကို အပူဒဏ်ခံနိုင်သော သေတ္တာကဲ့သို့ အရာထဲတွင် သိမ်းဆည်းရမည်။
12. ဓာတ်ပြုနိုင်သော Chemical များကိုခွဲခြားသိမ်းဆည်းပါ။
13. Chemical ထည့်ထားသော ပုံးများ၊ ဘူးများကို Label ကပ်ထားပါ။
14. Chemical အသစ်အသုံးပြုပါကအသုံးမပြုမီသတိပေးစာများ၊အသုံးပြုပုံ (MSDS)တို့အားသေချာစွာ အရင်ဖတ်ပါ။
15. အန္တရာယ်ရှိ၍ Moisture စုပ်ယူနိုင်သော Chemical များကိုလုံခြုံသော Safety bag များနှင့်သိုလှောင်ပါ။
16. Pipette ထဲသို့အရည်ဖြည့်ပါက ပါးစပ်မသုံးရ။ Pipette bulb သို့မဟုတ်အခြားအရည်ဖြည့်ကရိယာတခုခုသုံးရမည်။
17. တစ်ဦးတည်း အလုပ်မလုပ်ရ။
18. Lab ဝန်ထမ်းများအားလုံး Safety Equipment များအား သုံးနိုင်ရန် လေ့ကျင့်ထားပါ။
19. အနီးဆုံးတွင်ထားရှိသည့် မီးသတ်ဆေးဘူးနှင့် ဆေးသေတ္တာ နေရာအား သိရှိထားရန်။

20. Equipment များကိုသေချာသောအောက်ခံ၊လုံလောက်သောအကျယ်အဝန်းရှိသည့်မျက်နှာပြင်ပေါ်တွင်တင်ပါ။
21. Equipment များကို မတော်တဆရိုက်ခတ်မိခြင်းမရှိအောင်ဂရုစိုက်ပါ။
22. Equipment များကိုကောင်းမွန်သောအခြေအနေတွင်ထိန်းသိမ်းထားပါ။
23. ဝန်ထမ်းများအား Equipment များကို ဘေးကင်းစွာအသုံးပြုနည်း၊သန့်ရှင်းရေးပြုလုပ်နည်းနှင့် ပတ်သက်သည့်Safe Training ပေးပါ။

Bakery

1. ပူသောအစားအစာ(Bakery Test ပြုလုပ်သောမုန့်များ)များကို သယ်ယူစဉ် ဂရုစိုက်ပါ၊ အလျှင်စလို မပြုလုပ်ရ။ ဘေးမှလူများအား သတိပေးပါ။
2. ကြမ်းပြင်ပေါ်တွင် ပြုတ်ကျထားသည့် အစားအသောက်များ နှင့် ဖိတ်စင်သည့်ဆီများအား မရှိစေရ။
3. Bakery သုံး PPE များကို ဝတ်ဆင်ပါ။
4. ကွဲရှလွယ်သော ပစ္စည်းများကို ဂရုတစိုက် ကိုင်တွယ်ပါ။
5. Gas line များ ဓါတ်ငွေ့ယိုစိမ့်မှုရှိမရှိစစ်ဆေးပါ။ ယိုစိမ့်မှုရှိပါကမသုံးရ။
6. Dough break machine, mixer များလည်နေချိန်တွင်လက်မထည့်ရ။
7. Dough break machine, mixer, oven, proofer များပြုပြင်နေချိန်တွင်သက်ဆိုင်ရာ Breaker ကိုချထားပါ။

Pest Control

1. Fumigation ပြုလုပ်ခြင်း၊ဆေးဖြန်းခြင်းနှင့်ဆေးမှုတ်ခြင်းတို့ပြုလုပ်ပါကသတ်မှတ်ထားသော PPE အပြည့်အစုံဝတ်ဆင်ရမည်။
2. ပိုးသတ်သုံးဆေးများကိုထုတ်လုပ်သူအညွှန်းအတိုင်းထားသိုပါ။
3. ဆေးထည့်သည့်ဘူးများ၊ Container များအား label ပါ။စနစ်တကျထားသိုပြီးအလွယ်တကူယူ၍မရစေရန်သိုလှောင်ခန်းအားသော့ခတ်ထားပါ။
4. သတ်မှတ်ထားသော Work Instruction အတိုင်းလုပ်ဆောင်ရမည်။

5. ဂျုံစေ့၊ဂျုံမှုန့်ပိုင်များကိုဆေးအုပ်ထားပါက အန္တရာယ်ရှိကြောင်းသတိပေးစာမြင်သာအောင်ကပ်ပေးရမည်။
6. ဆေးအုပ်ထားသည့်ရက်ပြည့်ပါဖုံးအုပ်ထားသောပလပ်စတစ်စကိုလှန်ပြီး ၃၀ မိနစ်ကြာမှဂျုံစေ့၊ဂျုံမှုန့်အိတ်များကိုကိုင်တွယ်စေပါ။

Prepared by

Reviewed by

Objective

- ဝန်ထမ်းများ၏ကျန်းမာရေး၊ဘေးကင်းရေး၊စိတ်ပိုင်းဆိုင်ရာနှင့်လူမှုဘဝသာယာရေးတို့ကိုကာကွယ်ရန်။
- ဖြစ်နိုင်ခြေရှိသောအမြင့်ဆုံးစံချိန်စံညွှန်းများကိုအကောင်အထည်ဖော်ခြင်းဖြင့်ကျန်းမာရေးနှင့်ဘေးအန္တရာယ်ကင်းရှင်းသော လုပ်ငန်းခွင်ကိုပံ့ပိုးပေးနိုင်ရန်။
- လုပ်ငန်းခွင်တွင်ဖြစ်နိုင်သောအန္တရာယ်များကိုဖော်ထုတ်၍မဖြစ်အောင်တားဆီးရန်နှင့်ဖြစ်တန်စွမ်းကိုလျော့ချရန်။
- ကျန်းမာရေးနှင့်ဘေးကင်းရေးဆိုင်ရာပြဿနာများကိုဖြေရှင်းနိုင်မှုမြှင့်တင်ရန်နှင့်လျော့ချရန်၊စီမံခန့်ခွဲရာတွင်ကူညီပံ့ပိုးပေး သည့်လုပ်ငန်းခွင်ကိုဖန်တီးနိုင်ရန်။

HR/Admin Guideline

- HR ဌာနသည်ဝန်ထမ်းများအားကျန်းမာရေးနှင့်ဘေးကင်းရေးစည်းကမ်းများနှင့်အညီသေချာစွာလုပ်ဆောင်ရမည်။
- ဝန်ထမ်းများစည်းမျဉ်းစည်းကမ်းများကိုအသိပညာပေးနိုင်ရန်ကျန်းမာရေးနှင့်ဘေးကင်းရေးသင်တန်းပေးခြင်း၊ရှေးဦးသူနာပြုစုနည်းများနှင့်အရေးပေါ်အစီအစဉ်များကဲ့သို့သောသင်တန်းများကိုပို့ချပေးခြင်းတို့ကိုလုပ်ဆောင်ရမည်။
- ကျွမ်းကျင်သော၊တတ်သိနားလည်သောဝန်ထမ်းများရှိခြင်းသည်မတော်တဆမှုများကိုလျော့ပါးစေပြီးစည်းကမ်းချိုးဖောက်မှုများကိုပိုမိုကောင်းမွန်စွာကာကွယ်ပေးနိုင်ပါသည်။
- အန္တရာယ်ဖြစ်စေနိုင်သောနေရာများတွင် Safety Signage များထားရှိခြင်း။
- မန်နေဂျာများဝန်ထမ်းများကြားပွင့်လင်းစွာပြောဆိုဆက်ဆံမှုသည်ဘေးကင်းရေးဆိုင်ရာပြဿနာများကိုအချိန်နှင့် တပြေးညီသိစေနိုင်ပြီး Management နှင့်ဝန်ထမ်းများကြားယုံကြည်မှုပိုမိုလာခြင်း၊ ကုန်ထုတ်လုပ်မှုမြှင့်မားလာခြင်းနှင့်အဖွဲ့လိုက်လုပ်ဆောင်မှုကိုတိုးတက်စေပါသည်။

Silo

1. Silo walkway ပေါ်သို့ တက်လျှင် ချော်လဲခြင်း၊ ချော်ကျခြင်း မဖြစ်စေရန် ဂရုစိုက်၍ point ပါသော ဖိနပ်များ စီးနင်းပြီးမှ တက်ရန်။
2. စက်ပစ္စည်းအစိတ်အပိုင်းများ နှင့် conveyor များပေါ်သို့ ဖြတ်သန်းသွားလာခြင်းပြုလုပ်ရာတွင် ဘောင်းဘီအရှည် (uniform) ဖြင့်သာ ဝတ်ဆင် အလုပ်လုပ်ရန်၊
3. စက်ပစ္စည်းများ ပြုပြင်ခြင်း၊ Choke ဖြစ်၍ elevator, conveyor များကို load လျော့ခြင်းများပြုလုပ်လျှင် သက်ဆိုင်ရာ breaker များချခြင်း၊ control panel တွင် lock out/ tag out များချိတ်ဆွဲထားခြင်း ပြုလုပ်ရန်။
4. CTN နောက်ပိတ်တံခါးဖွင့်စဉ် လုပ်သားများ မထိခိုက်မိအောင်ကြိုးချည်ပြီး ဖွင့်ရန်။
5. Overhead Crane ဖြင့် Receiving ပြုလုပ်ရသော လုပ်သား/ဝန်ထမ်းများ အားလုံး Helmet ဆောင်းရန်။
6. Container ပုံးကို crane ဖြင့် မြောက်နေစဉ်အတွင်း လုပ်သားများ ပုံးအောက်သို့ ဝင်ရောက်ခြင်း၊ ဖြတ်သန်းသွားလာခြင်း မပြုရန်။
7. Bin ရှင်း၍ Auger (လွန်) မောင်းလျှင် လုပ်သားများ ထိခိုက်မှု မရှိစေရန် ဂရုစိုက်ပြောကြားရန်။
8. Sample ယူခြင်း၊ ပိုးစစ်ဆေးခြင်း နှင့် Silo level ညှိချိန်တို့တွင် Mill သို့ ဂျုံစေ့ပေးပို့ခြင်း၊ ဂျုံစေ့လက်ခံခြင်း မပြုလုပ်ရ။
9. Stock ကောက်ချိန်၊ Bin ညှိချိန်တို့တွင် Silo ထဲသို့ဝင်လျှင် Safety belt, Life line ကြိုးချည်နှောင်ဝတ်ဆင်ပြီးမှ ဝင်ရမည်။ (အမြင့်တက်ရမည့်လုပ်ငန်းများလုပ်ဆောင်ပါက Safety belt ဝတ်ဆင်ပါ။)
10. ကားတင်လုပ်ငန်းများ၊ ဇလားလောင်းလုပ်ငန်းများ ပြုလုပ်လျှင် pile ပြိုခြင်း မဖြစ်ပေါ်အောင် ဂရုစိုက်ရန်။ Pile ထပ်ခြင်းလုပ်ငန်းများတွင် ၂၅ လွှာထက် ပိုမထပ်ရ။
11. လျှပ်စစ်ကြိုး၊ မီးခလုတ်ခုံ၊ Breaker ၊ Junction box များကို အမြဲသန့်ရှင်းအောင်ထားရမည်။ ပျက်လျှင် အချိန်နှင့် တပြေးညီ ပြုပြင်ရန် ပြင်ထိန်းဌာနသို့ အသိပေးရမည်။

Production

1. Production Line တွင် သတ်မှတ်ထားသော Uniform ပြည့်စုံစွာ ဝတ်ဆင်ရမည်။
2. လည်ပတ်နေသောစက်များကို လိုအပ်သည့် Setting မှလွဲ၍ချိန်ညှိပြင်ဆင်ခြင်း မပြုလုပ်ရ။
3. လည်ပတ်နေသည့်စက်အစိတ်အပိုင်း အကာအရံများသည် ကောင်းမွန်သော အခြေအနေတွင်ရှိရမည်။
4. Process line တွင် choke ဖြစ်ပါက သက်ဆိုင်ရာစက်၏ Local switch အား off position ထားပါ။ လိုအပ်ပါက breaker ချပါ။ Breaker တွင် Warning tag ချိတ်ဆွဲထားပါ။
5. လည်ပတ်နေသည့်စက်အစိတ်အပိုင်းများကြားသို့ ခြေလက်များမထည့်ရ။
6. လှေကားသုံး၍ လုပ်ဆောင်ရမည့်နေရာများရှိပါက လှေကားကို သေချာစွာကိုင်တွယ်ပေးသူရှိမှ အမြင့်ကိုတက်ပါ။
7. Production ရပ်၍ စက်ရုံပိတ်ပါက ပြင်ထိန်းသို့ အကြောင်းကြား၍ Power supply main breaker ကို ချခိုင်းပါ။
8. စက်ရုံရက်ရှည်ပိတ်၍ ပြန်လည်ပါက Process line အတွင်း ရှင်းလင်းမှုရှိ/မရှိ အရင်စစ်ဆေးပြီး ရှင်းလင်းပါမှ ပြန်လည်ပါ။
9. ဂျုံစေ့ကန်၊ဂျုံမှုန့်ကန်အတွင်းသို့သန့်ရှင်းရေးပြုလုပ်ရန်ဆင်းပါက winch, cage သုံး၍ဆင်းပါ။ Safety belt ပတ်ပါ။မဆင်းခင် winch, cage ကိုကြိုခိုင်မှုရှိမရှိ၊အသုံးပြု၍ရမရစစ်ပါ။
10. ပြင်ထိန်းဌာနမှ စက်လာရောက်ပြုပြင်ပါက ပြုပြင်ပြီးကြောင်း၊ လည်၍ရပြီဖြစ်ကြောင်း အကြောင်းကြားမှ စက်ပြန်လည်ပါ။

Engineering & Maintenance

1. Maintenance လုပ်ငန်းများဆောင်ရွက်ချိန်တွင် သတ်မှတ် Uniform ,Safety Shoes, Helmet တို့ကို ပြည့်စုံစွာ ဝတ်ဆင်၍ လုပ်ငန်းခွင်သို့ဝင်ရန်။
2. Electric welding job ပြုလုပ်ပါက Welding face shield နှင့် Welding gloves တို့ကို မဖြစ်မနေဝတ်ဆင်ရန်။
3. Grinding machine များကိုင်တွယ်အသုံးပြုချိန်တွင် Goggle အားဝတ်ဆင်ရန်။
4. အမြင့်တက်ရမည့်လုပ်ငန်းများလုပ်ဆောင်ချိန်တွင် Safety belt အားဝတ်ဆင်ထားပါ။
5. Operation မှစက်များပြုပြင်ထိန်းသိမ်းလုပ်ငန်းများလုပ်ဆောင်ပါက ၎င်းစက်နှင့်သက်ဆိုင်သော Local switch အားပိတ်ပါ။ Local switch မရှိပါက သက်ဆိုင်ရာ Breaker အားချ၍ Warning tag ချိတ်ဆွဲထားပါ။
6. စက်ပြင်ဆင်ပြီးစီးပါက Hand tools များ၊ စွန့်ပစ်ပစ္စည်းများကိုသိမ်းဆည်းပါ။သက်ဆိုင်ရာဌာနအားပြီးစီးကြောင်း အကြောင်းကြားပါ။
7. စက်ပြုပြင်ထိန်းသိမ်းမှုပြုလုပ်ပါက အနည်းဆုံးဝန်ထမ်း(၂)ဦးဖြင့်ပြုလုပ်ပါ။
8. Hot work များပြုလုပ်ပါ Fire extinguisher များအနီးတွင်ထားရမည်။
9. အမှုန်အမွှား(Dust) ထူထပ်သောနေရာတွင် Hot work များလုပ်ပါကလေဝင်ထွက်ကောင်းစေရန် သတိပြုပါ။
10. လေခါးအသုံးပြုရမည့်အလုပ်များတွင် အနည်းဆုံးဝန်းထမ်း(၂)ယောက်ဖြင့် လေခါးကိုမြဲမြံစွာထိန်း၍ လုပ်ဆောင်ပါ။
11. ပျက်စီးနေသော Tool များမသုံးရ
12. Electric Panel ရှေ့တွင်မည်သည့်ပစ္စည်းမှပိတ်ဆို့မထားရ။
13. Workshop Area သည်ရှုပ်ပွနေခြင်းမရှိရ။
14. Generator House များတွင် Engine oil, diesel များယိုစိမ့်နေခြင်း၊ဖိတ်စင်နေခြင်းမရှိရ။
15. Transformer Yard သည်ရှင်းလင်းနေရမည်။

Warehouse

Forklift Truck Safety

1. Forklift မောင်းနှင်ပါက Helmet ၊ ရောင်ပြန်အင်္ကျီ၊ Shoes စသည့် PPE အပြည့်အစုံဝတ်ပါ။
2. ပုဆိုးဖြင့် မမောင်းရ။
3. မမောင်းမီ ဘေးပတ်လည်ပစ္စည်း၊လူ ရှင်း/မရှင်းကြည့်ပါ။
4. ရှေ့တိုးနောက်ဆုတ်၊ Fork အပေါ်အောက်၊ ဘေးဘယ်ညာ၊ အပေါ်ထောင်အောက်ငိုက်၊ ဘရိတ် စသည်တို့ကို စစ်ဆေးပြီးမှ မောင်းပါ။
5. Forklift မှ ခါးပတ်ကိုပတ်ပါ။
6. မောင်းသူအပြင် လူပိုမစီးရ။
7. Forklift မောင်းစဉ် ဖုန်းမပြောရ။
8. ကျဲ့အိတ်ပါ (ဝန်ပါ) Pallet ကိုတစ်ခုံထက်ပို မ မရ။
9. ရှေ့မြင်ကွင်းမရှင်းပါကနောက်ဆုတ်မောင်းပါ။ဟွန်းတီးပါ။
10. လမ်းထောင့်ချိုးလမ်းကူးတို့တွင်ဂရုစိုက်ပါ။ဟွန်းတီးပါ။
11. မောင်းနှင်ရာလမ်းကြောင်းရှေ့တူရွှကိုဂရုပြုပါ။
12. အကွေ့များတွင်မကွေ့မီ နောက်ပိုင်းနှင့်လွတ်မလွတ်သေချာကြည့်ပါ။
13. ရုတ်တရက်ဆောင့်ထွက်ခြင်း၊ဆောင့်ရပ်ခြင်း၊ချိုးကွေ့ခြင်းမလုပ်ရ။
14. အောက်ခံမျက်နှာပြင်ပျော့သောနေရာများတွင်မမောင်းရ။
15. အဆောက်အဦးအဝင်အထွက်များတွင်အပေါ်အောက်၊ဘေးဘယ်ညာလွတ်မလွတ်ကြည့်ပါ။
16. အမြင့်တွင်ဝန်မတင်ထားစဉ်အတွင်းအခြားတနေရာသို့မမောင်းရ။
17. Forklift တွန်းခြင်း၊ဆွဲခြင်းအလုပ်များတွင်မသုံးရ။
18. Pallet မနေစဉ်အတွင်းဂွင်းအောက်သို့မည်သူမှမဝင်ရ။
19. Pallet အားဆတ်ကနဲမတင်ခြင်း၊ချခြင်းမလုပ်ရ။
20. ဝန် မ နေစဉ်အတွင်းဒေါက်တိုင်အားရှေ့မငိုက်ရ။
21. Forklift မောင်းနှင်နေစဉ် Pallet or Fork သည်ကြမ်းပြင်မှ 6 လက်မနှင့် 8 လက်မကြားအမြင့်တွင်ရှိရမည်။

22. 5 KM/Hr နှုန်းထက်ပိုမမောင်းရ။
23. မကောင်းသော Pallet များကိုမသုံးရ။
24. ရပ်ထားသည့်အခါ Fork ကိုကြမ်းပြင်သို့စိုက်ထားပါ။ Hand brake ဆွဲပါ။သော့ကိုနှုတ်၍သိမ်းပါ။
25. ကုန်းဆင်းတွင်မရပ်ရ။
26. Battery အားသွင်းသောအခါ Battery Plug များကိုသေချာစွာတပ်ဆင်ပြီးမှ Breaker တင်ပါ။ Charger မှ Start Button အားနှိပ်ပါ။
27. Battery အားသွင်းပြီးသောအခါ Stop Button ကိုနှိပ်ပြီးမှ Breaker ချပါ။

Piling, Loading and unloading

1. ဂျုံအိတ်ပါ Pallet များကို ၄ ခုံထက်ပိုမထပ်ရ။
2. ဂျုံအိတ်ပါ Pallet များကိုရွှေ့စောင်းအနေအထားနှင့်မထပ်ရ။ညီညာစွာထပ်ရမည်။
3. Flat piling ပြုလုပ်မည့် Pile များတွင် အိတ်အလွှာ 25 လွှာထက်ပိုမထပ်ရ။
4. အမြင့်တင်နေသော Pallet များအောက်သို့ လူမဝင်စေရ။

Others

1. WH Staff ၊ နေ့စားလုပ်သားများအားလုံးဘောင်းဘီရှည်ဝတ်ဆင်ရမည်။ ပုဆိုး၊လုံချည်၊ဘောင်းဘီတိုများခွင့်မပြု။
2. Warehouse အတွင်းပြေးလွှားဆော့ကစားခြင်းမပြုလုပ်ရ။
3. ဆေးအုပ်ထားသောပိုင်ပုံများကိုမထိမိစေရ။

QC Lab, Bakery and R & D

QC Lab

1. Lab အခန်းအတွင်းတွင် အစားအသောက်များ မစားရ။
2. Lab coat, gloves, eye protection စသည့် သင့်လျော်သည့် PPE များ ဝတ်ဆင်ရမည်။
3. PPE ဝတ်စုံများကိုသေသပ်စွာဝတ်ဆင်ပါ။ဆံပင်ရှည်ရှိပါကနောက်ဘက်တွင်သပ်ရပ်စွာစီးထားပါ။
4. Chemical များအားတိုက်ရိုက်အနံ့ခံခြင်း၊ရှူခြင်းမပြုလုပ်ရ။လက်၊မျက်နှာ၊အရေပြား၊ အဝတ်အစား၊ ဖိနပ်တို့တိုက်ရိုက်မထိတွေ့ရ။
5. အန္တရာယ်ဖြစ်စေနိုင်သော Chemical များကိုညွှန်ကြားချက်အတိုင်းအသုံးပြုပါ။
6. Lab Chemical များကိုင်တွယ်ပြီးပါက လက်ဆေးပါ။
7. အစားမစားမီနှင့် Lab မှ မထွက်ခွာခင် လက်ကိုဆပ်ပြာ၊ရေတို့ဖြင့်သေချာစွာဆေးကြောပါ။
8. မိမိအသုံးအဆောင်ပစ္စည်းများကို Lab လုပ်ငန်းခွင်နှင့် ခွဲခြားထားပါ။
9. Chemical ပစ္စည်းများကို ဓာတ်ပြုမှုမရှိသော Materials ဖြင့် ပြုလုပ်ထားသည့် ပုံးများ၊ ဘူးများဖြင့် သိမ်းဆည်းရမည်။
10. လောင်ကျွမ်းစေတတ်သော အက်စစ်ကဲ့သို့ပျော်ရည်များကိုသီးခြား Cabinet များနှင့် 6 meter ခွာ၍သိုလောင်ထားပါ။
11. မီးလောင်လွယ်သော Chemical ပစ္စည်းအများအပြားကို အပူဒဏ်ခံနိုင်သော သေတ္တာကဲ့သို့ အရာထဲတွင် သိမ်းဆည်းရမည်။
12. ဓာတ်ပြုနိုင်သော Chemical များကိုခွဲခြားသိမ်းဆည်းပါ။
13. Chemical ထည့်ထားသော ပုံးများ၊ ဘူးများကို Label ကပ်ထားပါ။
14. Chemical အသစ်အသုံးပြုပါကအသုံးမပြုမီသတိပေးစာများ၊အသုံးပြုပုံ (MSDS)တို့အားသေချာစွာ အရင်ဖတ်ပါ။
15. အန္တရာယ်ရှိ၍ Moisture စုပ်ယူနိုင်သော Chemical များကိုလုံခြုံသော Safety bag များနှင့်သိုလှောင်ပါ။
16. Pipette ထဲသို့အရည်ဖြည့်ပါက ပါးစပ်မသုံးရ။ Pipette bulb သို့မဟုတ်အခြားအရည်ဖြည့်ကရိယာတခုခုသုံးရမည်။
17. တစ်ဦးတည်း အလုပ်မလုပ်ရ။
18. Lab ဝန်ထမ်းများအားလုံး Safety Equipment များအား သုံးနိုင်ရန် လေ့ကျင့်ထားပါ။
19. အနီးဆုံးတွင်ထားရှိသည့် မီးသတ်ဆေးဘူးနှင့် ဆေးသေတ္တာ နေရာအား သိရှိထားရန်။

20. Equipment များကိုသေချာသောအောက်ခံ၊လုံလောက်သောအကျယ်အဝန်းရှိသည့်မျက်နှာပြင်ပေါ်တွင်တင်ပါ။
21. Equipment များကို မတော်တဆရိုက်ခတ်မိခြင်းမရှိအောင်ဂရုစိုက်ပါ။
22. Equipment များကိုကောင်းမွန်သောအခြေအနေတွင်ထိန်းသိမ်းထားပါ။
23. ဝန်ထမ်းများအား Equipment များကို ဘေးကင်းစွာအသုံးပြုနည်း၊သန့်ရှင်းရေးပြုလုပ်နည်းနှင့် ပတ်သက်သည့်Safe Training ပေးပါ။

Bakery

1. ပူသောအစားအစာ(Bakery Test ပြုလုပ်သောမုန့်များ)များကို သယ်ယူစဉ် ဂရုစိုက်ပါ၊ အလျှင်စလို မပြုလုပ်ရ။ ဘေးမှလူများအား သတိပေးပါ။
2. ကြမ်းပြင်ပေါ်တွင် ပြုတ်ကျထားသည့် အစားအသောက်များ နှင့် ဖိတ်စင်သည့်ဆီများအား မရှိစေရ။
3. Bakery သုံး PPE များကို ဝတ်ဆင်ပါ။
4. ကွဲရှလွယ်သော ပစ္စည်းများကို ဂရုတစိုက် ကိုင်တွယ်ပါ။
5. Gas line များ ဓါတ်ငွေ့ယိုစိမ့်မှုရှိမရှိစစ်ဆေးပါ။ ယိုစိမ့်မှုရှိပါကမသုံးရ။
6. Dough break machine, mixer များလည်နေချိန်တွင်လက်မထည့်ရ။
7. Dough break machine, mixer, oven, proofer များပြုပြင်နေချိန်တွင်သက်ဆိုင်ရာ Breaker ကိုချထားပါ။

Pest Control

1. Fumigation ပြုလုပ်ခြင်း၊ဆေးဖြန်းခြင်းနှင့်ဆေးမှုတ်ခြင်းတို့ပြုလုပ်ပါကသတ်မှတ်ထားသော PPE အပြည့်အစုံဝတ်ဆင်ရမည်။
2. ပိုးသတ်သုံးဆေးများကိုထုတ်လုပ်သူအညွှန်းအတိုင်းထားသိုပါ။
3. ဆေးထည့်သည့်ဘူးများ၊ Container များအား label ပါ။စနစ်တကျထားသိုပြီးအလွယ်တကူယူ၍မရစေရန်သိုလှောင်ခန်းအားသော့ခတ်ထားပါ။
4. သတ်မှတ်ထားသော Work Instruction အတိုင်းလုပ်ဆောင်ရမည်။

5. ဂျုံစေ့၊ဂျုံမှုန့်ပိုင်များကိုဆေးအုပ်ထားပါက အန္တရာယ်ရှိကြောင်းသတိပေးစာမြင်သာအောင်ကပ်ပေးရမည်။
6. ဆေးအုပ်ထားသည့်ရက်ပြည့်ပါဖုံးအုပ်ထားသောပလပ်စတစ်စကိုလှန်ပြီး ၃၀ မိနစ်ကြာမှဂျုံစေ့၊ဂျုံမှုန့်အိတ်များကိုကိုင်တွယ်စေပါ။

Prepared by

Reviewed by

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) 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,	NTC	(-20 to 60 C)/ (-4º to 140ºF

	Detection limit -)/ (-20ºC - 60ºC)		
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

References:

Air Emissions from Municipal Solid Waste Landfills - Background Information for Proposed Standards and Guidelines, Office of Air Quality Planning and Standards, EPA-450/3-90-011a, Chapters 3 and 4, U. S. Environmental Protection Agency, Research Triangle Park, NC, March 1991.

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

Noel De Nervers, (2000), Air Pollution Control Engineering, 2nd edition, McGraw-Hill International Editions, Civil Engineering Series

General principles of Health risk assessment of air pollution, WHO , 2016

Sendai Framework for Disaster Risk Reduction 2015 – 2030, UN.

Solid Waste Management and Climate Change https://www.researchgate.net/publication/46212886_Capacity_building_of_disaster_waste_management_for_disaster_risk_reduction [accessed Sep 29, 2017].

Technical Guidance Note (Monitoring), M17, Monitoring Particulate Matter in Ambient Air around Waste Facilities, Environment Agency Version 2 July 2013

The Impact on Health of Emissions to Air from Municipal Waste Incinerators, Health Protection Agency, September 2009

2. Check lists

Sr.	Description	Remarks
1	Measuring equipment can be used (specification, calibration certificate)	Mentioned above
2	Maximum number of equipment can be	One set up

	mobilized for each Site	
3	Number and qualification of the personnel	(3) in number
4	Maximum number of qualified personnel can be mobilized for Site	(3) in number
5	Number of measuring points required per each Site (minimum and average)	(4 and 2)
6	Measurements Protocol for each pollutant (see 2.2.1)	Mentioned above
7	Monitoring frequency (Day/Night, 24h)	24 hr continuously
8	Maintenance of the equipment during the mission	Keep the instrument one day off along with battery charging for the next run after (2) days continuously monitoring.

2 Ambient Noise monitoring

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.

(i) Principles

Noise monitoring on LAeq which is the A-weighted equivalent continuous sound level in decibels db(A) measured over the certain period of time (24hr continuously) will be conducted at the selected location that is considered to best represent the most affected location and also can reflect the exposure of the nearest local community and sensitive locations in accordance with the procedures described below.

Sampling location

Sampling locations will be selected according to the site visit at the operation sites and nearby sensitive receptors in order to be the representative location of the noise exposure.

Site setting

Sound level meter (SLM including microphone) will be mounted on the tripod which is the standard methodology for most noise measurements taking into account not to make noises while observing the meter and ensuring the least amount of reflective surface from the observer's body is exposed to the meter.

The device will be set up more than 3.5m away from a reflective surface (building) at minimum and a noise reading will be taken at the average height of the receptor.

Monitoring

The baseline noise surveys will be conducted for the Project site including:
Sound statistical descriptors (L10, L50, L90); and Time varying noise: LAeq,T is used to quantify the noise where the Lp varies over time. In most situations, the LAeq,T is the most appropriate descriptor used to investigate environmental noise complaints.

Along with the deployment of a meteorological station to measure wind speed data for the purpose of excluding noise measurements affected by periods of high winds (>5m/s) and/or rain.

Calibration

Calibration of the SLM is to be carried out before and after each set of noise measurements using the Lutron SC-942 which generates 94dB and 114dB at 1000Hz – and this [especially 94dB] is a very common reference point for sound level meters. The Lp shown on the meter should match the stated Lp for the calibrator being used. Standard calibration is generally 94 dB(A) but can vary slightly due to the microphone sensitivity e.g. 93.8 dB(A).

The calibration level should be confirmed with the SLM manufacturer's specifications. The variation before and after the calibrations should be no more or less than 1 dB(A). If the deviation

of the calibration is greater than 1 dB(A) then the results obtained during the assessment are invalid.
The monitoring procedures, data analysis and interpretation were carried out in accordance with USEPA operating procedure as well as the operational manufacture.

Figure 3: Baseline noise level monitoring

2.1Features and Specification of the Equipment;

(i) SOUND LEVEL METER

Model No : SL-4023SD

Description :

SD Card real time data recorder

SOUND LEVEL METER,
Model : SL-4023SD

* Real time data recorder, save the data into the SD memory card and can be download to the Excel, extra software is no need.

* Meet IEC61672 class 2
*Frequency 31.5 to 8,000 Hz
* Auto range : 30 to 130 dB.
* Manual range : 3 ranges 30 to 80 dB, 50 to 100 dB, 80 to 130 dB .
* A/C frequency weighting.
* Fast/slow time weighting,
* Peak hold, Data hold.
* Record (Max., Min.).
* RS232/USB computer interface.
* Optional wind shield ball, SB-01.
* Patented. * Patent: Taiwan, China, Japan, Germany, USA pending.

2.2 Certificate of Calibration Regarding calibration, the external calibration adjustment is used before each and every monitoring starts.

94 dB	114 dB
	

Sound Calibrator (Lutron SC 942)

2.2 Comparison of Results with Applicable Guideline

Being the environmental sound level measurement, the A-weighted sound level expressed in the A scale decibel (dBA) unit which gives greater weight to the frequencies of sound to which the human ear is most sensitive.

The baseline equivalent sound pressure levels monitored will be compared accordingly with the following Noise level guideline value under National Environmental Quality (Emission) Guidelines stated by Environmental Conservation Department, Dec 29, 2015.

Receptor	**One Hour LAeq (dBA)** [a]	
	Daytime/ 07:00 -22:00 **(10:00 -22:00 for Public Holidays)**	**Nighttime /22:00-07:00** **(22:00 – 10:00 for Public Holidays)**
Residential, Institutional. Educational	55	45
Industrial, Commercial	70	70

[a] Equivalent continuous sound level in decibels

2.3 Proposed Team

EQM technician team comprising of (2) members who have been experienced with noise monitoring, data entry, analysis and reporting for years will conduct the project.

2.4 Reporting

The background ambient noise level will be described in terms of an average level which is LAeq (dBA) as the summation of all the time-varying events. Generally, the report is used to presented in average, min and max with L90 considering the background or ambient level of a noise environment.

If necessary, the report will be prepared with percentile dB (A) level (L90, L50, L10).
While determining the daily measure of environmental noise, surrounding activities will be observed and incorporated into the report to reveal the potential sources of noise emission.
The final report used to be submitted in accordance with the EQM format. If the format is available from the proponent side, it will be prepared accordingly.

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
USEPA, https://www.epa.gov/sites/production/files/2014-08/documents/indoor.pdf

3 Groundwater Sampling Methodology

3.1 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.

Special care must be taken not to contaminate samples. This includes storing samples in a secure location to preclude conditions which could alter the properties of the sample. Samples shall be custody sealed during long-term storage or shipment.

Collected samples are in the custody of the sampler or sample custodian until the samples are relinquished to another party.

Chain-of-custody documents shall be filled out and remain with the samples until custody is relinquished.

3.2 Sampling procedure and sampling device

Groundwater samples will typically be collected from the discharge line of a pump or from a bailer, either from the pour stream of an up-turned bailer or from the stream from a bottom-emptying device. Efforts should be made to reduce the flow from either the pump discharge line or the bailer during sample collection to minimize sample agitation. During sample collection, make sure that the pump discharge line or the bailer does not contact the sample container.

Sampling is the process of obtaining, containerizing, and preserving (if required) a ground water sample after the purging process is complete. Non-dedicated pumps for sample collection generally should not be used. Many pumps are made of materials such as brass, plastic, rubber, or other elastomer products which may cause chemical interferences with the sample. Their principle of operation may also render them unacceptable as a sample collection device. It is recognized that there are situations, such as industrial or municipal supply wells or private residential wells, where a well may be equipped with a dedicated pump from which a sample would not normally be collected. Discretion should always be used in obtaining a sample.

One member of the field sampling team should take all the notes and photographs, fill out tags, etc., while the other members collect the samples.

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 a clean pair of new, non-powdered, disposable gloves will be worn each time a different location is sampled and the gloves should be donned immediately prior to sampling. The gloves should not come in contact with the media being sampled and should be changed any time during sample collection when their cleanliness is compromised 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.

3.3 Water sample to be measured

Table-1.2 Laboratory services for water analysis provided to project

Laboratory	Parameters
Public Health Laboratory	pH, Color. Turbidity, Total solids, Total Hardness, Total Alkalinity, Calcium, Magnesium, Chloride, Sulphate, Iron, Total Coliforms

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

Groundwater Sampling https://www.epa.gov/foia/groundwater-sampling

4 Surface Water Sampling Methodology

4.1 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.

Special care must be taken not to contaminate samples. This includes storing samples in a secure location to preclude conditions which could alter the properties of the sample. Samples shall be custody sealed during long-term storage or shipment.

Collected samples are in the custody of the sampler or sample custodian until the samples are relinquished to another party.

Chain-of-custody documents shall be filled out and remain with the samples until custody is relinquished.

4.2 Sampling procedure and sampling device

The physical location of the investigator when collecting a sample may dictate the equipment to be used. If surface water samples are required, direct dipping of the sample container into the stream is desirable. Collecting samples in this manner is possible when sampling from accessible locations such as stream banks or by wading or from low platforms, such as small boats or piers. Wading or streamside sampling from banks, however, may cause the re-suspension of bottom deposits and bias the sample. Wading is acceptable if the stream has a noticeable current (is not impounded), and the samples are collected while facing upstream. If the stream is too deep to wade, or if the sample must be collected from more than one water depth, or if the sample must be collected from an elevated platform (bridge, pier, etc.), supplemental sampling equipment must be used.
To collect a surface water sample from a water body or other surface water conveyance, a variety of methods can be used:

- Dipping Using Sample Container
- Scoops
- Peristaltic Pumps
- Submersible Pumps
- Discrete Depth Samplers
- Bailers
- Buckets

Regardless of the method used, precautions should be taken to insure that the sample collected is representative of the water body or conveyance. These methods are discussed in the following sections.

One member of the field sampling team should take all the notes and photographs, fill out tags, etc., while the other members collect the samples.

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 a clean pair of new, non-powdered, disposable gloves will be worn each time a different location is sampled and the gloves should be donned immediately prior to sampling. The gloves should not come in contact with the media being sampled and should be changed any time during sample collection when their cleanliness is compromised 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.

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.

4.3 Water sample to be measured

Table-1.2 Laboratory services for water analysis provided to project

Laboratory	Parameters
Public Health Laboratory	pH, Color. Turbidity, Total solids, Total Hardness, Total Alkalinity, Calcium, Magnesium, Chloride, Sulphate, Iron, Total Coliforms

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/

Surface Water Sampling
https://www.epa.gov/foia/surface-water-sampling

ANNEX I
LOCATION MAP

Location Map of Green Land International flour mill industry

ANNEX II
METHODOLOGY

(1) Environmental and Social Impact Assessment

1 IMPACT ASSESSMENT METHODOLOGY

1.1 Introduction

An Environmental Impact Assessment (EIA) seeks to identify and, to the extent possible, quantify the potential negative impacts and positive benefits of a proposed project with respect to the environment (physical, ecological, human use, quality of life, and health values). Once these impacts have been identified, prevention, mitigation, and monitoring measures are proposed to prevent and/or mitigate possible negative impacts, and enhance positive impacts.
The assessment process constitutes a systematic approach to the evaluation of the proposed project in the context of the natural, regulatory and socio-economic environments in which development is proposed **(Figure 1-1**). In this regard, it is imperative to fully understand and consider the interaction among the following:

1) Understanding and developing a strategy for the regulatory process;
2) Developing a serious and effective public/stakeholders dialogue and consultation program to minimize potential conflicts that might arise during construction and operations;
3) Providing high-quality technical components such as the process followed for route selection and the EIA report that are scientifically defensible; and
4) Recognising and minimising long term liabilities from construction and operation.

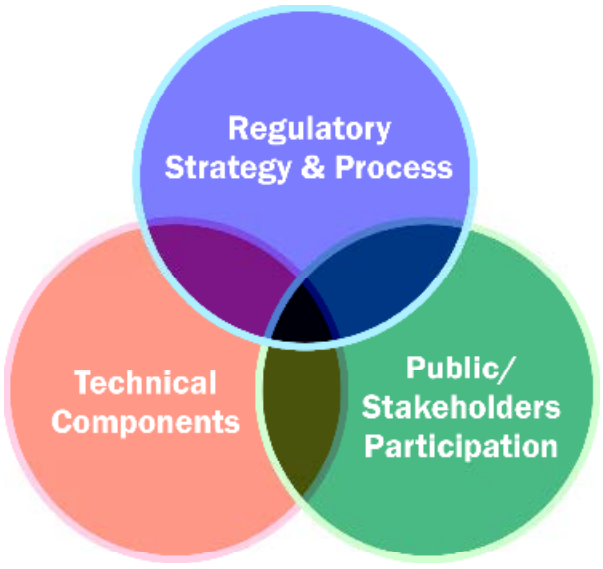
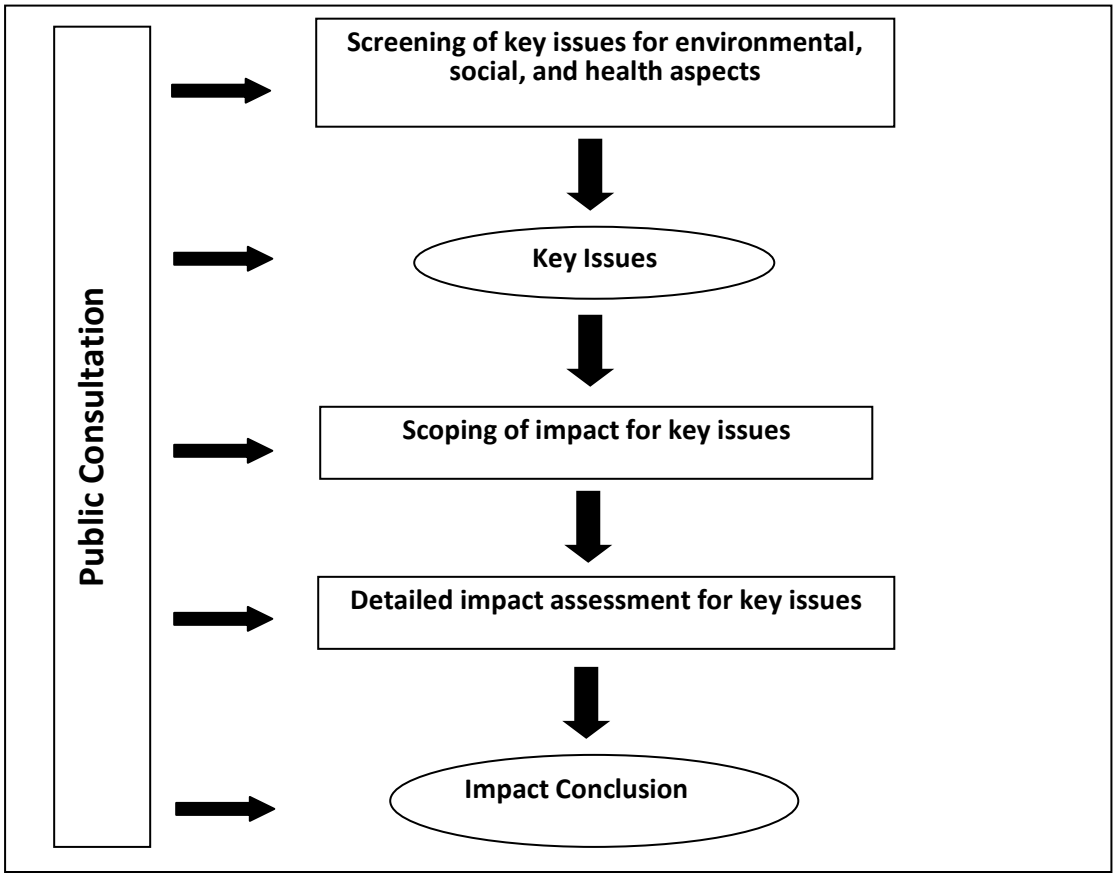


Figure 1-1: Major Components of EIA Process

In essence, the purpose of the EIA process and report can be summarized as follows:

1) To support the goals of environmental protection and sustainable development;
2) To integrate environmental protection and economic decisions at the earliest stages of the planning process;
3) To identify issues of concern according to local and regional/national categories as a basis for subsequent public input;
4) To identify routing options and evaluate the proposed routes;
5) To assess environmental, social, health, economic and cultural consequences of the project and to assess plans to mitigate any adverse impacts resulting from that activity; and

6) To provide for the involvement of the public, proponents, and government departments in the review of the proposed activities.
To achieve this objective, EIA process incorporates a number of key steps as summarized below.



Public consultation and participation are essential components of the EIA process and incorporated throughout the EIA development process.

1.2 Detailed Legislative Review

The Legislation and Policy Framework review addresses environmental, social, and health policies and requirements at the following levels:

- Government Agreement
- National Legislation
- International legislation and guidelines relevant to the project
- Client corporate policy and management systems
- Archaeology and Cultural Heritage
- Biodiversity and Sensitive Areas
- Social Regulations

The definition of relevant national and international standards and requirements will ensure that the project development is assessed against all relevant existing environmental and social regulations and guidelines as well as the environmental, social, health, ethical and business policies and standards.

1.3 Screening

Project screening is the first step of the impact assessment process and involves considering each activity of the planned project in the context of the environmental, health, and socio-economic setting within which it will take place. Project alternatives identified will be initially assessed, and issues screened and scoped, on the basis of existing available information. Identifying key issues early in the EIA process allows the emphasis to be placed on them throughout the remainder of the assessment.

Table 1 2: Impact Screening Matrix

No Impact
Cause Impact
Might Cause Impact

Environmental, Social, and Health Aspects				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 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.

1.5.2 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

Stage 1: 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 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**.**

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)

1.5.3 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.

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 Green Land/ Luvia Flour milling factory/ contractor and communities Enhancement in health and safety of local population
Low	Possible short term decrease in availability of resource or access to infrastructure not affecting livelihood Possible short term decrease in quality of life of household or settlement not affecting long term outcomes No effect on human health No discernable long term effect of the local economy Impacts which are long lasting but to which the community is able to adapt, such as increased access to information/possible slow cultural change/changes in economic structure
Medium	Potential effect or perceived effect on ability of household to maintain livelihood/store of assets in short term Potential reduction in quality of life in short term Potential disruption to lifestyle in short term Perception of missed opportunity to improve Possible decrease or perceived decrease in access to infrastructure to which community is unable to adapt in the short term Negative effect on human health which can be contained and is therefore short term with no increased mortality Impacts which may result in high levels of complaint in the short term

Impact Category	Social Impact
High	Negative effect on safety of humans or animals Negative effect on human health which cannot be contained or results in increased mortality Effect or perceived effect on ability of household to maintain livelihood/store of assets to an extent not acceptable to affected people Permanent or perceived permanent reduction in quality of life Permanent cultural change to which the communities are unable to adapt Widespread perception of missed opportunity to improve quality of life, resulting in frustration and disappointment Result in tensions with communities which lead to sabotage by local communities, or outbreaks of violence between workers and communities

1.6 Management and Monitoring

To assist in the management and implementation of the measures designed through the ESIA, and the monitoring of their effectiveness, an environmental management and monitoring plan has been developed in accordance with the IFC and the World Bank guidelines on management plan.
In accordance with Principal 4 of the Equator Principals, the managing and monitoring plan provides action plans, policies, management programs, procedures, performance indicators, responsibilities, training and periodic audits and inspections with respect to environmental or social matters designed to identify, assess and manage project's risk and impacts on an ongoing basis.
Additionally, the plan will also follow the World Bank operational policy, OP 4.01, which has outlined specific components that must be incorporated into a management plan as follows:

- Mitigation measures including type of impact which it aims to eliminate or reduce, conditions of its implementation, designs, equipment description and operating procedures, as appropriate;
- Monitoring activities including parameters to be measured, methods to be used, sampling locations, frequency of measurements, detection limits (where appropriate), and definition of thresholds that will signal the need for corrective actions; and (b) monitoring and reporting procedures;
- Institutional arrangements, roles and responsibilities of those responsible for implementing the environmental management plan and their capacity development opportunities; and
- Opportunities for integration of environmental management and monitoring plan within a project's overall planning, design, budget, and implementation.

The environmental management and monitoring plan for the project has incorporated the necessary components and requirements as outlined under the international standards.
IEM will also consider the plan's requirements as defined by the Equator Principle "Best Practices" working group which include the following elements for consideration:

- Design and implement a Public Consultation and Disclosure Plan or Community Engagement Plan to ensure a) consultation and disclosure of EIA and Management Plan documentation, and b) ongoing community engagement during Construction and Operation phases
- Establish, and report on progress, related to the Project's Grievance Mechanism system during both Construction, Operation and Decommissioning phases
- Incorporate the requirements of the performance standard on Labor and Working conditions into Human Resources Policy.
- Prepare a site-specific Emergency Preparedness and Response Plan, specifically dealing with accidents involving management and transportation of explosive materials, landslides and other accidents potentially affecting third parties, including workers and local communities
- Prepare a Resettlement Action Plan to manage land acquisition-related impacts for (a) the local road upgrade to the plant site, and (b) the corridor for the high-tension transmission line.

- Preparation of a Biodiversity Action Plan in accordance with Performance Standard 6
- Develop an Indigenous Peoples Development Plan to provide a structured approach to implementation of community development projects.
- Develop a ‘chance find’ procedure to be provided to all contractors and included in the terms of their contracts to ensure proper handling of any such discoveries.
- Submit monitoring reports relating to compliance with applicable standards and monitoring requirements including air emissions, ambient air quality, noise and vibrations, effluent quality, groundwater quality and level in community wells and dedicated monitoring wells, and solid wastes.

(2) Base Line Data Monitoring Methodology

2. Base Line Data Monitoring Methodology

2.1 Ambient air monitoring instrument

The air monitoring survey will use the HAZ-SCANNER EPAS Wireless Environmental Perimeter Air Monitoring System (EPAS).

(i) Principles

The EPAS, manufactured by EDC/SKC (USA), is a light scattering photometer equipped with a filter sampling system. This dual capability allows for simultaneous real-time and filter measurement. Single-jet impactors are used for particulate size selection and the TSPM, PM10 impactor would be used for this air quality survey.

The highly sensitive EPAS provides real-time determinations and data recordings of airborne particle concentration in $\mu g/m^3$. It provides the minimum, maximum and time-weighted average (TWA) monitoring of gases as well.

This instrument is factory calibrated with the appropriate USEPA certified target gas and correlated with USEPA methods. (Ref: Code of Federal Regulation 40CFR part 53).

The EPAS does not require laboratory analysis to determine concentrations. It operates maximum automation of data collection, uses the optional data logger including Dust Comm Pro Software for PC that provides statistical analysis, graphs, and detailed reports that can be printed for record keeping.

(ii) System check

Prior to the survey, calibration span and system checks (system flow rate, sensor baseline levels for all parameters, etc.) will be performed on the EPAS to ensure it is operational and ready for monitoring.

The air monitoring instrument will be operated in accordance with the manufacture's guidelines.

2.2 Ambient air monitoring

(i) The sensor intakes

The survey would deploy the sensor intakes based on the sitting criteria as specified in the U.S. Code of Federal Regulations (40 CFR 58 Appendix E - Probe Siting Criteria for Ambient Air Quality Monitoring).The survey will comply with the following guidelines as follows;

- Particulates and gas sensor intakes will be located between 2-3 meters above the ground level
- Keep unrestricted airflow located away from obstacles so that the distance from the sensor intake is at least twice the height that the obstacle protrudes above the probe
- Keep unrestricted airflow in an arc of at least 270 degrees around the inlet probe, or 180 degrees if the probe is on the side of a building
- Would be clear of optical obstructions, including potential obstructions that may move due to wind, human activity, growth of vegetation, etc.
    - Spacing from trees (10-20 m)
    - Spacing from roadways (10-250 m) depending on the traffic
- Observe temporary optical obstructions, such as rain, particles, fog, or snow

(ii) Location of the monitoring sites

The monitoring sites were selected based on their being broadly distributed within the project area and in proximity to the most sensitive receptors i.e. communities.

Operating activities of the project would impact local air quality. Air pollution both on site and in the surrounding locality may result from release of dust to the atmosphere from handling or processing of the wheat flour or 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: NO_2, SO_2, CO, VOC, NH_3, CH_4, O_3
3) Meteorology: Temperature, Relative Humidity, Wind Speed, Wind Direction which can have the influence on both local and regional air quality

Particulates (sensor: 90 degree Infra Red Light Scattering)
Calibration: Gravimetric reference NIST Traceable - SAE fine dust- ISO12103-1 Accuracy (± 10% to filter gravimetric SAE fine test dust which falls under the ACGIH/ ISO/CEN criteria.
Detection limit – 1- 20,000ug/m^3
Gases (sensor: electrochemical)
Calibration: ppm equivalent change/year in lab air (24month warranted)
NO_2, Detection limit – (0-5000) ppb
SO_2, Detection limit – (0-5000)ppb
CO, Detection limit – (0-100)ppm
VOC (sensor: photoionisation), Detection limit: – (0-100)ppm
Meteorology (EPAS Meters)
Temperature, Detection limit - (-4°C to 140°F)/ (-20°C - 60°C)
Relative Humidity, Detection limit – 90-100%
Wind Speed (sensor: 3-cup anemometer), Detection limit - (0 – 125 mph)
Wind Direction (sensor: continuous rotation on potentiometric wind direction vane), Detection limit - (5 – 355degrees)

Otherwise the presence of microbial growths in the indoor environment will continue to sufficient numbers or kinds that can affect in employees' health or comfort problems.

In general, the main sources that can trigger the ***microbial growths*** would be from the centrally controlled ventilation system (HVAC system); therefore, the ***remediation options mainly concerned on the HVAC system as follows;***

Table 2.1 The remediation options mainly concerned on the HVAC system

Source	Possible Causes	Action needed
High moisture-laden air in contact with the ceilings	***uncontrolled moisture*** inside of HVAC system's air ducts	***HVAC system*** must be ***checked and maintained*** if it properly functions the building's interior, pressurizes the building with dehumidified air.
High Air Velocity at HVAC Vent **in 3rd floor**	As airflow is influenced by controlled **mechanical systems**	***Air flow at HVAC system*** should be ***checked***
High Temperature in **2nd floor**	Thermal environment can also be influenced by such factors as ***radiant temperature, air velocity***.	***Temperature setting*** at the centrally controlled system should be checked
High Bacteria	***uncontrolled moisture***	***Maintain indoor air relative humidity***

Growth **Moderate Fungal Growth**	inside of air ducts ***that can*** trigger condensation and the subsequent growth of moulds and fungi ***Air filters*** contaminated with dirt ***Outdoor air intakes and air inlet area ways*** liable accumulation places for fungi, bacteria, dust The ***occupants' behaviors***	***below 60%***, if possible 50% ***Kitchens, bathrooms and washers*** need to be independently ***vented outdoors***. .Regular either ***cleaning or replacing of air filters and duct liners***, ***HVAC cooling coils, drain pans, humidifiers*** containing reservoirs of stagnant water, ***air washers and fan coil units*** ***Clean and check*** ***Clean*** and ***maintain floors, ceilings*** ***Avoid excessive indoor plants***

2.3 Air velocity, air flow and ambient air temperature using by anemomaster

Measurement of air velocity in the room prior to bio-aerosol sampling was performed in order to avoid air flow disturbances.

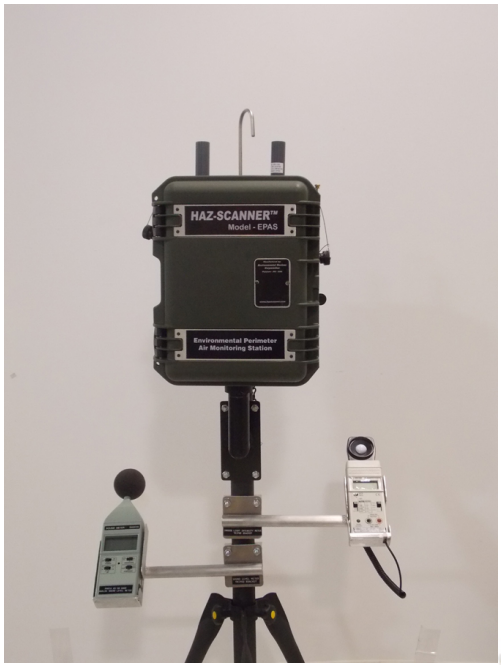


Figure 2.1 Hazscanner

Figure 2.2 Anemomaster

Both the air coming out from the AC vent and at breathing zone was detected along with measurement of duct shape and size settings.

2.4 Ceiling and wall's moisture using by TRAMEX moisture meter

Moisture measurement was performed by sliding across the wall surface through at each point of the wall and average value was calculated after measuring for 10 minutes at 10 places on the surface of the wall and 5 minutes measurement was performed for the ceiling.

Figure 2.3 Tramex moisture meter

2.5 Biological indoor air monitoring using by biostage along with impactors

Prior to bioaerosol air sampling, several precautions were taken such arrangements: preparing culture media for sampling, handling of all parts of instruments with care not to be contaminated and sending the impactors which collected air samples to the National Health Laboratory (NHL) within the same sampling day.

Figure 2.4 Single-stage viable cascade impactor

Figure 2.5 Biostage pump

Figure 2.6 Mounting biostage impactor

2.6 Procedure for measurement of air sampling (Colony culture)

The air monitoring instrument, BioStage, was placed at the site which is one meter from the ground level and one meter away from the side wall in order to represent the occupant breathing zone. Air samples were drawn over a petridish beneath a 400 pin-holed cap (0.25 mm hole diameter) with agar collection medium through standard BioStage single-stage, multiple-hole, agar impactors (which meets ACGIH recommendations for bio-aerosol sampling and meets NIOSH method 0800 and 0801 requirements, performance equivalent to Andersen N-6 an Aerotech A6) for **5 minutes at 20 L/min**.

Common types of growth media are Potato Dextrose Agar (PDA), Malt Extract Agar (MEA), Dichloran Glycerol 18 Agar for fungi and Tryptic Soy Agar (TSA) or Blood Agar Plates (BAP) for bacteria. Bottom of agar plate was labeled and the lid was secured with tape. The agar plate containing samples and blank unexposed agar plate were sent to laboratory.

After that, the petridishes were incubated and visually inspected so that the number of colony forming units (CFUs) of different types of microbes are identified and counted.

The results were obtained as bacteria-carrying particles and also called as CFU, Colony Forming Units (Avidicare, 2013) and as a consequence, results are reported as the number of colony-forming units (CFUs) of each viable microorganisms group per plate and further adjusted by the volume of air sampled to obtain concentrations (CFU/m^3).

Converting the number of colonies counted on a plate on c.f.u/m3 (VWR, n.d.) Volume of sampled air:100 litres (20L per min for 5 minutes)
Example: Counted colonies in a plate = 15
If 100 L contain 15 C.F.U = 1000 L contain 150 C.F.U = 150 C.F.U/m^3

2.7 Awareness for measurement of air sampling (Colony culture)

-Hands are sanitized and BioStage impactor was cleaned in between samples.
-All impactors must be be autoclaved, leaned with ethyl alcohol and dried in the air.
-Clean BioStage before first use and between each monitoring.
-Don't touch holes in jet classification stage.
-Never use expired agar, cracks or contaminated.
-When sampling indoors, all doors and windows were closed.
-Too long or too short sampling can cause overgrowth and false negatives respectively.
-Outdoor samples should be collected for comparison to indoor samples. Indoor control sample should be taken for non-complaint areas. Each sample was clearly marked.
-O-ring was ensured to fit in the channel in the inlet cone.
-The battery was charged completely approximately 5 hours and pump was not running at that time for maximum charge.

According to the predicting result, the magnitude of the impact from industrial solid waste was considered as low. The area of potential impact will be within the immediate area of project activities. Area of impact is beyond the project area but is in a safety zone. The extent of the impact for solid waste impact is noted that low level. The period of potential impact duration covers permanent situation and it can be affected on less than project duration level. The duration of the impact from solid waste was set as low. Therefore, the characteristic of solid waste impact was rated as low.

The impact is expected to cause some disturbances potentially affecting communities locally and regionally. The importance of the impact on solid waste was set medium.
In the condition of mitigation measures, the impact of Solid Waste would likely be audible in residences and the potential impact was rated as low. It has been seen that the impact from solid waste is no significant and no effect much on the environment.

(3) Air Monitoring Raw Data

Main | Preferences | Header | Data | Report

Environmental Report

Record Cnt 97

Start Date 11/8/2022 1:15:00 PM

End Date 12/8/2022 1:15:00 PM

	NH3 ppm	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	**8.95257**	**382.628**	**.310206**	**24.9896**	**155.649**	**57.8041**	**60.2577**	**37.9896**	**21.1958**	**86.5051**	**14.4845**	**26.0412**	**25.4432**	**217.298**	**2.70206**	**12.2659**
Max	15.7	412	1.5	137	200	138	180	56	42	100	27	28	70	237	6	12.6
Min	3.9	321	0	0	107	2	44	2	1	64	5	25	0	0	0	12

Comments

Environmental Report

Start: 11/8/2022 1:15 PM End: 12/8/2022 1:15 PM

Collected by:

Logger ID 912005

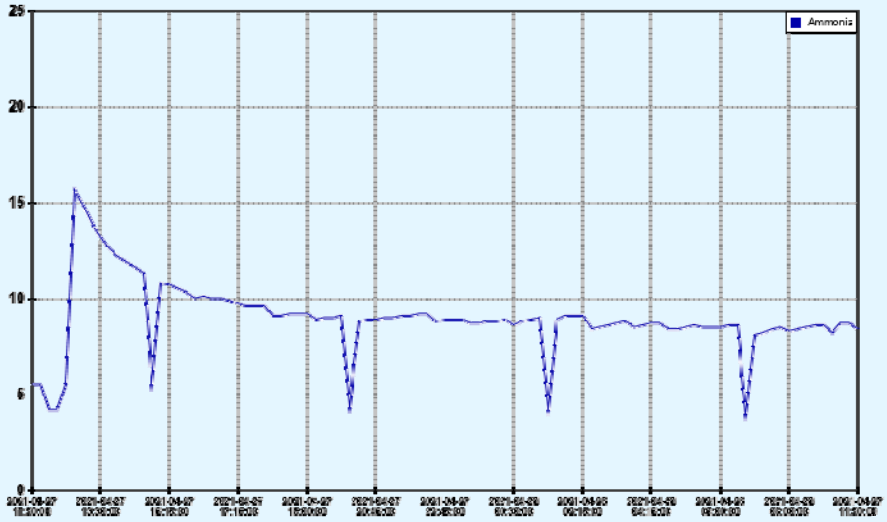
Record Count 97

Sensor ID

Ammonia

Range: 0 to 100 ppm

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
3.9	8.95257	15.7	ppm				



Environmental Report

Start: 11/8/2022 1:15 PM End: 12/8/2022 1:15 PM

Collected by:

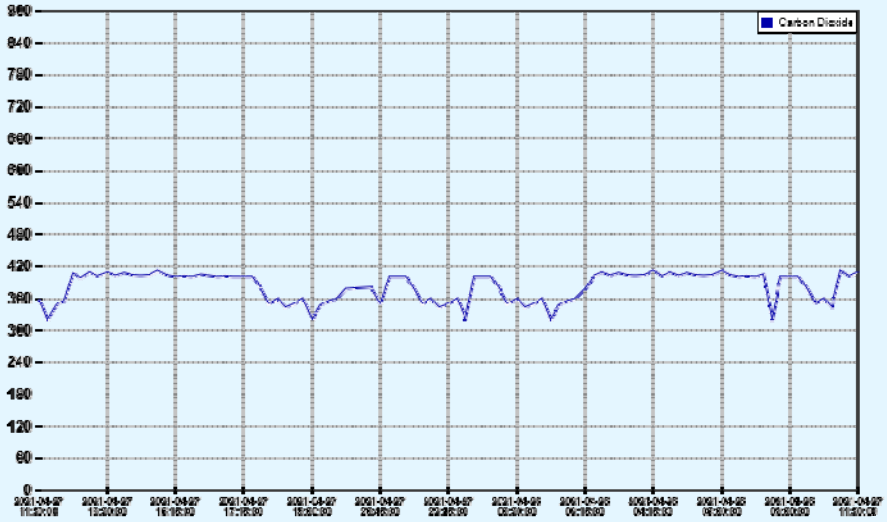
Logger ID 912005 Record Count 97

Carbon Dioxide

Sensor ID

Range: 0 to 5000 ppm

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
321	382.628	412	ppm				

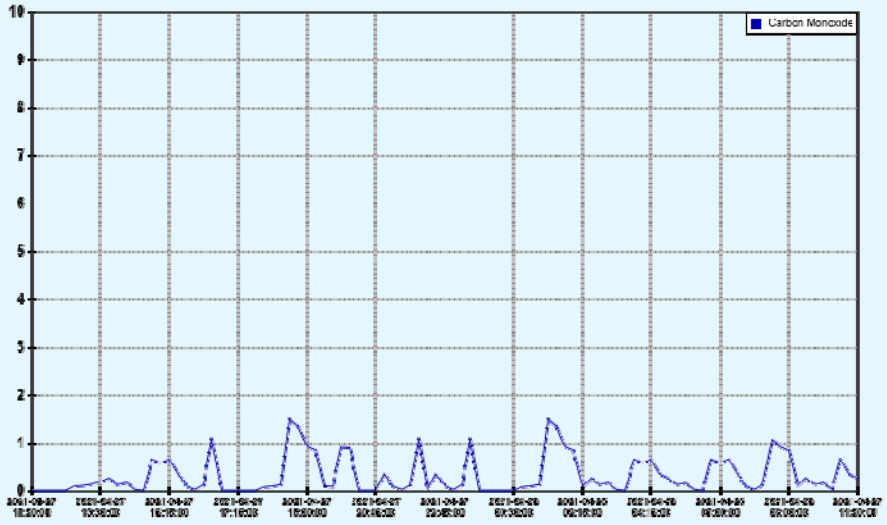


Carbon Monoxide

Sensor ID

Range: 0 to 114.5 mg/m3

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	.310206	1.5	mg/m3				



Environmental Report

Start: 11/8/2022 1:15 PM End: 12/8/2022 1:15 PM

Collected by:

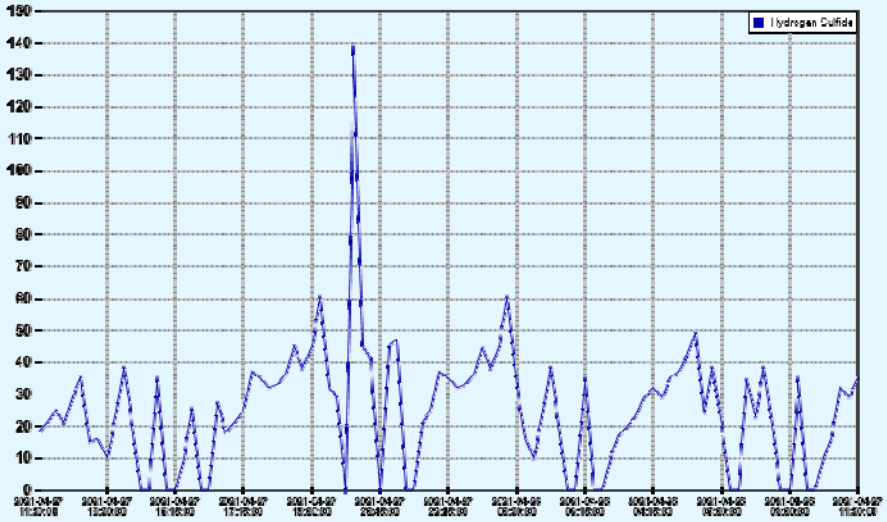
Logger ID 912005 Record Count 97

Hydrogen Sulfide

Sensor ID

Range: 0 to 5000 ppb

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	24.9896	137	ppb				

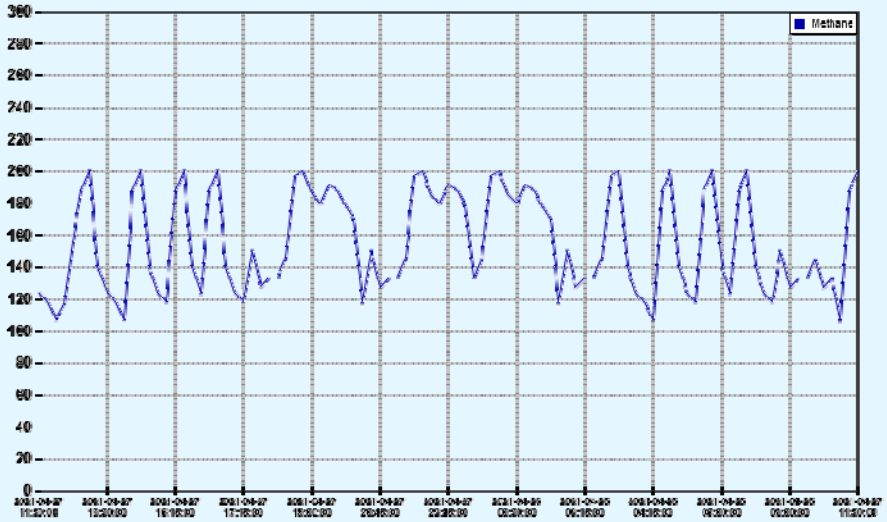


Methane

Sensor ID

Range: 0 to 10000 ppm

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
107	155.649	200	ppm				



Environmental Report

Start: 11/8/2022 1:15 PM End: 12/8/2022 1:15 PM

Collected by:

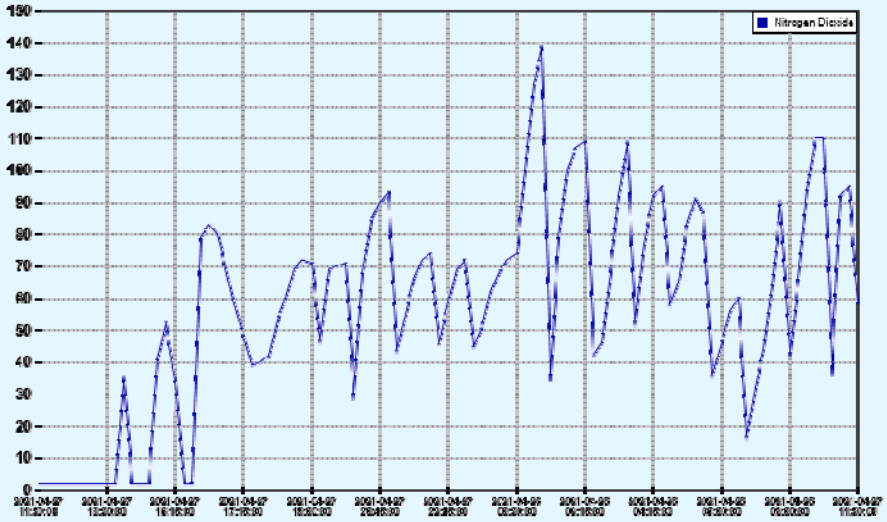
Logger ID 912005 Record Count 97

Nitrogen Dioxide

Sensor ID

Range: 0 to 18810 ug/m3

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
2	57.8041	138	ug/m3				

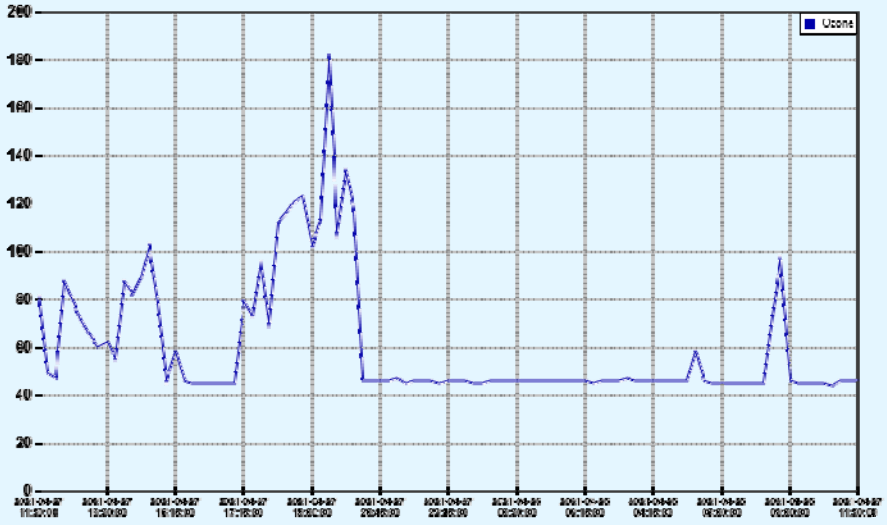


Ozone

Sensor ID

Range: 0 to 294.3 ug/m3

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
44	60.2577	180	ug/m3				



Environmental Report

Start: 11/8/2022 1:15 PM End: 12/8/2022 1:15 PM

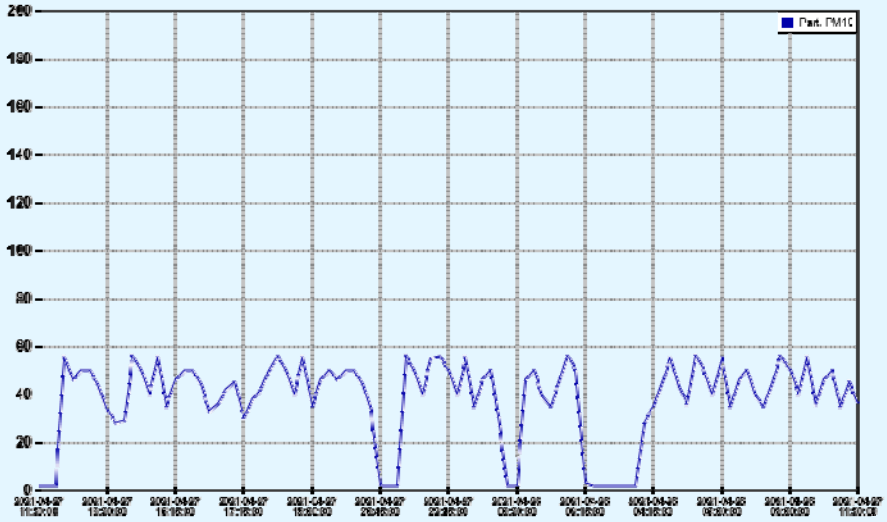
Collected by:

Logger ID 912005 Record Count 97

Prt10 **Part. PM10** Prt10 Sensor ID

Range: 0 to 20000 uG/m3

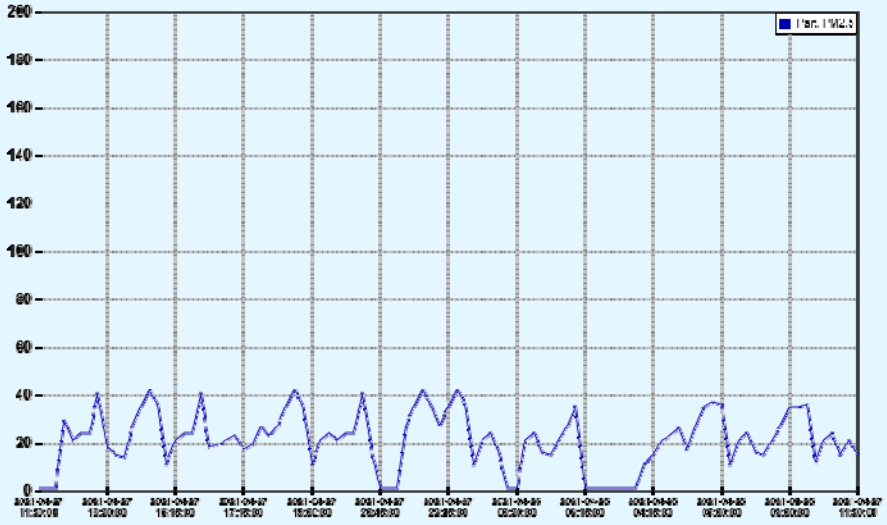
Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
2	37.9896	56	uG/m3				



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	21.1958	42	uG/m3				



Environmental Report

Start: 11/8/2022 1:15 PM End: 12/8/2022 1:15 PM

Collected by:

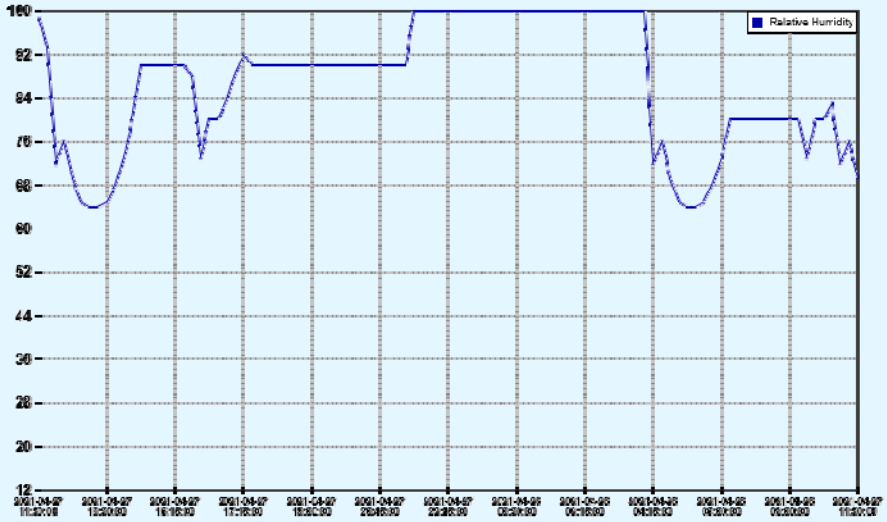
Logger ID 912005 Record Count 97

Relative Humidity

Sensor ID

Range: 0 to 100 %

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
64	86.5051	100	%				

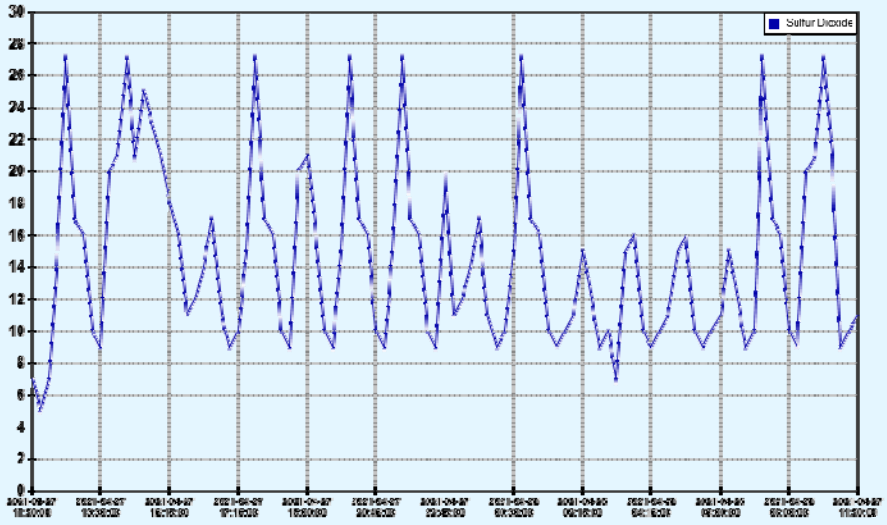


Sulfur Dioxide

Sensor ID

Range: 0 to 26190 ug/m3

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
5	14.4845	27	ug/m3				



Environmental Report

Start: 11/8/2022 1:15 PM End: 12/8/2022 1:15 PM

Collected by:

Logger ID 912005 Record Count 97

TEMP

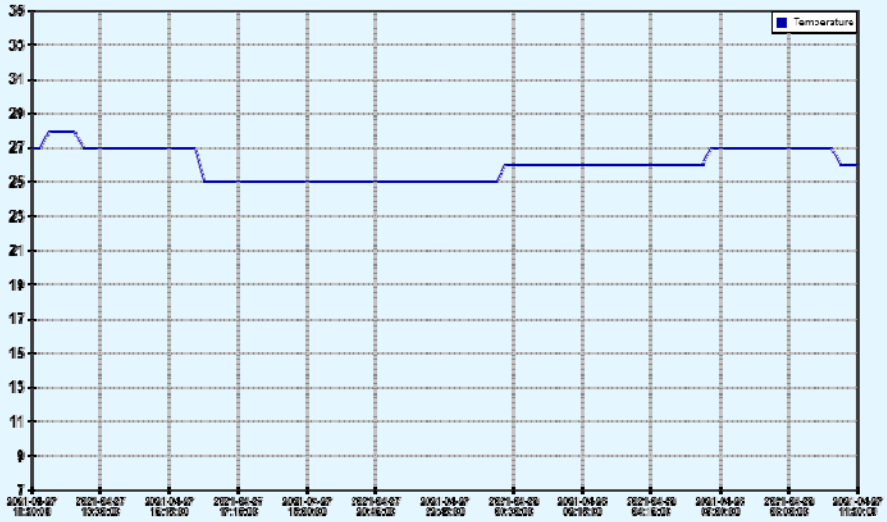
Temperature

TEMP

Sensor ID

Range: -20 to 60 Deg. C

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
25	26.0412	28	Deg. C				



VOCS

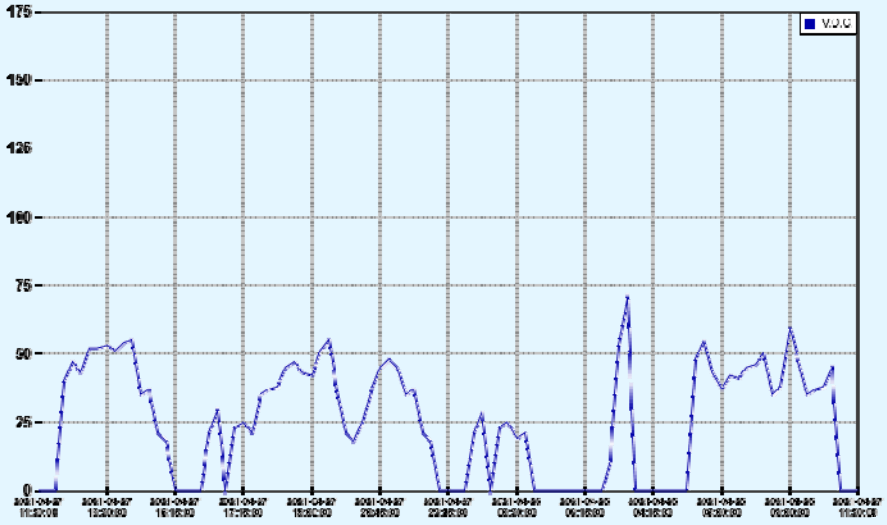
V.O.C.

VOCS

Sensor ID

Range: 0 to 50000 ppb

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	25.4432	70	ppb				



Environmental Report

Start: 11/8/2022 1:15 PM End: 12/8/2022 1:15 PM

Collected by:

Logger ID 912005 Record Count 97

W. DIR.

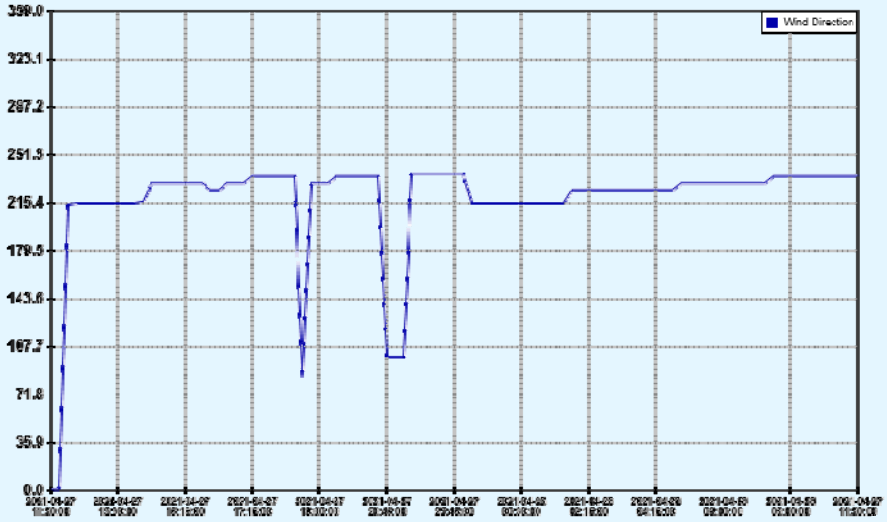
Wind Direction

W. DIR.

Sensor ID

Range: 0 to 359 Deg.

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	217.298	237	Deg.				



W. SPD.

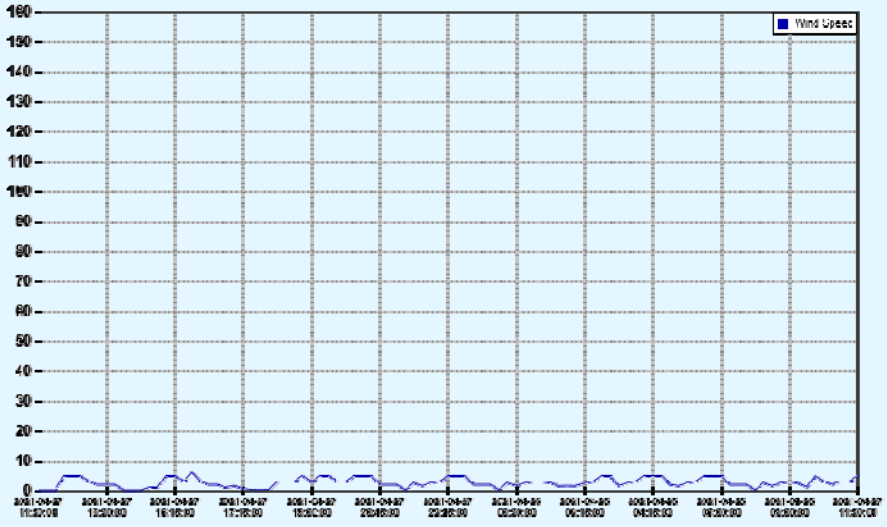
Wind Speed

W. SPD.

Sensor ID

Range: 0 to 160 kph

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	2.70206	6	kph				



Environmental Report

Start: 11/8/2022 1:15 PM End: 12/8/2022 1:15 PM

Collected by:

Logger ID 912005

Record Count 97

Batt.

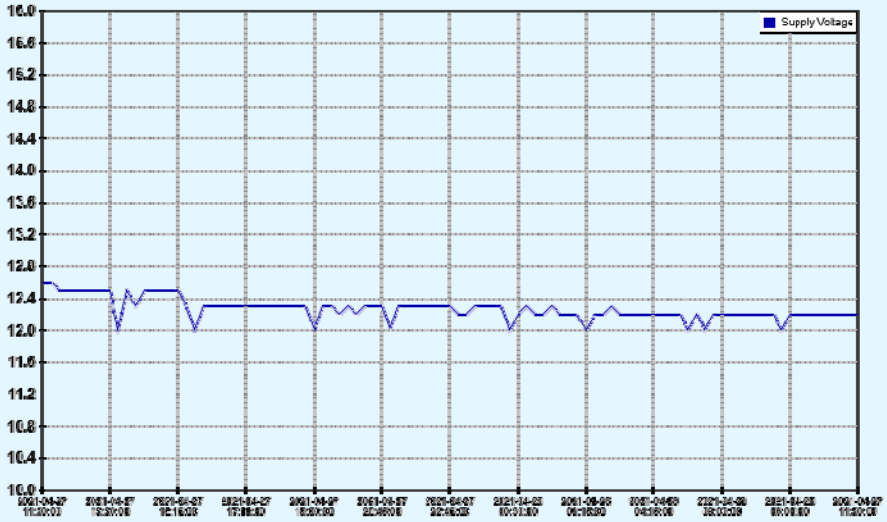
Supply Voltage

Batt.

Sensor ID

Range: 10 to 16 V

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
12	12.2659	12.6	V				



Main | Preferences | Header | Data | Report

Environmental Report

Record Cnt 97

Start Date 12/8/2022 1:30:00 PM

End Date 13/8/2022 1:30:00 PM

	NH3 ppm	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	**7.96597**	**397.082**	**.194639**	**15.8144**	**115.670**	**48.7731**	**45.5876**	**30.9072**	**15.4639**	**87.1030**	**10.4948**	**25.9072**	**20.8865**	**101.237**	**.905979**	**12.2752**
Max	8.8	479	1.06	70	200	98	109	60	25	100	17	28	38	215	5	12.5
Min	2.5	326	0	0	55	2	2	2	1	0	3	25	0	78	0	12

Comments

Environmental Report

Start: 12/8/2022 1:30 PM End: 13/8/2022 1:30 PM

Collected by:

Logger ID 912005

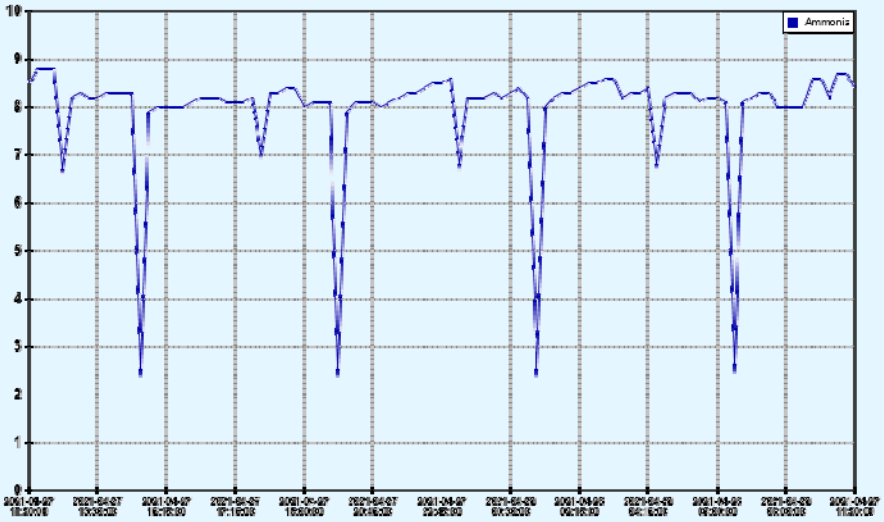
Record Count 97

Sensor ID

Ammonia

Range: 0 to 100 ppm

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
2.5	7.96597	8.8	ppm				



Environmental Report

Start: 12/8/2022 1:30 PM End: 13/8/2022 1:30 PM

Collected by:

Logger ID 912005

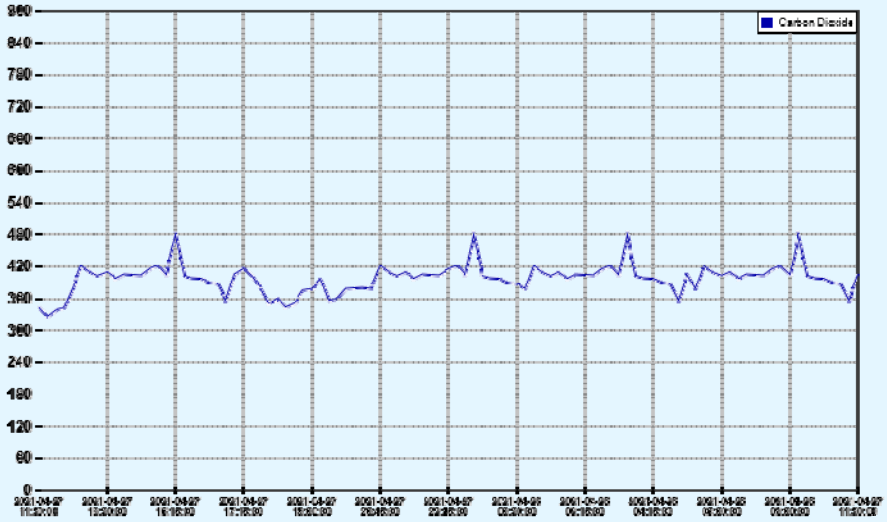
Record Count 97

Carbon Dioxide

Sensor ID

Range: 0 to 5000 ppm

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
326	397.082	479	ppm				

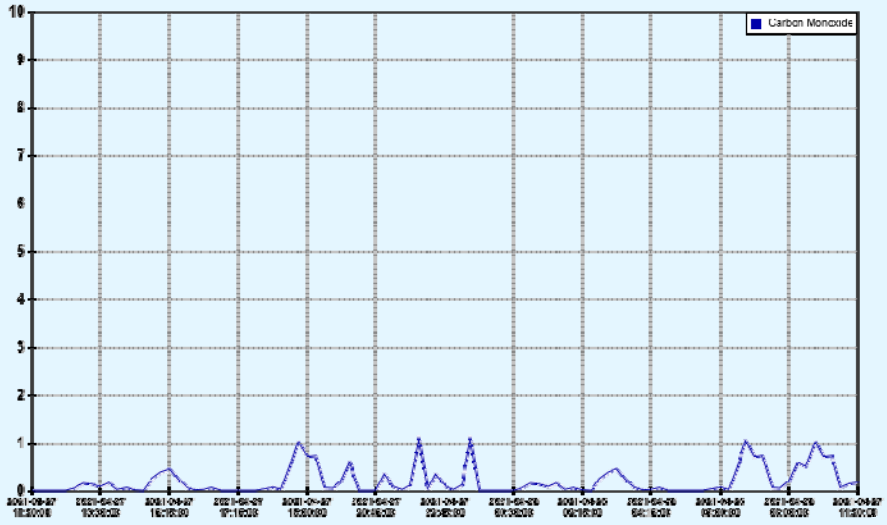


Carbon Monoxide

Sensor ID

Range: 0 to 114.5 mg/m3

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	.194639	1.06	mg/m3				



Environmental Report

Start: 12/8/2022 1:30 PM End: 13/8/2022 1:30 PM

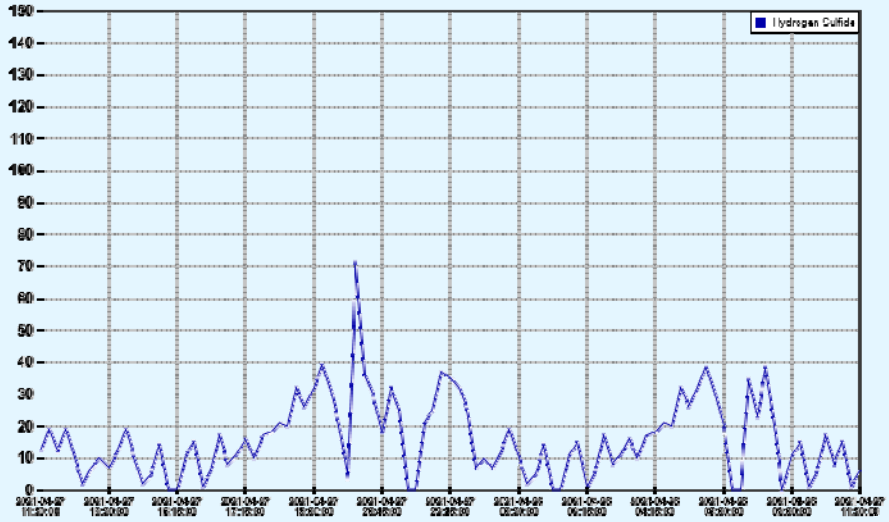
Logger ID 912005 Collected by: Record Count 97

Sensor ID

Hydrogen Sulfide

Range: 0 to 5000 ppb

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	15.8144	70	ppb				

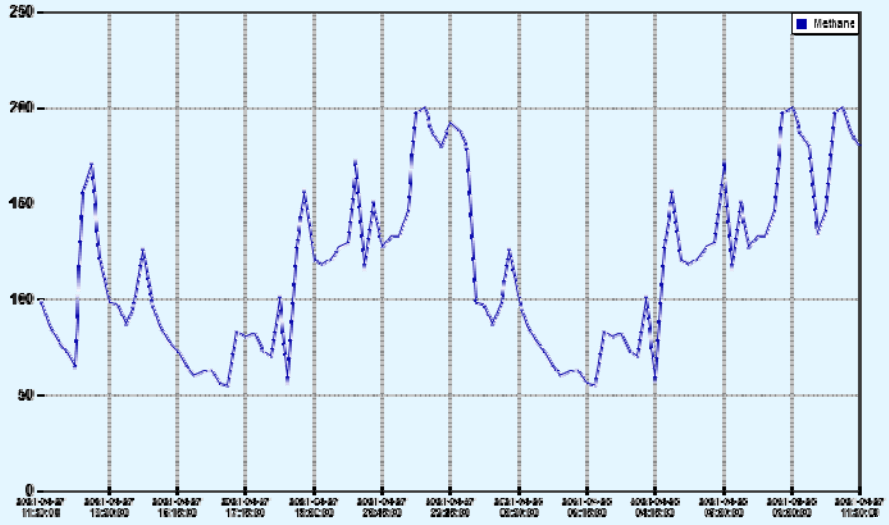


Sensor ID

Methane

Range: 0 to 10000 ppm

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
55	115.670	200	ppm				



Environmental Report

Start: 12/8/2022 1:30 PM End: 13/8/2022 1:30 PM

Collected by:

Logger ID 912005

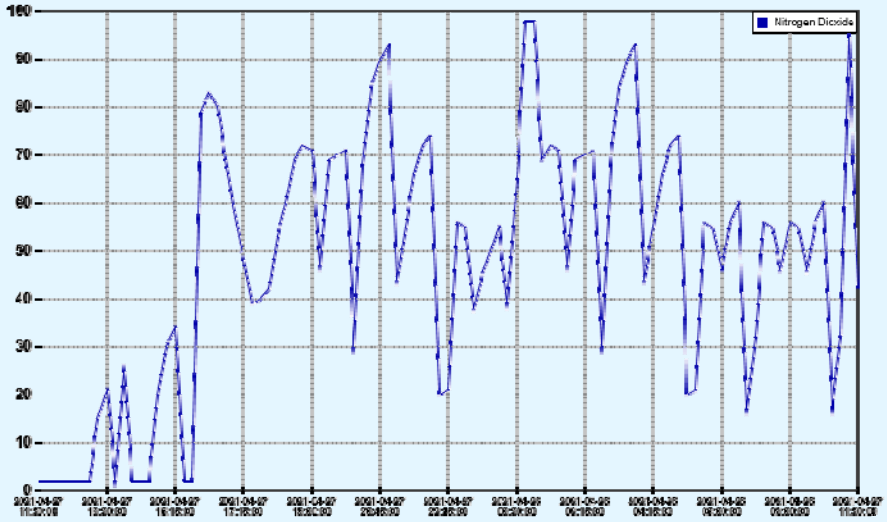
Record Count 97

Sensor ID

Nitrogen Dioxide

Range: 0 to 18810 ug/m3

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
2	48.7731	98	ug/m3				

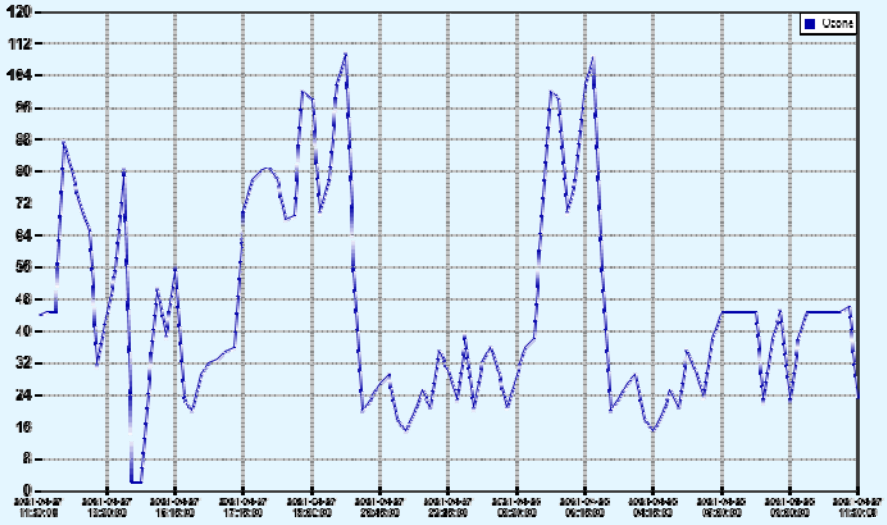


Sensor ID

Ozone

Range: 0 to 294.3 ug/m3

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
2	45.5876	109	ug/m3				



Environmental Report

Start: 12/8/2022 1:30 PM End: 13/8/2022 1:30 PM

Logger ID 912005 Collected by: Record Count 97

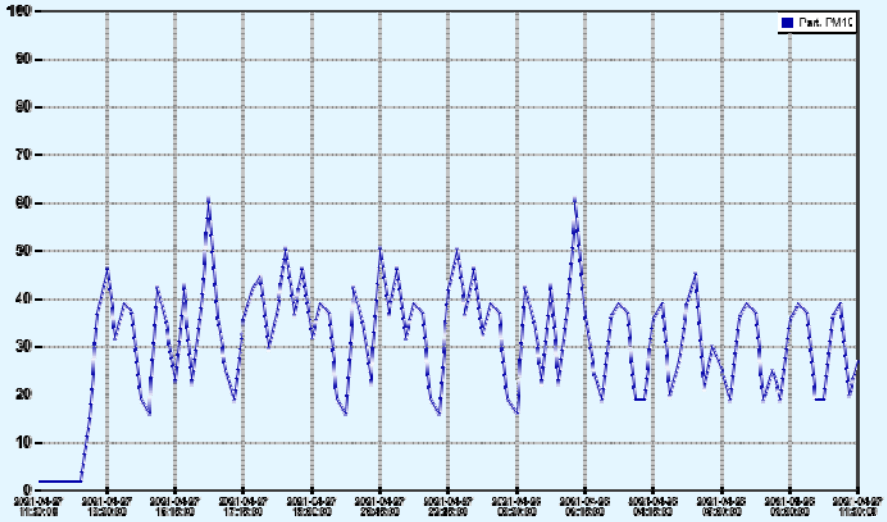
Prt10

Part. PM10

Prt10 Sensor ID

Range: 0 to 20000 uG/m3

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
2	30.9072	60	uG/m3				



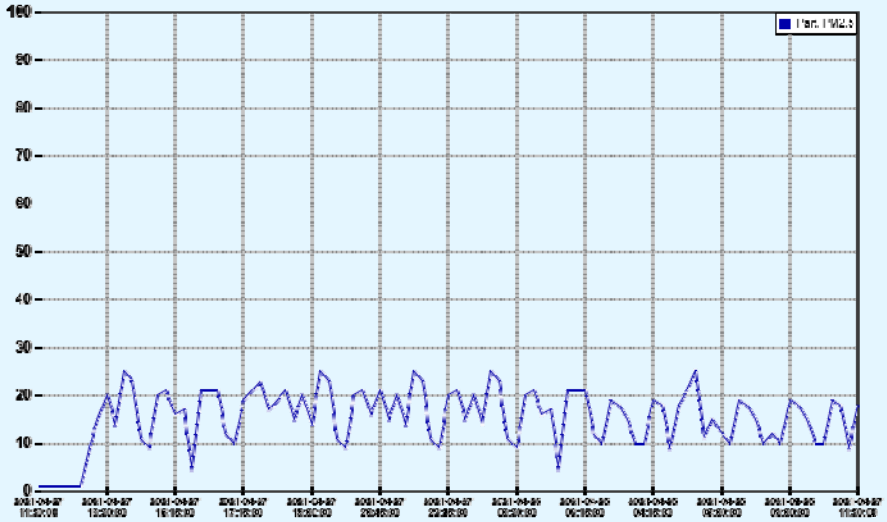
Prt10

Part. PM2.5

Prt10 Sensor ID

Range: 0 to 20000 uG/m3

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
1	15.4639	25	uG/m3				



Environmental Report

Start: 12/8/2022 1:30 PM End: 13/8/2022 1:30 PM

Collected by:

Logger ID 912005

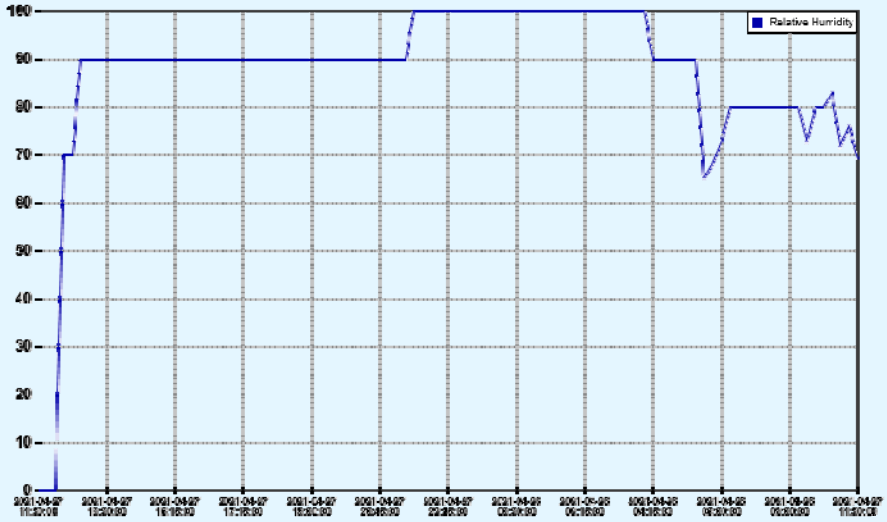
Record Count 97

Sensor ID

Relative Humidity

Range: 0 to 100 %

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	87.1030	100	%				

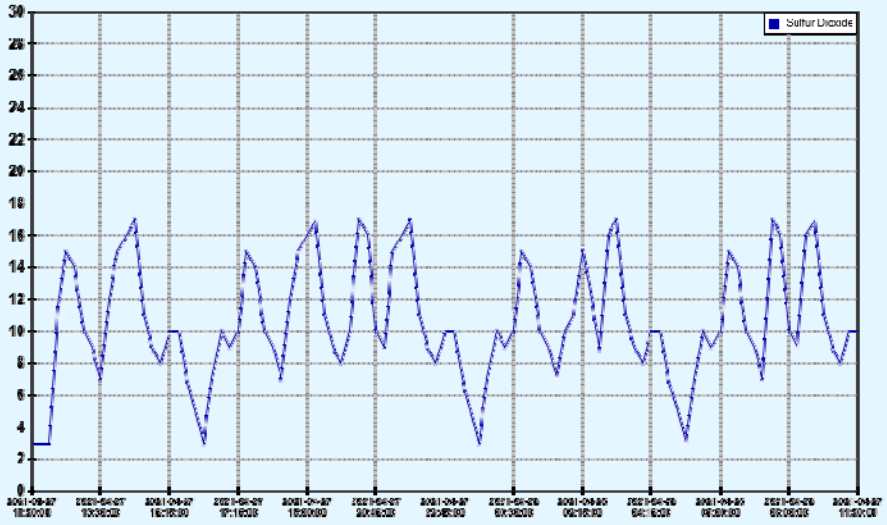


Sensor ID

Sulfur Dioxide

Range: 0 to 26190 ug/m3

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
3	10.4948	17	ug/m3				



Environmental Report

Start: 12/8/2022 1:30 PM End: 13/8/2022 1:30 PM

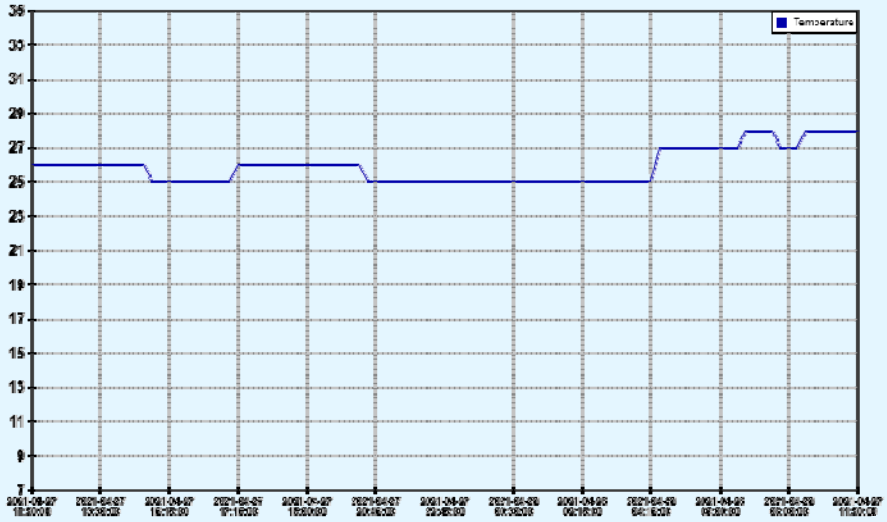
Logger ID 912005 Collected by: Record Count 97

Temperature

Sensor ID

Range: -20 to 60 Deg. C

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
25	25.9072	28	Deg. C				

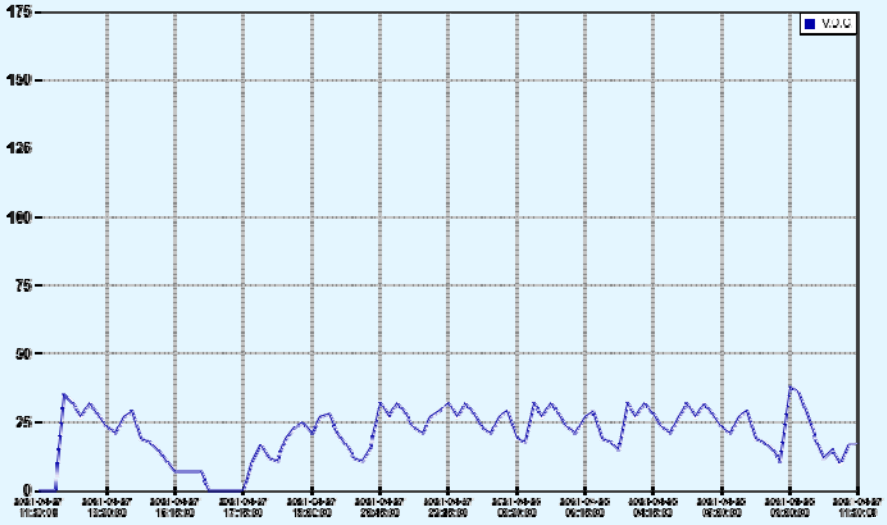


V.O.C.

Sensor ID

Range: 0 to 50000 ppb

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	20.8865	38	ppb				



Environmental Report

Start: 12/8/2022 1:30 PM End: 13/8/2022 1:30 PM

Logger ID 912005 Collected by: Record Count 97

W. DIR.

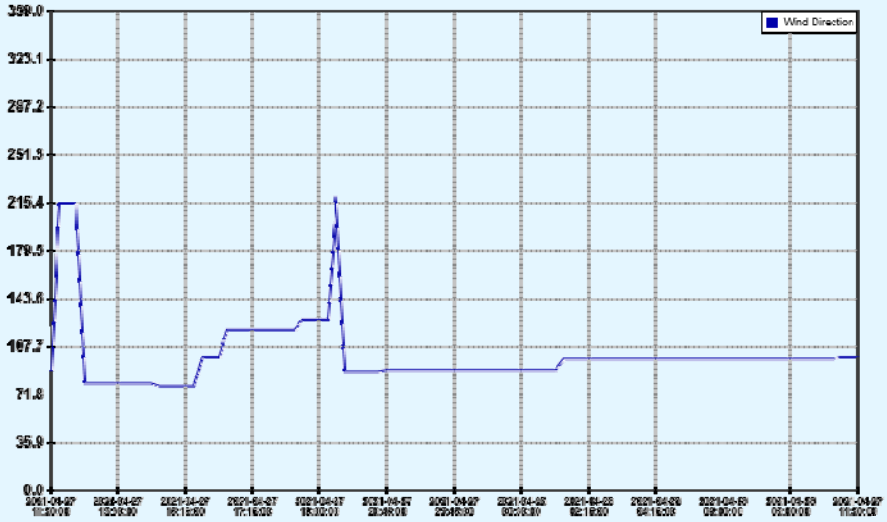
Wind Direction

W. DIR.

Sensor ID

Range: 0 to 359 Deg.

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
78	101.237	215	Deg.				



W. SPD.

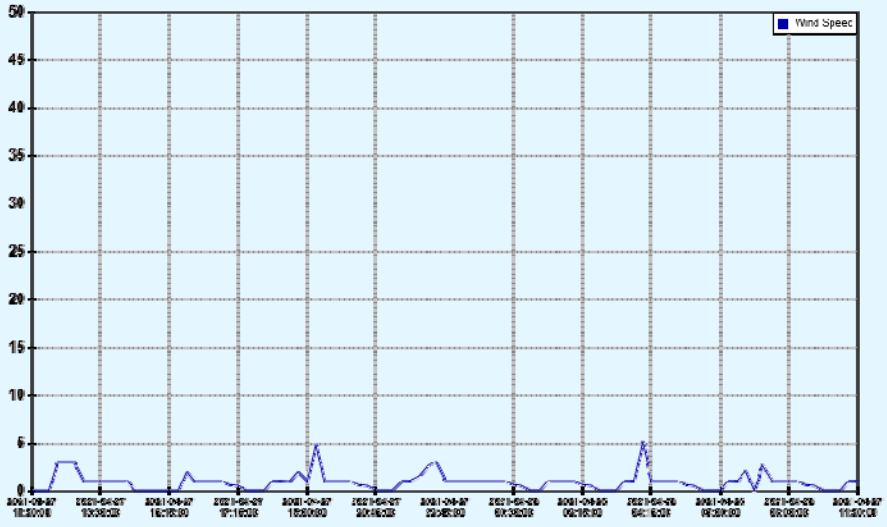
Wind Speed

W. SPD.

Sensor ID

Range: 0 to 160 kph

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
0	.905979	5	kph				



Environmental Report

Start: 12/8/2022 1:30 PM End: 13/8/2022 1:30 PM

Collected by:

Logger ID 912005

Record Count 97

Batt.

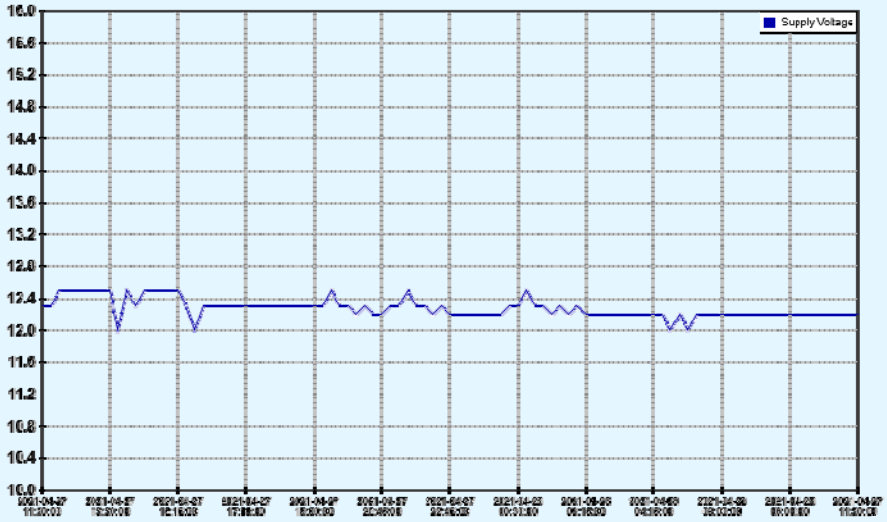
Supply Voltage

Batt.

Sensor ID

Range: 10 to 16 V

Min	Ave	Max		Hi Limit	% Above Hi	Lo Limit	% Below Lo
12	12.2752	12.5	V				



(4) Laboratory Results Data

ANALYSIS REPORT

ORIGINAL

Job Ref: 4353/2015
Date : 13.06.2015

Sample Described as	:	**STORM WATER**
Client Name	:	**ENVIRONMENT QUANTITY MANAGEMENT CO., LTD.** NO. 233, 23 QUARTER, SAYAY PIN STREET, THUWANA, YANGON, MYANMAR
Sample Received Date	:	03.06.2015
Sample Brought By	:	Client
Sample Marking	:	Sample 3 (9,10,11,12,13)
Analysed Date	:	04.06.2015
Lab Code No.	:	057/2015

No.	Test Parameter	Unit	Result	Method
1.	pH	-	7.48	Laboratory Manual For the Physico-Chemical Analysis of Soil, Water and Plant (pH meter)
2.	Total Suspended Solid	mg/l	30	Based on Standard methods for the examination of water & waste water APHA ,AWWA & WEF,22nd ed, 2012; 2540 D
3.	Ammonia Nitrogen	mg/l	0.441	Based on Standard methods for the examination of water & waste water APHA ,AWWA & WEF,22nd ed, 2012; 4500-NH_3 B , C
4.	Nitrate Nitrogen	mg/l	2.1	Based on Standard methods for the examination of water & waste water APHA ,AWWA & WEF,22nd ed, 2012 ; 4500-NO_3^- B
5.	Oil & Grease	mg/l	ND	Based on Standard methods for the examination of water & waste water APHA ,AWWA & WEF ,22nd ed, 2012 ; 5520 B

SGS (MYANMAR) LIMITED SGS (AGRI)

ANALYSIS REPORT

ORIGINAL

Job Ref: 4353/2015
Date : 13.06.2015

Lab Code No. : 057/2015

No.	Test Parameter	Unit	Result	Method
6.	Phosphorus	mg/l	0.644	Laboratory Manual For the Physico-Chemical Analysis of Soil, Water and Plant ; Phototmetric (Ascorbic) Method
7.	BOD	mg/l	35	In-house method based on Standard methods for the examination of water & waste water, APHA ,AWWA & WEF,22nd ed, 2012 ;**5210 D** (Respirometric) and manual of BOD System Ox direct (Lovibond)
8.	COD	mg/l	57	In-house method based on Standard methods for the examination of water & waste water APHA ,AWWA & WEF,22nd ed, 2012; **5220 D**(Closed Reflux ,Colorimetric) and manual of Photometer-system MD 100 and RD 125 Reactor(Lovibond)

End of Report

SGS (Myanmar) Limited

(Nu Nu Yi)
Manager

ANALYSIS REPORT

ORIGINAL

Job Ref: 4353/2015
Date : 13.06.2015

Sample Described as	:	**STORM WATER**
Client Name	:	**ENVIRONMENT QUANTITY MANAGEMENT CO., LTD.** NO. 233, 23 QUARTER, SAYAY PIN STREET, THUWANA, YANGON, MYANMAR
Sample Received Date	:	03.06.2015
Sample Brought By	:	Client
Sample Marking	:	Sample 4 (14,15,16,17,18)
Analysed Date	:	04.06.2015
Lab Code No.	:	058/2015

No.	Test Parameter	Unit	Result	Method
1.	pH	-	6.65	Laboratory Manual For the Physico-Chemical Analysis of Soil, Water and Plant (pH meter)
2.	Total Suspended Solid	mg/l	94.33	Based on Standard methods for the examination of water & waste water APHA ,AWWA & WEF,22nd ed, 2012; 2540 D
3.	Ammonia Nitrogen	mg/l	ND	Based on Standard methods for the examination of water & waste water APHA ,AWWA & WEF,22nd ed, 2012; 4500-NH_3 B , C
4.	Nitrate Nitrogen	mg/l	15.68	Based on Standard methods for the examination of water & waste water APHA ,AWWA & WEF,22nd ed, 2012 ; 4500-NO_3^- B
5.	Oil & Grease	mg/l	8.4	Based on Standard methods for the examination of water & waste water APHA ,AWWA & WEF ,22nd ed, 2012 ; 5520 B

SGS (MYANMAR) LIMITED SGS (AGRI)

ANALYSIS REPORT

ORIGINAL

Job Ref: 4353/2015
Date : 13.06.2015

Lab Code No. : 058/2015

No.	Test Parameter	Unit	Result	Method
6.	Phosphorus	mg/l	2.07	Laboratory Manual For the Physico-Chemical Analysis of Soil, Water and Plant ; Phototmetric (Ascorbic) Method
7.	BOD	mg/l	334	In-house method based on Standard methods for the examination of water & waste water, APHA ,AWWA & WEF,22nd ed, 2012 ;**5210 D** (Respirometric) and manual of BOD System Ox direct (Lovibond)
8.	COD	mg/l	396	In-house method based on Standard methods for the examination of water & waste water APHA ,AWWA & WEF,22nd ed, 2012; **5220 D**(Closed Reflux ,Colorimetric) and manual of Photometer-system MD 100 and RD 125 Reactor(Lovibond)

End of Report

SGS (Myanmar) Limited

(Nu Nu Yi)
Manager

ANALYSIS REPORT

ORIGINAL

Job Ref: 4353/2015
Date : 13.06.2015

Sample Described as	:	**STORM WATER**
Client Name	:	**ENVIRONMENT QUANTITY MANAGEMENT CO., LTD.** NO. 233, 23 QUARTER, SAYAY PIN STREET, THUWANA, YANGON, MYANMAR
Sample Received Date	:	03.06.2015
Sample Brought By	:	Client
Sample Marking	:	Sample 2 (6,7,8)
Analysed Date	:	04.06.2015
Lab Code No.	:	056/2015

No.	Test Parameter	Unit	Result	Method
1	Ammonia Nitrogen	mg/l	ND	Based on Standard methods for the examination of water & waste water APHA ,AWWA & WEF,22nd ed, 2012; 4500-NH_3 B , C
2.	Chloride	mg/l	174.41	Based on Standard methods for the examination of water & waste water APHA ,AWWA & WEF,22nd ed, 2012; 4500-Cl^- B
3.	Copper	mg/l	ND	Based on Standard methods for the examination of water & waste water APHA ,AWWA & WEF,22nd ed, 2012 ; 3111B (Direct Air-Acetylene Flame method)
4.	Manganese	mg/l	ND	Based on Standard methods for the examination of water & waste water APHA ,AWWA & WEF,22nd ed, 2012 ; 3111B (Direct Air-Acetylene Flame method)
5.	Zinc	mg/l	ND	Based on Standard methods for the examination of water & waste water APHA ,AWWA & WEF,22nd ed, 2012 ; 3111B (Direct Air-Acetylene Flame method)

End of Report

SGS (Myanmar) Limited

(Nu Nu Yi)
Manager

NO. 39-B THAZIN LANE,BAHO ROAD, AHLONE TOWNSHIP
YANGON, UNION of MYANMAR.
Tel : (95-1) 218 437, 218 438, 09-731 12672
Mobile : 09-5161431
Fax : (95-1) 222 122
Email : amd@yangon.net.mm / amdstaff@optusnet.com.au

Water and Waste water Treatment Division

ANALYTICAL RESULTS

Client: Environmental Impact Assessment

Location: Thingangyaun T/S

Type of Sample: Potable water II

Date of Analysis: 03.06.2015

Chemical Tests

Sr.	Item	Potable II	Unit	WHO Standard
1.	pH	7.7	-	6.5 ~ 8.5
2.	Iron	0.20	mg/l	<0.3 mg/l
3.	Total Dissolved Solids	910	mg/l	1000 mg/l
4.	Conductivity	1256	mg/l	N/A
5.	Turbidity	0	FTU	< 5 FTU
6.	Total Alkalinity	135	mg/l CaCo3	N/A
7.	Total Hardness	150	mg/l as CaCo3	N/A
8.	Chloride	184	mg/l	250 mg/l
9.	Magnesium	14	mg/l	150
10.	Calcium	40	mg/l	200
11.	Sulfate	96	mg/l	250 mg/l
12.	Zinc	0.028	mg/l	3.0 mg/l
13.	Colour	0	Pt-Co	15 cu
14.	Arsenic	0.001	mg/l	0.01mg/l
15.	Copper	0.037	mg/l	1-2mg/l

.....
Signature

Ei Thiri Khine
WT-Department
Amd

Advanced Medical & Diagnostics Amd

No.20,YWAR LAE LANE, ZA-NORTH WARD,
THINGANGYUN TSP,YANGON ,UNION OF MYANMAR
Tel : (95-1) 571656, 585797,
Mobile : 09-5161431,09-73176248, 09-73112672
Fax : (95-1) 8551095
Email : amd@yangon.net.mm / amdstaff@optusnet.com.au

WATER & WASTE WATER TREATMENT DIVISION

Attention To	**Environmental Quality Management Co.,Ltd** **No.233, Block 23, Sayeepin Street,** **Thingangyun Township,Yangon.** Ph:01-560291,01-561417

Source Water	: Factory Outlet
Analysis	: Chemical Test
Date Attended to Lab	: 29.07.2015

Sr.	Item	Sample 2	YCDC Target range
1.	Dissolved Oxygen (DO)	3.6	> 1 ppm

Comment: : DO is acceptable the target range.

Shwe Zin Oo
Water Treatment Department
Amd

THE REPUBLIC OF THE UNION OF MYANMAR
MINISTRY OF HEALTH
DEPARTMENT OF MEDICAL SERVICES
NATIONAL HEALTH LABORATORY
35, MAW KUN DAIK STREET, YANGON
BACTERIOLOGY SECTION

CULTURE AND SENSITIVITY REPORT

Laboratory No: B- 10024 /13 Date of Report: 10.8.15

Patient's Name: Slit sample

Address:

Referred by:

Reg. No: Voucher No: 00570

Type of Specimen: Blood agar plate (Slit sampler collection) Test Required: Culture

Date & Time of Collection:

Date &Time of Receipt : 29.7.15

Condition of Specimen:

MICROSCOPY

Gram stain: Gram positive cocci in pairs & group, Gram positive bacilli.

CULTURE

Result: Bacteria carrying particles----145

Organism isolated: (2) types of Coagulase negative Staphylococcus species & (1) types of *Bacillus* species isolated.

Refference: Medical Microbiology, The Practice Of Medical Micro biology, Robert Cruickshank,et.al,Twelfth Edition Vol II.

~~Officer~~/ Microbiologist

Head/ Consultant Microbiologist
Bacteriology Section

THE REPUBLIC OF THE UNION OF MYANMAR
MINISTRY OF HEALTH
DEPARTMENT OF MEDICAL SERVICES
NATIONAL HEALTH LABORATORY
35, HMAW KUN DAIK STREET, YANGON

Public Health laboratory Division

Mycology Section

Laboratory Report

Ref: No.....

Date.....

Name...Environmental Quality Management Co. Ltd

Referred by.....Hosp. Reg. No.....

Contact address.....

Type of Specimen - Air Sample(F)

Date and Time of Collection.....Date of Receipt-29.7.2015

EXAMINATION REQUIRED:- FUNGAL STUDY

CULTURE REPORT

Aspergillus flavus, Aspergillus fumigatus, Mycelia sterila,Penicilliun species and Cladosporium species isolated. (Total Count=29 CFU/m3)

Lab.No. M-954-15

Date. 10.8.2015

Technician 10/8/15

10.8.15

Dr. Khin Khin Mu
M.B.,B.S,M.Med.Sc (Microbiology)
Consultant Microbiologist
Head of Mycology Section
National Health Laboratory,Yangon

Consultant Microbiologist

THE REPUBLIC OF THE UNION OF MYANMAR
MINISTRY OF HEALTH
DEPARTMENT OF MEDICAL SERVICES
NATIONAL HEALTH LABORATORY
35, MAW KUN DAIK STREET, YANGON
BACTERIOLOGY SECTION

WATER BACTERIOLOGY REPORT

Laboratory No: B- 9691 Date of report: 30.7.15

Sender: EQM

Address: East Dagon

Voucher No: 024971

Source (Description): Waste Water: Ref - 4

Date and Time of collection : / 29.7.2015

Date and Time of receipt : / 29.7.2015

Result of Analysis:

Total coliforms in MPN/ 100ml	>16

(MPN= Most Probable Number)

Report: Water sample of B – 9691 is **bacteriologically unsatisfactory.**

Microbiologist:

Head/ Consultant Microbiologist
Bacteriology Section

Reference: 1. *Guidelines for Drinking-Water Quality, WHO, Geneva 1985 (Volume 3)*
2. *Dialysis water pre-treatment for In-Centre and Satellite Haemodialysis Units in NSW: A Set of Guidelines, June, 2008*
3. *Myer'sand Koshi's Manual of Diagnostic procedures in Medical Microbiology and Immunology/ Serology, 2001 (Christian Medical College and Hospital Vellore 632004, Tamil Nadu, India)*

THE REPUBLIC OF THE UNION OF MYANMAR
MINISTRY OF HEALTH
DEPARTMENT OF MEDICAL CARE
NATIONAL HEALTH LABORATORY
35, MAW KUN DAIK STREET, YANGON
BACTERIOLOGY SECTION

WATER BACTERIOLOGY REPORT

Laboratory No: B - 7065 Date of report: 4.6.15

Sender: EQM

Address: No.233, စရည်းပင်လမ်း၊ ၂၃ ရပ်ကွက်၊ သုဝဏ္ဏ၊ သဃ်ိန်းကျွန်း

Voucher No: 03331

Source (Description) : Portable Water

Date and Time of collection : 12:00 Noon / 3.6.2015

Date and Time of receipt : 2:30 Pm / 3.6.2015

Result of Analysis:

Total coliforms in MPN/ 100ml	>16

Report: Water sample of B – 7065 is **bacteriologically unsatisfactory.**

Microbiologist:

Head/ Consultant Microbiologist

Bacteriology Section

Environmental Quality Management

No.233,Block 23,Sayee Pin Lane,Thuwanna,Thingungyun Township,Yangon.
Ph:(95)1 2330291,(95) 1 2331417,(95) 9 5016606,Fax:(95) 1 2333994
E-mail : contact@eqm-myanmar.com,onhmarmay@eqm-myanmar.com
Website:www.eqm- myanmar.com

Table 1.1: Storm water sampling

Report Number: EQM-	**Date: 22.8.2022**
Client Information Client Name: **Greenland Factory** Registration Time: 13.8.2022 Contact : U Tin Lin Zaw Testing Purpose : Monitoring Plan	**Sample Information** Sample ID : 001 Sample Name **:** storm water Sample Type/ Source : Effluent Drains Sampling Date & Time : 13.8.2022 Sample Location : 16.896991 N, 96.233361E

Sr.	**Quality Parameters**	**Results**	**Units**	**Standard**	**Remark**
1.	BOD	36	mg/L	50 mg/L	**Normal**
2.	COD	< 200	mg/L	250 mg/l	**Normal**
3.	Total Phosphorus	0.168	mg/L	2 mg/l	**Normal**
4.	Suspended solid	119	mg/L	50 mg/l	**High**
5.	Total Nitrogen	3.19	mg/L	10 mg/l	**Normal**
6.	Oil & Grease	12	mg/L	≤ 10[d]	**High**
7.	Total Coliform	>1100		400	**High**

Tested by	**Checked by**	**Approved by**
Soe Thu Aung Lab Technician	Tin Nwe Htwe Lab Consultant	Dr. Ohnmar May Tin Hlaing Environmental Consultant

NG = No Guideline LOD = Limit of detection ND = Not Detected

[a] Standard Un

No.233,Block 23,Sayee Pin Lane,Thuwanna,Thingungyun Township,Yangon.
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E-mail : contact@eqm-myanmar.com,onhmarmay@eqm-myanmar.com
Website:www.eqm- myanmar.com

Table 1.2: Onsite Water Sampling Data

No.	Name	Time	pH(pH)	ORP (mvORP)	DO (%)	EC (µS/cm)	TDS (ppm)	Salinity (PSU)	Turbidity (FNU)	Temp (Deg C)	Pressure (Psi)
1	Storm Water	10:35 Am	7.12	169.5	5.6	107	54	0.05	105	25.83	14.626

ANNEX III
PUBLIC CONSULTATION QUESTIONNAIRES

Socio-Economic, Health and Environment
Key Informant 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 wheat flour project. The survey will be carried out in the households, which are located approximately 2 km from Wheat Flour

The Survey will focus on gaining Key Informant information and attitudes including:

- Information on the culture, natural environment and human use of the environment and infrastructure
- Attitudes on the prospective impacts of project during and after construction

I. KEY INFORMANT IDENTIFICATION

I1	STATE/ DIVISION	|__|
I2	**Village** 1 2 3 4 5 6 7 8	|__|__|
I3	KEY INFORMANT SAMPLE NUMBER _____	|__|__|__|__|
I4	NAME OF KEY INFORMANT_____	
I5	NAME OF RESPONDENT _____	

I6	DATE OF VISITS:	|__|__/__|__/**1**|**3**|
I7	ENUMERATOR:_____	SUPERVISOR _____

Enumerator's Remark: :.....

Supervisor's Remark :.....

****** indicates the question has skip (>>).

Module F: Infrastructure, Resource and Services

	Question	Response categories	Skip	Response
Health and Education				
f1	Is Health care available for members of your Community? ကျန်းမာရေးစောင့်ရှောက်ရန်ဆေးရုံဆေးခန်း၊ ဆေးပေးခန်း ရှိပါသလား။	Yes.....1 No.....2		____
f2	Has health care availability changed in your community? ကျန်းမာရေး စောင့်ရှောက်မှုပုံစံ ပြောင်းလဲသွားခြင်း ရှိပါသလား။	Yes – Limited health Care……1 No – No problems……2 Better – Improved……3		____
f3	Do you have access to education for members of your Community? အိမ်ထောင်စုအတွင်း ကျောင်းတက်နိုင်သူ ရှိပါသလား။	Yes.....1 No.....2		____
Energy				
f4	What source of lighting does your Communityprimarily use? လျှပ်စစ် (အလင်းစွမ်းအင်) ဘယ်ကရရှိပါသလဲ။	Public electricity.....1 Community hydro-power.....2 Battery.....3 Kerosene.....4 Candle.....5 Other (Specify) _____....6		____
f6	What is the main fuel source used by your Community for cooking? ဟင်းချက်ရာတွင်မည်သည့်(အဓိက)လောင်စာကအသုံးပြုသနည်း။	Electricity.....1 Gas/ kerosene/ diesel.....2 Charcoal/ firewood substitute.....3 Firewood.....4 Other (Specify) _____....5		____

	Question	*Response categories*	*Skip*	*Response*
Water, Sanitation and Hygiene				
f7	What is the main source of drinkingwater used by your Community for in the past 12 months? သင်၏မိသားစုအတွက် (အဓိက) သောက်ရေ ရရန်မည်သည့် အရင်းအမြစ်ကို သုံးပါသနည်း။ (လွန်ခဲ့သော ၁၂လ အတွင်း)	Public piped water.....1 Tube well.....2 Protected dug well/ pond/ spring/ rain water.....3 Unprotected dug well/ pond/ spring/ rain water.....4 River/ stream.....5		____
f8	What is the distance to this source of Drinking Water? ရေရရှိဖို့အတွက် အကွာအဝေး မည်မျှ ရှိပါသနည်း။	¼ mile.....1 1 mile.....2 More than one mile.....3		____.__
f9	Is yourdrinking water treated? ရေကို ပြုပြင်၍သောက်သုံးပါသလား။	Yes.....1 No.....2	>>**f11**	____
f10	If yes, what do you usually do to make it safe to drink? ရေသောက်သုံး ရာတွင် သန့်ရှင်းစေရန် မည်ကဲ့သို့ ဆောင်ရွက်ပါသနည်း။	Let it stand (sedimentation).....1 Filtration (ceramic, sand)……..2 Boil…… 3 Chlorine……4 Other (specify).....5		____
f11	Has water quality changed over time? အချိန်နှင့်အမျှ ရေ၏အရည်အသွေး ပြောင်းလဲမှုရှိပါသလား။	Yes.....1 No…….. 2		____
f12	Has water quantity changed over time? ရေ ပမာဏ ပြောင်းလဲမှု ရှိပါသလား။	Yes.....1 No.....2		____
f13	Is domestic waste water treated?	Yes.....1 No.....2		____

** indicates the question has skip (>>).

	နေအိမ်မှ ထွက်ရှိသည့်ရေဆိုး၊ရေညစ်၊မီးဖိုချောင်သုံးစွန့်ပစ်ရေများအားပြုပြင်၍(ဥပမာဆေးခပ်သန့်စင်ခြင်း) စွန့်ပစ် ပါသလား။			
f14	Do you take your solid waste to a community disposal area? အမှိုက်ပုံတွင် အမှိုက်ပုံပါသလား။	Yes.....1 No.....2		__|__|

Question		*Response categories*	*Skip*	*Response*
Transportation				
f17	သယ်ယူပို့ဆောင်ရေးအတွက် (အဓိက) အသုံးပြုသောအရာ	Walking……..1 Taxi/ Bus ..... 2 Motorcycle..... 3 Bicycle/Trishaw..... 4 Bullock cart ..... 5 Horse/pony cart ..... 6 Ship/Boat..... 7		__|__|

Module G: Cultural Aspect

	Question	Response categories	Skip	Response
Cultural Heritage				
g1	အရေးပါသော ဆုံဖြတ်ချက်များအား မည်သူကချမှတ်ပါသနည်း။	Village Leader……1 Religious Leader……2 Elder People……3 Small Group Leader……4 Others(Specify)_____... 5		____
g2	အရေးအပါဆုံးယဉ်ကျေးမှု ထုံးတမ်းစဉ်လာ ဓလေ့စရိုက်ကို ဖေါ်ပြပါ။	Language/ Literature……....1 Custom……..2 Taboo……...……..…3 Festival……..4 Temples/archaeological sites------.5 Others (Specify)_____.-- 6		____
g3	Do you know of important historic sites around your community? ပတ်ဝန်းကျင်တွင်ရှေးဟောင်းအမွေအနှစ်နယ်မြေများရှိပါသလား။	Yes..... 1 No..... 2		____
g4	Are those historic sites adequately protected? ၄င်းနေရာကိုလုံလောက်သောကာကွယ်စောင့်ရှောက်မှု၊ ပြုပြင်မွမ်းမံမှုများ ရှိပါသလား။	Yes..... 1 No..... 2		____

Module H: Air, Water and Climate

	Question	Response categories	Skip	Response
Air, Water and Soil				
h1	Have you noticed any changes to Air Quality as long as you have been in the Community? လေအရည်အသွေးပြောင်းလဲမှုရှိပါသလား။	Improved: …….. 1 Declined …….. 2 No Change……... 3		__
h2	Cause of change in air quality: အရည်အသွေးပြောင်းလဲမှုရှိခဲ့လျှင် မည်သည့် ကိစ္စကြောင့် ဖြစ်ခဲ့ရပါသနည်း။	Industry……4 Livestock Industry……5 Brush-burning/ Forest fire…….6		__
h3	Have you noticed any changes to Water Quality as long as you have been in the Community? ရေအရည်အသွေး ပြောင်းလဲမှု ရှိပါသလား။	Improved: …… 1 Declined ……..… 2 No Change…….. 3		__
h4	Cause of change in water quality: အရည်အသွေးပြောင်းလဲမှုရှိခဲ့လျှင် မည်သည့် ကိစ္စကြောင့် ဖြစ်ခဲ့ရပါသနည်း။	Industry……..…4 Livestock Industry……..……5 Brush-burning/ Forest fire…..……6		__
h5	Has the climate changed since you have been living in this area? အရင်ကနှင့်ယှဉ်ရင် ရာသီဥတု ပြောင်းလဲခဲ့မှု ရှိပါသလား။	Warmer..……..…1 Cooler……..2 Unchanged……..3		_
h6	Is the local climate changed to be? မည်သို့ပြောင်းလဲသွားပါသနည်း။	Wetter… ……4 Drier…… ……5		_

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Module I: Flora and Fauna

	Questions	Response	
1.Crops	a. What **crops** do you plant? မည့်သည့်ကောက်ပဲသီးနှံများစိုက်ပျိုးပါသနည်း။	List Crops 1.rice ဆန် 2.sugar cane ကြံ 3.beans ပဲ 4.sesame နှမ်း 5.ground nut မြေပဲ	
	b. Which is the most valuable **crop** that you grow? မည့်သည့်သီးနှံက ဈေးကောင်းအရဆုံး ဖြစ်သနည်း။	List Crops 1.rice ဆန် 2.sugar cane ကြံ 3.beans ပဲ 4.sesame နှမ်း 5.ground nut မြေပဲ	
	c. Do you use **fertilizer**? အသီးအပင် အားတိုးဆေး သုံးပါသလား။	1.Yes 2.No	
	d. Do you use **pesticide**? ပိုးသတ်ဆေး သုံးပါသလား။	1.Yes 2.No	
	e. Over the last 10 years has **crops** yield? ၁၀ နှစ်အတွင်း အထွက်နှုန်း မည့်သို့ရှိ သနည်း။	A. Increased, တက်သလား B. Decreased or ကျသွားသလား C. Remained stable နဂိုအတိုင်းမပြောင်းမလဲရှိသလား	

****** indicates the question has skip (>>).

	f. What is the cause of change? အဘယ့်ကြောင့် ထို့သို့ ပြောင်းလဲမှု ရှိသနည်း။	List Causes of possible change 1 not enough water ရေမလုံလောက်ခြင်း 2 too much water ရေများလွန်းခြင်း 3 too hot ပူလွန်းခြင်း 4 Change in ecosystem ဂေဟစနစ် ပြောင်းလဲမှု ဖြစ်ပေါ်ခြင်း	
	g. Are you crops an important food source? i.e. or are they sold စိုက်ပျိုးထားသော ကောက်ပဲသီးနှံများကို ရောင်းချပါသလား။	1.Yes 2.No	
4. Wild Plants တောရိုင်းပင်များ	a. Over the past 10 years has the abundance or distribution of **wild plants**? ၁၀ နှစ်အတွင်း အပင်ရိုင်း များ ပေါများမှုမှာ မည်သို့ရှိသနည်း။	A. Increased, တက်သလား B. Decreased or ကျသွားသလား C. Remained stable နဂိုအတိုင်းမပြောင်းမလဲရှိသလား	
	b. Over the past 10 years has the diversity/type of **wild plants**? လွန်ခဲ့သော ၁၀ နှစ်အတွင်း တောရိုင်းအပင် အမျိုးအစားများ မည်သို့ ပြောင်းလဲသနည်း။	A. Increased, တက်သလား B. Decreased or ကျသွားသလား C. Remained the same နဂိုအတိုင်းမပြောင်းမလဲရှိသလား	
	c. If there has been a change in number and or diversity of **wild plants**, why do you think this change has occurred? တောရိုင်းအပင် အရေအတွက် / အမျိုးအစား ပြောင်းလဲလျှင် မည့်သည့် အချက်ကြောင့် ပြောင်းလဲသနည်း။	1. Less Harvesting စိုက်ပျိုးခြင်း လျော့နည်းလာခြင်း 2. More Harvesting ပိုစိုက်ပျိုးခြင်း 3. Change in habits/ecosystem ဂေဟစနစ် ပြောင်းလဲလာခြင်း 4. Climate change ရာသီဥတု ပြောင်းလဲခြင်း	
	d. Over the past 10 years has the timing of **flowering** changed in any plants ၁၀ နှစ်အတွင်း အပင်များ၏ ပန်းပွင့်သော အချိန် ပြောင်းလဲပါသလား	1.Yes 2.No	
	e. Are these **wild plants an important source of food/medicine**? တောရိုင်းပင်များသည် အစာနဲ့ဆေး အတွက် အရေးပါ ပါသလား။	1.Yes 2.No	
5. Birds General ဌက်	a. Over the past 10 years has the number of wild **birds**?	A. Increased, တက်သလား B. Decreased or ကျသွားသလား	

** indicates the question has skip (>>).

	၁၀ နှစ်အတွင်း ဌက်အရေအတွက် ပြောင်းလဲပါသလား။	C. Remained the same နဂိုအတိုင်းမပြောင်းမလဲရှိသလား	
	b. Over the past 10 years has the diversity/type of wild **birds**? ၁၀ နှစ်အတွင်း ဌက်မျိုးစိတ် ပြောင်းလဲပါသလား။	A. Increased, တက်သလား B. Decreased or ကျသွားသလား C. Remained the same နဂိုအတိုင်းမပြောင်းမလဲရှိသလား	
	c. If there has been a change in number and or diversity of wild **birds**, why do you think this change has occurred? ဌက်အမျိုးအစားနှင့်အရေအတွက် ပြောင်းလဲမှုဖြစ်ပေါ်ပါလျှင် မည်သည့်အချက်ကြောင့် ပြောင်းလဲပါသနည်း။	1. Less Hunting အမဲလိုက်ခြင်း လျော့နည်းလာခြင်း 2. More Hunting ပို အမဲလိုက်ခြင်း 3. Change in habits/ecosystem ဂေဟစနစ် ပြောင်းလဲလာခြင်း 4. Climate change ရာသီဥတု ပြောင်းလဲခြင်း	
	d. Are wild birds and important source **food/medicine**? ဌက်များသည် အစာနှဲ့ဆေး အတွက် အရေးပါ ပါသလား။	1.Yes 2.No	
11. Rats and Mice ကြွက်	a. Have you ever seen a **Rats and Mice in this area**? ဤဒေသတွင် ကြွက်ကို မြင်ဖူးပါ သလား။	1.Yes 2.No	
	b. Are **Rats and Mice** common? ဤဒေသတွင် ကြွက် ပေါများပါသလား။	1.Yes 2.No	
	c. Has the number of **Rats and Mice** increased, decreased or remain stable over the past 10 years? ၁၀ နှစ်အတွင်း ကြွက် အရေအတွက် ပြောင်းလဲပါသလား။	A. Increased, တက်သလား B. Decreased or ကျသွားသလား C. Remained the same နဂိုအတိုင်းမပြောင်းမလဲရှိသလား	
	d. Has the diversity/type of **Rats and Mice** increased, decreased or remain stable over the past 10 years? ၁၀ နှစ်အတွင်း ကြွက်မျိုးစိတ် ပြောင်းလဲပါသလား။	A. Increased, တက်သလား B. Decreased or ကျသွားသလား C. Remained the same နဂိုအတိုင်းမပြောင်းမလဲရှိသလား	
	e.If there has been a change in number and or diversity of wild **Rats and Mice**, why do you think this change has occurred? ကြွက်အမျိုးအစားနှင့်အရေအတွက် ပြောင်းလဲမှုဖြစ်ပေါ်ပါလျှင် မည်သည့်အချက်ကြောင့် ပြောင်းလဲပါသနည်း။	1. Less Hunting အမဲလိုက်ခြင်း လျော့နည်းလာခြင်း 2. More Hunting ပို အမဲလိုက်ခြင်း 3. Change in habits ကျက်စားရာဒေသ ပြောင်းလဲခြင်း 4. Climate change ရာသီဥတု ပြောင်းလဲခြင်း	

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	f. Are **Rats and Mice** a source of foods/medicine? ကြွက်များသည် အစာနဲ့ဆေး အတွက် အရေးပါ ပါသလား။	1.Yes 2.No	
15. Bees **ပျား**	a. Have you ever seen a **Bees in this area**? ဤဒေသတွင် ပျားများကို မြင်ဖူးပါ သလား။	1.Yes 2.No	
	b. Are **Bees** common? ဤဒေသတွင် ပျားများ ပေါများပါသလား။	1.Yes 2.No	
	c. Has the number of **Bees** increased, decreased or remain stable over the past 10 years? ၁၀ နှစ်အတွင်း ပျားအရေအတွက် ပြောင်းလဲပါသလား။	A. Increased, တက်သလား B. Decreased or ကျသွားသလား C. Remained the same နဂိုအတိုင်းမပြောင်းမလဲရှိသလား	
	d. Has the diversity/type of **Bees** increased, decreased or remain stable over the past 10 years? ၁၀ နှစ်အတွင်း ပျားမျိုးစိတ် ပြောင်းလဲပါသလား။	A. Increased, တက်သလား B. Decreased or ကျသွားသလား C. Remained the same နဂိုအတိုင်းမပြောင်းမလဲရှိသလား	
	e.If there has been a change in number and or diversity of wild **Bees**, why do you think this change has occurred? ပျားအမျိုးအစားနှင့်အရေအတွက် ပြောင်းလဲမှုဖြစ်ပေါ်ပါလျှင် မည်သည့်အချက်ကြောင့် ပြောင်းလဲပါသနည်း။	1. Less Hunting အမဲလိုက်ခြင်း လျော့နည်းလာခြင်း 2. More Hunting ပို အမဲလိုက်ခြင်း 3. Change in habits ကျက်စားရာဒေသ ပြောင်းလဲခြင်း 4. Climate change ရာသီဥတု ပြောင်းလဲခြင်း	
	f. Are **Bees** a source of foods/medicine? ပျားများသည် အစာနဲ့ဆေး အတွက် အရေးပါ ပါသလား။	1.Yes 2.No	
16. Butterflies **လိပ်ပြာ**	a. Have you ever seen a **Butterflies in this area**? ဤဒေသတွင် လိပ်ပြာများကို မြင်ဖူးပါ သလား။	1.Yes 2.No	
	b. Are **Butterflies** common? ဤဒေသတွင် လိပ်ပြာများ ပေါများပါသလား။	1.Yes 2.No	
	c. Has the number of **Butterflies** increased, decreased or remain stable over the past 10 years? ၁၀ နှစ်အတွင်း လိပ်ပြာအရေအတွက် ပြောင်းလဲပါသလား။	A. Increased, တက်သလား B. Decreased or ကျသွားသလား C. Remained the same နဂိုအတိုင်းမပြောင်းမလဲရှိသလား	
	d. Has the diversity/type of **Butterflies** increased, decreased	A. Increased, တက်သလား	

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	or remain stable over the past 10 years? ၁၀ နှစ်အတွင်း လိပ်ပြာမျိုးစိတ် ပြောင်းလဲပါသလား။	B. Decreased or C. Remained the same	ကျသွားသလား နဂိုအတိုင်းမပြောင်းမလဲရှိသလား	
	e.If there has been a change in number and or diversity of wild **Butterflies**, why do you think this change has occurred? လိပ်ပြာအမျိုးအစားနှင့်အရေအတွက် ပြောင်းလဲမှုဖြစ်ပေါ်ပါလျှင် မည်သည့်အချက်ကြောင့် ပြောင်းလဲပါသနည်း။	1. Less Hunting 2. More Hunting 3. Change in habits 4. Climate change	အမဲလိုက်ခြင်း လျော့နည်းလာခြင်း ပို အမဲလိုက်ခြင်း ကျက်စားရာဒေသ ပြောင်းလဲခြင်း ရာသီဥတု ပြောင်းလဲခြင်း	
	f. Are **Butterflies** a source of foods/medicine? လိပ်ပြာများသည် အစာနဲ့ဆေး အတွက် အရေးပါ ပါသလား။	1.Yes 2.No		
17. Mosquitoes ခြင်	a. Have you ever seen a **Mosquitoes in this area**? ဤဒေသတွင် ခြင်များကို မြင်ဖူးပါ သလား။	1.Yes 2.No		
	b. Are **Mosquitoes** common? ဤဒေသတွင် ခြင်များ ပေါများပါသလား။	1.Yes 2.No		
	c. Has the number of **Mosquitoes** increased, decreased or remain stable over the past 10 years? ၁၀ နှစ်အတွင်း ခြင်အရေအတွက် ပြောင်းလဲပါသလား။	A. Increased, B. Decreased or C. Remained the same	တက်သလား ကျသွားသလား နဂိုအတိုင်းမပြောင်းမလဲရှိသလား	
	d. Has the diversity/type of **Mosquitoes** increased, decreased or remain stable over the past 10 years? ၁၀ နှစ်အတွင်း ခြင်မျိုးစိတ် ပြောင်းလဲပါသလား။	A. Increased, B. Decreased or C. Remained the same	တက်သလား ကျသွားသလား နဂိုအတိုင်းမပြောင်းမလဲရှိသလား	
	e.If there has been a change in number and or diversity of wild **Mosquitoes**, why do you think this change has occurred? ခြင်အမျိုးအစားနှင့်အရေအတွက် ပြောင်းလဲမှုဖြစ်ပေါ်ပါလျှင် မည်သည့်အချက်ကြောင့် ပြောင်းလဲပါသနည်း။	1. Less Hunting 2. More Hunting 3. Change in habits 4. Climate change	အမဲလိုက်ခြင်း လျော့နည်းလာခြင်း ပို အမဲလိုက်ခြင်း ကျက်စားရာဒေသ ပြောင်းလဲခြင်း ရာသီဥတု ပြောင်းလဲခြင်း	
	f. Are **Mosquitoes** a source of foods/medicine? ခြင်များသည် အစာနဲ့ဆေး အတွက် အရေးပါ ပါသလား။	1.Yes 2.No		

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18. Snakes **မြွေ**	a. Have you ever seen a **Snakes in this area**? ဤဒေသတွင် မြွေများကို မြင်ဖူးပါ သလား။	1.Yes 2.No	
	b. Are **Snakes** common? ဤဒေသတွင် မြွေများ ပေါများပါသလား။	1.Yes 2.No	
	c. Has the number of **Snakes** increased, decreased or remain stable over the past 10 years? ၁၀ နှစ်အတွင်း မြွေအရေအတွက် ပြောင်းလဲပါသလား။	A. Increased, တက်သလား B. Decreased or ကျသွားသလား C. Remained the same နဂိုအတိုင်းမပြောင်းမလဲရှိသလား	
	d. Has the diversity/type of **Snakes** increased, decreased or remain stable over the past 10 years? ၁၀ နှစ်အတွင်း မြွေမျိုးစိတ် ပြောင်းလဲပါသလား။	A. Increased, တက်သလား B. Decreased or ကျသွားသလား C. Remained the same နဂိုအတိုင်းမပြောင်းမလဲရှိသလား	
	e.If there has been a change in number and or diversity of wild **Snakes**, why do you think this change has occurred? မြွေအမျိုးအစားနှင့်အရေအတွက် ပြောင်းလဲမှုဖြစ်ပေါ်ပါလျှင် မည်သည့်အချက်ကြောင့် ပြောင်းလဲပါသနည်း။	1. Less Hunting အမဲလိုက်ခြင်း လျှော့နည်းလာခြင်း 2. More Hunting ပို အမဲလိုက်ခြင်း 3. Change in habits ကျက်စားရာဒေသ ပြောင်းလဲခြင်း 4. Climate change ရာသီဥတု ပြောင်းလဲခြင်း	
	f. Are **Snakes** a source of foods/medicine? မြွေများသည် အစာနဲ့ဆေး အတွက် အရေးပါ ပါသလား။	1.Yes 2.No	
19. General Environment	a. Over the past 10 years has natural habitat decreased by over25% ၁၀ နှစ်အတွင်း ကျက်စားရာ ဒေသ ၂၅% ထက်ပို၍ လျော့ကျပါသလား။	1.Yes 2.No	
	b. Over the past 10 years has the amount of wildlife decreased significantly? ၁၀နှစ်အတွင်း တောရိုင်းတိရစ္ဆာန်များ သိသိသာသာ လျော့နည်းပါသလား။	1.Yes 2.No	
	c. Over the past 10 years are there significantly more people in this area?	1.Yes 2.No	

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	၁၀နှစ်အတွင်း ဤဒေသတွင် သိသိသာသာ လူပို့များလာ ပါသလား။		
	d. Over the past 10 years has the weather changed significantly? ၁၀နှစ်အတွင်း ရာသီဥတု သိသိသာသာ ပြောင်းလဲလာပါသလား။	1.Yes 2.No	
	e. Are the wild plant and animals in this local environment a significant important source of food or medicine? တောရိုင်းအပင် နှင့် တိရစ္ဆာန်များ သည် ဤဒေသတွင် အစာနဲ့ဆေးအတွက် အရေးပါ ပါသလား။	1.Yes 2.No	
	f. Are the wild plant and animals in this local environment a significant important source of income? တောရိုင်းအပင် နှင့် တိရစ္ဆာန်များ သည် ဤဒေသတွင် အရေးပါသောဝင်ငွေရနိုင်သည့် အလုပ်ဖြစ်ပါသလား။	1.Yes 2.No	

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Module J: Key InformantAttitudes

Question		Response categories	Skip	Response
Awareness and Attitude about the project				
j1	ယခုစက်ရုံ အကြောင်းကို သင်မည်မျှ သိပါသနည်း။	Nothing at all ..... 1 A little..... 2 Some..... 3 A lot..... 4	>>**j3**	__|__|
j2	ယခုစက်ရုံ ကို မည်သူဆီမှ သင်သိရှိပါသနည်း။	Government agencies ..... 1 Community Leader ..... 2 Media ..... 3 Family members/Friends ..... 4 Surveyors/ Interviewers ..... 5 Other(Specify) ..... 6 No 2		__|__|
J3	ယခုစက်ရုံ သည် လူမှု ပတ်ဝန်းကျင် အတွက် မည်မျှအရေးကြီးပါသနည်း။	Not extremely important ..... 1 Not very important..... 2 Not important..... 3 Normal..... 4 important..... 5 Very important..... 6 Extremely important ..... 7 Unaware..... 8		__|__|
J4	ယခင်က 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 များမှနစ်နာကြေးကိစ္စများဆွေးနွေးဖူးပါသလား။	Yes..... 1 No..... 2		__|__|
J8	ယခုစက်ရုံ၏ကောင်းသော အကျိုးသက်ရောက်မှုများ ကြောင့် သင်တို့အပေါ်မည်သည့်အရာများ စွမ်းဆောင်ပေး နင်မည်ဟု ထင်ပါသနည်း။ (အရေးကြီးဆုံးအချက်)	Unaware..... 1 Increase employment ..... 2 Increase annual income..... 3 Improve living condition..... 4 Improved transport/infrastructure ... 5 Compensation for land used ..... 6 Improved environment..... 7		__|__|
J9	ယခုစက်ရုံ၏ တိုးတက်ဖွံ့ဖြိုးမှုအတွက် သဘောတူညီမှု ရှိပါသလား။	Yes..... 1 No..... 2 Not sure..... 3		__|__|

** indicates the question has skip (>>).

K10. Perceptions on Impacts of the Project

		Very negative	Negative	Slightly negative	No effect	Slightly positive	Positive	Very positive	
The effect on Physical Resources									
1	Soil quality	1	2	3	4	5	6	7	
2	Surface water quality	1	2	3	4	5	6	7	
3	Ground water quality	1	2	3	4	5	6	7	
4	Air quality	1	2	3	4	5	6	7	
5	Noise	1	2	3	4	5	6	7	
Effect on Biological Resource									
6	Forestry and conservation areas	1	2	3	4	5	6	7	
7	Agriculture/ Farmingareas	1	2	3	4	5	6	7	
8	Local animals	1	2	3	4	5	6	7	
9	Pasture	1	2	3	4	5	6	7	
10	Aquatic animals	1	2	3	4	5	6	7	
Effect on Human Use									
11	Local Fisheries	1	2	3	4	5	6	7	
12	Local Livestock	1	2	3	4	5	6	7	
13	Local Vegetation	1	2	3	4	5	6	7	
14	Local Industry	1	2	3	4	5	6	7	
15	Local Transportation	1	2	3	4	5	6	7	
16	Local Price	1	2	3	4	5	6	7	
17	Recreation	1	2	3	4	5	6	7	
18	Local Economy	1	2	3	4	5	6	7	
Effect on Quality of Life									
19	Housing	1	2	3	4	5	6	7	
20	Health	1	2	3	4	5	6	7	
21	Education	1	2	3	4	5	6	7	
22	Spiritual	1	2	3	4	5	6	7	
23	Safety	1	2	3	4	5	6	7	
23	Crime	1	2	3	4	5	6	7	
23	Family Structure	1	2	3	4	5	6	7	
24	Job opportunities	1	2	3	4	5	6	7	
25	Income	1	2	3	4	5	6	7	
26	Scenery	1	2	3	4	5	6	7	
27	Local Culture	1	2	3	4	5	6	7	
Effect on Cultural Heritage									
28	Religious Building	1	2	3	4	5	6	7	
29	Cemetery	1	2	3	4	5	6	7	
30	Historic buildings/sites	1	2	3	4	5	6	7	

"CHECK the whole questionnaire AGAIN, THANK the respondent and FINISH interview."

****** indicates the question has skip (>>).

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 wheat flour project. The survey will be carried out in the households, which are located approximately 2 km from Wheat Flour

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 Wheat Flour

I. HOUSEHOLD IDENTIFICATION

I1	STATE/ DIVISION	|__|
I2	**Village** 1 2 3 4 5 6 7 8	|__|__|
I3	SURVEY/HOUSEHOLD SAMPLE NUMBER _____	| | | | |
I4	NAME OF HOUSEHOLD HEAD _____	
I5	NAME OF RESPONDENT _____	

I6	DATE OF VISITS:	| |__/ |__/ **1| 5** |
I7	ENUMERATOR:_____	SUPERVISOR _____

Enumerator's Remark: :.....

Supervisor's Remark :.....

****** indicates the question has skip (>>).

Module A: Household Member Characteristics

	Question	Response categories	Skip to	Response
Name/Identification				
Household Member Characteristics				
a1	အိမ်ထောင်ဦးစီးနှင့် တော်စပ်ပုံ	ဦးစီး .....1 ဇနီး/ခင်ပွန်း .....2 သား/သမီး .....3 မိဘ/ 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 မိသားစုဂင် 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

Question		Response categories	Skip to	Response
Name/Identification				
Household Member Characteristics				
A7	လွန်ခဲ့သော ၇-ရက်အတွင်းက လုပ်ကိုင်ခဲ့သော အဓိကလုပ်ငန်းကို အမည်နှင့်တကွဖေါ်ပြပါ။	Worked to earn to income 1 Helped household business… 2 Search for work…… 3 Housework…… 4 Fulltime learning…… 5 Doing religious matters…… 6 Bad health/ disable…… 7 Pension/ support (not working) 8 Not work/ not search for work… 9		____
A8	အဓိကလုပ်ငန်းအမည် နှင့် တကွ ဖေါ်ပြပါ	Farmer…… .....1 Livestock worker…….. 2 Fisherman……. 3 Forestry worker……. 4 Sale worker……5 Service worker…….. 6 Skilled worker……7 Casual worker…… 8 Unpaid family worker…… 9 Other (Specify) ……10 Oil and Gas Worker……...11		____
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…..11 Under grad.Diploma …12 Vocation certificate …13. Monastery .....14 Never attended school. 15		____
A11	မိသားစုအတွင်း အမြင့်မားဆုံး ပညာရေး အရေြအနေ	KG - 1st std 0-1 2nd std.- 3rd std 2-3 4th – 9th std……4-9 10th std. passed…….10 Graduate/ post grad…..11 Under grad.Diploma …12 Vocation certificate …13. Monastery 14		____

** indicates the question has skip (>>).

Module B: Household health condition

Question		Response categories	Skip to	Response
Household Health Condition				
B1	မိသားစုအတွင်း ကိုယ်အင်္ဂါချို့ယွင်းမှု ရှိပါသလား။ (ရာသက်ပန် ချို့ယွင်းမှု)	No…….. ...1 Mobility/walking…..2 Loss of limb……..…3 Blindness……..4 Loss of hearing……..…5 Other ……..….6		__|__|
B2	လွန်ခဲ့သော ၃ လ က မိသာစုအတွင်း မတော်တဆ ဖြစ်ပွားမှုရှိပါသလာ။	No……...1 Occupational…. ... 2 Non Occupational ..3		__|__|
B3	လွန်ခဲ့သောလ က မိသာစု အတွင်း ၃ ကြိမ်နှင့် အထက် ဂမ်းလျှောမှု ရှိပါသလား။	No.....1 Yes.....2		__|__|
B4	လွန်ခဲ့သော လ က မိသာစု အတွင်းနေမကောင်း ဖြစ်ပွားမှုရှိခဲ့ပါသလား။	No.....1 Yes.....2		__|__|
B5	သင် မိသားစုအတွင်း အဖြစ်များဆုံး ရောဂါများအား အမည်နှင့်တကွဖေါ်ပြပါ	None ……..……1 Malaria…… ..... 2 Flu.....……3 Diseases of digestive system……4 Muscle pain…….……5 Diseases of the skin .....……..6 Hypertension.....……...7 Ear, eye ,tooth disease…….……8 Heart disea…….……..9 Cancer……..10 Catch a cold…….. .....11 Sexually Transmitted Disease… 12		__|__|
B6	ကျန်းမားရေ စောင့်ရှောက်မှု မည်သူနှင့် ခံယူပါသလဲ။	Doctor..... 1 Health Assistant ..... 2 Midwife/ LHV ..... 3 AMW..... 4 CHW..... 5 Traditional healer..... 6 Quack..... 7 Self medication ..... 8 Other (Specify) 9		__|__|
B7	ခြင်ထောင် နှင့် အိပ်ပါသလား။ (Last Night)	Yes.....1 No.....2		__|__|

** indicates the question has skip (>>).

Module C: Household structure and migration

	Question	Response categories	Skip to	Response
House Structure				
C1	သင်နေထိုင်သောအဆောက်အအုံ အမျိုးအစား	Two storey and above ..... 1 One storey house ..... 2 Hut..... 3 Other (Specify) 4		____
C2	အိမ် အမိုးကို မည်သည့် ပစ္စည်းဖြင့် တည်ဆောက်ထားသနည်း။	Thatch/ large leaves/ Palm ..... 1 Bamboo ..... 2 Other unfinished roof..... 3 CGI..... 4 Tarpaulin..... 5 Other finished roof..... 6 Other (Specify)_____.... 7		____
Migration				
C3	သင့်၏ မိသားစု ဒီနေရာမှာနေတာ ဘယ်လောက်ကြာပြီလဲ။	Less than one year……..…..1 One to three years……2 Three to ten years……...…3 More than ten years……..4		____
C4	လွန်ခဲ့သော (၁၂)လအတွင်းက အလုပ်ရှားပါးမှုကြောင့် အခြားဒေသသို့ သွားရောက်အလုပ်လုပ်သူရှိပါသလား။ (အမည်ဖြင့် တကွ ဖော်ပြပေးပါ)	No..... 0 Head of household ..... 1 Other male adult (15+ year) ..... 2 Other female adult (15+ year) ..... 3 Boys (under 15 year)..... 4 Girls (under 15 year)..... 5	>>d1	____
C5	ဘယ်နှစ်လခန့် သွားရောက်ခဲ့ပါသလဲ။	1-3……1 3-6……2 6-12……...3		____
C6	မည်သည့် ရာသီက သွားရောက်ခဲ့သလဲ။	Summer ..... 1 Rainy season ..... 2 Winter..... 3		____
C7	မည်သည့်အတွက် ကြောင့် သွားရောက်ခဲ့သလဲ။	Work……..…..1 Education……..…..,...2 Marriage/or live with other family……3 Other……..……..4		____
C8	အလုပ်အတွက်ဆိုပါက မည်သည့် အလုပ်အမျိုးအစား သွားရောက်လုပ်ကိုင်ပါသလဲ။	Agriculture/fishery……..……1 Factory/production……..……..2 Domestic/house……...…...3 Civil service……..…… .. 4 Other……..…….... 5 Oil and Gas project work……6		____
C9	လွန်ခဲ့သော (၁၂)လ အတွင်း မည်သည်နေရာသို့ ပြောင်းရွှေ့သွားပါသလဲ။	Within Township ..... 0 Within State/Division..... 1 Within Country..... 2 Abroad 3		____

** indicates the question has skip (>>).

Module E: Livelihood

Question		Response categories	Skip	Response
Land Ownership				
d5	မြေပိုင်ဆိုင်မှု / နေထိုင်မြေ ပိုင်ဆိုင်မှုရှိပါသလား။	Yes.....1 No 2		___|
d7	ပိုင်ဆိုင်မှု အထောက်အထား ရှိပါသလား။	With document.....1 No document With permission.....2 No Document No permission……. ..3		___|
Question		***Response categories***	***Skip***	***Response***
Agriculture				
e1**	လယ်ယာလုပ်ကိုင် ဆောင်ရွက်ပါသလား။	Yes .....1 No 2	>>**e4**	___|
e2	လယ်ယာ ဧက ဘယ်လောက်ပိုင်ဆိုင်ပါသလဲ။	Less than 2 acre 1 2-3 acres 2 Greater than 3 acres 3		___|
e3	လွန်ခဲ့သော နှစ်က အဓိကသီးနှံ ထုတ်လုပ်မှု ဖော်ပြပေးပါ။	Rice:___1__ Beans/Pulses:____2__ Corn:____3__ Sesame:____4__ Vegetables:___5_ Other:___6_		___|

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Question		Response categories	Skip	Response
Livestock				
e4	တိရစ္ဆာန် ပိုင်ဆိုင်မှု ရှိပါသလား။ တိရစ္ဆာန် ပိုင်ဆိုင်မှု ၁။ကျွဲ ၂။နွားမ ၃။နွားသိုး ၄။မြင်း ၅။ဝက် ၆။ကြက် ၇။သိုး ၈။ဆိတ် ၉။ဘဲ ၁၀။စသည်ဖြင့်	Yes .....1 No 2		___|
Question		**Response categories**	**Skip**	**Response**
Livestock				
E5	တိရစ္ဆာန် ပိုင်ဆိုင်မှု (အဓိက မွေးမြူသော၊ထားရှိသော) ၁။ကျွဲ ၂။နွားမ ၃။နွားသိုး ၄။မြင်း ၅။မြည်း ၆။လား ၇။သိုး ၈။ဆိတ် ၉။ဝက် ၁၀။စသည်ဖြင့်	Non-draught buffalo:_____1_ Non-draught ox:_____2_ Cow:_____3_ Horse:_____4_ Chickens:_____5_ Goat: _____6__ Sheep:_____7__ Pig: _____8__ Other (Specify):_____9__		___|

Question		Response categories	Skip	Response
Fishery				
E6	လွန်ခဲ့သော (၁၂)လ ခန့်က မိသားစုအတွင်း ရေလုပ်ငန်း အလုပ်လုပ်ကိုင်သူ ရှိပါသလား။	Yes .....1 No 2		|_|
E7	ငါး မွေးမြူရေးပုစွန် မွေးမြူရေး လုပ်ကိုင်ပါသလား (ကိုယ်ပိုင်)	Not own.....2 Yes 1		|_|_|

Question		Response categories	Skip	Response
Off-farm livelihood activities				
e7**	မိသာစုအတွင်း (လယ်ယာလုပ်ငန်နှင့်မသက်ဆိုင် ဓသာအခြားလုပ်ငန်းလုပ်ကိုင်ပါသလား။)	Yes .....1 No 2	>>e9	| |_|
e8	အခြားမည်သည့် အလုပ်ကိုင်ကို လုပ်ကိုင်ပါသနည်း။	Trading (wholesale, general trading) 1 Small retail shop.....2 Street vendor/ hawker/ green grocer 3 Rice huller .....4 Government Officer……..5 Salt field .....5 Boat/ land transport .....6 Cottage industry .....7 Homestead garden .....8 Company Officer……..9		| |_|

Question		Response categories	Skip	Response
Labor and Working condition				
e9	ကူညီလုပ်ကိုင်ပေမည့်လုပ်သားများလွယ်ကူစွာရနင်ပါသလား။ (မိသားစုဝင်မဟုတ်သည့်အခြားအလုပ်သမား)	Yes .....1 No 2	>>**e12**	|_|_|
e10	မည်သည့် နေရာမှလာရောက်လုပ်ကိုင်ပါသနည်း။	By hiring from other village .....1 Substitute with machine .....2 Other(Specify).....3		| |_|
e11	ယခုစက်ရုံ တည်ထောင်ခြင်းအားဖြင့် မိရိုးဖလာလုပ်ငန်းများအား ထိခိုက်မှု ရှိနင်ပါသလား။	Yes .....1 No 2		|_|_|
e12	သင့်၏တစ်နေ့ပုံမှန်ဝင်ငွေ မည်မျှရှိပါသနည်း။	Below 500 .....1 500 – 1,000.....2 1,000- 1,500 .....3 1,500 – 2,000……4 2,000+ 5		|| |_|
e13	မိသာစု၏တစ်နှစ်ခန့်မှန်ခြေဝင်ငွေ မည်မျှရှိပါသနည်း။	Below 500,000 .....1 500,001 – 1,000,000.....2 1,000,001 – 2,000,000.....3 2,000,001 – 3,000,000.....4 3,000,001 - 5,000,000 .....5 Above 5,000,000 6		|| |_|
e14	မိသာစု၏လက်ရှိ ငွေကြေးအခြေအနေ၊စုဆောင်းနင်မှုရှိပါသလား။	Do not have enough .....1 Have enough money but no savings .2 Have enough money and savings. 3		| |_||

Module F: Infrastructure, Resource and Services

Question		Response categories	Skip	Response
Health and Education				
f1	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 ကျောင်းတက်နင်သူ ရှိပါသလား။	Yes .....1 No 2		|_|_|

** indicates the question has skip (>>).

Energy				
f3	လျှပ်စစ် (အလင်းစွမ်းအင်) ဘယ်ကရရှိပါသလဲ။	Public electricity .....1 Community hydro-power.....2 Battery .....3 Kerosene.....4 Candle .....5 Other (Specify)_____.....6		|__|__|
f5	ဟင်းချက်ရာတွင်မည်သည့်(အဓိက)လောင်စာကအသုံးပြုသနည်း။	Electricity .....1 Gas/ kerosene/ diesel .....2 Charcoal/ firewood substitute .....3 Firewood.....4 Other (Specify)_____.....5		|__|__|
Question		**Response categories**	**Skip**	**Response**
Water, Sanitation and Hygiene				
f7	သင်၏မိသားစုအတွက် (အဓိက) သောက်ရေ ရရန်မည်သည့် အရင်းအမြစ်ကို သုံးပါသနည်း။ (လွန်ခဲ့သော ၁၂လ အတွင်း)	Public piped water ..... 1 Tube well ..... 2 Protected dug well/ pond/ spring/ rain water ..... 3 Unprotected dug well/ pond/ spring/ rain water ..... 4 River/ stream..... 5		| |_|
f8	ရေရရှိဖို့အတွက် အကွာအဝေး မည်မျှ ရှိပါသနည်း။	¼ mile ..... 1 1 mile ..... 2 More than one mile 3		| |_|. |
f9	ရေကို ပြုပြင်၍သောက်သုံးပါသလား။	Yes..... 1 No..... 2	>>**f11**	|__|__|
f10	ရေသောက်သုံး ရာတွင် သန့်ရှင်းစေရန် မည်ကဲ့သို့ ဆောင်ရွက်ပါသနည်း။	Let it stand (sedimentation)..... 1 Filtration (ceramic, sand)……...2 Boil……..…3 Chlorine……4 Other (specify)..... 5		|__|__|
f11	အချိန်နှင့်အမျှ ရေ၏အရည်အသွေး ပြောင်းလဲမှုရှိပါသလား။	Yes..... 1 No…….. 2		|__|__|
f12	ရေ ပမာဏ ပြောင်းလဲမှု ရှိပါသလား။	Yes..... 1 No..... 2		|__|__|
f13	ရေဆိုးမြောင်း အိမ်အနီးတွင်းရှိသလား။?	Yes..... 1 No..... 2		|__|__|
f14	အမှိုက်ပုံတွင် အမှိုက်ပုံပါသလား။	Yes..... 1 No..... 2		|__|__|
Question		**Response categories**	**Skip**	**Response**
Transportation				
f15	အများဆုံးအသုံးပြုသော သယ်ယူပို့ဆောင်ရေး။	Walking……..…0 Taxi/ Bus ..... 1 Motorcycle..... 2 Bicycle/Trishaw ..... 4 Bullock cart..... 5 Horse/pony cart..... 6 Ship/Boat 7		|__|__|

Module G: Cultural Aspect

	Question	Response categories	Skip	Response
Cultural Heritage				
g1	အရေးပါသော ဆုံဖြတ်ချက်များအား မည်သူကချမှတ်ပါသနည်း။	Village Leader……1 Religious Leader……2 Elder People……3 Small Group Leader……4 Others(Specify)_____... 5		__|__|
g2	အရေးအပါဆုံး ယဉ်ကျေးမှု ထုံးတမ်းစဉ်လာ ဓလေ့စရိုက် ကို ဖေါ်ပြပါ။	Language/ Literature……... 1 Custom……..2 Taboo……...……..…3 Festival……..4 Temples/archaeological sites-----. 5 Others (Specify) .-- 6		__|__|
g3	ရှေးဟောင်းအဓွေအနှစ် နယ်မြေ များရှိပါသလား။	Yes .....1 No.....2		__|__|
g4	၄င်းနေရာ ကိုလုံလောက်သော ကာကွယ် ဓ စာင့်ရှောက်မှုပြုပြင်မွမ်းမံမှုများ ရှိပါသလား။	Yes .....1 No.....2		__|__|

Module H: Air, Water and Climate

	Question	Response categories	Skip	Response
Air, Water and Soil				
h1	လေအရည်အသွေးပြောင်းလဲမှုရှိပါသလား။	Improved: …….. 1 Declined …….... 2 No Change……... 3		__|
h2	အရည်အသွေးပြောင်းလဲမှုရှိခဲ့လျှင် မည်သည့် ကိစ္စကြောင့် ဖြစ်ခဲ့ရပါသနည်း။	Industry……4 Livestock Industry……5 Brush-burning/ Forest fire…….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 I: Flora and Fauna

	Questions	Response	
1.Crops	a. What **crops** do you plant? မည့်သည့်ကောက်ပဲသီးနှံများစိုက်ပျိုးပါသနည်း။	List Crops 1.rice ဆန် 2.sugar cane ကြံ 3.beans ပဲ 4.sesame နှမ်း 5.ground nut မြေပဲ	
	b. Which is the most valuable **crop** that you grow? မည့်သည့်သီးနှံက ဈေးကောင်းအရဆုံး ဖြစ်သနည်း။	List Crops 1.rice ဆန် 2.sugar cane ကြံ 3.beans ပဲ 4.sesame နှမ်း 5.ground nut မြေပဲ	
	c. Do you use **fertilizer**? အသီးအပင် အားတိုးဆေး သုံးပါသလား။	1.Yes 2.No	
	d. Do you use **pesticide**? ပိုးသတ်ဆေး သုံးပါသလား။	1.Yes 2.No	
	e. Over the last 10 years has **crops** yield? ၁၀ နှစ်အတွင်း အထွက်နှုန်း မည့်သို့ရှိ သနည်း။	A. Increased, တက်သလား B. Decreased or ကျသွားသလား C. Remained stable နဂိုအတိုင်းမပြောင်းမလဲရှိသလား	
	f. What is the cause of change? အဘယ့်ကြောင့် ထို့သို့ ပြောင်းလဲမှု ရှိသနည်း။	List Causes of possible change 1 not enough water ရေမလုံလောက်ခြင်း 2 too much water ရေများလွန်းခြင်း 3 too hot ပူလွန်းခြင်း 4 Change in ecosystem ဂေဟစနစ် ပြောင်းလဲမှု ဖြစ်ပေါ်ခြင်း	
		—	

	g. Are you crops an important food source? i.e. or are they sold စိုက်ပျိုးထားသော ကောက်ပဲသီးနှံများကို ရောင်းချပါသလား။	1.Yes 2.No	
4. Wild Plants တောရိုင်းပင်များ	a. Over the past 10 years has the abundance or distribution of **wild plants**? ၁၀နှစ်အတွင်း အပင်ရိုင်း များ ပေါများမှုမည့်သို့ရှိသနည်း။	A. Increased, တက်သလား B. Decreased or ကျသွားသလား C. Remained stable နဂိုအတိုင်းမပြောင်းမလဲရှိသလား	
	b. Over the past 10 years has the diversity/type of **wild plants**? လွန်ခဲ့သော ၁၀ နှစ်အတွင်း တောရိုင်းအပင် အမျိုးအစားများ မည်သို့ ပြောင်းလဲသနည်း။	A. Increased, တက်သလား B. Decreased or ကျသွားသလား C. Remained the same နဂိုအတိုင်းမပြောင်းမလဲရှိသလား	
	c. If there has been a change in number and or diversity of **wild plants**, why do you think this change has occurred? တောရိုင်းအပင်၏ အရေအတွက်/အမျိုးအစား ပြောင်းလဲလျှင် မည်သည့်အချက် ကြောင့်ပြောင်းလဲသနည်း။	1. Less Harvesting စိုက်ပျိုးခြင်း လျော့နည်းလာခြင်း 2. More Harvesting ပိုစိုက်ပျိုးခြင်း 3. Change in habits/ecosystem ဂေဟစနစ် ပြောင်းလဲလာခြင်း 4. Climate change ရာသီဥတု ပြောင်းလဲခြင်း	
	d. Over the past 10 years has the timing of **flowering** changed in any plants ၁၀နှစ်အတွင်း အပင်များ၏ ပန်းပွင့်သော အချိန် ပြောင်းလဲပါသလား	1.Yes 2.No	
	e. Are these **wild plants an important source of food/medicine**? တောရိုင်းပင်များသည် အစာနဲ့ဆေး အတွက် အရေးပါ ပါသလား။	1.Yes 2.No	
5. Birds General ဌက်	a. Over the past 10 years has the number of wild **birds**? ၁၀ နှစ်အတွင်း ဌက်အရေအတွက် ပြောင်းလဲပါသလား။	A. Increased, တက်သလား B. Decreased or ကျသွားသလား C. Remained the same နဂိုအတိုင်းမပြောင်းမလဲရှိသလား	
	b. Over the past 10 years has the diversity/type of wild **birds**? ၁၀ နှစ်အတွင်း ဌက်မျိုးစိတ် ပြောင်းလဲပါသလား။	A. Increased, တက်သလား B. Decreased or ကျသွားသလား C. Remained the same နဂိုအတိုင်းမပြောင်းမလဲရှိသလား	

	c. If there has been a change in number and or diversity of wild **birds**, why do you think this change has occurred? ဌက်အမျိုးအစားနှင့်အရေအတွက် ပြောင်းလဲမှုဖြစ်ပေါ်ပါလျှင် မည်သည့်အချက်ကြောင့် ပြောင်းလဲပါသနည်း။	1. Less Hunting အမဲလိုက်ခြင်း လျှော့နည်းလာခြင်း 2. More Hunting ပို အမဲလိုက်ခြင်း 3. Change in habits/ecosystem ဂေဟစနစ် ပြောင်းလဲလာခြင်း 4. Climate change ရာသီဥတု ပြောင်းလဲခြင်း	
	d. Are wild birds and important source **food/medicine**? ဌက်များသည် အစာနှဲ့ဆေး အတွက် အရေးပါ ပါသလား။	1.Yes 2.No	
11. Rats and Mice ကြွက်	a. Have you ever seen a **Rats and Mice in this area**? ဤဒေသတွင် ကြွက်ကို မြင်ဖူးပါ သလား။	1.Yes 2.No	
	b. Are **Rats and Mice** common? ဤဒေသတွင် ကြွက် ပေါများပါသလား။	1.Yes 2.No	
	c. Has the number of **Rats and Mice** increased, decreased or remain stable over the past 10 years? ၁၀ နှစ်အတွင်း ကြွက် အရေအတွက် ပြောင်းလဲပါသလား။	A. Increased, တက်သလား B. Decreased or ကျသွားသလား C. Remained the same နဂိုအတိုင်းမပြောင်းမလဲရှိသလား	
	d. Has the diversity/type of **Rats and Mice** increased, decreased or remain stable over the past 10 years? ၁၀ နှစ်အတွင်း ကြွက်မျိုးစိတ် ပြောင်းလဲပါသလား။	A. Increased, တက်သလား B. Decreased or ကျသွားသလား C. Remained the same နဂိုအတိုင်းမပြောင်းမလဲရှိသလား	
	e.If there has been a change in number and or diversity of wild **Rats and Mice**, why do you think this change has occurred? ကြွက်အမျိုးအစားနှင့်အရေအတွက် ပြောင်းလဲမှုဖြစ်ပေါ်ပါလျှင် မည်သည့်အချက်ကြောင့် ပြောင်းလဲပါသနည်း။	1. Less Hunting အမဲလိုက်ခြင်း လျှော့နည်းလာခြင်း 2. More Hunting ပို အမဲလိုက်ခြင်း 3. Change in habits ကျက်စားရာဒေသ ပြောင်းလဲခြင်း 4. Climate change ရာသီဥတု ပြောင်းလဲခြင်း	
	f. Are **Rats and Mice** a source of foods/medicine? ကြွက်များသည် အစာနှဲ့ဆေး အတွက် အရေးပါ ပါသလား။	1.Yes 2.No	
15. Bees ပျား	a. Have you ever seen a **Bees in this area**? ဤဒေသတွင် ပျားများကို မြင်ဖူးပါ သလား။	1.Yes 2.No	
	b. Are **Bees** common? ဤဒေသတွင် ပျားများ ပေါများပါသလား။	1.Yes 2.No	

	c. Has the number of **Bees** increased, decreased or remain stable over the past 10 years? ၁၀ နှစ်အတွင်း ပျားအရေအတွက် ပြောင်းလဲပါသလား။	A. Increased, တက်သလား B. Decreased or ကျသွားသလား C. Remained the same နဂိုအတိုင်းမပြောင်းမလဲရှိသလား	
	d. Has the diversity/type of **Bees** increased, decreased or remain stable over the past 10 years? ၁၀ နှစ်အတွင်း ပျားမျိုးစိတ် ပြောင်းလဲပါသလား။	A. Increased, တက်သလား B. Decreased or ကျသွားသလား C. Remained the same နဂိုအတိုင်းမပြောင်းမလဲရှိသလား	
	e.If there has been a change in number and or diversity of wild **Bees**, why do you think this change has occurred? ပျားအမျိုးအစားနှင့်အရေအတွက် ပြောင်းလဲမှုဖြစ်ပေါ်ပါလျှင် မည်သည့်အချက်ကြောင့် ပြောင်းလဲပါသနည်း။	1. Less Hunting အမဲလိုက်ခြင်း လျော့နည်းလာခြင်း 2. More Hunting ပို အမဲလိုက်ခြင်း 3. Change in habits ကျက်စားရာဒေသ ပြောင်းလဲခြင်း 4. Climate change ရာသီဥတု ပြောင်းလဲခြင်း	
	f. Are **Bees** a source of foods/medicine? ပျားများသည် အစာနဲ့ဆေး အတွက် အရေးပါ ပါသလား။	1.Yes 2.No	
16. Butterflies **လိပ်ပြာ**	a. Have you ever seen a **Butterflies in this area**? ဤဒေသတွင် လိပ်ပြာများကို မြင်ဖူးပါ သလား။	1.Yes 2.No	
	b. Are **Butterflies** common? ဤဒေသတွင် လိပ်ပြာများ ပေါများပါသလား။	1.Yes 2.No	
	c. Has the number of **Butterflies** increased, decreased or remain stable over the past 10 years? ၁၀ နှစ်အတွင်း လိပ်ပြာအရေအတွက် ပြောင်းလဲပါသလား။	A. Increased, တက်သလား B. Decreased or ကျသွားသလား C. Remained the same နဂိုအတိုင်းမပြောင်းမလဲရှိသလား	
	d. Has the diversity/type of **Butterflies** increased, decreased or remain stable over the past 10 years? ၁၀ နှစ်အတွင်း လိပ်ပြာမျိုးစိတ် ပြောင်းလဲပါသလား။	A. Increased, တက်သလား B. Decreased or ကျသွားသလား C. Remained the same နဂိုအတိုင်းမပြောင်းမလဲရှိသလား	
	e.If there has been a change in number and or diversity of wild **Butterflies**, why do you think this change has occurred? လိပ်ပြာအမျိုးအစားနှင့်အရေအတွက် ပြောင်းလဲမှုဖြစ်ပေါ်ပါလျှင် မည်သည့်အချက်ကြောင့် ပြောင်းလဲပါသနည်း။	1. Less Hunting အမဲလိုက်ခြင်း လျော့နည်းလာခြင်း 2. More Hunting ပို အမဲလိုက်ခြင်း 3. Change in habits ကျက်စားရာဒေသ ပြောင်းလဲခြင်း 4. Climate change ရာသီဥတု ပြောင်းလဲခြင်း	

	f. Are **Butterflies** a source of foods/medicine? လိပ်ပြာများသည် အစာနှဲ့ဆေး အတွက် အရေးပါ ပါသလား။	1.Yes 2.No	
17. Mosquitoes **ခြင်**	a. Have you ever seen a **Mosquitoes in this area**? ဤဒေသတွင် ခြင်များကို မြင်ဖူးပါ သလား။	1.Yes 2.No	
	b. Are **Mosquitoes** common? ဤဒေသတွင် ခြင်များ ပေါများပါသလား။	1.Yes 2.No	
	c. Has the number of **Mosquitoes** increased, decreased or remain stable over the past 10 years? ၁၀ နှစ်အတွင်း ခြင်အရေအတွက် ပြောင်းလဲပါသလား။	A. Increased, တက်သလား B. Decreased or ကျသွားသလား C. Remained the same နဂိုအတိုင်းမပြောင်းမလဲရှိသလား	
	d. Has the diversity/type of **Mosquitoes** increased, decreased or remain stable over the past 10 years? ၁၀ နှစ်အတွင်း ခြင်မျိုးစိတ် ပြောင်းလဲပါသလား။	A. Increased, တက်သလား B. Decreased or ကျသွားသလား C. Remained the same နဂိုအတိုင်းမပြောင်းမလဲရှိသလား	
	e.If there has been a change in number and or diversity of wild **Mosquitoes**, why do you think this change has occurred? ခြင်အမျိုးအစားနှင့်အရေအတွက် ပြောင်းလဲမှုဖြစ် ပေါ်ပါလျှင် မည်သည့်အချက်ကြောင့် ပြောင်းလဲပါသနည်း။	1. Less Hunting အမဲလိုက်ခြင်း လျော့နည်းလာခြင်း 2. More Hunting ပို အမဲလိုက်ခြင်း 3. Change in habits ကျက်စားရာဒေသ ပြောင်းလဲခြင်း 4. Climate change ရာသီဥတု ပြောင်းလဲခြင်း	
	f. Are **Mosquitoes** a source of foods/medicine? ခြင်များသည် အစာနှဲ့ဆေး အတွက် အရေးပါ ပါသလား။	1.Yes 2.No	
18. Snakes **မြွေ**	a. Have you ever seen a **Snakes in this area**? ဤဒေသတွင် မြွေများကို မြင်ဖူးပါ သလား။	1.Yes 2.No	
	b. Are **Snakes** common? ဤဒေသတွင် မြွေများ ပေါများပါသလား။	1.Yes 2.No	
	c. Has the number of **Snakes** increased, decreased or remain stable over the past 10 years? ၁၀ နှစ်အတွင်း မြွေအရေအတွက် ပြောင်းလဲပါသလား။	A. Increased, တက်သလား B. Decreased or ကျသွားသလား C. Remained the same နဂိုအတိုင်းမပြောင်းမလဲရှိသလား	

	d. Has the diversity/type of **Snakes** increased, decreased or remain stable over the past 10 years? ဘဂ နှစ်အတွင်း မြွေမျိုးစိတ် ပြောင်းလဲပါသလား။	A. Increased, တက်သလား B. Decreased or ကျသွားသလား C. Remained the same နဂိုအတိုင်းမပြောင်းမလဲရှိသလား	
	e.If there has been a change in number and or diversity of wild **Snakes**, why do you think this change has occurred? မြွေအမျိုးအစားနှင့်အရေအတွက် ပြောင်းလဲမှုဖြစ်ပေါ်ပါလျှင် မည်သည့်အချက်ကြောင့် ပြောင်းလဲပါသနည်း။	1. Less Hunting အမဲလိုက်ခြင်း လျှော့နည်းလာခြင်း 2. More Hunting ပို အမဲလိုက်ခြင်း 3. Change in habits ကျက်စားရာဒေသ ပြောင်းလဲခြင်း 4. Climate change ရာသီဥတု ပြောင်းလဲခြင်း	
	f. Are **Snakes** a source of foods/medicine? မြွေများသည် အစာနဲ့ဆေး အတွက် အရေးပါ ပါသလား။	1.Yes 2.No	
19.General Environment	a. Over the past 10 years has natural habitat decreased by over25% ဘဂ နှစ်အတွင်း ကျက်စားရာ ဒေသ ၂၅% ထက်ပို၍ လျော့ကျပါသလား။	1.Yes 2.No	
	b. Over the past 10 years has the amount of wildlife decreased significantly? ဘဂနှစ်အတွင်း တောရိုင်းတိရစ္ဆာန်များ သိသိသာသာ လျော့နည်းပါသလား။	1.Yes 2.No	
	c. Over the past 10 years are there significantly more people in this area? ဘဂနှစ်အတွင်း ဤဒေသတွင် သိသိသာသာ လူပိုများလာပါသလား။	1.Yes 2.No	
	d. Over the past 10 years has the weather changed significantly? ဘဂနှစ်အတွင်း ရာသီဥတု သိသိသာသာ ပြောင်းလဲလာပါသလား။	1.Yes 2.No	

	e. Are the wild plant and animals in this local environment a significant important source of food or medicine? တောရိုင်းအပင် နှင့် တိရစ္ဆာန်များ သည်ဤဒေသတွင် အစာနှံ့ဆေး အတွက် အရေးပါ ပါသလား။	1.Yes 2.No	
	f. Are the wild plant and animals in this local environment a significant important source of income? တောရိုင်းအပင် နှင့် တိရစ္ဆာန်များ သည်ဤဒေသတွင် အရေးပါသော ဝင်ငွေရနိုင်သည့် အလုပ်ဖြစ်ပါသလား။	1.Yes 2.No	

Module J: Household Attitudes

Question		Response categories	Skip	Response
Awareness and Attitude about the project				
j1	ယခုစက်ရုံ အကြောင်းကို သင်မည်မျှ သိပါသနည်း။	Nothing at all.....1 A little .....2 Some .....3 A lot 4	>>j3	__|__|
j2	ယခုစက်ရုံ ကို မည်သူဆီမှ သင်သိရှိပါသနည်း။	Government agencies ..... 1 Community Leader ..... 2 Media ..... 3 Family members/Friends ..... 4 Surveyors/ Interviewers ..... 5 Other(Specify) ..... 6 No 2		__|__|
J3	ယခုစက်ရုံ သည် လူမှု ပတ်ဝန်းကျင် အတွက် မည်မျှအရေးကြီးပါသနည်း။	Not extremely important.....1 Not very important .....2 Not important .....3 Normal .....4 important .....5 Very important .....6 Extremely important.....7 Unaware 8		__|__|
J4	ယခင်က 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 များမှနစ်နာကြေးနှင့်ပက်သက်ပြီးဆွေးနွေးဖူးပါသလား	Yes .....1 No.....2		__|__|
J8	ယခုစက်ရုံ၏ကောင်းသော အကျိုးသက်ရောက်မှုများ ကြောင့် သင်တို့အပေါ်မည်သည့်အရာများ စွမ်းဆောင်ပေး နိုင်မည်ဟု ထင်ပါသနည်း။ (အရေးကြီးဆုံးအချက်)	Unaware .....1 Increase employment.....2 Increase annual income .....3 Improve living condition .....4 Improved transport/infrastructure ... 5 Compensation for land used .....6 Improved environment 7		__|__|
J9	ယခုစက်ရုံ၏ တိုးတက်ဖွံ့ဖြိုးမှုအတွက် သဘောတူညီမှု ရှိပါသလား။	Yes.....1 No.....2 Not sure 3		__|__|

K10. Perceptions on Impacts of the Project

		Very negative	Negative	Slightly negative	No effect	Slightly positiv	Positive	Very positiv	
The effect on Physical Resources									
1	Soil quality	1	2	3	4	5	6	7	
2	Surface water quality	1	2	3	4	5	6	7	
3	Ground water quality	1	2	3	4	5	6	7	
4	Air quality	1	2	3	4	5	6	7	
5	Noise	1	2	3	4	5	6	7	
Effect on Biological Resource									
6	Forestry and conservation areas	1	2	3	4	5	6	7	
7	Agriculture/ Farming areas	1	2	3	4	5	6	7	
8	Local animals	1	2	3	4	5	6	7	
9	Pasture	1	2	3	4	5	6	7	
10	Aquatic animals	1	2	3	4	5	6	7	
Effect on Human Use									
11	Local Fisheries	1	2	3	4	5	6	7	
12	Local Livestock	1	2	3	4	5	6	7	
13	Local Vegetation	1	2	3	4	5	6	7	
14	Local Industry	1	2	3	4	5	6	7	
15	Local Transportation	1	2	3	4	5	6	7	
16	Local Price	1	2	3	4	5	6	7	
17	Recreation	1	2	3	4	5	6	7	
18	Local Economy	1	2	3	4	5	6	7	
Effect on Quality of Life									
19	Housing	1	2	3	4	5	6	7	
20	Health	1	2	3	4	5	6	7	
21	Education	1	2	3	4	5	6	7	
22	Spiritual	1	2	3	4	5	6	7	
23	Safety	1	2	3	4	5	6	7	
23	Crime	1	2	3	4	5	6	7	
23	Family Structure	1	2	3	4	5	6	7	
24	Job opportunities	1	2	3	4	5	6	7	
25	Income	1	2	3	4	5	6	7	
26	Scenery	1	2	3	4	5	6	7	
27	Local Culture	1	2	3	4	5	6	7	
Effect on Cultural Heritage									
28	Religious Building	1	2	3	4	5	6	7	
29	Cemetery	1	2	3	4	5	6	7	
30	Historic buildings/sites	1	2	3	4	5	6	7	

"CHECK the whole questionnaire AGAIN, THANK the respondent and FINISH interview."

****** indicates the question has skip (>>).

Cultural Heritage Questionnaire

1. Actual location of Pagodas and Monasteries
ဘုရား၊ဘုန်းကြီးကျောင်းများ၏တည်နေရာ

2. Location of Cultural Heritage Places;
ယဉ်ကျေးမှုဆိုင်ရာ ထိန်းသိမ်းနယ်မြေများ၏ တည်နေရာ

3. Location of Cemetaries
သချိုင်းများ၏တည်နေရာ

4. Location of local archeological sites
ရှေးဟောင်းအမွေအနှစ်အဆောက်အအုံများ၏ တည်နေရာ

5. Dates of Important Cultural Activities
အရေးပါသော ယဉ်ကျေးမှုဆိုင်ရာ လုပ်ငန်းဆောင်တာများအတွက် နေ့ ရက်များ