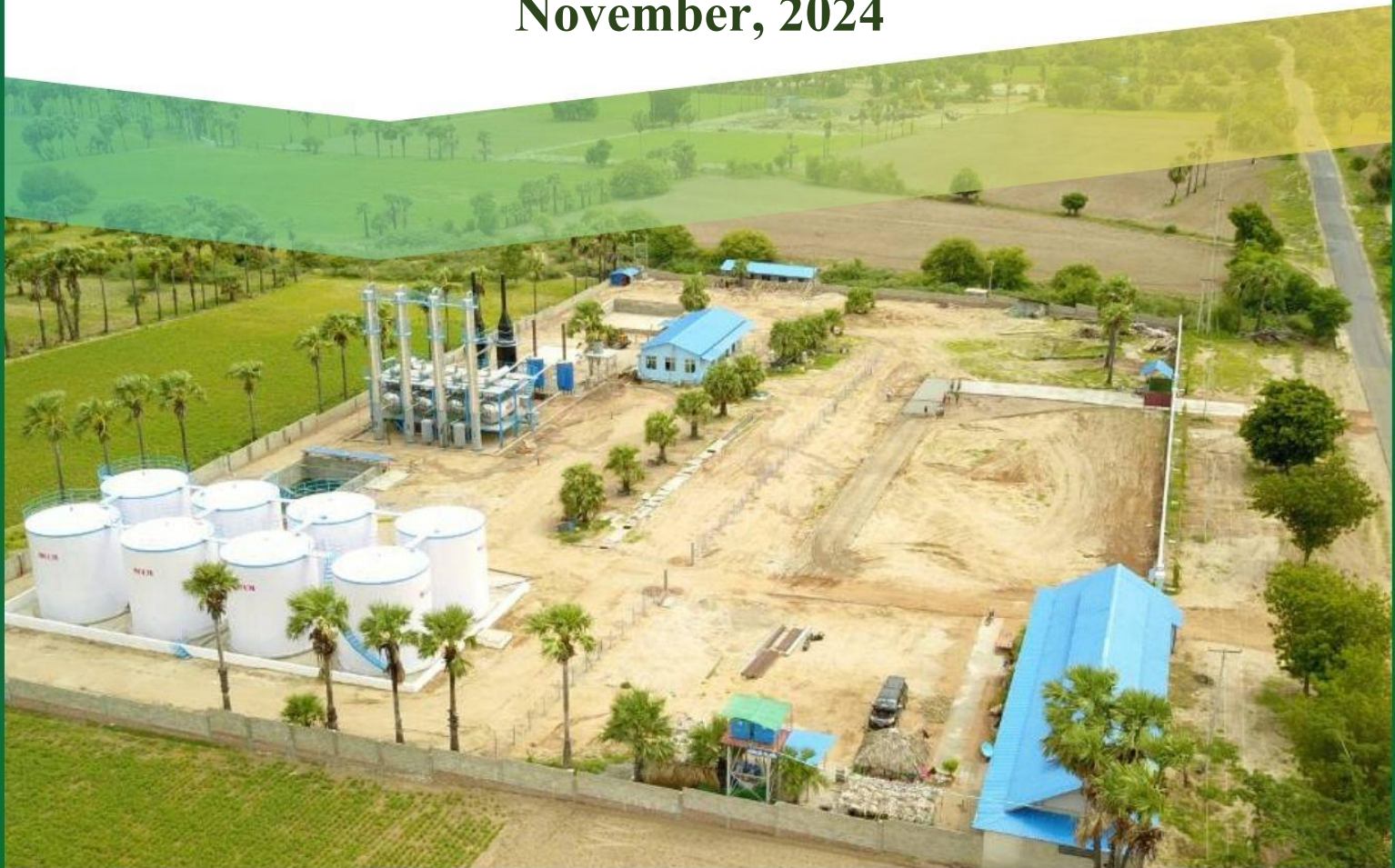




MCCM COMPANY LIMITED
မာမိမိမာမိ ကုမ္ပဏီ လီမိတက်

MCCM COMPANY LIMITED

**Environmental Impact Assessment (EIA)
Report for Petroleum Mini Refinery
Approve Report
November, 2024**



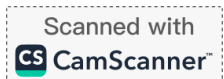
**Prepared by:
Hexagonal Angle
International Consultants Co., Ltd.**

ကတိကဝတ်များ

- (က) ဤပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း အစီရင်ခံစာ (EIA) တွင် ပါဝင်သော ကတိကဝတ်များနှင့် သက်ဆိုင်ရာဥပဒေများကို တိကျစွာ လိုက်နာဆောင်ရွက်ပါမည်။
- (ခ) အစီရင်ခံစာပါ ပတ်ဝန်းကျင်အရည်အသွေး တန်ဖိုးများကိုလည်း လုပ်ငန်း ဖော်ဆောင်မှု ကြောင့် သက်ရောက်မှု မရှိအောင် ထိန်းသိမ်းကာကွယ်သွားပါမည်။
- (ဂ) MCCM Company Limited ၏ အသေးစားရေနံချက်လုပ်ငန်းဆောင်ရွက်ခြင်းကြောင့် ပတ်ဝန်းကျင်နှင့် လူမှုဝန်းကျင်အပေါ် ဖြစ်ပေါ်နိုင်သော ဆိုးကျိုးသက်ရောက်မှုများအတွက် လျော့ချရေး လုပ်ငန်းစဉ်များနှင့် အစီအစဉ်များကိုလည်း အပြည့်အဝ အစဉ်အမြဲ လိုက်နာ ဆောင်ရွက်သွားပါမည်။
- (ဃ) ကောင်းကျိုးသက်ရောက်မှုများကိုလည်း ပိုမိုကောင်းမွန်အောင် လုပ်ဆောင်သွားပါမည်။
- (င) ပတ်ဝန်းကျင်စောင့်ကြပ်ကြည့်ရှုရမည့် အစီအစဉ်တွင် ပါဝင်သော စောင့်ကြည့်ရမည့် ကဏ္ဍများကိုလည်း သေချာစွာ လိုက်နာဆောင်ရွက်ပါမည်။
- (စ) စောင့်ကြပ်ကြည့်ရှုရမည့် အစီအစဉ်အတွက် အသုံးပြုမည့် လျာထားရန်ပုံငွေ၊ ထိခိုက်မှု လျော့ပါးစေရေးအတွက် ရန်ပုံငွေ၊ ဘေးအန္တရာယ် ကာကွယ်ရေး အစီအစဉ်၊ အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးခြင်းနှင့် ဒေသဖွံ့ဖြိုးရေး လုပ်ငန်းများအတွက်ရန်ပုံငွေ စသည့် လျာထားရန်ပုံငွေများ အတိုင်း လိုက်နာဆောင်ရွက်မည်ဖြစ်ကြောင်းနှင့် အဆိုပါ လျာထား ရန်ပုံငွေသည် လုံလောက်မှုမရှိပါက ကုမ္ပဏီမှ ထပ်မံထည့်သွင်း ဆောင်ရွက် သွားပါမည်။
- (ဆ) စီမံကိန်းလုပ်ငန်းများပြီးစီး၍ ပိတ်သိမ်းချိန်တွင်လည်း ပတ်ဝန်းကျင်နှင့် လူမှုဝန်းကျင် အပေါ်သက်ရောက်မှုအနည်းဆုံးဖြစ်အောင် ဆောင်ရွက်မည်ဖြစ်ပြီး၊ အကယ်၍ သက်ရောက်မှုများ ဖြစ်ပေါ်နိုင်ခြေရှိလျှင် ကြိုတင်အစီအစဉ်များ ရေးဆွဲ၍ ဆောင်ရွက် သွားမည်ဖြစ်ကြောင်း ကတိကဝတ် ပြုပါသည်။
- (ဇ) ကုန်ကြမ်းများသယ်ဆောင်ခြင်း၊ ဝယ်ယူခြင်းများနှင့်ပတ်သတ်၍ လိုင်စင်ရှိသော ဒေသန္တရ လုပ်ငန်းရှင်များနှင့် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနမှ ချမှတ်ထားရှိသော ဥပဒေ၊ နည်းဥပဒေ၊ လုပ်ထုံးလုပ်နည်းများနှင့်အညီ ဆောင်ရွက်သည့်လုပ်ငန်းရှင်များထံမှ ဝယ်ယူမည်ဖြစ်ကြောင်း ကတိကဝတ်ပြုပါသည်။


Myint Maung
Managing Director
MCCM Co., Ltd.

MCCM Co., Ltd



အကြံပေးအဖွဲ့အစည်း၏ဝန်ခံချက်

ဤပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း အစီရင်ခံစာအား ကျွန်ုပ်တို့၏ ဟက်ဇဂွန်နယ် အန်ဂယ် နိုင်ငံတကာ အကြံပေးများ ကုမ္ပဏီလီမိတက်မှ တာဝန်ယူရေးဆွဲဆောင်ရွက်ထားကြောင်း ဝန်ခံ ကတိပြု ပါသည်။

- (က) ဤပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း (EIA) အစီရင်ခံစာ ရေးဆွဲရန် အကြံပေးအဖွဲ့အစည်း ရွေးချယ်ခြင်း အတည်ပြုချက်အား သယံဇာတနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ဝန်ကြီးဌာန၊ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ဦးစီးဌာန၊ နေပြည်တော်မှ ၂၀၂၁ ခုနှစ်၊ ဩဂုတ်လ၊ (၂၀) ရက်စွဲပါ စာအမှတ် အီးအိုင်အေ-၂/၂/(ရေန်) (၁၃၆၉ / ၂၀၂၁) ဖြင့် ရရှိ ပြီးဖြစ်ကြောင်း ဝန်ခံပါသည်။
- (ခ) ဤပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း (EIA) အစီရင်ခံစာအား တိကျခိုင်မာမှုများနှင့် ပြည့်စုံစွာ ဆောင်ရွက် ထားပါသည်။
- (ဂ) အစီရင်ခံစာကို ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း (၂၀၁၅)၊ သက်ဆိုင်ရာ ဥပဒေများ၊ မူဘောင်များနှင့်အညီ ရေးဆွဲထားပါသည်။
- (ဃ) ပတ်ဝန်းကျင်အရည်အသွေး တန်ဖိုးများကိုလည်း အရည်အသွေးပြည့်မီသော စက်ပစ္စည်းများ ဖြင့်သော်လည်းကောင်း၊ အရည်အသွေးတန်ဖိုးများကို ဓာတ်ခွဲခန်းများ သို့ ဝိုဆောင်၍ သော်လည်းကောင်း တိုင်းတာထားပါသည်။
- (င) အသေးစားရေနံချက်လုပ်ခြင်းလုပ်ငန်းစီမံကိန်းကြောင့် ဖြစ်ပေါ်နိုင်သော သက်ရောက်မှုများ ကို လုပ်ငန်းဆိုင်ရာ နားလည်တတ်ကျွမ်းမှုနှင့် စုံစမ်းရရှိသော အချက်အလက်များကို အခြေခံ၍ လေ့လာ ဆန်းစစ် ဖော်ထုတ်ထားပါသည်။
- (စ) ဤပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း(EIA)အစီရင်ခံစာတွင် ဖော်ပြပါရှိသော စီမံကိန်း အကြောင်းအရာ ဖော်ပြချက်များ၊ ရှင်းလင်းဖော်ပြချက်များသည် စီမံကိန်း တာဝန်ရှိသူထံမှ ရရှိလာသော အချက်အလက်များပေါ်တွင် အခြေခံ၍ ရေးသား ပြုစု ထားပါသည်။
- (ဆ) ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း လေ့လာမှုနှင့် စုံစမ်းစစ်ဆေးမှုများအား ဖော်ပြရာတွင် စီမံကိန်းကြောင့် သက်ရောက်နိုင်မည့် အနီးပတ်ဝန်းကျင် အခြေအနေများ၊ ဇီဝမျိုးစုံမျိုးကွဲများ နှင့် ဒေသခံပြည်သူများ စသည့် အချက်အလက်များအပေါ် အခြေခံ၍ ထည့်သွင်းစဉ်းစားပြီး ရေးဆွဲထားပါသည်။
- (ဇ) ဤပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း(EIA)အစီရင်ခံစာအား ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း ပြုလုပ်ရန် လိုအပ်သော လုပ်ငန်းတာဝန်များနှင့် အညီ တိကျစွာ လိုက်နာ ပြုစုထားပါကြောင်း ဝန်ခံပါသည်။



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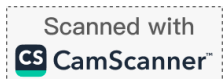


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LIST OF ABBREVIATION

%	- Percentage
%LEL	- Percentage of Lower Explosive Limits
%Vol	- Percentage of Volume
&	- And
°C	- Degree Celsius
µg/m ³	- Microgram per Cubic Meter
µS/cm	- Microsiemens per Centimeter
3R	- Reuse, Reduce and Recycle
ADB	- Asian Development Bank
Al ³⁺	- Aluminum
AM	- Ante Meridiem
AQI	- Air Quality Index
ASTM	- American Society for Testing and Materials
AWWA	- American Water Works Association
BANCA	- Biodiversity and Nature Conservation Association
BOD	- Biological Oxygen Demand
BTEX	- Benzene, Toluene, Ethylbenzene and Xylene
C	- Consequence
Ca ⁺⁺	- Calcium
CBD	- Convention on Biological Diversity
CCET	- Center for Communication and Educational Technology
CCTV	- Closed-circuit Televisions
CDIA	- Cities Development Initiative for Asia
CEC	- Cation Exchange Capacity
CEDAW	- Convention on Elimination of All Forms of Discrimination against women
CH ₄	- Methane
CITES	- Convention on International Trade in Endangered Species of Wild Fauna and Flora
cm	- Centimeter
CO	- Carbon Monoxide
Co., Ltd.	- Company Limited
CO ₂	- Carbon Dioxide
COD	- Chemical Oxygen Demand
CSR	- Corporate Social Responsibility
D	- Duration of the Impact
dB(A)	- Decibel A
DD	- Data Deficient
DIN	- Dissolved Inorganic Nitrogen
DO	- Dissolved Oxygen
E	- Extent of the Impact
EC	- Electric Conductivity
ECC	- Environmental Compliance Certificate
ECD	- Environmental Conservation Department
ECL	- Environmental Conservation Law
ECRs	- Environmental Conservation Rules
EHS	- Environmental Health and Safety
EI	- Environmental Impact
EIA	- Environmental Impact Assessment
EMP	- Environmental Management Plan
EMS	- Environmental Management System
EN	- Endangered species
EPA	- Environmental Protection Agency
ER	- Environmental Risk

ESIA	- Environmental and Social Impact Assessment
ETC	- Environmental Technology Centre
F.O	- Fuel Oil (Heating Oil)
FAU	- Formazine Attenuation Unit
FCCC	- Framework Convention on Climate Change
FCCU	- Fluid Catalytic Cracking Unit
FESR	- Framework for Economic and Social Reform
FGD	- Focused Group Discussion
FGDs	- Focused Group Discussions
ft	- Feet
GHG	- Greenhouse Gas
GHS	- Globally Harmonized System
GIS	- Geographic Information System
GPS	- Global Positioning System
GRM	- Grievance Redress Mechanism
H ⁺	- Hydrogen Ion
H ₂ S	- Hydrogen Sulfide
HA	- Hexagonal Angle International Consultants Co., Ltd
HCHO	- Formaldehyde
HP	- Horsepower
hPa	- Hectopascals
hr	- Hour
HSE	- Health, Safety and Environment
HU	- Hazen Units
I	- Intensity of the Impact
IEE	- Initial Environmental Examination
IFC	- International Finance Corporation
IGES	- Institute for Global Environmental Strategies
ILO	- International Labor Organization
ISO	- International Organization for Standardization
ITTA	- International Tropical Timber Agreement
IUCN	- International Union for Conservation of Nature
IVI	- Important Value Index
K ⁺	- Potassium
kg	- Kilogram
km	- Kilometer
km/h	- Kilometer per hour
km ²	- Kilometer square
KVA	- Kilo-Volt-Ampere
kw	- Kilowatt
LC	- Least Concern species
LOD	- Lower-limit of detection
LPG	- Liquefied Petroleum Gas
M	- Magnitude of the Impact
m	- Meter
m/s	- Meters per Second
m/s ²	- Meter per Second Squared
m ³ /h	- cubic meter per hour
MCCP	- Myanmar Climate Change Policy' principles
MCCS	- Myanmar Climate Change Strategy
MCDC	- Mandalay City Development Committee
Meq/100g	- Milliequivalents per 100 grams
mg/l	- Milligram per liter
mg/m ³	- Milligram per Cubic Meter

mg/Nm ³	- Milligrams per Cubic Nanometer
Mg ⁺⁺	- Magnesium Ion
MIC	- Myanmar Investment Commission
min	- Minute
mm/s	- Millimeters per Second
MMK	- Myanmar Kyat
MOALI	- Ministry of Agriculture, Livestock and Irrigation
MOECAF	- Ministry of Environmental Conservation and Forestry
MOLES	- Ministry of Labour, Immigration and Population
MONREC	- Ministry of Natural Resources and Environmental Conservation
MPN/100 ml	- Most Probable Number per 100 Milliliters
ms/cm	- MilliSiemens per Centimeter
MSDP	- Myanmar Sustainable Development Plan
N	- Nitrogen
NA	- No Emissions Guideline
Na ⁺	- Sodium
NAPA	- National Adaptation Program of Action
NBSAP	- National Biodiversity Strategy Action Plans
NCDP	- National Comprehensive Development Plan
NDC	- Nationally Determined Contribution
NECC	- National Environmental Conservation Committee
NEQEG	- National Environmental Quality (Emission) Guideline
NG	- No Guideline
NH ₃	- Ammonia
NO ₂	- Nitrogen Dioxide
NO _x	- Nitrogen Oxide
NT	- Nearly Threatened species
NW	- North West
O ₃	- Ozone
OHS	- Occupational Health and Safety
P	- Probability
PAP	- Project Affected Person
PCM	- Public Consultation Meeting
pcs	- Pieces
PD	- Public Disclosure
PDCA	- Plan Do Check Act
PEL	- Permissible Exposure Limit
PF	- Prioritization Factor
pH	- Percentage of Hydrogen
PM	- Post Meridiem
PM ₁	- Particulate Matter 1 micrometers or less in diameter
PM ₁₀	- Particulate Matter 10 micrometers or less in diameter
PM _{2.5}	- Particulate Matter 2.5 micrometers or less in diameter
PPAH	- Pollution Prevention and Abatement Handbook
PPE	- Personal Protective Equipment
ppm	- Parts per million
QC	- Quality Control
QGIS	- Quantum Geographic Information System
QMS	- Quality Management Standard
R	- Reversibility of the Impact
r/min	- Rotation per Minute
Rd	- Relative Dominance
RF	- Relative Frequency
RH%	Relative Humanity Percentage
S	- Significance

S.U.	- Standard Unit
SE	- South East
SIA	- Social Impact Assessment
SO ₂	- Sulphur Dioxide
SO _x	- Sulphur Oxide
SRU	- Sulfur Recovery Unit
SW	- South West
T	- Type of the Impact
TB	- Tuberculosis
TDS	- Total Dissolved Solids
TSP	- Total Suspended Particles
TSS	- Total Suspended Solids
TVOC	- Total Volatile Organic Compounds
U.S EPA	- United States Environmental Protection Agency
UN	- United Nations
UNCCD	- United Nations Convention to Combat Desertification
UNDHR	- Universal Declaration of Human Rights
UNEP	- United Nations Environment Program
UNESCO	- United Nations Educational Scientific and Cultural Organization
UNFCCC	- United Nations Framework Convention on Climate Change
UTM	- Universal Transverse Mercator
V	- Volts
VOC	- Volatile Organic Compounds
WD	- Wind Direction
WHH	- Women Headed Households
WHO	- World Health Organization
WS	- Wind Speed
YCDC	- Yangon City Development Committee

အစီရင်ခံစာအကျဉ်းချုပ်

၁။ နိဒါန်း

MCCM Company Limited သည် မြန်မာနိုင်ငံ ကုမ္ပဏီများ အက်ဥပဒေ ၁၉၁၄ ခုနှစ်အရ ၂၀၁၈ ခုနှစ်၊ ဇွန်လ ၄ ရက်နေ့တွင် အစုရှယ်ယာအားဖြင့် တာဝန်ကန့်သတ်ထားသည့် အများနှင့်မသက်ဆိုင်သော ကုမ္ပဏီ (၁၀၀ ရာခိုင်နှုန်း မြန်မာနိုင်ငံသားရင်းနှီးမြှုပ်နှံမှု) အဖြစ် ဖွဲ့စည်းမှတ်ပုံတင်ခဲ့ပါသည်။ အဆိုပြု စီမံကိန်း၏ ရင်းနှီးမြှုပ်နှံမည့် သက်တမ်းကာလမှာ (၃၀) နှစ်ဖြစ်ပြီး ရင်းနှီးမြှုပ်နှံမည့် တန်ဖိုးပမာဏမှာ မြန်မာကျပ်ငွေ ၂၅ ဘီလီယံ ဖြစ်ပါသည်။ ကုမ္ပဏီမှတ်ပုံတင်အမှတ်မှာ ၁၀၃၉၄၅၂၃၂ ဖြစ်ပါသည်။

၂။ ဥပဒေရေးရာပြဋ္ဌာန်းချက်များ

အဆိုပြုထားသော စီမံကိန်း၏ ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှုသည် ပတ်ဝန်းကျင် ထိန်းသိမ်း စောင့်ရှောက်ရေး နည်းဥပဒေ ၅၀/၂၀၁၄၊ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း အမိန့်ကြေငြာစာအမှတ် ၆၁၆/၂၀၁၅ နှင့် ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်းဆိုင်ရာ အထွေထွေ လမ်းညွှန်ချက်၊ စက်တင်ဘာလ ၂၀၁၇ တို့နှင့် အညီ သဘာဝပတ်ဝန်းကျင်ဆန်းစစ်ခြင်းအစီရင်ခံစာကို ပြုစု ရေးသားရမည်ဖြစ်သည်။ ထို့ကြောင့် အမ်စီစီအမ်ကုမ္ပဏီလီမိတက်သည် ရေနံချက်စက်ရုံ လုပ်ငန်းစဉ်များအား ဖော်ဆောင်ရာတွင် လိုအပ်သည့် ဥပဒေရေးရာ စီမံထားရှိချက်များအား မဖြစ်မနေ အတည်ပြု အကောင်အထည်ဖော် ဆောင်ရွက်ရမည်ဖြစ်သည်။ လက်ရှိတွင် မြန်မာနိုင်ငံရှိ တည်ဆဲဥပဒေမူဘောင်သည် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးကို အထောက်အကူပြုရန် အပြည့်အဝ မဖွံ့ဖြိုးသေးသည့်အပြင် အချို့သော ဥပဒေများသည် အခြေခံမူများသာဖြစ်သောကြောင့် ထိရောက်သော သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးကို အကောင်အထည်ဖော်ရာတွင် စည်းမျဉ်း၊ စည်းကမ်းများ ပိုမိုလိုအပ်ပါသည်။ ဤအစီရင်ခံစာတွင် အမ်စီစီအမ်ကုမ္ပဏီလီမိတက်သည် လက်ရှိပြဋ္ဌာန်းထားသော ဥပဒေပြဋ္ဌာန်းချက်များမှ စီမံကိန်းလိုအပ်ချက်အရ သက်ဆိုင်ရာ ဥပဒေအစိတ်အပိုင်း၊ အချက်အလက်များကိုသာ ဖော်ပြထားရှိခြင်း ဖြစ်ပါသည်။ အဆိုပြုစီမံကိန်းအတွက် ဖော်ပြထားသော စည်းမျဉ်း၊ စည်းကမ်းများ၊ ဥပဒေမူဘောင်များ၏ အကျဉ်းချုပ်နှင့် မြန်မာနိုင်ငံ၏ အခြေအနေ၊ လိုအပ်ချက်များနှင့် ကိုက်ညီသော စည်းမျဉ်း၊ စည်းကမ်းနှင့် မူဘောင်များဆိုင်ရာ

အကြံပြုချက်များသည် ဤနယ်ပယ် အတိုင်းအတာ သတ်မှတ်ခြင်း အစီရင်ခံစာနှင့် ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း အစီရင်ခံစာတွင် အကျုံးဝင်မည်ဖြစ်သည်။

သဘာဝပတ်ဝန်းကျင်ဆိုင်ရာ စည်းမျဉ်း၊ စည်းကမ်းများနှင့် ဥပဒေမူဘောင်များသည် လူသားများ၊ တိရစ္ဆာန်များ၊ အရင်းအမြစ်များနှင့် နေထိုင်ရာ သဘာဝပတ်ဝန်းကျင်ကို ကာကွယ်ရာတွင် အရေးကြီးသော အခန်းကဏ္ဍမှ ပါဝင်သည်။ ကွန်ဗင်းရှင်းများ၏ တရားဝင်လက်မှတ်ရေးထိုးထားသော ရက်စွဲများအား ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း အစီရင်ခံစာတွင် ဖြည့်စွက်ဖော်ပြသွားမည်ဖြစ်သည်။ သဘာဝပတ်ဝန်းကျင်ဆိုင်ရာ အမျိုးသားအဆင့် ဥပဒေမူဘောင်နှင့် သက်ဆိုင်ရာမူဝါဒများ၏ အဓိက ရည်ရွယ်ချက်များမှာ ထိရောက်သော လျှော့ချရေးအစီအစဉ်များ ဆောင်ရွက်ရန်၊ သဘာဝပတ်ဝန်းကျင်နှင့် လူမှုစီးပွားရေးဆိုးကျိုးများကို တတ်နိုင်သမျှ ရှောင်ရှားရန်နှင့် စီမံကိန်းကြောင့်ဖြစ်ပေါ်လာသည့် ကောင်းသော သက်ရောက်မှုများကို ရေရှည်တည်တံ့စေရန် ရည်ရွယ်သည်။ ဤအစီရင်ခံစာတွင် ဖော်ပြထားသော သဘာဝပတ်ဝန်းကျင်ဆိုင်ရာ ဥပဒေများ၊ စည်းမျဉ်း၊ စည်းကမ်းများ၊ ဥပဒေမူဘောင်များနှင့် လမ်းညွှန်ချက်များမှာ အောက်ပါအတိုင်းဖြစ်သည်။

ဇယား ၁ သက်ဆိုင်သော ဥပဒေ နှင့် နည်းဥပဒေများ

စဉ်	ဥပဒေနှင့် နည်းဥပဒေများ	ထုတ်ပြန်သည့် ခုနှစ်	ပုဒ်မ
ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး			
၁	ပြည်ထောင်စု သမ္မတမြန်မာနိုင်ငံတော်ဖွဲ့စည်းပုံအခြေခံဥပဒေ	၂၀၀၈	၃၇၊ ၄၅၊ ၃၉၀
၂	ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဥပဒေ	၂၀၁၂	၇(ဏ)၊ ၁၄၊ ၁၅၊ ၂၄၊ ၂၉
၃	ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးနည်းဥပဒေများ	၂၀၁၄	၆၉(က)၊ (ခ)
၄	ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း	၂၀၁၅	၁၀၂၊ ၁၀၃၊ ၁၀၄၊ ၁၀၅၊ ၁၀၆၊ ၁၀၇၊ ၁၀၈၊ ၁၀၉၊ ၁၁၀၊ ၁၁၃၊ ၁၁၅၊ ၁၁၇
၅	အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များ	၂၀၁၅	-
သစ်တော၊ ဇီဝမျိုးစုံမျိုးကွဲနှင့် သဘာဝရင်းမြစ်များ			
၆	သစ်တောဥပဒေ	၂၀၁၈	၁၂ (က)
၇	သစ်တောနည်းဥပဒေများ	၁၉၉၅	၂၀၊ ၃၆၊ ၆၀

စဉ်	ဥပဒေနှင့် နည်းဥပဒေများ	ထုတ်ပြန်သည့် ခုနှစ်	ပုဒ်မ
၈	ဇီဝမျိုးစုံမျိုးကွဲနှင့် သဘာဝထိန်းသိမ်းရေးနယ်မြေများ ကာကွယ်စောင့်ရှောက်ခြင်းဆိုင်ရာဥပဒေ၊	၂၀၁၈	၃၅ (က), (ဂ), (ဃ), ၂၉ (င), ၃၉ (ဃ)
၉	ရေအရင်းအမြစ်နှင့်မြစ်ချောင်းများထိန်းသိမ်းရေးဥပဒေ	၂၀၀၆ (ပြင်ဆင် ၂၀၁၇)	၆, ၈ (က), ၁၁, ၁၉, ၂၁ (ခ), ၂၂, ၂၄ (ခ), ၃၀
၁၀	ရေအရင်းအမြစ်နှင့်မြစ်ချောင်းများထိန်းသိမ်းရေးနည်းဥပဒေများ	၂၀၁၃	-
၁၁	မြေအောက်ရေအက်ဥပဒေ	၁၉၃၀	၃, ၅
လူ့အခွင့်အရေးနှင့် ယဉ်ကျေးမှုအမွေအနှစ်ဆိုင်ရာ			
၁၂	တိုင်းရင်းသားလူမျိုးများ၏ အခွင့်အရေး ကာကွယ်စောင့်ရှောက်သည့်ဥပဒေ	၂၀၁၅	၅
၁၃	တိုင်းရင်းသားလူမျိုးများ၏ အခွင့်အရေး ကာကွယ်စောင့်ရှောက်သည့်နည်းဥပဒေများ	၂၀၁၉	၂၀, ၂၁
၁၄	ယဉ်ကျေးမှုအမွေအနှစ်ဒေသများ ကာကွယ်စောင့်ရှောက်ရေးဥပဒေ	၁၉၉၈ (ပြင်ဆင် ၂၀၁၉)	၂၁ (ခ)
၁၅	ရှေးဟောင်းဝတ္ထုပစ္စည်းများ ကာကွယ်စောင့်ရှောက်ရေး ဥပဒေ	၂၀၁၅	၃, ၁၂, ၁၃
၁၆	ရှေးဟောင်းအဆောက်အအုံများ ကာကွယ်စောင့်ရှောက်ရေးဥပဒေ	၂၀၁၅	၁၂, ၁၅, ၂၀ (စ)
ကျန်းမာရေးဆိုင်ရာ			
၁၇	ပြည်သူ့ကျန်းမာရေးဆိုင်ရာဥပဒေ	၁၉၇၂	၃, ၅
၁၈	ကူးစက်ရောဂါများ ကာကွယ်နှိမ်နင်းရေး ဥပဒေ	၁၉၉၅	၃ (က) (၉), ၄, ၁၁
၁၉	ဆေးလိပ်နှင့် ဆေးရွက်ကြီးထွက်ပစ္စည်းသောက်သုံးမှု ထိန်းချုပ်ရေးဥပဒေ	၂၀၀၆	၉
မြေအသုံးချရေးဆိုင်ရာ			
၂၀	လယ်ယာမြေဥပဒေ	၂၀၁၂	၃၀
၂၁	မြေလွတ်၊ မြေလပ်နှင့်မြေရိုင်းများ စီမံခန့်ခွဲရေးဥပဒေ	၂၀၁၂ (ပြင်ဆင် ၂၀၁၈)	၁၀ (က), ၁၉ (က), (ဃ)
မြို့ပြဖွံ့ဖြိုးတိုးတက်ရေးနှင့် စက်မှုလုပ်ငန်းဆိုင်ရာ			
၂၂	ရေနံနှင့် ရေနံထွက်ပစ္စည်းဆိုင်ရာဥပဒေ	၂၀၁၇	၈ (က), (ဂ), ၉ (က), (င), ၁၀

စဉ်	ဥပဒေနှင့် နည်းဥပဒေများ	ထုတ်ပြန်သည့် ခုနှစ်	ပုဒ်မ
			(က), (ခ), (ဃ), (င), ၁၁
၂၃	စံချိန်စံညွှန်းသတ်မှတ်ခြင်းဆိုင်ရာဥပဒေ	၂၀၁၄	၁၆, ၁၇, ၁၉
၂၄	အင်ဂျင်နီယာကောင်စီဥပဒေ	၂၀၁၃	၃၄
၂၅	အလုပ်ရုံများဥပဒေ	၁၉၅၁ (ပြင်ဆင် ၂၀၁၆)	၇, ၄၇, ၄၈, ၄၉, ၆၂
၂၆	ပုဂ္ဂလိကစက်မှုလုပ်ငန်းဥပဒေ	၁၉၉၀	၂၇
၂၇	ဓာတုပစ္စည်းနှင့်ဆက်စပ်ပစ္စည်းများ အန္တရာယ်မှ တားဆီးကာကွယ်ရေးနည်းဥပဒေ	၂၀၁၃	၁၅ (က), (ခ), ၁၆ (ခ) မှ (ည), ၁၇, ၂၂, ၂၇ (က) မှ (ဃ)
၂၈	ဓာတုပစ္စည်းနှင့်ဆက်စပ်ပစ္စည်းများ အန္တရာယ်မှ တားဆီးကာကွယ်ရေးနည်း ဥပဒေများ	၂၀၁၆	-
၂၉	လျှပ်စစ်ဥပဒေ	၂၀၁၄	၂၀, ၂၁ (က), ၂၄, ၂၇, ၂၉, ၃၃, ၄၀, ၆၈
စီးပွားရေးနှင့် ရင်းနှီးမြှုပ်နှံမှု			
၃၀	ပို့ကုန်သွင်းကုန်ဥပဒေ	၂၀၁၂	၇
၃၁	မြန်မာနိုင်ငံကုမ္ပဏီများ ဥပဒေ	၂၀၁၇	၂, ၄
၃၂	မြန်မာနိုင်ငံရင်းနှီးမြှုပ်နှံမှုဥပဒေ	၂၀၁၆ (ပြင်ဆင်၂၀၁၉)	၅၀, ၅၁, ၆၅, ၇၃
၃၃	မြန်မာနိုင်ငံရင်းနှီးမြှုပ်နှံမှုနည်းဥပဒေများ	၂၀၁၇	၂၀၂, ၂၀၃, ၂၀၆, ၂၁၂
၃၄	မြန်မာ့အာမခံလုပ်ငန်းဥပဒေ	၁၉၉၃	၁၅, ၁၆
လုပ်သားများနှင့် လုပ်ငန်းခွင်ဆိုင်ရာ			
၃၅	အလုပ်သမားအဖွဲ့အစည်းဥပဒေ	၂၀၁၁ (ပြင်ဆင်၂၀၁၂)	၁၈, ၁၉, ၂၀, ၂၁, ၂၂
၃၆	အလုပ်သမားအဖွဲ့အစည်း နည်းဥပဒေများ	၂၀၁၂	၂၉, ၃၀
၃၇	အလုပ်သမားရေးရာ အငြင်းပွားမှုဖြေရှင်းရေးဥပဒေ	၂၀၁၂ (ပြင်ဆင်၂၀၁၉)	၃၈ (က), ၃၉, ၄၀, ၅၁
၃၈	အလုပ်အကိုင်နှင့်ကျွမ်းကျင်မှုဖွံ့ဖြိုးတိုးတက်ရေးဥပဒေ	၂၀၁၃	၅, ၁၄, ၃၀

စဉ်	ဥပဒေနှင့် နည်းဥပဒေများ	ထုတ်ပြန်သည့် ခုနှစ်	ပုဒ်မ
၃၉	လုပ်ငန်းခွင်ဘေးအန္တရာယ်ကင်းရှင်းရေးနှင့် ကျန်းမာရေးဆိုင်ရာဥပဒေ	၂၀၁၉	၁၂, ၁၄, ၁၆, ၁၇, ၁၈, ၂၆, ၂၇, ၃၄, ၃၆
၄၀	အနည်းဆုံးအခကြေးငွေကဥပဒေ	၂၀၁၃ (ပြင်ဆင် ၂၀၁၅)	၁၂, ၁၃
၄၁	အနည်းဆုံးအခကြေးငွေနည်းဥပဒေများ	၂၀၁၃	၄၃, ၄၄
၄၂	အခကြေးငွေပေးချေရေးဥပဒေ	၂၀၁၆	၃, ၄, ၅, ၁၄, အခန်း ၃
၄၃	ခွင့်ရက်နှုန်းအလုပ်ပိတ်ရက်နည်းဥပဒေများ	၁၉၅၁	၅
၄၄	လူမှုဖူလုံရေးဥပဒေ	၂၀၁၂ (ပြင်ဆင် ၂၀၁၄)	၁၁ (က), ၁၅ (က), (ခ), ၁၈ (ခ), ၄၈ (ခ), ၇၅
၄၅	အလုပ်သမားရေးရာ အငြင်းပွားမှု ဖြေရှင်းပေးပေးရေး ဥပဒေ	၂၀၁၂ (ပြင်ဆင် ၂၀၁၉)	၃၈, ၃၉, ၄၀, ၅၁
သယ်ယူပို့ဆောင်ရေးဆိုင်ရာ			
၄၆	အမြန်လမ်းမကြီးများဥပဒေ	၂၀၀၀ (ပြင်ဆင် ၂၀၁၄)	၈
၄၇	ယာဉ်အန္တရာယ်ကင်းရှင်းရေးနှင့် မော်တော်ယာဉ် စီမံခန့်ခွဲမှုဥပဒေ	၂၀၂၀	၉ (က), ၁၂ (ဂ), ၁၄ (ဒ), ၁၈ (က), ၈၁ (ဆ)
၄၈	ယာဉ်အန္တရာယ်ကင်းရှင်းရေးနှင့် မော်တော်ယာဉ် စီမံခန့်ခွဲမှုနည်းဥပဒေများ	၂၀၂၂	၂၅၂, ၂၅၃, ၂၅၄, ၂၅၆, ၂၆၁, ၂၆၂, ၂၆၃, ၂၆၉, ၂၇၁
၄၉	ဘက်စုံပို့ဆောင်ရေးဥပဒေ	၂၀၁၄ (ပြင်ဆင် ၂၀၂၂)	၃
အရေးပေါ်			
၅၀	မြန်မာနိုင်ငံမီးသတ်တပ်ဖွဲ့ဥပဒေ	၂၀၁၅	၂၅
၅၁	သဘာဝဘေးအန္တရာယ်ဆိုင်ရာစီမံခန့်ခွဲမှုဥပဒေ	၂၀၁၃	၁၄ မှ ၁၈

စီမံကိန်းအဆိုပြုသူသည် မြန်မာနိုင်ငံ၏ သက်ဆိုင်ရာ တည်ဆဲဥပဒေများ၊ နည်းဥပဒေများနှင့် စည်းမျဉ်း၊ စည်းကမ်းများအား အပြည့်အဝအစဉ်အမြဲ လိုက်နာဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။ ဥပဒေရေးရာအချက်အလက်များ ၏ အသေးစိတ်ကို အခန်း ၂ တွင် ဖော်ပြထားပါသည်။

၃။ စီမံကိန်းလုပ်ငန်းတည်နေရာဖော်ပြချက်

မန္တလေးတိုင်းဒေသကြီး၊ မြင်းခြံခရိုင်၊ တောင်သာမြို့နယ်၊ ကျောဇီကျေးရွာအုပ်စု၊ ကွင်းအမှတ် (၈၃၇-ဂ)၊ ကျောဇီအနောက်ကွင်း၊ ဦးပိုင်အမှတ် (၉၂/၁၊ ၉၃၊ ၉၄/ ၁၊ ၉၄/ ၂၊ ၉၄/၃) တွင်တည်ရှိပြီး မြောက်လတ္တီကျု ၂၁.၂၉၈၂၉၁ ဒီဂရီ၊ အရှေ့လောင်ဂျီကျု ၉၅.၁၇၃၇၀၄ ဒီဂရီတွင် တည်ရှိပြီး (၃.၉၈) ဧက ကျယ်ဝန်းပါသည်။

၃.၁။ စီမံကိန်းဧရိယာရှိ အဆောက်အဦများ

စီမံကိန်းဧရိယာတွင် ကုန်ကြမ်း၊ ကုန်ချောသိုလှောင်ရုံများ၊ ကုန်တင်ကုန်ချ ပြုလုပ်သည့်နေရာများ၊ လုပ်ငန်းလည်ပတ်သည့်နေရာ၊ ရုံးခန်း၊ ထိန်းချုပ်ခန်း၊ ကန်တင်း၊ နားနေဆောင်၊ ကားပါကင်၊ အိမ်သာ၊ လုံခြုံရေးဂိတ်နှင့် အခြား အဆောက်အဦများစွာရှိပါသည်။

၃.၂။ ထုတ်လုပ်ပုံအဆင့်အဆင့်

စီမံကိန်းလုပ်ငန်းတွင် အသုံးပြုသော ရေနံချက်လုပ်သည့် နည်းလမ်းမှာ အခြေခံကျသော ရေနံသန့်စင်ခြင်းနည်းစနစ်ဖြစ်ပါသည်။ ပထမဦးစွာ ရောက်ရှိလာသော ရေနံဆီကုန်ကြမ်းများကို အလေးချိန် ချိန်ပြီး ပဏာမသိုလှောင်ကန်သို့ ပို့ဆောင်ပါသည်။ ထိုကန်အတွင်း၌ ရေနံဆီများခဲမသွားစေရန်နှင့် ပါဝင်လာသော ရေများအား ဖယ်ရှားရန် ၅၀ ဒီဂရီစင်တီဂရိတ်ဖြင့် အပူပေးထားပါသည်။ ထို့နောက် ပိုက်လိုင်းများမှ တစ်ဆင့် (၄) လုံးသော ဆိုင်လိုများဆီသို့ ပို့ဆောင်ပါသည်။ ထို ဆိုင်လို(၄)လုံးထဲတွင်လည်း ကုန်ကြမ်းများကို ၅၀ ဒီဂရီစင်တီဂရိတ်ဖြင့် အပူပေးအနည်ထိုင်စေပါသည်။

ထို့နောက် ဆိုင်လိုများမှ ဆီကုန်ကြမ်းများအား အနည်စစ်ဇကာ (၂) ခုကို ဖြတ်သန်းစေပြီး ရေနှင့် အနည်များကို ဇကာဖြင့် သန့်စင်၍ Circular Crude Oil Drum သို့ ပို့ဆောင်ပါသည်။ Circular Crude Oil Drum မှ သန့်စင်ပြီးသော ကုန်ကြမ်းရေနံဆီများကို မီးဖိုသို့ပို့ဆောင်ပြီး ၃၃၅ ဒီဂရီစင်တီဂရိတ်တွင် အပူပေး ချက်လုပ်ပါသည်။ ဓာတ်ဆီချက်လုပ်ရန် အပူချိန်သည် ၈၀ မှ ၁၈၀ ဒီဂရီစင်တီဂရိတ်လိုအပ်ပြီး ဒီဇယ်ချက်လုပ်ရန် ၁၈၀ မှ ၃၃၅ ဒီဂရီစင်တီဂရိတ်လိုအပ်ပါသည်။ မီးဖိုနှင့် Distillation Column မှ ထွက်လာသော ရေနံဆီအငွေ့များသည် Condenser တွင် ငွေ့ရည်ဖွဲ့ပါသည်။ ငွေ့ရည်ဖွဲ့ပြီး ရရှိလာသော ဓာတ်ဆီနှင့် ဒီဇယ်များကို Overhead Receiving Tank တွင် သိုလှောင်ပါသည်။ ငွေ့ရည်ဖွဲ့မှု မရရှိသော အငွေ့များကို Circular Crude Oil Drum သို့ ထပ်မံပို့ဆောင်ပါသည်။

Overhead Receiving Tank မှ ဆီများကို အရည်အသွေးကောင်းစေရန်နှင့် ဆီအကြွင်းအကျန်များကို ခွဲထုတ်ရန် ဆီလီကာသဲများဖြင့် သန့်စင်ပါသည်။ ထို့နောက် ကုန်ချောဖြစ်သည့် ဓာတ်ဆီနှင့် ဒီဇယ်များကို သိုလှောင်ကန်အသီးသီးသို့ ပို့ဆောင် သိုလှောင်ပါသည်။



ပုံ (၁) ထုတ်ကုန်ထုတ်လုပ်ပုံအဆင့်ဆင့်

၃.၃။ စီမံကိန်းမှ လုပ်ငန်းလည်ပတ်ရန် ထောက်ပံ့ပေးထားသော အရာများ

စီမံကိန်းအကောင်အထည်ဖော်ရာတွင် ကဏ္ဍအားလုံး လုပ်ငန်းလည်ပတ်ရန်အတွက် လျှပ်စစ်၊ ရေ နှင့် မီးစက်တို့ကို အသုံးပြုပါသည်။

၃.၃.၁။ လျှပ်စစ်စွမ်းအင်

စီမံကိန်းလုပ်ငန်းတွင် လျှပ်စစ်စွမ်းအင်သည် လုပ်ငန်းလည်ပတ်ရန်အတွက် မရှိမဖြစ် လိုအပ်သော အရာ ဖြစ်ပါသည်။ စီမံကိန်းလုပ်ငန်းအတွက် လျှပ်စစ်ဓာတ်အားကို တောင်သာမြို့နယ် ဓာတ်အားလိုင်းမှ ရယူပါသည်။ စက်ရုံတွင် (၃၁၅) ကေဗွီအေရှိ ထရန်စဖော်မာ တစ်လုံးရှိပါသည်။

စက်ရုံတွင် လျှပ်စစ်ဓာတ်အားပြတ်တောက်မှုများ ဖြစ်ပေါ်ပါက ၂၅၀ ကေဗွီအေ၊ ၄၁၀ ကေဗွီအေနှင့် ၁၅၀ ကေဗွီအေ ရှိသော မီးစက်ကို (၂) လုံးကို အသုံးပြုပါသည်။ မီးစက်လည်ပတ်ရန် အတွက် ဒီဇယ်လောင်စာဆီကို အသုံးပြုပြီး လုပ်ငန်းလည်ပတ်မှုရှိသည့် ကာလများအတွင်းတွင် (၁(ရက်လျှင် ဒီဇယ်ဆီ (၅၀) ဂါလံခန့် သုံးစွဲရပါသည်။

၃.၃.၂။ ရေအသုံးပြုမှု

စီမံကိန်းသည် ရေလိုအပ်မှုကို အဝီစိတွင်း (၂) တွင်းမှ ရယူသုံးစွဲပါသည်။ အကျယ် (၄) လက်မ၊ အနက် ပေ (၄၂၀) ရှိသော တွင်း (၁)ခုနှင့် အကျယ် (၂) လက်မ၊ အနက် ပေ (၄၂၀)ရှိသော တွင်း (၁)ခု မှ ရယူသုံးစွဲလျက်ရှိပါသည်။ အကျယ် (၄) လက်မပိုက်ကို စီမံကိန်းလုပ်ငန်း လည်ပတ်ခြင်း အတွက် အသုံးပြုပြီး စီမံကိန်းဧရိယာအနီးတွင်ရှိပါသည်။ အကျယ် (၂) လက်မ ရှိသောရေတွင်းကို အိမ်သုံး/ ဝန်ထမ်းသုံးအတွက် အသုံးပြုပြီး မီးဖိုချောင်အနီးတွင်ရှိပါသည်။ ရေတွင်းမှ ရေကို ထုတ်ယူသုံးစွဲရန်အတွက် ရေစက် (၂) လုံးအား အသုံးပြုရပါသည်။ သောက်ရေအတွက် နွေရာသီတွင် (၂၀) လီတာရေဘူး ၁၀၀ ဘူးခန့် အသုံးပြုပြီး ဆောင်းရာသီတွင် ဘူး ၅၀ မှ ၆၀ ခန့်အထိ အသုံးပြုပါသည်။

၃.၃.၃။ ဓာတုပစ္စည်းအသုံးပြုမှု

အဆိုပြုစီမံကိန်းတွင် ဓာတုပစ္စည်းသုံးစွဲမှုမှာ ဒီဇယ်အား အရောင်ဆိုးရန်အတွက် အရောင်းဆေးဆိုးမှုနှုန်းကို အသုံးပြုပြီး ၎င်းဓာတုပစ္စည်းများနှင့် သက်ဆိုင်သည့် ဘေးအန္တရာယ်ကင်းရှင်းရေး အချက်အလက်များကို နောက်ဆက်တွဲ (၀) တွင်ဖော်ပြထားပါသည်။

၃.၄။ ပတ်ဝန်းကျင်အပေါ်ညစ်ညမ်းမှုများကို ထိန်းချုပ်ရန် ထောက်ပံ့ထားမှု

၃.၄.၁။ အသံဆူညံညစ်ညမ်းမှုလျော့ချခြင်း

အသံဆူညံညစ်ညမ်းမှုကို လျော့ချနိုင်ရန်အတွက် အဆိုပြုစီမံကိန်းသည် မီးစက်ကို သီးခြားအခန်းတစ်ခုဖြင့် ထားရှိပါသည်။

၃.၅။ စွန့်ပစ်အမှိုက် ထွက်ရှိမှု

အဆိုပြုစီမံကိန်းတွင် လုပ်ငန်းလည်ပတ်ခြင်းမှ ထွက်ရှိလာသော စွန့်ပစ်အမှိုက်များမှာ ဆီလီကာဂျယ်နှင့် ရေနံဆီအကြွင်းအကျန်တို့ ဖြစ်ပြီး အိမ်သုံးစွန့်ပစ်အမှိုက်များ အနေဖြင့် တစ်ရှူး၊ ရေဘူးခွံ၊ စားကြွင်းစားကျန်စသည်တို့ ထွက်ရှိပါသည်။ ထိုအမှိုက်များကို စီမံကိန်းရှိ အမှိုက်စွန့်ပစ်သည့် နေရာသို့ တစ်လလျှင် (၃) ကြိမ်ခန့်စွန့်ပစ်ပြီး ဝန်ထမ်းများမှ ထွက်ရှိလာသော စားကြွင်းစားကျန်များကို မြေဩဇာအဖြစ် အသုံးပြုပါသည်။

၃.၆။ စွန့်ပစ်ရေ ထွက်ရှိမှု

အဆိုပြုစီမံကိန်းတွင် လုပ်ငန်းလည်ပတ်ခြင်းအဆင့်၌ လုပ်ငန်းသုံးစွန့်ပစ်ရည်နှင့် အိမ်သုံးစွန့်ပစ်ရည်ဟူ၍ (၂) မျိုးထွက်ရှိပါသည်။ လုပ်ငန်းလည်ပတ်သည့် ၂-၃ ရက်ခန့်တွင် စွန့်ပစ်ရည် ၂၀ ဂါလံခန့်ထွက်ရှိပါသည်။ အိမ်သုံးစွန့်ပစ်ရည်မှာ တစ်ရက်လျှင် ၁၅၀ လီတာခန့် ထွက်ရှိပါသည်။

၃.၇။ ဝန်ထမ်းများအတွက် စီစဉ်ထားရှိမှုများ

အဆိုပြုစီမံကိန်းသည် ဝန်ထမ်းများအတွက် သက်သာချောင်ချိရေး အစီအစဉ်များ စီစဉ်ထားပါသည်။ ဝန်ထမ်းများအတွက် ထမင်းစာဆောင်၊ မီးဖိုချောင်၊ အိပ်ဆောင် စသည်တို့ စီစဉ်ထားပြီး လုပ်ငန်းခွင်အတွင်းတွင် အပူဒဏ်လျော့ချနိုင်ရန် ပန်ကာ၊ လေအေးပေးစက်များ တပ်ဆင်ပေးထားပါသည်။ ထို့အပြင် သောက်သုံးရေများကိုလည်း စီစဉ်ပေးထားပြီး ဝန်ထမ်းများကို မီးဘေး၊ အရေးပေါ်တုံ့ပြန်ရေးနည်းလမ်းများ စသည့်သင်တန်းများကို ပို့ချပေးပါသည်။

၄။ ပတ်ဝန်းကျင်ဆိုင်ရာအချက်အလက်များလေ့လာမှု

ဤအခန်းတွင် စီမံကိန်းဧရိယာတစ်ဝိုက်ရှိ (၃) ကီလိုမီတာ ခန့်အကွာအဝေးတွင်းရှိ ပတ်ဝန်းကျင်အတွက် သက်ရောက်မှုများကို စစ်ဆေးလေ့လာထားပါသည်။ ပတ်ဝန်းကျင်ကို

လေ့လာရာတွင် ကဏ္ဍ (၃)မျိုး ပါဝင်ပါသည်။ ၎င်းတို့မှာ ၁ (ရုပ်ပိုင်းဆိုင်ရာ (၂) ဇီဝဗေဒဆိုင်ရာ နှင့် (၃) လူမှုစီးပွားရေး အစိတ်အပိုင်းများဖြစ်သည်။

ရုပ်ပိုင်းဆိုင်ရာ အစိတ်အပိုင်းများ အနေဖြင့် တောင်သာမြို့နယ်သည် မိုးနည်းသော အပူပိုင်းရာသီဥတုရှိပြီး အမြင့်ဆုံး အပူချိန် ၃၄.၇°C နှင့် အနိမ့်ဆုံး အပူချိန် ၂၀.၇°C ရှိသော ရာသီဥတုရှိပါသည်။ လေထုဖိအားအခြေအနေကို ရာသီဥတုအလိုက်) နွေရာသီ၊ မိုးရာသီ၊ ဆောင်းရာသီ ဟူ၍ ခွဲခြားဖော်ပြထားပါသည်။ ၎င်းတို့မှာ (မတ်လမှ မေလလယ်အထိသည် နွေရာသီ၊ မေလလယ်မှ အောက်တိုဘာလ အထိမှာ မိုးရာသီ၊ နိုဝင်ဘာလမှဖေဖော်ဝါရီလအထိ ဆောင်းရာသီ ဖြစ်ပါသည်။

၄.၁။ ပတ်ဝန်းကျင်ဆိုင်ရာအချက်အလက်များလေ့လာမှု

ပတ်ဝန်းကျင် အခြေခံအရည်အသွေး လေ့လာဆန်းစစ်ရန်အတွက် ပြင်ပလေထု အရည်အသွေး၊ အခန်းတွင်း လေအရည်အသွေး၊ ထုတ်လွှတ်အခိုး အငွေ့ အရည်အသွေး၊ ရေအရည်အသွေး၊ အလင်းအရည်အသွေး၊ ဆူညံသံအရည်အသွေးနှင့် တုန်ခါမှု၊ အပူချိန်၊ အနံ့အရည်အသွေး၊ မြေအရည်အသွေးတို့ကို တိုင်းတာပြီး ခွဲခြမ်းစိတ်ဖြာပါသည်။ အခြေခံ အရည်အသွေး တိုင်းတာခြင်းအား စီမံကိန်းဧရိယာနှင့် အနီးပတ်ဝန်းကျင် နေရာ (၃) နေရာတွင် တိုင်းတာခဲ့ပြီး မိုးရာသီတွင် တစ်ကြိမ်နှင့် ခြောက်သွေ့ရာသီတွင် တစ်ကြိမ် စုစုပေါင်း နှစ်ကြိမ် ပြုလုပ်ခဲ့ပါသည်။

ပြင်ပလေထုအရည်အသွေးများဖြစ်သော အမှုန်အမွှားထွက်ရှိမှုနှုန်း PM2.5 နှင့် PM10၊ ကာဗွန်ဒိုင်အောက်ဆိုဒ်၊ ဆာလဖာဒိုင်အောက်ဆိုဒ်၊ နိုက်ထရိုဂျင်ဒိုင်အောက်ဆိုဒ်၊ ကာဗွန်မို နောက်ဆိုဒ်၊ အိုဇုန်း၊ ငွေ့ရည်ပျံလွယ်သော ဓာတုဒြပ်ပေါင်း၊ ဆိုင်းကြွအမှုန်၊ ပျမ်းမျှစိုထိုင်းဆ၊ အပူချိန်၊ လေတိုက်နှုန်း၊ လေတိုက်ခတ်ရာအရပ်တို့ကို OCEANUS-AQM 09 အားအသုံးပြု၍ တိုင်းတာခဲ့ပြီး ရလဒ်တို့အား အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ (ထုတ်လွှတ်မှု) အရည်အသွေး လမ်းညွှန်ချက်များနှင့် နှိုင်းယှဉ်ခဲ့ပါသည်။ ၂၄ နာရီ လေ့လာစမ်းစစ်မှုများအရ ရလဒ်များမှာ အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ (ထုတ်လွှတ်မှု)အရည်အသွေး လမ်းညွှန်ချက် အတွင်းသာ ရှိပါသည်။ အခန်းတွင်းလေထုအရည်အသွေး တိုင်းတာမှုကို စီမံကိန်းဧရိယာအတွင်း နေရာ (၅) နေရာတွင် တိုင်းတာခဲ့ပါသည်။ တိုင်းတာခဲ့သည့် လေအရည်အသွေး အမျိုးအစားများမှာ ဖုန်မှုန့် (PM 2.5, PM 10)၊ ငွေ့ရည်ပြန်လွယ်သော ဓါတုဒြပ်ပေါင်း (TVOC)၊ ဖော်မယ်လ်ဒီဟိုက် (HCHO) နှင့် ကာဗွန်ဒိုင်အောက်ဆိုဒ် (CO2) တို့ဖြစ်ပါသည်။ တိုင်းတာမှုရလဒ်များအရ တိုင်းတာခဲ့သော

အခန်းများနှင့် နေရာများသည် ကောင်းမွန် ဘေးကင်းသော အခြေအနေတွင် ရှိပါသည်။ ထုတ်လွှတ်အခိုးအငွေ့ အနေဖြင့် မိသိန်း၊ ဟိုက်ဒရိုဂျင်ဆာလဖိုက်၊ နိုက်ထရိုဂျင်အောက်ဆိုဒ်၊ အမိုးနီးယား၊ ကာဗွန်မိုနောက်ဆိုဒ်၊ အောက်ဆီဂျင်နှင့် ဆာလဖာဒိုင်အောက်ဆိုဒ် တို့ကို စက်ရုံဝန်းအတွင်းရှိ မီးဖိုမီးခိုးခေါင်းတိုင်နှင့် မီးစက်မီးခိုးခေါင်းတိုင်တို့တွင် တိုင်းတာခဲ့ပြီး နိုင်ငံတကာဘဏ္ဍာရေး ကော်ပိုရေးရှင်း၏ စံနှုန်းနှင့် အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ (ထုတ်လွှတ်မှု)အရည်အသွေး လမ်းညွှန်ချက် (အသေးစားရေနံချက်လုပ်ငန်း)တို့၏ လမ်းညွှန်ချက် များဖြင့် တိုင်းတာချက်များအရ ထုတ်လွှတ်အခိုးအငွေ့အရည်အသွေးရလဒ်များသည် သတ်မှတ် စံနှုန်းအတွင်း၌ သာရှိကြောင်းတွေ့ရပါသည်။

စီမံကိန်းဧရိယာ၏ ရေအရည်အသွေးကိုသိရှိနိုင်ရန် မြေပေါ်ရေအရည်အသွေးများကို ဧရာဝတီမြစ် အထက်ပိုင်းနှင့် အောက်ပိုင်းတွင် နေရာ (၂) နေရာ၊ မြေအောက် ရေအရည်အသွေး များကို စီမံကိန်းဧရိယာ အတွင်းနှင့် အနီးပတ်ဝန်းကျင် ကျေးရွာ (၂) နေရာ စုစုပေါင်း နေရာ (၅) နေရာတွင် တိုင်းတာခဲ့ပြီး မိုးရာသီတွင် တစ်ကြိမ်နှင့် ခြောက်သွေ့ရာသီတွင် တစ်ကြိမ် စုစုပေါင်း နှစ်ကြိမ် ပြုလုပ်ခဲ့ပါသည်။ မြေပေါ်ရေအရည်အသွေး)ဇီဝဆိုင်ရာအောက်ဆီဂျင် လိုအပ်ချက်၊ ဓါတုဆိုင်ရာအောက်ဆီဂျင်လိုအပ်ချက်၊ သံဓာတ်၊ ဆီနှင့် ချောဆီ၊ ချဉ်ဖန်ကိန်း၊ ကလိုရင်း (စုစုပေါင်း)ဖော့စဖရပ်၊ နိုက်ထရိုဂျင် (စုစုပေါင်း)ဆိုင်းကြွအနည်၊ ပျော်ဝင်အနည်၊ အစေးအသွက်၊ နောက်ကျိုမှု၊ လျှပ်ကူးမှု၊ အရောင်၊ အပူချိန်၊ Arsenic၊ ပျော်ဝင်အောက်ဆီဂျင်၊ ခဲ) နှင့် မြေအောက်အရည်အသွေး (ချဉ်ဖန်ကိန်း၊ သံဓာတ်၊ ကလိုရင်း) လွတ်လပ် (ဆိုင်းကြွအနည်၊ ပျော်ဝင်အနည်၊ အစေးအသွက်၊ လျှပ်ကူးမှု၊ Arsenic ၊ ပျော်ဝင်အောက်ဆီဂျင်၊ ဖော့စဖရပ်၊ Total Coliform) စသည့်ပါရာမီတာများ တိုင်းတာပြီး ဓါတ်ခွဲခန်းတွင် စမ်းသပ်စစ်ဆေးပါသည်။

ထို့အပြင် မြေအောက်ရေအရည်အသွေးကို စီမံကိန်းဧရိယာအတွင်း Hanna instrument (HI98129) ဖြင့် တိုင်းတာပြီး အပူချိန်၊ ချဉ်ဖန်ကိန်း၊ လျှပ်ကူးမှု နှင့် ပျော်ဝင်အနည်တို့ကို တိုင်းတာပါသည်။ ပထမအကြိမ် တိုင်းတာရရှိသော လုပ်ငန်းလည်ပတ်ခြင်း ထွက်ရှိလာသည့် စွန့်ပစ်ရေရလဒ်တွင် ဇီဝဆိုင်ရာအောက်ဆီဂျင် လိုအပ်ချက်သည် သတ်မှတ်စံနှုန်းထက် အနည်းငယ်ကျော်လွန်နေပြီး ကျန်ရလဒ်များအနေဖြင့် ပါရာမီတာ အများစုသည် အမျိုးသား ပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး(ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များ အတွင်းတွင် ရှိပါသည်။ ဒုတိယအကြိမ်တိုင်းတာရရှိခဲ့သော မြေပေါ်ရေ အရည်အသွေး ရလဒ်များအရ ဧရာဝတီမြစ် အောက်ပိုင်းတွင်တိုင်းတာခဲ့သည့်ရလဒ်များသည် ခဲ နှင့် ဆီနှင့် အဆီခဲ အရည်အသွေးမှလွဲ၍ ကျန်အရည်အသွေးများသည် အမျိုးသားမြေပေါ်ရေ

အရည်အသွေးစံချိန်စံညွှန်း အတွင်းတွင် ရှိနေသည်ကို တွေ့ရှိရပါသည်။ ကျန်ရလဒ်များမှာ သတ်မှတ်စံနှုန်း အတွင်း၌သာ ရှိကြောင်းတွေ့ရပါသည်။ မြေအောက်ရေ အရည်အသွေး တိုင်းတာမှု ရလဒ်များအနက် ကျောဇီကျေးရွာတွင် ပျော်ဝင်အနည် နှင့် Total Coliform သည် လမ်းညွှန်ချက်ထက် အနည်းငယ် ကျော်လွန်နေပြီး ကျန်ရလဒ်များ သည် စံနှုန်းအတွင်း၌သာ ရှိပါသည်။

စီမံကိန်းလုပ်ငန်းမှ ထွက်ရှိသော ဆူညံသံသည် ပြင်ပသို့ရောက်ရှိခြင်း ရှိ၊ မရှိ သိရှိရန်နှင့် လုပ်ငန်းအတွင်းရှိ ဆူညံသံအဆင့်သည် ပတ်ဝန်းကျင်အပေါ် သက်ရောက်မှုရှိမရှိ သိရှိနိုင်ရန် ဆူညံသံကို တိုင်းတာခြင်းအား စီမံကိန်းဧရိယာအတွင်းနှင့် အနီးပတ်ဝန်းကျင် ကျေးရွာ (၂) နေရာတွင် တိုင်းတာခဲ့ပြီး မိုးရာသီတွင် တစ်ကြိမ်နှင့် ခြောက်သွေ့ရာသီတွင် တစ်ကြိမ် စုစုပေါင်း နှစ်ကြိမ် ပြုလုပ်ခဲ့ပါသည်။ ရလဒ်များကို အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များဖြင့် နှိုင်းယှဉ်ထားပါသည်။ ၂၄ နာရီ ဆူညံသံတိုင်းတာမှု ရလဒ်အနေဖြင့် နေ့အချိန်နှင့် ညအချိန် ဆူညံသံအဆင့်သည် လမ်းညွှန်ချက်အတွင်းတွင်ရှိပြီး ပတ်ဝန်းကျင်အပေါ်သက်ရောက်မှုမရှိကြောင်း တွေ့ရှိရပါသည်။

အခန်းတွင်းအသံဆူညံမှုကိုလည်း စက်ရုံအတွင်း ရုံးခန်း၊ စားဖိုဆောင်၊ ထိန်းချုပ်ခန်း၊ သိုလှောင်ခန်းနှင့် စက်ခန်းတို့တွင် တိုင်းတာခဲ့ပြီး ရလဒ်များမှာ သတ်မှတ်စံနှုန်းအတွင်းတွင်သာ ရှိကြောင်းတွေ့ရပါသည်။ တုန်ခါမှုအရည် အသွေးများကို စက်ရုံအတွင်း ထုတ်လုပ်မှုဧရိယာအတွင်း Steel column တိုင်များနှင့် ၊ Distillation column စသည်ဖြင့် နေရာ (၃) နေရာတို့တွင် တိုင်းတာခဲ့ပြီး ရလဒ်များကို နိုင်ငံတကာ သတ်မှတ်စံနှုန်းများနှင့် နှိုင်းယှဉ်ဖော်ပြထားပြီး ရလဒ်များအရ သတ်မှတ်စံနှုန်းအတွင်းတွင်သာ ရှိကြောင်းတွေ့ရပါသည်။

လုပ်ငန်းခွင်ပတ်ဝန်းကျင်သာယာမှုအတွက် အလင်းနှင့် အပူချိန်တိုင်းတာခြင်းကိုလည်း စက်ရုံအတွင်းရှိ နေရာ (၅) နေရာ ရုံးခန်း၊ စားဖိုဆောင်၊ ထိန်းချုပ်ခန်း၊ သိုလှောင်ခန်းနှင့် စက်ခန်း စသည်တို့တွင် တိုင်းတာမှုများပြုလုပ်ခဲ့ပြီး မိုးရာသီတွင် တစ်ကြိမ်နှင့် ခြောက်သွေ့ရာသီတွင် တစ်ကြိမ် စုစုပေါင်း နှစ်ကြိမ် ပြုလုပ်ခဲ့ပါသည်။ ပထမအကြိမ်တိုင်းတာသည့် ရလဒ်များအရ အလင်းရရှိမှုသည် တိုင်းတာခဲ့သည့် နေရာများအနက် ရုံးခန်းနေရာ၊ စားဖိုဆောင်၊ ထိန်းချုပ်ခန်း တွင် သတ်မှတ်စံချိန်စံညွှန်းများ ပြည့်မီရန် လိုအပ်ကြောင်း လေ့လာတွေ့ရှိခဲ့ရပါသည်။ သို့သော် သိုလှောင်ခန်း၊ နှင့် စက်ခန်းများသည် ပတ်ဝန်းကျင်ဆိုင်ရာ ကျန်းမာရေးနှင့် ဘေးအန္တရာယ် ကင်းရှင်းရေးစံချိန်စံညွှန်းများနှင့် ပြည့်မီသည်ကို တွေ့ရှိရပါသည်။ ဒုတိယအကြိမ် တိုင်းတာချက်များအရ ရုံးခန်းတွင် အလင်းရရှိမှုသည် သတ်မှတ်စံချိန်စံညွှန်းပြည့်မီရန်

အနည်းငယ်လိုအပ်ကြောင်း တွေ့ရှိရပြီး ကျန်တိုင်းတာသည့်နေရာများတွင် စံနှုန်းပြည့်မီသည်ကို တွေ့ရှိရပါသည်။ အပူချိန်တိုင်းတာမှုများကို စက်ရုံအတွင်းရှိ နေရာ (၅) နေရာ ရုံးခန်း၊ စားဖိုဆောင်၊ ထိန်းချုပ်ခန်း၊ သိုလှောင်ခန်းနှင့် စက်ခန်း စသည်တို့တွင် တိုင်းတာမှုများပြုလုပ်ခဲ့ပြီး မိုးရာသီတွင် တစ်ကြိမ်နှင့် ခြောက်သွေ့ရာသီတွင် တစ်ကြိမ် စုစုပေါင်း နှစ်ကြိမ် ပြုလုပ်ခဲ့ပါသည်။ ပထမအကြိမ်အပူချိန်တိုင်းတာမှုရလဒ်များသည် နိုင်ငံတကာဘဏ္ဍာရေး ကော်ပိုရေးရှင်း၏ လုပ်ငန်းခွင် ဘေးအန္တရာယ် ကင်းရှင်းရေး နှင့် ကျန်းမာရေးဆိုင်ရာစည်းမျဉ်း စံချိန်စံညွှန်း (၂၀၁၆) အတွင်း၌ ရှိကြောင်း တွေ့ရှိရပါပြီး ဒုတိယအကြိမ်တိုင်းတာမှု ရလဒ်များသည် စံနှုန်းထက် အနည်းငယ်ကျော်လွန်နေသည်ကို တွေ့ရှိရပါသည်။

အနံ့တိုင်းတာမှုများကိုလည်း မီးဖိုခေါင်းတိုင်၊ မီးဖို၊ Condenser၊ ထိန်းချုပ်ခန်း၊ စက်ရုံအပြင်ဘက် (စိုက်ခင်းများအနီး)နှင့် စက်ရုံအပြင်ဘက် (လမ်းအနီး) တွင် တိုင်းတာ ရရှိခဲ့ပါသည်။ တိုင်းတာမှု ရလဒ်များကို အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များဖြင့် နှိုင်းယှဉ်ခဲ့ပြီး သတ်မှတ်စံနှုန်းအတွင်းတွင်သာ ရှိကြောင်းတွေ့ရှိရပါသည်။

မြေအရည်အသွေးတိုင်းတာမှုကို စီမံကိန်းဧရိယာအတွင်း မြေအရည်အသွေးကို နေရာ (၂) နေရာတွင် တိုင်းတာရရှိခဲ့ပြီး ဓါတ်ခွဲခန်းတွင် စမ်းသပ်စစ်ဆေးပါသည်။ ထို့အပြင် စီမံကိန်းဧရိယာအတွင်း မြေအရည်အသွေးများကို Onsite Soil Survey Instrument ဖြင့် တိုင်းတာပြီး အပူချိန်၊ ချဉ်ဖန်ကိန်းနှင့် စိုထိုင်းဆတို့ကို တိုင်းတာပါသည်။ တိုင်းတာမှုရလဒ်များအရ မြေ၏အရည်အသွေးသည် အက်စစ်ဓါတ်အနည်းငယ် ပါဝင်နေကြောင်း ဆန်းစစ်တွေ့ရှိရပါသည်။

၄.၂။ မြေအသုံးချမှုနှင့် လူမှုစီးပွားဆိုင်ရာအချက်အလက်များ

မြေအသုံးချမှု စစ်တမ်းအား စီမံကိန်းပတ်လည် (၃) ကီလိုမီတာ အတွင်း ပတ်ဝန်းကျင်ကို လေ့လာခဲ့ပါသည်။ ရလဒ်အရ စိုက်ပျိုးမြေဧရိယာသည် စုစုပေါင်း ၅၅.၅၂ ရာခိုင်နှုန်း၊ လူနေဧရိယာ ၄.၀၃ ရာခိုင်နှုန်း၊ ရေထုဧရိယာသည် ၆.၃၅ ရာခိုင်နှုန်း၊ မြေလွတ်မြေရိုင်းဧရိယာ ၃၃.၄၂ ရာခိုင်နှုန်း၊ ချောင်းခြောက် ၀.၄၃ ရာခိုင်နှုန်း၊ အနီးဝန်းကျင် စက်ရုံဧရိယာ ၀.၁၉ ရာခိုင်နှုန်းနှင့် စီမံကိန်းဧရိယာသည် ၀.၀၆ ရာခိုင်နှုန်း ဖြစ်ပါသည်။

လူမှုစီးပွားရေးဆိုင်ရာလေ့လာခြင်း၏ ရည်ရွယ်ချက်မှာ စီမံကိန်းတည်ရှိရာ ဒေသ၏ လူမှုရေး၊ စီးပွားရေး အခြေအနေ၊ ရေရရှိနိုင်မှု၊ လျှပ်စစ်ရရှိမှု စသည်ဖြင့် အခြေခံအဆောက်အအုံ

ပိုင်းဆိုင်ရာအချက်အလက်များအား သိရှိတင်ပြနိုင်ရန်ဖြစ်ပါသည်။

မြို့နယ်အထွေထွေအုပ်ချုပ်ရေး ဦးစီးဌာန၏ အချက်အလက်များအရ လူမှုစီးပွားကဏ္ဍအနေဖြင့် တောင်သာမြို့နယ်သည် မန္တလေးတိုင်းဒေသကြီးအတွင်း တည်ရှိပြီး စီးပွားရေးအရ အချက်အခြာကျသော စီးပွားရေးဖွံ့ဖြိုးရေးတိုးတက်မှု သင့်တင့်ကောင်းမွန်သော မြို့နယ်တစ်ခု ဖြစ်ပါသည်။ မြို့နယ်အတွင်းရှိ ဒေသခံပြည်သူလူထုသည် စိုက်ပျိုးရေးလုပ်ငန်း၊ မွေးမြူရေးလုပ်ငန်းကို အဓိက လုပ်ကိုင်ဆောင်ရွက်ကြပါသည်။ ထို့အပြင် လက်မှုလုပ်ငန်းများကိုလည်း စီးပွားဖြစ် လုပ်ကိုင်ကြပါသည်။ တောင်သာမြို့နယ်သည် မြန်မာပြည်အောက်ပိုင်းနှင့် အထက်ပိုင်း ဒေသများသို့ ကုန်းလမ်း၊ ရေလမ်းများဖြင့်သွားလာနိုင်ပြီး လမ်းပန်းဆက်သွယ်ရေး အနေဖြင့် ကောင်းမွန်ပါသည်။ မြို့နယ်၏ အဓိကထွက်ကုန်များမှာ ပဲမျိုးစုံ၊ ဆီထွက်သီးနှံ၊ ထန်းလျက်၊ ကြက်သွန်နီ၊ ပြောင်းတို့ဖြစ်ပြီး မြန်မာပြည်အောက်ပိုင်းဒေသများသို့ အများဆုံး တင်ပို့ရောင်းချပါသည်။ တောင်သာမြို့နယ်သည် မြန်မာပြည်အောက်ပိုင်းဒေသများမှ ဆန်စပါးနှင့် ရေထွက်ကုန်ပစ္စည်းများကို အဓိကတင်သွင်းရပါသည်။ တောင်သာမြို့နယ်၏ နှစ်စဉ် တစ်ဦးချင်းဝင်ငွေသည်) ၂၀၁၈-၂၀၁၉) အရ ၁,၃၂၃,၂၉၇ ကျပ် ဖြစ်ပါသည်။ ပညာရေးကဏ္ဍအနေဖြင့် တောင်သာမြို့နယ်တွင် အထက်တန်းကျောင်း (၃၆) ကျောင်း၊ မူလတန်းကျောင်း (၁၂၉) ကျောင်းနှင့် ပုဂ္ဂလိက ပညာရေးကျောင်း (၄၅) ကျောင်းရှိပါသည်။ ကျန်းမာရေး ကဏ္ဍအနေဖြင့် ၂၀၁၉ ခုနှစ်တွင် အစီရင်ခံတင်ပြထားသော ရောဂါများမှာ ဝမ်းပျက်ဝမ်းလျှော၊ ဝမ်းကိုက်ရောဂါနှင့် တီဘီရောဂါ ဖြစ်သည်။ ယဉ်ကျေးမှုဆိုင်ရာ ကဏ္ဍအနေဖြင့် စီမံကိန်းတည်ရှိရာ တောင်သာမြို့နယ် ယူနက်စကိုမှ သတ်မှတ်ထားသော ယဉ်ကျေးမှုဆိုင်ရာ အမွေအနှစ်များ မရှိပါ။

လူမှုစီးပွားစစ်တမ်းကောက်ယူမှု ရလဒ်များအရ စီမံကိန်းနှင့် အနီးပတ်ဝန်းကျင် ကျေးရွာအုပ်စု (၂) ခုမှ ဒေသခံပြည်သူများ၏ ဆွေးနွေးချက်များ၊ အကြံပေးချက်များနှင့် သဘောထားအမြင်များကို မှတ်တမ်းများ ရယူခဲ့ပါသည်။ ရပ်ရွာလူထုမှ ဒေသခံပြည်သူအများစုမှာ အဆိုပြုစီမံကိန်းအပေါ်တွင် ကောင်းမွန်၍ အပြုသဘောဆောင်သော အမြင်များရှိပါသည်။

စီမံကိန်းဧရိယာနှင့် အနီးပတ်ဝန်းကျင် ကျေးရွာအုပ်စုများဖြစ်သည့် ကျောဇီကျေးရွာနှင့် မာလာကျေးရွာသည် ကုန်းကြောပေါ်တွင် သဲဝန်းနှင့် အနိမ့်မြေပြန့်လွင်ပြင်တွင် စနယ်မြေများဖြစ်ပြီး စိုက်ပျိုးမြေများ ဖြစ်ကြသည်။ လေ့လာစမ်းစစ်မှုများအရ ဒေသခံ ပြည်သူလူထုသည် စိုက်ပျိုးရေးလုပ်ငန်းနှင့် မွေးမြူရေးကို အဓိက လုပ်ကိုင်ဆောင်ရွက်ကြပါသည်။ မြို့နယ်၏ အဓိကထွက်ကုန်များမှာ မြေပဲ၊ ပဲတီစိမ်း၊

ကြက်သွန်နှင့် နွေစပါး၊ မိုးစပါးတို့ကို ရေသွင်းစိုက်ပျိုးကြသည်။ ကုန်းလမ်း သယ်ယူပို့ဆောင်ရေးသည် ဒေသတွင်း သွားလာရေးနှင့် အခြားနေရာများသို့ ချိတ်ဆက်သွားလာရန် လွယ်ကူသောလမ်း ဖြစ်ပါသည်။ ကျေးရွာများတွင် လမ်းများကို မြေသားလမ်းများ၊ ကျောက်ခင်းလမ်းများဖြင့် ဖောက်လုပ်ထားပါသည်။ ထို့အပြင် ကျေးရွာအများစုတွင် ဆိုင်ကယ်၊ သုံးဘီးများဖြင့် သွားလာခြင်းကို အဓိကအလေးပေးထား အသုံးပြုကြသည်။ ပညာရေးကဏ္ဍအနေဖြင့် ကျောဇီကျေးရွာနှင့် မာလာကျေးရွာတွင် အထက်တန်းကျောင်း ၁ ကျောင်း၊ ကျောဇီကျေးရွာတွင် ပုဂ္ဂလိက ပညာရေးကျောင်း ၄ ကျောင်းရှိသည်။ ကျန်းမာရေး ကဏ္ဍအနေဖြင့် ကျေးရွာအတွင်း အဖြစ်အများဆုံးရောဂါမှာ ရာသီတုပ်ကွေးရောဂါများဖြစ်ပြီး ကျန်းမာရေး စောင့်ရှောက်မှုအနေဖြင့် ကျောဇီကျေးရွာတွင် ပုဂ္ဂလိကဆေးရုံ (၁) ခုနှင့် မာလာကျေးရွာတွင် ဒေသန္တရဆေးခန်း (၁)ခု ရှိပါသည်။ ကွင်းဆင်းလေ့လာချက်များအရ ကျေးရွာအားလုံးနီးပါးသည် ဧရာဝတီမြစ်နှင့် ရေတွင်းများမှ ရေကို အိမ်သုံးရေဖြင့် အသုံးပြုရန် အဓိက မှီခိုအားထားကြရသည်။ ကျေးရွာများတွင် လျှပ်စစ်ဓာတ်အားလိုင်းကို မြင်းခြံဓာတ်အားလိုင်းမှ ရယူပြီး အခြားစွမ်းအင်အရင်းအမြစ်များ အနေဖြင့် ထင်း၊ မီးသွေး စသည်တို့ကို အသုံးပြုလျှက်ရှိပါသည်။ ထို့အပြင် စေတီပုထိုးများ၊ ဘုန်းတော်ကြီးကျောင်းများကိုလည်း တွေ့ရှိရသည်။ ယဉ်ကျေးမှုဆိုင်ရာကဏ္ဍအနေဖြင့် စီမံကိန်းတည်ရှိရာ ဒေသ၏ ဘာသာရေး၊ ကိုးကွယ်ယုံကြည်မှု၊ လူမျိုးစုများကဲ့သို့ ယဉ်ကျေးမှု ဆိုင်ရာ အချက်အလက်များနှင့် သဘာဝဘေးအန္တရာယ်များ စသည်အချက်အလက်များကို အခန်း (၄) တွင်ဖော်ပြထားပါသည်။

၄.၃။ သက်ရှိဆိုင်ရာအကြောင်းအချက်များ

နိဒါန်း

ဤကဏ္ဍသည် အဆိုပြုထားသော စီမံကိန်းဧရိယာ၏ ၃ ကီလိုမီတာအတွင်းရှိ ဇီဝမျိုးစုံမျိုးကွဲများကို လေ့လာခြင်းကဏ္ဍတွင် အပင်မျိုးစိတ်များနှင့် သတ္တဝါမျိုးစိတ်များကို လေ့လာခြင်း၊ တွေ့ရှိရသော မျိုးစိတ်များကို IUCN Red List နှင့် နှိုင်းယှဉ်ဖော်ပြခြင်း၊ ငှက်မျိုးစိတ်များ၏ မျိုးစိတ်ကွဲပြားမှုနှင့် အဆိုပြုထားသော စီမံကိန်းဧရိယာတည်ရှိသည့် မြင်းခြံခရိုင် တောင်သာမြို့နယ်အတွင်းရှိ တိရစ္ဆာန်မျိုးစိတ်များ၏ ရာသီအလိုက် တွေ့ရှိရမှုတို့အား ဖော်ပြထားပါသည်။ အဆိုပြုထားသော စီမံကိန်းဧရိယာအတွင်း သဘာဝပေါက်ပင်ဧရိယာများ၏ ဖုံးလွှမ်းမှု၊ အပင်အမျိုးအစားနှင့် မျိုးစိတ်များကို ဖော်ထုတ်ရန် အပင်မျိုးစိတ်များကို လေ့လာဆန်းစစ်ခဲ့ပါသည်။ ကောက်ယူရရှိသော သတ္တဝါမျိုး စိတ်များကိုလည်း လေ့လာခြင်း၊

အမျိုးအစားခွဲခြားခြင်း၊ အမျိုးအမည်ခွဲခြားခြင်းတို့ကို ဆောင်ရွက်ခဲ့ပါသည်။ ဇီဝညွှန်းကိန်း ဖော်ပြနိုင်သော ငှက်မျိုးစိတ်များကိုလည်း အမျိုးအမည်ခွဲခြား၍ ဆန်းစစ်လေ့လာခဲ့ပါသည်။ ကောက်ယူရရှိသော မျိုးစိတ်များအား ခွဲခြမ်းစိတ်ဖြာခြင်းနှင့် အကဲဖြတ်ခြင်းများ ပြုလုပ်ပြီး ရလဒ်အချက်အလက်များကို အောက်ပါဇယားတွင် ဆက်လက်ဖော်ပြထားပါသည်။

၄.၃.၁ အပင်မျိုးစိတ်များ

ကွင်းဆင်းလေ့လာစစ်တမ်းရလဒ်များ

နမူနာကွက်များတွင် ကောက်ယူထားသော အပင်မျိုးစိတ်များ (သစ်မာပင်များ၊ ပင်ပျော့များနှင့် ချုံပင်များ) ပေါ်တွင် အခြေခံ၍ မျိုးစိတ်ဖွဲ့စည်းမှုကို ခွဲခြမ်းစိတ်ဖြာထားပါသည်။ ကွင်းဆင်းလေ့လာမှုစစ်တမ်းအရ စုစုပေါင်းအပင်မျိုးစိတ် (၃၁)မျိုး၊ မျိုးစု (၂၉) မျိုး၊ မျိုးရင်း (၁၉)မျိုးနှင့် မျိုးစဉ် (၁၄) မျိုးတို့အား ခွဲခြားသတ်မှတ်ထားပြီး အပင်စာရင်းကောက်ယူမှု နည်းစနစ်အသေးစိတ်အား အခန်း (၄) တွင် ပြည့်စုံစွာဖော်ပြထားပါသည်။ ကောက်ယူရရှိသော မျိုးစိတ်များကို သစ်မာပင်များ၊ ချုံပင်များ၊ ပင်ပျော့များ၊ နွယ်ပင်/တွယ်တက်ပင်များအဖြစ် အမျိုးအစားခွဲခြားထားပါသည်။ စုစုပေါင်း သစ်မာပင် မျိုးစိတ် (၁၈) မျိုး၊ ချုံနွယ်အမျိုးအစားဝင် (၇) မျိုး၊ ပင်ပျော့မျိုးစိတ် (၂) မျိုးနှင့် နွယ်ပင်/တွယ်တက်ပင်မျိုးစိတ် (၂) မျိုးတို့ကို တွေ့ရှိခဲ့ပါသည်။

လေ့လာမှုဧရိယာတွင် မျိုးစဉ် Fabales သည် အတွေ့ရအများဆုံး မျိုးစိတ်များဖြစ်ပါသည်။ မြန်မာနိုင်ငံအလယ်ပိုင်း အပူပိုင်းဇုန်ရှိ ပတ်ဝန်းကျင်အခြေအနေများနှင့် ကောင်းမွန်စွာ လိုက်လျောညီထွေရှိသော ဝိသေသလက္ခဏာများကြောင့် Fabales အနွယ်ပင်အပင်မျိုးများအား အများဆုံးတွေ့ ရှိခြင်းဖြစ်ပါသည်။ *Senegalia catechu* နှင့် *Ziziphus Jujuba* တို့သည် လေ့လာမှုဧရိယာတွင် ခြောက်သွေ့ရွက်ကြောသစ်တောဂေဟ စနစ်၏ မျိုးစိတ်များဖြစ်သောကြောင့် အတွေ့ရအများဆုံး မျိုးစိတ်များအဖြစ်တွေ့ရှိရပါသည်။

IUCN Red List

IUCN Red List အရ ယူကလစ် (*Eucalyptus camaldulensis*) အား မျိုးသုဉ်းရန် အန္တရာယ်ကျရောက်လုနီးပါးမျိုးစိတ်အဖြစ် သတ်မှတ်ထားကြောင်းတွေ့ရှိရပါသည်။ ဂေါင်းလေး/ ခေါင်းလေး (*Capparis grandis*)နှင့် သရက် (*Mangifera indica*) တို့အား အချက်အလက် ပြည့်စုံမှုမရှိသည့် မျိုးစိတ်များအဖြစ် ဖော်ပြထားပါသည်။ ကျန်မျိုးစိတ် (၁၇)မျိုးအား မျိုးသုဉ်းရန် အန္တရာယ်နည်းပါးသည့် မျိုးစိတ်အဖြစ် ဖော်ပြထားပါသည်။ ဤအခြေအနေသည် မျိုးစိတ်များ၏ ဦးရေသည် တည်ငြိမ်ပြီး မျိုးသုဉ်းလုနီးပါးအန္တရာယ်များကို ရင်ဆိုင်နေခြင်း မရှိကြောင်း ညွှန်ပြပါသည်။ သို့သော်လည်း ထိန်းသိမ်းရေး လုပ်ငန်းများ ဆောင်ရွက်မှုများ ဆောင်ရွက်ရန်လိုအပ်ပါသည်။ နောက်ဆုံးနေဖြင့် မျိုးစိတ် (၁၁) မျိုးအား မည့်သည့်အမျိုးအစားအတွင်းတွင် ပါဝင်နေကြောင်း ဖော်ပြထားခြင်းမရှိသည့် အခြေအနေဖြင့် တွေ့ရှိရပါသည်။

ဆွေးနွေးချက်နှင့် နိဂုံး

ဤကဲ့သို့သော ခြောက်သွေ့ရပ်ဝန်းဒေသများတွင် ခြောက်သွေ့မှုဒဏ်ခံနိုင်သော ရှားနှင့် ဇီး မျိုးစိတ်များအား ထင်ရှားသော မျိုးစိတ်များအဖြစ်တွေ့ရှိရပါသည်။ လေ့လာမှုရလဒ်များအရ ရှားနှင့် ဇီးမျိုးစိတ်များသည် ရှင်သန်ပေါက်ရောက်မှုအားကောင်းပြီး Dominant Species များအဖြစ် တွေ့ရှိရပါသည်။ ရှား၊ ဇီးနှင့် တမာမျိုးစိတ်များအား ဂေဟစနစ်နှင့် စီးပွားရေးအရ အရေးပါသော မျိုးစိတ်များအဖြစ် တွေ့ရှိရပါသည်။

၄.၃.၂ သတ္တဝါမျိုးစိတ်များ

၄.၃.၂.၁ နို့တိုက်သတ္တဝါများ

ကွင်းဆင်းလေ့လာမှုရလဒ်

နို့တိုက်သတ္တဝါမျိုးစိတ်များကို ကွင်းဆင်းလေ့လာစဉ်အတွင်း ဓါတ်ပုံခြင်း၊ မှတ်တမ်း တင်ခြင်းများဆောင်ရွက်ခဲ့ပါသည်။ နို့တိုက်သတ္တဝါငယ်များဖြစ်သည့် သစ်စွေတစ်မျိုး တည်းကိုသာ တွေ့ရှိရပါသည်။ ၎င်းတို့ကို လူနေအိမ်၊ ကျေးရွာ၊ အဆောက်အဦနှင့် သစ်ပင်များအနီးတွင် တွေ့ရှိရပြီး လယ်ကွင်းပြင်နှင့် မြစ်ကြောင်းတစ်လျှောက်တွင် မတွေ့ရှိရပါ။

၄.၃.၂.၂ ငှက်မျိုးစိတ်များ

ကွင်းဆင်းလေ့လာမှုရလဒ်

ကွင်းဆင်းလေ့လာစဉ်အတွင်း ငှက်မျိုးစိတ် (၂၈)မျိုး၊ မျိုးစု (၂၃)စု၊ မျိုးရင်း (၁၉)မျိုးနှင့် မျိုးစဉ် (၁၀)မျိုးတို့ကို လေ့လာတွေ့ရှိရပါသည်။ မျိုးစိတ်ပါဝင်မှုအနေဖြင့် မျိုးစဉ် Passeriformes သည် (၄၆.၃၄%)၊ Pelecaniformes သည် (၁၄.၂၉%)၊ Coraciiformes သည် (၁၀.၇၁ %)၊ Cuculiformes သည် (၇.၁၄ %)၊ Caprimulgiformes, Charadriiformes, Ciconiiformes, Columbiformes, Strigiformes, Suliformes တို့အား ၃.၅၇ % အသီးသီးလေ့လာတွေ့ရှိရပါသည်။ မျိုးစဉ် Passeriformes အုပ်စုတွင် မျိုးစိတ် (၁၃)မျိုး၊ မျိုးစဉ် Pelecaniformes တွင် မျိုးစိတ် (၄) မျိုး၊ မျိုးစဉ် Coraciiformes တွင် မျိုးစိတ် (၃) မျိုး၊ Cuculiformes တွင် မျိုးစိတ် (၂) မျိုးနှင့် ကျန်မျိုးစဉ် (၅)မျိုးတွင် မျိုးစိတ် (၁)မျိုးအဖြစ် ပါဝင်နေကြောင်း တွေ့ရှိရပါသည်။ ငှက်မျိုးစိတ်များအရေအတွက် စုစုပေါင်း (၂၈)မျိုးတွေ့ရှိရပြီး အားလုံးသည် ဌာနေငှက်များဖြစ်ပါကြပါသည်။

IUCN Red List

IUCN Red List အရ တွေ့ရှိရသော ငှက်မျိုးစိတ်အားလုံးအား မျိုးသုဉ်းရန် အန္တရာယ်နည်းပါးသည့် မျိုးစိတ်များအဖြစ်သာ တွေ့ရှိရပါသည်။ သစ်တောဦးစီးဌာန ထုတ်ပြန်ထားသော ကာကွယ်ထားသည့် တိရစ္ဆာန်များစာရင်းအရ ခရုတုတ်၊ ငှက်တော်၊ တစ်တီတူး၊ ဇီးကွက်၊ ပိန်းညှင်းရင်ဖြူ၊ စွေငှက်တို့အား လုံးဝကာကွယ်ထားသော တိရစ္ဆာန်များအဖြစ် ကာကွယ်ထားပါသည်။ ပုစဉ်းထိုးမြီးပြာ၊ ကျွဲကျောင်းဖျိုင်း၊ ဗျိုင်းအောက်၊ ဆတ်ဖျိုင်း/ရေဘုတ်၊ ပုစဉ်းထိုးငှက်၊ သာယာဝတီဖျိုင်း၊ ဗျိုင်း၊ ဆက်ရက်ခေါင်းဖြူနှင့် ကျွဲကျောင်း

ဆက်ရက် တို့ကို သာမန်ကာကွယ်ထားသည့် မျိုးစိတ်များအဖြစ် သတ်မှတ်ထားပါသည်။ ဆက်လက်၍ ကျန်ရှိသော ငှက်မျိုးစိတ်များဖြစ်သည့် ဥဩ၊ တင်ကျီး၊ သပိတ်လွယ်နှင့် ဗွတ်ဖင်နီတို့အား မတ်လ (၁၅) ရက်မှ စက်တင်ဘာလ (၃၀) ရက်နေ့အတွင်း ရာသီအလိုက်ကာကွယ်ထားသော တိရစ္ဆာန်များအဖြစ် သတ်မှတ်ထားကြောင်း တွေ့ရှိရပါသည်။

ဆွေးနွေးချက်နှင့် နိဂုံး

လေ့လာဆန်းစစ်ထားသော ရလဒ်များအရ မျိုးစဉ် Passeriformes အုပ်စုဝင် ငှက်မျိုးစိတ်များအား အတွေ့ရအများဆုံး အပေါများဆုံး မျိုးစိတ်အဖြစ်တွေ့ရှိရပါသည်။ ပွင့်လင်း/နွေရာသီတွင် အပင်နှင့် ချုံပုတ်များအတွင်း အင်းဆက်များ၊ အခွံမာသီးများ၊ အစေ့အဆံများကို စားသုံးပြီး ဆောင်းရာသီတွင် ၎င်းတို့၏ အမူအရာနှင့် နေထိုင်မှုပုံစံများပြောင်းလဲ၍ အသီးများနှင့် အစေ့များခွဲပျော့သီးများကို ပြောင်းလဲ၍ စားသုံးကြောင်း တွေ့ရှိရပါသည်(Roberts, ၁၉၉၂)။ ထို့ကြောင့် ၎င်း Passeriformes အုပ်စုဝင်ငှက်များ၏ ပေါများမှုသည် ကုန်းမြေပတ်ဝန်းကျင် အမျိုးမျိုးအဖုံဖုံတွင် ယင်းတို့၏ ပျံ့နှံ့မှုတည်ရှိမှုကို လိုက်လျောညီထွေစွာ နေထိုင်မှုကြောင့်ဟု ယူဆနိုင်ပါသည်။

၄.၃.၂.၃. ရေနေသတ္တဝါများ

၄.၃.၂.၂.၁ အပင်မျှောနှင့် အကောင်မျှောများ

ကွင်းဆင်းလေ့လာမှုရလဒ်

မြင်းခြံခရိုင်၊ တောင်သာမြို့နယ်ရှိ ကျောဇီကျေးရွာနှင့် မာလာကျေးရွာ တို့တွင် နေရာ (၂) သတ်မှတ်၍ အပင်မျှော၊ အကောင်မျှော၊ ငါး၊ ခရုနှင့် ယောက်သွားတို့ကို နမူနာကောက်ယူ လေ့လာခဲ့ပါသည်။ ရလဒ်များအရ မျိုးပေါင်းစု Chlorophyta၊ Euglenophyta၊ Cyanophyta၊ Arthropoda၊ နှင့် Rotifera တို့ကို လေ့လာတွေ့ရှိရပါသည်။ မျိုးစိတ်ပါဝင်မှုအနေဖြင့် မျိုးပေါင်းစု Rotifera တွင် (၃၈%) နှင့် မျိုးပေါင်းစု Chlorophyta တွင် (၂၅%) အဖြစ် အများဆုံးတွေ့ရှိရပါသည်။ ကျောဇီကျေးရွာတွင် မျိုးစိတ်အများဆုံးအား လေ့လာတွေ့ရှိရပါသည်။

ဆွေးနွေးချက်နှင့် နိဂုံး

ကျောဇီကျေးရွာနှင့် မာလာကျေးရွာတို့တွင် အဏုဇီဝမျိုးစိတ်များအား လေ့လာခဲ့ပြီး မျိုးပေါင်းစု Rotifera ကို အတွေ့ရ အများဆုံး မျိုးစိတ်များအဖြစ် တွေ့ရှိရပါသည်။ ၎င်းတို့သည်မူလရေချို ကျောရိုးမဲ့များ အုပ်စုဖြစ်ပြီး ရေချိုဂေဟစနစ်တွင် အရေးပါသော အခန်းကဏ္ဍမှပါဝင်ပါသည်။ Rotifera မျိုးပေါင်းစုသည် ကျောရိုးရှိနှင့် ကျောရိုးမဲ့ သတ္တဝါများ၏ အရေးပါသောအစာရင်းမြစ်လည်းဖြစ်ပါသည်။ Microalgae များသည် ရေနေဂေဟစနစ်တွင် အစာကွင်းဆက်၏ အရေးပါသော ထုတ်လုပ်သူအဖြစ်တည်ရှိနေပါသည်။

၄.၃.၂.၂.၂ Benthic Macroinvertebrates (ခရုများနှင့် ယောက်သွားများ)

ကွင်းဆင်းလေ့လာမှုရလဒ်နှင့် ဆွေးနွေးချက်များ

ကွင်းဆင်းလေ့လာမှုရလဒ်များအရ ခရုနှင့် ယောက်သွားမျိုးစိတ် (၁၀)မျိုး၊ မျိုးစု (၅)မျိုး၊ မျိုးရင်း (၅) မျိုးနှင့် မျိုးစဉ် (၅)မျိုးတို့ကို လေ့လာတွေ့ရှိခဲ့ပါသည်။ မျိုးစိတ်ပါဝင်မှုအများဆုံးအနေဖြင့် မျိုးစဉ်တွင် Neotaenioglossaသည် (၄၀%)၊ မျိုးစဉ် Unionidaတွင် (၃၀%)၊ မျိုးစဉ် Venerida တွင် (၁၀%)၊ မျိုးစဉ် Architaenioglossa တွင် (၁၀%)၊ မျိုးစဉ် Unionidaတွင် (၃၀%) နှင့်မျိုးစဉ် Hygrophila တွင်(၁၀%)အဖြစ် တွေ့ရှိရပါသည်။ လေ့လာသည့် အလိုက် တွေ့ရှိရသော မျိုးစိတ်အရေအတွက်ပေါ်မူတည်၍ ကျောဇီကျေးရွာတွင် မျိုးစိတ် (၆)မျိုးနှင့် မာလာကျေးရွာတွင် မျိုးစိတ် (၂) မျိုးတွေ့ရှိရပါသည်။

ဤလေ့လာမှုတွင် မှတ်တမ်းတင်ထားသော ခရုများနှင့် ယောက်သွားများကို ဧရာဝတီမြစ်၏ သဲသောင်ပြင် ကမ်းပါးများတွင် တွေ့ရှိရသည်။ လေ့လာသည့်နေရာ(၁)၊ ကျောဇီရွာသည် ကျောဇီကျေးရွာအနောက်ဘက်ခြမ်းနှင့် လေ့လာသည့် နေရာ (၂)၊ မာလာကျေးရွာတို့သည် မာလာကျေးရွာအနီး ဧရာဝတီမြစ်ကမ်းတွင် တည်ရှိပြီး ၎င်းနေရာတို့တွင် လူတို့၏ ဆောင်ရွက်မှုများ (ငါးဖမ်းခြင်း၊ အမှိုက်များ၊ ရေဆိုးများနှင့် သဘာဝပတ်ဝန်းကျင် ထိခိုက်မှု) များကို တွေ့ရှိရသည်။ မြစ်အတွင်းရှိ လူတို့၏ လုပ်ဆောင်ချက်များသည် ရေချိုခရုများနှင့် ယောက်သွားများ၏ နေထိုင်ရာနေရာ အပြောင်းအလဲကို ဖြစ်စေသည့် ဆိုးကျိုးများ ဖြစ်စေပါသည်။ ခရုများနှင့် ယောက်သွားများကဲ့သို့ ရေနေသတ္တဝါများ၏ နေထိုင်ရာများနှင့် ကျက်စားရာနေရာများ သည် လူတို့၏ လုပ်ဆောင်ချက်များ ကြောင့် ထိခိုက်မှုရှိသည်ဟု ကောက်ချက်ချနိုင်သည်။

၄.၃.၂.၂.၃ ငါးမျိုးစိတ်များ

ကွင်းဆင်းလေ့လာမှုရလဒ်နှင့် ဆွေးနွေးချက်များ

လေ့လာသည့်နေရာ (၁) ကျောဇီရွာတွင် ငါးမျိုးစိတ် (၂၂)မျိုးနှင့် လေ့လာသည့် နေရာ (၂) မာလာရွာတွင် ငါးမျိုးစိတ် (၁၉)မျိုးတို့အား လေ့လာစဉ်ကာလအတွင်း တွေ့ရှိရပါသည်။ ကောက်ယူရရှိသော ရလဒ်များအရ မျိုးစဉ် Cypriniformes နှင့် Siluriformesတို့တွင် ငါးမျိုးစိတ်အများဆုံးတွေ့ရှိရပါသည်။ ၎င်းမျိုးစဉ် (၂)မျိုးအား နှိုင်းယှဉ်သည့်အခါ မျိုးစဉ် Cypriniformes တွင် ငါးမျိုးစိတ်သည် မျိုးစဉ်Siluriformes ပိုမိုများပြားစွာပါဝင်နေကြောင်းတွေ့ရှိရပါသည်။ ရလဒ်များအရ မျိုးစိတ်ပါဝင်မှုနှုန်းသည် မျိုးစဉ် Cypriniformes တွင် (၄၁%)၊ မျိုးစဉ် Siluriformes တွင် (၃၂%)၊ မျိုးစဉ် Perciformes တွင် (၁၄ %)၊ မျိုးစဉ် Mugiliformes တွင် (၅%)၊ မျိုးစဉ် Osteoglossiformes (၄ %)နှင့် မျိုးစဉ် Clupeiformes (၄

%)အဖြစ်အများဆုံးတွေ့ရှိရပါသည်။ မျိုးစဉ် Cypriniformes အား အတွေ့ရအများဆုံး မျိုးစိတ်အရေအတွက်ပါဝင်မှု မျိုးစဉ်အဖြစ်တွေ့ရှိရပြီး ဤမျိုးစဉ် သည် ရေချိုငါးအုပ်စုတွင် အကြီးမားဆုံးသော မျိုးစဉ်တစ်ခုဖြစ်ပါသည်။

၅။ ပတ်ဝန်းကျင်ဆိုင်ရာအချက်အလက်များလေ့လာမှု

ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းသည် တစ်ဦးချင်းစီနှင့် လူထုအဖွဲ့အစည်းအပေါ် သက်ရောက်နေသည့် ရုပ်ပိုင်းဆိုင်ရာ၊ ဇီဝဆိုင်ရာနှင့် လူမှုရေးဆိုင်ရာ ကိစ္စရပ်များကို အဓိက အလေးထား ဆန်းစစ်ပြီး နောက်ဆုံးတွင် ထိုသက်ရောက်မှု၏ ပုံစံ၊ အမျိုးအစား၊ ဆက်နွယ်မှုနှင့် ရှင်သန်နိုင်မှုကို ဆုံးဖြတ်ပေးပါသည်။ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း အကြောင်းအရာတွင် သက်ရောက်မှုများသည် ဆိုးရွားသော သက်ရောက်မှု (သို့မဟုတ်) ကောင်းမွန်သော အပြုသဘောဆောင်သည့် သက်ရောက်မှုလည်း ဖြစ်နိုင်ပါသည်။ တည်ဆောက်ခြင်းအဆင့်နှင့် လုပ်ငန်းလည်ပတ်ခြင်း/ ထိန်းသိမ်းခြင်းအဆင့်တွင် ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများနှင့် လျော့ချရေးနည်းလမ်းများကို **အခန်း (၅)** တွင် အသေးစိတ်ဖော်ပြထားပါသည်။

ထိုသို့သက်ရောက်မှုများအား အကဲဖြတ်တွက်ချက်ရာတွင် မှန်ကန်တိကျသော နည်းစနစ်များ လိုအပ်သကဲ့သို့ မည်ကဲ့သို့သော သက်ရောက်မှုများရှိသည်၊ မည်ကဲ့သို့သော လုပ်ငန်းဆောင်တာများ ဆောင်ရွက်သည်များအား အခြေခံတွက်ချက်ခြင်း ဖြစ်သဖြင့် စီမံကိန်းနှင့် အနီးဝန်းကျင်အား ကွင်းဆင်းလေ့လာခြင်းများ လိုအပ်ပေသည်။ သို့ဖြစ်ပါ၍ ကွင်းဆင်းလေ့လာခြင်းများနှင့် ပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေးတိုင်းတာခြင်းများအား ဆောင်ရွက်ခဲ့ပြီးဖြစ်ပါသည်။ ကွင်းဆင်း လေ့လာမှုများနှင့် တိုင်းတာမှုများမှရရှိသော ပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေးနှင့် လေ့လာတွေ့ရှိမှုများအပေါ်မူတည်၍ ဤသက်ရောက်မှု အကဲဖြတ်ခြင်း နည်းဗျူဟာ ကိုဆန်းစစ် တွက်ချက်ထားပါသည်။

အကျိုးသက်ရောက်မှုအကဲဖြတ်ခြင်းနည်းစနစ်ကို South African Heritage Resources Information System (SAHRIS) ၏ သက်ရောက်မှုအကဲဖြတ် နည်းစနစ်များ အတိုင်းဆောင်ရွက်ထားပါသည်။ အရေးပါသော အဆင့်သတ်မှတ်ခြင်း နည်းစနစ်၏ ကျယ်ပြန့်သောချဉ်းကပ်မှုမှာ သက်ရောက်မှုတစ်ခုစီ၏ အကျိုးဆက် (C) (သဘာဝ၊ အတိုင်းအတာ၊ ကြာချိန်၊ ပြင်းအား၊ နှင့် နောက်ပြန်ကောင်းမွန်နိုင်မှုတို့ပါဝင်သည်) ကို ထည့်သွင်းစဉ်းစားခြင်းဖြင့် သဘာဝပတ်ဝန်းကျင်ဆိုင်ရာ ထိခိုက်မှု (EI) ကို အကဲဖြတ်ရန်ဖြစ်သည်။ ထို့အပြင် ဆက်စပ်သက်ရောက်မှုများ၊ အများသူငှာဆိုင်ရာ

စိုးရိမ်ပူပန်မှုနှင့် အစားထိုး၍မရသော အရင်းအမြစ်များ ဆုံးရှုံးနိုင်ခြေများ အပါအဝင် အခြားအချက်များအားထည့်သွင်းစဉ်းစားထားသော သိသာထင်ရှားသော သက်ရောက်မှု (S)နှင့် သဘာဝပတ်ဝန်းကျင်ဆိုင်ရာ ထိခိုက်မှု (EI)တို့ကို အသုံးပြု၍ သက်ရောက်မှုဦးစားပေးသတ်မှတ်ခြင်း (PF) ကို ဆန်းစစ်ရန် အသုံးပြုပါသည်။

ဇယား - ၂ လုပ်ငန်းတည်ဆောက်ခြင်းကာလ/ဖျက်သိမ်းခြင်းကာလ နှင့် လည်ပတ်ခြင်းကာလအတွင်း သိသာထင်ရှားသော သက်ရောက်မှုများအား တွက်ချက်ခြင်း

ကာလ	အကျိုးသက်ရောက်မှု $C = ((E + D + I + R) / ၄) * N$						ဖြစ်နိုင်ခြေ (P)	ပတ်ဝန်းကျင်အန္တရာယ်အဆင့် (EI = C x P)	သက်ရောက်မှုအတန်းအစား	သက်ရောက်မှုအခြေအနေ
	E	D	I	R	N	C				
လေထုညစ်ညမ်းမှုလျော့ချရေးနည်းလမ်းများ မဆောင်ရွက်မီ										
တည်ဆောက်ခြင်းကာလ/ ဖျက်သိမ်းခြင်းကာလ	၂	၂	၄	၃	-၁	-၂.၇၅	၄	-၁၁	အလယ်အလတ်	ဆိုးကျိုး
လုပ်ငန်းလည်ပတ်ခြင်း	၃	၄	၄	၄	-၁	-၃.၇၅	၅	-၁၈.၇၅	မြင့်	
လေထုညစ်ညမ်းမှုလျော့ချရေးနည်းလမ်းများဆောင်ရွက်ပြီး										
တည်ဆောက်ခြင်းကာလ/ ဖျက်သိမ်းခြင်းကာလ	၁	၂	၃	၂	-၁	-၂	၃	-၆	နိမ့်	ဆိုးကျိုး
လုပ်ငန်းလည်ပတ်ခြင်း	၂	၄	၃	၃	-၁	-၃	၄	-၁၂	အလယ်အလတ်	
ရေထုညစ်ညမ်းမှုလျော့ချရေးနည်းလမ်းများ မဆောင်ရွက်မီ										
တည်ဆောက်ခြင်းကာလ/ ဖျက်သိမ်းခြင်းကာလ	၃	၂	၃	၃	-၁	-၂.၇၅	၄	-၁၁	အလယ်အလတ်	ဆိုးကျိုး
လုပ်ငန်းလည်ပတ်ခြင်း	၃	၄	၄	၄	-၁	-၃.၇၅	၅	-၁၈.၇၅	မြင့်	

ကာလ	အကျိုးသက်ရောက်မှု $C = ((E + D + I + R) / ၄) * N$						ဖြစ်နိုင်ခြေ (P)	ပတ်ဝန်းကျင်အန္တရာယ်အဆင့် (EI = C x P)	သက်ရောက်မှုအတန်းအစား	သက်ရောက်မှုအခြေအနေ
	E	D	I	R	N	C				
ရေထုညစ်ညမ်းမှုလျော့ချရေးနည်းလမ်းများဆောင်ရွက်ပြီး										
တည်ဆောက်ခြင်းကာလ/ ဖျက်သိမ်းခြင်းကာလ	၂	၂	၂	၂	-၁	-၂	၃	-၆	နိမ့်	ဆိုးကျိုး
လုပ်ငန်းလည်ပတ်ခြင်း	၂	၄	၃	၃	-၁	-၃	၃	-၉	အလယ်အလတ်	
အစိုင်အခဲစွန့်ပစ်ပစ္စည်းညစ်ညမ်းမှုလျော့ချရေးနည်းလမ်းများ မဆောင်ရွက်မီ										
တည်ဆောက်ခြင်းကာလ/ ဖျက်သိမ်းခြင်းကာလ	၂	၂	၃	၃	-၁	-၂.၅	၅	-၁၂.၅	အလယ်အလတ်	ဆိုးကျိုး
လုပ်ငန်းလည်ပတ်ခြင်း	၃	၄	၃	၄	-၁	-၃.၅	၅	-၁၇.၅	မြင့်	
အစိုင်အခဲစွန့်ပစ်ပစ္စည်းညစ်ညမ်းမှုလျော့ချရေးနည်းလမ်းများဆောင်ရွက်ပြီး										
တည်ဆောက်ခြင်းကာလ/ ဖျက်သိမ်းခြင်းကာလ	၁	၃	၂	၂	-၁	-၂	၄	-၈	နိမ့်	ဆိုးကျိုး
လုပ်ငန်းလည်ပတ်ခြင်း	၂	၄	၂	၃	-၁	-၂.၇၅	၄	-၁၁	အလယ်အလတ်	
ဆူညံသံနှင့် တုန်ခါမှုလျော့ချရေးနည်းလမ်းများ မဆောင်ရွက်မီ										
တည်ဆောက်ခြင်းကာလ/ ဖျက်သိမ်းခြင်းကာလ	၃	၂	၄	၄	-၁	-၃.၂၅	၄	-၁၃	အလယ်အလတ်	ဆိုးကျိုး

ကာလ	အကျိုးသက်ရောက်မှု $C = ((E + D + I + R) / ၄) * N$						ဖြစ်နိုင်ခြေ (P)	ပတ်ဝန်းကျင်အန္တရာယ်အဆင့် (EI = C x P)	သက်ရောက်မှုအတန်းအစား	သက်ရောက်မှုအခြေအနေ
	E	D	I	R	N	C				
လုပ်ငန်းလည်ပတ်ခြင်း	၃	၄	၄	၃	-၁	-၃.၅	၄	-၁၄	အလယ်အလတ်	
ဆူညံသံနှင့် တုန်ခါမှုလျော့ချရေးနည်းလမ်းများဆောင်ရွက်ပြီး										
တည်ဆောက်ခြင်းကာလ// ဖျက်သိမ်းခြင်းကာလ	၂	၂	၃	၃	-၁	-၂.၅	၃	-၇.၅	နိမ့်	ဆိုးကျိုး
လုပ်ငန်းလည်ပတ်ခြင်း	၂	၄	၃	၂	-၁	-၂.၇၅	၃	-၈.၂၅	နိမ့်	
မြေထုညစ်ညမ်းမှုလျော့ချရေးနည်းလမ်းများ မဆောင်ရွက်မီ										
တည်ဆောက်ခြင်းကာလ/ ဖျက်သိမ်းခြင်းကာလ	၂	၂	၃	၃	-၁	-၂.၅	၄	-၁၀	အလယ်အလတ်	ဆိုးကျိုး
လုပ်ငန်းလည်ပတ်ခြင်း	၃	၄	၃	၃	-၁	-၃.၂၅	၄	-၁၃	အလယ်အလတ်	
မြေထုညစ်ညမ်းမှုလျော့ချရေးနည်းလမ်းများဆောင်ရွက်ပြီး										
တည်ဆောက်ခြင်းကာလ// ဖျက်သိမ်းခြင်းကာလ	၁	၂	၂	၂	-၁	-၁.၇၅	၃	-၅.၂၅	နိမ့်	ဆိုးကျိုး
လုပ်ငန်းလည်ပတ်ခြင်း	၂	၄	၂	၂	-၁	-၂.၅	၃	-၇.၅	နိမ့်	
ဇီဝမျိုးစုံမျိုးကွဲများအပေါ်ထိခိုက်မှုလျော့ချရေးနည်းလမ်းများ မဆောင်ရွက်မီ										
တည်ဆောက်ခြင်းကာလ/	၁	၂	၃	၃	-၁	-၂.၅	၄	-၁၀	အလယ်အလတ်	ဆိုးကျိုး

ကာလ	အကျိုးသက်ရောက်မှု $C = ((E + D + I + R) / ၄) * N$						ဖြစ်နိုင်ခြေ (P)	ပတ်ဝန်းကျင်အန္တရာယ်အဆင့် (EI = C x P)	သက်ရောက်မှုအတန်းအစား	သက်ရောက်မှုအခြေအနေ
	E	D	I	R	N	C				
ဖျက်သိမ်းခြင်းကာလ										
လုပ်ငန်းလည်ပတ်ခြင်း	၃	၄	၃	၄	-၁	-၃.၅	၄	-၁၄	အလယ်အလတ်	
ဇီဝမျိုးစုံမျိုးကွဲများအပေါ်ထိခိုက်မှုလျော့ချရေးနည်းလမ်းများဆောင်ရွက်ပြီး										
တည်ဆောက်ခြင်းကာလ/ ဖျက်သိမ်းခြင်းကာလ	၁	၂	၂	၃	-၁	-၂	၃	-၆	နိမ့်	ဆိုးကျိုး
လုပ်ငန်းလည်ပတ်ခြင်း	၂	၄	၃	၃	-၁	-၃	၄	-၁၂	အလယ်အလတ်	
အသက်မွေးဝမ်းကြောင်းနှင့်လူမှုစီးပွားရေး										
တည်ဆောက်ခြင်းကာလ နှင့် လုပ်ငန်းလည်ပတ်ခြင်း/ ဖျက်သိမ်းခြင်းကာလ	၃	၅	၄	၃	+၁	+၃.၇၅	၅	+ ၁၈.၇၅	မြင့်	ဆိုးကျိုး

ဇယား -၃ လုပ်ငန်းတည်ဆောက်ခြင်းကာလ/ဖျက်သိမ်းခြင်းကာလနှင့် လည်ပတ်ခြင်းအတွင်း သိသာထင်ရှားသော နောက်ဆုံးအဆင့် ပတ်ဝန်းကျင်အပေါ် သက်ရောက်မှုများအား တွက်ချက်ခြင်း

ကာလ	ဦးစားပေး သတ်မှတ်ခြင်း (P = PR + CI+ LR)				စံသတ်မှတ်ချက်	ဦးစားပေးမှု (PF)	ပတ်ဝန်းကျင်ဆိုင်ရာအရေးပါမှု (PF*EI)	အဆင့်သတ်မှတ်ချက်	သက်ရောက်မှုအခြေအနေ
	PR	CI	LR	P					
လေထုညစ်ညမ်းမှု									
တည်ဆောက်ခြင်းကာလ/ ဖျက်သိမ်းခြင်းကာလ	၁	၂	၁	၄	အလယ်အလတ်	၁.၅	-၉	နိမ့်	ဆိုးကျိုး
လုပ်ငန်းလည်ပတ်ခြင်း	၁	၂	၃	၆	အလယ်အလတ်	၁.၅	-၁၈	အလယ်အလတ်	
ရေထုညစ်ညမ်းမှု									
တည်ဆောက်ခြင်းကာလ/ ဖျက်သိမ်းခြင်းကာလ	၁	၂	၃	၆	အလယ်အလတ်	၁.၅	-၉	နိမ့်	ဆိုးကျိုး
လုပ်ငန်းလည်ပတ်ခြင်း	၁	၃	၃	၇	အလယ်အလတ်	၁.၅	-၁၃.၅	နိမ့်	
အစိုင်အခဲစွန့်ပစ်ပစ္စည်းညစ်ညမ်းမှု									
တည်ဆောက်ခြင်းကာလ/ ဖျက်သိမ်းခြင်းကာလ	၁	၃	၂	၆	အလယ်အလတ်	၁.၅	-၁၂	နိမ့်	ဆိုးကျိုး
လုပ်ငန်းလည်ပတ်ခြင်း	၁	၂	၃	၆	အလယ်အလတ်	၁.၅	-၁၆.၅	အလယ်အလတ်	
အသံဆူညံမှုနှင့်တုန်ခါမှု									
တည်ဆောက်ခြင်းကာလ/ ဖျက်သိမ်းခြင်းကာလ	၁	၂	၂	၅	အလယ်အလတ်	၁.၅	-၁၁.၅၅	နိမ့်	ဆိုးကျိုး

ကာလ	ဦးစားပေး သတ်မှတ်ခြင်း (P = PR + CI+ LR)				စံသတ်မှတ်ချက်	ဦးစားပေးမှု (PF)	ပတ်ဝန်းကျင်ဆိုင်ရာအရေးပါမှု (PF*EI)	အဆင့်သတ်မှတ်ချက်	သက်ရောက်မှုအခြေအနေ
	PR	CI	LR	P					
ဖျက်သိမ်းခြင်းကာလ									
လုပ်ငန်းလည်ပတ်ခြင်း	၁	၃	၂	၆	အလယ်အလတ်	၁.၅	-၁၂.၃၈	နိမ့်	
မြေထုညစ်ညမ်းမှု									
တည်ဆောက်ခြင်းကာလ/ ဖျက်သိမ်းခြင်းကာလ	၁	၂	၂	၅	အလယ်အလတ်	၁.၅	-၇.၈၆	နိမ့်	ဆိုးကျိုး
လုပ်ငန်းလည်ပတ်ခြင်း	၁	၂	၂	၅	အလယ်အလတ်	၁.၅	-၁၁.၂၅	နိမ့်	
ဇီဝမျိုးစုံမျိုးကွဲ									
တည်ဆောက်ခြင်းကာလ/ ဖျက်သိမ်းခြင်းကာလ	၂	၂	၂	၆	အလယ်အလတ်	၁.၅	-၉	နိမ့်	ဆိုးကျိုး
လုပ်ငန်းလည်ပတ်ခြင်း	၂	၂	၃	၇	အလယ်အလတ်	၁.၅	-၁၈	အလယ်အလတ်	
အသက်မွေးဝမ်းကြောင်းနှင့်လူမှုစီးပွားရေး									
တည်ဆောက်ခြင်းကာလ/ ဖျက်သိမ်းခြင်းကာလ နှင့် လုပ်ငန်းလည်ပတ်ခြင်း	၂	၂	၂	၆	အလယ်အလတ်	၁.၅	+ ၂၈.၁၃	မြင့်	ဆိုးကျိုး

၅.၁ဘေးအန္တရာယ်အကဲဖြတ်ဆန်းစစ်ခြင်းနှင့် လျှော့ချရေးအစီအမံများ

ဘေးအန္တရာယ်အကဲဖြတ်ဆန်းစစ်ခြင်းကို လုပ်ငန်း အမျိုးအစား တစ်ခုချင်းစီနှင့် လုပ်ငန်းစဉ်တစ်ခုချင်းအတွက် အသေးစိတ်လုပ်ဆောင်ရန် လိုအပ်သည်။ အန္တရာယ် အကဲဖြတ်ခြင်းသည် လုပ်ငန်းအဖွဲ့အစည်းဆိုင်ရာ ရည်မှန်းချက်များ အောင်မြင်စေခြင်း၊ လုပ်ငန်းစွမ်းဆောင်ရည် တိုးတက်စေခြင်း၊ လုပ်ငန်းလည်ပတ်မှု ထိရောက် စေခြင်း၊ လုပ်ငန်းခွင်ဘေးအန္တရာယ် ကင်းရှင်းရေးနှင့် ကျန်းမာရေးကိုတိုးတက်စေခြင်းနှင့် သဘာဝ ပတ်ဝန်းကျင် ထိန်းသိမ်းကာကွယ်ခြင်းတို့ကို အထောက်အကူပြုသည်။ ဤအစီအရင်ခံစာတွင် အသုံးပြုထားသော အန္တရာယ်အကဲဖြတ်ခြင်း နည်းစနစ်သည် ၂၀၁၇ ခုနှစ်၊ စက်တင်ဘာလတွင် သယံဇာတနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ဝန်ကြီးဌာနမှ ထုတ်ပြန်ထားသော ‘ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်း လမ်းညွှန်ချက် (မူကြမ်း)’ မှ ကိုးကား ဖော်ပြထားပါသည်။ အန္တရာယ်အကဲဖြတ်ခြင်းတွင် ပါဝင်သောအဆင့်များမှာ အန္တရာယ်ဖြစ်နိုင်သော အခြေအနေကို ဖော်ထုတ်ခြင်း (Hazard Identification)၊ အန္တရာယ်အဆင့် သတ်မှတ်ခြင်းနှင့် ထိန်းချုပ်ခြင်း (Risk Evaluation and Risk Control) တို့ပါဝင်သည်။

သဘာဝဘေးအန္တရာယ်များကြောင့် လူများ၊ ပစ္စည်းပိုင်ဆိုင်မှုများ၊ ဝန်ဆောင်မှုလုပ်ငန်းများ၊ လူနေထိုင်မှုပုံစံများနှင့် ပတ်ဝန်းကျင်အပေါ် ဖြစ်ပေါ်လာနိုင်သော အလားအလာရှိသည့် ဘေးအန္တရာယ်များ၏ သဘာဝများနှင့် အတိုင်းအတာများကို ဆန်းစစ်ရန်အတွက် အရည်အသွေး (သို့) အရေအတွက်ကိုမူတည်၍ ဆုံးဖြတ်သောနည်းလမ်းကို အသုံးပြုပါသည်။ ထို့ကြောင့် သဘာဝဘေးအန္တရာယ်များကို လေ့လာအကဲဖြတ်ရာတွင် ဖြစ်နိုင်ခြေ (Likelihood) နှင့် အကျိုးဆက် (Consequences) များအပေါ်အခြေခံသည့် 5 x 5 Matrix Risk Methodology အား အသုံးပြုပါသည်။

ဇယား (၄) စီမံကိန်း၏ လုပ်ငန်းလည်ပတ်ခြင်းကာလ အားလုံးအတွက် အန္တရာယ်အကဲဖြတ်ဆန်းစစ်ခြင်း

အချိန်ကာလ	စဉ်	အရင်းအမြစ်နှင့် ဖြစ်ပေါ်နိုင်သော အန္တရာယ်	အန္တရာယ် အဆင့်	လျော့ချရမည့်နည်းလမ်းများ
လုပ်ငန်းခွင်ဘေးအန္တရာယ်				
တည်ဆောက်ခြင်း ကာလ/ ပိတ်ခြင်းကာလ	၁	<p style="text-align: center;">မြေတူးခြင်း</p> <p>(စက်ယန္တရားများ၊ စက်ပစ္စည်းများကြောင့် ဖြစ်ပွားတတ်သော မတော်တဆမှုများ သင့်တော်သော ဖိနပ်မစီးခြင်းကြောင့် ခြေထောက်ထိခိုက်ဒဏ်ရာ ရရှိမှုများ)</p>	မြင့်	<ul style="list-style-type: none"> ✓ ဆောက်လုပ်ရေးလုပ်ငန်းခွင်အတွင်း လုပ်ငန်းခွင်သုံး လုံခြုံရေးဖိနပ်များစီးရန်၊ ✓ ပစ္စည်းများအသုံးမပြုမှီ၊ စက်ယန္တရားများ မမောင်းနှင်ခင် ဂရုတစိုက်စစ်ဆေးရန်၊ ✓ စက်ယန္တရားများမောင်းနှင်ရန် ကျွမ်းကျင်လုပ်သားများ၊ အရည်ချင်းပြည့်မှီသော ဝန်ထမ်းများသာ ခွင့်ပြုရန်။
	၂	<p style="text-align: center;">ကုန်ကြမ်းသယ်ဆောင်ခြင်း</p> <p>(ကုန်တင်ကားများမှ အရာဝတ္ထု ပြုတ်ကျသဖြင့် ထိမှန်ခြင်း၊ ကုန်ကြမ်းများကို သယ်ဆောင်ခြင်းနှင့် သယ်ယူရာတွင် ထိခိုက်ဒဏ်ရာရခြင်း)</p>	အလယ် အလတ်	<ul style="list-style-type: none"> ✓ ကုန်တင်ကားများဖြင့် မသယ်မှီ ပစ္စည်းများအား တင်းကြပ်စွာချည်နှောင်ရန်နှင့် ဖုံးအုပ်ရန်၊ ✓ သယ်ယူပို့ဆောင်ရာတွင် တန်ပိုတင်ဆောင်မှုအား စစ်ဆေးရန် ✓ လေးလံသောပစ္စည်းများနှင့် အရာဝတ္ထုများကို သယ်ဆောင်ရာတွင် ညှပ်ကရိယာများနှင့် ကရိန်းများကို အသုံးပြုရန်။
	၃	<p>ဆောက်လုပ်ရေး/ ပိတ်သိမ်းရေးလုပ်ငန်းများ လုပ်ဆောင်ခြင်း</p>	အလယ် အလတ်	<ul style="list-style-type: none"> ၆ ပေထက်မြင့်သော နေရာများတွင် အလုပ်လုပ်နေစဉ် လုံခြုံရေးဖိနပ်၊ ဦးထုပ်နှင့် ခါးပတ်များ အသုံးပြုရန်။

		<p>အမြင့်မှပြုတ်ကျခြင်း၊ ချော်လဲခြင်း၊ စက်ယန္တရားများကြောင့် ဖြစ်ပွားတတ်သော မတော်တဆမှုများ</p>		<p>ဆောက်လုပ်ရေးလုပ်ငန်းခွင်အတွင်း လမ်းအနေအထားကို ညီညာချောမွေ့စေရန်။</p> <p>စက်ယန္တရားများကို မောင်းနှင်ရန် အရည်အချင်းပြည့်မီသော သို့မဟုတ် အသိအမှတ်ပြုထားသော အလုပ်သမားများကိုသာ မောင်းနှင်ခွင့်ပြုရန်။</p>
<p>လုပ်ငန်း လည်ပတ်ခြင်း ကာလ</p>	<p>၁</p>	<ul style="list-style-type: none"> • အခြေခံအဆောက်အအုံများအား ပြုပြင် ထိန်းသိမ်းခြင်း။ (လျှပ်စစ်ဘေးအန္တရာယ်၊ မီးဘေးအန္တရာယ်၊ ကျန်းမာရေးနှင့် ဘေးအန္တရာယ်) 	<p>အလယ် အလတ်</p>	<ul style="list-style-type: none"> ✓ မြင့်မားသောနေရာများတွင် ပြုပြင်ထိန်းသိမ်းရေး လုပ်ငန်းများ ဆောင်ရွက်နေစဉ် လုံခြုံရေးဦးထုပ်၊ လုံခြုံရေးဖိနပ်၊ လုံခြုံရေးခါးပတ်ကဲ့သို့သော PPE ကိုအသုံးပြုစေခြင်း။ ✓ လျှပ်စစ်ဝါယာကြိုးများ၊ လျှပ်စစ်ပစ္စည်းများ တပ်ဆင်ရာတွင် ကျွမ်းကျင် လျှပ်စစ်ပညာရှင်များ ဖြင့်သာလုပ်ဆောင်စေခြင်း။ ✓ ပေါက်ပြဲပျက်စီးနေသော ဝါယာကြိုးများ၊ လျှပ်စစ်ပစ္စည်းများရှိလျှင် ချက်ချင်း ပြုပြင်ခြင်း။ ✓ လုံလောက်သောမီးဘေးကာကွယ်ရေးပစ္စည်းများ၊ မီးသတ်ဆေးဘူးများ ထောက်ပံ့ပေးခြင်း။ ✓ မီးလောင်လွယ်သောအမှိုက်များအား ခွဲခြား၍ ပုံမှန်စွန့်ပစ်စေခြင်း။

လူထုဝန်းကျင်ဘေးအန္တရာယ်

<p>တည်ဆောက်ခြင်း ကာလ၊ လုပ်ငန်း လည်ပတ်ခြင်း/ ပိတ်သိမ်းခြင်းကာလ</p>	<p>၁</p>	<ul style="list-style-type: none"> • ယာဉ်သွားလာခြင်းမှ မတော်တဆ ဖြစ်ပွားနိုင်ခြင်း (ကုန်ကြမ်း၊ ကုန်တင်ကုန်ချပြုလုပ်ရန်လာသော ယာဉ်များကြောင့် မတော်တဆ ဖြစ်ပွားနိုင်မှု) 	<p>နိမ့်</p>	<ul style="list-style-type: none"> ✓ ထရပ်ကားဖြင့် မသယ်မီ တာပေါ်လင်ဖြင့် ဖုံးအုပ်ခြင်း သို့မဟုတ် ကုန်ပစ္စည်းများကို တင်းကြပ်စွာ ချည်နှောင်ခြင်း။ ✓ သယ်ယူပို့ဆောင်ရေးတွင် ဝန်ပိုမတင်စေရန် ကုန်တင်ကားကို စစ်ဆေးခြင်း။ ✓ လမ်းများပေါ်တွင် သတ်မှတ်ထားသော ကီလိုမီတာထက် ပိုမမောင်းရန် ပစ္စည်းများ သယ်ဆောင်သည့် ယာဉ်များကို ကြပ်မတ်ဆောင်ရွက်ရန်။ ✓ ၆ လတစ်ကြိမ် မော်တော်ယာဉ်များကို ပုံမှန်ထိန်းသိမ်းခြင်း။
<p>✓ ကျန်းမာရေးဆိုင်ရာသက်ရောက်အကဲဖြတ်ဆန်းစစ်ခြင်း (လုပ်ငန်းခွင် ကျန်းမာရေး)</p>				
<p>တည်ဆောက်ခြင်း ကာလ၊ လုပ်ငန်း လည်ပတ်ခြင်း/ ပိတ်သိမ်းခြင်းကာလ</p>	<p>၁</p>	<p>လုပ်ငန်းခွင်ကျန်းမာရေး စီမံကိန်းတည်ဆောက်ပြုပြင်ခြင်းလုပ်ငန်းများတွင် ဖုန်မှုန့်များထုတ်လွှတ်ခြင်း၊ အသံဆူညံခြင်းများကြောင့် မျက်လုံးထိခိုက်ခြင်း၊ အကြားအာရုံထိခိုက်ခြင်း၊ အသက်ရှူလမ်းကြောင်းဆိုင်ရာပြဿနာများ ဖြစ်နိုင်ခြင်း</p>	<p>နိမ့်</p>	<ul style="list-style-type: none"> ✓ ဖုန်မှုန့်ထုတ်လွှတ်မှုမြင့်မားသောလုပ်ငန်းခွင်အတွက် နှာခေါင်းစည်းနှင့် မျက်မှန်များ တပ်ဆင်ရန်၊ ✓ ၆ပေထက်မြင့်သော နေရာများတွင်အလုပ်လုပ်နေစဉ် လုံခြုံရေးဖိနပ်၊ဦးထုပ်နှင့် ခါးပတ်များ အသုံးပြုရန်၊ ✓ စက်ကိရိယာချို့ယွင်းမှုကြောင့် ဆူညံသံမဖြစ်အောင် လတစ်ကြိမ် ပြုပြင်ထိန်းသိမ်းခြင်း။(၆)

				<ul style="list-style-type: none"> ✓ မလိုအပ်လျှင် စက်ပစ္စည်းများကို တစ်ပြိုင်နက်တည်း အသုံးမပြုရန်၊ ✓ စက်ယန္တရားများကို မလိုအပ်ဘဲ ဖွင့်ထားခြင်းများ မကျန်အောင် စစ်ဆေးပါ။ ✓ ဆူညံသောနေရာများတွင် အလုပ်လုပ်သော အလုပ်သမားများအား နားကြပ်များပေးအပ်ပြီး ပံ့ပိုးပေးထားသည့် PPE များကို ဝတ်ဆင်ရန် တိုက်တွန်းရန်။
J	<p style="text-align: center;">အပူထိတွေ့မှုများ (အပူဖျဉ်းခြင်း၊ အပူဖုများ၊ အပူကြွက်တက်ခြင်းများ၊ အပူလျှပ်ခြင်းများ)</p> <ul style="list-style-type: none"> • နာတာရှည် အပူဓာတ် ပင်ပန်းနွမ်းနယ်ခြင်း၊ အိပ်ရေးပျက်ခြင်း 	အလယ် အလတ်	<ul style="list-style-type: none"> ✓ လုံလောက်သောသောက်ရေများနှင့် ဓာတ်ဆားများ ထောက်ပံ့ပေးရန်၊ ✓ လုပ်ငန်းခွင်အနီး အနားယူရန် အနားယူနိုင်မည့်နေရာများ ထားရှိပေးရန်၊ ✓ နေရောင်အောက်တွင်အလုပ်လုပ်ရလျှင် ဦးထုပ်၊ ဘောင်းဘီရှည်၊ လက်ရှည်များ ဝတ်ဆင်ရန်၊ ✓ နေ့အပူချိန် မြင့်မားနေချိန်တွင် လုပ်သားအား အလုပ်အဆိုင်ရွှေ့ပေးရန်။ 	
၃	<p style="text-align: center;">ရောဂါကူးစက်နိုင်မှုများ (ကိုဗစ်-၁၉ ရောဂါများ၊ ကာလဝမ်းရောဂါများ၊</p>	အလယ် အလတ်	<ul style="list-style-type: none"> ✓ လုံလောက်သောသောက်ရေများနှင့်ဓာတ်ဆားများ 	

		<ul style="list-style-type: none"> • အသည်းရောင်အသားဝါရောဂါများ) 		ထောက်ပံ့ပေးရန်၊ ✓ လိုအပ်သော ကျန်းမာရေးအသိပညာပေးများ ပြုလုပ်ပေးရန်၊ ✓ ဆပ်ပြာများ၊လက်သန့်ဆေးများ၊နှာခေါင်းစည်းများနှင့် ဓာတ်ဆားများ ထားရှိပေးရန်။
လူထုဝန်းကျင်ကျန်းမာရေး				
တည်ဆောက်ခြင်း ကာလ၊ လုပ်ငန်း လည်ပတ်ခြင်း/ ပိတ်သိမ်းခြင်းကာလ	၁	<ul style="list-style-type: none"> • (ပတ်ဝန်းကျင်လေထုထဲတွင် အမှုန်အမွှားများ ပျံ့နှံ့သွားပြီး အသက်ရှူလမ်းကြောင်းကို ထိခိုက်စေခြင်း၊ • အမှုန်အမွှားများသည် ပတ်ဝန်းကျင်ရေထုထဲသို့ ကျရောက်ပြီး အသုံးပြုသောလူများကို အန္တရာယ်ဖြစ်စေနိုင်ခြင်း၊ • အနီးနားရှိလူများကို နှောင့်ယှက်ခြင်း၊ ဆူညံသံကြောင့် အကြားအာရုံ ပျက်စီးခြင်း) 	နိမ့်	✓ လုပ်ငန်းခွင်အနီးရှိ ဖုန်ထူသောနေရာနှင့် ယာဉ်သွားလာမှုများပြားသော လမ်းများအနီးတွင် တစ်နေ့လျှင် နှစ်ကြိမ် ရေဖြန်းပေးရန်၊ ✓ လေပြင်းနှင့် ဖုန်ထူသောနေရာများတွင် အစိမ်းရောင် ဇကာအထည်ဖြင့် ကာကွယ်ခြင်း။ ✓ စက်ယန္တရားများနှင့် သယ်ယူပို့ဆောင်ရေးယာဉ်များ၏ အမြန်နှုန်းကို လျှော့ချခြင်း၊ ✓ ညအထိ အလုပ်မလုပ်ရန်။
မီးဘေးအန္တရာယ်				
တည်ဆောက်ခြင်း ကာလ၊ လုပ်ငန်း	၁	<ul style="list-style-type: none"> • မီးဘေးအန္တရာယ် • ပေါက်ကွဲနိုင်မှု 	မြင့်	✓ လုံလောက်သောမီးဘေးကာကွယ်ရေးပစ္စည်းများနှင့် မီးသတ်ဆေးဘူးများ ထားရှိပေးရန်၊

လည်ပတ်ခြင်း/ ပိတ်သိမ်းခြင်းကာလ		<ul style="list-style-type: none"> • (အသက်အန္တရာယ် • မီးဘေးကြောင့် အလုပ်သမားများနှင့် လုပ်ငန်းရည်ရွယ်ချက်များ ထိခိုက်မှု) <ul style="list-style-type: none"> • ရှို့မီးလောင်ခြင်း။ 		<ul style="list-style-type: none"> ✓ လောက်ကျမ်းနိုင်သောအမှုကိစ္စများကို သီးသန့်သိုလှောင်ရန်နှင့် စွန့်ပစ်ရန်၊ ✓ အမှုကိစ္စသိမ်းဆည်းခြင်းနှင့်လောင်စာဆီသိုလှောင်ခြင်းအတွက် ဆောင်ရန်၊ ရှောင်ရန်များကို အသိပညာပေးခြင်းပြုလုပ်ရန်၊ ✓ အရေးပေါ်ကိစ္စများအတွက် ဖလတစ်ကြိမ် မီးဘေးကာကွယ် ရေးပညာပေးများပြုလုပ်ရန်၊ ✓ လောင်စာသိုလှောင်သည့်နေရာများ၊ မီးစက်စသည်တို့တွင် ဘေးကင်းရေးနှင့် သတိပေးဆိုင်းဘုတ်များထားရှိရန်။ ✓ ပျက်နေသော အီလက်ထရိုနစ်ပစ္စည်းများနှင့် ဝါယာကြိုးများကို လျှပ်စစ်ပညာရှင်မှ ချက်ချင်းပြုပြင်ပေးရန်၊ ✓ လောင်စာဆီသိုလှောင်သည့်နေရာသို့ဝင်ရောက်ခွင့်ရှိသူကိုသာ ခွင့်ပြုပါ။ ✓ စီမံကိန်းဧရိယာ၏ အများပိုင်ဧရိယာတွင် အရေးပေါ် ဆက်သွယ်ရန် နံပါတ်များကို ထားရှိရန်၊
သဘာဝဘေးအန္တရာယ်				
လုပ်ငန်း	၁	• မြေငလျင်အန္တရာယ်	မြင့်	✓ လူတစ်ဦးချင်းစီ၏ ဘေးလွတ်ရာသို့ ရွှေ့ပြောင်းရေးနှင့်

လည်ပတ်ခြင်း ကာလ		<ul style="list-style-type: none"> • (အလုပ်သမား ထိခိုက်ဒဏ်ရာရခြင်း။ • စီမံကိန်းအတွင်း အဆောက်အဦ၊ ပစ္စည်းများ ထိခိုက်ပျက်စီးခြင်း။) 		ကယ်ဆယ်ရေးအတွက် အရေးပေါ်အစီအစဉ်ကို ရေးဆွဲပြီး လိုက်နာဆောင်ရွက်ခြင်း။
တည်ဆောက်ခြင်း ကာလ၊ လုပ်ငန်း လည်ပတ်ခြင်း/ ပိတ်သိမ်းခြင်းကာလ	၂		အလယ်အလတ်	<ul style="list-style-type: none"> ✓ အရေးပေါ်ဆေးသေတ္တာများ (First-Aid Box) များစီစဉ်ထားရှိခြင်း။ ✓ အရေးပေါ်အခြေအနေအတွက် ဆေးခန်း သို့မဟုတ် အနီးဆုံးဆေးရုံသို့ ပို့ဆောင်ရန် စီဆောင်ရွက်ထားခြင်း။ ✓ စီမံကိန်းဧရိယာအတွင်း ဘေးအန္တရာယ်ရှိနိုင်သော အောက်ခံမြေသား၏ အန္တရာယ်ကို လျှော့ချရန် ဘူမိနည်းပညာဆိုင်ရာ စုံစမ်းစစ်ဆေးမှုများအပေါ် ပိုမိုအလေးထားဆောင်ရွက်ရန်။ ✓ မြေအောက်ရေရုတ်တရက်တက်လာခြင်း၊ ကျောက်တုံးများနှင့် မြေဆီလွှာများ ပျော့ပြောင်းခြင်းစသည့် ငလျင်၏ ရှေ့ပြေး နိမိတ်များ အားသိရှိနိုင်ရန် ရေရှည်နှင့် ရေတိုငလျင် စောင့်ကြည့်ရေးစနစ် သို့မဟုတ် ငလျင်သတိပေး သည့်စနစ်အား တပ်ဆင်အသုံးပြုခြင်း။
တည်ဆောက်ခြင်း ကာလ၊ လုပ်ငန်း	၃	<p style="text-align: center;">ရေကြီးခြင်းအန္တရာယ် (အလုပ်သမား ထိခိုက်ဒဏ်ရာရခြင်း။)</p>	အလယ် အလတ်	<ul style="list-style-type: none"> ✓ ဘေးအန္တရာယ်များ ဖြစ်ပေါ်နိုင်ခြေကို သိရှိနိုင်ရန်အတွက် မိုးလေဝသသတင်းများအား စောင့်ကြည့် နားထောင်ရန်။

လည်ပတ်ခြင်း/ ပိတ်သိမ်းခြင်းကာလ		<ul style="list-style-type: none"> • စီမံကိန်းအတွင်း အဆောက်အဦ၊ ပစ္စည်းများ ထိခိုက်ပျက်စီးခြင်း။ 		
	၄	<p style="text-align: center;">မြေကျွံခြင်း</p> <ul style="list-style-type: none"> • (စီမံကိန်းအတွင်း အဆောက်အဦ၊ ပစ္စည်းများ ထိခိုက်ပျက်စီးခြင်း။) 	နိမ့်	<ul style="list-style-type: none"> ✓ လုပ်ငန်းလည်ပတ်ခြင်းကာလတွင် မြေသားကြွဲခိုင်းမှု စစ်ဆေးခြင်းအား ၁ နှစ်တစ်ကြိမ် စစ်ဆေးခြင်း ✓ ဆီသိုလှောင်ထားသော Silos များတည်ရှိရာ နေရာတွင် မြေကျွံမှုများ မဖြစ်ပေါ်စေရန် အောက်ခံမြေသားများ၊ foundation များ ခိုင်ခံ့အောင် ပြုလုပ်ရန်။

၆။ အများပြည်သူဆွေးနွေးတိုင်ပင်ခြင်းနှင့် ပြည်သူတို့၏ ပူးပေါင်းပါဝင်မှု

စီမံကိန်းဖွံ့ဖြိုးရေးအစီအစဉ်များနှင့်ပတ်သက်၍ ဒေသခံပြည်သူများ၊ ဒေသဆိုင်ရာ အာဏာပိုင်များနှင့် အခြားသက်ဆိုင်ရာ အဖွဲ့အစည်းများအကြား အများပြည်သူသိရှိစေရန် ထုတ်ဖော်တင်ပြခြင်းနှင့် တိုင်ပင်ဆွေးနွေးပွဲပြုလုပ်ခြင်းကို နယ်ပယ်အတိုင်းအတာသတ်မှတ်ခြင်း အဆင့်တွင် တစ်ကြိမ်၊ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်းအစီအစဉ်တွင် တစ်ကြိမ် ပြုလုပ်ခဲ့ပါသည်။

အများပြည်သူသိရှိစေရန် ထုတ်ဖော်တင်ပြခြင်း၏ ရည်ရွယ်ချက်မှာ အမ်စီအမ် ကုမ္ပဏီ၏ အသေးစားရေနံချက်စက်ရုံစီမံကိန်းအား ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်း အစီရင်ခံစာ (ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း) ရေးဆွဲဆောင်ရွက်ရာတွင် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း အစီရင်ခံစာအတွက် အများပြည်သူများအနေဖြင့် ဝေဖန်အကြံပြုချက်များပေးနိုင်ရန် ဖြစ်ပါသည်။ အများပြည်သူသို့ ထုတ်ဖော်တင်ပြရန်အတွက် အစိုးရဌာနများ၊ ကျေးရွာများနှင့် အနီးဝန်းကျင်ရှိ သက်ဆိုင်သော နေရာများသို့ အသိပေးစာများနှင့် အကြံပြုစာလက်ခံစာရွက်များ ပေးပို့၍ အကြံပြုချက်များ ရယူခဲ့ခြင်းဖြစ်ပါသည်။

အများပြည်သူတွေ့ဆုံပွဲပြုလုပ်ခြင်း၏ အဓိကရည်ရွယ်ချက်မှာ စီမံကိန်းနှင့်သက်ဆိုင်သော သတင်းအချက်အလက်များ၊ ထုတ်လုပ်မှုဖြစ်စဉ်များ၊ စွန့်ပစ်ပစ္စည်းများကို စီမံခန့်ခွဲမှုနှင့် ပတ်ဝန်းကျင် အပေါ် ကောင်းကျိုး (သို့မဟုတ်) ဆိုးကျိုးသက်ရောက်နိုင်ချေတို့ကို တာဝန်ရှိသည့် ဝန်ကြီးဌာနများနှင့် သက်ဆိုင်သူများကို ရှင်းလင်းတင်ပြပြီးနောက် အကြံပြုချက်လမ်းညွှန်မှုများ ရယူရန်ဖြစ်ပါသည်။ စီမံကိန်းအဆိုပြုသူသည် ထိုအကြံပြုချက်များ နှင့် ဆွေးနွေးချက်များကို စီမံကိန်းအကောင်အထည် ဖော်ဆောင်ရွက်စဉ်ကာလတွင် ထည့်သွင်းစဉ်းစားသွားမည် ဖြစ်ပါသည်။

၆.၁ ပထမအကြိမ် ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်း၏ နယ်ပယ် အတိုင်းအတာသတ်မှတ်ခြင်းအဆင့်အတွက် အများပြည်သူသို့ ထုတ်ဖော် တင်ပြခြင်း နှင့် အများပြည်သူများနှင့် တိုင်ပင်ဆွေးနွေးပွဲ

၆.၁.၁ နယ်ပယ်အတိုင်းအတာသတ်မှတ်ခြင်းအဆင့်အတွက် အများပြည်သူသို့ ထုတ်ဖော်တင်ပြခြင်း

နယ်ပယ်အတိုင်းအတာသတ်မှတ်ခြင်းအဆင့်တွင် အများပြည်သူသို့ ထုတ်ဖော်တင်ပြခြင်း အား ၂၀၂၂ ခုနှစ်၊ ဖေဖော်ဝါရီလ၊ ၁၀ ရက်မှ ဖေဖော်ဝါရီလ ၂၃ ရက်နေ့အထိ ကျင်းပပြုလုပ်ခဲ့ပါသည်။

အများပြည်သူသို့ ထုတ်ဖော်တင်ပြရန်အတွက် စီမံကိန်းအကြောင်းအရာဖော်ပြချက်များ၊ နောက်ခံအချက်အလက်များနှင့် အကြံပြုစာများကို အစိုးရဌာနများနှင့် စီမံကိန်းအနီးပတ်ဝန်းကျင်ရှိ ကျေးရွာများနှင့် ဒေသခံပြည်သူများထံသို့ ပေးပို့ဆောင်ရွက်ခဲ့ပါသည်။ ထို့နောက် တောင်သာမြို့နယ်၊ အထွေထွေအုပ်ချုပ်ရေးမှူးရုံးနှင့် ညောင်ဦးခရိုင်၊ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနမှ အကြံပြုစာ များအား ရယူခဲ့ပါသည်။ အကြံပြုစာများအား နောက်ဆက်တွဲ (H) တွင် ဖော်ပြထားပါသည်။

၆.၁.၂ နယ်ပယ်အတိုင်းအတာသတ်မှတ်ခြင်းအဆင့်အတွက် အများပြည်သူများနှင့် တိုင်ပင်ဆွေးနွေးပွဲ

နယ်ပယ်အတိုင်းအတာသတ်မှတ်ခြင်းအဆင့်အတွက် အများပြည်သူများနှင့် တိုင်ပင် ဆွေးနွေးပွဲအား ၁၇ ရက်၊ ဖေဖော်ဝါရီလ၊ ၂၀၂၂ ခုနှစ်တွင် ကိုဗစ်-၁၉ ရောဂါအခြေအနေကြောင့် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန၏ ကိုဗစ်-၁၉ လမ်းညွှန်ချက်များအရ Zoom Application ဖြင့် အွန်လိုင်းအစည်းအဝေးပြုလုပ်ခဲ့ပါသည်။ ပွဲစဉ်အား နံနက် ၁၀ နာရီမှ နေ့လည် ၁၂ နာရီအထိ ကျင်းပရန် စီစဉ်ခဲ့ပါသည်။ အများပြည်သူများနှင့် တိုင်ပင်ဆွေးနွေးပွဲအား အစိုးရဌာနများနှင့် စီမံကိန်းအနီးပတ်ဝန်းကျင်ရှိ ဒေသခံပြည်သူများနှင့်အတူ ကျင်းပခဲ့ပါသည်။ တိုင်ပင်ဆွေးနွေးပွဲသို့ အစိုးရဌာနများ၊ မြို့နယ်အုပ်ချုပ်ရေးမှူးများ၊ စီမံကိန်း၏တာဝန်ရှိသူများ၊ တတိယအကြံပေး အဖွဲ့အစည်းများနှင့် ဒေသခံပြည်သူများအပါအဝင် စုစုပေါင်း ၁၃ ဦး တက်ရောက်ခဲ့ပါသည်။ ဆွေးနွေးပွဲတွင် စွန့်ပစ်အမှိုက်များအား စက်ရုံဝန်းအတွင်း၌ မြေဖို့ရာတွင် အသုံးပြုသင့်ကြောင်း၊ စီမံကိန်းပတ်ဝန်းကျင်ရှိကျေးရွာများတွင် ဖွံ့ဖြိုးတိုးတက်မှုအစီအစဉ်များလုပ်သင့်ကြောင်း၊ ဆီလီကာ စွန့်ပစ်အမှိုက်များအား အမှုန်ပျံ့လွင့်မှုမရှိစေရန် စနစ်တကျဖုံးအုပ်ထားသင့်ကြောင်း စသည်ဖြင့်အ ကြံပေးပြောကြားခဲ့သည်များ ရှိပါသည်။ အကြံပြုချက်များ၊ အမေးအဖြေကဏ္ဍများစသည့် အသေးစိတ်အချက်အလက်များအား အောက်ပါ အခန်း (၆) တွင် ဖော်ပြထားပါသည်။ တက်ရောက်သူများစာရင်း၊ အကြံပြုလွှာ လက်ခံရရှိသူများ စာရင်းနှင့် ဖိတ်စာလက်ခံရရှိသူများစာရင်းအား နောက်ဆက်တွဲ (G) တွင် ဖော်ပြထား ပါသည်။

၆.၂ ဒုတိယအကြိမ် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းအတွက် အများပြည်သူသို့ ထုတ်ဖော်တင်ပြခြင်းနှင့် အများပြည်သူများနှင့် တိုင်ပင်ဆွေးနွေးပွဲ

၆.၁.၂ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းအတွက် အများပြည်သူသို့ ထုတ်ဖော်တင်ပြခြင်း

ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်းအတွက် အများပြည်သူသို့ ထုတ်ဖော်တင်ပြခြင်း လုပ်ငန်းစဉ်အား ၂၄ရက်၊ ဇူလိုင်လ၊ ၂၀၂၃ ခုနှစ်တွင် ကျင်းပပြုလုပ်ခဲ့ပါသည်။ အများပြည်သူသို့ ထုတ်ဖော်တင်ပြရန်အတွက် စီမံကိန်းအကြောင်းအရာဖော်ပြချက်များ၊ နောက်ခံအကြောင်းအရာများ၊ ဖြစ်နိုင်သောသက်ရောက်မှုလေ့လာဆန်းစစ်ခြင်းများ၊ စီမံခန့်ခွဲမှုများနှင့် အကြံပြုစာများကို အစိုးရဌာနများ၊ စီမံကိန်းအနီးရှိ ကျေးရွာများနှင့် ဒေသခံပြည်သူများထံသို့ ပေးပို့ဆောင်ရွက်ခဲ့ပါသည်။ ထို့နောက် တောင်သာမြို့နယ်၊ မြင်းခြံမြို့နယ်နှင့် ညောင်ဦးမြို့နယ်မှ အစိုးရဌာနများနှင့် စီမံကိန်းအနီး ပတ်ဝန်းကျင်ရှိ ကျေးရွာများ၊ ဒေသခံပြည်သူများထံမှ အကြံပြုချက်များကို ၂၇ရက်၊ ဇူလိုင်လ၊ ၂၀၂၃ ခုနှစ်တွင် ပြန်လည်ကောက်ယူခဲ့ပါသည်။ အကြံပြုချက်များတွင် မီးသတ်ဦးစီးဌာနမှချမှတ်ထားသည့်စည်းမျဉ်းများ၊ ဥပဒေများနှင့်အညီ လိုက်နာဆောင်ရွက်သွားရန်၊ လုပ်ငန်းလည်ပတ်မှုမှ ဖြစ်ပေါ်လာမည့်သက်ရောက်မှုများအား စီမံခန့်ခွဲရန်၊ စီမံကိန်းအနီးအနားရှိဇီဝမျိုးစုံ၊ မျိုးကွဲများအား ထိန်းသိမ်းရန်၊ ဒေသခံပြည်သူများ၏ အကြံပေးချက်များအား ထည့်သွင်းစဉ်းစားရန် စသည်ဖြင့် အကြံပြုခဲ့ကြပါသည်။ အကြံပြုစာများကို နောက်ဆက်တွဲ (၂) တွင် ဖော်ပြထားပါသည်။ အကြံပြုစာများ ပေးပို့ခဲ့သော အဖွဲ့အစည်းများကို ဇယား (၅) တွင် ဖော်ပြထားပါသည်။

ဇယား (၅) စီမံကိန်း အစီရင်ခံစာအတွက် အကြံပြုစာများပေးပို့ခဲ့သည့် အဖွဲ့အစည်းများ

အကြံပြုသူများ	လိပ်စာ
ဒေသခံပြည်သူများ	<ul style="list-style-type: none"> • ကျောဇီကျေးရွာ • မာလာကျေးရွာ

အကြံပြုသူများ	လိပ်စာ
အစိုးရဌာနများ	<ul style="list-style-type: none"> • အထွေထွေအုပ်ချုပ်ရေးဦးစီးဌာန၊ တောင်သာမြို့နယ်နှင့် မြင်းခြံမြို့နယ် • လျှပ်စစ်ဓာတ်အားပေးရေး ကော်ပိုရေးရှင်း၊ မြင်းခြံမြို့နယ် • စည်ပင်သာယာရေးကော်မတီ၊ တောင်သာမြို့နယ်နှင့် မြင်းခြံမြို့နယ် • သယံဇာတနှင့်သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာန၊ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန၊ ညောင်ဦးခရိုင် • လူမှုပူလုံရေးအဖွဲ့ • စိုက်ပျိုးရေး၊ မွေးမြူရေးနှင့် ဆည်မြောင်းဝန်ကြီးဌာန၊ ဆည်မြောင်းနှင့်ရေအသုံးချမှု စီမံခန့်ခွဲရေးဦးစီးဌာန ၊ မြင်းခြံမြို့နယ် • ကျန်းမာရေးဝန်ကြီးဌာန၊ ပြည်သူ့ကျန်းမာရေးဦးစီးဌာန၊ တောင်သာမြို့နယ်နှင့် မြင်းခြံမြို့နယ် • စက်မှုဝန်ကြီးဌာန၊ စက်မှုကြီးကြပ်ရေးနှင့် စစ်ဆေးရေးဦးစီးဌာန၊ မြင်းခြံမြို့နယ် • မြို့နယ်မီးသတ်ဦးစီးဌာန၊ တောင်သာမြို့နယ်နှင့် မြင်းခြံမြို့နယ် • အလုပ်ရုံနှင့်အလုပ်သမားဥပဒေစစ်ဆေးရေးဦးစီးဌာန၊ တောင်သာမြို့နယ်နှင့် မြင်းခြံမြို့နယ် • အမ်စီစီအမ်ကုမ္ပဏီလီမိတက် • ဟက်ဇဂွန်နယ်အန်ဂယ်နိုင်ငံတကာအကြံပေးများကုမ္ပဏီလီမိတက်

၆.၂. ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းအတွက် အများပြည်သူနှင့် တွေ့ဆုံ ဆွေးနွေးပွဲ

ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းအတွက် အများပြည်သူနှင့် တွေ့ဆုံဆွေးနွေးပွဲအား ၂၈ ရက်၊ ဇူလိုင်လ၊ ၂၀၂၃ ခုနှစ်တွင် ကျင်းပ ပြုလုပ်ခဲ့ပါသည်။ စီမံကိန်း၏ အနီးအနားပတ်ဝန်းကျင်မှ ဒေသခံပြည်သူများ၊ သက်ဆိုင်ရာဌာနဆိုင်ရာများကို ဖိတ်ကြားကာ လုပ်ငန်းအကြောင်း အရာများအား ဆွေးနွေးတိုင်ပင်၍ အကြံဉာဏ်များ ရယူခဲ့ပါသည်။ ဆွေးနွေးပွဲတွင် မီးသတ်သင်တန်းများတက်ရောက်ကြရန်၊ စွန့်ပစ်အမှိုက်များဖြစ်သည့်ပလတ်စတစ်၊ စက္ကူ၊ ဓာတုပစ္စည်းစွန့်ပစ်ပစ္စည်းများစသည့်ဖြင့်တို့ကို သီးခြားခွဲ၍ ၃ R (Reduce, Reuse, Recycle) စနစ်အားအသုံးပြုခြင်းဖြင့် ဒေသခံများအတွက် အကျိုးကျေးဇူးရရှိနိုင်ရန်အတွက် ဖန်တီးပေးရန်၊ EIA အစီရင်ခံစာတွင်ပါဝင်သည့်ကတိကဝတ်များအား လိုက်နာဆောင်ရွက်ရန်စသည်ဖြင့် အကြံပြု ဆွေးနွေးခဲ့ကြပါသည်။ အစည်းအဝေးတက်ရောက် လာသူများ စာရင်းအား ဇယား (၆) တွင်

ဖော်ပြထားပါသည်။ အများပြည်သူနှင့်တွေ့ဆုံ ဆွေးနွေးပွဲတွင် ရရှိလာသော အကြံပြုချက်များနှင့် အမေးအဖြေ ကဏ္ဍများကို အခန်း ၆ နှင့် (၆)နောက်ဆက်တွဲ (K) တွင် ဖော်ပြထားပါသည်။

ဇယား (၆) အစည်းအဝေးသို့ တက်ရောက်လာသူများ စာရင်း

<p>အစည်းအဝေးတက်ရောက်သော အစိုးရဌာနများနှင့် ကျေးရွာများ</p>	<ul style="list-style-type: none"> • အလုပ်ရုံနှင့် အလုပ်သမားဥပဒေစစ်ဆေးရေးဦးစီးဌာန • မြို့နယ်မီးသတ်ဦးစီးဌာန • ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန • စက်မှုကြီးကြပ်ရေးနှင့် စစ်ဆေးရေးဦးစီးဌာန • လူမှုမှုလုံခြုံရေးအဖွဲ့ • ကျောဇီကျေးရွာ • မာလာကျေးရွာ • HA company မှ တာဝန်ရှိပုဂ္ဂိုလ်များ • MCCM Company မှ တာဝန်ရှိပုဂ္ဂိုလ်များ
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၇။ ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှု အစီအစဉ်

ဤအခန်းတွင် ပတ်ဝန်းကျင်အပေါ် ဖြစ်ပေါ်နိုင်သော သက်ရောက်မှု ဆန်းစစ်ခြင်းအခန်းမှ လေ့လာတွေ့ရှိထားသော သက်ရောက်မှုများကို လျော့ချပေးနိုင်မည့် အစီအစဉ်များ ပါဝင်ပါသည်။ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်တွင် MCCM Co., Ltd. ၏ ထုတ်လုပ်မှု လုပ်ငန်းကြောင့် ဖြစ်ပေါ်နိုင်သော ပတ်ဝန်းကျင်အပေါ်ထိခိုက်သက်ရောက်မှုများ အတွက် စီမံခန့်ခွဲမှုအစီအစဉ်၊ စောင့်ကြပ်ကြည့်ရှုမှု အစီအစဉ်များကို လုပ်ထုံးလုပ်နည်းများနှင့် အညီ ရေးဆွဲထားပါသည်။ ထို့အပြင် ပြဋ္ဌာန်းဥပဒေ လိုအပ်ချက်များအရ အာဏာပိုင် အဖွဲ့အစည်းများ၏ ချမှတ်ထားသော ပတ်ဝန်းကျင်ဆိုင်ရာ ဥပဒေ၊ စည်းမျဉ်းများနှင့်အညီ သင့်လျော်သော လျှော့ချရေး အစီအစဉ်များကို အကောင်အထည် ဖော်ဆောင်ရွက်ရန် ရေးဆွဲထားပါသည်။

ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီရင်ခံစာသည် MCCM Co., Ltd မှ လိုက်နာမည်ဟု ဝန်ခံကတိပြုထားသော လျှော့ချရေးနည်းလမ်းများအား လိုက်နာ ဆောင်ရွက်ရာတွင် ထိရောက်မှုကို စောင့်ကြပ်ကြည့်ရှုခြင်း၊ အကဲဖြတ်ခြင်းစသည်တို့တွင် အထောက်အကူပြုမည် ဖြစ်ပါသည်။ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ် အကြောင်းအရာ အသေးစိတ်အား **အခန်း (၇)** တွင် ရေးသားထားပြီး စီမံကိန်းလည်ပတ်သည့်ကာလနှင့် ပိတ်သိမ်းသည့်ကာလအတွင်း

ပတ်ဝန်းကျင်အပေါ် ဆိုးကျိုး သက်ရောက်မှုနှင့် လျော့ချနိုင်မည့်နည်းလမ်းများကို **ဇယား (၈)** တွင် ဖော်ပြထားပါသည်။

စီမံကိန်းလုပ်ငန်းမှ ပတ်ဝန်းကျင်စောင့်ကြပ်ကြည့်ရှုရေး အစီအစဉ်များနှင့် နှစ်စဉ် ခန့်မှန်း အသုံးစရိတ်ကို **ဇယား (၇)** နှင့် စောင့်ကြပ်ကြည့်ရှုရေး အစီအစဉ်တွင် တိုင်းတာရမည့် သက်ရောက်မှုများ၏ အချက်အလက်များ၊ နေရာများ၊ ကြိမ်နှုန်းနှင့် တိုင်းတာရမည့် အကြိမ်ရေနှင့် အကောင်အထည် ဖော်ဆောင်ရွက်ရန် တာဝန်ရှိသော အဖွဲ့အစည်းတို့ကို အောက်ပါ **ဇယား (၁၀)** ၌ ဖော်ပြထားပါသည်။ ထို့ပြင် စီမံကိန်းအဆိုပြုသူမှ မြန်မာနိုင်ငံရင်းနှီးမြုပ်နှံမှုကော်မရှင် မှ ချမှတ်ထားသော နှစ်စဉ်အသားတင်အမြတ်ငွေ၏ (၂) ရာခိုင်နှုန်းကို လူထုအကျိုးတူ ပူးပေါင်းပါဝင်မှုတွင် ပါဝင်ရန် အဆိုပြုထားပါသည်။ MCCM Co., Ltd မှ CSR အစီအစဉ်အတွက် လျာထားရန်ပုံငွေကို **ဇယား (၁၁)** တွင် ဖော်ပြထားပါသည်။

ဇယား (၇) ပတ်ဝန်းကျင်စောင့်ကြပ်ကြည့်ရှုရေး အစီအစဉ်များအတွက် နှစ်စဉ် ခန့်မှန်းအသုံးစရိတ်

စဉ်	စောင့်ကြည့်ရမည့် ကဏ္ဍများ	နှစ်စဉ်ခန့်မှန်း အသုံးစရိတ် (မြန်မာကျပ်)
ပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေးများ တိုင်းတာခြင်း (တည်ဆောက်ခြင်း၊ လုပ်ငန်းလည်ပတ်ခြင်း)		
၁	လေအရည်အသွေးတိုင်းတာခြင်း	၄,၀၀၀,၀၀၀
၂	စွန့်ပစ်ရေအရည်အသွေးတိုင်းတာခြင်း	၅၀၀,၀၀၀
၃	ဆူညံသံတိုင်းတာခြင်း	၅၀၀,၀၀၀
၄	စွန့်ပစ်အစိုင်အခဲ စနစ်တကျစွန့်ပစ်မှုအား စောင့်ကြည့်ခြင်း	၅၀၀,၀၀၀
၅	တုန်ခါမှုတိုင်းတာခြင်း	၅၀၀,၀၀၀
၆	အနံ့တိုင်းတာခြင်း	၅၀၀,၀၀၀
၇	မီးခိုးခေါင်းတိုင် ထုတ်လွှတ်အခိုးအငွေ့ တိုင်းတာခြင်း	၁,၀၀၀,၀၀၀
၈	ကျန်းမာရေးနှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေးလုပ်ငန်းများ (လုပ်ငန်းခွင်နှင့်လူမှုပတ်ဝန်းကျင်)	၅၀၀,၀၀၀
၉	မီးဘေးအန္တရာယ်ကြိုတင်ကာကွယ်ခြင်း	၅၀၀,၀၀၀
၁၀	အရေးပေါ်အခြေအနေတုံ့ပြန်ခြင်း	၅၀၀,၀၀၀
စုစုပေါင်း		၉,၀၀၀,၀၀၀

ဇယား (၈) စီမံကိန်းတည်ဆောက်ခြင်းနှင့် လုပ်ငန်းလည်ပတ်ခြင်း/ ဖျက်သိမ်းခြင်းကာလအတွင်း ပတ်ဝန်းကျင်အပေါ် ဆိုးကျိုးသက်ရောက်မှုနှင့် လျှော့ချနိုင်မည့် နည်းလမ်းများနှင့် နှစ်စဉ်ခန့်မှန်းအသုံးစရိတ်

အကြောင်းအရာ	ဖြစ်ပေါ်နိုင်သော သက်ရောက်မှုများ	လျှော့ချနိုင်မည့်နည်းလမ်းများ	ကာလ	နှစ်စဉ်ခန့်မှန်း အသုံးစရိတ် (မြန်မာကျပ်)	တာဝန်ယူမည့် အဖွဲ့အစည်း
လေထုအရည်အသွေး					
လေထုအရည်အသွေး	<ul style="list-style-type: none"> မော်တော်ယာဉ်များလှုပ်ရှားသွားလာခြင်းမှ အမှုန်အမွှား များ (PM2.5, PM10) နှင့် ဆိုင်းကြွအနည်းများ ထွက်ရှိခြင်း။ မျက်စိယားယံခြင်း။ အသက်ရှူမဝခြင်းကြောင့် အမြင်အာရုံ ဝေဝါးခြင်း။ 	<ul style="list-style-type: none"> ရေဖြန်းပေးခြင်းဖြင့် ဖုန်မှုန့်ထွက်ရှိကို ၇၀ ရာခိုင်နှုန်းအထိ လျှော့ချနိုင်သောကြောင့် ခင်းထားသောလမ်းများနှင့် ဆောက်လုပ်ဆဲ နေရာများကို တစ်နေ့လျှင် အနည်းဆုံး (၂)ကြိမ် ရေဖြန်းပေးခြင်း၊ အထူးသဖြင့် ခြောက်သွေ့ရာသီတွင် ရေဖြန်းပေးခြင်း။ သွားလာနေသော ယာဉ်များကြောင့် ဖုန်မှုန့်ထွက်ရှိကို လျှော့နည်းစေရန် အတွင်းလမ်းများအား ထိန်းသိမ်းခြင်း။ ဖုန်မှုန့်ထွက်ရှိကို ၅၀ ရာခိုင်နှုန်း 	တည်ဆောက်ခြင်း /ဖျက်သိမ်းခြင်း	၅၀၀,၀၀၀	ကန်ထရိုက်တာ/ MCCM Co., Ltd.

အကြောင်းအရာ	ဖြစ်ပေါ်နိုင်သော သက်ရောက်မှုများ	လျှော့ချနိုင်မည့်နည်းလမ်းများ	ကာလ	နှစ်စဉ်ခန့်မှန်း အသုံးစရိတ် (မြန်မာကျပ်)	တာဝန်ယူ မည့် အဖွဲ့အစည်း
		<p>လျှော့ချနိုင်ရန် ထရပ်ကားများ အတွက် ကန့်သတ်အမြန်နှုန်းအား တစ်နာရီ ၃၀ ကီလိုမီတာမှ တစ်နာရီ ၁၅ ကီလိုမီတာသို့ လျှော့ချ၍ မောင်းနှင်စေခြင်း။</p> <ul style="list-style-type: none"> ယာဉ်များနှင့် အခြားလောင်စာဆီသုံး စက်ယန္တရားများကို စနစ်တကျ လည်ပတ်ခြင်းနှင့် ထိန်းသိမ်းခြင်းဖြင့် သွားလာနေသော ယာဉ်များမှ ထုတ်လွှတ်သော အမှုန်အမွှားများ၊ ဆာလဖာဒိုင်အောက်ဆိုဒ်၊ နိုက်ထရိုဂျင်ဒိုင်အောက်ဆိုဒ်နှင့် ဟိုက်ဒရိုကာဗွန်များကို လျှော့ချ နိုင်ပါသည်။ 			
		<ul style="list-style-type: none"> အစိုဓာတ်မြင့်တက်စေရန် တစ်နေ့လျှင် အနည်းဆုံး တစ်ကြိမ် 	လုပ်ငန်း လည်ပတ်ခြင်း	၅၀၀,၀၀၀	MCCM Co., Ltd.

အကြောင်းအရာ	ဖြစ်ပေါ်နိုင်သော သက်ရောက်မှုများ	လျော့ချနိုင်မည့်နည်းလမ်းများ	ကာလ	နှစ်စဉ်ခန့်မှန်း အသုံးစရိတ် (မြန်မာကျပ်)	တာဝန်ယူ မည့် အဖွဲ့အစည်း
		<p>ရေဖြန်းသင့်ပါသည်။ (မနက် သို့မဟုတ် ညနေတွင် ရေဖြန်းနိုင်ပါသည်။)</p> <ul style="list-style-type: none"> • စီမံကိန်းဇုန်များတွင် လုပ်ငန်းသုံး ယာဉ်များ လည်ပတ်သည့်အခါ စက်ကိရိယာများနှင့် ယာဉ်များကို ပုံမှန်ထိန်းသိမ်းခြင်း။ • ရုံးခန်းအတွင်း တပ်ဆင်ထားသော လေဝင်လေထွက်စနစ် (အထူးသဖြင့် လေအေးပေးစနစ်၊ ပန်ကာများနှင့် ပြတင်းပေါက်များ) ကို ပုံမှန် ထိန်းသိမ်းခြင်း။ • စောင့်ကြပ်ကြည့်ရှုခြင်း အစီအစဉ်တွင် ဖော်ပြထားသော လေအရည်အသွေး များ ဖြစ်သည့် (PM2.5 and PM10, TSP, SO2, NO2, CO2, VOC, O3) 	ကာလ		

အကြောင်းအရာ	ဖြစ်ပေါ်နိုင်သော သက်ရောက်မှုများ	လျော့ချနိုင်မည့်နည်းလမ်းများ	ကာလ	နှစ်စဉ်ခန့်မှန်း အသုံးစရိတ် (မြန်မာကျပ်)	တာဝန်ယူမည့် အဖွဲ့အစည်း
		များကို ပုံမှန်စောင့်ကြပ်ကြည့်ရှုခြင်း။			
ရေထုအရည်အသွေး					
ရေထုညစ်ညမ်းမှု	<ul style="list-style-type: none"> • အိမ်သာနှင့် လက်ဆေးဘေစင်များမှ စွန့်ပစ်ရေထွက်ရှိခြင်း။ • မိလ္လာစွန့်ပစ်ရေများကြောင့် ဝမ်းနှင့် သက်ဆိုင်သော ရောဂါများ ဖြစ်ပေါ်ခြင်း။ • မိုးရွာသွန်းပြီးနောက် အိမ်ခေါင်မိုးများ၊ လမ်းများမှ ရေများ မြောင်းများထဲသို့ စီးဆင်းခြင်း။ 	<ul style="list-style-type: none"> • တည်ဆောက်ခြင်းကာလအတွင်း အကျိုးသက်ရောက်မှု များသော ရေနုတ်မြောင်းများနှင့် အနီးပတ်ဝန်းကျင်ရှိ ရေစီးကြောင်းများ ပေါ် စီမံခန့်ခွဲမှုမရှိစေရန် ရေသို လှောင်ရန် အတွက် အနည်စစ်ကန် အသုံးပြုခြင်းကဲ့သို့ သင့်လျော်သော ရေစီမံခန့်ခွဲမှုစနစ်ကို အကောင်အထည်ဖော် ဆောင်ရွက်ခြင်း။ • ရေဆိုးထွက်ရှိခြင်းကို အလွန်အကျွံမဖြစ်စေရန် ပြုလုပ်ခြင်း။ • မလိုအပ်သော ရေဆိုးထွက်ရှိခြင်းကို လျော့ချနိုင်ရန် ဖြစ်နိုင်လျှင် 	တည်ဆောက်ခြင်း/ ဖျက်သိမ်းခြင်း	၅၀၀,၀၀၀	ကန်ထရိုက်တာ/ MCCM Co., Ltd.

အကြောင်းအရာ	ဖြစ်ပေါ်နိုင်သော သက်ရောက်မှုများ	လျော့ချနိုင်မည့်နည်းလမ်းများ	ကာလ	နှစ်စဉ်ခန့်မှန်း အသုံးစရိတ် (မြန်မာကျပ်)	တာဝန်ယူ မည့် အဖွဲ့အစည်း
		<p>ရေမီတာကို အသုံးပြုခြင်း။</p> <ul style="list-style-type: none"> • အမှိုက်စွန့်ပစ်ရာနေရာမှ ရေစိမ့်ဝင်မှုမရှိစေရန် စနစ်တကျ ဆောင်ရွက်ခြင်း။ • ဆောက်လုပ်ရေးလုပ်ငန်းခွင်မှ လောင်စာဆီ၊ စက်သုံးဆီနှင့် ချောဆီတို့ ယိုစိမ့်မှုမရှိစေရန် ဆောင်ရွက်ခြင်း။ • မိလ္လာကန်များမှ ရေဆိုးများ မယိုစိမ့်စေရန် ဆောင်ရွက်ခြင်း။ • အိမ်သာများဖြိုဖျက်ခြင်းမှ ထွက်ရှိသော ရေဆိုးနှင့် ယာယီ အိမ်သာများမှ ထွက်ရှိသော ရေဆိုးများကို စည်ပင်သာယာ ရေးကော်မတီနှင့် ချိတ်ဆက်၍ စွန့်ပစ်ရန်။ 			

အကြောင်းအရာ	ဖြစ်ပေါ်နိုင်သော သက်ရောက်မှုများ	လျှော့ချနိုင်မည့်နည်းလမ်းများ	ကာလ	နှစ်စဉ်ခန့်မှန်း အသုံးစရိတ် (မြန်မာကျပ်)	တာဝန်ယူ မည့် အဖွဲ့အစည်း
		<ul style="list-style-type: none"> • စီမံကိန်းဧရိယာတွင် အသုံးပြုသော ရေပမာဏကို အနည်းဆုံး ဖြစ်အောင် လျှော့ချခြင်း။ • မလိုအပ်သော ရေဆိုးထုတ်လုပ်မှုကို ထိန်းချုပ်ရန် ဖြစ်နိုင်လျှင် ရေမီတာကို အသုံးပြုခြင်း။ • ရေနုတ်မြောင်းနှင့် ရေဆိုးမြောင်းအတွက် ပိုက်လိုင်းစနစ်တို့ကို သီးသန့်ခွဲထားရန်နှင့် မြေမျက်နှာပြင်ပေါ် စိမ့်ထွက်မှုမရှိစေရန် ဆောင်ရွက်ခြင်း။ • ရေဆိုးယိုစိမ့်မှုမရှိစေရန် မိလ္လာကန်ကို ပုံမှန်စစ်ဆေးပေးခြင်း။ • စီမံကိန်းဧရိယာရှိ ရေမြောင်းများအားလုံးကို 	လုပ်ငန်းလည်ပတ်ခြင်းကာလ	၅၀၀,၀၀၀	MCCM Co., Ltd.

အကြောင်းအရာ	ဖြစ်ပေါ်နိုင်သော သက်ရောက်မှုများ	လျော့ချနိုင်မည့်နည်းလမ်းများ	ကာလ	နှစ်စဉ်ခန့်မှန်း အသုံးစရိတ် (မြန်မာကျပ်)	တာဝန်ယူ မည့် အဖွဲ့အစည်း
		<p>ပုံမှန်သန့်ရှင်းပေးခြင်းနှင့် စစ်ဆေးပေးခြင်း။</p> <ul style="list-style-type: none"> ရေဆိုးများကို ရေဆိုးမြောင်းထဲသို့ မစွန့်ပစ်မီ ရေသန့်စင်စနစ် ပြုလုပ်ရန်။ 			
စွန့်ပစ်ပစ္စည်းစီမံခန့်ခွဲမှု					
<p>စွန့်ပစ်ပစ္စည်းများ ကြောင့် ပတ်ဝန်းကျင် ညစ်ညမ်းမှု</p>	<p>အိမ်သုံးစွန့်ပစ်အမှိုက် (အန္တရာယ်မရှိစွန့်ပစ်အမှိုက်)</p> <ul style="list-style-type: none"> အစိုင်အခဲစွန့်ပစ်အမှိုက်များအား စနစ်တကျမစွန့်ပစ်ပါလျှင် ၎င်းနှင့် ဆက်စပ်သည့် ကျန်းမာရေး အန္တရာယ်နှင့် ရပ်ရွာ အပေါ် သက်ရောက်နိုင်ခြင်း။ ဆိုးရွားသော ပတ်ဝန်းကျင်အပေါ် 	<ul style="list-style-type: none"> တည်ဆောက်ရေးကာလနှင့် ဖျက်သိမ်းခြင်းကာလမှ စွန့်ပစ်အမှိုက်များကို အမှိုက်စို၊ အမှိုက်ခြောက် နှင့် အန္တရာယ်ရှိ စွန့်ပစ်ပစ္စည်းဟူ၍ အမျိုးအစားခွဲကာ စွန့်ပစ်ရန်။ ဆောက်လုပ်ရေးအပျက်အစီးများ၊ ထုပ်ပိုးပစ္စည်းများ၊ အပိုင်းအစများနှင့် သတ္တုအပိုင်းအစများကို မြေကြီးပေါ်တွင် မထားရှိဘဲ စနစ်တကျ စွန့်ပစ်ခြင်း။ ပြန်လည်အသုံးပြုခြင်းနှင့် 	<p>တည်ဆောက် ခြင်း/ ဖျက်သိမ်းခြင်း</p>	<p>၅၀၀,၀၀၀</p>	<p>ကန်ထရိုက် တာ/ MCCM Co., Ltd.</p>

အကြောင်းအရာ	ဖြစ်ပေါ်နိုင်သော သက်ရောက်မှုများ	လျော့ချနိုင်မည့်နည်းလမ်းများ	ကာလ	နှစ်စဉ်ခန့်မှန်း အသုံးစရိတ် (မြန်မာကျပ်)	တာဝန်ယူ မည့် အဖွဲ့အစည်း
	သက်ရောက်နိုင်မှု။	<p>စွန့်ပစ်ခြင်းတို့ကို ပိုမိုလွယ်ကူစေရန်နှင့် အမျိုးအစားမတူသော စွန့်ပစ်ပစ္စည်းများကြား သက်ရောက်မှု မရှိစေရန်အတွက် အမှိုက်များကို အော်ဂဲနစ်အမှိုက် (စားကြွင်းစားကျန်များ)၊ အန္တရာယ်မရှိသော စွန့်ပစ်ပစ္စည်း (သတ္တု၊ ဖန်၊ ကွန်ကရစ်၊ ပလတ်စတစ် စသည်)၊ ဓာတ်မပြုသော စွန့်ပစ်ပစ္စည်း (မြေသန့်) နှင့် အန္တရာယ်ရှိ စွန့်ပစ်ပစ္စည်း (အိမ်သုတ်ဆေး၊ ပျော်ရည်၊ ဆီ၊ ဘက်ထရီများ၊ ဆေးဘက်ဆိုင်ရာ စွန့်ပစ်ပစ္စည်းများ) စသည်တို့ကဲ့သို့ သီးခြားစီ ခွဲခြားထားရမည်။</p>			

အကြောင်းအရာ	ဖြစ်ပေါ်နိုင်သော သက်ရောက်မှုများ	လျော့ချနိုင်မည့်နည်းလမ်းများ	ကာလ	နှစ်စဉ်ခန့်မှန်း အသုံးစရိတ် (မြန်မာကျပ်)	တာဝန်ယူ မည့် အဖွဲ့အစည်း
		<ul style="list-style-type: none"> • အမှိုက်များကို စုပြီး သတ်မှတ်နေရာတွင် မစွန့်ပစ်မီ သိမ်းဆည်းရာ အခန်းကို သီးသန့်နေရာတစ်ခု ခွဲထားခြင်း။ • စွန့်ပစ်ရည်များ ယိုစိမ့်မှုမရှိစေရန် သင့်လျော်သောနေရာ (သို့) အန္တရာယ် မရှိသော စွန့်ပစ်နေရာတစ်ခု တည်ဆောက်ခြင်း။ • အန္တရာယ်ရှိသော စွန့်ပစ်ပစ္စည်းများနှင့် အန္တရာယ်မရှိသော စွန့်ပစ်ပစ္စည်းများ ဟူ၍ ခွဲခြားရန် သတ်မှတ်ထားသော ပုံးများကို အသုံးပြုခြင်း။ • စွန့်ပစ်ပစ္စည်းများကို အမျိုးအစားအလိုက် ခွဲခြားပြီးနောက် အမှိုက်ကန်များ အတွင်းသို့ စနစ်တကျ စွန့်ပစ်ရမည်။ 	လုပ်ငန်းလည်ပတ်ခြင်းကာလ	၅၀၀,၀၀၀	MCCM Co., Ltd.

အကြောင်းအရာ	ဖြစ်ပေါ်နိုင်သော သက်ရောက်မှုများ	လျော့ချနိုင်မည့်နည်းလမ်းများ	ကာလ	နှစ်စဉ်ခန့်မှန်း အသုံးစရိတ် (မြန်မာကျပ်)	တာဝန်ယူ မည့် အဖွဲ့အစည်း
		<ul style="list-style-type: none"> ပြန်လည်အသုံးပြုနိုင်သော အမှိုက်ပုံးများကို ထားရှိရန် လိုအပ်ပြီး ပြန်လည်အသုံးပြုနိုင်သည့် အမှိုက်များကို အမြဲတမ်း စနစ်တကျ အမျိုးအစားခွဲရန် လိုအပ်ပါသည်။ 			
ဆူညံသံနှင့် တုန်ခါမှု					
ဆူညံသံနှင့် တုန်ခါမှု	<ul style="list-style-type: none"> စိတ်မသက်မသာဖြစ်ခြင်း၊ စိတ်ဖိစီးမှုများခြင်း၊ စိတ်ရှုပ်ထွေးခြင်း။ အာရုံစိုက်ရခက်ခဲခြင်း။ မတော်တဆထိခိုက်နိုင်ခြေများခြင်း။ သွေးတိုး၊ နှလုံးနှင့်သက်ဆိုင်သည့် ရောဂါများဖြစ်နိုင်ခြင်း။ 	<ul style="list-style-type: none"> ကန်ထရိုက်တာသည် ဆောက်လုပ်ရေးသုံးစက်ပစ္စည်းများကို အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များ (၂၀၁၅) ထက် ကျော်လွန်သော ဆူညံမှုအဆင့် များကို လျော့ချရန် အစီအမံများ ပြုလုပ်ရမည်။ အနီးနားပတ်ဝန်းကျင်ကို အနှောင့်အယှက် မဖြစ်စေရန် 	တည်ဆောက် ခြင်း/ ဖျက်သိမ်းခြင်း	၅၀၀,၀၀၀	ကန်ထရိုက် တာ/ MCCM Co., Ltd.

အကြောင်းအရာ	ဖြစ်ပေါ်နိုင်သော သက်ရောက်မှုများ	လျော့ချနိုင်မည့်နည်းလမ်းများ	ကာလ	နှစ်စဉ်ခန့်မှန်း အသုံးစရိတ် (မြန်မာကျပ်)	တာဝန်ယူ မည့် အဖွဲ့အစည်း
		<p>ထရပ်ကားများသွားလာခြင်းနှင့် ကျယ်လောင်သော ဆူညံသံများ ထွက်ရှိသည့် ဆောက်လုပ်ရေးသုံးပစ္စည်းများကို ညအချိန်၌ အသုံးပြုခြင်းကို ကန့်သတ်ထားရမည်။</p> <p>ထရပ်ကားယာဉ်များကို ညအချိန်၌ ကားဟွန်းအသုံးပြုခြင်း ၊ အသံကျယ်ကျယ် သီချင်းဖွင့်ခြင်း များမပြုလုပ်ရန် ညွှန်ကြားထားခြင်း။</p> <ul style="list-style-type: none"> ထိခိုက်လွယ်သော မြေအသုံးပြုမှု၏ မီတာ (၁၅၀) အတွင်း ညအချိန်၌ ဆောက်လုပ်ရေးလုပ်ငန်းများကို တတ်နိုင်သမျှ ရှောင်ကြဉ်ခြင်း။ ဆူညံသံနိမ့်သော စက်ပစ္စည်းကိရိယာများကို 			

အကြောင်းအရာ	ဖြစ်ပေါ်နိုင်သော သက်ရောက်မှုများ	လျော့ချနိုင်မည့်နည်းလမ်းများ	ကာလ	နှစ်စဉ်ခန့်မှန်း အသုံးစရိတ် (မြန်မာကျပ်)	တာဝန်ယူ မည့် အဖွဲ့အစည်း
		<p>အစားထိုးသုံးစွဲခြင်း။</p> <ul style="list-style-type: none"> စက်ပစ္စည်းကိရိယာများကို ပုံမှန်စစ်ဆေးပေးခြင်းနှင့် အလှည့်ကျ သုံးစွဲပေးခြင်း။ 			
		<ul style="list-style-type: none"> ဆူညံသံနှင့် တုန်ခါမှုနိမ့်သော စက်ပစ္စည်း ကိရိယာများကို အသုံးပြုခြင်း။ စက်တစ်ခုချင်းစီကို ပုံမှန်စစ်ဆေး၊ ပြုပြင်ထိန်းသိမ်း၍ မှတ်တမ်း တင်ပြီး (လိုအပ်ပါက) အရည်အသွေး ကောင်းမွန်သော ပစ္စည်းများကို ပြောင်းလဲအသုံးပြုခြင်း။ ဆူညံသံလွန်ကဲသောနေရာများတွင် အလုပ်လုပ်သော အလုပ်သမား များအား နားအကာအကွယ်ပစ္စည်းများ (နားစို့များ (သို့) နားကြပ်များ) ကို 	လုပ်ငန်း လည်ပတ်ခြင်း	၅၀၀,၀၀၀	MCCM Co., Ltd.

အကြောင်းအရာ	ဖြစ်ပေါ်နိုင်သော သက်ရောက်မှုများ	လျော့ချနိုင်မည့်နည်းလမ်းများ	ကာလ	နှစ်စဉ်ခန့်မှန်း အသုံးစရိတ် (မြန်မာကျပ်)	တာဝန်ယူမည့် အဖွဲ့အစည်း
		<p>လုံလောက်စွာ ထားရှိပေးခြင်း။</p> <ul style="list-style-type: none"> • အလုပ်သမားများကို အသံဆူညံမှု 85 dB(A) ထက်မြင့်သော နေရာများတွင် နားအကာအကွယ်မပါပဲ တစ်နေ့လျှင် (၈) နာရီထက် ကျော်လွန်၍ ထိတွေ့မှုမရှိစေရန်၊ ထို့အပြင် နားအကာအကွယ် မပါလျှင် 140 dB(C) ထက်မြင့်သော အသံကို (ဆက်တိုက်) နားထောင်ခြင်းမပြုရန်။ • ဆူညံသံ နှင့် တုန်ခါမှုများသော နေရာများတွင် အလုပ်သမားများ ကို အလှည့်ကျ တာဝန်ပေးခြင်း။ 			
မြေဆီလွှာနှင့် မြေမျက်နှာသွင်ပြင်များ					
မြေဆီလွှာနှင့် မြေမျက်နှာသွင်ပြင်	<ul style="list-style-type: none"> • မြေထုအရည်အသွေး ညစ်ညမ်းခြင်း • မြေမျက်နှာသွင်ပြင်အခြေအနေ 	<ul style="list-style-type: none"> • ဆောက်လုပ်ရေးသုံး ယာဉ်များကို ကောင်းမွန်အောင် ထိန်းသိမ်းခြင်းသည် 	တည်ဆောက်ခြင်း/ ဖျက်သိမ်းခြင်း	၅၀၀,၀၀၀	ကန်ထရိုက်တာ/ MCCM Co., Ltd..

အကြောင်းအရာ	ဖြစ်ပေါ်နိုင်သော သက်ရောက်မှုများ	လျှော့ချနိုင်မည့်နည်းလမ်းများ	ကာလ	နှစ်စဉ်ခန့်မှန်း အသုံးစရိတ် (မြန်မာကျပ်)	တာဝန်ယူ မည့် အဖွဲ့အစည်း
	များ ပျက်စီးခြင်း	<p>စီမံကိန်းတည်ဆောက်ရေး လုပ်ငန်းခွင် သို့ လာရောက်လည်ပတ်သူများ နှင့် ဝန်ထမ်းများ၏ ယာဉ်များမှ ဆီယိုဖိတ်မှုကို လျှော့ချခြင်းဖြင့် မြေဆီလွှာ ညစ်ညမ်းမှုကို ကာကွယ်ခြင်း။</p> <ul style="list-style-type: none"> • မြေဆီလွှာညစ်ညမ်းမှုမှ ကာကွယ်ရန် လုပ်ငန်းခွင်သုံး ယာယီ အိမ်သာများနှင့် ဆောက်လုပ်ရေးစခန်းများမှ ရေဆိုးများကို လက်ခံပြီး သန့်စင်ရန်အတွက် လုံလောက်သော မိလ္လာကန်များကို ဆောက်လုပ်ခြင်း။ • ဆောက်လုပ်ရေးနှင့်ပျက်သိမ်းရေးလုပ် ငန်းနေရာမှ ရေဆိုးစွန့်ပစ်ခြင်း ကို 			

အကြောင်းအရာ	ဖြစ်ပေါ်နိုင်သော သက်ရောက်မှုများ	လျော့ချနိုင်မည့်နည်းလမ်းများ	ကာလ	နှစ်စဉ်ခန့်မှန်း အသုံးစရိတ် (မြန်မာကျပ်)	တာဝန်ယူ မည့် အဖွဲ့အစည်း
		<p>ပုံမှန်စစ်ဆေးခြင်း။</p> <ul style="list-style-type: none"> • ကုမ္ပဏီပိုင် ယာဉ်များ၏အင်ဂျင်များကို ထိန်းသိမ်း ပြုပြင်ခြင်း သည် ဆီယိုဖိတ်မှုကို ကာကွယ်ပေးနိုင်ပြီး သင့်လျော်သော စီမံခန့်ခွဲမှုသည် ဧည့်သည်များနှင့် နေထိုင်သူများ၏ ယာဉ်များမှ ဆီအလေအလွင့် ဖြစ်မှုကို ကာကွယ်ပေးနိုင်ပါသည်။ • ပြုပြင်ထိန်းသိမ်းခြင်းလုပ်ငန်းများ ဆောင်ရွက်သည့်အခါ စက်သုံးဆီ နှင့် သုတ်ဆေးများ ယိုဖိတ်မှုကို ကာကွယ်ခြင်း။ • ပြုပြင်ထိန်းသိမ်းခြင်းလုပ်ငန်းအပြီးတွင် စွန့်ပစ်ပစ္စည်းများနှင့် လက်ကျန် သုတ်ဆေးများကို စနစ်တကျ စွန့်ပစ်ရန်။ 	လုပ်ငန်း လည်ပတ်ခြင်း	၅၀၀,၀၀၀	MCCM Co., Ltd.

အကြောင်းအရာ	ဖြစ်ပေါ်နိုင်သော သက်ရောက်မှုများ	လျော့ချနိုင်မည့်နည်းလမ်းများ	ကာလ	နှစ်စဉ်ခန့်မှန်း အသုံးစရိတ် (မြန်မာကျပ်)	တာဝန်ယူ မည့် အဖွဲ့အစည်း
		<ul style="list-style-type: none"> ပတ်ဝန်းကျင်အနီးအနားကို အန္တရာယ်မဖြစ်စေရန် စွန့်ပစ်ပစ္စည်းများကို သတ်မှတ်ထားသော နေရာတွင်သာ စွန့်ပစ်ခြင်း။ 			
ဇီဝမျိုးစုံမျိုးကွဲ					
ဇီဝမျိုးစုံမျိုးကွဲ	<ul style="list-style-type: none"> စားကျက်မြေဆုံးရှုံးခြင်း မျိုးစိတ်တွေ့ရှိပုံပြောင်းလဲခြင်း 	<ul style="list-style-type: none"> မြေဆီလွှာအရည်အသွေးနှင့် မြေဆီလွှာတိုက်စားခြင်းကို ကာကွယ်သော ဒေသမျိုးရင်အပင်များကို စိုက်ပျိုးခြင်း။ အကယ်၍ စီမံကိန်းဧရိယာအတွင်း ဆောင်းခိုငှက်များနှင့် အခြားတိရစ္ဆာန်များ ဝင်ရောက်ခြင်း၊ နေထိုင်ခြင်းများ ရှိခဲ့လျှင် ဖမ်းဆီးခြင်းများမှ ရှောင်ကြဉ်ပြီး သက်ဆိုင်ရာဌာနနှင့်ပူးပေါင်းကာ လုံခြုံရာနေရာသို့ရွှေ့ပြောင်းခြင်း။ 	တည်ဆောက်ခြင်း/ ဖျက်သိမ်းခြင်း	-	ကန်ထရိုက်တာ/ MCCM Co., Ltd.

အကြောင်းအရာ	ဖြစ်ပေါ်နိုင်သော သက်ရောက်မှုများ	လျော့ချနိုင်မည့်နည်းလမ်းများ	ကာလ	နှစ်စဉ်ခန့်မှန်း အသုံးစရိတ် (မြန်မာကျပ်)	တာဝန်ယူ မည့် အဖွဲ့အစည်း
		<ul style="list-style-type: none"> • တိရစ္ဆာန်အမျိုးမျိုးကိုထောင်ဖမ်းခြင်း၊ စုဆောင်းခြင်းနှင့် အမဲလိုက်ခြင်းကို အဆိုပြုပရောဂျက်၏ အဆင့်တိုင်းတွင် ရှောင်ကြဉ်ခြင်း။ • စီမံကိန်းဧရိယာအတွင်း ငှက်ပစ်ခြင်းနှင့် တိရစ္ဆာန်များကို အမဲလိုက်ခြင်းများကို ရှောင်ကြဉ်ရမည်။ • အကယ်၍ ကျူးကျော်မျိုးစိတ်အပင်များကို စီမံကိန်းအတွင်း အဆောက်အဦများနှင့် ဥယျာဉ်များအတွင်း ရှုခင်းများအတွက် စိုက်ပျိုးခဲ့လျှင် အဆိုပါမျိုးစိတ်များကို စီမံကိန်းဧရိယာအပြင်သို့ ပျံ့နှံ့မသွားအောင် ဆောင်ရွက်ရမည်။ • စီမံကိန်းဧရိယာအတွင်းရှိ မျိုးစိတ်များ 	လုပ်ငန်းလည်ပတ်ခြင်းကာလ	-	MCCM Co., Ltd.

အကြောင်းအရာ	ဖြစ်ပေါ်နိုင်သော သက်ရောက်မှုများ	လျော့ချနိုင်မည့်နည်းလမ်းများ	ကာလ	နှစ်စဉ်ခန့်မှန်း အသုံးစရိတ် (မြန်မာကျပ်)	တာဝန်ယူ မည့် အဖွဲ့အစည်း
		<p>၏ အသိုက်ပြုလုပ်ခြင်းနှင့် နားခိုခြင်း နေရာဖြစ်နိုင်သော အပင်ကြီးများကို ထိန်းသိမ်းထားရမည်။</p> <ul style="list-style-type: none"> • စီမံကိန်းဧရိယာအတွင်းနှင့် အနီးဝန်းကျင်တွင် မျိုးသုဉ်းအန္တရာယ်ရှိမျိုးစိတ်များနှင့် ရှားပါးမျိုးစိတ်များကို စိုက်ပျိုးရမည်။ • စီမံကိန်း၏ တောရိုင်းတိရစ္ဆာန်များ၊ အပင်များအပေါ်အကျိုးသက်ရောက်မှု များအတွက် ရေရှည်စီမံခန့်ခွဲခြင်းအစီအစဉ်တစ်ခု တည်ထောင်ရန်။ 			
လုပ်ငန်းခွင် ကျန်းမာရေးနှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေး					
လုပ်ငန်းခွင်ကျန်းမာရေးနှင့်လုံခြုံရေး	<ul style="list-style-type: none"> • ကိုယ်လက်ထိခိုက်မှုဖြစ်ပွားခြင်း • မတော်တဆမှုဖြစ်ပွားခြင်း 	မြေတူးခြင်း/ ကုန်ကြမ်းသယ်ဆောင်ခြင်း/	တည်ဆောက်ခြင်း ကာလ/	၁,၀၀၀,၀၀၀	ကန်ထရိုက်တာ/ MCCM

အကြောင်းအရာ	ဖြစ်ပေါ်နိုင်သော သက်ရောက်မှုများ	လျော့ချနိုင်မည့်နည်းလမ်းများ	ကာလ	နှစ်စဉ်ခန့်မှန်း အသုံးစရိတ် (မြန်မာကျပ်)	တာဝန်ယူ မည့် အဖွဲ့အစည်း
		<p>ဆောက်လုပ်ခြင်း/ပိတ်သိမ်းခြင်းလုပ်ငန်းများလုပ်ဆောင်ခြင်း</p> <ul style="list-style-type: none"> ဆောက်လုပ်ရေးလုပ်ငန်းခွင်အတွင်း လုပ်ငန်းခွင်သုံး လုံခြုံရေးဖိနပ်များစီးရန်၊ ပစ္စည်းများအသုံးမပြုမှီ၊စက်ယန္တရားများ မမောင်းနှင်ခင် ဂရုတစိုက်စစ်ဆေးရန်၊ ကုန်တင်ကားများဖြင့် မသယ်မှီ ပစ္စည်းများအား တင်းကြပ်စွာချည်နှောင်ရန်နှင့် ဖုံးအုပ်ရန်၊ စီမံကိန်းဧရိယာအတွင်းရှိလမ်းများကို ညီညာပြန်ပြုအောင်ပြုလုပ်ထားရန် 	ပိတ်သိမ်းခြင်း ကာလ		Co., Ltd.

အကြောင်းအရာ	ဖြစ်ပေါ်နိုင်သော သက်ရောက်မှုများ	လျော့ချနိုင်မည့်နည်းလမ်းများ	ကာလ	နှစ်စဉ်ခန့်မှန်း အသုံးစရိတ် (မြန်မာကျပ်)	တာဝန်ယူမည့် အဖွဲ့အစည်း
	<ul style="list-style-type: none"> ချော်လဲခြင်း ကိုယ်လက်အင်္ဂါထိခိုက်မှုဖြစ်ပွားခြင်း 	<ul style="list-style-type: none"> ဖိပေထက်မြင့်သော နေရာများတွင်အလုပ်လုပ်နေစဉ် လုံခြုံရေးဖိနပ်၊ ဦးထုပ်နှင့် ခါးပတ်များ အသုံးပြုရန်၊ လျှပ်စစ်ပညာရှင်များဖြင့် အကြံပြုချက်များ ရယူပြီး လျှပ်စစ်ပစ္စည်းများ ထိန်းသိမ်းရန်၊ လျှပ်စစ်ပစ္စည်းများနှင့် လျှပ်စစ်ကြိုးများအား ပျက်စီးလျှင် ချက်ချင်းပြုပြင်ရန်၊ ဖြစ်ပေါ်နိုင်သော အန္တရာယ်သတိပေး ဆိုင်းဘုတ်များ ထားရှိရန်၊ <p>လုပ်ငန်းခွင်၏အများသုံးနေရာများတွင် အရေးပေါ်ဆက်သွယ်ရမည့် ဖုန်းနံပါတ်များ ထားရှိရန်။</p>	လုပ်ငန်းလည်ပတ်ခြင်းကာလ	၁,၀၀၀,၀၀၀	MCCM Co., Ltd.

အကြောင်းအရာ	ဖြစ်ပေါ်နိုင်သော သက်ရောက်မှုများ	လျှော့ချနိုင်မည့်နည်းလမ်းများ	ကာလ	နှစ်စဉ်ခန့်မှန်း အသုံးစရိတ် (မြန်မာကျပ်)	တာဝန်ယူ မည့် အဖွဲ့အစည်း
ကျန်းမာရေး					
ကျန်းမာရေး	<ul style="list-style-type: none"> လုပ်ငန်းခွင်ကျန်းမာရေးနှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေး 	<p>ဆောက်လုပ်ခြင်းနှင့်ပိတ်သိမ်းခြင်း</p> <ul style="list-style-type: none"> ပုန်မှုန့်ထုတ်လွှတ်မှုမြင့်မားသောလုပ်ငန်းခွင်အတွက် နှာခေါင်းစည်းနှင့် မျက်မှန်များ တပ်ဆင်ရန်၊ စက်ယန္တရားများကို မလိုအပ်ဘဲ ဖွင့်ထားခြင်းများ မကျန်အောင် စစ်ဆေးပါ။ <p>အပူထိတွေ့မှုများ</p> <ul style="list-style-type: none"> လုံလောက်သောသောက်ရေများနှင့် ဓာတ်ဆားများ ထောက်ပံ့ပေး ရန်၊ နေရောင်အောက်တွင်အလုပ်လုပ်ရလျှင် ဦးထုပ်၊ ဘောင်းဘီရှည်၊ လက်ရှည်များ ဝတ်ဆင်ရန်၊ 	တည်ဆောက်ခြင်း ကာလ/ ပိတ်သိမ်းခြင်းနှင့် လည်ပတ်ခြင်း ကာလ	၂,၀၀၀,၀၀၀	ကန်ထရိုက် တာ/ MCCM Co., Ltd.

အကြောင်းအရာ	ဖြစ်ပေါ်နိုင်သော သက်ရောက်မှုများ	လျော့ချနိုင်မည့်နည်းလမ်းများ	ကာလ	နှစ်စဉ်ခန့်မှန်း အသုံးစရိတ် (မြန်မာကျပ်)	တာဝန်ယူ မည့် အဖွဲ့အစည်း
		<p style="text-align: center;"><u>ရောဂါကူးစက်နိုင်မှုများ</u></p> <ul style="list-style-type: none"> • ရေမသန့်ရှင်းရာမှဖြစ်ပေါ်သော ဝမ်းပျက်ဝမ်းလျှော့ရောဂါများကိုကာ ကွယ်ရန် သန့်ရှင်းသောသောက်ရေ များ ထောက်ပံ့ပေးရန်၊ • ဆပ်ပြာများ၊လက်သန့်ဆေးများ၊နှာခေါင်းစည်းများနှင့် ဓာတ်ဆားများ ထားရှိပေးရန်။ <p style="text-align: center;"><u>ပတ်ဝန်းကျင်အပေါ်လေနှင့်ရေညစ်ညမ်းမှု</u></p> <ul style="list-style-type: none"> • လုပ်ငန်းခွင်အနီးရှိ ဖုန်ထူသောနေရာနှင့် ယာဉ်သွားလာမှုများပြားသော လမ်းများအနီးတွင် တစ်နေ့လျှင် နှစ်ကြိမ် ရေဖြန်းပေးရန်၊ • လေပြင်းနှင့် ဖုန်ထူသောနေရာများတွင် အစိမ်းရောင် ဇကာအထည်ဖြင့် 			

အကြောင်းအရာ	ဖြစ်ပေါ်နိုင်သော သက်ရောက်မှုများ	လျော့ချနိုင်မည့်နည်းလမ်းများ	ကာလ	နှစ်စဉ်ခန့်မှန်း အသုံးစရိတ် (မြန်မာကျပ်)	တာဝန်ယူ မည့် အဖွဲ့အစည်း
		ကာကွယ်ခြင်း။			
မီးဘေးအန္တရာယ်					
မီးဘေးအန္တရာယ်	<ul style="list-style-type: none"> • အပူလောင်ခြင်း၊ • မီးဘေးအန္တရာယ်ဖြစ်ပေါ်ခြင်း၊ • ကိုယ်လက်အင်္ဂါထိခိုက်မှု။ • ပစ္စည်းများ ထိခိုက်ပျက်စီးခြင်း။ 	<ul style="list-style-type: none"> • လုံလောက်သော မီးဘေးကာကွယ်ရေးပစ္စည်းများနှင့် မီးသတ်ဆေးဘူးများ ထားရှိပေးရန်၊ • လောက်ကျွမ်းနိုင်သောအမှုိုက်များကို သီးသန့်သိုလှောင်ရန်နှင့် စွန့်ပစ်ရန်၊ • အရေးပေါ်ကိစ္စများအတွက် ဖိလတစ်ကြိမ် မီးဘေးကာကွယ်ရေးပညာပေးများပြုလုပ်ရန်၊ • လောင်စာသိုလှောင်သည့်နေရာများ၊ မီးစက်စသည်တို့တွင် ဘေးကင်းရေးနှင့် 	တည်ဆောက်ခြင်း ကာလ/ ပိတ်သိမ်းခြင်း နှင့် လည်ပတ်ခြင်း ကာလ	၂,၀၀၀,၀၀၀	ကန်ထရိုက်တာ/ MCCM Co., Ltd.

အကြောင်းအရာ	ဖြစ်ပေါ်နိုင်သော သက်ရောက်မှုများ	လျော့ချနိုင်မည့်နည်းလမ်းများ	ကာလ	နှစ်စဉ်ခန့်မှန်း အသုံးစရိတ် (မြန်မာကျပ်)	တာဝန်ယူ မည့် အဖွဲ့အစည်း
		<p>သတိပေးဆိုင်ဘုတ်များထားရှိရန်။</p> <hr/> <ul style="list-style-type: none"> • ပျက်နေသော အီလက်ထရွန်းနစ်ပစ္စည်းများနှင့် ဝါယာကြိုးများကို လျှပ်စစ်ပညာရှင်မှ ချက်ချင်းပြုပြင်ပေးရန်၊ • လောင်စာဆီသိုလှောင်သည့်နေရာသို့ဝင်ရောက်ခွင့်ရှိသူကိုသာ ခွင့်ပြုပါ။ • စီမံကိန်းဧရိယာ၏ အများပိုင်ဧရိယာတွင် အရေးပေါ်ဆက်သွယ်ရန် နံပါတ်များကို ထားရှိရန်။ 			
သဘာဝဘေးအန္တရာယ်					
သဘာဝဘေးအန္တရာယ်	<ul style="list-style-type: none"> • မြေငလျင် • ရေကြီးခြင်း 	<p style="text-align: center;"><u>မြေငလျင်အန္တရာယ်</u></p> <ul style="list-style-type: none"> • လူတစ်ဦးချင်းစီ၏ ဘေးလွတ်ရာသို့ 	တည်ဆောက်ခြင်း ကာလ/ ပိတ်သိမ်းခြင်းနှင့်	၂,၀၀၀,၀၀၀	ကန်ထရိုက်တာ/ MCCM Co., Ltd.

အကြောင်းအရာ	ဖြစ်ပေါ်နိုင်သော သက်ရောက်မှုများ	လျော့ချနိုင်မည့်နည်းလမ်းများ	ကာလ	နှစ်စဉ်ခန့်မှန်း အသုံးစရိတ် (မြန်မာကျပ်)	တာဝန်ယူ မည့် အဖွဲ့အစည်း
	<ul style="list-style-type: none"> မြေကျွံခြင်း 	<p>ရွှေ့ပြောင်းရေးနှင့် ကယ်ဆယ်ရေးအတွက် အရေးပေါ်အစီအစဉ်ကို ရေးဆွဲပြီး လိုက်နာဆောင်ရွက်ခြင်း။</p> <ul style="list-style-type: none"> အရေးပေါ်ဆေးသေတ္တာများ (First-Aid Box) များစီစဉ်ထားရှိခြင်း။ အရေးပေါ်အခြေအနေအတွက် ဆေးခန်း သို့မဟုတ် အနီးဆုံးဆေးရုံသို့ ပို့ဆောင်ရန် စီဆောင်ရွက်ထားခြင်း။ အရေးပေါ်အခြေအနေအတွက် ဆေးခန်း သို့မဟုတ် အနီးဆုံးဆေးရုံသို့ ပို့ဆောင်ရန် စီဆောင်ရွက်ထားခြင်း။ မြေအောက်ရေရုတ်တရက်တက်လာခြင်း၊ ကျောက်တုံးများနှင့် မြေဆီလွှာများ ပျော့ပြောင်းခြင်း စသည့် 	လည်ပတ်ခြင်း ကာလ		

အကြောင်းအရာ	ဖြစ်ပေါ်နိုင်သော သက်ရောက်မှုများ	လျော့ချနိုင်မည့်နည်းလမ်းများ	ကာလ	နှစ်စဉ်ခန့်မှန်း အသုံးစရိတ် (မြန်မာကျပ်)	တာဝန်ယူ မည့် အဖွဲ့အစည်း
		<p>လျင်၏ ရှေ့ပြေး နိမိတ်များ အားသိရှိနိုင်ရန် ရေရှည်နှင့် ရေတိုလျင် စောင့်ကြည့်ရေးစနစ် သို့မဟုတ် လျင်သတိပေး သည့်စနစ်အား တပ်ဆင်အသုံးပြုခြင်း။</p> <p>ရေကြီးခြင်းအန္တရာယ်</p> <ul style="list-style-type: none"> • ဘေးအန္တရာယ်များ ဖြစ်ပေါ်နိုင်ခြေ ကို သိရှိနိုင်ရန်အတွက် မိုးလေဝသ သတင်းများအား စောင့်ကြည့်နား ထောင်ရန်။ <p>မြေကျုံ့ခြင်း</p> <ul style="list-style-type: none"> • မြေအောက်ရေ ထုတ်ယူသုံးစွဲရာတွင် ရေစုပ်ယူစမ်းသပ်ချက် ရလဒ်များကို ကျော်လွန်၍အသုံးမပြုရန် 			

ဇယား (၉) လုပ်ငန်းလည်ပတ်ခြင်းနှင့် ပိတ်သိမ်းခြင်းကာလ အတွင်း စောင့်ကြပ်ကြည့်ရှုရမည့်အချက်အလက်များ

စောင့်ကြည့်ရမည့် ကဏ္ဍများ	ကာလ	စောင့်ကြည့်ရမည့် အကြောင်းအရာ	စောင့်ကြပ်ရမည့်နေရာ	ကြိမ်နှုန်း	တာဝန်ရှိယူမည့် အဖွဲ့အစည်း
ပြင်ပ လေထုအရည်အသွေး	တည်ဆောက်ခြင်း/ ပိတ်သိမ်းခြင်း ကာလ	<p>ပြင်ပလေထုအရည် အသွေး (၂၄ နာရီ) ဖုန်မှုန့်နှင့် အမှုန်အမွှားများ (PM10၊ PM2.5 နှင့် TSP)၊ ဆာလဖာဒိုင်အောက်ဆိုဒ်၊ နိုက်ထရိုဂျင်ဒိုင် အောက်ဆိုဒ်ဓာတ်ငွေ့၊ ကာဗွန်ဒိုင်အောက်ဆိုဒ်ကာဗွန်မိုနောက်ဆိုဒ်၊ ငွေ့ရည်ပျံလွယ်သောဓာတ်ပေါင်းများ၊ အိုဇုန်း</p>	<p>စီမံကိန်းဧရိယာအတွင်း (ဆောက်လုပ်ခြင်း/ပိတ်သိမ်းခြင်း)</p>	တစ်နှစ်လျှင် နှစ်ကြိမ်	ကန်ထရိုက်တာ/ MCCM Co., Ltd.
	လုပ်ငန်းလည်ပတ် ခြင်းကာလ		<p>စီမံကိန်းဧရိယာ မြောက်လတ္တီကျု ၂၁ ဒီဂရီ ၁၇ မိနစ် ၅၄.၂၄ စက္ကန့် အရှေ့လောင်ဂျီကျု ၉၅ ဒီဂရီ ၁၀ မိနစ် ၂၄.၂၆ စက္ကန့်</p>	တစ်နှစ်လျှင် တစ်ကြိမ်	MCCM Co., Ltd.
	<p>ကျောဇီကျေးရွာ မြောက်လတ္တီကျု ၂၁ ဒီဂရီ ၁၈ မိနစ် ၅၆.၁၀ စက္ကန့် အရှေ့လောင်ဂျီကျု ၉၅ ဒီဂရီ ၁၀ မိနစ် ၄၁.၄၆ စက္ကန့်</p>		တစ်နှစ်လျှင် တစ်ကြိမ်	MCCM Co., Ltd.	
<p>မာလာကျေးရွာ မြောက်လတ္တီကျု ၂၁ ဒီဂရီ ၁၇ မိနစ် ၅၉.၈၇ စက္ကန့်</p>	တစ်နှစ်လျှင် တစ်ကြိမ်	MCCM Co., Ltd.			

စောင့်ကြည့်ရမည့် ကဏ္ဍများ	ကာလ	စောင့်ကြည့်ရမည့် အကြောင်းအရာ	စောင့်ကြပ်ရမည့်နေရာ	ကြိမ်နှုန်း	တာဝန်ရှိယူမည့် အဖွဲ့အစည်း
			အရှေ့လောင်ဂျီကျု။ ၉၅ ဒီဂရီ ၈ မိနစ် ၄၁.၁၉ စက္ကန့်		
စွန့်ပစ်ရေ	တည်ဆောက်ခြင်း/ ပိတ်သိမ်းခြင်း ကာလ	ချဉ်ဖန်ကိန်း၊ စုစုပေါင်းဆိုင်းကြွအနည်း၊ ဇီဝဆိုင်ရာ အောက်စီဂျင် လိုအပ်ချက်၊ ခါတုဆိုင်ရာ အောက်စီဂျင် လိုအပ်ချက်၊ စုစုပေါင်း ဖော့စဖော့ရပ်၊ ခဲ၊ ဆီနှင့်ချောဆီ၊ စုစုပေါင်းနိုက်ထရိုဂျင်။ ပျော်ဝင်အောက်ဆီဂျင်၊ ခရိုမီယမ်	ဆောက်လုပ်ရေးလုပ်ငန်းခွင်မှ စွန့်ပစ်ရေ နောက်ဆုံးထွက်ရှိသည့်နေရာ	တစ်နှစ်လျှင် နှစ်ကြိမ်	ကန်ထရိုက်တာ/ MCCM Co., Ltd.
	လုပ်ငန်းလည်ပတ် ခြင်းကာလ		လုပ်ငန်းလည်ပတ်ရာမှ ထွက်ရှိလာသည့် စွန့်ပစ်ရေဆိုး မြောက်လတ္တီကျု။ ၂၁ ဒီဂရီ ၁၇ မိနစ် ၅၅.၈၃ စက္ကန့် အရှေ့လောင်ဂျီကျု။ ၉၆ ဒီဂရီ ၁၀မိနစ် ၂၇.၈၂ စက္ကန့်	တစ်နှစ်လျှင် နှစ်ကြိမ်	MCCM Co., Ltd.
ဆူညံသံ	တည်ဆောက်ခြင်း/ ပိတ်သိမ်းခြင်း ကာလ	အသံဆူညံမှုပမာဏ (၂၄ နာရီ) (dB(A) scale)	စီမံကိန်းဧရိယာအတွင်း (ဆောက်လုပ်ခြင်းနှင့်ပိတ်သိမ်းခြင်း)	တစ်နှစ်လျှင် နှစ်ကြိမ်	ကန်ထရိုက်တာ/ MCCM Co., Ltd.

စောင့်ကြည့်ရမည့် ကဏ္ဍများ	ကာလ	စောင့်ကြည့်ရမည့် အကြောင်းအရာ	စောင့်ကြပ်ရမည့်နေရာ	ကြိမ်နှုန်း	တာဝန်ရှိယူမည့် အဖွဲ့အစည်း
	လုပ်ငန်းလည်ပတ် ခြင်းကာလ		<p>စီမံကိန်းဧရိယာ</p> <p>မြောက်လတ္တီကျု ၂၁ ဒီဂရီ ၁၇ မိနစ် ၅၄.၂၄ စက္ကန့်</p> <p>အရှေ့လောင်ဂျီကျု ၉၅ ဒီဂရီ ၁၀ မိနစ် ၂၄.၂၆ စက္ကန့်</p>	တစ်နှစ်လျှင် နှစ်ကြိမ်	MCCM Co., Ltd.
အနံ့	လုပ်ငန်းလည်ပတ် ခြင်းကာလ	အနံ့အရည်အသွေး	<p>မီးဖိုမီးခိုးခေါင်းတိုင်</p> <p>မြောက်လတ္တီကျု ၂၁ ဒီဂရီ ၁၇ မိနစ် ၅၄.၉၆ စက္ကန့်</p> <p>အရှေ့လောင်ဂျီကျု ၉၅ ဒီဂရီ ၁၀ မိနစ် ၂၅.၃၇ စက္ကန့်</p>	တစ်နှစ်လျှင် နှစ်ကြိမ်	MCCM Co., Ltd.
စွန့်ပစ်အမှိုက် နှင့် အန္တရာယ်ရှိသော စွန့်ပစ်ပစ္စည်း ထွက်ရှိမှု	တည်ဆောက်ခြင်း/ ပိတ်သိမ်းခြင်းကာလ	<ul style="list-style-type: none"> ထွက်ရှိလာသောစွန့်ပစ် ပစ္စည်း များကို ပမာဏ၊ အမျိုး အစား ခွဲခြားခြင်း။ ခွဲခြားထားသော စွန့်ပစ် အမှိုက် များကို နေ့စဉ် ချိန်တွယ်ခြင်း၊ မှတ်တမ်း ပြုလုပ်ခြင်း။ အမှိုက်စွန့်ပစ်သည့် အရေအတွက် နှင့် စွန့်ပစ်သည့် နည်းလမ်းကို မှတ်တမ်း 	<ul style="list-style-type: none"> စီမံကိန်းဧရိယာအတွင်း လုပ်ငန်းစဉ်အလိုက် အမှိုက် ထွက်ရှိသည့် နေရာ (ဥပမာ။ သစ်သားအပိုင်းအစများ၊ သံအပိုင်း အစများ၊ ဘီလပ်မြေအိတ်များ စသဖြင့်) နှင့် စီမံကိန်းဧရိယာ အတွင်း အမှိုက်စုပုံသည့်နေရာ 	နေ့စဉ်	ကန်ထရိုက်တာ/ MCCM Co., Ltd.

စောင့်ကြည့်ရမည့် ကဏ္ဍများ	ကာလ	စောင့်ကြည့်ရမည့် အကြောင်းအရာ	စောင့်ကြပ်ရမည့်နေရာ	ကြိမ်နှုန်း	တာဝန်ရှိယူမည့် အဖွဲ့အစည်း
	လုပ်ငန်းလည်ပတ် ခြင်းကာလ	<p>ပြုလုပ် ခြင်း။</p> <ul style="list-style-type: none"> • အမှိုက်စနစ်တကျစွန့်ပစ်မှုရှိမရှိ စစ်ဆေးခြင်း။ • အမှိုက်များကို မီးရှို့ခြင်းမရှိစေရန် စစ်ဆေးခြင်း။ 	စီမံကိန်းဧရိယာအတွင်း အမှိုက်စွန့်ပစ်သည့်နေရာ		MCCM Co., Ltd.
တုန်ခါမှု	လုပ်ငန်းလည်ပတ် ခြင်းကာလ	<ul style="list-style-type: none"> • တုန်ခါမှု (Vibration level Acceleration (m/s²) Velocity (mm/s)) 	<p>မီးစက်</p> <p>မြောက်လတ္တီကျု ၂၁ ဒီဂရီ ၁၇ မိနစ် ၅၅.၇၂ စက္ကန့် အရှေ့လောင်ဂျီကျု ၉၅ ဒီဂရီ ၁၀ မိနစ် ၂၇.၅၃ စက္ကန့်</p>	တစ်နှစ်လျှင် နှစ်ကြိမ်	MCCM Co., Ltd.
မြေဆီလွှာ	လုပ်ငန်းလည်ပတ် ခြင်းကာလ	<ul style="list-style-type: none"> • ချဉ်ဖန်ကိန်း၊ စိုထိုင်းဆ (ရာခိုင်နှုန်း)၊ နိုင်ထရိုဂျင် စုစုပေါင်း 	<p>စွန့်ပစ်ရေ နောက်ဆုံးစွန့်ထုတ်ရာနေရာ</p> <p>မြောက်လတ္တီကျု ၂၁ ဒီဂရီ ၁၇ မိနစ် ၅၅.၇၄ စက္ကန့် အရှေ့လောင်ဂျီကျု ၉၅ ဒီဂရီ ၁၀ မိနစ် ၂၈.၂၉ စက္ကန့်</p>	တစ်နှစ်လျှင် နှစ်ကြိမ်	MCCM Co., Ltd.

စောင့်ကြည့်ရမည့် ကဏ္ဍများ	ကာလ	စောင့်ကြည့်ရမည့် အကြောင်းအရာ	စောင့်ကြပ်ရမည့်နေရာ	ကြိမ်နှုန်း	တာဝန်ရှိယူမည့် အဖွဲ့အစည်း
မီးခိုးခေါင်းတိုင်	လုပ်ငန်းလည်ပတ် ခြင်းကာလ	မီသိန်း၊ ဟိုက်ဒရိုဂျင်ဆာလဖိုက်ဒါ၊ နိုက်ထရိုဂျင်အောက်ဆိုဒါ၊ အမိုးနီးယား၊ ကာဗွန်မိုနောက်ဆိုဒါ၊ အောက်ဆီဂျင်၊ ဆာလဖာဒိုင်အောက်ဆိုဒါ	<p><u>မီးဖိုမီးခိုးခေါင်းတိုင်</u></p> <p>မြောက်လတ္တီကျု ၂၁ ဒီဂရီ ၁၇ မိနစ် ၅၄.၉၆ စက္ကန့် အရှေ့လောင်ဂျီကျု ၉၅ ဒီဂရီ ၁၀ မိနစ် ၂၅.၃၇ စက္ကန့်</p> <p><u>မီးစက် မီးခိုးခေါင်းတိုင်</u></p> <p>မြောက်လတ္တီကျု ၂၁ ဒီဂရီ ၁၇ မိနစ် ၅၅.၇၂ စက္ကန့် အရှေ့လောင်ဂျီကျု ၉၅ ဒီဂရီ ၁၀ မိနစ် ၂၇.၅၃ စက္ကန့်</p>	တစ်နှစ်လျှင် နှစ်ကြိမ်	MCCM Co., Ltd.
လုပ်ငန်းခွင် ကျန်းမာရေးနှင့် ဘေးအန္တရာယ် ကင်းရှင်းရေး	တည်ဆောက်ခြင်း/ ပိတ်သိမ်းခြင်း ကာလ	<ul style="list-style-type: none"> • လုပ်ငန်းခွင်အတွင်းတစ်ကိုယ်ရေသုံးကာ ကွယ်ရေးပစ္စည်းများထောက်ပံ့ပေးခြင်း (သို့) ထောက်ပံ့ထား သော အကာအကွယ် ပစ္စည်း များ ဝတ်ဆင်ခြင်း ရှိမရှိ စစ်ဆေးခြင်း • အလုပ်တက်ရောက်သူ မှတ်တမ်းများ ထားရှိ ခြင်း 	<p><u>စီမံကိန်းဧရိယာအတွင်း</u></p> <ul style="list-style-type: none"> • တစ်ကိုယ်ရေ အကာအကွယ်သုံး ပစ္စည်းများ (PPE) အလုံအလောက် ထောက်ပံ့ပေးထားမှု အခြေအနေ၊ • သတိပေး ဆိုင်းဘုတ်များ 	လစဉ်	ကန်ထရိုက်တာ/ MCCM Co., Ltd.
	လုပ်ငန်းလည်ပတ် ခြင်းကာလ				
	လုပ်ငန်းလည်ပတ် ခြင်းကာလ				

စောင့်ကြည့်ရမည့် ကဏ္ဍများ	ကာလ	စောင့်ကြည့်ရမည့် အကြောင်းအရာ	စောင့်ကြပ်ရမည့်နေရာ	ကြိမ်နှုန်း	တာဝန်ရှိယူမည့် အဖွဲ့အစည်း
		<ul style="list-style-type: none"> • ဘေးအန္တရာယ်အသိပေးဆိုင်ခန်းများ ထား ရှိခြင်း • အရေးပေါ်ဆက်သွယ်နိုင်ရန် ဖုန်းနံပါတ်များကပ်ထားခြင်း 	<p>တပ်ဆင် ထားရှိမှု အခြေအနေ၊</p> <ul style="list-style-type: none"> • ရောင်ပြန်များ တပ်ဆင် ထားရှိမှု အခြေအနေ၊ <ul style="list-style-type: none"> • ဆေးသေတ္တာများကို လုပ်သားများ လက်လှမ်း မှီသည့်နေရာတွင် ထားရှိ မှု အခြေအနေ၊ • မတော်တဆ ထိခိုက်မှု များရှိခဲ့ပါလျှင် သက်ဆိုင်ရာအရေးပေါ် ဌာနများ သို့ ဆက်သွယ် နိုင်မည့် ဖုန်းနံပါတ်များကို အများ မြင်သာသော နေရာများတွင် ချိတ်ဆွဲ ပေးထားမှု အခြေအနေ 		

စောင့်ကြည့်ရမည့် ကဏ္ဍများ	ကာလ	စောင့်ကြည့်ရမည့် အကြောင်းအရာ	စောင့်ကြည့်ရမည့်နေရာ	ကြိမ်နှုန်း	တာဝန်ရှိယူမည့် အဖွဲ့အစည်း
မီးဘေးအန္တရာယ်၊	တည်ဆောက်ခြင်း/ ပိတ်သိမ်းခြင်း ကာလ နှင့် လုပ်ငန်းလည်ပတ် ခြင်းကာလ	<ul style="list-style-type: none"> • မီးသတ်ဆေးဘူးများ၏ ဖိအားအတိုင်းအတာနှင့် အဖွင့်အပိတ်ခလုတ် များကို လစဉ်စစ်ဆေးရန် • မီးသတ်ဆေးဘူးများကို မီးလောင်လွယ်သည့်နေရာများတွင် ထားရှိရန် • မီးသတ်ကိရိယာများ (မီးသတ်ဆေးဘူး၊ မီးသတ်ပိုက်၊မီးသတ်ရေငုတ်) များကို အလုံအလောက်ထားရှိရန် • မီးသတ်ကားဝင်ရောက်နိုင်ရန်အတွက် စီမံကိန်းအဝင်ပေါက်များကို ရှင်းလင်းထားရန် 	စီမံကိန်းဧရိယာအတွင်း	တစ်နှစ်လျှင် နှစ်ကြိမ်	MCCM Co., Ltd.

စောင့်ကြည့်ရမည့် ကဏ္ဍများ	ကာလ	စောင့်ကြည့်ရမည့် အကြောင်းအရာ	စောင့်ကြပ်ရမည့်နေရာ	ကြိမ်နှုန်း	တာဝန်ရှိယူမည့် အဖွဲ့အစည်း
အရေးပေါ် ဘေးအန္တရာယ်	တည်ဆောက်ခြင်း/ ပိတ်သိမ်းခြင်းကာ လ နှင့် လုပ်ငန်းလည်ပတ် ခြင်းကာလ	<ul style="list-style-type: none"> • အရေးပေါ်အစီအစဉ်များကို လေ့ကျင့် ခြင်း။ (Emergency Drill) • အသိပညာပေးခြင်းနှင့် သင်တန်းပေး ခြင်း။ • အရေးပေါ် ဆက်သွယ် ရမည့် အဖွဲ့ အစည်းများ၏ လိပ်စာ၊ ဖုန်းနံပါတ် များအား အလွယ်တကူ ထားရှိခြင်း။ 	စီမံကိန်းဧရိယာ	တစ်နှစ်လျှင် နှစ်ကြိမ်	MCCM Co., Ltd.

ပတ်ဝန်းကျင်စောင့်ကြည့်ကြည့်ရှုရေးအဖွဲ့ကို ပုံမှန်စောင့်ကြည့်စစ်ဆေးခြင်းနှင့် စစ်ဆေးခြင်း တို့ကို ပြီးမြောက်စေရန် ဖွဲ့စည်းထားသင့်သည်။ စောင့်ကြပ်ကြည့်ရှုရေး အဖွဲ့ခေါင်းဆောင်သည် စက်ရုံ၏ သဘာဝပတ်ဝန်းကျင်ရေးရာအတွက် အပြည့်အဝတာဝန်ယူသင့်သည်။

စောင့်ကြပ်ကြည့်ရှုမည့် အစီအစဉ်ကို အကောင်အထည်ဖော် ဆောင်ရွက်မည့် အဖွဲ့များမှာ အောက်ပါ ဇယား (၉) အတိုင်းဖြစ်ပါသည်။

ဇယား (၁၀) ပတ်ဝန်းကျင်စောင့်ကြပ်ကြည့်ရှုရေးအဖွဲ့၏ တာဝန်ဝတ္တရားများ

စဉ်	တာဝန်ရှိပုဂ္ဂိုလ်	ရာထူး	တာဝန်ဝတ္တရားများ
၁။	ဦးကိုကိုဦး (ညွှန်ကြားရေးမှူး)	စောင့်ကြပ် ကြည့်ရှုရေး အဖွဲ့ခေါင်းဆောင်	<ul style="list-style-type: none"> ✓ ပတ်ဝန်းကျင်အရည်အသွေးတိုင်းတာခြင်းဆိုင်ရာ စီစဉ်ဆောင်ရွက်ခြင်း၊ ✓ ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှု အစီအစဉ်ပါ လျှော့ချရေးနည်းလမ်းများ အကောင်အထည်ဖော်ဆောင်ရွက် နိုင်ရေး အတွက် စီမံကြီးကြပ်ခြင်း။ ✓ သက်ဆိုင်ရာအစိုးရဌာနများ၏ ညွှန်ကြားချက်များကို လိုက်နာဆောင်ရွက်ခြင်း။ ✓ လုပ်ငန်းဆောင်ရွက်မှုအခြေအနေများကို အစီရင်ခံတင်ပြခြင်း။ ✓ ဝန်ထမ်းများအတွက် အခြေခံလိုအပ်ချက်များလုံလောက်စွာ ထောက်ပံ့ပေးခြင်း။
၂။	ဦးသန်းဇင် (ဒါရိုက်တာ)	လုပ်ငန်းခွင် ကျန်းမာရေးနှင့် ဘေးအန္တရာယ် အဖွဲ့ ခေါင်းဆောင်	<ul style="list-style-type: none"> ✓ လုပ်ငန်းအတွင်းလုပ်ဆောင်မှုများကို စစ်ဆေးခြင်း။ ✓ လုပ်ငန်းအတွင်းဖြစ်စဉ်များကို တင်ပြခြင်း။ ✓ ဝန်ထမ်းများ၏ လိုအပ်ချက်များကို မှတ်တမ်းထားပြီး တင်ပြခြင်း။ ✓ လုပ်ငန်းခွင်ဘေးအန္တရာယ်ကင်းရှင်းရေးဆိုင်ရာသင်တန်းများစီစဉ်ဆောင်ရွက်ပေးခြင်း။ ✓ စွန့်ပစ်ပစ္စည်းစီမံခန့်ခွဲမှုအစီအစဉ်အား အကောင်အထည်ဖော်ဆောင်ရွက်ခြင်း။ ✓ လုပ်ငန်းခွင်ဘေးအန္တရာယ်လျော့ပါးရေးဆိုင်ရာ စစ်ဆေးကြပ်မတ်ခြင်း။
၃။	ဦးဇော်သန်း (Manager)	လက်ထောက် အဖွဲ့ခေါင်းဆောင်	<ul style="list-style-type: none"> ✓ မီးဘေးအန္တရာယ်ကာကွယ်ရေးဆိုင်ရာ စစ်ဆေးကြပ်မတ်ခြင်းနှင့် အကောင်အထည်ဖော်ဆောင်ရွက်ခြင်း။

စဉ်	တာဝန်ရှိပုဂ္ဂိုလ်	ရာထူး	တာဝန်ဝတ္တရားများ
			<ul style="list-style-type: none"> ✓ စက်ကိရိယာနှင့် ယာဉ်ယန္တရားများအား စောင့်ကြည့်စစ်ဆေးခြင်း။ ✓ လုပ်ငန်းခွင်ဘေးအန္တရာယ်ဖြစ်ပေါ်ပါက အဖွဲ့ခေါင်းဆောင်အား သတင်းပို့ခြင်း။

ဇယား (၁၁) MCCM Co., Ltd. ၏ CSR အစီအစဉ်အတွက် လျာထားရန်ပုံငွေ

စဉ်	လုပ်ဆောင်ချက်	တာဝန်ရှိအဖွဲ့အစည်း	ကြိမ်နှုန်း	ခန့်မှန်းပမာဏ
လူမှုရေး				
၁	အနီးနားရှိ ကျေးရွာများတွင် လမ်းတည်ဆောက်ပေးခြင်း၊ ရေမြောင်းများ ပြုပြင်တည်ဆောက်ပေးခြင်း	MCCM Co., Ltd.	နှစ်စဉ်	၂,၀၀၀,၀၀၀
ကျန်းမာရေး				
၂	အနီးနားရှိကျေးရွာများတွင် သောက်ရေထောက်ပံ့ပေးခြင်း၊ ဆေးပေးခန်းများ တည်ဆောက်ပေးခြင်း	MCCM Co., Ltd.	နှစ်စဉ်	၂,၅၀၀,၀၀၀
ဘာသာရေး				
၃	အနီးနားရှိ ဘုန်းကြီးကျောင်းများ၊ ဘာသာရေးအဆောက်အဦများ၊ ကိစ္စများတွင် ပါဝင်ကူညီခြင်း	MCCM Co., Ltd.	နှစ်စဉ်	၂,၀၀၀,၀၀၀
ပညာရေး				
၄	အနီးနားရှိ ကျေးရွာများတွင် ကျောင်းအဆောက်အဦများ တည်ဆောက်ခြင်း	MCCM Co., Ltd.	နှစ်စဉ်	၂,၀၀၀,၀၀၀
စုစုပေါင်း				၈,၅၀၀,၀၀၀

၈။ နိဂုံး

အဆိုပြုစီမံကိန်း MCCM Co., Ltd သည် မန္တလေးတိုင်းဒေသကြီး၊ မြင်းခြံခရိုင်၊ တောင်သာမြို့နယ်တွင် တည်ရှိပါသည်။ စီမံကိန်း အကောင်အထည်ဖော်သူသည် Hexagonal Angle

International Consultants ကုမ္ပဏီလီမိတက်အား ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း အစီရင်ခံစာ (EIA) ရေးဆွဲရန် ငှားရမ်း ခဲ့ပါသည်။

ဤအစီရင်ခံစာတွင် မူလ ပတ်ဝန်းကျင်အရည်အသွေး တိုင်းတာခြင်း၊ ကွင်းဆင်း လေ့လာခြင်း များကို ရာသီ (၂) မျိုးတွင် လေ့လာခဲ့ပါသည်။ မိုးရာသီတွင် လေ့လာမှု လုပ်ငန်းများကို စက်တင်ဘာလ၊ ၂၀၂၁ ခုနှစ်တွင် ပြုလုပ်ခဲ့ပြီး နွေရာသီတွင်မူ မေလ၊ ၂၀၂၃ ခုနှစ်တွင် လေ့လာခဲ့ပါသည်။ မူလ ပတ်ဝန်းကျင်အရည်အသွေး တိုင်းတာခြင်း၊ ကွင်းဆင်း လေ့လာခြင်းများတွင် လေထုအရည်အသွေးတိုင်းတာခြင်း၊ ရေအရည်အသွေးတိုင်းတာခြင်း၊ ဆူညံသံနှင့် တုန်ခါမှု အရည်အသွေးတိုင်းတာခြင်း၊ အနံ့အရည်အသွေးတိုင်းတာခြင်း၊ မြေဆီလွှာ အရည်အသွေး တိုင်းတာခြင်း၊ ဇီဝမျိုးစုံမျိုးကွဲလေ့လာခြင်း၊ လူမှုစီးပွားရေး အခြေအနေများလေ့လာခြင်း၊ ယာဉ်သွားလာမှု စစ်တမ်းကောက်ယူခြင်းနှင့် စီမံကိန်း ဧရိယာအား လေ့လာခြင်းတို့ ပါဝင်ပါသည်။

သက်ရောက်မှုများကို လေ့လာဆန်းစစ်ရာတွင် လုပ်ငန်းတည်ဆောက်ခြင်းအဆင့်/ ပိတ်သိမ်းခြင်းကာလ၊ လုပ်ငန်းလည်ပတ်ခြင်း ကာလအဆင့်ဟူ၍ ခွဲခြား ဆန်းစစ်ထားပါသည်။ ပတ်ဝန်းကျင်နှင့် လူမှုရေးဆိုင်ရာ အကျိုးသက်ရောက်မှုများကို အကဲဖြတ်ခြင်းနှင့် အသေးစိတ် ထည့်သွင်းစဉ်းစားခြင်းများကို **အခန်း ၅** တွင် ဖော်ပြထားပါသည်။ အန္တရာယ်ဖြစ်နိုင်ချေ လေ့လာဆန်းစစ်ခြင်းနှင့် ပတ်ဝန်းကျင်အပေါ် ဆက်စပ်သက်ရောက်မှုများကိုလည်း ထိုအခန်းတွင် ကြည့်ရှုနိုင်ပါသည်။

လုပ်ငန်းတည်ဆောက်ခြင်း/ပိတ်သိမ်းခြင်းအဆင့်မှ ဖြစ်ပေါ်သော ပတ်ဝန်းကျင် ထိခိုက်သက်ရောက်မှုများအနက် အဓိကဖြစ်ပေါ်သော ထိခိုက်မှုများမရှိ၍ အလယ်အလတ် သက်ရောက်မှုမျှသာ ရှိပါသည်။ လုပ်ငန်းလည်ပတ်ခြင်းအဆင့်တွင် အလယ်အလတ် သက်ရောက်မှုများမှာ လေထုညစ်ညမ်းမှု၊ စွန့်ပစ်အမှိုက်များဖြစ်ပြီး ရေထုညစ်ညမ်းမှု၊ ဆူညံသံနှင့် တုန်ခါမှု၊ မြေဆီလွှာနှင့် မြေမျက်နှာသွင်ပြင်တို့မှာ နိမ့်သောအဆင့် သက်ရောက်မှုသာဖြစ်ပါသည်။ အဆိုပြုစီမံကိန်းသည် သည် ဒေသခံ များ အတွက် အလုပ်အကိုင်အခွင့်အလမ်းများ ဖန်တီး ပေးနိုင်၍ အလုပ်သမား/ ဝန်ထမ်းများ၏ စွမ်းရည် ကိုလည်း တိုးတက် စေပါသည်။ ထို့နောက် လူမှု စီးပွား အတွက် ကောင်းကျိုး များ ဖြစ်ပေါ်စေပြီး လူမှု အကျိုးတူ ပူးပေါင်းပါဝင်မှု အစီအစဉ် များကိုလည်း ဆောင်ရွက်လျက် ရှိပါသည်။ ထို့ကြောင့် ဒေသအတွက် ကောင်းကျိုးဖြစ်ရုံသာမက နိုင်ငံအတွက်လည်း အကျိုးပြုကြောင်း လေ့လာတွေ့ရှိရပါသည်။

EXECUTIVE SUMMARY

1. INTRODUCTION

MCCM Company Limited was incorporated on 4th June, 2018 as a private company limited (100% Myanmar Citizen Investment) by shares in accordance with Myanmar Investment Law and Rules. The proposed project will invest about 30 years and the authorized capital of the company was 25 billion Myanmar Kyats. Company Registration Number is 103945232.

2. LEGAL REQUIREMENTS

Environmental management of the proposed project needs to comply with legal requirements of the Environmental Impact Assessment prescribed in the Environmental Conservation Rules, Notification No. 50/2014, the EIA Procedure, Notification No. 616/2015, and the general Environmental Impact Assessment Guideline, September 2017. Therefore, it is essential for the MCCM to identify and implement appropriate legal arrangements that are required for performing petroleum refinery processes. At present, the existing legal framework in Myanmar is not fully developed to support environmental conservation, while some laws set out only basic principles, which means more regulations are required to implement effective environmental conservation. In this report, MCCM itself is addressed only in disparate, vague, and related pieces of legislation. The summary of the regulations and legal framework described for the proposed project and recommendations for regulatory frameworks that fit with the Myanmar context and requirements will be covered in this scoping report and EIA report.

The environmental regulations and legal framework play a huge part in protecting humans, animals, resources, and habitats. The ratification dates of the mentioned conventions and agreements will be described in the follow up EIA study. The objectives of the national legal framework and the relevant policies are to make proactive mitigation measures, to avoid the environmental and social adverse impacts as much as possible, and to maximize the positive effects of the project. Environmental laws, regulations, legal frameworks, and guidelines mentioned in this report are as follows;

Table 1 Applicable laws and regulations

Sr	Laws and regulations	Enacted Year	Committed Section
Environmental Conservation			
1	The Constitution of the Republic of the Union of Myanmar	2008	
2	The Environmental Conservation Law	2012	7(o), 14, 15, 24, 29
3	The Environmental Conservation Rules	2014	69 (a), (b)
4	Environmental Impact Assessment Procedure	2015	102 to 110, 113,

Sr	Laws and regulations	Enacted Year	Committed Section
			115, 117
5	National Environmental Quality (Emission) Guideline	2015	-
Forest, Biodiversity and Natural Resources			
6	Forest Law	2018	12 (a)
7	Forest Rules	1995 (Amended 1998)	20, 36, 60
8	The Conservation of Biodiversity and Protected Area Law	2018	35 (a), (c), (d), 29 (e), 39 (d)
9	The Conservation of Water Resources and Rivers Law	2006 (Amended 2017)	6, 8 (a), 11, 19, 21 (b), 22, 24 (b), 30
10	The Conservation of Water Resources and Rivers Rules	2013	-
11	Underground Water Act	1930	3, 5
Human rights and Cultural heritage			
12	The Ethnic Rights Protection Law	2015	5
13	The Ethnic Rights Protection Rules	2019	20, 21
14	The Protection and Preservation of Cultural Heritage Regions Law	1998 (Amended 2019)	21 (b)
15	The Protection and Preservation of Antique Objects Law	2015	3, 12, 13
16	The Protection and Preservation of Ancient Monuments Law	2015	12, 15, 20 (f)
Public Health			
17	Public Health Law	1972	3, 5
18	Prevention and Control of Communicable Diseases Law	1995 (Amended 2011)	3 (a) (9), 4, 11
19	The Control of Smoking and Consumption of Tobacco Product Law	2006	9
Landuse			
20	Farm Land Law	2012	30
21	The Vacant, Fallow and Virgin Lands Management Law	2012 (Amended 2018)	10 (a), 19 (a), (d)
Urban Development and Industrial			
22	The Petroleum and Petroleum Product Law	2017	8 (a), (c), 9 (a), (e), 10 (a), (b), (d),(e), 11

Sr	Laws and regulations	Enacted Year	Committed Section
23	The Standarization Law	2014	16, 17, 19
24	Myanmar Engineering Council Law	2013	34
25	The Factories Act	1951 (Amended 2016)	7, 47, 48, 49, 62
26	Private Industrial Enterprise Law	1990	27
27	Prevention of Hazard from Chemical and Related Substances Law	2013	15 (a), (b), 16 (b) to (j), 17, 22, 27 (a) to (d)
28	Prevention of Hazard from Chemical and Related Substances Rules	2016 (Amended 2018)	-
29	The Electricity Law	2014	20, 21 (a), 24, 27, 29, 33, 40, 68
Economic and Investment			
30	The Export and Import Law	2012	7
31	The Myanmar Companies Law	2017	2, 4
32	Myanmar Investment Law	2016 (Amended 2019)	50, 51, 65, 73
33	The Myanmar Investment Rules	2017	202, 203, 206, 212
34	Myanmar Insurance Law	1993	15, 16
Workers and Workplace			
35	Labour Organization Law	2011	18 to 22
36	The Labour Organization Rules	2012	29, 30
37	The Workmen's Compensation Act	1923	12, 13
38	Employment and Skill Development Law	2013	5, 14, 30
39	Occupational Safety and Health Law	2019	12, 14, 16, 17, 18, 26, 27, 34, 36
40	The Minimum Wage Law	2013 (Amended 2023)	12, 13
41	The Minimum Wages Rules	2013	43, 44
42	The Payment of Wages Law	2016	3, 4, 5, 14, Chapter 3
43	The Leave and Holiday Act	1951 (Amended 2014)	5
44	The Social Security Law	2012	11 (a), 15 (a), (b),

Sr	Laws and regulations	Enacted Year	Committed Section
		(Amended 2014)	18 (b), 48 (b), 75
45	The Settlement of Labour Dispute Law	2012 (Amended 2019)	38, 39, 40, 51
Transportation			
46	The Highways Law	2000 (Amended 2014)	8
47	Vehicle Safety and Vehicle Management Law	2020	9 (a), 12 (c), 14 (r), 18 (a), 81 (g)
48	Vehicle Safety and Vehicle Management Rules	2022	252, 253, 254, 256, 261, 262, 263, 269, 271
49	Multimodal Transport Law	2014 (Amended 2022)	3
Emergency			
50	The Myanmar Fire Force Law	2015	25
51	Natural Disaster Management Law	2013	14 to 18

The project proponent is committed to the existing relevant Myanmar Laws, rules, and regulations. The detail of legal requirements is presented in Chapter 2.

3. DESCRIPTION OF THE PROJECT LOCATION

The project proponent, MCCM Co., Ltd., is situated in the Mandalay Region, Myingyan District, Taungtha Township, Kyawzi Village Tract; Plot No. (837-C), Kyawzi West Field No. (92/1, 93, 94/1, 94/2, 94/3), which lies at the coordinates of 21.298291° N and 95.173704° E. The factory covers an area of 3.98 acres.

3.1 SITE DESCRIPTION

The project infrastructure includes crude & product tanks, loading/unloading pump house, operation area, office building, control building, canteen, worker dormitory, car parking, toilets, security gates and other infrastructure.

3.2 PRODUCTION PROCESS

The technology that will be used is basic oil refining method (Chinese Distillation and Refining method). The production process is as followed. Firstly, the weight of the

imported crude oil is measured and then, sent to the preliminary storage tank for sedimentation and heating the crude oil to separate the water participation and prevent the oil freeze by heating 50°C. After heating the crude oil, it is sent to the storage tanks (four silos) via the pipe. The crude oil is stored at 50 °C and the sedimentation process continues in four storage tanks (four silos).

The crude oil from the storage tanks (four silos) are transport to the Circular Crude Oil Drum through two filters. The water and sediments from the crude oil is cleaned by filtering with sieves and screens of the filters. The filtered crude oil from the Circular Crude Oil Drum is then pumped into heating furnaces and heated to 335°C. The temperature for the gasoline is ranged from 80°C to 180°C and the temperature for diesel is ranged from 180°C to 335°C. The petroleum gas which comes from furnaces is passing through the Circular Crude Oil Drum and the distillation column and then, condensate in the condenser. The gasoline and diesel getting from condensing in the condenser are collect in Overhead Receiving Tank. The vapor which does not become liquid will be sent back into the Circular Crude Oil Drum column by return line.

The oil and diesel from the Overhead Receiving Tank pass through the filter filled with Silica Gel inside to improve the quality and filter out the oil residue. And then, the final products (gasoline and diesel) are sent to each storage tank of gasoline and diesel.



Figure -1 Production Process

3.3 OPERATION UTILITIES

In the implementation of the project, electricity, generators, and water are used for the operation of all sectors.

3.3.1. Electricity

In the project, electrical energy is essential to run the operational processes. Electricity was obtained from the Taungtha township electric power line and utilized a 315 KVA transformer.

In the event of a power outage, standby capacities of the generators—250 KVA and 150 KVA—are reserved to provide the necessary power supply. These two generators use diesel fuel, with a fuel consumption rate of 50 gallons per day during operational period.

3.3.2. Water Supply

Water is extracted from the groundwater through two tube wells. The first one is a 4-inch tube well with a depth of 420 feet, and the second one is a 2-inch tube well, also with a depth of 420 feet, similar to the first. The 4-inch tube well is used for operational processes as it is situated near the production area. Conversely, the 2-inch tube well is designated for domestic use and is located near the kitchen.

To facilitate the extraction of water from the tube wells, two water motors are employed for pumping. For drinking water purposes, approximately 100 containers, each with a capacity of 20 liters, are consumed per month during the summer, while around 50 to 60 containers are used per month in the winter.

3.3.3. Application of Chemical

In the factory, chemical products such as solvent green are used to dye diesel blue or green. The Material Safety Data Sheet is mentioned in **Appendix (O)**.

3.4 POLLUTION CONTROL FACILITIES

3.4.1. Noise Control

The proposed factory put generators in the canopies under a separated shade structure in the proposed factory.

3.5 SOLID WASTE

Solid wastes generated from the operational process include used Silica Gel and residues from petroleum after the operational process.

Domestic waste such as leftovers, plastic bottles, tissues, and kitchen waste are generated. Factory waste is disposed of at a disposal site near the factory three times per month, and leftovers from workers' meals are used as fertilizer for the trees within the factory premises.

3.6 WASTEWATER

Two types of wastewaters (such as domestic and operation wastewater) are generated during the operation phase of the project. Operation wastewater generated about 20 gallons during 2-3 days from operation process. Domestic wastewater generates about 150 liters per day.

3.7 STAFF FACILITIES

The project provided a welfare plan which will be applicable for all staff in the company. The accommodation, kitchen and canteen are provided for the staff. The factory set up air conditioner and fans to reduce heat in the workplace. Drinking water is also provided for the factory workers. In addition, workers have been trained on firefighting and other emergency response plan.

4 SURROUNDING ENVIRONMENT

In this chapter, the area of about 3 km radius around the project site has been studied to check the impacts for the surrounding environment. Three groups of components are consisted in studying surrounding environment. They are (i) Physical Components (ii) Biological Components (iii) Socio-economic Components.

As the physical component components, Taungtha Township has tropical low rainy region climate with a maximum temperature of 34.7°C and a minimum temperature of 20.7°C. The atmospheric condition is more or less categorized into three primary seasons (Summer, Rainy and Cool Season). The summer season lasts from mid-March to mid-May. The southeast monsoon wind is the main source of rain and the study area receives rain during the period from mid-May to end of September. The cool season lasts from November through February.

4.1. ENVIRONMENT BASELINE QUALITY

For the environmental baseline assessment, ambient and indoor air quality, stack emissions, water quality, noise, and vibration levels, light intensity, odor presence, temperature, and soil conditions are monitored and analyzed. Baseline quality measurements were conducted twice: once during the wet season and once during the dry season. These measurements were taken at three different locations, including the project site and the nearest villages to the project site.

The outdoor air quality measurement such as Particulate Matters (PM10 and PM2.5) and gases Carbon monoxide (CO), Carbon dioxide (CO2), Ozone (O3), Sulphur dioxide (SO2), Nitrogen dioxide (NO2), VOC, Total suspended particulate (TSP), Wind speed (WS), Wind direction (WD), Relative humidity (Rh), Air pressure and Temperature have been measured using the OCEANUS-AQM09. The results were compared with National Environmental Quality (Emission) Guidelines (NEQEG). After analyzing the ambient air result, all the results were within the NEQE guidelines. Indoor air quality was measured at 5 points within the project area. Dust (PM 2.5, PM 10) was measured, as well as volatile organic compounds (TVOC), formaldehyde (HCHO), and carbon dioxide (CO2). According to the measurement results, the measured rooms and areas are in good safety condition. Stack

emission measurement such as Methane (CH₄), Hydrogen Sulphide (H₂S), Nitrogen Oxide (NO_x), Ammonia (NH₃), Carbon monoxide (CO), Oxygen (O₂), Sulphur dioxide (SO₂) was conducted at the furnace stack and generator stack in the factory compound and these measurements were made in accordance with the guidelines of IFC General EHS Guideline and NEQEG Guidelines - Petroleum Refining (2015). According to the results, all the parameters were within the guideline.

To assess water quality in the project area, measurements were conducted twice: once during the wet season and once during the dry season. The measurements were taken at two locations for surface water quality, as upstream and downstream of the Ayeyarwady River, and at five locations for groundwater quality, including the project site and the nearest villages. Water samples were collected and tested in the laboratory. For surface water, parameters such as pH, temperature, true color, turbidity, total suspended solids, total dissolved solids, conductivity, hardness, dissolved oxygen, free chlorine, phosphorus, arsenic, iron, lead, oil and grease, and total nitrogen were examined.

Groundwater quality analysis included parameters like pH, total suspended solids, total dissolved solids, hardness, conductivity, ammonia, dissolved oxygen, free chlorine, phosphorus, iron, arsenic, and total coliform. Furthermore, the water quality of tube well water within the project area was measured using the Hanna instrument (HI98129) for pH, temperature, electric conductivity (EC), and total dissolved solids (TDS). The measurement results indicated that the biological oxygen demand in operational wastewater quality slightly exceeded the guidelines, while most other parameters remained within guidelines. For the surface water quality results downstream of Ayeyarwady is within the National Surface Water Quality Standard expect lead and oil & grease parameter. Regarding groundwater quality in Kyaw Zi village, most parameters adhered to the NEQE guidelines. However, total suspended solids and total coliform results slightly exceeded the guidelines

In order to find out whether the noise from the operation of the project reaches the outside and whether the noise level in the project affects the surrounding area, noise levels are conducted in three locations within the project area and the nearest villages and monitored as 24-hr outdoor noise monitoring and indoor manual noise monitoring are conducted at five points of project factory once during the wet season and dry season. The results are compared with National Environmental Quality (Emission) Guidelines (NEQEG). As results, daytime and nighttime outdoor noise level are under the guidelines and safe for workers and environments around the project area. Also, indoor noise measurement was conducted at office area, kitchen, control room, silica gel room and machinery store in the project factory and all the results are within the guidelines. Vibration monitoring was conducted at three points within the project area, such as the production area of steel columns and the distillation column and the results were compared with the international guidelines. As results, all the parameters are within the standard guidelines.

Measurements of light and temperature were also made at five places such as office area, kitchen, control room, silica gel room and machinery store in the factory for the comfort of the working environment once during the wet season and dry season. According to the first-time measurement results, the light availability was measured in the factory such as office area, kitchen, control room are required to meet with the guideline. However,

illumination for store room and machinery room are at a proximity to the standard value of Guidelines. As the second-time measurement results, the light availability was measured in the factory, office area was required to meet with the guideline and the other places were meet at the standard value of the guideline. The temperature measurement results were analyzed at five places such as office area, kitchen, control room, silica gel room and machinery store in the factory once during the wet season and dry season. The results of the first-time measurement were found to be within the the International Finance Corporation's general health and safety guidelines standards (2016) while the results of the second measurement were found to be slightly above the standard.

Odor measurements in the project area were taken at seven locations, such as furnace stack, furnace, condenser, control room, outside of the factory, outside factory (plantation area), and outside factory next to the road, and the average results obtained were compared to national environmental quality emission guidelines and had no significant effects on the environment.

Soil sample are collected from (2) locations as in the project site and the results are tested at the laboratory and compared with the International Guidelines. In addition, the soil quality was measured with Soil Survey Instrument within the project area measuring temperature, pH and moisture. As a result, the soil quality was found to be slightly acidic.

4.2. LANDUSE AND SOCIO-ECONOMIC CONDITION

Land use field survey was performed by the study of surrounding environment within 3 km radius marginal area around the project area. First of all, the project area occupies a total of 0.06 %. The residential area follows with occupancy of 4.03 % of study area, 33.42 % vacant land, 0.19 % industrial area, 0.43 % of dry stream, 6.35 % of water body and 55.52 % of the study area is agriculture land area.

The objective of the socio-economic study is in order to know the present basic infrastructure information such as the socio-economic situation, water supply system, electricity availability. According to secondary data from Township General Administration Department (GAD), the socio-economic component of Taungtha Township which located in Mandalay Region, is an economically significant township with strong economic development growth. The local people in the township are mainly engaged in agriculture and livestock farming. In addition, handicrafts are also commercially operated. Taungtha Township is situated on the intersection of land and waterways and has good transportation. The main products are pulses, oilseeds, palm trees, onion and maize are mostly exported to the lower regions of Burma. Taungtha Township mainly imports rice and aquatic products from the lower regions of Burma. According to the 2018–2019 record, the capita per township is 1,323,297. In the education sector, there is 36 high schools, 129 primary schools and 45 private schools. For the health sector, the diseases of high prevalence reported in 2019 are malaria, diarrhea, dysentery and tuberculosis (TB). For the cultural component, there is no cultural heritage site designated by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) in this area.

According to the social field survey approach, the suggestions, discussed issues, and concerns were collected from Kyaw Zi village and Malar village which is nearest the project area. Most of the local people have positive point of views on the proposed project.

In the proposed project area and study villages, seasonal cultivation takes place in some area and are agriculture land. The local people in the village are mainly engaged in agriculture and livestock farming. Therefore, agricultural products are main items of the project area. The main agricultural products such as peanut, onion and bean especially in wet season and seasonal rice such as rain rice, spring rice are planted by irrigation water. gas. Land road transportation is only reliable and accessible way not only within the region but also to connect other adjacent regions. In some villages could be allowed on earthen and gravel roads which are connected towns and villages as well. Land transportation by motorcycle, tricycle is mainly used in the study villages. Kyaw Zi Village and Malar village have one education high school for each, and (4) private schools in Kyaw Zi Village. On the study villages, there are one rural health care center in Malar village and one private hospital in Kyaw Zi village. Based on survey team data, almost all villages depend on Ayeyarwady and tube wells for their domestic uses. The study villages access the electricity from Myingyan Government Grid of Electricity with government payment rate and other energy consumption are firewood and charcoal. Furthermore, there has religious infrastructures, including monuments and pagodas, found in the study villages and are briefly described in Chapter (4).

4.3. BIOLOGICAL COMPONENTS

Introduction

This sector is the study of biodiversity of the proposed project area within 3 km with the sector of identifying the flora and fauna species, identification of IUCN Red List status, species diversity of avifauna, and seasonal occurrence of fauna species in the proposed project area, located in Thaingtha Township, Myingyan District. Flora species were collected and analyzed to identify the vegetation cover, vegetation type and flora species of the proposed project area. Fauna species are studied, classified and identified of the collected species and diversity of the bioindicator, avifauna are analyzed and depicted. The exiting biodiversity status, biodiversity survey, analysis and assessment are conducted and results data are described in the following sector.

4.3.1 Flora

Field Survey Results of Species Composition

The species composition was analyzed based on all plant species (tress, herbs and shrubs) collected in the sample plots. Based on the field survey, a total of (31) species distributed under (29) genera, (19) families and (14) orders have been identified and the detail of these methodology of the survey are shown in the following Chapter 4. These species are categorized into different types, including trees, shrubs, herbs, and climbers/creepers. In terms of trees, a total of (18) distinct species were documented. Shrub species were represented by (7) different types. Additionally, (4) species of herbs and (2) species of climbers/creepers are identified.

Order Fabales is the most common species order in the study area. The order Fabales is frequently observed in the central dry zone of Myanmar due to its well-adapted characteristics to the prevailing environmental conditions in that region. The prevalence of S.

catechu and *Z. jujuba* as the most common species in the study area is a result of their native status within the dry deciduous forest ecosystem.

IUCN Red List

It has been categorized that *Eu-ca-lit* (*Eucalyptus camaldulensis*) has been categorized as a species that is nearly threatened. *Tha-yet* (*Mangifera indica*) and *Khaung Lay* (*Capparis grandis*) on the other hand, have been labeled as data deficient species. Among the assessed species, the remaining (17) species have been classified as Least Concern. This status suggests that their populations are relatively stable and not facing imminent threats of extinction. However, this does not imply that conservation efforts are unnecessary. Lastly, it's noteworthy that certain (11) species have not been included in the IUCN Red List assessment.

Discussion and Conclusion

Tree species in this region are prominent with *Sha* and *Zi* which are resistant to drought and environment condition of dry zone. *Sha* and *Zi* are the dominant species of the study which have more vitality than other species. *Sha*, *Zi* and *Tama* indicate these species are ecologically and economically importance to ecosystem at these areas.

4.3.2 Fauna

4.3.2.1 Mammals

Field Survey Results of Species Composition

Mammals were photographed and recorded while birds were studied. Small animals are observed while performing the bird species census. Only one species as tree shrew has been sighted. It was spotted during the survey in communities, and trees but not in fields or beside waterways.

4.3.2.2 Birds

Field Survey Results

A total of 28 bird species distributed under 23 genera, 19 families and 10 orders were identified and recorded during this study. There are 28 kinds of birds in total, all of the recorded species are resident. The highest composition of species was recorded in order Passeriformes (46.43%), followed by Pelecaniformes (14.29%), Coraciiformes (10.71 %), Cuculiformes (7.14 %), Caprimulgiformes, Charadriiformes, Ciconiiformes, Columbiformes, Strigiformes, Suliformes (each with 3.57%). The order Passeriformes constitute the highest number of species (13), followed by Pelecaniformes with (4) species, Coraciiformes with (3) species, Cuculiformes with (2) species, while the remaining (5) orders were represented by (1) species only.

IUCN Red List

In terms of conservation status, it is noteworthy that all species have been categorized as "least concern" according to the IUCN Red List. According to the list of protected animals by the forest department, the Asian Openbill, Black Drongo, Red-wattled Lapwing, Spotted Owlet, and White-throated Kingfisher, along with the White-throated Babbler, are recognized as full protection status, signifying their heightened conservation priority. Similarly, species such as the Blue-tailed Bee-eater, Cattle Egret, Cinnamon Bittern, Green Bee Eater, Intermediate Egret, Little Egret, Vinous-breasted Myna, and White-vented Myna are listed as protected species.

Further, the Asian Koel, Little Cormorant, Oriental Magpie Robin, and Red-vented Bulbul are recognized as seasonally protected animals, indicating that their conservation measures are aligned from March 15th to September 30.

Discussion and Conclusion

According to the analyzed data, Passeriformes, commonly known as perching birds or songbirds, emerged as a prominent presence within the study area, exhibiting a considerable abundance. Passerines feed mainly on insects, nuts and seeds collected from trees and shrubs in summer. In winter their feeding behavior changes and they feed on berries and fruits. (Roberts 1992). So, their prevalence can be attributed to their remarkable adaptability to a diverse range of terrestrial environments.

4.3.2.3 Aquatic Organisms

4.3.2.2.1 Phytoplankton, Zooplankton

Field Survey Result

For the investigation of plankton, fish, snail and mussels, in the present study two sample collection sites near Western Part of Kyawzi Village and Malar Village in the Taungtha Township, Myingyan District are allocated. Phylum Chlorophyta, Euglenophyta, Cyanophyta, Arthropoda, and Rotifera, were recorded in this work. The highest composition of species was recorded in Phylum Rotifera (38%), followed by Chlorophyta (25%). In this study, the largest number of species (14) was recorded in Kyawzi Village.

Discussion and Conclusion

The microorganisms are studied in two sample collection sites near Western Part of Kyawzi Village and Malar Village, Taungtha Township. Rotifers are recorded as most common species in the study, which are group of primary freshwater invertebrates. Rotifers play a vital role in many freshwater ecosystems. They also serve as an essential food source for invertebrate and vertebrate predators. Microalgae are primary producers at the base of food web of an aquatic ecosystem.

4.3.2.2.2 Benthic Macroinvertebrates (Snails and Mussels)

Field Survey Result and Conclusion

A total of 10 species distributed under (5) genera, (5) families and (5) orders were identified and recorded during this study.

The highest composition of species was recorded in order Neotaenioglossa (40%), followed by Unionida (30%), Venerida (10%), Architaenioglossa (10%), Unionida (30%) and Hygrophila (10%). With respect to the number of species encountered at each study site, the largest number of species (6) was encountered in Kyawzi Village, Site (I), followed by those of Malar Village Site (II).

In this study, recorded snails and mussels are found in the sandy bank area of the Ayeyarwady River. Study Site I and Site II are located at the bank of the Ayeyarwady River near Western Part of Kyawzi Village and Malar Village where anthropogenic activities (fishing, solid wastes, wastewater, and environmental disturbance activities) are found. Anthropogenic activities in the river might have a negative impact leading to habitat change of freshwater snails and mussels. It can be concluded that the habitats, feeding grounds, nesting sites of aquatic organisms like snails and mollusks are affected by human activities.

4.3.2.2.3 Fish

Field Survey Result and Conclusion

A total number of (22) fish species were observed the most at site I, followed by site II with 19 species during the study period. Among recorded orders, the Order Cypriniformes and Siluriformes are the highest number of fish species. Compare with these two orders, the individual number of species of Cypriniformes is higher than Siluriformes. Cypriniformes was the most dominant (41%) and the species composition of following order Siluriformes (32%), orders perciformes (14%) and species composition of order Mugiliformes (5%), Osteoglossiformes (4%) and Clupeiformes (4%) were the lowest. Cypriniformes is the most dominant order holding maximum number of species in percentage when compared to other orders. Cypriniformes is the largest order of freshwater fish group.

5 POTENTIAL ENVIRONMENTAL IMPACT ASSESSMENT

Environmental Impact Assessment (EIA) mainly focuses on physical, biological and social dimension along with their complex interactions, which affects individuals, communities and ultimately determines their forms, character, relationship, and survival. In EIA context, impact can be defined as adverse impact or positive impact. The project activity process may cause the potential environmental impacts. The potential impact and mitigation measures of the construction, operation and decommission phase of the project are described in Chapter (5).

When assessing and calculating such impacts, accurate and precise methods are necessary, as well as an understanding of the types of impacts involved. Conducting a field study of the project and its surrounding area is necessary to establish the basis for the anticipated activities. Therefore, field studies and measurements of environmental quality have been carried out. This impact assessment strategy is evaluated based on environmental quality and observations obtained from field studies and measurements.

The impact assessment methodology is guided by the South African Heritage Resources Information System (SAHRIS). The broad approach to the significance rating methodology is to determine the environmental impact (EI) by considering the consequence (C) of each impact (comprising Nature, Extent, Duration, Magnitude, and Reversibility). In addition, other factors, including cumulative impacts, public concern, and potential for irreplaceable loss of resources, are used to determine a prioritization factor (PF) which is applied to the EI to determine the overall significance (S).

Table -2 Calculating the Level of Significance Classes of Environmental Impact During Construction, Decommission and Operation Phase

Phase	Consequence $C = ((E + D + I + R) / 4) * N$						Probability (P)	Environmental Impact Score (EI = C x P)	Significance Classes	Status of Impact
	E	D	I	R	N	C				
Pre-Mitigation of Air Pollution										
Construction / Decommission	2	2	4	3	-1	-2.75	4	-11	Medium	Negative
Operation	3	4	4	4	-1	-3.75	5	-18.75	High	
Post-Mitigation of Air Pollution										
Construction / Decommission	1	2	3	2	-1	-2	3	-6	Low	Negative
Operation	2	4	3	3	-1	-3	4	-12	Medium	
Pre-Mitigation of Water Pollution										
Construction / Decommission	3	2	3	3	-1	-2.75	4	-11	Medium	Negative
Operation	3	4	4	4	-1	-3.75	5	-18.75	High	
Post-Mitigation of Water Pollution										
Construction / Decommission	2	2	2	2	-1	-2	3	-6	Low	Negative
Operation	2	4	3	3	-1	-3	3	-9	Medium	
Pre-Mitigation of Solid Waste Pollution										
Construction / Decommission	2	2	3	3	-1	-2.5	5	-12.5	Medium	Negative
Operation	3	4	3	4	-1	-3.5	5	-17.5	High	
Post-Mitigation of Solid Waste Pollution										
Construction /	1	3	2	2	-1	-2	4	-8	Low	Negative

Phase	Consequence $C = ((E + D + I + R)/4) * N$						Probability (P)	Environmental Impact Score (EI = C x P)	Significance Classes	Status of Impact
	E	D	I	R	N	C				
Decommission										
Operation	2	4	2	3	-1	-2.75	4	-11	Medium	
Pre-Mitigation of Noise and Vibration										
Construction / Decommission	3	2	4	4	-1	-3.25	4	-13	Medium	Negative
Operation	3	4	4	3	-1	-3.5	4	-14	Medium	
Post – Mitigation of Noise and Vibration										
Construction / Decommission	2	2	3	3	-1	-2.5	3	-7.5	Low	Negative
Operation	2	4	3	2	-1	-2.75	3	-8.25	Low	
Pre-Mitigation of Soil Pollution										
Construction / Decommission	2	2	3	3	-1	-2.5	4	-10	Medium	Negative
Operation	3	4	3	3	-1	-3.25	4	-13	Medium	
Post – Mitigation of Soil Pollution										
Construction / Decommission	1	2	2	2	-1	-1.75	3	-5.25	Low	Negative
Operation	2	4	2	2	-1	-2.5	3	-7.5	Low	
Pre-Mitigation of Biodiversity										
Construction / Decommission	1	2	3	3	-1	-2.5	4	-10	Medium	Negative

Phase	Consequence $C = ((E + D + I + R)/4) * N$						Probability (P)	Environmental Impact Score (EI = C x P)	Significance Classes	Status of Impact
	E	D	I	R	N	C				
Operation	3	4	3	4	-1	-3.5	4	-14	Medium	
Post – Mitigation of Biodiversity										
Construction / Decommission	1	2	2	3	-1	-2	3	-6	Low	Negative
Operation	2	4	3	3	-1	-3	4	-12	Medium	
Livelihood and Socio-economic										
Construction / Decommission and Operation	3	5	4	3	+1	+3.75	5	+ 18.75	High	Negative

Table – 3 Calculating the Level of Final Environmental Significance Rating of Environmental Impact During Construction, Decommission and Operation Phase

Phase	Priority (P = PR + CI+ LR)				Ranking	Prioritization Factor (PF)	Environmental Significance (PF*EI)	Rating	Status of Impact
	PR	CI	LR	P					
Air Pollution									
Construction / Decommission	1	2	1	4	Medium	1.5	-9	Low	Negative
Operation	1	2	3	6	Medium	1.5	-18	Medium	
Water Pollution									
Construction / Decommission	1	2	3	6	Medium	1.5	-9	Low	Negative
Operation	1	3	3	7	Medium	1.5	-13.5	Low	

Phase	Priority (P = PR + CI+ LR)				Ranking	Prioritization Factor (PF)	Environmental Significance (PF*EI)	Rating	Status of Impact
	PR	CI	LR	P					
Solid Waste Pollution									
Construction / Decommission	1	3	2	6	Medium	1.5	-12	Low	Negative
Operation	1	2	3	6	Medium	1.5	-16.5	Medium	
Noise and Vibration									
Construction / Decommission	1	2	2	5	Medium	1.5	-11.25	Low	Negative
Operation	1	3	2	6	Medium	1.5	-12.38	Low	
Soil Pollution									
Construction / Decommission	1	2	2	5	Medium	1.5	-7.86	Low	Negative
Operation	1	2	2	5	Medium	1.5	-11.25	Low	
Biodiversity									
Construction / Decommission	2	2	2	6	Medium	1.5	-9	Low	Negative
Operation	2	2	3	7	Medium	1.5	-18	Medium	
Livelihood and Socio-economic									
Construction / Decommission and Operation/	2	2	2	6	Medium	1.5	+ 28.13	High	Negative

5.1 Risk Assessment and Mitigation Measure

Risk assessment needs to be done in detail for each type of business and each process. Risk assessment helps to achieve business organizational goals, improving business performance, operational efficiency and it helps to improve occupational safety and health as well as protect the natural environment. The risk assessment methodology used for the Occupational Safety Risk, Health Impact Assessment and Fire risk is from “General Environmental Impact Assessment Guidelines (September, 2017) issued by the Ministry of Natural Resources and Environmental Conservation¹. The steps involved in risk assessment are Hazard Identification, Risk evaluation and Risk control.

A qualitative or quantitative approach to determine the nature and extent of disaster risk by analyzing potential hazards and evaluating existing conditions of exposure and vulnerability that together could harm people, property, services, livelihoods and the environment on which they depend. The risk assessment methodology for natural disaster risk is 5 × 5 Matrix Risk assessment methodology based on likelihood and consequences.²

¹ Ministry of Natural Resources and Environmental Conservation, September, 2017. General Environmental Impact Assessment Guideline. The Republic of the Union of Myanmar, Version 3. pp (25)

² *kevinian.com*

Table 4 Assessment of Risk Level in All Phases

Period	No.	Source & Hazard	Status of Risk	Risk Control
Occupational Risk				
Construction/ Decommission Phase	1	Excavation <ul style="list-style-type: none"> • Land Reclaiming and Leveling • Accidents caused by machineries and equipment • Foot injury due to not wearing proper shoes. • Slip due to uneven ground in construction site 	High	<ul style="list-style-type: none"> ✓ To wear safety shoe or shoe that have good condition grip in construction site. ✓ Carefully inspection before driving the machineries and using equipment. ✓ Permit only the qualified or certified workers to drive the machineries.
	2	Carrying Raw Materials <ul style="list-style-type: none"> • Injury during loading/unloading of raw materials • Accidents caused by machineries and equipment • Hit by falling object from trucks 	Medium	<ul style="list-style-type: none"> ✓ Cover with tarpaulin or strictly tied up the materials before carrying with truck. ✓ Carefully inspection before driving the machineries and using equipment. ✓ To carry the materials with proper and safe handling posture.
	3.	Structure Construction/ Decommission <ul style="list-style-type: none"> • Falling from height • Slip • Accidents caused by 	Medium	<ul style="list-style-type: none"> ✓ Use PPE such as safety helmet, safety shoe, safety belt while working at high places where more than 6 ft. ✓ To make flat and smooth the road condition in the construction site. ✓ Permit only the qualified or certified workers to drive the

		machineries and equipment		machineries.
Operation Phase	1	Operation and Maintaing the Factory <ul style="list-style-type: none"> Maintaining Basic Infrastructure (Electrical Hazard, Fire Hazard, Health & Safety) 	Medium	<ul style="list-style-type: none"> ✓ Use PPE such as safety helmet, safety shoe, safety belt while working at high places where more than 6 ft. ✓ To maintain the electrical wire and devices with electrician. ✓ To repair immediately the damage wire and electrical devices. ✓ Place the warning sign board that can happen potential risk. ✓ To put the emergency contact numbers in public area of project area.
Community Risk				
Construction/ Decomssion Phase and Operation Phase	1	Accident from vehicles <ul style="list-style-type: none"> (Accident due to carrying raw materials) 	Low	<ul style="list-style-type: none"> ✓ Cover with tarpaulin or strictly tied up the materials before carrying with truck. ✓ Inspect the truck to not overload in transportation. ✓ To enforce vehicles that carry materials not to drive more than the specified kilometer on the roads. ✓ Regular maintenance the vehicles every 6 months.
Health Impact Assessment (Occupational Health)				
Construction/ Decomssion Phase and Operation Phase	1	Ocupational Health <ul style="list-style-type: none"> Eye damage and respiration problem due to dust emission in land reclaiming and leveling process activities 	Low	<ul style="list-style-type: none"> ✓ Enforce worker to wear the mask and eyes protection glass working in high dust emission area. ✓ Repair and maintain machinery every (6) months to prevent noise due to equipment failure. ✓ Do not operate equipment and machinery simultaneously unless

				<p>necessary.</p> <ul style="list-style-type: none"> ✓ Monitor machinery to ensure that it is not left on unnecessarily. ✓ Providing earplugs or ear muffs to workers working in noisy areas and enforce to wear the PPEs that provided.
	2	<p>Heat Stress</p> <ul style="list-style-type: none"> • Heat edema, heat rashes, heat cramps, heat syncope, heat stroke and so on 	Medium	<ul style="list-style-type: none"> ✓ Supply the sufficient drinking water and Oral Rehydration salt pack. ✓ Construct the rest places near the working area. ✓ Worker who work under the sun must wear long-sleeved shirts, long pants, hats. (Applying Thanaka and sun cream, wearing sunglasses can also be used) ✓ Assign the worker with working shift when day temperature is high.
	3	<p>Infectious Disease Risks</p> <ul style="list-style-type: none"> • Cholera diseases • Hepatitis • Covid-19 disease, etc. 	Medium	<ul style="list-style-type: none"> ✓ Provide workers with clean drinking water to prevent diarrheal diseases caused by impure drinking water. ✓ Sharing health education knowledge to workers about communicable diseases such as Covid-19, Hepatitis. ✓ Supply hand washing soap, hand sanitizers, masks and oral rehydration salt.
Community Health				

Construction/ Decommission Phase and Operation Phase	1	<ul style="list-style-type: none"> Air Pollution/ Noise Pollution to Surrounding area (Impact on the surrounding environment due to dust and noise generated from operations.) 	Low	<ul style="list-style-type: none"> ✓ Spraying water twice a day on dusty area near the working site and the roads with high traffic. ✓ Protect with green filter cloth in windy and dusty areas. ✓ Slow down the speed of machinery and transport vehicles. ✓ Do not operate till night.
Fire Risk				
Construction/ Decommission Phase and Operation Phase	1	<p>Fire Hazard</p> <ul style="list-style-type: none"> Fire from preliminary tank, operation area, silo area and waste storage area Worker behaviors (e.g. Smoking, careless using electricity & electronic devices) Arson 	High	<ul style="list-style-type: none"> ✓ Sufficient fire protection equipment and fire extinguishers are provided. ✓ Combustible wastes are disposed regularly and stored separately. ✓ Awareness about do's and don'ts for waste storage and fuel storage is given. ✓ To train the fire drill for emergency cases every 6 month. ✓ To put the safety & warning signs at fuel storage areas, generator, etc. ✓ To repair the broken electronic devices and wires immediately by electrician. ✓ Only permit person allow to access to fuel storage area. ✓ To put the emergency contact numbers in public area of project area.
Natural Disaster Risk				

Operation Phase	1	Earthquake <ul style="list-style-type: none"> • Worker Injuries • Damage to project properties 	High	<ul style="list-style-type: none"> ✓ Make and follow the emergency plan for the evacuation and rescue of individuals. ✓ Make backup arrangement the Emergency medicine boxes (First-Aid Box). ✓ Arrange for delivery to the clinic or nearest hospital for emergency.
Construction/ Decommission Phase	2		Medium	<ul style="list-style-type: none"> ✓ Greater focus on geotechnical investigations is needed to reduce the risk of unsatisfactory foundation performance in the project area. ✓ Long term and short-term earthquake monitoring system or earthquake warning system should be installed in place based on the precursors of an earthquake such as the sudden rise of groundwater, the changes of elasticity in rocks and soils, etc.
Construction/ Decommission Phase and Operation Phase	3	Flood <ul style="list-style-type: none"> • Worker Injuries • Damage to project properties 	Medium	<ul style="list-style-type: none"> ✓ Constantly listening the weather reports to know the possibility of natural disasters such as storms and flood.
	4	Ground Subsidence <ul style="list-style-type: none"> • Worker Injuries • Damage to project properties 	Low	<ul style="list-style-type: none"> ✓ Conduct ground level geotechnical survey annually. ✓ To prevent subsidence, strengthen the underlying soil foundations where the oil storage silos are located.

6 PUBLIC CONSULTATION AND PUBLIC PARTICIPATION

The project proponent and its consultant organized public disclosure and public consultation among regulators, the local community, local authorities, and other relevant organizations on the project's development, which were conducted once at the EIA scoping stage and once at the EIA study.

The objective of public disclosure is to give the suggestion as local people and government organization for Environmental Impact Assessment Report of the proposed project of MCCM Co., Ltd. To conduct public disclosure, suggestions were collected after sending the project information and letters of suggestion to local people and government organizations.

The main objective of public consultation meeting is to collect suggestions, comments and feedbacks for this proposed project after project information, project background, project description, potential impact assessment and management process was presented to the government organizations and local people which are located near the project. The project proponent will consider and take action with these suggestions, comments and feedbacks during the implementation of the project.

6.1 First Time Public Disclosure and Public Consultation Meeting in Scoping Stage

6.1.1 Public Disclosure in Scoping Stage

The public disclosure was undertaken from 10th February to 23rd February, 2022 at EIA scoping stage. Project information, project background, project description, and letters of suggestions were sent to government organizations and local people which are located near the project for Public Disclosure. Then, suggestions from government organizations which are General Administration Office, Taungtha Township and Environmental Conservation Department, Nyaung U District were collected. Letters of suggestion are attached in **Appendix (H)**.

6.1.2 Public Consultation Meeting in Scoping Stage

Public Consultation Meeting in scoping stage was conducted on 17th Feb 2022 with zoom meeting due to the Covid-19 period in accordance with the Covid-19 pandemic of MONREC. The event was planned to be held from 10:00 AM to 12:00 PM. The public consultation meeting is carried out with Government Organization and local people of villages which are located near the project area. Total of 13 people, including government organizations, township administration officers, MCCM Co., Ltd. project proponents, third-party organizations, and local people attended the public consultation meeting. In the meeting, domestic waste should be disposed of properly in the factory compound by landfilling, the proponent should make development programs to the surrounding and neighbouring villages, the silica gel should be stored properly under the cover to prevent generating dust, etc. were discussed and recommended. The details of suggestions, questions

and feedbacks are described in the chapter 6. The attendance list, acceptance suggestion forms and acceptance invitation letters of Public Consultation Meeting are attached in **Appendix (G)**.

6.2 Second Time Public Disclosure and Public Consultation Meeting in EIA Stage

6.2.1 Public Disclosure in EIA Stage

Public Disclosure in EIA Stage was held on 24th July, 2023. Project information, project background, project description, potential impact assessment, management process and letters of suggestions were sent to government organizations and local people which are located near the project for Public Disclosure.

Then, suggestions of government organizations in Taungtha Township, Myingyan Township and Nyaung U Township and local people which are located near the project were collected on July 27, 2023. In the suggestion letters, the project proponent should obey Systematic Fire Prevention Activities with rules and laws from Fire Services Department, to manage minimum impacts during operation, to maintain biodiversity near the project and to think and act in suggestions of Local People, etc are described. Suggestion letters are shown in **Appendix (J)**. List of Government Organizations and local people sending letters of suggestion is shown in Table 5.

Table 5 Organizations and Villages sending letters of suggestions and recommendations

Organization	Address
Local people	<ul style="list-style-type: none"> • Kyaw Zi Village • Malar Village
Government Organizations	<ul style="list-style-type: none"> • General Administrative Department, Taungtha Township and Myingyan Township • Ministry of Electric Power, Myingyan Township • Taungtha Township Development Committee and Myingyan Township Development Committee • Ministry of Natural Resource and Environmental Conservation, Environmental Conservation Department, Nyaung-U District Mandalay Division • Social Security Board • Ministry of Agriculture, Livestock and irrigation, Irrigation and Water Utilization Management Department, Myingyan Township • Ministry of Health, Department of Medicinal Services, Taungtha Township and Myingyan Township • Ministry of Industry, Department of Industrial Supervision and Inspection, Myingyan Township • Myanmar Fire Services Department, Taungtha Township and Myingyan Township

Organization	Address
	<ul style="list-style-type: none"> • Ministry of Labour, Ministry of Factory and General Labour Laws Inspection Taungtha Township and Myingyan Township • MCCM Company Limited • Hexagonal Angle International Consultants Co., Ltd.

6.2.2 Public Consultation Meeting in EIA Stage

Public Consultation Meeting was held on 28th July, 2023 in EIA stage. We invited government organizations and local people which are located near the project. to discuss and receive advices and suggestions on the processes of the project. In the consultation meeting, the project proponent should implement and attend fire safety manager training, dispose of solid waste separately in plastic, paper, chemical waste, and so on, use the 3Rs system to generate economic income from waste for Villagers, follow the commitments of the EIA report, etc., which are discussed by attendees. The attendance lists of Public Consultation Meeting are shown in Table (6). Suggestions, Discussions and Questions & Answers are shown in Chapter 6 and **Appendix (K)**.

Table – 6 Attendance list of Public Consultation Meeting

<p>PAPs and Organizations</p>	<ul style="list-style-type: none"> • Ministry of Factory and General Labor Laws Inspection • Myanmar Fire Services Department • Environmental Conservation Department • Social Security Board • Kyaw Zi Village • Malar Village • HA company • MCCM Company
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7 ENVIRONMENTAL MANAGEMENT PLAN

The Environmental Management Plan (EMP) provides the procedures and processes, which will apply to the project production activities to check and monitor compliance and effectiveness of the mitigation measure to which MCCM Co., Ltd has committed. In addition, this EMP is used to ensure compliance with statutory requirements and corporate safety and environmental policies.

The environmental management plans are detailly described in Chapter 7 and the proposed Environmental Monitoring Plan and Environmental Mitigation Plans to reduce and minimize and the negative impacts are shown in Table-8. The budget for EMP fund will cover the initial cost and recurring expenses for implementation EMP. The total budget allocation for proposed environmental monitoring plan of MCCM Co., Ltd as shown in Table-7. In addition, the monitoring plan include monitoring item, monitoring parameter,

area to be monitored, frequency and responsible person as described in Table 10. The project proponent already has the portion about 2% from the annual profit in order to support all the staffs and workers of social occasional events and corporate social responsibility programs. The estimated budgets are for the social, education, and health sectors, respectively, for the CSR program of MCCM Co., Ltd as shown in Table 11.

Table 7- Estimated Budget for Environmental Monitoring Plan

No	Monitoring Items	Annually estimated budget (MMK)
Environmental Monitoring (construction /operation)		
1.	Air quality monitoring	4,000,000
2.	Wastewater quality monitoring	500,000
3.	Noise quality monitoring	500,000
4.	Solid waste monitoring	500,000
5.	Vibration monitoring	500,000
6.	Odor monitoring	500,000
7.	Stack height emission monitoring	1,000,000
8.	Health and safety (Occupational & Community)	500,000
9.	Fire Hazard	500,000
10.	Emergency Condition	500,000
Total		9,000,000

Table 7- Environmental Impacts and Mitigation Measures Plan, and Estimated Budget for Construction/ Decommission and Operation Phases

Categories	Expected Environmental and Social Impact	Mitigation Measure	Period	Annually Estimated Budget (MMK)	Responsible Party
Air Quality					
Air Quality	<ul style="list-style-type: none"> • Particulate Matters (PM_{2.5}, PM₁₀) and Total suspended particles from moving of vehicles. • Eyes irritation • Shortness of breath which leads decrease visibility 	<ul style="list-style-type: none"> • Sprinkling water on un-paved road and any areas that are currently under construction and demolition at least three time per day especially during dry season because of wet suppression can greatly reduce dust emission up to 70%. • Maintain the interior roads compact to reduce dust emission from moving vehicles. • The speed limit for trucks will be reduced from 30 km/h to 15 km/h to minimize dust emissions by 50%. • By properly operating and maintaining vehicles and other oil-operated machinery, it is possible to maintain and minimize the emission of particulate matter (PM), SO₂, NO₂, and hydrocarbons from moving vehicles. 	Construction/ Decommission Phase	500,000	Contractor/ MCCM Co., Ltd.
		<ul style="list-style-type: none"> • Water should be sprayed as suppressants to increase the moisture content at least one time per day (it can be applied in the morning or evening). • Regular maintenance of furnace, equipment, and vehicles. • Regular maintain the installed ventilation system especially air-cooling system, fans and window in the office room. • Regular monitoring for air quality parameters (PM_{2.5} and PM₁₀, TSP, SO₂, NO₂, CO₂, VOC, O₃) 	Operation Phase	500,000	MCCM Co., Ltd.

Categories	Expected Environmental and Social Impact	Mitigation Measure	Period	Annually Estimated Budget (MMK)	Responsible Party
		mentioned in the monitoring program.			
Water Quality					
Water Quality	<ul style="list-style-type: none"> • Domestic waste water from toilets and hand wash basin • Sewage water can cause diarrhea-related diseases. • Storm water runoff from roofs, roads, paths into drains after raining. 	<ul style="list-style-type: none"> • During the construction and demolition period, a suitable water management system needs to implement, such as effective land drainage and the usage of artificial ponds for receiving site runoff to reduce the effect of runoff on surrounding watercourses. • Prevent producing excessive wastewater. • If at all possible, use a water meter to reduce the generation of unnecessary wastewater. • Manage the fuel, oil, and lubricant leaks from the construction and demolition site. • To connect the City Development Committee and dispose of the sewage water produced from the demolition of toilets and sewage water produced from temporary toilets 	Construction/ Decommission Phase	500,000	Contractor/ MCCM Co., Ltd.

Categories	Expected Environmental and Social Impact	Mitigation Measure	Period	Annually Estimated Budget (MMK)	Responsible Party
		<ul style="list-style-type: none"> • Reduce the amount of water utilized for domestic uses at the project area to a minimum. • Avoid generating unnecessary wastewater. • Regularly check the septic tank to avoid leakage of sewage. • Regular cleaning and checking of all drainage channels in the project area. • Make a wastewater filtration system before disposing of the drainage channel. 	Operation Phase	500,000	MCCM Co., Ltd.
Solid Waste					
Solid Wastes	<ul style="list-style-type: none"> • Domestic Waste (Non-Hazardous Waste) • Impact of waste generated on related health risk and for community • Serious negative environmental impacts 	<ul style="list-style-type: none"> • Dispose of the wastes from construction and decommission phases as wet waste, dry waste, hazardous waste in orderly manner. • Construction and demolition debris, packaging materials, scraps, and metal fragments are correctly disposed of without being left lying around on the ground. • To make recycling, reuse, and disposal easier and to stop interactions between different forms of garbage, waste is separated and avoided mixing, such as organic waste (food scraps), non-hazardous waste (metal, glass, concrete, plastic, etc.), inert waste (cleaned soil), and hazardous waste (Paints, 	Construction/ Decommission Phase	500,000	Contractor/ MCCM Co., Ltd.

Categories	Expected Environmental and Social Impact	Mitigation Measure	Period	Annually Estimated Budget (MMK)	Responsible Party
		solvents, oils, batteries, medical waste).			
		<ul style="list-style-type: none"> • Provide a separate place for storage where waste can be collected and disposed of at the allowed dumping place. • Build a suitable tent or safe disposal area to avoid liquid leakage from it. • To separate hazardous and non-hazardous waste, use designated bins. • Waste must be systematically disposed of into containers after being sorted by type. • Recyclable waste bins need to be available and recycling trash needs to be sorted properly as a habit. 	Operation Phase	500,000	MCCM Co., Ltd.
Noise and Vibration					
Noise and Vibration	<ul style="list-style-type: none"> • Interference in concentration • Increase the rate of accidents • High blood pressure • Long term cardiovascular diseases 	<ul style="list-style-type: none"> • Contractor will take measures to reduce noise levels from heavy machinery and vehicle that exceed the NEQG guideline limitations. • To prevent disturbing the surrounding area, movements of trucks and other construction and demolition equipment that generate loud noises must be limited at night. Truck drivers should be instructed not to use their horns at night and to stop playing loud music. • Avoiding the construction and demolition activities 	Construction/ Decommission Phase	500,000	Contractor/ MCCM Co., Ltd..

Categories	Expected Environmental and Social Impact	Mitigation Measure	Period	Annually Estimated Budget (MMK)	Responsible Party
		<p>at night within 150 meters of sensitive land uses where feasible.</p> <ul style="list-style-type: none"> • Substitution of low noise devices and equipment. • Regular inspection and rotation of equipment and machinery. 			
		<ul style="list-style-type: none"> • Use equipment and machines which generate low noise levels. • Record and inspection maintenance for each machine and change the good quality product (if necessary). • Provide adequate ear protection (ear plugs or muffs) to workers working in the excessive noise areas. • No employee should be exposed to a noise level greater than 85 dB(A) for a duration of more than 8 hour per day without hearing protection. In addition, no unprotected ear should be exposed to a peak sound pressure level (instantaneous) of more than 140 dB (C). • Arrange employees on a rotating basis in noisy places. 	Operation Phase	500,000	MCCM Co., Ltd.
Soil and Landscape					
Soil and Landscape	<ul style="list-style-type: none"> • Degrading Soil Quality • Land Degradation 	<ul style="list-style-type: none"> • By maintaining heavy machinery, equipment and vehicles in good condition and containing other contaminants in storage tanks and other places, it is possible to prevent soil contamination by 	Construction/ Decommission Phase	500,000	Contractor/ MCCM Co., Ltd..

Categories	Expected Environmental and Social Impact	Mitigation Measure	Period	Annually Estimated Budget (MMK)	Responsible Party
		<p>minimizing oil spills from vehicles of visitors and staff in the project construction and demolition sites.</p> <ul style="list-style-type: none"> To prevent soil contamination, septic tanks with sufficient capacities should be built to receive and treat wastewater from all temporary worksite toilets and construction camps. Additionally, construction and demolition camps wastewater disposal should be regularly inspected. 			
		<ul style="list-style-type: none"> Maintaining the company's vehicles' engines will help prevent oil spills, and proper management will prevent visitors' and residents' cars from picking up any stray oil. Control proper oil and paint leakage when doing maintenance tasks. After the maintenance operation, properly dispose of the waste and paint remains. To dispose waste at the designated area to avoid harmful to the environment 	Operation Phase	500,000	MCCM Co., Ltd..
Biodiversity					
Biodiversity	<ul style="list-style-type: none"> Habitat Degradation Species Occurrence 	<ul style="list-style-type: none"> Growing native trees that can improve the soil quality and prevent soil erosion. If any migratory birds or animals are found entering and sheltering in the project property, 	Construction/ Decommission Phase	-	Contractor/ MCCM Co., Ltd.

Categories	Expected Environmental and Social Impact	Mitigation Measure	Period	Annually Estimated Budget (MMK)	Responsible Party
	Changes	<p>avoid arrest and move to safe location in cooperation with the related departments.</p> <ul style="list-style-type: none"> • Plan for habitat restoration and re-vegetation in impacted areas after construction/demolitions to promote the return of native flora and fauna. • Raise awareness among construction workers and the local community about the importance of minimizing environmental impacts. • The various kinds of animals cannot be trapped, collected, or hunted at any stages of the proposed project. 			
		<ul style="list-style-type: none"> • Avoidance of bird shooting and hunting of animals in the project area. • Even if exotic species of plants have been planted to create landscaping in the gardens and residential building and houses, keeping these species from spreading outside the area of the project. • Large trees must be preserved wherever possible since they serve as nesting and resting places for species found in the area. • Preservation and cultivation of endangered and rare plant species in or near the project area. • Establish a long-term monitoring program to access to the ongoing impacts of the project on 	Operation Phase	-	MCCM Co., Ltd

Categories	Expected Environmental and Social Impact	Mitigation Measure	Period	Annually Estimated Budget (MMK)	Responsible Party
		wildlife and plants.			
Health and Safety					
Health and Safety	<ul style="list-style-type: none"> Physical Injury Occupational Incident 	<u>Excavation/</u> <u>Carrying Raw Materials/</u> <u>Infrastructure Construction/ Decommission</u> <ul style="list-style-type: none"> To wear safety shoe or shoe that have good condition grip in construction site. Carefully inspection before driving the machineries and using equipment. To carry the materials with proper and safe handling posture. To make flat and smooth the road condition in the construction site. 	Construction/ Decommission Phase	1,000,000	Contractor/ MCCM Co., Ltd.
	<ul style="list-style-type: none"> Slippery and Fall Physical Injury 	<u>Operation and maintaining the factory</u> <ul style="list-style-type: none"> Use PPE such as safety helmet, safety shoe, safety belt while working at high places more than 6 ft. To maintain the electrical wire and devices with electrician. To repair immediately the damage wire and electrical devices. Place the warning sign board that can happen 	Operation Phase	1,000,000	MCCM Co., Ltd

Categories	Expected Environmental and Social Impact	Mitigation Measure	Period	Annually Estimated Budget (MMK)	Responsible Party
		<p>potential risk.</p> <ul style="list-style-type: none"> To put the emergency contact numbers in public area of project area. 			
<u>Health</u>					
Health	<ul style="list-style-type: none"> Occupational Health and Safety 	<p><u>Construction/ Decommission activities (Construction/ Decommission Phase)</u></p> <ul style="list-style-type: none"> Enforce worker to wear the mask and eyes protection glass working in high dust emission area. Monitor machinery to ensure that it is not left on unnecessarily. <p><u>Heat Stress (Construction/ Decommission Phase and Operation Phase)</u></p> <ul style="list-style-type: none"> Supply the sufficient drinking water and Oral Rehydration salt pack. Worker who works under the sun must wear long-sleeved shirts, long pants, hats. <p><u>Infectious Disease risks (Construction/ Decommission Phase and Operation Phase)</u></p> <ul style="list-style-type: none"> Provide workers with clean drinking water to prevent diarrheal diseases caused by impure drinking water. Supply hand washing soap, hand sanitizers, masks 	Construction/Decommission and Operation Phase	2,000,000	Contractor/ MCCM Co., Ltd.

Categories	Expected Environmental and Social Impact	Mitigation Measure	Period	Annually Estimated Budget (MMK)	Responsible Party
		<p>and oral rehydration salt.</p> <p><u>Air Pollution/ Noise Pollution to Surrounding area (Construction/ Decommission Phase)</u></p> <ul style="list-style-type: none"> • Spraying water twice a day on dusty area near the working site and the roads with high traffic. • Protect with green filter cloth in windy and dusty areas. 			
<u>Fire Hazard</u>					
Fire	<ul style="list-style-type: none"> • Burn • Fire Hazard • Physical Injury • Property Damage 	<ul style="list-style-type: none"> • Sufficient fire protection equipment and fire extinguishers are provided. • Combustible wastes are disposed regularly and stored separately. • To train the fire drill for emergency cases every 6 month. • To repair the broken electronic devices and wires immediately by electrician. • Only permit person allow to access to fuel storage area. • To put the emergency contact numbers in public area of project area. 	Construction/Decommission and Operation Phase	2,000,000	Contractor/ MCCM Co., Ltd.
<u>Natural Disasters</u>					
Natural Disasters	<ul style="list-style-type: none"> • Earthquake 	<u>Earthquake</u>	Construction/Decommission and Operation Phase	2,000,000	Contractor/ MCCM Co.,

Categories	Expected Environmental and Social Impact	Mitigation Measure	Period	Annually Estimated Budget (MMK)	Responsible Party
	<ul style="list-style-type: none"> Flood Ground Subsidence 	<ul style="list-style-type: none"> Make and follow the emergency plan for the evacuation and rescue of individuals. Arrange for delivery to the clinic or nearest hospital for emergency. Long term and short-term earthquake monitoring system or earthquake warning system should be installed in place based on the precursors of an earthquake such as the sudden rise of groundwater, the changes of elasticity in rocks and soils, etc. <p><u>Flood</u></p> <ul style="list-style-type: none"> Constantly listening the weather reports to know the possibility of natural disasters such as storms and flood. <p><u>Ground Subsidence</u></p> <ul style="list-style-type: none"> Groundwater use should not exceed the amount of water that can be extracted based on the results of the pumping test. 			Ltd.

Table 9 Environmental Monitoring Program for Operation and Decommission Phases

Monitoring Item	Phases	Monitoring Parameter	Area to be Monitored	Frequency	Responsible Organization
Outdoor air quality	Construction/ Decommission	For 24 hours PM _{2.5} and PM ₁₀ , TSP, NO ₂ , SO ₂ ,	Within the Project Site (Construction/ Decommission)	Twice a year	Contractor/ Project Proponent

Monitoring Item	Phases	Monitoring Parameter	Area to be Monitored	Frequency	Responsible Organization
	Operation	CO ₂ , CO, VOC, O ₃	Project Site Lat:21°17'54.24"N Long: 95°10'24.26"E	Twice a year	Project Proponent
			Kyaw Zi Village Lat:21°18'56.10"N Long: 95°10'41.46"E	Once a year	
			Malar Village Lat:21°17'59.87"N Long: 95°8'41.19"E		
Wastewater	Construction/ Decommission	pH, Total Suspended Solid, BOD, COD, Total Phosphorous, Lead, Sulfide, Oil and Grease, Total Nitrogen, Chromium (Hexavalent)	Final water discharge point from construction site	Twice a year	Contractor/ Project Proponent Project Proponent
	Operation		Operation Wastewater Lat:21°17'55.83"N Long: 95°10'27.82"E	Twice a year	Project Proponent
Noise	Construction/ Decommission	For 24 hours Noise level (dB(A) scale)	Within the Project Site (Construction/ Decommission)	Twice a year	Contractor/ Project Proponent Project Proponent
	Operation		Project Site Lat:21°17'54.24"N Long: 95°10'24.26"E	Twice a year	Project Proponent
Odor	Operation	Odor Quality	Furnace Stack Lat:21°17'54.96"N Long: 95°10'25.37"E	Twice a year	Project Proponent

Monitoring Item	Phases	Monitoring Parameter	Area to be Monitored	Frequency	Responsible Organization
Solid waste and Hazardous waste	Construction/ Decommission	<ul style="list-style-type: none"> ✓ The amount of waste generation and classification ✓ Daily weighing and recording of segregated waste ✓ Recording the quantity and method of waste disposal 	Waste generation source of each operation process at project area (eg. Wood pieces, iron scarp, cement bags, etc) and waste disposal site within the project area	Daily	Contractor/ Project Proponent Project Proponent
	Operation	<ul style="list-style-type: none"> ✓ Checking whether or not there is a systematic disposal of waste ✓ Checking the waste burning or not 	Waste disposal area within the project site		Project Proponent
Vibration	Operation	<ul style="list-style-type: none"> ✓ Vibration level Acceleration (m/s²) Velocity (mm/s) 	Generator Lat:21°17'55.72"N Long: 95°10'27.53"E	Twice a year	Project Proponent
Soil	Operation	<ul style="list-style-type: none"> ✓ pH, Moisture (%), Total Nitrogen (CEC) 	Final Discharge Point Lat:21°17'55.74"N Long: 95°10'28.29"E	Twice a year	Project Proponent
Stack Height Emission	Operation	Methane (CH ₄), Hydrogen Sulphide (H ₂ S), Nitrogen Oxide (NO _x), Ammonia (NH ₃), Carbon monoxide (CO), Oxygen (O ₂), Sulphur dioxide (SO ₂)	Furnace Stack Lat:21°17'54.96"N Long: 95°10'25.37"E	Twice a year	Project Proponent
			Generator Lat:21°17'55.72"N Long: 95°10'27.53"E		

Monitoring Item	Phases	Monitoring Parameter	Area to be Monitored	Frequency	Responsible Organization
Occupational Health and Safety	Construction/ Decommission	<ul style="list-style-type: none"> ✓ Provide personal protective equipment in the workplace (or) check whether or not protective equipment is wearing 	Within project area <ul style="list-style-type: none"> ✓ Condition the supply PPE ✓ Condition the place of warning sign ✓ Condition the place of reflection sign ✓ First aid-kit ✓ Emergency contact numbers 	Monthly	Contractor/ Project Proponent
	Operation	<ul style="list-style-type: none"> ✓ Keeping work attendance records ✓ Placing hazard warning signs ✓ Place emergency contact number in workplace 			
Fire Hazard	Construction/ Decommission & Operation	<ul style="list-style-type: none"> ✓ Monthly inspection of the pressure gauge, and seal on fire extinguishers ✓ Place the fire extinguisher near the potential fire hazard places. ✓ Place sufficient fire extinguishing equipment such as fire extinguisher, fire hose, fire hydrant. ✓ Clear the project entrance road to enter the fire truck. 	Within project area	Twice a year	Project Proponent
Emergency Risks	Construction/ Decommission & Operation	<ul style="list-style-type: none"> ✓ Practicing emergency drill ✓ Education and training ✓ Addresses of organizations that should be contacted in an emergency; phone numbers should be easily accessible 	Within project area	Twice a year	Project Proponent

The environmental team should be comprised to accomplish regular monitoring. The leader of the team should be fully responsible for the environmental affairs of the factory. The following **Table 10** shows proposed organization plan for the monitoring team.

Table 10- Responsibility for Environmental Monitoring Team

No.	Name	Position	Responsibility
1.	U Ko Ko Oo (Director)	Monitoring Leader	<ul style="list-style-type: none"> ✓ Environmental quality measurement planning; ✓ The implementation of mitigation measure in the environmental management plan ✓ complying with the instructions of relevant government departments ✓ Reporting of operational conditions ✓ Providing employees with their basic needs
2.	U Thant Zin (Director)	Occupation Health and Safety Leader	<ul style="list-style-type: none"> ✓ Inspection of internal operation process ✓ Reporting of project process ✓ Recording of employees needs ✓ Arranging training on occupational safety ✓ Implementation of waste management plan ✓ Supervision of occupational safety reduction
3.	U Zaw Thant (Manager)	Assistant Leader	<ul style="list-style-type: none"> ✓ Inspection and implementation of fire prevention ✓ Monitoring of equipment and vehicles ✓ Reporting to the team leader if a workplace accident occurs

Table-11- Estimated Budget for CSR Program of MCCM Co, Ltd.

No	Item	Responsible Organization	Frequency	Estimated Budgets (MMK)
	Social			
	Road construction and make good water drainage system near villages	MCCM Co., Ltd.	Annually	2,000,000
2	Health			

No	Item	Responsible Organization	Frequency	Estimated Budgets (MMK)
	Provide drinking water tank near villages and rural health department in the project area	MCCM Co., Ltd.	Annually	2,500,000
Religion				
3	Donation to monastery and religious organization near villages	MCCM Co., Ltd.	Annually	2,000,000
Education				
4	Support to Building construction for schools at near villages	MCCM Co., Ltd.	Annually	2,000,000
Total				8,500,000

8. CONCLUSION

The project proponent, MCCM Co., Ltd. is situated at Mandalay Region, Myingyan District, Taungtha Township. The project proponent requested Hexagonal Angle International Consultants Co., Ltd. to implement the Environmental Impact Assessment (EIA) of the project.

In this EIA report study, baseline environmental data collection and site visit activities was conducted in two seasons which are wet and dry seasons. In wet season, the baseline quality and site visit were conducted in September, 2021 and also conducted on May, 2023 in dry season. The environmental baseline qualities and site visit activities included monitoring for air, water, noise, vibration, light, temperature, odor, soil and surveyed for biodiversity, socio-economic, traffic counting and project investigation.

The assessments of each impact are based on the construction/ decommission and operation process of the project. Evaluation of environmental and social impact assessment and detail consideration can be seen in **Chapter 5**. The assessment of risk and cumulative impact of the project are also presented in this chapter.

In the potential environmental impact assessment during the construction/ decommission phase, there is no major and moderate impacts level. During operation phase,

the moderate impact level is air pollution, solid waste and the remaining parameters such as water pollution, noise and vibration, soil pollution are low impact level.

It has been figured out that, the proposed project is going to generate local employment opportunities and enhance capabilities and working skills of employees as well as improvement of living standard for local people. The study indicates that further positive impacts would be of immense benefit to the local community and national development as well.

CHAPTER 1

CONTEXT OF THE PROJECT

1.1. BACKGROUND OF THE PROJECT

The project proponent, MCCM Co., Ltd., is situated in the Mandalay Region, Myingyan District, Taungtha Township, Kyawzi Village Tract; Plot No. (837-C), Kyawzi West Field No. (92/1, 93, 94/1, 94/2, 94/3), Myanmar. The proposed project is invested by the MCCM Co., Ltd. with an authorized capital investment of 25 billion Myanmar Kyats. MCCM Co., Ltd. was established on 4th June, 2018 as a private company with company registration number 103945232 under the Myanmar Companies Act (1914). The proposed duration of the investment project is 30 years terms.

The necessary documents for the project implementation such as land use permission, recommendation of related government departments, no objection letters from local are received. The company registration license and land related documents are described in **Appendix A**.

1.1.1. The Project Type and Size

The type of project is manufacturing and distributing diesel oil, heavy diesel, light diesel, gasoline, crude oil, and heating oil (F.O). There are two types of diesels, such as heavy diesel and light diesel. The size of the project area is 3.98 acre and located beside Myingyan – Nyaung U highway road. The location map of the project site is presented in Figure 1-1.

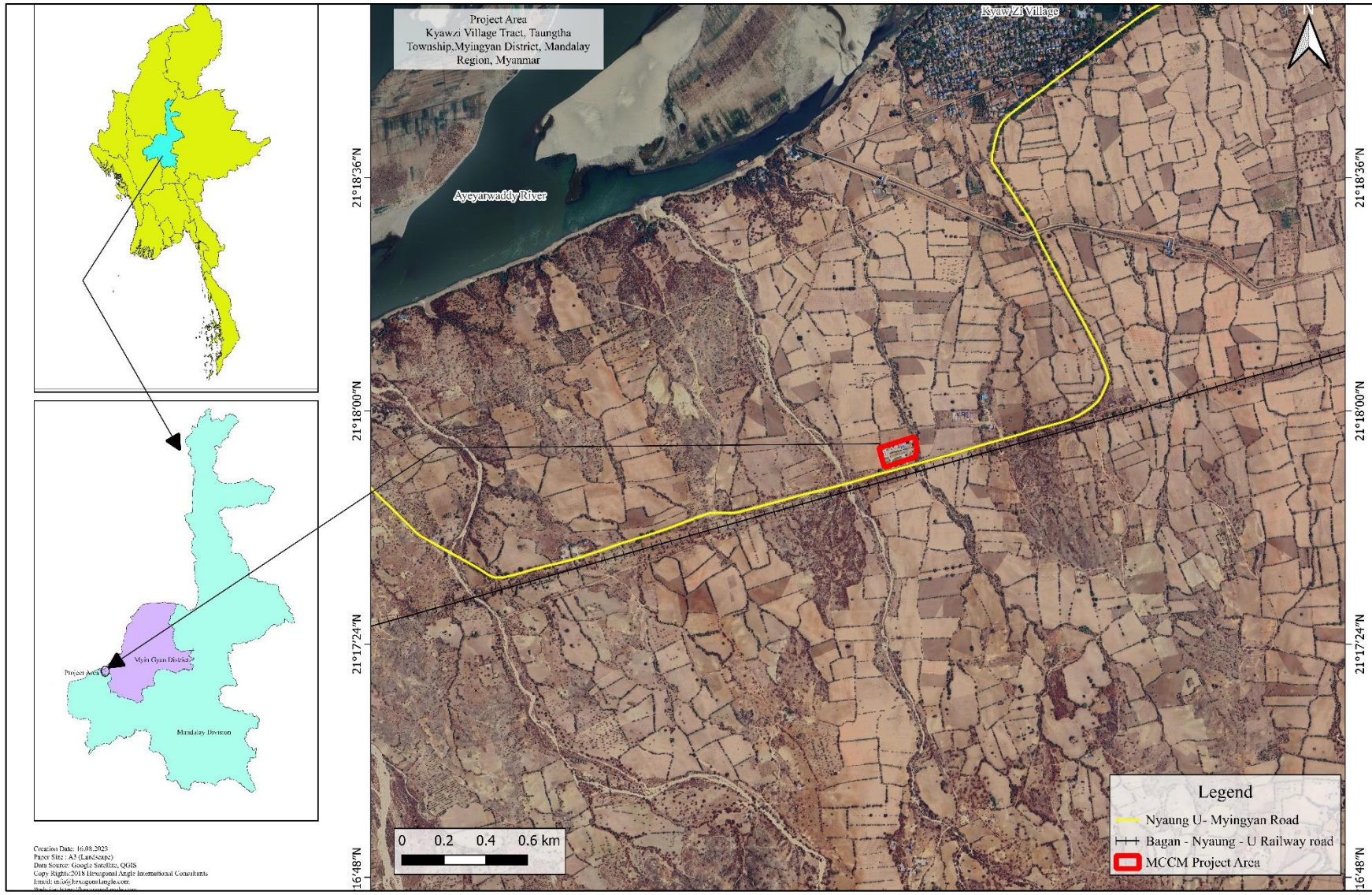


Figure 1-1 Location Map of The Project Area

1.1.2. Purpose of The Project Implementation

The purpose of the project is to enhance the economic status of the region and promote the income of Nation and to create job opportunities for local people.

1.2. PURPOSE OF THE EIA STUDY

Environmental Impact Assessment (EIA) is mandated by the Environmental Conservation Law (No. 9/2012). Section 42 (b) of this law allows the Environmental Conservation Committee to establish and implement a system of environmental and social impact assessment. The EIA procedure (2015) provides detailed legal guidance on how the EIA process should work and outlines the responsibilities of government institutions and project proponents as well as the decision-making process surrounding initial environmental examination (IEE) and EIA report and/or environmental management plan (EMP) approval. According to article 47 of the EIA Procedure (2015), it is required to submit a scoping study report. The Ministry of Natural Resources and Environmental Conservation issues a certificate in accordance with Notice No. 616/2015. According to that announcement, the project proponent requested Hexagonal Angle International Consultants Co., Ltd. (HA) to implement the Environmental Impact Assessment (EIA) for the petroleum refinery project in strict compliance with applicable national laws, rules, and regulations issued especially by the Environmental Conservation Department (ECD) under the Ministry of Natural Resources and Environmental Conservation (MONREC). The third-party confirmation approval letter is presented in **Appendix C**.

The EIA for the project identifies the principal approaches, procedures, and methods to control and minimize the environmental and social impacts of the factory's operation. The main objectives of the EIA are (a) to identify, evaluate, and report the environmental and socio-economic impacts; (b) to define details of who, what, where, and when environmental management and mitigation measures are to be implemented; and (c) to ensure that the environmental quality of the area does not deteriorate due to the project.

The scoping report of the project was submitted to ECD on 8th September, 2022 and this report is approved from MONREC on 20th December, 2022. According to the approval letter, the final EIA report must be continuously submitted to MONREC after assessed the environmental impact during implementation of a project. In addition, the project proponent must follow up the article 55 of the EIA Procedure (2015)

1.3. EIA STUDY SCHEDULE

The HA Company starts the EIA research in September 2021, and it will be finished in April 2023. According to Table 1-1, the estimated time frame for studying is six months. The HA company will proceed through each stage as planned.

Table 1-1 EIA Study Schedule

No	Stages	2021-2023		
		2021	2022	2023
1.	First Time Field Survey (Environmental and Biodiversity Survey)			
2.	Third Party Confirmation			
3.	Data Processing and Analysis			
4.	Impact assessment and analysis (Scoping report)			
5.	Second Time Field Survey (Biodiversity Survey and Social Survey and Public Disclosure)			
6.	Data Processing and Analysis			
8.	Prepare Impact Assessment and Mitigation Measure of the Project			
9.	Prepare Environmental Management Plan			
10.	Conduct Public Consultation Meeting (Government and Local People)			
11.	EIA Report Preparation			
12.	EIA Report Submission to Client			
13.	EIA Report Submission to Environmental Conservation Department			

1.4. RELATED PROJECTS AND DEVELOPMENT ACTION

There is Kyaw Zi crude oil mini refinery near the study area. To the west of the factory is a Yay Way dry stream of the Ayeyarwady River. The factory is about a mile from the river. The factory is about 2 miles from the nearest village, Kyaw Zi village and there are 600 houses in the village. The location of the block is free from protected areas, historical/cultural heritage zones, and other project areas.

1.5. THE INFORMATION ABOUT OF PROJECT PROPONENT

The organization chart of MCCM Co., Ltd. is shown in Figure 1-2. A brief description of the project is given below.

Table 1-2 Information of Project Proponent

Company Name	MCCM Co., Ltd.	
Types of Business	Petroleum Mini Refining Industry	
Investment Year	30 Years	
Amount of Investment	25 billion Myanmar Kyats	
Land use Area	3.98 Acres	
Location	Mandalay Region, Myingyan District, Taungtha Township, Kyawzi Village Tract, Plot No. (837-C), Kyawzi Weast Field No. (92/1, 93, 94/1, 94/2, 94/3)	
Project Proponent	Name	Mr. Myint Maung
	Position	Managing Director
	Address	Mandalay Region, Myingyan District, Taungtha Township, Kyawzi Village Tract; Plot No. (837-C), Kyawzi Weast Field No. (92/1, 93, 94/1, 94/2, 94/3)
	Phone Number	+95 943104888

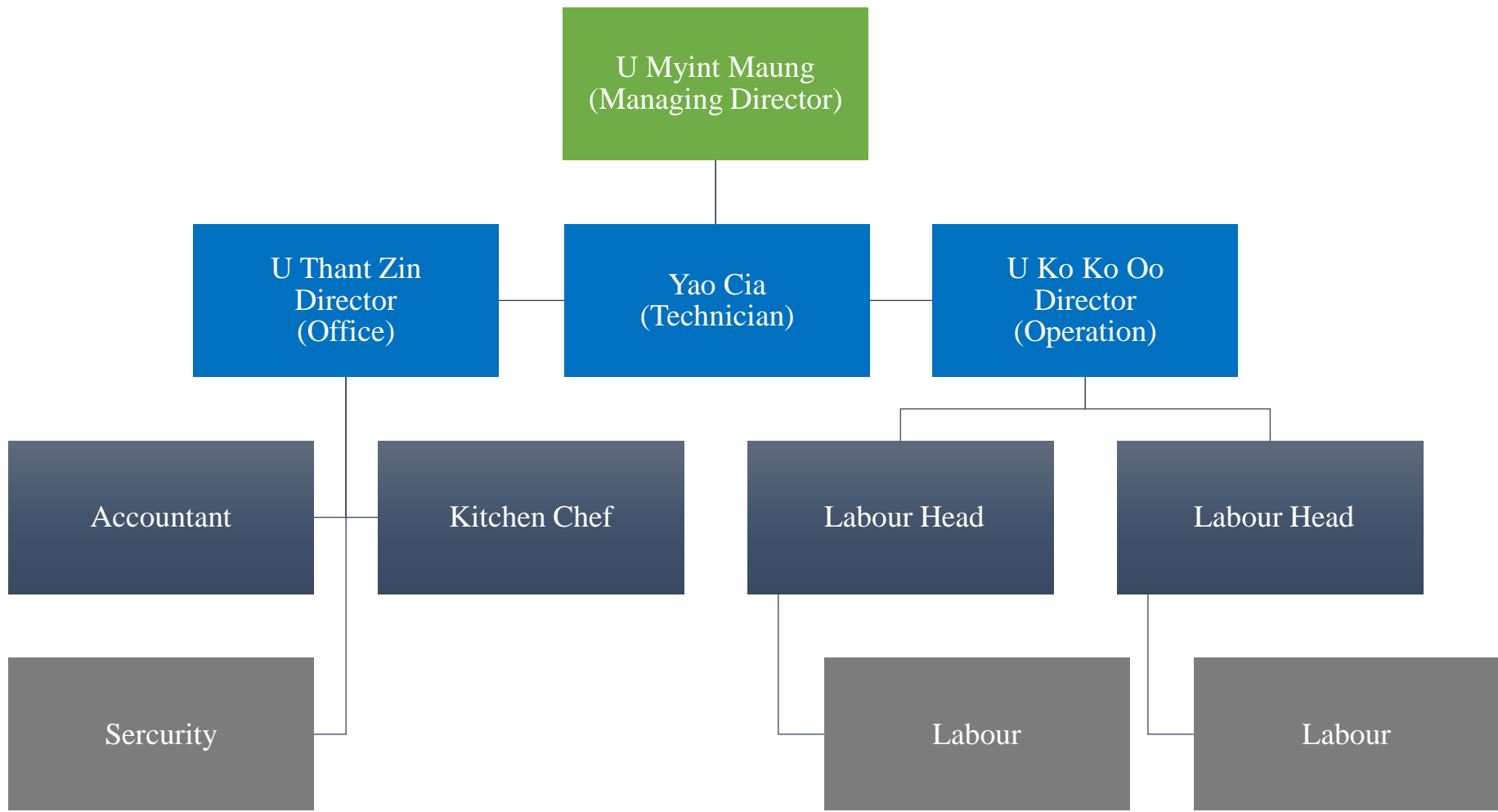


Figure 1-2 Organization Chart of MCCM Co., Ltd.

1.6. THE DESCRIPTION OF ENVIRONMENTAL, HEALTH AND SOCIAL EXPERTS TEAM

1.6.1. EIA Consultant

Hexagonal Angle International Consultants Co., Ltd. (HA) is the third-party organization, which conducted the EIA of this project. of this project. The contact's name and address of the Environmental Consulting Organization described below:

Representative	:	Ms. Thu Thu Aung
Position	:	Managing Director
Mobil Phone	:	+95 9898333733
Office Phone	:	+95 13551620
Email	:	thuthuaung@hexagonalangle.com
Address:		Office: No. 1288, Moe Nyin Street, North Dagon Township, Yangon, Myanmar

1.6.2. Background Information of HA Company

Hexagonal Angle International Consultants is a local company, leading the transport sector projects, environmental consulting, research & survey, business consultancy, coaching and trainings in Myanmar. The company is motivated by its intention to provide high quality services. We carefully select our consultants in order to offer our customers foremost quality of expertise together with extensive experience of industry practices. We have successfully teamed with Transport Specialist, GIS Specialist, Business Advisor, Environmental Specialist, Geologist, Engineer, Research and Survey Specialist, Project Management Specialist and Project Coordinator.

Its office is located at No. 1288, Moe Nyin Street, North Dagon Township, Yangon, Myanmar. The company was founded in September 2017 by Ms. Thu Thu Aung and the main idea is to collaborate with local experts and foreign consultants for government and development partners' transport sector projects. Since that time, our company participated in activities which are ADB's Myanma Railway Modernization project, ADB's Yangon-Pyay Railway On-board Passenger Survey and ADB & CDIA's Yangon Urban Transport Development project, Yangon Smart Car Parking System for YCDC, Traffic Survey Project for Shwe Taung Company, Level Crossing Survey Project for Yangon Circular Railway Upgrading Project and Mandalay-Lashio-Muse Railway Traffic Study and Freight Forwarding Survey Project. In addition, we will start the World Bank's Road Safety Project in Yangon & Mandalay Region.

Hexagonal Angle (HA) is supporting the services for environmental and social sector. The company have experts and team for environmental and social services which are Environmental and Social Impact Assessment (ESIA), Environmental Impact Assessment (EIA), Initial Environmental Examination (IEE), Environmental Management Plan (EMP),

Social Survey and Monitoring Projects in Myanmar. There are more than 70 projects in the fields of energy, agriculture, manufacturing, infrastructure and services, transportation, and mining have already received HA approval. The list of environmental consultants who prepared the EIA report is showed in Table 1-3.

Hexagonal Angle (HA) has another business which is called “HA INSTITUTE” that was established on August 2019. HA Institute is now running the training programs for GIS, Data Visualization and Analysis, Environmental Studies, Social Studies and other online trainings. Furthermore, QGIS, social impact assessment and pollution control online training program are starting in mid-2020. The consultant registrations are described in **Appendix B**.

Table 1-3 Environmental Consultants Profile

Name	Responsibility
Team Member	
Daw Ei Ei Zaw	<ul style="list-style-type: none"> • Study the baseline air quality measurement and write potential impact on ambient air quality for four phases, • Write air quality management plan • Study the water supply, water consumption, drinking water facilities, hydrogeology, geology, seismic background, natural disaster component of project, • Assessing and mitigating natural disaster risk of earthquake, flood and ground subsidence, • Identifying the environmental impact assessment methodology, potential environmental impacts of the projects and potential impacts and sources for each project phases, • Study and write impact on water pollution • Study and write potential environmental impacts and mitigation measures of ambient air quality and water quality, • Geology and Soil, Impact Assessment and Analysis, Project Management, Social Survey and Environmental report writing
Dr. Thar Htet Kyaw	<ul style="list-style-type: none"> • Air Pollution Control, Risk Assessment and Hazard Management, Water Pollution Control and Waste Management
U Win Naing Oo	<ul style="list-style-type: none"> • Manage and collect the baseline environmental quality of air, water and soil quality for dry and wet seasons and • Write and analyze the air quality baseline data for wind speed, wind direction, temperature and rainfall • Collect socio economic component, demography, religious, education and health data of project surrounding area, • Facilitating and coordinating for social and cultural activities of local communities, • Designing and development of questionnaire formats for baseline surveys, • Compiling, tabulating and analyzing the collected data including demographic and socio-economic data, • Collect health questions to community of surrounding project area, • Conduct questions to key stakeholders and the relevant host community health authorities, • Report writing of health management plan and analysis report, • Lead traffic data collection for traffic survey • Survey project management, Land use survey, Field survey, Survey research and methodology
U Htet Wai Aung	<ul style="list-style-type: none"> • Geology and Soil, Air quality monitoring and analysis, Noise and Vibration
Daw Kyawt Kay Paing	<ul style="list-style-type: none"> • Ecological Impact Assessment, Air quality monitoring and analysis, Noise and Vibration

Name	Responsibility
U Than Htike Zaw	<ul style="list-style-type: none"> • Solid Waste Management, Occupational health & safety, Air quality monitoring
U Ko Ko Naing	<ul style="list-style-type: none"> • Biodiversity survey, Ecological Impact Assessment, Collecting and analyzing species and samples, Environmental quality monitoring (Noise, Light, Temperature)
U Kyaw Thet	<ul style="list-style-type: none"> • Collect baseline data of birds and biodiversity, • Make taxonomy for resource inventory of fauna, • Prepare the status of endangered animal species • Analysis of collected data, • Study of habitat and rehabilitation system of project area, • Report writing of mitigation measure and management plan for fauna, • Flora and fauna data analysis based on survey data and Environmental quality monitoring (Air, Noise and Vibration)
U Win Thein	<ul style="list-style-type: none"> • Conduct and analyze the baseline environmental quality for noise and vibration monitoring in wet and dry seasons • Analysis the potential environmental impact on noise and vibration, • Write impact assessment and management plan of noise and vibration, • Study the climate and meteorology, • Calculate and analyze the greenhouse gas emission, • Write risk assessment methodology for hazard identification and risk evaluation and control, • Assessing and mitigating the risks for occupational safety risk, community risk, health impact assessment and fire hazard for construction and decommission & operation phase, • Write risk management plan and emergency response plan for health and safety, fire and natural disasters management plan, • Lead the traffic data collection and study current transportation system and traffic data, • Traffic data analysis based on survey data, Environmental quality monitoring and Traffic survey research and methodology
Daw Su Myat Noe	<ul style="list-style-type: none"> • Studies the international, regional and domestic rules and regulation, • Conduct and analyze the legal related documents of project, • Conduct assessment of legal requirements for project, • Prepare Myanmar Government Institutional Framework, • Prepare commitments table, • Report writing of standard guideline, rules, laws, standards, • Conducting and analyzing legal problems and preparation for legal requirements

Name	Responsibility
Dr. Khin Khin Wai	<ul style="list-style-type: none"> • Study the context of the project and background, purpose and study team, • Write project description of the project and overview of the project • Write and analyze the landuse pattern and GIS map produce for landuse development • Study and write the component of the project for type and size of infrastructure and land use • Analysis of the project alternatives for description, comparison and zero option, • Environmental consulting and Air Pollution Management
Dr. Cherry Myo Lwin	<ul style="list-style-type: none"> • Energy management plan and action, Environmental management plan and Performance tracking of energy reduction measures
Dr. Khin Thandar Lin	<ul style="list-style-type: none"> • Ecological and biodiversity survey, Ecological impact assessment and Environmental consulting
Daw Kyawt Kyawt Khaing	<ul style="list-style-type: none"> • Design analysis and development, both initial outlines and full plans, of wastewater and sanitation solutions to include the wastewater and fecal sludge process, treatment and systems
Daw May Thuzar Khin	<ul style="list-style-type: none"> • Signaling Design, Geometric Design and Cost Estimation of the new projects of signaling of new intersection • and Relocation of intersections
U Than Zaw Min	<ul style="list-style-type: none"> • Advising on all aspects of laws and present cases

CHAPTER 2

OVERVIEW OF POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

2.1. INTRODUCTION

The Hexagonal Angle Company Limited (HA) has been appointed by the MCCM Company Limited to prepare a report for the petroleum refinery process. This chapter of the report mainly entailed stating and recommending a legal and regulatory framework for existing legal rights of national laws and regulations relating to natural resource conservation, labour rights, land use rights, and laws relating to implementing a plantation within Myanmar, whilst sub-chapters include the international laws, international treaties, and conventions. It is essential for MCCM to identify and implement appropriate legal arrangements which were required for performing petroleum refinery processes. At present, the existing legal framework in Myanmar is not yet fully developed to support environmental conservation, while some laws set out only basic principles and therefore require implementing regulations in order to be effective. MCCM itself is addressed only in disparate, vague, and related pieces of legislation.

This chapter will be the summary of the regulations and legal framework for the proposed project and recommendations to regulatory frameworks that fit with the Myanmar context and requirements will be covered. The project proponent is committed to the existing relevant Myanmar Laws, rules, and regulations. In addition, the project proponent is committed the international rules, regulations and guidelines related to the project. The Project Proponent will be followed and committed to National laws and regulations for environmental protection of Myanmar which are as the following Table 2-1.

Table 2-1 Commitment of the National Laws and Regulations in Myanmar

Sr	Laws and regulations	Enacted Year	Committed Section
Environmental Conservation			
1	The Constitution of the Republic of the Union of Myanmar	2008	
2	The Environmental Conservation Law	2012	7(o), 14, 15, 24, 29
3	The Environmental Conservation Rules	2014	69 (a), (b)
4	Environmental Impact Assessment Procedure	2015	102 to 110, 113, 115, 117
5	National Environmental Quality (Emission) Guideline	2015	-
Forest, Biodiversity and Natural Resources			
6	Forest Law	2018	12 (a)

Sr	Laws and regulations	Enacted Year	Committed Section
7	Forest Rules	1995 (Amended 1998)	20, 36, 60
8	The Conservation of Biodiversity and Protected Area Law	2018	35 (a), (c), (d), 29 (e), 39 (d)
9	The Conservation of Water Resources and Rivers Law	2006 (Amended 2017)	6, 8 (a), 11, 19, 21 (b), 22, 24 (b), 30
10	The Conservation of Water Resources and Rivers Rules	2013	-
11	Underground Water Act	1930	3, 5
Human rights and Cultural heritage			
12	The Ethnic Rights Protection Law	2015	5
13	The Ethnic Rights Protection Rules	2019	20, 21
14	The Protection and Preservation of Cultural Heritage Regions Law	1998 (Amended 2019)	21 (b)
15	The Protection and Preservation of Antique Objects Law	2015	3, 12, 13
16	The Protection and Preservation of Ancient Monuments Law	2015	12, 15, 20 (f)
Public Health			
17	Public Health Law	1972	3, 5
18	Prevention and Control of Communicable Diseases Law	1995 (Amended 2011)	3 (a) (9), 4, 11
19	The Control of Smoking and Consumption of Tobacco Product Law	2006	9
Landuse			
20	Farm Land Law	2012	30
21	The Vacant, Fallow and Virgin Lands Management Law	2012 (Amended 2018)	10 (a), 19 (a), (d)
Urban Development and Industrial			
22	The Petroleum and Petroleum Product Law	2017	8 (a), (c), 9 (a), (e), 10 (a), (b), (d),(e), 11
23	The Standarization Law	2014	16, 17, 19
24	Myanmar Engineering Council Law	2013	34
25	The Factories Act	1951 (Amended)	7, 47, 48, 49, 62

Sr	Laws and regulations	Enacted Year	Committed Section
		2016)	
26	Private Industrial Enterprise Law	1990	27
27	Prevention of Hazard from Chemical and Related Substances Law	2013	15 (a), (b), 16 (b) to (j), 17, 22, 27 (a) to (d)
28	Prevention of Hazard from Chemical and Related Substances Rules	2016 (Amended 2018)	-
29	The Electricity Law	2014	20, 21 (a), 24, 27, 29, 33, 40, 68
Economic and Investment			
30	The Export and Import Law	2012	7
31	The Myanmar Companies Law	2017	2, 4
32	Myanmar Investment Law	2016 (Amended 2019)	50, 51, 65, 73
33	The Myanmar Investment Rules	2017	202, 203, 206, 212
34	Myanmar Insurance Law	1993	15, 16
Workers and Workplace			
35	Labour Organization Law	2011	18 to 22
36	The Labour Organization Rules	2012	29, 30
37	The Workmen's Compensation Act	1923	12, 13
38	Employment and Skill Development Law	2013	5, 14, 30
39	Occupational Safety and Health Law	2019	12, 14, 16, 17, 18, 26, 27, 34, 36
40	The Minimum Wage Law	2013 (Amended 2023)	12, 13
41	The Minimum Wages Rules	2013	43, 44
42	The Payment of Wages Law	2016	3, 4, 5, 14, Chapter 3
43	The Leave and Holiday Act	1951 (Amended 2014)	5
44	The Social Security Law	2012 (Amended 2014)	11 (a), 15 (a), (b), 18 (b), 48 (b), 75
45	The Settlement of Labour Dispute Law	2012 (Amended 2019)	38, 39, 40, 51

Sr	Laws and regulations	Enacted Year	Committed Section
Transportation			
46	The Highways Law	2000 (Amended 2014)	8
47	Vehicle Safety and Vehicle Management Law	2020	9 (a), 12 (c), 14 (r), 18 (a), 81 (g)
48	Vehicle Safety and Vehicle Management Rules	2022	252, 253, 254, 256, 261, 262, 263, 269, 271
49	Multimodal Transport Law	2014 (Amended 2022)	3
Emergency			
50	The Myanmar Fire Force Law	2015	25
51	Natural Disaster Management Law	2013	14 to 18

2.2. INSTITUTIONAL FRAMEWORK OF PROJECT PROPONENT

MCCM Co., Ltd is managed by the Mnanging Director, U Myint Maung and the total of staffs are 19. The Institutional Arrangement of the MCCM Co., Ltd. is as shown in **Figure 2-1**

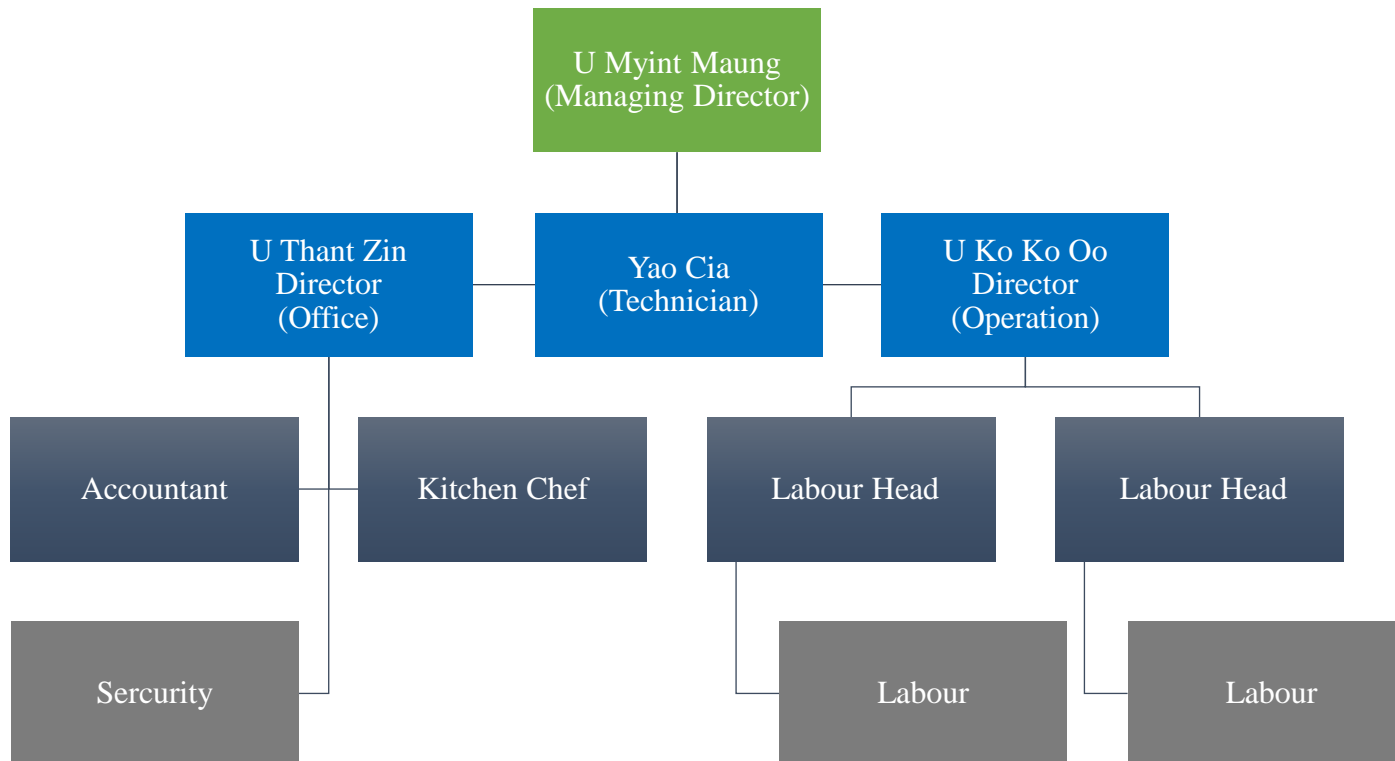


Figure 2-1 Institutional Arrangement (Organization Chart of MCCM Co., Ltd.)

2.3. CORPORATE ENVIRONMENTAL AND SOCIAL POLICIES

The Project Proponent is committed to the sustainable development principle. In this regard, the Project Proponent will manage the environmental aspects of the Project in accordance with the ISO 14001: 2015 Environmental Management System. ISO 14001:2015 specifies the requirements for an environmental management system that any organization can use to enhance its environmental performance. It is intended for use by an organization seeking to manage its environmental responsibilities in a systematic manner that contributes to the environmental pillar of sustainability. The intended outcomes of an environmental management system include:

- Enhancement of environmental performance;
- Fulfillment of compliance obligations;
- Achievement of environmental objectives.

The Project Proponent will establish an Environmental Management System (EMS) for the project and will operate the EMS to meet the requirements of ISO 14001:2015. As the first step towards meeting the requirements of ISO 14001, the Project Proponent will formulate an environmental and social management policy to guide its environmental and social management during the construction and operation phases of the Project. This policy will support the following activities:

Develop a comprehensive Environmental, Health, and Safety (EHS) Management System for implementing the environmental management plan (EMP) to be prepared as part of EIA of the Project;

Implement EMP as a part of the project and operational management to be conducted at an appropriate interval during the operational phase and decommission phases of the Project;

In implementing EMP during the project operation, and decommission phases, the Project Proponent must prepare and implement the specific EHS measure for the proposed Project;

During the operational phase, EHS management will be an integral part of the operational management of the proposed project;

Establish adequate environmental and social safeguards capacities;

Encourage public participation in EHS management related to surrounding communities and

Collect the information that obtain from the EHS management and will prepare EHS performance documents as required by the corporate management and the relevant authorities of the Government.

The Project Proponent will establish and activate the EHS Management System at the commencement of construction.

2.4. NATIONAL POLICY AND LEGAL FRAMEWORK

According to the Myanmar Constitution (2008) - Section 45: 'the Union shall protect and conserve natural environment'. Additionally, Section 390 (b) states that 'every citizen has the duty to assist the Union in carrying out the following matters:

- Preservation and safeguarding of cultural heritage
- Environmental conservation
- Striving for development of human resources
- Protection and preservation of public property

This represents the highest commitment of the Republic of the Union of Myanmar to responsible environmental management.

Part of Myanmar's reform process involves updating and enforcing environmental policy and legislation. The Government of Myanmar has publicly stated its commitment to a development path that is economically strong, but also socially and environmentally sustainable for its citizens. The Framework for Economic and Social Reform (FESR 2013) and the National Comprehensive Development Plan (NCDP 2011-2030) express this vision.

The Environmental Conservation Law (ECL 2012) and Rules (ECL Rules 2014) both have implications for domestic and foreign investors in Myanmar. Section 7 of the ECL states the duties and powers of the Ministry of Environmental Conservation and Forestry (MOECAF), which includes prescribing environmental quality standards on emissions, effluents, solid waste, production procedures, processes and products, facilitating the settlement of environmental disputes, specifying categories and classes of hazardous wastes generated from the production and use of chemicals or other hazardous substances used in industry, agriculture, mineral production, sanitation and other activities, prescribing categories of hazardous substances that may significantly affect the environment, prescribing the terms and conditions for effluent treatment in industrial estates, buildings, and other sites and emissions of machines, vehicles and mechanisms, developing and implementing a system of environmental impact assessment (EIA) and social impact assessment (SIA), enforcing compensation by polluters for environmental impacts; collecting funds from organizations which benefit from natural ecosystems and revenues from businesses which explore, trade and use natural resources, in order to support environmental conservation works.

The National Environmental Conservation Committee (NECC) was formed in 2011 with the aim to achieve sound environmental management in the country. With a view to effectively implementing the protection and conservation of the environment the new government in 2016 has created the new ministry, Ministry of Natural Resources and Environmental Conservation (MONREC). It is believed that effective and meaningful management of the environmental affair will be achieved. The Environmental Conservation Department (ECD) is the focal and coordinating agency for the overall and detail environmental management throughout the country.

As this project is carrying out in Myanmar, the project proponent will follow and commit to the laws and regulations enacted by the Ministry of Environmental Conservation and Forestry, Ministry of Natural Resources & Environmental Conservation and the laws enacted by the Pyidaungsu Hluttaw that are relating to the environmental conservation, workplace and environment safety and health. The project proponent to follow laws, rules and regulations, procedures and guidelines are included in this chapter.

2.4.1. National Environmental Policy

The National Environmental Policy provides long-term, strategic guidance for achieving a sustainable future for Myanmar. It requires the mainstreaming of environmental protection into planning and decision-making at all levels of government and in all sectors. Its detailed principles respect livelihood needs and development objectives while at the same time recognizing the full value of Myanmar's ecosystems and the implications of climate change. This Policy ensures that environmental protection continues to be a central objective in Myanmar's sustainable development pathway. This Policy builds on Myanmar's 1994 National Environment Policy and reaffirms its core values:

- (a) The wealth of the nation is its people, its cultural heritage, its environment and its natural resources.
- (b) It is the responsibility of the State and every citizen to preserve our natural resources in the interests of present and future generations.
- (c) Environmental protection should always be the primary objective in seeking development.
- (d) Section 3, This Policy builds on Myanmar's 1994 National Environment Policy and reaffirms its core values:
- (e) The wealth of the nation is its people, its cultural heritage, its environment and its natural resources.
- (f) It is the responsibility of the State and every citizen to preserve our natural resources in the interests of present and future generations.
- (g) Environmental protection should always be the primary objective in seeking development.

Section 4, It also builds on the 1997 Myanmar Agenda 21, the 2009 National Sustainable Development Strategy. It is grounded in the environmental responsibilities in the 2008 Constitution of the Republic of the Union of Myanmar, and the obligations contained in the 2012 Environmental Conservation Law. It also aligns with, and expands upon, the environmental considerations in the 2015 National Comprehensive Development Plan and the 2018 Myanmar Sustainable Development Plan. The Policy recognizes and

integrates Myanmar’s commitments to Multilateral Environmental Agreements, including the 2015 Paris Agreement.

As this project is carrying out in Myanmar, the project proponent will follow and commit to the laws and regulations enacted by the Ministry of Environmental Conservation and Forestry, Ministry of Natural Resources & Environmental Conservation and the laws enacted by the Pyidaungsu Hluttaw that are relating to the environmental conservation, workplace and environment safety and health. Figure 2-2.



Figure 2-2 Linkages between the National Environmental Policy, Strategic Framework and Master Plans

2.4.2. National Waste Management Strategy and Master Plan (2018-2030)

Myanmar has had to face tremendous challenges in waste management in the recent past, due to many factors including the growing population, economy, increasing complexity of waste streams and lack of effective waste management systems, proper infrastructure, capital investment, financial and human resources, as well as effective policy and regulatory environment. To solve these issues, the National Waste Management

Strategy and Master Plan (2018-2030) was developed by the MONREC with the assistance of the International Environmental Technology Centre (ETC) of the United Nations Environment Programme (UN Environment) and the IGES Centre Collaborating with UNEP on Environmental Technologies (CCET).

The aim of the National Waste Management Strategy and the Master Plan is to develop and implement the holistic and integrated waste management strategy based on the principles of inclusiveness, zero waste, zero emissions, and circular economy to achieve a greener, cleaner and healthier environment in Myanmar.

2.4.3. Myanmar Climate Change Strategy (2018-2030)

The Myanmar Climate Change Strategy (MCCS) 2018-2030 has been formulated and adopted to provide a roadmap for Myanmar to strategically address climate-related risks, and also seize opportunities, over the next 13 years and beyond. The MCCS fully builds on the Myanmar Climate Change Policy' (MCCP) principles and also upholds principles of inclusive development, resource-efficient development, integrated development, results-oriented development.

The MCCS is aligned with Myanmar's development policies and supports the National Comprehensive Development Plan (NCDP), Myanmar Sustainable Development Plan (MSDP) and National Sustainable Development Strategy and is mandated by the MCCP as well as the National Adaptation Programme of Action (NAPA) and the Nationally Determined Contribution (NDC). The MCCS also complements the country's Green Growth Strategy which is currently under preparation.

2.5. MYANMAR GOVERNMENT INSTITUTIONAL FRAMEWORK

Myanmar has 23 ministries under the Office of the President as of 2021. The leading ministries in charge of environmental and social considerations are the Environmental Conservation Department of the Ministry of Environmental Conservation and Forestry (MOECAF), now transformed into the Ministry of Natural Resources and Environmental Conservation (MONREC), the Ministry of Agriculture, Livestock and Irrigation (MOALI), the Ministry of Labour, Immigration & Population (MOLES) and the Ministry of Social Welfare, Relief & Resettlement. Institutional structure of MONREC is shown in Figure 2-3.

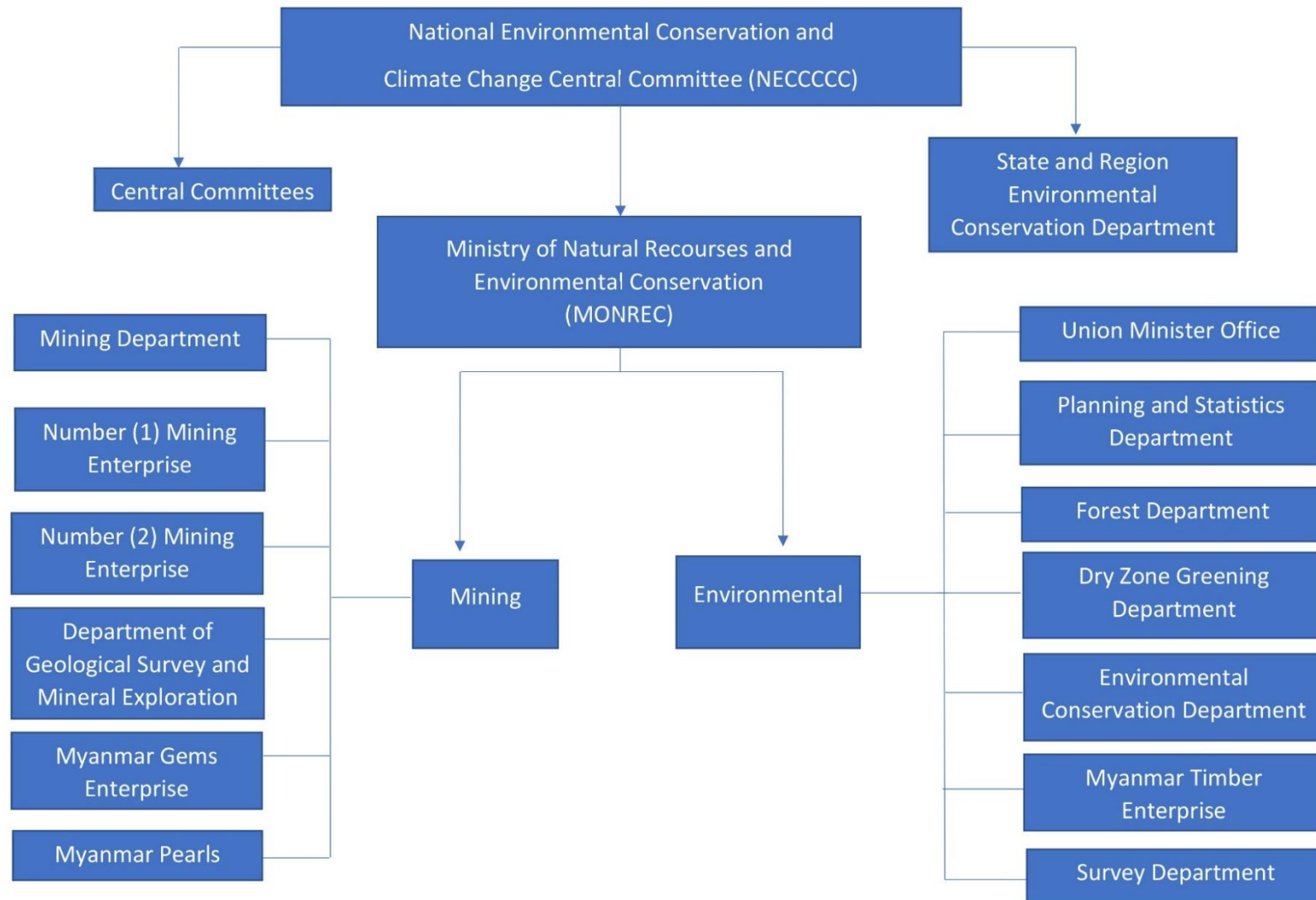


Figure 2-3 Institutional Structure of the Ministry of Natural Resources and Environmental Conservation

2.6. MYANMAR LAWS AND REGULATIONS RELATED TO THE PROJECT

The Project Proponent committed to follow these laws relating to environmental and social issues of the oil and gas sector and their relevance to the EIA study for the proposed project are as followings:

2.6.1. Laws Relating to Environment

2.6.1.1. The Constitution of the Republic of the Union of Myanmar, 2008

The Constitution of the Republic of the Union of Myanmar (2008) states in the Section 37 that the Union (a) 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, (b) the Union shall enact necessary law to supervise extraction and utilization of State-owned natural resources by economic forces, (c) the Union shall permit citizens right of private property, right of inheritance, right of private initiative and patent in accord with the law

Section 45, the Union shall protect and conserve natural environment.

Section 390, Every citizen has the duty to assist the Union in carrying out the following matters (a) preservation and safeguarding of cultural heritage, (b) environmental conservation, (c) striving for development of human resources, and (d) protection and preservation of public property. As the Sections said, the following and implementation of the conservation of the environment is one of the most important priorities of the government.

2.6.1.2. The Environmental Conservation Law (2012)

The Environmental Conservation Law was enacted in March 2021 by MOECF, and this law the fundamental law of environmental management and environmental conservation in Myanmar. The laws related to the proposed project are as these following Sections:

Section 4 mentioned that the duties and powers relating to the environmental conservation of the Ministry are as follows:

- (a) implementing the environmental conservation policies;
- (b) planning and laying down national or regional work plans relating to environmental management;
- (c) laying down, carrying out and monitoring programs for conservation and enhancement of the environment, and for conservation, control and abatement not to cause environmental pollution;

- (d) prescribing environmental quality standards including standards on emissions, effluents, solid wastes, production procedures, processes and products for conservation and enhancement of environmental quality;
- (e) submitting proposals to the Committee for economic incentive mechanisms and terms and conditions which may not affect the environment or cause least environmental affect for sustainable development in addition to legal affairs and guidelines relating to environment;
- (f) facilitating for the settlement of environmental disputes and, if necessary, forming bodies to negotiate such disputes;
- (g) specifying categories and classes of hazardous wastes generated from the production and use of chemicals or other hazardous substances in carrying out industry, agriculture, mineral production, sanitation and other activities;
- (h) prescribing categories of hazardous substances that may affect significantly at present or in the long run on the environment;
- (i) promoting and carrying out the establishment of necessary factories and stations for the treatment of solid wastes, effluents and emissions which contain toxic and hazardous substances;
- (j) prescribing the terms and conditions relating to effluent treatment in industrial estates and other necessary places and buildings and emissions of machines, vehicles and mechanisms;
- (k) negotiating, cooperating and implementing in respect of international, regional and bilateral agreements, instruments and programs relating to matters of environment;
- (l) implementing the international, regional and bilateral agreements accepted by Myanmar for environmental conservation and enhancement of environmental quality in accord with the guidance adopted by the Union Government or the Committee;
- (m) causing to lay down and carry out a system of environmental impact assessment and social impact assessment as to whether or not a project or activity to be undertaken by any Government department, organization or person may cause a significant impact on the environment;
- (n) laying down guidance relating to the management, conservation and enhancement of environment for the matters of protection of ozone layer, conservation of biological diversity, conservation of coastal environment, mitigation and adaptation of global warming and climate change, combating desertification and management of non-depleting substances and management of other environmental matters;

- (o) managing to cause the polluter to compensate for environmental impact, cause to contribute fund by the organizations which obtain benefit from the natural environmental service system, cause to contribute a part of the benefit from the businesses which explore, trade and use the natural resources in environmental conservation works;
- (p) carrying out other functions and duties assigned by the Union Government relating to environmental conservation.

Section 7, The duties and powers relating to the environmental conservation of the Ministry 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 25, The Ministry may, if it is found that a holder of the prior permission fails to comply with any of the terms and conditions relating to environmental conservation contained in the prior permission, pass any of the following administrative penalties:

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

Section 29, No one shall violate any prohibition contained in the rules, notifications, orders, directives and procedures issued under this Law.

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

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

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

Section 34, Whoever imports, exports, produces, stores, carries or trades any material prohibited by the Ministry due to its impact on environment shall on conviction, be punished with imprisonment for a term from a minimum of three years to a maximum of five years, or with fine from a minimum of one hundred thousand kyats to a maximum of two million kyats, or with both. Moreover, he shall incur the expenditure for the treatment and disposal of such material until the process that has no impact on the environment.

2.6.1.3. Environmental Conservation Rules (2014)

Environmental Conservation Rules (ECRs) as detailed enforcement regulations for ECL was gotten through parliament in July 2013 and going to be issued. ECRs stipulates basic policy and concept on EIA application of the development of Projects. The project proponent is comply with Rule 69, (a) Any person shall not emit, cause to emit, dispose, cause to dispose, pile and cause to pile, by any means, the pollutants to environment 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 the actions which can be damaged to natural environment which is changing due to ecosystem and such system, except permission of the relevant Ministry in order to the interest of the public.

2.6.1.4. Environmental Impact Assessment Procedure (2015)

The Ministry of Environmental Conservation and Forestry, in exercise of the power conferred by sub-section (b) of Section 42 of the Environmental Conservation Law, issued the Environmental Impact Assessment Procedure in 2015. This procedure mentioned the legal responsibilities for the project proponent and the project proponent is commit to follow the procedures in performing the proposed project.

In Section 102 of EIA Procedure, 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, In carrying out any inspection, the Ministry may take photographs and make other audio and video recordings of any type, take soil, sediment, water, and air samples, and examine computers, copy documents including digital files, interview persons, and carry out any other investigation which the Ministry believes to be necessary or appropriate. The Ministry, as it deems necessary, may carry out such inspection in coordination with any other ministries.

Section 108, 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, including outside normal working hours.

Section 109, The Ministry's inspections may include without limitation sites, facilities, vehicles, computers, archives, documents and all other forms and types of media and information storage, and persons.

Section 110, 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.

Section 113, The Ministry shall indicate the manner in which environmental obligations are not being complied with by the Project Proponent, and shall give the

Project a specified time period (determined by the Ministry to be reasonable under the circumstances) within which to bring the Project into compliance.

Section 115, All costs of the Ministry to conduct inspection and monitoring of the Project shall be borne by the Project Proponent. Such costs shall not exceed that which is necessary to ensure the Project's compliance with the Project commitments as set out in the EMP and in the ECC.

Section 117, The Ministry may require that Projects and other economic activities that derive from such policy, strategy, development plan, framework or program and which have been required to undertake a study to identify and assess the potential environmental and social impacts (as stipulated above) shall be developed and implemented (sited, designed, constructed and operated) in accordance with the environmental and social management and monitoring framework of such policy, strategy, development plan, framework or program.

2.6.2. Laws Relating to Forest, Biodiversity and Natural Resources

2.6.2.1. Forest Law (2018)

The Forest Law was enacted in September 2018 by the Forest Department and this law mentioned the objectives and duties of the government. The project proponent hereby commits that they're aware of this law. In Section 3, The objectives of this Law are:

to implement the forest policy of the Government;

to implement the policy of the Government related to natural resources and environmental conservation;

- (a) to promote public cooperation in implementing the forest policy and the natural resources and environmental conservation policy of the Government;
- (b) to support economic development of the State, to contribute towards food, clothing and shelter needs of the public and to enjoy benefits perpetually through conservation and protection of forests;
- (c) to comply with the international agreements relating to conservation of forests, conservation of natural resources and environment, climate change and natural disaster risk reduction;
- (d) to prevent deforestation, biodiversity decline, outbreak of fires, insect infestation and plant disease incidence;
- (e) to conserve natural forests and establish forest plantations simultaneously;
- (f) to contribute towards fuel requirement of the State;

- (g) to implement sustainable forest management in order to support sustainable development.

Section 9, The functions of the Forest Department are:

- (a) implementation of the Myanmar forest policy of the Government;
- (b) implementation of the plans relating to conservation of water, soil, biodiversity and environment, sustained yield of forest products and protection of forest covered land;
- (c) management of forest land in accordance with the provisions of this Law;
- (d) submission of proposals to the Ministry for constitution or declaration, alteration or cancellation of reserved forests, protected public forests and species of reserved trees;
- (e) upgrading forestry practices, forestry extension and human resource development in natural environment and forest sector;
- (f) upgrading forest management database system, inventorying forest resources and disseminating information to the public;
- (g) conducting forestry research;
- (h) supporting and supervising implementation of community forestry;
- (i) determining the payment for environmental services for doing business in forest land;
- (j) carrying out other forestry related tasks assigned by the Ministry.

2.6.2.2. Forest Rules (1995)

As the Forest Law was first enacted in 1992, the Forest Rules were essential in sustaining the long-lasting forest. This forest rules mention in Rule 20, In the forest area and forest-covered land at the disposal of the government:

- (a) the Ministry of Forestry may allow for carrying out any development work or any economic scheme if it does not affect or damage the natural environment;
- (b) the Director General or a forest officer delegated by him may allow carrying out education or research work, conducting a training course or establishing study camp if it does not affect or damage the natural environment.

Rule 22, According to sub-rules (a) or (b) of rule 20, the permission holder:

- (a) is entitled to carry out only the matters determined and allowed in the relevant
- (b) permission. In doing so, it shall take care not to damage or destroy the natural environment;
- (c) shall not transfer the relevant permission without the agreement of the person who issued permission;

Rule 36, In establishing the forest plantations according to sub-section (a) of section 13 of the Forest Law, the following principles shall be based:

- (a) planting at the depleted or degraded forests;
- (b) planting at the forest where commercially fewer valuable trees are grown;
- (c) planting tree species which are compatible with water, soil and climate;
- (d) planting tree species which have good yield and valuable in extraction and use;
- (e) planting by the methods which do not affect the water, soil environment;
- (f) contributing to improvement of living standard of local people and development of local area.

Rule 60, Any person, if he does not obtain the special permit issued by the Director General or a person who is delegated by him, in moving the forest produces;

- (a) shall not cause reducing water flow, change or blockage of watercourse in the rivers;
- (b) shall not cause any traffic jam along the motor road or rail road.

2.6.2.3. The Conservation of Biodiversity and Protected Area Law (2018)

This law hereby indicates the duties of the government as in Section 19, With the approval of the Ministry, the Forest Department:

- (a) shall declare the following categories of endangered wild fauna that need to be protected from extinction, in accordance with the necessity of the State:
- (b) completely protected wild fauna;
- (c) (ii) normally protected wild fauna;
- (d) (iii) seasonally protected wild fauna.
- (e) may revise categories of endangered wild fauna declared under sub-section (a);
- (f) shall declare species and associated site to conserve wild flora that need to be protected from extinction, in accordance with the necessity of the State;

- (g) shall declare conservation status of wild fauna and wild flora from time to time to conserve for sustainability and to prevent their extinction in accordance with the necessity of the State;
- (h) shall declare the appendices designated by the Convention for the public
- (i) shall take measures to protect endangered wild fauna and wild flora species;
- (j) shall coordinate with the relevant department and organization if protected endangered wild fauna and wild flora are under the administration of other Ministries.

2.6.2.4. The Conservation of Water Resources and Rivers 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.
- (b) cause the wastage of water resources willfully.

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 13, No person shall carry out sand suction, sand dredging, sand excavating, river shingle suction, panning for gold, gold mineral dredging or resource production for commercial purpose in the river-creek boundary, bank boundary and waterfront boundary without the recommendation of the Directorate.

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 waterfront 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;

- (a) violate the conditions relating to navigation of vessel in rivers and creek prescribed by the Directorate for conservation of water resources, rivers and creeks.
- (b) violate the conditions prescribed by the Directorate so as not to cause water pollution and change of watercourse in rivers and creeks.

Section 30, Any government department and organization or any person desirous of constructing drainage, utilizing river water intake, constructing bridges spanning rivers, connecting underground pipe, connecting underground electric power cable, connecting underground telecom cable or digging in rivers and creeks, bank boundary and waterfront boundary, under the requirement of work, shall in order not to adversely affect the water resources and rivers and creeks, carry out only after obtaining the approval of the Ministry of Transport. As the proposed project is located nearly a mile from the river, the project proponent must comply with the laws of not disposing wastes and not harming the natural resources by dumping or releasing the harmful substances into the natural rivers.

2.6.2.5. Underground Water Act (1930)

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

Section 4, (1) Any magistrate taking cognizance of an offence under section 3 may at any time order the tube inspect of which the offence has been or is alleged to have been committed to be forthwith closed until such time as a license for the same has been taken out in accordance with the provisions of the said section.

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

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

2.6.3. Laws Relating to Human Rights and Cultural Heritage

2.6.3.1. The Ethnic Rights 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.

Section 22, No one shall prohibit the rights and privileges of the ethnic groups without credible reasons.

Section 25, Whoever violates the prohibition in section 22 shall, on conviction, be punished with imprisonment for a term not exceeding one year or with a fine not exceeding one hundred thousand kyats or with both.

2.6.3.2. The Ethnic Rights Protection Rules (2019)

Rules 20, In relation to the project to be developed in the area inhabited by ethnic peoples, the project proponent:

- (a) The benefits and contents of the project must be fully and accurately explained in advance, using languages and methods that they can understand so that the local ethnic groups who are settled in the area where the project is planned to be implemented are aware of it.
- (b) The policy directions of the Myanmar Sustainable Development Plan (MSDP); strategies; It must be carried out in accordance with the procedures.
- (c) In order to find out whether it can cause changes to the environment and socio-economic life in the area, environmental impact assessment and socio-economic development impact assessment shall be carried out in accordance with the relevant department's guidelines.
- (d) In all stages of the environmental impact assessment and socio-economic development impact assessment process, discussions and consultations with indigenous peoples shall be carried out in an open manner.

Rules 21, The project proponent:

- (a) Before starting the project, the implementation according to Rule 20 must be reported to the Ministry and get comments.
- (b) Upon completion of project implementation, pre-planned activities and completion conditions shall be submitted to the Ministry.

2.6.3.3. The Protection and Preservation of Cultural Heritage Regions Law 1998 (Amended 2019)

Section 18, No person can construct a building in the zone where the ancient monument or ancient site is located or shall amend or extend the boundaries of its courtyard within the zone without obtaining prior permission issued by this law.

Section 19, No person shall do any of the following to any building within the protected zone without obtaining prior permission issued under this Act -

- (a) construction or extension of construction;

(b) amending or extending the boundary of its premises.

Section 21, No person shall, without prior permission granted under this Law, carry out any of the following in the cultural heritage region:

- (a) carrying out renovation and maintenance work on an ancient monument
- (b) carrying out archaeological excavation;
- (c) building road, constructing bridge, irrigation canal, embankment or extending the same
- (d) digging well, pond, fish-breeding pond or extending the same

2.6.3.4. The Protection and Preservation of Antique Objects Law (2015)

Section 3, The objectives of this law are as follows:

- (a) to implement the policy of protection and preservation for the perpetuation of antique objects;
- (b) to protect and preserve antique objects so as not to deteriorate due to natural disaster or man-made destruction;
- (c) to uplift hereditary pride and to cause dynamism of patriotic spirit by protection and preservation of antique objects;
- (d) to have public awareness of the high value of antique objects;
- (e) to carry out in respect of protection and preservation of antique objects in conformity with the International Convention and Regional Agreement ratified by the State.

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

Section 13, (a) If the information is received under section 12, the Ward or Village-Tract Administrator shall keep the said object as may be necessary and shall forward the information to the relevant Township Administrative Office within 14 days. The Township Administrator shall promptly carry out the necessities and inform the Department within 7 days from the date on which the information is received;

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

2.6.3.5. The Protection and Preservation of Ancient Monuments Law (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, A person desirous of any of the followings within the specified area of an ancient monument shall apply to get prior permission to the Department:

- (a) extending towns, wards and villages;
- (b) constructing or extending or repairing new buildings including hotels, factories and residential buildings or fencing or extending a fence;
- (c) digging to search petroleum, natural gas, gem or mineral, piping petroleum and natural gas, constructing factories, connecting national grid, constructing communication tower, constructing or extending infrastructures such as road, bridge, airfield, irrigation and embankment;
- (d) connecting underground electric cable, communication cable and other underground works;
- (e) digging or extending wells, lakes, canals and ponds;
- (f) gold sieving, digging, burning bricks, digging well, lake, creek, ditch, gully, pit digging, refilling, levelling, mining, quarry, gravel digging and unearth sand, removing the mounds and hills which can damage the physical feature of the land;
- (g) placing and fencing ancient monuments in a private compound and area;
- (h) constructing a building which is not consistent with the terms and conditions stipulated according to the region by the Ministry near and at the surrounding of an ancient monument.

Section 20, No one shall carry out any of the following acts which is 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:

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

2.6.4. Laws Relating to the Public Health

2.6.4.1. Public Health Law (1972)

The law deals with the provisions to promote and safeguard public health including preventive measures to promote environmental health. The laws related to public health are provided in Sections 2 to 5. It is concerned with the protection of people's health by controlling the quality and cleanliness of food, drugs, environmental sanitation, epidemic diseases, and regulation of private clinics.

Section 3, Notwithstanding any other existing laws, the government shall further improve the health of the working people. To prevent the health of workers from being affected, and advising on the health issues described below; checking supervision; and repair Works such as prohibition shall be carried out.

(1) Environmental health activities:

- (a) Garbage in the residential environment; Storage and disposal of waste.
- (b) Establishing and protecting public drinking water to international standards.

- (c) Smoke that will cause danger to people in the surrounding atmosphere where people live; width age powder, Protection from contamination by noise and radiation.
 - (d) City and village municipalities; Buildings used by housing construction and workers to travel and live. Or for the health and hygiene of places.
- (2) Matters related to food produced and sold by workers:
- (a) food manufacturing and selling workshop; factory Registration of business units; Cancellation and re-registration of registration.
 - (b) Making the food sold to the workers healthy and clean.
 - (c) adulteration of food sold to the working public; mixed with other inferior materials; Protection from the extraction of addictive substances in food.
 - (d) Workshops that produce and sell food; factory Keeping business departments healthy and clean.
 - (e) Keeping premises where food is sold healthy and clean.
 - (f) Preventing people with infectious diseases from entering and serving in places where food is produced and sold to the working public.
 - (g) Storage and destruction of hazardous food.
 - (h) Sending food-related matters to government laboratories for inspection if necessary.
 - (i) Ensuring that food meets the standards set by the government from time to time.
- (3) Matters related to home appliances and beauty products to be used by working people:
- (a) A workshop that manufactures home appliances and beauty products; Registration of factories; Cancellation and re-registration.
 - (b) If the manufactured home appliances and beauty products may cause danger to workers, or if it can be poisonous, Prohibition of manufacturing even if it contains harmful radiation.
 - (c) Destruction of dangerous manufactured home appliances and beauty products in a way that does not pose any danger to workers.
 - (d) Seizing and destroying dangerous household items and cosmetics from shops.
 - (e) Making home appliances and beauty products conform to the standards set by the government from time to time.
- (4) Matters related to infectious diseases:
- (a) To suppress and prevent the spread of infectious diseases; Promulgation of diagnoses to be reported by region from time to time.
 - (b) for the prevention of infectious diseases; investigation Establishing a vaccination program for the entire workforce; vaccination; Extermination of pest animals and other necessary activities.
 - (c) If there is a situation where the health of the workers may be affected by an infectious disease. or if an infectious disease occurs; The government is the state, every district Township neighborhood village Or declaring a certain

area as an emergency area of concern for health and carrying out the necessary disease prevention activities.

(5) Matters related to private medical centers:

- (a) Prescribing requirements regarding private medical facilities.
- (b) registration of all private medical facilities; Deregistration and re-registration.

(6) Matters related to medicine required for use by workers:

- (a) Manufacture of medicines for distribution and sale; Registration of businesses such as retail and wholesale sales; Cancellation and re-registration.
- (b) To ensure that the medicines are safe and effective for the workers, and to send samples of the medicines to the organizations that the government will set up for this purpose.
- (c) more or more than the medicinal power. or lying Prohibition of advertising.
- (d) Distribution of medicines imported from abroad only after verification of potency.
- (e) To test the potency of medicine. Assignment to a laboratory designated by the government.

Section 5, Organizations established by this law, or Those who have been assigned by these groups, or Government departments and organizations subordinate to the government assigned under this law; matters related to environmental health activities; issues related to food; Issues related to home appliances and beauty products for the working people. Issues related to infectious diseases; Matters related to private medical centers; Workshop for matters related to medicines used by workers, etc. factories, business departments, shops, metaphors Places He has the right to enter and inspect the buildings at any time.

2.6.4.2. Prevention and Control of communicable Diseases Law 1995 (Amended 2011)

This law was enacted in March, 1995 by the Ministry of Health & Sports. This law describes functions and responsibilities of health personnel and citizens in relation to prevention and control of communicable diseases. It also describes measures to be taken in relation to environmental sanitation, reporting and control of outbreaks of epidemics and penalties for those failing to comply. The law also authorizes the Ministry of Health to issue rules and procedures, when necessary, with approval of the government.

Section 3, (a) In order to prevent the outbreak of communicable diseases, the Department of Health shall implement the following activities systematically under the guidance of the Ministry of Health:

- (ix) giving advice to and coordinating with relevant Government departments, organizations and non-governmental organizations for construction of healthy housing, obtaining safe drinking water and fresh water for use, proper waste disposal in order to prevent occurrence of communicable

disease for workers who are carrying out activities of social and economic development;

Section 9, When the head of the household, any member of the household or any entrepreneur knows the occurrence of any of the following matters, he shall report immediately to the nearest health department or hospital:

- (a) enmasse death of animals including chicken and birds;
- (b) rat fall;
- (c) suspicion or occurrence of epidemic disease;
- (d) occurrence of notifiable disease.

Section 11, In order to prevent and control the spread of a 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) other necessary investigation;
- (e) prohibition of the right of movement of the vehicle carrying animal or animal product suspected of having epidemic disease.

2.6.4.3. 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 following 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, following the stipulations;
- (c) supervise and carry out measures so that no one shall smoke in the non-smoking area;
- (d) accept the inspection when the supervisory body comes to the place for which he is responsible.

2.6.5. Laws Relating to the Landuse

2.6.5.1. Farm Land Law (2012)

Section 30, 30. In respect of application to use the farm land by other means for the interests of the public:

(a) the Central Administrative Body of the Farm Land may permit to use the farm land by other means with the recommendation of the Region or State Administrative Body of the Farm Land;

(b) The relevant Region or State Government Organization shall permit to use the farm land by other means except low land with the recommendation of the Region or State Administrative Body of the Farm Land.

2.6.5.2. The Vacant, Fallow and Virgin Lands Management Law 2012 (Amended 2018)

Section 10, The Central Committee may, when permitting vacant, fallow and virgin lands for agriculture, livestock breeding and businesses relating to them in respect of land area:

(a) in the agricultural business:

(i) permit not exceeding 5000 acres at a time, if it is the perennial tree. If it has been carried out 75 percent of the permitted acres fully, permit not exceeding 5000 acres for a time and up to the total of 50000 acres time after time. If it is the business which should be permitted for the interest of the State, permit more than 5000 acres at a time of acres that can actually grow with the approval of the Union Government;

(ii) if it is the horticultural crops, permit not exceeding 3000 acres;

(iii) if it is the industrial seasonal crop, permit not exceeding 5000 acres at a time. If it has been carried out 75 percent of the permitted acres fully, permit not exceeding 5000 acres for a time and up to the total of 50000 acres time after time. If it is the business which should be permitted for the benefit of the State, permit more than 5000 acres at a time with the approval of the Union Government;

(iv) administer to enable to permit by the relevant regional organization, not exceeding 50 acres of vacant, fallow and virgin lands for the rural farmers and family capacity who desire to carry out agriculture;

Section 19, The Central Committee has the right to recover the required minimum land area from the permitted vacant, fallow and virgin lands if any of the following conditions arises:

(a) finding the ancient cultural heritages in the permitted vacant, fallow and virgin lands;

(d) finding resources in the vacant, fallow and virgin lands permitted to carry out the business contained in sub-sections (a), (b) and (d) of section 4.

2.6.6. Laws Relating to the Urban Development and Industrial

2.6.6.1. The Petroleum and Petroleum Product Law (2017)

The primary and the fundamental law which directly related to the process of the MCCM Co., Ltd.'s proposed project is the Petroleum and Petroleum Product Law which enacted in August 2017. The objectives of this Law are as follows:

- (a) to carry out the petroleum and petroleum product business activities systematically in accordance with the provisions of the law, stipulated standards, procedures and conditions;
- (b) to enable the petroleum and petroleum product business activities to carry out safely without environmental impact;
- (c) to establish free and fair competition in carrying out petroleum and petroleum product business activities;
- (d) to secure energy requirement and energy security of the Union;
- (e) to obtain tax revenue of the Union.

When applying for the License, Issue of Permit, Determining Conditions to be abided by, and Supervision, the project proponent is committed to comply with the laws as followings:

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;
- (b) determining period, form, conditions, means of applying for license, permitting authority and fees to be assessed for licenses under subsection (a);
- (c) determining and supervision on ports for vessels and barges that carry out import, export, and transport by water in accord with procedures;
- (d) taking action, as necessary, in accordance with the existing laws if it occurs spill or accident in carrying out import, export, transport, and sale and distribution of petroleum and petroleum product by water;
- (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 license 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 license, permitting authority and fees to be assessed for license 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;
- (e) determining, in coordination with ministries concerned, procedures and conditions relating to standard and quality of storage tanks and warehouse, and tanks of vehicles, vessels and barges that carry any petroleum and petroleum product.

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 to the receptacle.

Section 12, The provisions contained in section 11 shall not apply to any following receptacles:

- (a) any glass, stone or metal receptacle in which the dangerous petroleum lesser than two gallons is put with secure cap;
- (b) a tank attached to machine-powered vehicle or machinery that uses any petroleum and petroleum product;
- (c) a storage tank absolutely buried underground;
- (d) any class of receptacles, by notification, exempted from the application of this section by the Ministry.

Section 30, Any person shall, without the relevant license, not carry out any business activities or measures required to obtain license under this law.

Section 37, Any person who violates the prohibition contained in section 30 shall, on conviction, be punished with imprisonment for a term not exceeding one year, or with fine from a minimum of three hundred thousand Kyats to a maximum of five million Kyats, or with both, and the property concerned with the commission of offence shall be confiscated.

2.6.6.2. The Standarization Law (2014)

Section 16, The department and organization which have obtained the accreditation certificate shall:

- (a) register at the Department after obtaining the approval of the Council on the standardization mark for each category of quality recommendation for which it may issue.
- (b) submit the list of businesses to which it has issued quality recommendation to the Department in accord with the stipulations.

Section 17, A person desirous of obtaining quality recommendation shall apply to the department and organization which have obtained the accreditation certificate from the Department.

Section 19, The Committee may, if it is found out that the person who has obtained the quality recommendation violates any term or condition contained in the relevant recommendation, take any of the following actions:

- (a) warning;
- (b) suspending the quality recommendation for a limited period;
- (c) cancelling the quality recommendation.

2.6.6.3. Myanmar Engineering Council Law (2013)

Section 34, If, whoever has received a registration certificate, is found to have breached any rules contained in the registration certificate or violated any prohibition contained in a rule, order or directive enacted under this law or in any stipulation of this law, the executive committee may take the following administrative actions-

- (a) giving a warning;
- (b) assessing a suitable fine;
- (c) suspending the registration certificate;
- (d) cancelling the registration certificate.

Section 37, No one shall perform any engineering work and technological work which are specified as being dangerous to the public by a rule enacted under this law without having received a registration certificate issued by the council, except for engineers appointed in a government department or an organization in the performance of their duties.

2.6.6.4. The Factories Act (1951)

The Factory Act stipulates the work condition of the workers in the factory such as working hours, worksite safety and health measures. According to the act, worker at age 18 or over shall not work exceed 8 working hours per day or 44 hours per week, and the working days shall not exceed 6 days per week. As for worksite safety, the factory shall be kept clean with proper ventilation, light and heat and the workspace shall be situated away from drains, latrines, or other things which create a bad or unhealthy smell. Some of the important sections of the Act are as follows.

In the section of the Power to require specifications of defective parts or tests of stability of Section 47 mentions that if it appears to the Inspector that any building or part of a building, or any part of the passage ways, machinery or plant in a factory is in such a condition that it will be dangerous to human life or safety, he may serve on the manager of the factory an order in writing requiring him before a specified date-

To furnish such plans, specifications and other particulars as may be necessary to determine whether such building, passage ways, machinery or plant can be used with safety, or

To carry out such tests in such manner as may be specified in the order and to inform the Inspector of the results thereof.

Section 48,

(1) The President may make rules requiring that in any specified factory or class of factories where in more than two hundred and fifty workers are ordinarily employed, a canteen adequate for the use of workers shall be provided and maintained by the occupier.

(2) Without prejudice to the generality of the foregoing power, such rules may provide for

the date by which such canteen shall be opened;

the plans of the canteen to be constructed, and the method of accommodation, furniture and other equipment to be provide therein;

the foodstuffs to be served therein and the charges to be made there for; and

the constitution of a committee for the management of the canteen and the inclusion of workers' representative there on.

Section 49,

In every factory wherein more than one hundred workers are ordinarily employed adequate and suitable rest-sheds or rest rooms and an adequate and suitable lunch room, with drinking water facilities, where workers can take meals brought by them, shall be provided and maintained for the use of the workers:

Provided that any canteen maintained in accordance with the provide

Section 7 of working hours of adults mentions in Section 59 that no adult worker shall be required or allowed to work in a factory for more than forty-fours hours in a week;

Provided that an adult male worker in a factory engaged in work which for technical reasons must be continuous throughout the day may work forty-eight hours in a week.

Section 62, subject to the provision of section 59 no adult worker shall be required or allowed to work in a factory for more than eight hours in any day.

2.6.6.5. Private Industrial Enterprise Law (1990)

Section 27, An entrepreneur:

- (a) in distributing and selling the goods he has produced shall not sell without a trade mark;
- (h) shall not violate any provision of section 13;
- (c) shall not fail to comply with any order or decision passed by the Minister and the Director Genera

2.6.6.6. Prevention of Hazard from Chemical and Related Substance Law (2013)

Section 3, The Central Leading Board may lay down the following relevant policies in respect of the prevention of hazard from chemical and related substances:

- (a) performing the sticking pictogram for being least the health impacts and accident injuries in the occupational area according to the prescribed standards and norms of the Globally Harmonized System (GHS);
- (b) making the necessary arrangements to be safety of the occupational area and issuing orders and directives for preventing and decreasing the accident;
- (c) laying down the proliferation plans on knowledge, and safety of chemical and related substances to administrators, license holders, public and workers;
- (d) cooperating with local and foreign governmental departments, organizations and non-governmental organizations in respect of safety management for chemicals hazard.

Section 15, Before the license holder commences the operation of the relevant chemicals and related products:

- (a) The safety and durability of the equipment shall be inspected by the relevant supervisory and inspection bodies.
- (b) Those who will be employed in relevant foreign courses or government departments; They must attend the chemical and related materials risk prevention courses and skill courses opened by government organizations.

Section 16, The license holder shall,

- (b) To ensure safety in the handling and use of chemicals and related materials, he must follow the instructions himself, and ensure that the employees in the business follow them precisely.
- (c) Chemicals and associated materials industry must have sufficient safety equipment, and free personal protective equipment and uniforms must be issued to those working in the industry.
- (d) occupational safety equipment for workers in the chemical and related industries; Provide training to properly use personal protective equipment and uniforms; Training and instruction shall be provided as necessary.
- (e) the health of people and animals and the environment and whether it is vulnerable to harm must be inspected by the relevant supervisory and inspection teams.
- (f) Those who will work in the chemical and related products business shall be allowed to work only after a health check-up and confirmation that they are healthy

to work in the business. Records of their health checks must be properly maintained.

- (g) In case of permission to store hazardous chemicals or related materials, a copy of the notification of approval shall be sent to the relevant Township General Administration Department.
- (h) In case of using materials that cause fire hazards or explosive materials, if working in a business that has a risk of fire, the relevant Fire Department's guide consent must be obtained in advance.
- (i) When transporting chemicals and related materials domestically, they must carry only the permitted amount in accordance with the specified terms.
- (j) If chemicals and related materials are to be changed and transported from one licensed location to another location, permission must be obtained from the central regulatory body.

Section 17, The licensee shall, in connection with the business of chemicals and related materials, treat both humans and animals. In case of damage to the environment, insurance must be kept by the conditions for compensation.

Section 22, The holder of the registration certificate must comply with the terms of the registration certificate as well as the orders and instructions issued by the Central Supervisory Board from time to time.

Section 27, License holders must comply with the following to control, prevent, and mitigate risks associated with chemicals and related materials:

- (a) classifying the level of risk according to the properties of the chemical and related materials to prevent risk;
- (b) displaying the safety level record and hazard warning symbol;
- (c) safety devices to prevent and mitigate accidents; Having personal protective equipment and attending training to learn how to use it properly;
- (d) transportation of chemicals and related materials; to be in possession; storage using Compliance with provisions relating to disposal.

2.6.6.7. Prevention of Hazard from Chemical and Related Substance Rules 2016 (Amended 2018)

The Ministry of Industry issued the Prevention of Hazard from Chemical and related Substances Rules on 12th January, 2016. The rules mentioned the aspects of the prevention of hazard from chemical and related substances.

2.6.6.8. The Electricity Law (2014)

The objectives of this laws are as follows:

- (g) to have the right to use the electric power which has the standardized voltage, current, and frequency by the users of electric power and to protect from causing damages to the electrical equipment of users due to the electric power which is not consistent with standardization
- (h) to adhere in accord with the international environmental protection treaties which Myanmar has ratified.

Section 20, The permit holder shall abide by the rules, regulations, bye-laws, notifications, orders, directives and procedures issued by the Ministry in carrying out the electrical business contained in the permit.

Section 21, (a) The permit holder shall, if causes damages and losses to any person and entity for failing to abide by this laws, rules, procedures, regulations, bye-laws, order and directives and failing to abide by the prescribed qualities and standardization, be liable according to law.

Section 24, If damages or losses arise to any other electric power user or any electrical business due to negligence of any electric power user, the calculated compensation in accord with the method prescribed by the Ministry for the value of damage or loss shall be paid.

Section 27, In the event of electricity hazard occurs in respect of generation, transmission, distribution and utilization of electric power, the permit holder and the electrical authorized person shall report to the Chief Inspector and in-charge of the relevant department as soon as possible.

Section 29, The Ministry shall inspect the specification of quality and standardizations in respect of the factories, equipments installed to them, business buildings, and electrical equipment which are manufactured, imported and sold from the local and foreign country.

Section 33, The Chief Inspector, Inspectors and persons conferred duty by them have the right to enter and inspect any place or building to perform their duties in accord with stipulations.

Section 40, The permit holders shall carry out in accord with the rules, standardizations and procedures issued by the Ministry and shall be subjected to necessary inspection of relevant Government department and organizations.

Section 68, If a person is injured, or disabled or killed by the electric shock or outbreak of fire due to negligence or default of the permit holder or the person designated by him, the aggrieved person shall have the right to claim for compensation from the permit holder as follows:

- (a) if the aggrieved person is applied to the existing Workmen's Compensation Act, the compensation prescribed under such law;
- (b) if the aggrieved person is not applied to the existing Workmen's Compensation Act, the compensation prescribed by the rules issued under this Law.

2.6.7. Laws Relating to Economic and Investment

2.6.7.1. Export Import Law (2012)

Section 5, No person shall export or import restricted, prohibited and banned goods.

Section 6, Without obtaining license, no person shall export or import the specified goods

which is to obtain permission.

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

the license.

2.6.7.2. The Myanmar Companies Law (2017)

Section 2, 2. The following types of company may be incorporated and registered under this law:

- (a) a company limited by shares, which may be either:
 - (i) a private company which may have no more than 50 members not including persons who are in the employment of the company; or
 - (ii) a public company which may have any number of members;
- (b) a company limited by guarantee which may have any unlimited number of members; and
- (c) an unlimited company which may have any number of members.

Section 4, (a) A company registered under this law shall have the following facts:

- (i) a name;
 - (ii) a constitution;
 - (iii) at least one share in issue (provided that a company limited by guarantee need not have a share capital);
 - (iv) at least one member;
 - (v) subject to sub-section (vi), at least one director who shall be ordinarily resident in the Union;
 - (vi) if the company is a public company, at least three directors, one of whom shall be a Myanmar citizen who is ordinarily resident in the Union; and
 - (vii) a registered office address in the Union.
- (b) A company may appoint a company secretary and have a common seal.

2.6.7.3. Myanmar Investment Law 2016 (Amended 2019)

Section 50, (a) An investor who obtains permit or endorsement under this Law has the right to obtain a long-term lease of land or building from the owner if it is private land or building, or from the relevant government departments or government organizations if it is land managed by the Government, or land or building owned by the

Union in accordance with the stipulations in order to do investment. Citizen investors may invest in their own land or building in accordance with the existing laws.

(b) Foreign investor may lease land or building either from the government or government organizations or from owners of private land or building from commencing on the date of receipt of the permit or endorsement of the Commission up to an initial period of (50) year in accordance with the stipulation.

(c) After the expiry of the term of the right to use land or building or the period of right to lease of land or building permitted under subsection (b), a consecutive period of (10) year and a further consecutive period of (10) year extension to such period of lease of land or building may be obtained with the approval of the Commission.

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

(e) The Government may grant more favorable terms and conditions for the lease of land and the use of land by Myanmar citizen investors.

(f) The Commission shall obtain the approval of the Pyidaungsu Hluttaw through the Government, when granting an extension to investors for the rights to lease land or building and the rights to use the land or building in this Law, in less-developed and remote region for the purpose of the development around the Union.

Section 51, The investor:

- (a) may appoint any citizen who is a qualified person as senior manager, technical and operational experts, 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 manager, technical and operational experts, and advisors;
- (c) shall appoint only citizens for works which do not require skill;
- (d) shall appoint skilled citizen and foreign workers, technicians, and staffs by signing an employment contract between employer and employee in accordance with the labour laws and rules;
- (e) shall ensure to obtain the entitlements and rights in the labour law and rules, including minimum wages and salary, leave, holiday, overtime fee, damages, compensation of the workman, social welfare, and other insurance relating to workers in stipulating the rights and duties of employers and employees and the occupational terms and conditions in the employment contract.
- (f) shall settle disputes arisen among employers, among workers, between employers and workers and technicians or staff in the investment in accordance with the existing law.

Section 65, The investor:

- (a) shall respect and comply with the customs, traditions, and traditional culture of the ethnic groups in the Union;

- (b) shall establish and register a company or sole proprietorship or legal entities or branches of such entities under the Laws in order to invest;
- (c) shall abide by the terms and conditions, stipulations of a special license, permit, and business operation certificates issued to them, including the rules, notifications, orders and directives and procedures issued by this Law and the existing laws, terms and conditions of contract and tax obligations;
- (d) shall carry out in accordance with the stipulations of the relevant department if it is, by the nature of the business or by other need, required to obtain any license or permit from the relevant Union Ministries, government departments and government organizations, or to carry out registration;
- (e) shall immediately inform the Commission if it is found that natural mineral resources or antique objects and treasure troves are not related to the investment permitted above and under the land on which the investor is entitled to lease or use and not included in the original contracts. If the Commission allows, the investor shall continue to carry out the investment in such land, and if not allowed, the investor shall transfer and carry out, by obtaining the permission, at the substituted place which is selected and submitted by him;
- (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 the existing laws, rules, procedures and best standards practiced internationally for his 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 statements, 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 the existing laws for any breach of employment contracts, closure of investment, sale and transfer of investment, discontinuation of investment, or reduction of the workforce;
- (j) shall pay wages and salaries to employees in accordance with the existing 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 the existing 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 his investment, to abide by the existing laws, rules, orders and directives, and the culture and traditions of Myanmar;
- (m) shall respect and comply with the labour 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 socio-economic losses caused by logging or extraction of natural resources which are not related to the scope of permissible investment, except carrying out the measures 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 the activities of the investments which obtained permit or endorsement of the commission.

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.

2.6.7.4. Myanmar Investment Rules (2017)

Rules 202 states the Investor must comply with the conditions of the Permit and other applicable laws when making an investment.

Rules 203 states the Investor shall fully assist while negotiating with the Authority for settling the grievances of the local community that have been affected due to Investments.

Rules 206 states 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.

Rules 212 states 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.

2.6.7.5. Myanmar Insurance Law (1993)

Section 15 states owners of motor vehicles shall affect compulsory Third Party Liability Insurance with the Myanmar Insurance.

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

2.6.8. Laws Relating to Workers and Work Place

2.6.8.1. Labour Organization Law (2011)

Section 18, The labour organization has the right to demand the relevant employer to re-appoint a worker if such worker is dismissed by the employer and if there is cause to believe that the reasons of such dismissal were based on labour organization membership or activities, or were not in conformity with the labour laws.

Section 19, The labour organizations have the right to send representatives to the Conciliation Body in settling a dispute between the employer and the worker. Similarly, they have the right to send representatives to the Conciliation Tribunals formed with the representatives from the various levels of labour organizations.

Section 20, In discussing with the Government, the employer and the complaining workers in respect of worker's rights or interests contained in the labour laws, the representatives of the labour organization also have the right to participate and discuss.

Section 21, The labour organizations have the right to participate in solving the collective bargains of the workers in accord with the labour laws.

Section 22, The labour organizations shall carry out peacefully in carrying out holding of meetings, going on strike and carrying out other collective activities in accord with their procedures, regulations, by-laws and any directives prescribed by the relevant Labour Federation.

Section 43, No employer shall, without permission of the relevant conciliation body, lock-out a public utility service or service which is not included in public utility service.

Section 44, No employer shall:

- (a) lock-out a work due to such dispute during the pendency of a trade dispute settlement;
- (b) carry out an illegal lock-out which is involved with any provision contained in sub-sections (a) and (c) of section 41;
- (c) dismiss a worker who opposes an illegal lock-out which is involved with any provision contained in sub-sections (a) and (c) of section 41;
- (d) dismiss a worker for his membership in a labour organization for the exercise of organizational activities or participating in a strike in accord with this Law.

2.6.8.2. The Labour Organization Rules (2012)

Rule 29, The employer shall recognize the labour organizations of his trade as the organizations representing the workers.

Rule 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.

2.6.8.3. The Workmen's Compensation Act (1923)

Section 13, Where a workman has recovered compensation in respect of any injury caused under circumstances creating a legal liability of some person other than the person by whom the compensation was paid to pay damages in respect thereof, the person by whom the compensation was paid and any person who has been called on to pay an indemnity under section 12 shall be entitled to be indemnified by the person so liable to pay damages as aforesaid.

2.6.8.4. Employment and Skill Development Law (2013)

Section 5, (a) (1) An employer must sign an employment agreement within 30 days after appointing an employee to work. However, government departments It shall not be related to the appointment of permanent staff in the government organization.

(2) If a preliminary training period and a trial period are set before employment, the trainee shall not be subject to the requirements of sub-section (1).

(b) The employment agreement must include the following:

- (1) type of employment;
- (2) the trial period;
- (3) wages; salary,
- (4) location of employment;
- (5) contract term;
- (6) working hours;

- (7) resting day; holidays and vacations;
- (8) working overtime;
- (9) meal plan during working hours;
- (10) accommodation,
- (11) medical treatment;
- (12) before going to the workplace; arranging transportation and travel;
- (13) Terms and conditions to be followed by workers.
- (14) If the employer attends the training, the period of time the employee agrees to continue working after attending the training;
- (15) resignation and termination of employment;
- (16) termination of contract;
- (17) Responsibilities according to the terms of the contract;
- (18) the employer to the employment agreement contract; Two workers agreed to cancel;
- (19) other matters;
- (20) amending and supplementing contract terms; setting
- (21) General.

(c) The terms of employment included in the employment agreement must be consistent with existing laws, and the employee's benefits must not be less than those provided for in existing laws.

(d) If the work is completed earlier than the period specified in the contract of employment agreement; For unexpected reasons, the whole business or even if a part of the business or a region has to be terminated, If the issue of termination of employment arises due to various reasons.

The Ministry shall issue a notification to pay the specified compensation.

- (a) The contract of employment agreement signed under sub-section (a) of the government department; Day laborers temporarily appointed to government organizations; It must also apply to unskilled workers.
- (b) The employer and the employee or employees may, by mutual agreement, amend the terms of employment and benefits in the employment agreement as necessary in accordance with applicable law.
- (c) The employer must send a copy of the employment agreement signed by the employer and the employee to the relevant employment and labor search office and obtain approval within the specified period.
- (d) Employment agreements entered into prior to the enactment of this Act shall be valid until the expiration of the original contract.

Section 14, The employer must carry out training programs to increase the level of job skills of the workers who are to be employed in his business and the workers who are currently working in the business in accordance with the policy of the skill development group according to the needs of the business.

Section 30, Conducting other matters.

- (a) the total wages paid by an employer of industry and services to workers at the level of supervisors and below that level in his business; a sum of not less than zero and fifteen percent of the salary must be paid to the fund without fail every month.
- (b) The contribution paid under sub-section (a) is the wages of the workers. No deduction from salary.

2.6.8.5. Occupational Safety and Health Law (2019)

This law was enacted on 15th March 2019 with the objectives of

- (a) To implement Occupational Safety and Health matters effectively in the respective industries or businesses
- (b) To determine the duties of relevant persons applicable under this law including employers and workers to lessen and mitigate occurrence of occupational disease and occupational accidents
- (c) To cause relevant persons applicable under this law, employers and workers to take precaution and prevention against occupational hazards and occupational diseases
- (d) To improve the productivity and health of workers by preventing the occurrence of occupational accidents and occupational disease for their safety
- (e) To create workplaces that are safe and good for health by prescribing the occupational safety and health standards relevant to the Union's status after considering international and regional standards and
- (f) To support and help research activities carried out for the development of occupational safety and health matters.

Section 12, The employer shall:

- (a) appoint a person in-charge for occupational safety and health according to the type of industries to closely supervise the safety and health of the workers in accordance with the specifications of the Ministry;
- (b) establish each Occupational Safety and Health Committee comprising equal number of employers and workers' representatives according to the types of industry without lessening the number of workers prescribed by the Ministry to be safe and healthy workplace, in accordance with the specifications of the Ministry. In establishing the Committee, occupational safety and health matters for female workers shall be considered according to the nature of work.

Section 14, The persons in-charge for occupational safety and health shall comply with this Law, and rules, orders, directives and, procedures issued under this Law to be safe and healthy workplace.

Section 16, The inspectors shall inspect the workplace under this Law for occupational safety and health, instruct the respective employer on the facts to be observed, and report to the chief inspector.

Section 17, For the purposes of occupational safety and health in line with the code of conduct, inspectors are entitled to:

- (a) enter, inspect and examine any workplace applicable to this Law without a warrant by showing their identity cards at any time;
- (b) inspect and copy all records, books, and documents relating to the workplace and process, and seize any of them as exhibits, if necessary;
- (c) take photographs and video records of the workplace situations and processes which may be harmful to the occupational safety and health;
- (d) assess and record the amount of impact and time on the workplace environment, due to noise, illumination, temperature, dust, fume and hazardous materials, with the assistance of an expert on the respective subjects, if necessary;
- (e) inquire any person working at the workplace during working hours about contracting occupational diseases or potential situations with the assistance of a certified doctor;
- (f) ask the responsible person from hospitals and medical clinics to confidentially send the medical report of a worker who is receiving medical treatment for injuring in a workplace accident or suffering from an occupational disease or information about death or the autopsy report requested with the form prescribed by the Department.

Section 18, The inspectors shall issue a temporary order to the employer for work stoppage partially or wholly with the approval of the chief inspector and inform the relevant departments, if necessary, if any occupational accident, disease, dangerous occurrence or major accident happens or is likely to happen due to any of the following facts:

- (a) impropriety to work continuously due to the unsafe workplace conditions, unsafe acts of workers, the existence of hazardous material and machinery at the workplace, or parts of machinery or laying out of machinery at the workplace, and working practices;
- (b) impropriety to work continuously due to violation of or failure to comply with any provision of this Law;
- (c) assumption to be harmful to workers at the workplace due to any act of negligence and carelessness or omission by any person;
- (d) necessity to evacuate workers for safety due to the imminent danger situation of the occupational injury;

Section 26, Any employer shall:

- (a) arrange to assess the risk severity of material and machinery used in the workplace and process, if necessary;
- (b) arrange to assess the risk of occupational factors, if necessary;
- (c) arrange to conduct medical examination for workers by the certified doctor in accordance with the specifications whether occupational diseases are contracted;
- (d) arrange to be safe and healthy workplace based on the findings of subsections (a), (b) and (c);

- (e) provide the suitable personal protective equipment, things and facilities adequately prescribed and allowed by the Department to the workers with free of charge, and make sure them to wear at the workplace;
- (f) take the preventive measures and emergency response preparedness;
- (g) establish dispensary, appoint registered doctors and nurses, and provide necessary medicines and facilities at the workplace where the workers are not less than the number of workers prescribed by the Ministry;
- (h) cause to attend the training on occupational safety and health prescribed by the Ministry to the managers and workers from the respective type of work or branch including himself and members of the Occupational Safety and Health Committee;
- (i) arrange to give information immediately to the person in-charge for occupational safety and health or managers if any worker faces the situation which is likely to happen occupational injury or harm his life and health;
- (j) arrange to be safe and healthy for persons at the work place due to material and machinery used in the workplace or process, or wastes;
- (k) arrange to stop the process immediately, remove the workers from the workplace, and perform necessary evacuation and rescue procedures in case of imminent danger. If possible, workers are transferred to and worked at other suitable safety workplaces;
- (l) have instructions, warning signs, notices, posters and signage regarding occupational safety and health in accordance with the specifications;
- (m) arrange to follow the precautions in accessing to the restricted workplaces where may be harmful;
- (n) arrange to distribute or disseminate the manual and guidance regarding the occupational safety and health issued by respective Ministries to workers and persons related to the workplace for acquiring knowledge, technology and skills;
- (o) design the fire security plan and organize the fire-drills, and train to use systematically fire extinguishers and devices;
- (p) allow the chief inspector and inspectors to inspect the workplace, inquire, ask for documents or seize exhibits;
- (q) employ workers within the prescribed working hours at hazardous work and workplaces;
- (r) bear any expenditure regarding occupational safety and health measures.

Section 27, No employer shall dismiss or suspend any worker due to one of the following reasons:

- (a) before obtaining the medical report of a registered doctor for being injury in the workplace or the medical report of a certified doctor for contracting occupational disease;
- (b) complaint about a matter of unsafe or health risk;
- (c) undertaking the functions and duties of the Occupational Safety and Health Committee;

- (d) no longer working at the imminent danger situation or situation to be contracted the occupational disease.

Section 34, An employer, in accordance with the specifications, is liable to:

- (a) inform the Department in case of an occupational accident, dangerous occurrence and major accident;
- (b) submit a report with the medical report of the certified doctor to the Department, in case of any worker contracted any of the prescribed occupational diseases or being or likely to be occupational poisoning due to any material or process.

Section 36, (a) Inspectors shall investigate the occupational accident, dangerous occurrence, occupational disease, and occupational poisoning if they become aware of.

- (b) No person shall, without the permission of the chief inspector, remove, destroy, add or alter the whole or part of material, machinery, equipment, layouts, and documents related to the occupational accidents, dangerous occurrences, occupational diseases and occupational poisoning.
- (c) The prohibition of subsection (b) shall not be applicable to the activities necessarily for the safety of life and property, and rescue operations.
- (d) The chief inspector may allow to remove, detach, add and alter the material, machinery, equipment and layouts in case of causing adverse consequences due to the prohibition under subsection (b).

2.6.8.6. The Minimum Wage Law 2013 (Amended 2023)

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 commerce, production business and service in cash. Moreover, if the specific benefits, interests or opportunities are to be paid, it may be paid in cash in accord with the stipulations or jointly in some cash and in some produce prescribed in local price according to the desire of the worker;
- (e) may pay jointly in some cash and some produce prescribed in local price according to the local custom or desire of the majority of workers or collective agreement in paying the minimum wage to the workers and working in the agriculture and livestock breeding business. 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 record the lists, schedules, documents and wages of the workers correctly in accord with the stipulation;
- (c) shall report the lists, schedules and documents recorded under sub-section (b) to the relevant department in accord with the stipulations;
- (d) shall accept the inspection when summoned by the inspection. Moreover, he shall produce the said lists and documents when so required;
- (e) shall allow the entry and inspection of the inspector workplaces of commerce, production and service, agriculture and livestock breeding and give necessary assistances;
- (f) shall give them holiday for medical treatment in accord with the stipulations if the workers cannot work due to sickness;
- (g) shall give holiday without deducting from the minimum wage, in accord with the stipulations if the funeral matter of the family of worker or his parent occurs.

Section 15, The worker who is entitled to obtain the wage and other benefits under section 14:

- (a) if he does not obtain all wages or other benefits entitled to be obtained, or obtains less than the stipulated minimum wage, may submit to the relevant Union Territory Committee, Region committee or State committee and Department within one year from the day he is entitled to obtain such injured wages and other benefits;
- (b) may sue under civil proceeding for all wages that is entitled to obtain.

Section 16, If an employer is convicted by a court for his failure to pay the minimum wages and other benefits stipulated under this Law or for the payment to worker less than such minimum wage and ordered to pay defaulted wages and other benefits to the relevant worker as fine, and if such worker does not obtain fully the wages and other benefits which is entitled under section 14, it shall not affect the right to institute civil proceeding for such wages and benefits.

The National Committee for Minimum Wage finally issued the Notification 1/2023 on 5th October 2023, replacing the Notification 2/2018 that the minimum wages have been revised in Myanmar from 01 October 2023. The minimum wage for an 8-hour workday has been increased from MMK4,800.00 to MMK5,800.00 per month through an allowance of MMK1,000. This stipulated the rate of minimum wage applies uniformly to

all workers nationwide and across all industries except those in small, family-run businesses with a workforce of fewer than 15 workers.

2.6.8.7. The Minimum Wages Rules (2013)

Rule 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 parents' 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.

Rule 44, The employees:

- (a) shall perform to fulfill the productivity in accord with the employment grade of skill;
- (b) shall be responsible to continue to serve the duty in accord with the employment grade of skill, if sent by the employer to attend the skill training;
- (c) unable 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, he is entitled to enjoy the leave and holiday act 1951.
- (d) in the event of family or parents' funeral affairs, his entitled remuneration should not be deducted and shall be entitled to enjoy according to leave and holiday act 1951;
- (e) salary earner, wages earner, piece rate employees are entitled to enjoy allowed leave and public holidays;
- (f) if the remuneration given to the skillful and competent employee is more than the minimum wage, the said remuneration shall be continued to be confirmed;
- (g) if employment agreement, any other contract, the accepted remuneration is less than the minimum wage the said employment agreement or the prescribed remuneration contained in the agreement shall be repealed.

2.6.8.8. The Payment of Wages Law (2016)

The Payment of Wages Act was firstly enacted in 1936, the act was repealed on 25th January 2016 as the Payment of Wages Law, 2016. The purpose of this law is the employer must pay wage or salary to the employee (working part-time, weekly or monthly) within a designated time frame. This Act contains 9 main Chapters.

In Chapter 2 (Method of Payment and period) of the law, Section 3 and 4 describe the following:

Section 3, The employer must;

- (a) Pay in local currency or foreign currency recognized by the central bank of Myanmar. This may be in cash, check or deposit into the bank account of the Employee.
- (b) Moreover, pay can be in the mean of;
 - i. Totally in cash or half the cash and half in things set as local price according to the local price to those employees working in trade, manufacturing and service sector.
 - ii. Totally in cash or half the cash and half in things set as local price according to local traditions or common agreement to those working in agriculture and livestock sectors. However, this must be for the sake of the employees and their families. Moreover, it must be reasonable and fair.
 - iii. An employee shall receive the payment for 60 days when he/she is in Alternative Civil Service.

Section 4. An employer must pay for;

- (a) Part-time, daily, weekly or other part-time job, temporary or piecework when the work is done or at the agreed time.
- (b) According to the Section (a), the period shall not exceed one month.
- (c) Wages for the permanent work must pay per monthly basic as below.
 - i. Must pay at the end of the payment period when there are not more than 100 workers.
 - ii. If there are 100 workers and above, pay must not be administered later than 5 days after the end of the payment period.
- (d) Upon termination, wages must pay within 2 days from the date of termination.
- (e) If a resignation letter submitted, wages must pay at the ending day of the payment period.
- (f) If an employee dies, wages must pay to legally recognized person within 2 working days after the day he/she died.
- (g) All wages must pay during the working day.

Section 5, If an employer encounters difficulties to make payment under sub-section (c) of the Section 4 due to any unexpected condition, including natural disaster, the

employer shall submit that which date has been altered for the payment of wages with the consent of the workers to the Department on reasonable ground.

Section 14, The worker has the right to enjoy overtime wages stipulated by the law if he works over time.

2.6.8.9. The Leave and Holiday Act (1951)

Section 5,

(1) An employee shall be admissible to casual leave with wages or pay (as the case may be) aggregating six days in a year: Provided that he shall only be admissible to a maximum casual leave of three days at any one time.

(2) Casual leave shall not be combined with any other kind of leave.

(3) If the employee does not take the casual leave which he is entitled to within the year, it shall lapse.

2.6.8.10. The Social Security Law 2012 (Amended 2014)

Section 3, The objectives of this Law are as follows:

- (a) Causing to support the development of the State's economy through the increase of production to enjoy more security in social life and health care of workers who are major productive force of the Union by the collective guaranty of the employer, worker and the Union for enabling to fulfill health and social needs of the workers;
- (b) Causing to enjoy more security in social life and health care by the public by their voluntary insurance;
- (c) Causing to raise public reliance upon the social security system by providing benefits which are commensurate with the realities;
- (d) Causing to have the right to draw back some of the contributions paid by the employers and the workers as savings, in accord with the stipulations;
- (e) Causing to obtain the right to continued medical treatment, family assistance benefit, invalidity 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, decease and employment injury of the workers.

Section 11, (a) The following establishments shall be applied with the provisions for compulsory registration for social security system and benefits contained in this Law if they employ minimum number of workers and above determined by the Ministry of Labour in co-ordination with the Social Security Board:

- (i) 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;
- (ii) Government departments, Government organizations and regional administrative organizations which carry out business;
- (iii) development organizations;
- (iv) financial organizations;
- (v) companies, associations, organizations, and their subordinate departments and branch offices which carry out business;
- (vi) shops, commercial establishments, public entertaining establishments;
- (vii) Government departments and Government organizations which carry out business or transport businesses owned by regional administrative body, and transport businesses carried out with the permission of such department, body or in joint venture with such department or body;
- (viii) constructions carried out for a period of one year and above under employment agreement;
- (ix) businesses carried out with foreign investment or citizen investment or joint ventured businesses;
- (x) businesses relating to mining and gem contained in any existing law;
- (xi) businesses relating to petroleum and natural gas contained in any existing law;
- (xii) ports and out-ports contained in any existing law;
- (xiii) businesses and organizations carried out with freight handling workers;
- (xiv) Ministry of Labour and its subordinate departments and organizations;
- (xv) establishments determined by the Ministry of Labour, from time to time, that they shall be applied with the provisions of compulsory registration for Social Security System and benefits contained in this Law in co-ordination with the Social Security Board and with the approval of the Union Government.

Section 15, (a) The following funds are included in the Social Security Fund:

- (i) health and social care fund;
- (ii) family assistance fund;
- (iii) invalidity benefit, superannuation benefit, and survivors' benefit fund;
- (iv) unemployment benefit fund;
- (v) other social security fund for social security system of compulsory registration and contribution stipulated by the Ministry of Labour, in co-ordination with the Social Security Board, under clause (ii) of sub-section (e) of section 13;
- (vi) other social security fund stipulated that contribution may be paid after voluntary registration under clause (ii) of sub-section (e) of section 13;
- (vii) Social Security Housing Plan fund.

(b) The employers and workers of establishments shall pay contributions after effecting compulsory registration to the fund contained in clauses (i), (iii), (iv) and (v) of sub-section (a).

Section 18 (b), The employer shall deduct contributions to be paid by worker from his wages together with contribution to be paid by him and pay to the social security fund. The employer shall also incur the expense for such contribution.

Section 48 (b), The employers may affect insurance by registering voluntarily for the workers who are not applied to provisions of compulsory registration for employment injury benefit insurance system and by paying stipulated contribution to employment injury benefit insurance fund.

Section 75, The employers of establishments applied by this Law:

- (a) shall prepare and keep the following records and lists correctly and submit to the relevant township social security office in accord with the stipulations:
 - (i) records and lists of workers' daily attendance;
 - (ii) records on appointment of new workers, employing worker by changing of work, termination, dismissal and resignation;
 - (iii) records on promotion and paying remuneration;
 - (iv) records and lists of employer, manager, and administrator and records on change of them;
- (b) shall inform the relevant township social security office if the following matters arise:
 - (i) changes in number of workers and address of establishment;
 - (ii) change of employer, change of business, suspension of work, and close-down of work;
 - (iii) employment injury, decease and contracting diseases;
- (c) shall submit records of work and lists if requested by inspectorate or official assigned by the Social Security Head Office and various levels of Regional Social Security Office under this Law.

2.6.8.11. The Settlement of Labour Dispute Law 2012 (Amended 2019)

Section 3, In any trade in which more than 30 workers are employed to obtain the collective agreement by negotiating, the employer shall:

- (a) if there is any labour organization, shall form the Workplace Coordinating Committee with the view to make a collective bargaining as follows:
 - i. two representatives of workers nominated by each of the labour organizations;
 - ii. representatives of worker and an equivalent number of representatives of employer;
- (b) if there is no labour organization, shall form the Workplace Coordinating Committee as follows:
 - i. two representatives of workers elected by them;

- ii. two representatives of employer.

Section 15, The dispute relevant to interest that cannot be settled by negotiating and coordination between employer and the labour organizations, the employer may appoint the representatives of the employer or the labour organizations may appoint the representative of the workers before the period of conciliation. Where no labour organization exists, the workers shall elect their representatives.

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

Section 24, The relevant Conciliation Body shall, in respect of the collective dispute known or received by the complaint of employer or worker, in respect of the dispute; information sent by the Minister or the Region or State Government or any other means, carry out as follows:

- (a) conciliating so as to be settled within three days, not including the official holidays, from the day of knowing or receipt of such dispute;
- (b) concluding mutual agreement if the settlement is reached in conciliating under subsection (a), before the Conciliation Body.

Section 34, No one shall do the following in the any freshwater fisheries waters:

- (e) catching fish or causing mischief with explosive substance, poison, chemicals and dangerous material of a like nature;
- (f) catching fish by a prohibited method and fishing implement;
- (g) catching fish of a prohibited species and size;
- (h) catching fish during a prohibited period and at a prohibited place.

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 one shall cultivate agricultural crops within the boundary of a fishery creek.

Section 40, No one shall cause harassment of fish and other aquatic organisms or pollution of the water in a freshwater fisheries water.

Section 51, If any employer, in the course of settlement of dispute, commits any act or omission, without sufficient cause, which by causing a reduction in production resulting so as to reduce the workers' benefits shall be liable to pay full compensation in the amount determined by the Arbitration Body or Tribunal. Such money shall be recovered as the arrear of land revenue.

2.6.9. Laws Relating to the Transportation

2.6.9.1. The Highways Law 2000 (Amended 2014)

Section 8, Whoever commits any of the following acts shall, on conviction, be punished with imprisonment for a term which may extend to months or with fine or with both: -

- (a) disturbing or obstruction the work of constructing, extension, repairing and maintenance of highway;
- (b) driving a vehicle the traffic of which and the type of the wheel of which is prohibited and a vehicle with a laden weight or using an iron rim of cart wheel on highways;
- (c) planting, cutting or destroying tree or crops within the boundary of the highway without permission of Public Works;
- (d) disturbing or obstructing public works in clearing of trees which cause danger.
- (e) damaging the road, bridge and terrain without the permission of the public construction work within the boundary of the main road;
- (f) Erection of advertising signs within the boundary of the main road without the permission of the public construction industry;
- (g) Roadside restaurants within the boundaries of the main road without the permission of the public construction industry. Building and selling shops.

2.6.9.2. Vehicle Safety and Vehicle Management Law (2020)

Section 9, The Ministry shall undertake the following matters with the approval of the Union Government -

- (a) Determining and restricting the areas where domestic vehicles are allowed to travel.

Section 12 (c), The Ministry shall approve and publish the standards and criteria relating to the safety and environmental protection regulations about the initial registration of motor vehicles.

Section 14 (r), The powers and responsibilities of the Department are as follows - Speed setting for the safe movement of vehicles traveling on public roads.

Section 18, The owner of the vehicle -

- (a) The vehicle must be maintained and repaired following the standards set by the Department to drive it safely.

Section 81 (g), No one in a public place

- (g) Dangerous Goods shall not be loaded or transported in a vehicle without complying with the requirements;

2.6.9.3. Vehicle Safety and Vehicle Management Rules (2022)

Rule 5, The motor vehicle owner must register the motor vehicle with the relevant registration and submitted to the officer in the form prescribed by the Department.

Rule 7, The concerned registration officer shall receive the reservation under rule 5. Whether or not the specified documents are fully attached or comply with the standards

for safe driving, regardless of whether or not the motor vehicle is equipped, Export document, verify whether or not the motor vehicle does not meet the requirements. The registration of the motor vehicle must be completed.

2.6.9.4. Multimodal Transport Law (2014)

Section 3, The objectives of this Law are as follows:

- (a) to implement the provisions contained in international convention and promises contained in regional agreement related to the multimodal transport;
- (b) to support the development of commercial business systematically through the cooperation and coordination of multimodal transport operators in land and at abroad;
- (c) to cause more development of, effective and fast multimodal transport services to fulfill the requirements of international trade;
- (d) to perform operation by the multimodal transport operators in accord with the terms and conditions by registering under this Law;
- (e) to enable to enjoy fair interests between users and operators in multimodal transport services and to settle the problems peacefully arising thereof;
- (f) to reduce and free from difficulties and problems in every step-in transporting good through intermediary countries by formal method and to facilitate the transport of goods more quickly.

2.6.10. Laws Relating to the Emergency

2.6.10.1. The Myanmar Fire Force Law (2015)

The main objectives of this Law are as follows:

- (a) to prevent destruction of State-owned property, private property, cultural heritage and the lives and property of the public by fire and other natural disaster;
- (b) to organize the Fire brigade systematically and to train members of the fire brigade;
- (c) to carry out extinguishing fire, prevention and search and rescue when fire, other natural disaster, epidemic disease or any kind of sudden disaster occurs;
- (d) to educate, organize and incite extensively so as to achieve public cooperation when any disaster occurs;
- (e) to participate and help, if necessary, for the State safety, peace of the public and the rule of law.

The project proponent must comply with Section 14, The Reserve Fire Brigade shall:

- (a) accept supervision and inspection of the head of the relevant Department of Fire Services
- (b) coordinate with the relevant fire service personnel and members of the Auxiliary Fire Brigade in performing the activities of fire safety and in the occurrence of fire hazard, other disaster, epidemic disease or sudden disasters
- (c) accept the direction of the Department of Fire Services for training and acquiring skills and technology of fire safety.

Section 16, The person-in-charge of the Township Fire Services Department shall:

- (d) issue from time to time, the directives on fire safety to be abided by the residents in the city, ward or village - tract;
- (e) inspect or cause to inspect in accord with the stipulations whether the residents in the city, ward or village - tract abide by the directives issued under sub-section (a) and arrange to enable warning or taking action, as may be necessary, against those who do not abide by.

Section 25, The owner or manager of the factory, workshop, bus terminal, airport, port, hotel, motel, lodgings, condominium, market, department, organization or business exposed to fire hazard shall, in accord with the directive of the Department of Fire Services:

- (a) not fail to form the Reserve Fire Brigade;
- (b) not fail to provide fire safety equipment.

2.6.10.2. Natural Disaster Management Law (2013)

Section 12, The President may, after the declaration of being a natural disaster affected area, extend and alter the specified period and the area as may be necessary.

Section 14, Preparatory measures for natural disaster risk reduction before the natural disaster strikes include the followings:

- (a) prioritization of the natural disaster risk reduction by the National Committee and each Local Body;
- (b) carrying out improvement on early warning system of natural disaster;
- (c) applying education, knowledge and innovation to be a habit of safety and resilience at every level from the national level to the ward or village tract level;

- (d) incorporating measures of natural disaster risk reduction in development plans of the State;
- (e) establishing sound preparations to confront the natural disaster at every level from the national level to the ward or village tract level.

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

- (a) indentifying the area where the natural disaster is likely to strike and preparing the natural disaster risk assessment and drawing emergency plans;
- (b) assuring public awareness of knowledge of the natural disaster, keeping the early warning systems, training for search and rescue and holding rehearsal;
- (c) enhancing the capacity of the public for emergence of a disaster resilient community in compatible with climate change for reduction of damage and losses due to unforeseen disaster risk caused by climate change;
- (d) guiding, motivating and implementing active participation of the community including youth volunteers in the community-based natural disaster management activities and disaster reduction activities by the National Committee and Local Body;
- (e) issuing information and early warning to the public to enable timely evacuation of their properties and cattle to a safety area;
- (f) stockpiling to provide readily the minimum requirement of food and relief items and rehabilitation materials according to the type of natural disaster;
- (g) taking measures to enable to get assistance of the Defence Services, the Myanmar Police Force, the Fire Brigade, the Red Cross, volunteer organizations, civil societies and other non-government organizations for search, rescue and assistance expeditiously;
- (h) communications network for providing necessary assistance by foreign countries, international organizations and foreign regional organizations in case of serious damage and heavy losses caused by the natural disaster;
- (i) taking preparatory measures for rehabilitation and reconstruction of health, education, social and other sectors for improving better living standard after the natural disaster strikes;
- (j) performing other duties assigned by this Law in respect of the preparatory measures.

Section 16, Preventive measures to be carried out in the area where the natural disaster is likely to strike before the natural disaster include the followings:

- (a) building cyclone shelters and life-saving hillock-sanctuaries in the area where easy evacuation is impossible;
- (b) constructing embankments along the coast and in the possible flooded areas;
- (c) preservation of mangroves along the coast and planting fast-growing trees;
- (d) taking preventive measures according to the type of natural disaster;
- (e) performing other duties assigned by this Law in respect of the preventive measures.

Section 17, When the natural disaster strikes, emergency responses including search and rescue include the following:

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

Section 18, Rehabilitation and reconstruction activities to be carried out after the disaster include the following:

- (a) collecting data and confirming damage and losses due to natural disaster;
- (b) providing the continuation of sufficient food, relief items and rehabilitation items and appropriate financial assistance from the allotted funds to the victims;
- (c) laying down the plan for rehabilitation and reconstruction on the situation of damage and losses;
- (d) reconstructing buildings and houses damaged by the natural disaster in an appropriate place as disaster-resilient buildings;
- (e) rehabilitating to restore agriculture, livestock breedings and other vocations required for victims;
- (f) establishing reintegration into society by uplifting the mental affected person due to the natural disaster;
- (g) providing medical treatment to the victims and taking preventive measures against contagious diseases that is likely to cause as consequences;
- (h) taking measures for the continuation of students' studies out of the victims and reconstruction of schools;
- (i) taking measures for the safety of the victims and the rule of law in the disaster affected area;
- (j) coordination with the relevant body of prevention against human trafficking to the victims;
- (k) performing other duties assigned by this Law in respect of rehabilitation and reconstruction.

2.7. INTERNATIONAL AND NATIONAL GUIDELINES AND STANDARDS

2.7.1. National Environmental Quality Emission Guidelines and Standards

The National Environmental Quality (Emission) Guidelines (NEQG Guidelines) provide the basis for regulation and control of noise and vibration, air emissions, and liquid discharges from various sources to prevent pollution for purposes of protection of human and ecosystem health. The type of the proposed project is refining petroleum and this project will comply with guidelines applies to processing operations from crude oil to finished liquid products, including liquefied petroleum gas, motor gasoline, kerosene, diesel oil, heating oil, fuel oil, bitumen, asphalt, sulfur, and intermediate products (e.g., propane/propylene mixtures, virgin, naphtha, middle distillate, and vacuum distillate) for the petrochemical industry. Finished products are produced from the blending of intermediate products. Effluent levels of NEQG are shown in Table 2-2 and Table 2-3.

Table 2-2 Effluent Levels for Petroleum Refineries

Parameter	Unit	Guideline Value
5-day Biochemical oxygen demand	mg/l	30
Benzene	mg/l	0.05
Benzo(a)pyrene	mg/l	0.05
Chemical oxygen demand	mg/l	150
Chromium (hexavalent)	mg/l	0.05
Chromium (total)	mg/l	0.5
Copper	mg/l	0.5
Cyanide (free)	mg/l	0.1
Cyanide (total)	mg/l	1
Iron	mg/l	3
Lead	mg/l	0.1
Mercury	mg/l	0.02
Nickel	mg/l	0.5
Oil and grease	mg/l	10
pH	S.U.a	6-9
Phenol	mg/l	0.2
Sulphides	mg/l	1
Temperature increase	°C	<3b
Total nitrogen	mg/l	10c
Total phosphorus	mg/l	2
Total suspended solids	mg/l	30
Vanadim	mg/l	1

a Standard unit

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

c The effluent concentration of total nitrogen may be up to 40 mg/l in processes that include hydrogenation

Table 2-3 Air Emission Levels for Petroleum Refineries

Parameter	Unit	Guideline Value
Hydrogen sulfide	mg/Nm ^{3a}	10
Nickel	mg/Nm ³	1
Nitrogen oxides	mg/Nm ³	450
Particulate matter PM10 ^b	mg/Nm ³	50
Sulfur oxide	mg/Nm ³	150 (for sulfur recovery units) 500 (for other units)
Vanadium	mg/Nm ³	5

^aMiligrams per normal cubic meter at specified temperature and pressure

^bParticulate matter 10 micrometers or less in diameter

Table 2-4 Odor Level Guideline

Parameter	Guideline Value
Odor	5-10

2.7.2. Surface Water Quality Standard

The surface water quality is compared with TCVN 5942-1995: Water Quality-Surface Quality Standard of the people's Socialist Republic of Vietnam. In the standards, Barium, DDT, Cadmium, Detergent, Gross Alpha Activity, Gross Beta Activity, Tin and Total Pesticide (except DDT) parameters cannot tested in laboratories in Myanmar.

Table 2-5 TCVN 5942-1995: Water Quality-Surface Quality Standard

Surface water	Unit	Standard
Arsenic	mg/l	0.1
BOD	mg/l	<25
COD	mg/l	<35
Dissolved Oxygen	mg/l	≥2
Iron	mg/l	2
pH	mg/l	5.5 - 9
Lead	mg/l	0.1
Oil and Grease	mg/l	0.3
Ammonia(as N)	mg/l	1
Barium	mg/l	4
Chromium(Hexa)	mg/l	0.05
Coliform	MPN/100 ml	10000
DDT	mg/l	0.01
Cadimium	mg/l	0.02
Chromium(Tri)	mg/l	1
Copper	mg/l	1
Cyanide	mg/l	0.05

Detergent	mg/l	0.5
Flouride	mg/l	1.5
Gross Alpha Activity	Bq/l	0.1
Gross Beta Activity	Bq/l	1.0
Manganese	mg/l	0.8
Mercury	mg/l	0.002
Nickel	mg/l	1
Nitrate(as N)	mg/l	15
Nitrites(as N)	mg/l	0.05
Phenol compounds	mg/l	0.02
Suspended Solids	mg/l	80
Tin	mg/l	2
Total Pesticide(except DDT)	mg/l	0.15
Zinc	mg/l	2

2.7.3. Myanmar National Drinking Water Standard

The ground water quality is compared with Myanmar National Drinking water standard (2019). In the standards, the parameters of Taste and odor cannot test in laboratories at Myanmar.

Table 2-6 Myanmar National Drinking water standard (2019)

No.	Parameters	Unit	Limitation
1	pH	mg/L	6.5 - 8.5
2	Total Dissolved Solid	mg/L	1000
3	Hardness	mg/L (as CaCO ₃)	500
4	Arsenic	mg/L	0.05
5	Total Coliform	MPN/100ml	3
6	Iron	mg/L	1
7	Turbidity	NTU (Nephelometric Turbidity Units)	5
8	Color	TCU (True Color Unit)	15
9	Lead	mg/L	0.01
10	Fecal coliform	MPN/100ml	0
11	Manganese	mg/L	0.4
12	Chloride	mg/L	250
13	Sulphate	mg/L	250
14	Taste	Acceptable/ No objectionable taste	
15	Odor	Acceptable/ No objectionable taste	
16	Nitrate	mg/L	50

2.7.4. International Finance Corporation (IFC)’S Environmental, Health, And Safety (EHS) Standards and Guidelines

International policies, guidelines and standards relevant to environmental and social impacts of projects that referred to by most countries are those issued by the NEQG, World Health Organization (WHO), the U.S Environmental Protection Agency (EPA), the World Bank, and the International Finance Corporation (IFC). The policies, guidelines and standards of the World Bank and IFC are cross-referenced and complementary as the IFC is an organization of the World Bank Group. They are also adopted by most development organizations such as the Asian Development Bank, and Japan Bank for International Cooperation. It should be noted that the guidelines and standards recommended by the World Bank and IFC, especially those related to environmental pollution, also provide due consideration to the guidelines and standards of U.S. EPA and WHO.

Only those international policies, guidelines and standards relevant to this Project discussed herein.

2.7.4.1. IFC Performance Standards

IFC strives for positive development outcomes in the activities it supports in developing countries. IFC pursues and expects to achieve through the application of this Policy on Environmental and Social Sustainability (the Sustainability Policy or the Policy), and a comprehensive set of environmental and social Performance Standards. The Performance Standards that the project proponent must comply are as the followings:

- Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts
- Performance Standard 2: Labour and Working Conditions
- Performance Standard 3: Resource Efficiency and Pollution Prevention
- Performance Standard 4: Community Health, Safety, and Security
- Performance Standard 5: Land Acquisition and Involuntary Resettlement
- Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources
- Performance Standard 7: Indigenous Peoples
- Performance Standard 8: Cultural Heritage

2.7.4.2. Emissions and Effluent Guidelines

The following tables (Table 2-7 and Table 2-8) present emission and effluent guidelines for the Petroleum Refining sector. The guideline values are assumed to be achievable under normal operating conditions in appropriately designed and operated facilities through the application of pollution prevention and control techniques discussed in the preceding sections of this document.

Table 2-7 Air Emissions Levels for Petroleum Refining Facilities

Pollutant	Units	Guideline Value
NO _x ^b	mg/Nm ³	300 100 for FCCU
SO _x ^c	mg/Nm ³	150 for SRU; 300 for FCCU 500
Particulate Matter (PM ₁₀) ^d	mg/Nm ³	25
Vanadium	mg/Nm ³	5
Nickel	mg/Nm ³	1
H ₂ S ^e	mg/Nm ³	5

a. Dry gas at 3 percent O₂.

b. NO_x means NO+NO₂ expressed in NO₂ equivalent. Guideline value from European Commission Joint Research Center (EC JRC), “Best Available Techniques Reference (BREF) Document for the Refining of Mineral Oil and Gas” (2015).

c. SO_x mean SO₂ + SO₃ expressed in SO₂ equivalent.

d. Guideline value from EC JRC, “BREF Document for the Refining of Mineral Oil and Gas” (2015). Particulate matter guideline value is also valid for FCCU.

e. From G.S.R. 186(E) and 820(E), India Ministry of Environment and Forests Notification

http://envfor.nic.in/legis/env_stand.htm

Table 2-8 Liquid Effluents Levels for Petroleum Refining Facilities

Pollutant	Units	Guideline Value
pH	S.U.	6-9
BOD5	mg/L	30b
COD	mg/L	125c
Total Suspended Solids (TSS)	mg/L	30
Oil and Grease Chromium (Total)	mg/L	10 0.5
Chromium (hexavalent)	mg/L	0.05
Copper	mg/L	0.5
Iron	mg/L	3
Cyanide Total	mg/L	1
Free		0.1
Lead	mg/L	0.1
Nickel	mg/L	0.5
Mercury	mg/L	0.003d
Arsenic	mg/L	0.1
Vanadium	mg/L	1
Phenol	mg/L	0.2
Benzene	mg/L	0.05e
Benzo(a)pyrene	mg/L	0.05
Sulfides	mg/L	0.2
Total Nitrogen	mg/L	10f
Total Phosphorus	mg/L	2
Temperature increase	°C	<3g

a. Assumes an integrated petroleum refining facility.

b. Guideline value from EC JRC, BREF (2015) Table 3.16; National legislations may have lower values such as China: 20 mg/L.

c. Guideline value from EC JRC, BREF (2015); National legislations may have lower values such as China: 120 mg/L.

d. EC JRC, BREF (2015) Table 3.16.

e. Guideline value from EC JRC, BREF (2015).

f. The effluent concentration of nitrogen (total) may be up to 40 mg/l in processes that include hydrogenation.

g. At the edge of a scientifically established mixing zone, which takes into account ambient water quality, receiving water use, potential receptors, and assimilative capacity. EC JRC, BREF (2015) Table 3.16.

2.7.4.3. Environmental Monitoring

Environmental monitoring programs for the Petroleum Refining sector should be implemented to address all activities that have been identified to have potentially significant impacts on the environment, during both normal operations and upset conditions (emergencies and consequent flaring). Environmental monitoring activities should be based on direct or indirect indicators of emissions, wastewater, and resource use applicable to the particular project, and for point sources of emissions this should include both concentration and mass flow rate of pollutants.

Table 2-9 Fence Line Monitoring Action Level

Pollutant	Guideline Value
Benzene	9 µg/m ³ a

Annual average concentration that is corrected for background contribution. Guideline value from U.S. EPA 40CFR63 Subpart CC—National Emission Standards for Hazardous Air Pollutants from Petroleum Refineries (2015).

2.7.4.4. Resource Use, Energy Consumption, Emission and Waste Generation

The following tables provide the emission examples of IFC’s EHS Guidelines. The project proponent is committed to preparing a continuous improvement in these areas.

Table 2-10 Resource and Energy Consumption

Parameter	Definition of Parameter	Unit	Industry Benchmark
Total Energy Consumption (1)	Total energy consumed by the process, including direct combustion, steam, electricity, etc.	M J per metric ton of processed crude oil	2,300-3,300
Electric Power Consumption (1)	Total electricity consumed by the process	kWh per metric ton of processed crude oil	22-31
Fresh Make-up Water (2)	The supply of raw filtered water that integrates drift and evaporation losses as well as blowdown	m ³ per metric ton of processed crude oil	0.07-0.66

1. Based on CONCAWE, EU refinery energy systems and efficiency, Report No. 3/12. (2012); CONCAWE, Oil Refining Report No. 1/13 (2013); U.S. Energy Information Administration (EIA), Short Term Energy Outlook (2013).

2. Based on EC JRC, “BREF Document for the Refining of Mineral Oil and Gas” (2015).

Table 2-11 Emission and Waste Generation

Parameter	Unit	Industry Benchmark
Wastewater	m ³ /metric ton crude oil	0.1-1.51
Emissions CO ₂ NO _x ³ Particulate matter SO _x ⁴ VOC	Metric ton/million metric tons of processed crude oil	105,000-276,000 7.-450 60-150 60-300 65-300
Solid waste	Metric ton/million metric tons of processed crude oil	10-100

1. Based on European Commission Joint Research Center (EC JRC), “Best Available Techniques Reference (BREF) Document for the Refining of Mineral Oil and Gas” (2015).

2. Not all GHGs, only total CO₂. Based on EC JRC, “BREF Document for the Refining of Mineral Oil and Gas” (2015).

3. NO+NO₂ expressed in NO₂ equivalent.

4. SO₂+SO₃ expressed in SO₂ equivalent

2.7.5. NSW (New South Wales), Australia guideline (2006)

This guideline has been developed to update the previous guideline (developed in the mid-1980s) in the light of advances in methods for assessing and measuring vibration. Australian and international standards, current scientific research and the practices of other regulating authorities were reviewed. This guideline presents preferred and maximum vibration values and provides recommendations for measurement and evaluation techniques.

Table 2-12 Criteria for exposure vibration

No.	Location	Time	*Criteria for Workshop			
			Acceleration (m/s ²) (dB re 10 ⁻⁶ m/s ²)		Velocity (mm/s) (dB re 10 ⁻⁶ m/s ²)	
			Preferred	Max	Preferred	Max
1.	Workshops	Day or night-time	0.040 (92 dB)	0.080 (98 dB)	0.80 (118 dB)	1.6 (124 dB)

2.7.6. Standard Guideline of International Labor Organization (ILO) (Threshold Limit Values)

The International Labour Organization (ILO) provides guidelines for working in different temperature conditions to ensure occupational safety and health. The guidelines help protect workers from heat stress and related health risks. The objective is to describe International labour standards and effective implementation of the occupational safety and health standards specifically on “Working Temperature Conditions” backed by a supervisory system designed to address all sorts of problems in their application.

Table 2-13 Wet Bulb Globe Temperature (WBGT) guideline

Screening Criteria FOR Heat Stress Exposure (WBGT values in °C) For 8hour work day days per week with conversational breaks				
Allocation of Work in a Work/ Rest Cycle	Threshold Limit Values			
	Light	Moderate	Heavy	Very heavy
75-100%	31.0	28.0	--	--
50-75%	31.0	29.0	27.5	--
25-50%	32.0	30.0	29.0	28.0
0-25%	32.5	31.5	30.5	30.0

2.7.7. Standard Guideline for Topsoil (Food and Agriculture Organization of the United Nations)

The Food and Agriculture Organization (FAO) is a specialized agency of the United Nations that leads international efforts to defeat hunger. This guideline source is from Global Soil Partnership (GSP) and upload in Food and Agriculture Organization of the United Nations. This field gives the soil reaction of topsoil. pH, measured in a soil-water solution, is a measure for the acidity and alkalinity of the soil. Five major pH classes are considered here that have specific agronomic significance.

Table 2-14 Standard Guideline for Topsoil Quality Measurement

No	Standard Range	Guideline Description (FAO*)
1	> 8.5	Alkaline soils
2	7.2 – 8.5	Neutral soils to Alkaline
3	5.5 – 7.2	Acid to neutral soils
4	4.5 – 5.5	Very Acid Soils
5	< 4.5	Extremely Acidic

2.7.8. World Bank’s Pollution Prevention and Abatement Handbook (1988) “Towards Clear Production”

The World Bank’s Pollution Prevention and Abatement Handbook (PPAH) is a comprehensive document providing guidelines for industrial pollution control, and it recommends emission and ambient quality standards to apply in environmental management. These recommends standards have taken into account the standards enforced by U.S.EPA and those recommended by WHO. They are referred to in the IFC’s EHS Guidelines.

2.7.9. National Surface Water Quality Standard (Draft)

With the objective to enable clean and safe surface water for aquatic life and human beings, national surface water quality standards and guidelines are necessary to be established in order to minimize the surface water pollution in the country. The National Standard Council was organized in 29th December 2014, and was reformed in 25th June 2018 in order to set relevant standards for respective sectors in Myanmar. National Surface Water Quality Standard (NSWQS) has been formulated with the guidance and supervision of the Environmental Quality Standard Technical Sub-Committee under the National Standard Council since 2015. In addition, considerable efforts and effective cooperation are being made among related ministries and departments. Moreover, technical assistance has been received from the Ministry of the Environment, Japan, through the Water Environment Partnership in Asia (WEPA), and international organizations such as, the Asia Development Bank (ADB), the Institute for Global Environmental Strategies (IGES) and the Japan International Cooperation Agency (JICA).

Table 2-15 Standard Values of Parameters for Human Health

Parameter	Unit	Class I - V
Chemical Parameter		
Boron	mg/L	2.4
Cyanide	mg/L	0.07
Fluoride	mg/L	1.5
Nitrate nitrogen	mg/L	10
Nitrite nitrogen	mg/L	1
Organics		
Benzene	mg/L	0.01
Phenol	mg/L	0.05
Polychlorinated Biphenyls (PCB)	Ug/L	0.5
Heavy Metals		
Arsenic	mg/L	0.05
Cadmium	mg/L	0.003

Parameter	Unit	Class I - V
Chromium (Hexavalent)	mg/L	0.05
Lead	mg/L	0.01
Mercury	mg/L	0.001
Nickel	mg/L	0.07
Badia &	mg/L	0.04

Table 2-16 Standard Values of Monitoring Parameters

Parameter	Unit	Class I	Class II	Class III	Class IV	Class V
Colour	TCU (or) mg Pt/ L	15	25	50	100	150
Conductivity	dS/ m	1	1.5	1.5	3	6
Total Dissolved Solids	mg/ L	500	1000	1000	1500	2000
Turbidity	NTU	5	25	25	50	100
Chemical Parameter						
Chloride	mg/ L	250	250	250	350	400
Pesticides						
Atrazine	g/L	100				
Carbofuran	Ug/L	7				
Chlorpyrifos	Ug/L	30				
Fenitrothion	Ug/L	3				
Glyphosate	Ug/L	370				
Permethrin	Ug/L	300				
Thiram	Ug/L	6				

2.8. INTERNATIONAL ENVIRONMENTAL AND SOCIAL CONVENTIONS, PROTOCOLS AND AGREEMENTS

Myanmar participated in ratifications of the international environmental conventions in which directly or indirectly related to biological diversity, chemical and waste, climate and atmosphere, environmental governance, land and agriculture, marine and freshwater. The Project Proponent have proposed to follow and commit to the following environmental conventions, protocols, and agreements related to the project:

Table 2-17 Conventions and Agreements

No.	Conventions/Agreements
1	United Nations Framework Convention on Climate Change (UNFCCC), 1992,

No.	Conventions/Agreements
2	International Tropical Timber Agreement (ITTA), 1994,
3	UN Convention on Biological Diversity, 1995
4	United Nations Convention to Combat Desertification (UNCCD) 1997
5	Botanic Gardens Conservation International, 1998
6	The Cartagena Biosafety Protocol, a subsidiary agreement to the UN Convention on Biological Diversity, 2000
7	Convention on Biological Diversity (CBD), Rio de Janeiro, 1992 (1994)
8	UN Convention on the Law of the Sea
9	International Labour Organization Conventions, 2012
10	National Biodiversity Strategy Action Plans (NBSAP) 2011)
11	Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC), 2005
12	Vienna Convention for the Protection of the Ozone Layer, Vienna, 1985
13	Montreal Protocol on Substances that Deplete Ozone Layer, Vienna, 1985 (1993)
15	Montreal Amendment, 1997 and Beijing Amendment, 199 to the Montreal Protocol on Substances that Deplete Ozone Layer, 1997 (2012)
16	Plant Protection agreement for the South-East Asia and the Pacific Region, 1956 (1959)
17	Convention on International Trade in Endangered Species of Wild Fauna and Flora, 1973, and this Convention as amended in 1979 (CITIES) (1997)
18	ASEAN Agreement on the Conservation of Nature and Natural Resources, Kuala Lumpur, 1985 (1997)
19	ASEAN Agreement on Transboundary Haze Pollution, 1997
20	International Convention for the Prevention of Pollution from Ships (MARPOL)
21	Agreement on the Networks of Aquaculture Centers in Asia and the Pacific Region
22	Treaty on the Non-Proliferation of nuclear weapons
23	International Treaty on Plant Genetic Resources for Food and Agriculture, 2001 (2004)
24	Stockholm Convention on Persistent Organic Pollutants (POPs), 2001 (2004)
25	The Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat, 1971 as amended in 1982 and 1987 (2004)
26	Establishment of ASEAN Regional Centre for Biodiversity (2005)
27	Civil Aviation Environmental Protection Vol.II, Aircraft Noise, 1992
28	Framework Convention on Climate Change (FCCC) 1995
29	Universal Declaration of Human Rights (UNDHR)
30	Convention on Elimination of All Forms of Discrimination against women (CEDAW)
31	ILO Conventions ratified for Myanmar that still in force C029 – Forced Labour Convention, 1930 (No.29) C087 - Freedom of Association and Protection of the Right to Organise Convention, 1948 (No. 87)

No.	Conventions/Agreements
	<p>C138 - Minimum Age Convention, 1973 (No. 138)</p> <p>C182 - Worst Forms of Child Labour Convention, 1999 (No. 182)</p> <p>C001 - Hours of Work (Industry) Convention, 1919 (No. 1)</p> <p>C002 - Unemployment Convention, 1919 (No. 2)</p> <p>C006 - Night Work of Young Persons (Industry) Convention, 1919 (No. 6)</p> <p>C011 - Right of Association (Agriculture) Convention, 1921 (No. 11)</p> <p>C014 - Weekly Rest (Industry) Convention, 1921 (No. 14)</p> <p>C017 - Workmen's Compensation (Accidents) Convention, 1925 (No. 17)</p> <p>C018 - Workmen's Compensation (Occupational Diseases) Convention, 1925 (No. 18)</p> <p>C019 - Equality of Treatment (Accident Compensation) Convention, 1925 (No. 19)</p> <p>C026 - Minimum Wage-Fixing Machinery Convention, 1928 (No. 26)</p> <p>C027 - Marking of Weight (Packages Transported by Vessels) Convention, 1929 (No. 27)</p> <p>C042 - Workmen's Compensation (Occupational Diseases) Convention (Revised), 1934 (No. 42)</p> <p>C052 - Holidays with Pay Convention, 1936 (No. 52)</p> <p>C063 - Convention concerning Statistics of Wages and Hours of Work, 1938 (No. 63)</p> <p>C185 - Seafarers' Identity Documents Convention (Revised), 2003, as amended (No. 185)</p> <p>MLC, 2006 - Maritime Labour Convention, 2006 (MLC, 2006)</p>

2.9. COMMITMENTS

The project proponent will follow and implement the mitigations and monitoring program in this commitments table as shown in Table 2-18.

Table 2-18 Comments of the Project Proponent

Commitment List	No	Explanation of Commitment	Chapter
Legal requirement	1	Environmental policy and legal framework The project proponent will follow all the legal requirements mentioned in Chapter 2. The project proponent will inform to relevant government administrators if the historical objects found in project implementation according to The Protection and Preservation of Antique Objects Law.	Chapter 2
Environmental quality monitoring	2	Measured based on National Environmental Quality (Emission) Guidelines (2015) and international environmental guidelines and Environmental management guidelines.	Chapter 4
Ambient quality Air	2.1	The results of air quality measurements are presented by comparing with NEQEG (2015).	Paragraph Section 4.4.1, 4.4.2
Stack Emission Height	2.2	Stack emission results are described by IFC General EHS Guidelines by International Finance Corporation (World Bank Group), 30 th April 2007 and NEQEG Guidelines - Petroleum Refining (2015)	Paragraph Section 4.4.3
Water quality	2.3	Surface water and ground water quality were collected and the results are indicated by comparing NEQEG (2015), National Drinking Water Quality Standard of Myanmar (2019) and WHO Guidelines.	Paragraph Section 4.4.4
Noise and Vibration	2.4	Noise Quality Results are described by comparing NEQEG (2015). Vibration results are described by comparing Assessing Vibration: a technical guideline, 2006, Department of Environment and Conservation, NSW (New South Wales), Australia.	Paragraph Section 4.4.5, 4.4.6

Commitment List	No	Explanation of Commitment	Chapter
Light Measurement	2.5	Light quality results are described by General EHS Guidelines by International Finance Corporation (World Bank Group) on 30 th April 2007	Paragraph Section 4.4.7
Temprature	2.6	Temperature results are described by comparing Standard Guideline of International Labor Organization (ILO)	Paragraph Section 4.4.8
Odor	2.7	Odor Quality Results are described by comparing NEQEG (2015).	Paragraph Section 4.4.9
Soil	2.8	Soil results are presented by comparing with FAO Guidelines.	Paragraph Section 4.7.10
Public Consultation and disclosure	3	Project proponents will commit and follow according to suggestion from the public consultation meeting. Project proponents will implement the future plan describe at section 6.7.	Paragraph Section 6.5.3 Paragraph Section 6.7
Environmental management plan	4	Responsible organization, responsibilities, estimated budget and emergency response plan for implementing mitigation measures and monitoring to mitigate environmental impacts are completely described.	Chapter 7
Air pollution	4.1	Construction/ Decommission Phase	Paragraph Section 7.4.2 and Table 7.5
		Air Quality Management Plan mentioned in section 7.4.2.1 and Table 7.5 will be followed and implemented by the project proponent and contractor.	
		Operation Phase	
		Air Quality Management Plan mentioned in section 7.4.2.2 and Table 7.5 will be followed and implemented by the project proponent.	
Water pollution	4.2	Construction/ Decommission Phase	Paragraph Section 7.4.3 and Table 7.6
		Water Quality Management Plan mentioned in section 7.4.3.1 and Table 7.6 will be followed and implemented by the project proponent and contractor.	
		Operation Phase	

Commitment List	No	Explanation of Commitment	Chapter
		Water Quality Management Plan mentioned in section 7.4.3.2 and Table 7.6 will be followed and implemented by the project proponent.	
Solid Wastes	4.3	Construction/ Decommission Phase	Paragraph Section 7.4.4 and Table 7.7
		Solid Waste Management Plan mentioned in section 7.4.4.1 and Table 7.7 will be followed and implemented by the project proponent and contractor.	
		Operation Phase	
		Solid Waste Management Plan mentioned in section 7.4.4.2 and Table 7.7 will be followed and implemented by the project proponent.	
Noise and Vibration	4.4	Construction/ Decommission Phase	Paragraph Section 7.4.5 and Table 7.8
		Noise and Vibration Quality Management Plan mentioned in section 7.4.5.1 and Table 7.8 will be followed and implemented by the project proponent and contractor.	
		Operation Phase	
		Noise and Vibration Quality Management Plan mentioned in section 7.4.5.2 and Table 7.8 will be followed and implemented by the project proponent.	
Soil Contamination	4.5	Construction/ Decommission Phase	Paragraph Section 7.4.6 and Table 7.9
		Soil contamination and landscaping Management Plan mentioned in section 7.4.6.1 and Table 7.9 will be followed and implemented by the project proponent and contractor.	
		Operation Phase	
		Soil contamination and landscaping Management Plan mentioned in section 7.4.6.2 and Table 7.9 will be followed and implemented by the project proponent.	
Biodiversity	4.6	Construction/ Decommission Phase	Paragraph Section 7.4.7 and Table 7.10
		Biodiversity Management Plan mentioned in section 7.4.7.1 and Table 7.10 will be followed and implemented by the project proponent and contractor.	

Commitment List	No	Explanation of Commitment	Chapter
		Operation Phase Biodiversity Management Plan mentioned in section 7.4.7.2 and Table 7.10 will be followed and implemented by the project proponent.	
Environmental Monitoring Program	5	The objectives of environmental monitoring program are outlined in five points.	Paragraph Section 7.3.
Outdoor Quality	Air	5.1 Parameter - PM _{2.5} and PM ₁₀ , TSP, NO ₂ , SO ₂ , CO ₂ , CO, VOC, O ₃ Guidelines - NEQEG (2015) For construction/ decommission phase, operation phase Area to be Monitored - Project Area Lat:21°17'54.24"N Long: 95°10'24.26"E Frequency - Twice a year Kyaw Zi Village Lat:21°18'56.10"N Long: 95°10'41.46"E Malar Village Lat:21°17'59.87"N Long: 95°8'41.19"E Frequency - Once a year	Table 7.3
Wastewater	5.2	Parameter - pH, Total Suspended Solid, BOD, COD, Total Phosphorous, Lead, Sulfide, Oil and Grease, Total Nitrogen, Chromium (Hexavalent) Guidelines - NEQEG (2015)	Table 7.4

Commitment List	No	Explanation of Commitment	Chapter
		For construction/decommission phase Area to be Monitored - Final water discharge point from construction site Frequency - Twice a year For operation phase Area to be Monitored - Operation Wastewater Lat:21°17'55.83"N Long: 95°10'27.82"E e Frequency - Twice a year	
Noise	5.3	Parameter - For 24 hours Noise level (dB(A) Pascale), Guidelines - NEQEG (2015), a technical guideline, 2006, Within the Project Site (Construction/ Decommission) Frequency - Twice a year For operation phase Project Site Frequency - Twice a year Area to be Monitored Lat: 21°17'54.24"N Long: 95°10'24.26"E	Table 7.4
Vibration	5.4	Parameter - For Vibration level, Acceleration (m/s ²), Velocity (mm/s) Guidelines - Department of Environment and Conservation, NSW (New South Wales), Australia. For operation phase Frequency - Twice a year Area to be Monitored Generator	Table 7.4

Commitment List	No	Explanation of Commitment	Chapter
		Lat:21°17'55.72"N Long: 95°10'27.53"E	
Odor	5.5	Parameter - Odor Quality Guidelines - NEQEG (2015) Furnace Stack (Operation Phase) Frequency - Twice a year Area to be Monitored Lat:21°17'54.96"N Long: 95°10'25.37"E	Table 7.4
Solid waste and Hazardous waste	5.6	Parameter - The amount of waste generation and classification, Daily weighing and recording of segregated waste, Recording the quantity and method of waste disposal, checking whether or not there is a systematic disposal of waste, Checking the waste burning or not. Guidelines - IFC General EHS Guidelines by International Finance Corporation (World Bank Group), 30 th April 2007 and NEQEG Guidelines - Petroleum Refining (2015) For operation phase Area to be Monitored - Waster disposal area within the project site Frequency - Daily	Table 7.4
Stack Emission Height	5.7	Parameter - Odor Quality, Methane (CH ₄), Hydrogen Sulphide (H ₂ S), Nitrogen Oxide (NO _x), Ammonia (NH ₃), Carbon monoxide (CO), Oxygen (O ₂), Sulphur dioxide (SO ₂) Guidelines - NEQEG (2015) Furnace Stack (Operation Phase) Frequency - Twice a year Area to be Monitored Furnace Stack	Table 7.4

Commitment List	No	Explanation of Commitment	Chapter
		Lat:21°17'54.96"N Long: 95°10'25.37"E	
Soil	5.8	Parameter - pH, Moisture (%), Total Nitrogen (CEC) Guidelines - FAO Guidelines Final Discharge Point (Operation Phase) Frequency - Twice a year Area to be monitored Lat:21°17'55.74"N Long: 95°10'28.29"E	Table 7.4
Occupational Health and Safety	5.9	Parameter - Record of incident/accident report, first aid training report, health checkup and seasonal diseases For construction/ decommission, operation phase Area to be Monitored - The whole project area, supply of PPE, Providing warning signs and relection sign, First Aid Kid, Emergency Contact Number Frequency - Monthly	Table 7.4
Fire Hazard	5.10	Parameter - monthly inspection of pressure gauge and seal on fire extinguisher, monthly inspection on smoke detector, water sprinklers For construction/ decommission, operation phase Area to be Monitored - Within project area Frequency - Twice a year	Table 7.4
Emergency Risk	5.11	Parameter - Practicing emergency drill, records of emergency plan, education and training, Emergency Response Plan For construction/ decommission, operation phase Area to be Monitored - Within project area Frequency - Twice a year	Table 7.4

Commitment List	No	Explanation of Commitment	Chapter
Environmental monitoring team	5.12	The names and positions of people who are responsible for environmental monitoring program are described in Table 7.1.	Table 7.1
Estimated budget for environmental monitoring	5.13	The estimated budget for environmental monitoring program is described in Table 7.2.	Table 7.2
Corporate Social Responsibilities	5.14	CSR program of project proponent are mentioned in paragraph section 7.9.	Paragraph Section 7.9

The project proponent is commitment as the below;

- (1) According to the EIA procedure 108, The project proponent will obey the monitoring program such as odor and wastewater quality every 6 months per year.
- (2) The surface water quality will compare with the National Surface Water Quality Standard.
- (3) If any ancient evidence is discovered during the project' operation, it will be reported to the Department of Archeology and the National Museum, Mandalay Branch as well as the closest administrative offices.

CHAPTER 3

PROJECT DESCRIPTION AND ALTERNATIVE SELECTION

3.1. DESCRIPTION OF THE PROJECT LOCATION

MCCM Company Limited is located in Mandalay Region, Myingyan District, Taungtha Township, Kyawzi Village Tract. The factory covers an area of 3.98 acres. The project area is surrounded by the Nyaung-U - Myingyan highways in the south, and on the north by the Irrawaddy River. The factory is about a mile away from the river. The factory is located on the border between the Mandalay Region and Magway Region, and Nyaung U - Myingyan Highway are located in front of the factory. Yay Way dry stream is located at the west of the factory and small dry stream is located at east of the factory. Dry streams appear temporarily during the wet season but dissipate within a few weeks because the project area is located in a dry zone area.

The factory is approximately 2 miles from the nearest village, Kyawzi, and there are 600 households in the village. The population is about 4,433. The location of the project area is free from national/regional/protected areas, historical/cultural heritage zones, and other project areas. The factory lies at the coordinates of 21°17'54.24"N and 95°10'24.26"E.

The project proponent proposes to use alternative land for the project factory; the original land use type of the project area is agricultural land. As a result, the project proponent requested to the Mandalay Government Organization, and Appendix A includes a description of the permission certificate la ya (30-b).

The project aims to manufacture and distribute gasoline, heavy diesel, light diesel, and heating oil (FO) by using the Chinese Refining and Distillation Method. The pre-construction phase of the proposed factory was initiated on 26th September, 2018 and the construction phase was initiated in 22nd April, 2019. The operation stage of the factory commenced in March 2020. Currently, the number of gallons sold per month is 49,600 gallons for diesel and 10,500 gallons for gasoline. The operation of the factory was already operating when the EIA scoping report was conducted whereas, the factory is currently closed because of difficulties in availability of electricity, raw materials, Covid 19 and political situation. So, the current production process, technology, workforce, project infrastructure, and other related factors are mentioned below. In addition, the overview map and project area of the project is as shown in Figure 1-1 and Figure 3-1.

3.2. PROJECT IMPLEMENTATION SCHEDULE

The project implementation period was started on April, 2019 to February, 2020 (including machine installation stage). The operation stage was initiated on March, 2020 and the duration of operation is estimated about 30 years as presented in Table 3-1. However, there will be extended depending on the availability of raw materials and demand. Currently, the project is suspended due to the availability of raw materials, electricity and political conditions.

Table 3-1 The overall schedule of project implementation

Stages	2019							2020			2050	Above 2051
	April	May	June	July	October	November	December	January	February	March		
Preconstruction						-	-	-	-	-	-	
Construction						-	-	-	-	-	-	
Machine Installation	-	-	-	-	-				-	-	-	
Operation	-	-	-	-	-	-	-	-	-			
Decommission	-	-	-	-	-	-	-	-	-	-	-	

3.3. SITE DESCRIPTION

The project infrastructure includes crude & product tanks, loading/unloading pump house, operation area, office building, control building, canteen, worker dormitory, car parking, toilets, security gates and other infrastructure are shown in Table 3-2. The worker's room and kitchen are included in the office building, and the control room, chemical lab, and storeroom are included in the control building. Among them, the crude oil and product tank area is 7,800 square feet (60 ft x 130 ft), the production area is 3,250 square feet (65 ft x 50 ft), the control building is 750 square feet (50 ft x 25 ft), the office building is 2,750 square feet (25 ft x 110 ft), the loading/unloading area is 480 square feet (16 ft x 30 ft), the fire pool is 200 square feet (20ft x 10ft), and other infrastructure (such as canteen, worker dormitory, car parking, toilets, security gates) respectively. The lists of the building in the project area and factory layout plan are as shown in Figure 3-1.

Table 3-2 List of Infrastructures

Sr.	Description	Number
1	Crude & product tanks	8
2	Preliminary storage tank	1
3	Loading/Unloading pump house	1
4	Water tanks (operation and domestic)	6
5	Fire fighting water storage tank	2
6	Production area	1
7	Furnace	4
8	Tube Well	2
9	Office building (worker room and kitchen)	1
10	Control building (control room, chemical lab, store room)	1
11	Worker Dormitory	1
12	Generator room	1
13	Fire fighting pump house and Portable Extinguisher Store	1
14	Waste Storage area	3
15	Separator, Waste pit & flare	1
16	Canteen	1
17	Toilets	2
18	Car parking	1
19	Security Gate	2

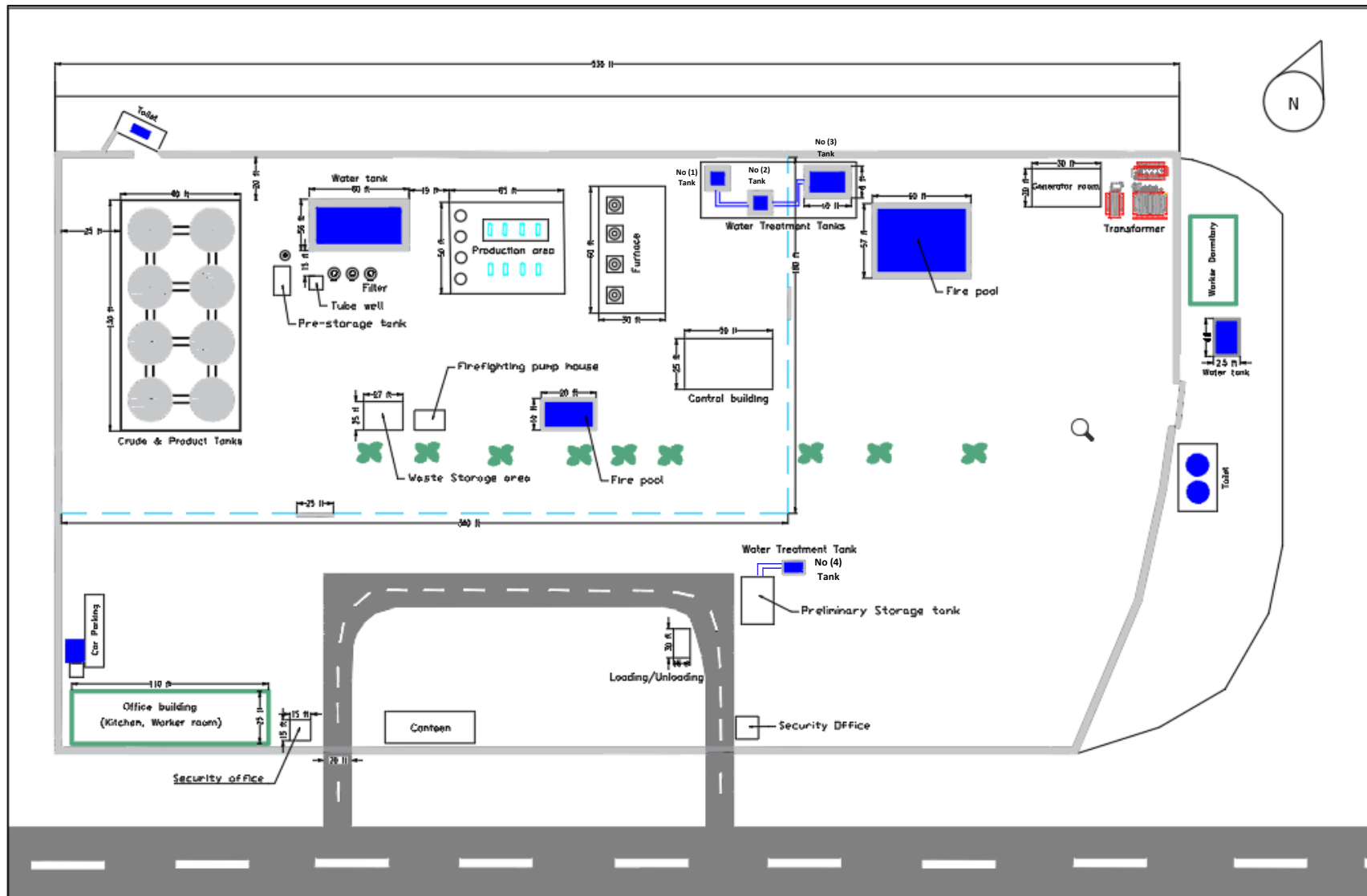


Figure 3-1 Factory Layout Plan



Figure 3-2 Overview Photo of The Project Area

3.4. WORKFORCE

The project's pre-construction phase began on 26th September, 2018, and included site clearance and leveling work. It took about one month to finish. The workforce used in the pre-construction phase was 14 people, and the working hours were 8 hours, which is from 8 AM to 12 PM and 1 PM to 5 PM.

After the pre-construction phase, the construction phase started on 22nd April, 2019. The construction process was finished on 13th October 2019. Machine installation continued

after finishing construction from 9th November 2019 to 7th January, 2020. The workforce used in the construction phase was 65 people, and the workforce used in machine installation was 35 people, of which eight were Chinese technicians. The working hours were eight hours for the construction phase, which is from 8 am to 12 PM and 1 PM to 5 PM, and the working hours of machine installation were six hours, which is from 8 PM to 11 PM and 2 PM to 5 PM.

The operation phase was started in March 2020. The proposed refining factory operates 24 hours a day, and the working schedule is divided into two shifts, such as day shift and night shift. The day shift starts from 7 AM to 7 PM, and the night shift is from 7 PM to 7 AM. The overtime wages will be given according to rules and regulation from Labor law in Myanmar. The total number of employees has a total of 19 people, among whom are 2 directors, one Chinese technician, one accountant, one kitchen chef, 12 operation workers, and 2 security workers, respectively. The list of the employees in operation phase is as shown in Table 3-3

Table 3-3 List of Employees in Operation Phase

Sr.	Description	Number
1	Director	2
2	Accountant	1
3	Kitchen chef	1
4	Chinese technician	1
5	Worker	12
6	Security	2

3.5. PRODUCTION PROCESS

The technology used in the factory is basic oil refining method (Chinese Distillation and Refining method). The production process is as followed. Firstly, the weight of the imported crude oil is measured and then, sent to the preliminary storage tank for sedimentation and heating the crude oil to separate the water participation and prevent the oil freeze by heating 50°C. After separating and heating the crude oil, it is sent to the storage tanks (four silos) via the pipe. The crude oil is stored at 50 °C and the sedimentation process continues in four storage tanks (four silos).

The crude oil from the storage tanks (four silos) are transferred to the Circular Crude Oil Drum through two filters. The water and sediments from the crude oil is cleaned by filtering with sieves and screens of the filters. The cleaned crude oil from the Circular Crude Oil Drum is then pumped into heating furnaces and heated to 335°C. The temperature for the gasoline is ranged from 80°C to 180°C and the temperature for diesel is ranged from 180°C to 335°C. The petroleum gas which comes from furnaces is passing through the Circular Crude Oil Drum and the distillation column and then, condensate in the condenser. The gasoline and diesel getting from condensing in the condenser are collect in Overhead

Receiving Tank. The vapor which does not become liquid will be sent back into the Circular Crude Oil Drum column by return line.

The oil and diesel from the Overhead Receiving Tank pass through the filter filled with Silica Gel inside to improve the quality and filter out the oil residue. And then, the final products (gasoline and diesel) are sent to each storage tank of gasoline and diesel.

The final product, the heating oil (F.O) production process is the same as the process of gasoline and diesel except for the filtering process with Silica Gel. The temperature for the final product, heating oil (F.O) is ranged from 335°C to 370°C. Residual heating oil (F.O) in the Circular Crude Oil Drum passes through the fuel condenser and is stored for use as the fuel of the furnace. The production flow chart of the factory is shown in Figure 3-3.



Figure 3-3 Production Process of The Proposed Factory

3.5.1.1.Raw Materials

Raw material, crude oil is purchased from hand-powered oil wells in Tatma Village, Nyaung-U District, Mandalay Region, and Myaing Township, Pakokku District, Magway Region, and sometimes from Minhla Township, Magway Region. Specifically, around 40,000 gallons are purchased from Tatma Village and around 25,000 gallons from Myaing Township per month. Occasionally, around 9,000 gallons are purchased from the hand-powered oil wells in Minhla Township. Mostly, 60 percent of crude oil is purchased from Tatma village and 40 percent of crude oil is purchased from Myaing township each month. There is also a plan to apply for a permit from the regional government for oil drilling and get raw materials for crude oil from the drilling.

Another raw material used in the operation process is silica gel, which is used in filters to improve the quality and filter out the oil residue. Silica gel was purchased from China and transported from Yangon port to the factory by container cars. Silica gel is stored in a separate room from other store items as shown in Figure 3-4. The monthly silica gel used is around 80-100 bags and it is based on the type of crude oil. The weight of one bag is 20 kg. Used silica gel is dumped in a temporary dumping area with a concrete floor and barrier on either side and it will sell to the outside buyers for production pellets fuel.



Figure 3-4 Storing the silica gel

3.5.1.2.Receiving Raw Materials and Weighting

Crude oil carried from Tatma Village and Myaing Township by trucks is weighed to know the quality and water concentration in crude oil. If the weight of crude oil meets the required standard, the crude oil is bought and sent to the preliminary tank.

3.5.1.3.Preliminary Tank

The market value of crude is largely determined by quality characteristics. Therefore, as a first step, the quality of crude oil is tested in the laboratory. After that, the oil which

meets desired quality is weighted and put into the preliminary tank. In the preliminary tank, it is heated about 50°C to separate water participation and prevent oil from solidifying.

Water from separate oil stage in preliminary tank is stored to the No 4 tanks that size is 15'x10'x4'. Generally, only good grade crude oils are permitted in factories, therefore water participation in crude oil is low. The amount of water from separate oil stage is 10 Liter per day. This water is used to pour the plants in the factory, and extra water is sent to the firefighting water tank. In addition, water from the separate oil stage evaporates at normal temperatures because the project region is in a dry zone. The oil sludge (discharge waste) in the No. 4 tank is added back to the preliminary tank because this sludge can be reused. The preliminary tank is shown in Figure 3-5.



Figure 3-5 Heating Crude Oil in Preliminary Tank



Figure 3-6 Water stored tank

3.5.1.4. Transferring oil into the silos through pipeline

After heating crude oil in preliminary tank, it is transferred into the four silos (storage tanks) through pipelines.

3.5.1.5. Storage in Silos (Storage Tanks)

Crude oil coming through pipeline is stored at 50°C and let it settle down in the storage tanks. Raw material (crude oil) are stored in four silos and each silo can store 56,000 gallons. Totally, crude oil 224,000 gallons can store in the factory. On an average month, between 70,000 gallons and 80,000 gallons of crude oil are utilized in the production of products. In the storage tanks (silos), crude oil and diesel storage silos don't need to conduct

the water spraying system due to the nature of the materials, which are not explosive in normal conditions. But, water spraying system is fitted on top the gasoline storage tank (silo). It is made by 1ft iron pipe and sends water with a 3 kg motorized water pump. Photo of water spraying pipe and storage tanks photos are shown in Figure 3-7

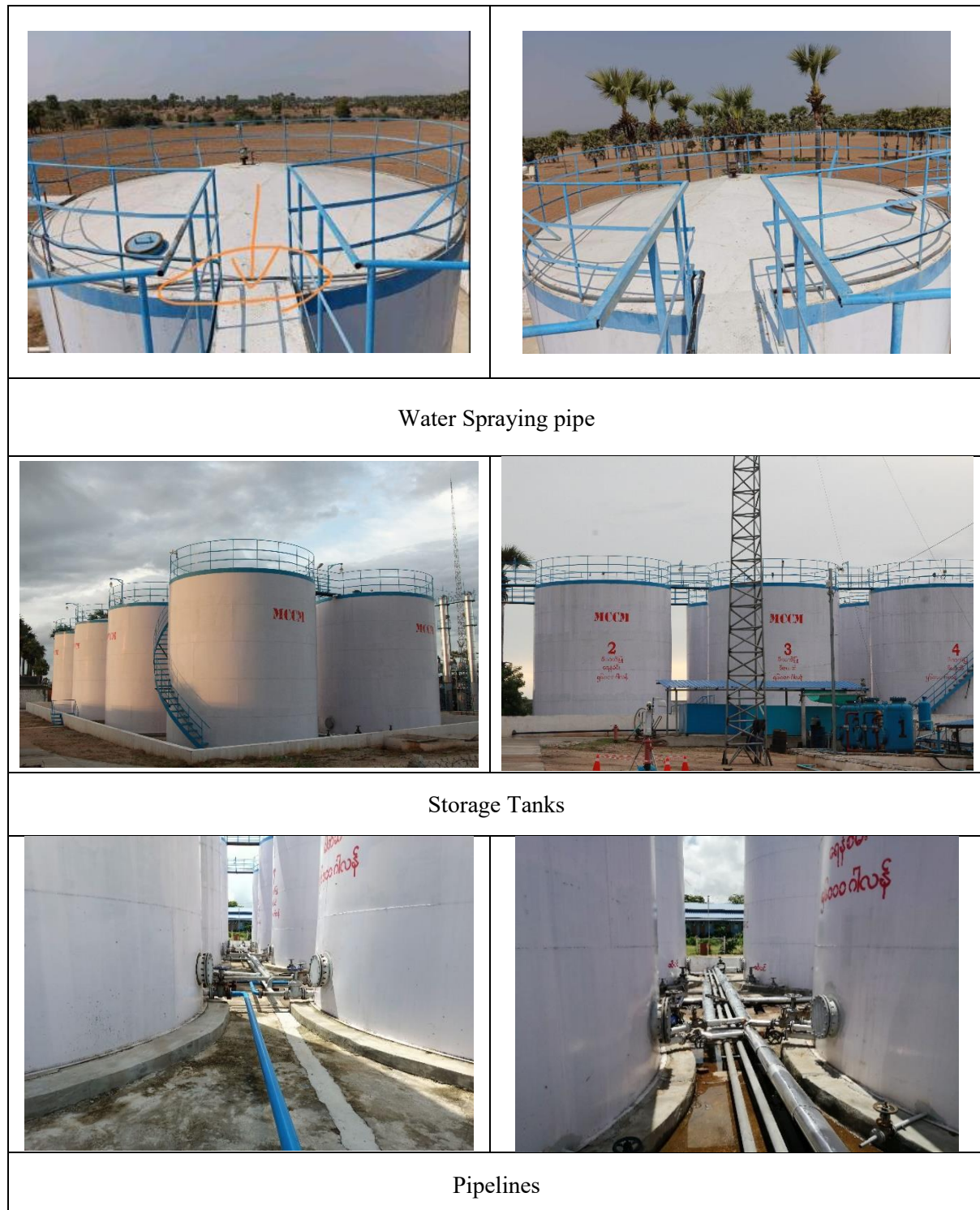


Figure 3-7 Water spraying pipe and storage in Silos

3.5.1.6. Circular Crude Oil Drum

The crude oil from the storage tanks (four silos) are sent to the Circular Crude Oil Drum (CCOD) through two filters. The water and sediments from the crude oil is cleaned by filtering with sieves and screens of the filters. Sediments and water from the CCOD are disposed of in the temporary storage area in the factory separately, but this cleaning process is conducted twice a year. If sufficient quantities are available, these materials are sold to candle and fuel pellet factories. Circular crude oil drum photo is shown in Figure 3-8.



Figure 3-8 Circular Crude Oil Drum

3.5.1.7. Furnace

The cleaned crude oil from the CCOD is then pumped into heating furnaces and heated to 335°C. The temperature for the gasoline is ranged from 80°C to 180°C and the temperature for diesel is ranged from 180°C to 335°C. Furnace photo in the factory is shown in Figure 3-9. The stack height of the factory is about 20 feet.



Figure 3-9 Furnace

3.5.1.8. Petroleum Gas from furnace are pass through CCOD Column

Crude oil is heated in furnaces, and petroleum gas is emitted. The emitted petroleum gases are passed back to the CCOD column via the pipe. And the petroleum gas passes to the distillation tower from CCOD column.

3.5.1.9. Distillation Tower

The petroleum gas which comes from furnaces is passing through the Circular Crude Oil Drum and the distillation column and then, condensate in the condenser (water cooling tank). Inside the condenser, water from the water tank passes continuously through the outer layer to condense the petroleum gas in the inner layer. This water is going back to the previous water tank for recycling. This water is circulated between the water tank and the condenser; therefore, no wastewater is generated. The water tank is cleaned twice a year, and wastewater will be generated at this time. The size of condenser (water cooling tank) is 3 ft (diameter) and side length is 6.5 ft. Four condensers (water cooling tanks) are fitted, and the amount of water storage per condenser is about 3 gallons. Distillation tower photos are shown in Figure 3-10.

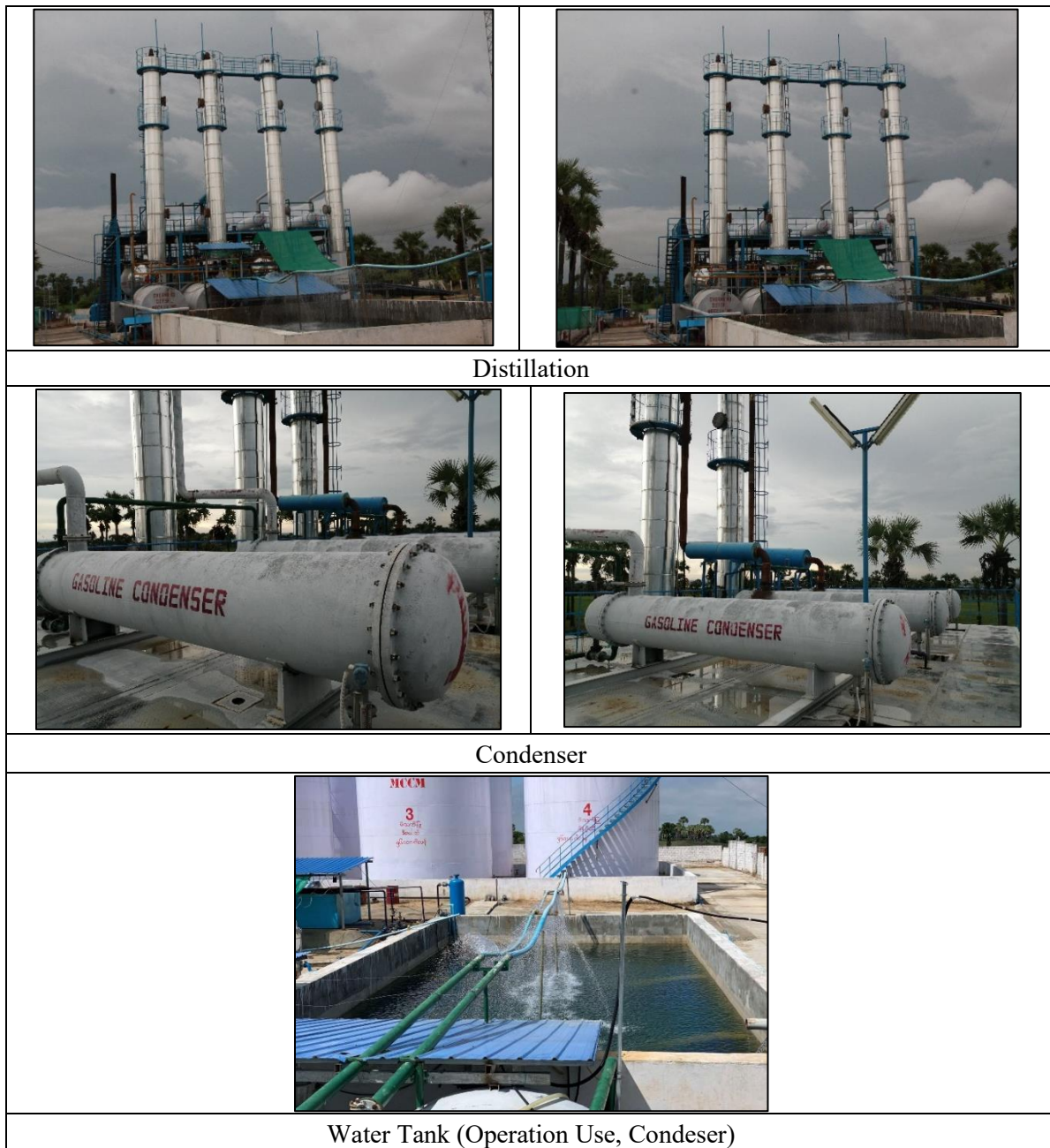


Figure 3-10 Distillation Tower and Condenser

3.5.1.10. Overhead Receiving Tank

. The gasoline and diesel getting from condensing in the condenser are collect in Overhead Receiving Tank. The vapor which does not become liquid will be sent back into the Circular Crude Oil Drum column by return line. Overhead receiving tank photo is shown in Figure 3-11.



Figure 3-11 Overhead Receiving Tank

3.5.1.11. Silica Filter

. The oil and diesel from the Overhead Receiving Tank pass through the filter filled with Silica Gel inside to improve the quality and filter out the oil residue. And then, the final products (gasoline and diesel) are sent to each storage tank of gasoline and diesel. Silica filter photo is shown in Figure 3-12.



Figure 3-12 Silica Filter

3.5.1.12. Final Product Storage

The oil and diesel from the Overhead Receiving Tank pass through the filter filled with Silica Gel inside to improve the quality and filter out the oil residue. And then, the final products (gasoline and diesel) are sent to each storage tanks (Silos) of gasoline and diesel. The production rate per month is about 40,000 gallons for diesel and about 10,000 gallons for gasoline. Final product storage photos are shown in Figure 3-13.



Figure 3-13 Final Product Storage

3.5.1.13. Final Product Distribution

In the final product distribution stage, the stored products (diesel and gasoline) from the silos are passing to the distribution area via pipe lines. The number of gallons sold per month is about 40,000 gallons for diesel and about 10,000 gallons for gasoline. At this stage, the products are stored in silos until there is enough to sell for a month, and purchasers come to the factory to buy with an oil truck after the products are enough stored. Therefore, the numbers of the trucks which come to the factory is low but enough space is created for the entering and outgoing cars. Furthermore, two gates are built to allow cars in and out of the factory, with gate no. 2 for entering cars and gate no. 1 for outgoing cars. The products are sold locally. The distribution area is shown in Figure 3-14.



Figure 3-14 Distribution area

3.6. NECESSARY DEVICES FOR PRODUCTION

3.6.1. List of Equipment and Machineries

There are 16 types of machines and the total quantities are 37. The list of machineries and equipment used in the petroleum mini refining industry can be seen in the Table 3-4 and some machines and equipment photos are shown in Figure 3-15.

Table 3-4 List of Devices and Machines

Sr.	Item	Description	Number
1	Transformer	315 KVA	1
2	Generator	250 KVA, 150 KVA	2
3	Furnace		2
4	Water motor pump	5.5kw, 380V, 2900r/min, (18m ³ /h, 40m)	3
5	Water motor pump	15kw, 380V/660V, 2930r/min, (87m ³ /h, 38m)	5
6	Water motor pump	7.5kw, 380V, 1440r/min, (29m ³ /h, 5m)	2
7	Vacuum	7.5kw, 380V/660V, 970r/min	3
8	Water motor pump	18.5kw, 380V/660V, 1470r/min, (40m ³ /h, 7m)	4
9	Water motor pump	3kw, 380V, 1420r/min, (5m ³ /h, 5m)	2
10	Water motor pump	7.5kw, 380V/660V, 2930r/min	1
11	Water motor pump	41.5kw, 380V/660V, 2950r/min, (250m ³ /h, 36m)	2
12	Water motor pump	3kw, 380V, 2900r/min, (50m ³ /h, 12.5m)	3
13	Water motor pump	4kw, 380V, 2900r/min, (16m ³ /h, 32m)	2
14	Water motor pump	15kw, 380V/660V, 2930r/min, (87m ³ /h, 38m)	1
15	Air Compressor	7.5kw, 380V, 2990r/min	3
16	Loader		1
Total			37





Figure 3-15 Machine and Equipment Photos

3.7. LABORATORY

In the factory, laboratory is situated near the control room. The purpose of laboratory is to test the quality of crude oil. Therefore, the equipment in the laboratory are placed simple structure of operation process. Therefore, there is no waste generation from the laboratory process but wastes will generate after lab equipment are broken. The equipment used in laboratory are small electric furnace, boiling flask, allihn condenser and beakers. Equipment used in laboratory are shown in Table 3-5, Figure 3-16 and location of the laboratory is shown in Figure 3-17.

Table 3-5 Equipment used in laboratory

No	Type	Number
1	Electric Furnace	1
2	Boiling flask	1
3	Allihn condenser	1
4	beaker	5

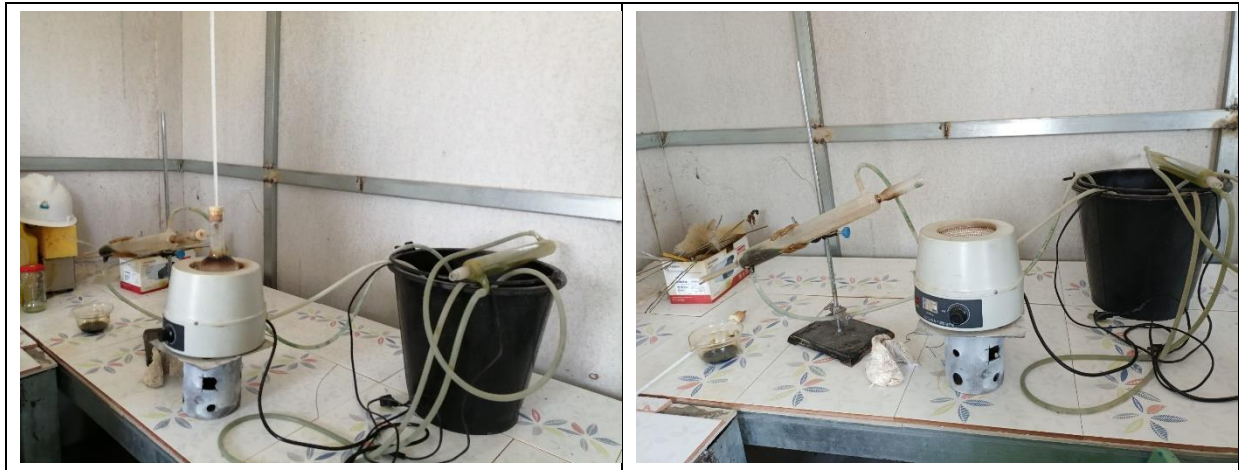


Figure 3-16 Simple Structure in Laboratory

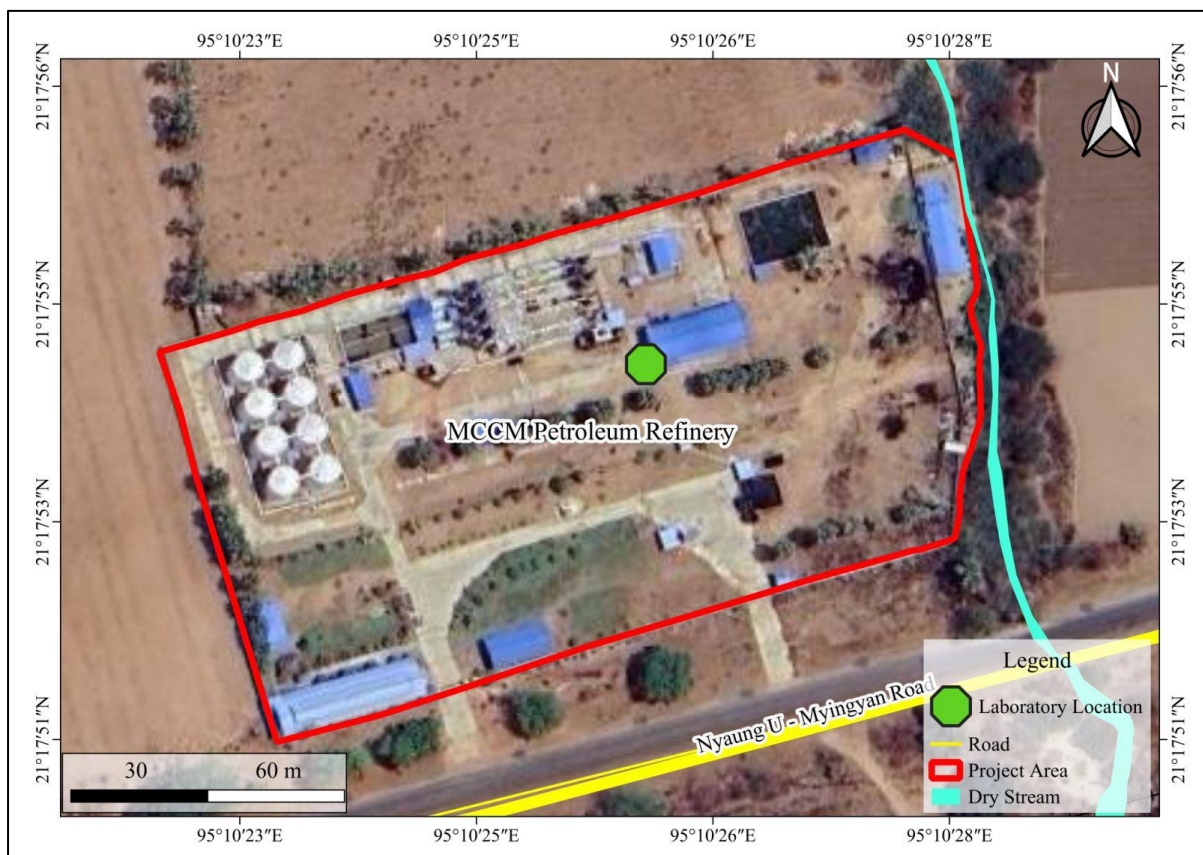


Figure 3-17 Location of the laboratory in factory

3.8. OPERATION UTILITIES

The main energy sources of the proposed factory are electricity, generator and water supply system. The detail descriptions of them are presented in the following.

3.8.1. Electricity

The electric power supply for the factory is from a 315 KVA transformer from the Taungtha township electric power line and applies to the lighting of the factory, pumps for pumping water, and product production, except for furnaces. The power transmission line is

situated about 2 kilometers of the project factory. The factory's running hours are 24 hours, so electricity is always required. Two diesel generators, having a capacity of 250 KVA and 150 KVA, are installed for emergency backup contingency arrangements. For a 250 KVA generator, 50 gallons of diesel are used for 12 hours, and for a 150 KVA generator, 50 gallons of diesel are used for 24 hours. Two generators are located in the same room near the transformer. The electric supply system is shown in Figure 3-18.



Figure 3-18 Electric Supply System (Transformer, Generator)

3.8.2. Water Supply

Water was extracted from ground water via two tube wells. The first one is 4-inch tube and the depth of the tube well is 420 feet. The second one is 2-inch tube and the depth of the tube well is 420 feet like the first one. A 4-inch tube well is used for the operation process and it is near the production area. A 2-inch tube well is used for domestic use and it is near the kitchen. Water is extracted via tube well; therefore, water is pumped up by 2 water motors. Water pumps are pumped 4 times per day during the summer and 2 times per day during the winter. Water pumping amount per month is between 2000 and 3000 gallons. As for drinking water, purifying drinking water bottles (20 liters) are used. During the summer, 100 bottles are used per month and about 50 to 60 bottles are used per month in winter.

For water storage, two overhead tanks and four water tanks are located in the factory. Two overhead tanks are used for domestic use, and each overhead tank can store 500 liters. Of the 4 water tanks, one tank is used for the petroleum gas condensing process in operation. The storage capacity is 80000 gallons and the size is (56'x 60' x 12'). One tank is used for domestic use and the storage is 100 gallons, and the size is (2.5'x 4'x 2.5'). The other two tanks are used for firefighting purposes. A water supply system is shown in Figure 3-19.



Figure 3-19 Water Supply System

3.9. RESOURCES CONSUMPTION

3.9.1. Water Consumption

The proposed factory uses about 50 liters for daily usage of the employee and about 60 liters for drinking water per day. According to the water consumption rate, the impact of the groundwater usage long period can be low.



Figure 3-20 Daily Water Consumption



Figure 3-21 Daily Drinking Water Consumption

3.9.2. Fuel Consumption

The proposed factory uses around 189 liters of diesel for the generator.

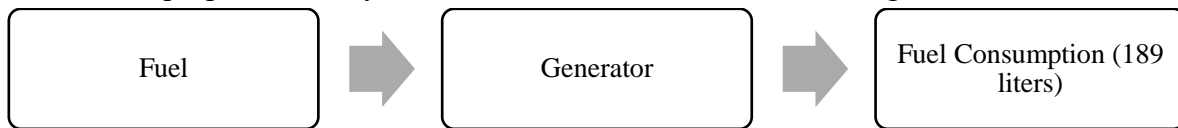


Figure 3-22 Fuel Usage

3.9.3. Application of Chemicals

There is chemical used in the production process. Solvent Green 5 (color powder) is used to change the color of diesel to blue or green according to the order No.211/2019 Local Refinery and Mini released by the Ministry of Electricity of Energy. However, this chemical is not always used in production process. Therefore, the amount of color powder to change the product as per customer demand is very small. Color powder is stored separately in storage room. If the raw chemical usage in factory, it will be stored systematically according to the chemical substance law.

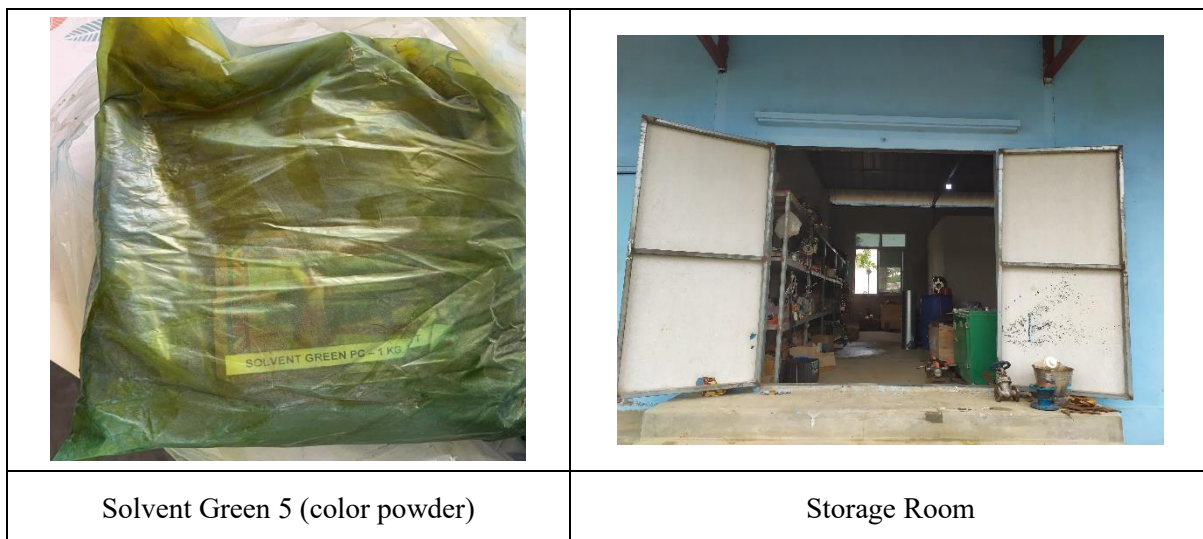


Figure 3-23 Chemical Utilities

Table 3-6 Chemical Usage of The Proposed Factory

No.	Item	Department/ Used Area	Daily Usage	Monthly Usage	Yearly Usage
1	Solvent Green 5	Dying Fuel	0.01 kg	0.3 kg	3.6 kg

Table 3-7 Safety Data Sheet for Chemical Products

No	Name	Hazard level	Impact	First Aid	Handling and Storage
1	Solvent Green 5	No	Harmful if swallowed, Stomach discomfort. Respiratory Irritation.	<ul style="list-style-type: none"> • Immediately flush eyes with plenty of water for at least 15 minutes. • Get medical aid if irritation develops or persists. • Exposure to fresh air immediately. 	<ul style="list-style-type: none"> • Handled with chemical safety goggles, rubber gloves, chemical fume hood. • Use with adequate ventilation. • Minimize dust generation and accumulation.

3.9.4. Solid Waste

There are three stages, pre-construction, construction and operation stages generate wastes from Petroleum Mini Refining Industry project. Both solid waste and domestic waste are released from the pre-construction, construction and operation stages.

The first step of the construction is pre-construction stage, land clearance plays the important role to make enough space for buildings. In pre-construction stage, cutting down the shrubs, weeds, and some palms are produced as the wastes. Then topsoil and rocks are excavated in order to proceed the foundation step. The others such as rubble and dirt can also be seen. And the remains from workers' foods in the pre-construction stage were defined as domestic wastes.

In the construction stage, the processing material wastes such as rubber, plastics, gypsum, wire, aluminum products, and light bulbs, etc. In addition, some chemical substances like various kinds of concrete slurry, paints, lacquer, thinner, varnish, adhesives, engine oils, lubricant oils are regarded as the hazardous wastes. Dredging materials are materials or objects that are displaced during the preparation of a construction or demolition site. While pouring the basement, there are a lot of steel scraps and were come out as the side products. The woven bags are produced from raw materials packaging and often produce hazardous waste. The waste may include lead, asbestos, plasterboard, paint thinners, strippers, and solvents, mercury, fluorescent bulbs, and aerosol cans. On the other hand, domestic wastes are produced from the workers' accommodation and dining area. Those may be food scraps, tissues, plastic bags, glass.

Solid wastes and domestic wastes are also generated during the operation process. Solid wastes generated from the operation process are the used Silica Gel, the residues of petroleum after the operation process and oil sample bottles. Used Silica gel generated is mixed with hot water and extract oils from the Silica gel. So, Silica gel that already extracts oils can be defined as solid waste. The amount of hazardous waste per month is 300kg. None of these wastes will be reused in the factory, however, the residues of petroleum and the used Silica gel can be sold to outside buyers like the fuel pallet factory.

The silica gel packs are stored in the warehouse systematically before using it. In addition, the reused silica gel is collected into the temporary dumping area and it will sell to the outside buyers. As the storing process before selling, these reused silica gels will be stored in a temporary dumping area with a concrete floor and barriers. These reused silica gel and residues of petroleum have some prices therefore these materials are sold to buyer rather than disposed of elsewhere.

As for the oil sample bottle, it is used to check the quality of the product by looking at the color of the product. Oil sample bottle can be reused therefore the waste amount is considerably low, 1 bottle per month.

Domestic wastes generate such as leftovers, plastic bottles, tissues, leftover from kitchen etc. To know the solid waste generation rate, solid waste generation measurement was conducted during the field trip and compared with Yangon City solid waste generation

rate. Yangon City solid waste generation rate is 0.39 kg personal/day³. Wastes from factory are disposed to the disposal site near the factory three times per month and leftovers from workers' food are used as fertilizer for the trees in the factory. The wastes from production process and domestic wastes are shown in Figure 3-24 and domestic solid waste generation rate from kitchen and worker's accommodation is in Figure 3-24. The solid waste from the factory (domestic wastes) are disposed in the temporary disposal area in the factory and the location of the temporary disposal site is shown in Figure 3-25. After the temporary disposal area is full, the waste is buried to prevent it from reaching the outside. In addition, the solid waste from mini laboratory in the factory compound will be disposed as the method of hazardous waste.

	
<p>Residue of Petroleum</p>	<p>Used Silica gel</p>
	
<p>Domestic Solid Waste Generation Measurement</p>	<p>Waste Bin</p>

Figure 3-24 Solid Waste Generation from Proposed Factory

³ The Yangon City solid waste generation rate as of 2012 is 0.39 kg per personal day (Pollution Control and Cleaning Department, Yangon City Development Committee, 2014).



Figure 3-25 Location of temporary disposal area

3.9.5. Wastewater

Water is a key component of a construction project and used as part of the fluid for excavation and foundations such as mixing the cement. In many cases, it also appears as a result of rain and effluent seepage. In addition, domestic effluent is likely to discharge from washrooms and toilets. Except from that, there is no significant wastewater in the construction stage.

Two types of wastewaters (such as domestic and operation wastewater) are generated during the operation phase of the project. Domestic wastewater is discharged from washrooms, toilets, and kitchens by employees and from 3 septic tanks. Domestic wastewater generates about 40 gallons per day. The wastewater from the operation process and drainage are shown in Figure 3-26.

Operation wastewater generated about 20 gallons during 2-3 days from operation process. Wastewater is also generated from the oil-extracting process from the silica gel. Used silica gels contain oil residual after filtering process therefore these silica gels are wash and extract by water to get oil residual. This wastewater is flow to the drainage channel. The No 1 and 2 tanks are filtered oil and water from the drainage channel. The size of tanks is 5'x5'x3' and 4'x3'x3' ft respectively. The No 3 tank is only filtered water from the previous tanks that are connect with 2 pipes which diameter is 2 inches. The sand and charcoal are placed layer by layer in the treatment tank. The size of the tank is 10'x7'x3' ft. The water discharge from the No 3 tank is flow to the firefighting tank.

Wastewater is also generated from the preliminary storage tank. When the crude oil in the preliminary storage tank is heated, water is separated from the crude oil and flows to the nearby tank (No.4 tank).

Since operation wastewater generation is low, the constructed water tanks are enough since No.3 tank was constructed. Normally, operation wastewater is evaporated because the amount of wastewater is low and day time temperature is high. Therefore, wastewater impact on the surrounding area is considerably low. However, during the wet season, No. 3 tank is filled by rainwater, which lasts only a few weeks. To minimize the impact of wastewater, the filtrated water is sent to a firefighting tank near the water treatment tank. Wastewater disposal process is shown in Figure 3-27. The design layout of wastewater tanks is shown in Figure 3-28.

No 4 tank is situated near the primary storage tank. The water generation from primary storage tank is stored to the No 4 tanks that size is 15’x10’x4’. The photos of wastewater treatment tanks are described in Figure 3-32. Wastewater final discharge point is shown in Figure 3-30.



Figure 3-26 Drainage System for Domestic and Operation Wastewater

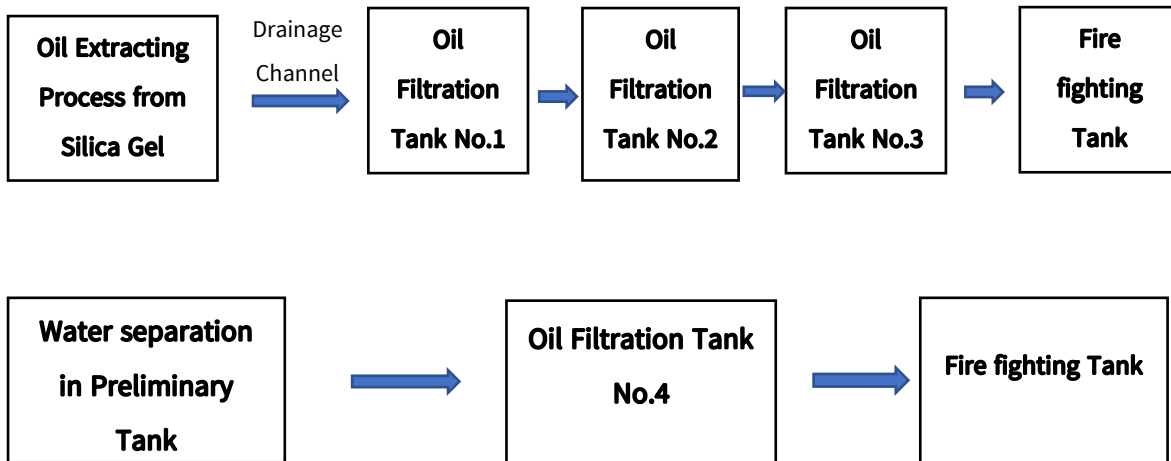


Figure 3-27 Wastewater disposal process

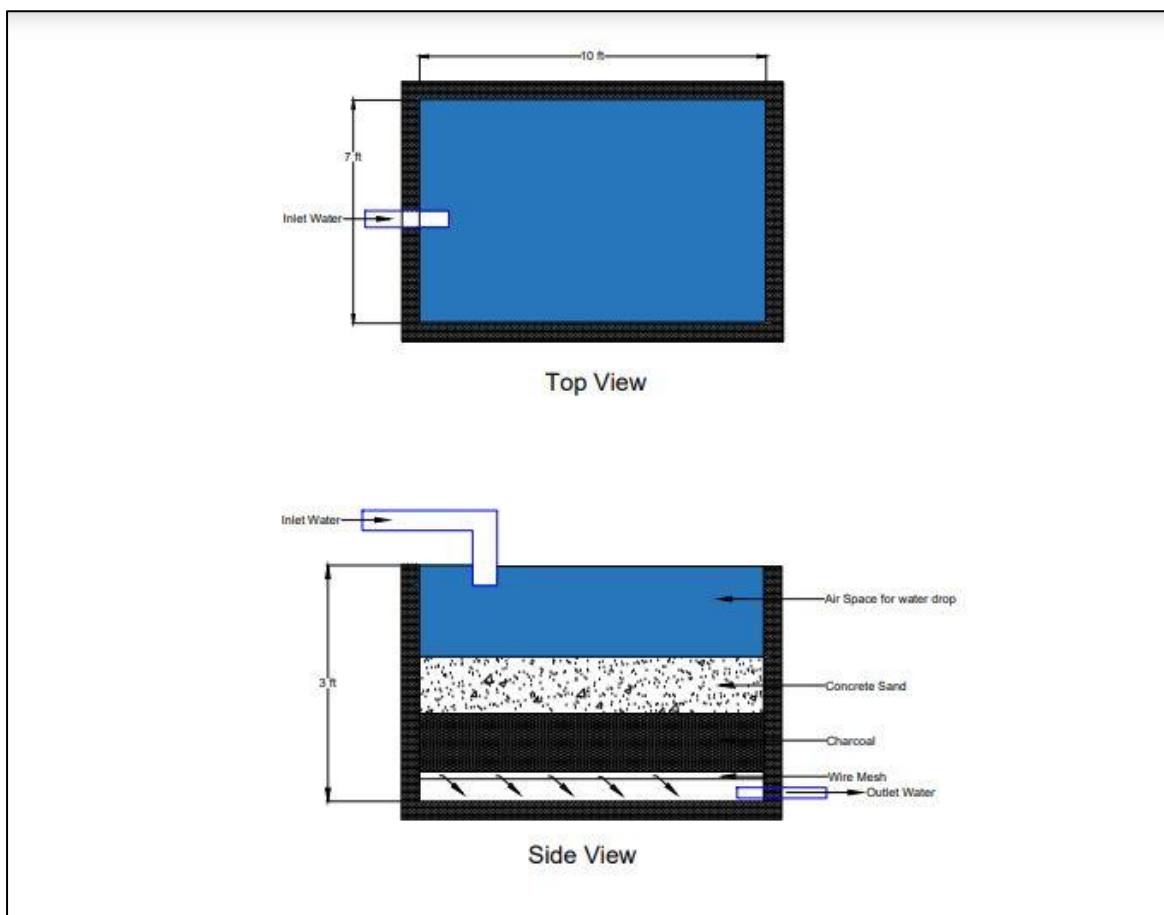


Figure 3-28 Wastewater Tank design layout



No 1 and 2 (Oil filtration tanks)



No.3 (Water filtration tank)



No.4 (Water treatment tank)

Figure 3-29 Wastewater Treatment Tanks

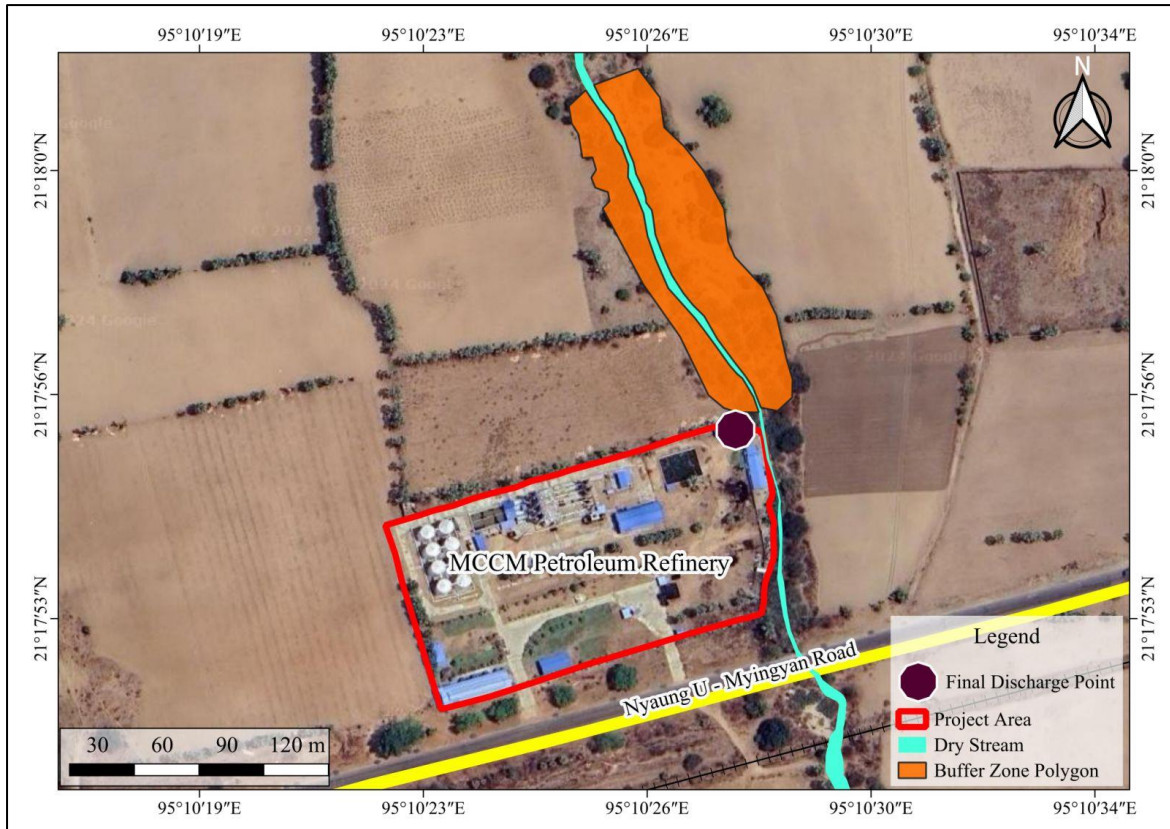


Figure 3-30 Wastewater Final Discharge Point

3.10.POLLUTION CONTROL FACILITIES

3.10.1. Noise Control Facilities

The proposed factory put generators in the canopies under a separated shade structure in the proposed factory as shown in Figure 3-18.

3.11.STAFF FACILITIES

3.11.1. Welfare Facilities

The proposed factory provides a welfare plan which applicable for all staff in the company. The accommodation, kitchen and canteen are provided for the staff. The factory set up air conditioner and fans in the workplace. Closed-circuit televisions (CCTV) are also set up around the factory for security. Hand washed basins with soaps are also supplied over the factory are also provided for the purpose of hygiene. The photos of facilities are shown in Figure 3-31.

	
<p style="text-align: center;">Accommodation</p>	<p style="text-align: center;">CCTV</p>
	
<p style="text-align: center;">Air Con</p>	<p style="text-align: center;">Refrigerator</p>
	
<p style="text-align: center;">Satellite Television</p>	<p style="text-align: center;">Washing Machine</p>

Figure 3-31 Photos of Welfare Facilities

3.11.2. Drinking Water Facilities

Purified drinking water system is installed to ensure that every employee can have drinkable water. The amount of drinking water storage is 200 Liters. The amount of water consumption for drinking water is approximately 60 liters. The photos of drinking water facilities are depicted in Figure 3-32.



Figure 3-32 Photos of Drinking Water Facilities

3.11.3. Sanitary Facilities

There is a hand wash basin with liquid soap. Similarly, masks are provided for all workers to protect against the Covid-19 pandemic. Furthermore, garbage bins are located around the factory compound for waste disposal.

The proposed factory contains toilets and bathrooms. There are also septic tanks which are installed for the sludge. The photos of sanitary facilities are shown in Figure 3-33.



Figure 3-33 Photos of Sanitary Facilities

3.11.4. Fire Prevention and Fire Fighting

The factory is an open space operation industry and fire hydrants are placed around the factory. The water is distributed to all fire hydrants from firefighting tanks and firefighting tanks will be filled with water all the time. Two firefighting water tanks are constructed in the factory and the capacities of these water tanks are over 100,000 gallons and 5,000 gallons respectively. The size of over 100,000 gallons tank is (57' × 60' × 12') and the size of 5,000 gallons tank is (20' × 20' × 8'). A manual break glass call point is also installed in the control room of the factory and watched the operation process conditions 24hr with CCTV. Fire extinguishers, fire safety signboards, and emergency call lists are placed near the operation area and around the factory. Specifically, the number of the materials for fire safety are three 50 kg fire extinguishers, two 35 kg fire extinguishers, forty 5 kg fire extinguishers, ten 5 kg fire extinguishers with foam, twelve fire hydrants, ten axes, twenty fire buckets and two fire alarms. Some fire safety materials are also placed in the firefighting room. And MCCM Co., Ltd. gets no objection recommendation letter from the Taungtha Fire Service Department as shown in **Appendix- A**. Emergency layout plan and placement of fire safety facilities are shown in Figure 3-34 and Figure 3-35.

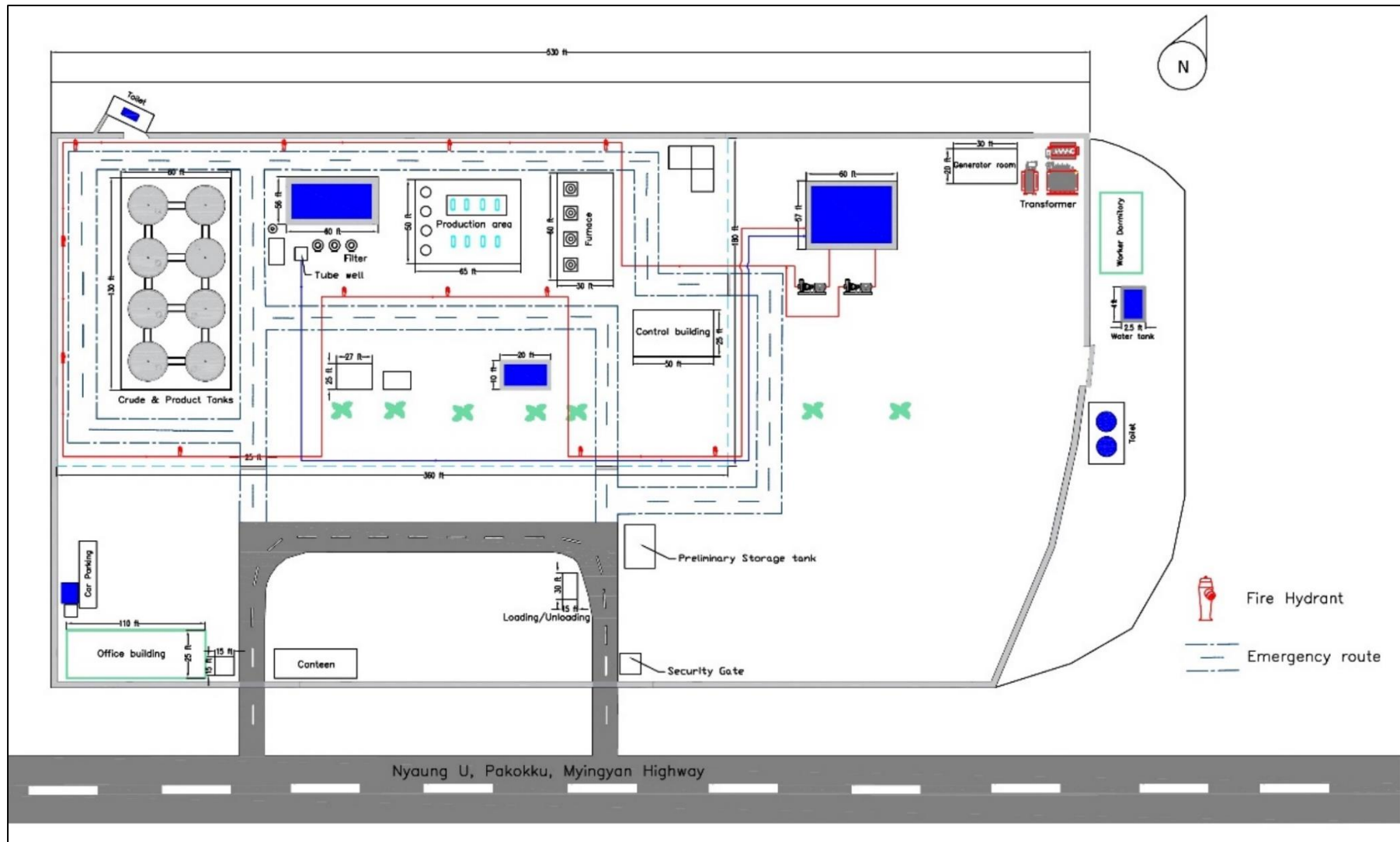


Figure 3-34 Emergency Layout Plan of Proposed Factory



Figure 3-35 Fire Safety Facilities

3.11.5. Training Program Facilities

MCCM Petroleum Mini Refining factory already has a regular emergency alarm training, fire drill, and fire-fighting training program, which is a vital part of workplace fire safety. The training took place on 19th December 2020.

The factory will prepare the internal sharing section in which the accomplished people must share their knowledge and experience through the juniors concerned with the mentioned courses. In the project area, fire-fighting training shown in Figure 3-36.



Fire-fighting training program
Figure 3-36 Fire-fighting training

3.12.PROJECT ALTERNATIVES

3.12.1. Description

The MCCM Co., Ltd. is the mini petroleum refinery which produce fuel for the local customers focusing to reduce high demanding of import oil products such as gasoline and diesel. Other places in Magway are considered before choosing the current project site but they are not chosen due to the difficulties in water requirement. The current site is chosen because it has more positive facts over other places. Moreover, the raw materials are near the project site making the place most suited for petroleum refining.

Due to the best operation, the project factory has received the best performance pride from Ministry of Electricity and Energy in 2020. The certificate is described in **Appendix A**.

The project's best operation is described as follows:

- The project operation is the first project of mini refinery factory in Kyawzi village, Taung Thar Township, Mandalay Region.
- Moden technology can apply for petroleum refinery process,
- The good quality product can produce in the factory,
- Waste pollution can control with technology and
- Create job opportunities for local people

3.12.2. Comparison

Alternatives	MCCM Project	Other Locations in Myanmar	Potential Environmental and Social Impact of other locations
Location	<ul style="list-style-type: none"> The current project area is available and convenient for production of petroleum products. 	<ul style="list-style-type: none"> In Magway, the proposed site is not convenient due to lack of water supply The proposed area in Magway is not as economic as the current location 	<ul style="list-style-type: none"> Water demand can cause mainly issued for project production. The gas emission and operation process may impact on residential area.
Technology	<ul style="list-style-type: none"> Current technology is Chinese technology that needs a little manpower, no need to burn coal or other biomass pellets or fuel. 	<ul style="list-style-type: none"> Traditional refining technologies that need to be operated manually, high manpower requirements, and the need to burn coal or biomass pellets 	<ul style="list-style-type: none"> It may cause pollution source both environment and community.
Demand	<ul style="list-style-type: none"> The current location is available for market and the current market is big in production of crude oil but not final petroleum products 	<ul style="list-style-type: none"> It will be difficult for other places since the market is farther than the current project site. 	<ul style="list-style-type: none"> It can cause air pollution and social problems due to transportation vehicles that transport the required raw material to the project factory.
Site Layout	<ul style="list-style-type: none"> The current site layout is the most convenient compare to another site. 	<ul style="list-style-type: none"> Other location may not be completely convenient for the project site. 	<ul style="list-style-type: none"> The site layout and infrastructure in the factory may lead to the environmental pollution such as water pollution, gas emission and oil spill to the ground.
Energy	<ul style="list-style-type: none"> The current location has easy access to electricity. 	<ul style="list-style-type: none"> The other places may take a long time to get electricity from the government 	<ul style="list-style-type: none"> Due to the electric demand, it can cause electric insufficient issue on the

Alternatives	MCCM Project	Other Locations in Myanmar	Potential Environmental and Social Impact of other locations
			environment.
Social	<ul style="list-style-type: none"> There is no residential and commercial area within 3-kilometer radius of the project area. Therefore, the social issue cannot be found. 	<ul style="list-style-type: none"> The other areas can cause social problem such as conflict between worker and local people, if the area is reaching out the very overcrowded near the project site. 	<ul style="list-style-type: none"> It is the big challenge to happen social problem.
Cultural	<ul style="list-style-type: none"> The project location is situated in the Nyaung U-Myinchan road and bare land area of Kyawzi village tract. For that reason, there is no cultural impact due to project implementation. 	<ul style="list-style-type: none"> The rest areas may not be suitable for the factory. 	<ul style="list-style-type: none"> In some location, the cultural building, religious building and pogodas can be demolished by project construction.

3.12.3. Zero Option

The zero option for this project is as shown in Table 3-8.

Table 3-8 Zero Option of Proposed Project

Aspect	Conditions without the project	Conditions with the project
Technical Aspect	<ul style="list-style-type: none"> There will be no petroleum refining technology in the country 	<ul style="list-style-type: none"> Current project will become pioneer to locally produced petroleum products
Economic Aspect	<ul style="list-style-type: none"> The country will still depend on importing petroleum final products from the foreign although the raw materials are currently available in the country. There will be no job opportunity for local people. 	<ul style="list-style-type: none"> There will be a drop in importing of petroleum final products thus reducing foreign importing to the country. There will be job opportunity for local people.
Environment and social considerations	<ul style="list-style-type: none"> There will be no impact on physical environment and social environment by the project. 	<ul style="list-style-type: none"> During the construction phase and operation phase, there will be emission of gas and other matter to natural environment.

CHAPTER 4

SURROUNDING ENVIRONMENT

4.1. INTRODUCTION

The purpose of this section is to predict how environmental and socio-economic conditions will be impacted because of the operation of the proposed project. This requires a sound understanding of the baseline conditions at the project site, which established through desktop study research, site surveys, primary data collection and projections for future developments. Findings provide the current and future characteristics of the project site and the value and vulnerability of the key environmental and socio-economic resources and receptors. The following sections provide a description of the environmental and socio-economic aspects of the project.

In this chapter, the area of about 3 km radius around the project site has been studied to check the impacts for the surrounding environment. Three groups of components are consisted in studying surrounding environment. They are (i) Physical Components including description with data and maps of topography; water resources; geology and soils, hydrology/hydrogeology; environmental quality; climate; vegetation cover; and natural hazards (ii) Biological Components: descriptions on fauna and flora (iii) Socio-economic Components: descriptions of income and livelihoods, living conditions and access to public services and natural resources, land use maps, population distribution maps, maps and charts of other socio-economic indicators such as poverty, employment and education.

4.2. PHYSICAL ENVIRONMENT

Air quality, stack emission, water quality, noise, light, temperature, odor, soil, vibration, climate and meteorology and geology had been studied to know the physical environmental condition.

4.3. OVERVIEW OF THE PROJECT AREA

The proposed project is situated in 21°17'54.24"N and 95°10'24.26"E. The project site has coverage of about 3.98 acres in area extent, located in Kyaw Zi Village Tract, Taungtha Township, Myingyan District, Mandalay Region. Overview map of the project area as shown in Figure 4-1.

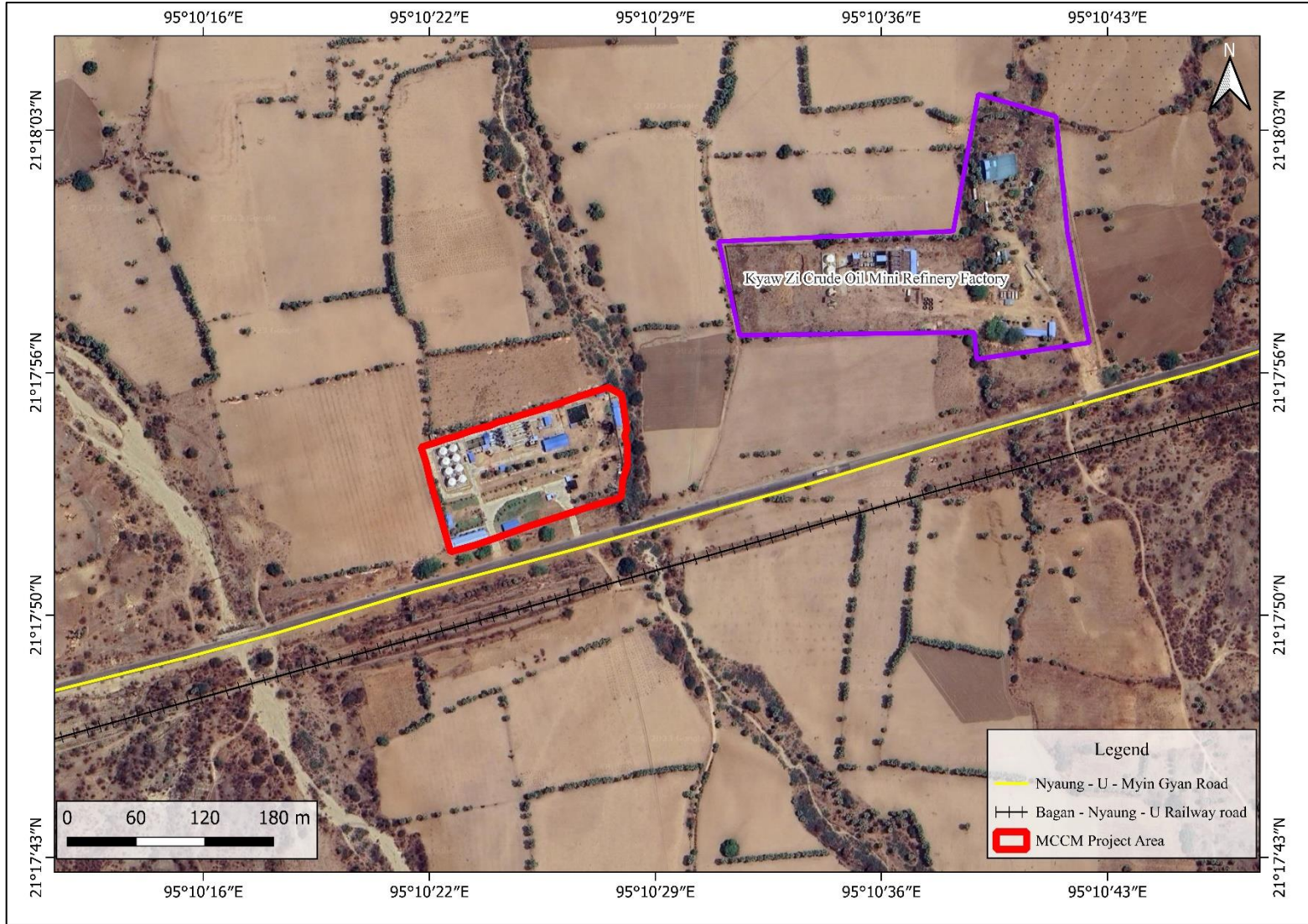


Figure 4-1 Overview Map of the Project Area

4.3.1. Climate and Meteorology

The proposed project location is situated in Mandalay Region, Myingyan District, Taungtha Township, which experiences tropical low rainy region climate. It lies on 442.9ft above the sea level. Summer, rainy season, and cool season roughly correspond to the three main seasons of the atmosphere. The summer season lasts from mid-March to mid-May. The southeast monsoon wind is the main source of rain and the study area receives rain during the period from mid-May to end of September. The cool season lasts from November through February. The weather is good for cultivation and different crops are cultivated in the area. The months like November, December and January have low temperature and defined as cold months.

The mean monthly temperature is highest in May at 34.7 °C and lowest in January at 20.4°C. Except in December and January, the monthly temperatures are above 23.0 °C. The southwest monsoon wind is the main source of rain, and receives rain during the period from May to November. Rainfall sharply decreases from November and continues to be less than Myingyan Township is shown in Table 4-1 and Table 4-2.

Table 4-1 2013-2022 Rainfall Data in Myingyan (mm)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2013	20.1	21.2	24.7	25.9	28.5	29.1	29.8	30.1	29.4	26.2	24.3	20.1
2014	20.5	21.6	25.5	26.4	28.9	29.4	30.2	30.6	28.8	26.1	24.6	21.3
2015	21.3	22.5	25.8	26.8	29.0	29.4	30.4	30.8	29.0	26.5	24.0	21.6
2016	21.6	23.6	26.1	29.1	29.7	30.2	31.2	31.5	29.4	27.3	25.6	22.4
2017	22.5	25.0	26.9	29.6	30.5	31.1	30.4	30.3	29.9	28.7	26.9	22.9
2018	21.7	25.2	29.1	31.3	31.2	29.8	31.2	30.0	30.5	27.6	25.7	23.7
2019	22.0	25.3	28.3	32.9	34.2	32.2	31.3	30.5	30.3	29.7	27.7	22.9
2020	22.1	24.6	29.8	32.2	33.2	32.3	32.2	30.8	31.8	30.7	26.2	23.7
2021	23.9	25.7	30.1	32.4	32.9	32.3	31.2	30.4	29.7	30.0	27.1	23.9
2022	22.7	23.0	30.6	32.0	31.4	31.4	31.9	30.7	29.9	30.4	27.6	23.4
2023	23.5	24.2	30.8	32.5	31.8	32.2	31.6	31.3	30.2	31.6	28.0	24.2

(Source: <https://weatherandclimate.com/myanmar/mandalay/myingyan>)

Table 4-2 2017-2022 Temperature Data in Myingyan (°C)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2013	20.7	23.9	28.5	32.1	32.4	31.8	32.4	30.1	29.8	28.2	25.3	21
2014	20.4	23.2	28.1	31.5	31.9	30.6	31.4	30.6	30.4	28.4	26.1	21.4
2015	21.6	23.4	28.6	31.1	32.0	30.4	30.7	31.1	31.8	27.8	25.9	22.1

2016	21.4	24.2	28.7	32.7	33.2	31.4	30.9	30.5	30.4	28.2	27.4	21.2
2017	21.3	24.7	27.3	30.8	31.9	31.3	30.4	30.5	30.1	28.6	26.5	21.6
2018	21.7	24.1	28.6	32.1	32.0	30.2	31.7	31.1	31.0	28.0	25.9	22.8
2019	20.7	23.9	27.6	32.7	34.7	31.8	30.0	29.0	28.7	29.3	27.6	21.3
2020	21.7	22.2	28.6	31.2	33.3	32.3	31.8	31.0	31.3	30.0	25.7	22.0
2021	22.4	24.2	28.7	32.7	33.2	32.4	30.9	30.5	29.4	29.2	27.4	23.0
2022	21.3	21.8	29.5	32.9	31.4	31.8	30.6	30.2	31.4	30.0	28.2	23.4
2023	21.7	23.1	28.6	32.1	32.0	30.2	31.7	31.1	31.0	28.0	25.9	22.8

(Source: <https://weatherandclimate.com/myanmar/mandalay/myingyan>)

4.3.2. Topography

Taungtha Township is located between North latitudes 21°00'20" along 21°24'00" and between East longitudes 95°06'05" and 95°08'05". It is 442.9 ft above the sea level. Total area of this township is 507.21 square miles. The area is 32 miles from east to west. It is 22 miles wide from south to north. Half of the area is uneven valley consists of various mountains, hills and watersheds. The other half is uneven plain. There are 4 mountains in the area which are Taungtha Hill (1788 ft), Nan Myint Hill (1315 ft), Oh Hill (1368 ft) and Myin Sine Hill (1316 ft).

4.3.3. Geology

Geomorphological as well as tectonically Myanmar can be divided into four major tectonic provinces which are north-south trending linear belts, these are from east to west (1) Shan-Tanintharyi Block, (2) Central Cenozoic Belt, (3) Western Fold Belt and (4) Rakhine Coastal Belt. Geomorphological, the study area is situated in the Central Cenozoic Belt Figure 4-2 as well as within the Dry Zone (Figure 4-3 and Figure 4-4).

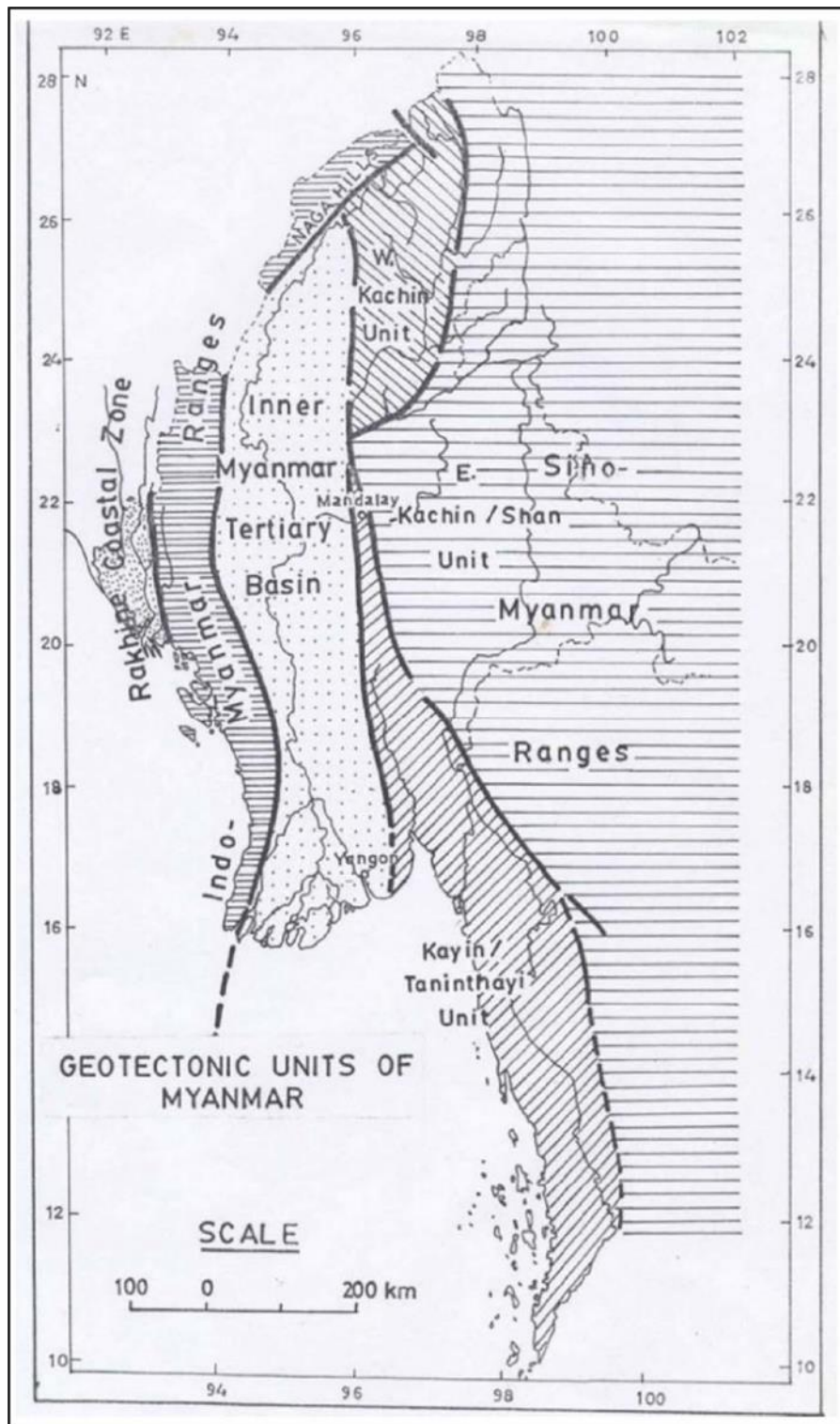


Figure 4-2 Major Geotectonic Units of Myanmar¹

¹ Dr. Ir. Subagyo Pramumijoyo, Zaw. K. L and Lat. K.Z, 2010. Regional Geology of Myanmar. Gadjah Mada University.

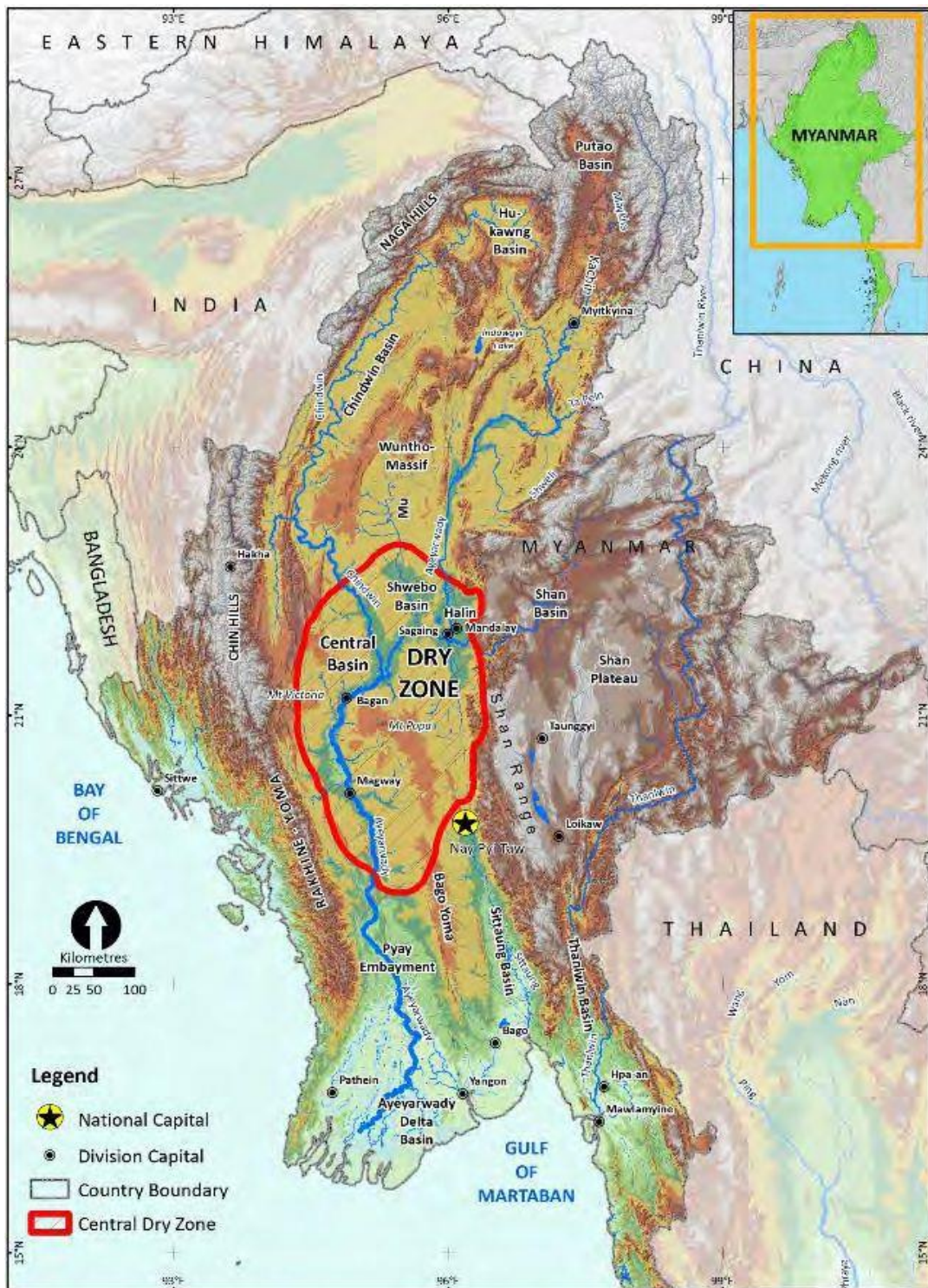


Figure 4-3 Central Myanmar Dry Zone⁴

² Dr. Drury.L.W. Hydrogeology of the Dry Zone_Central Myanmar. The Australian Water Partnership.

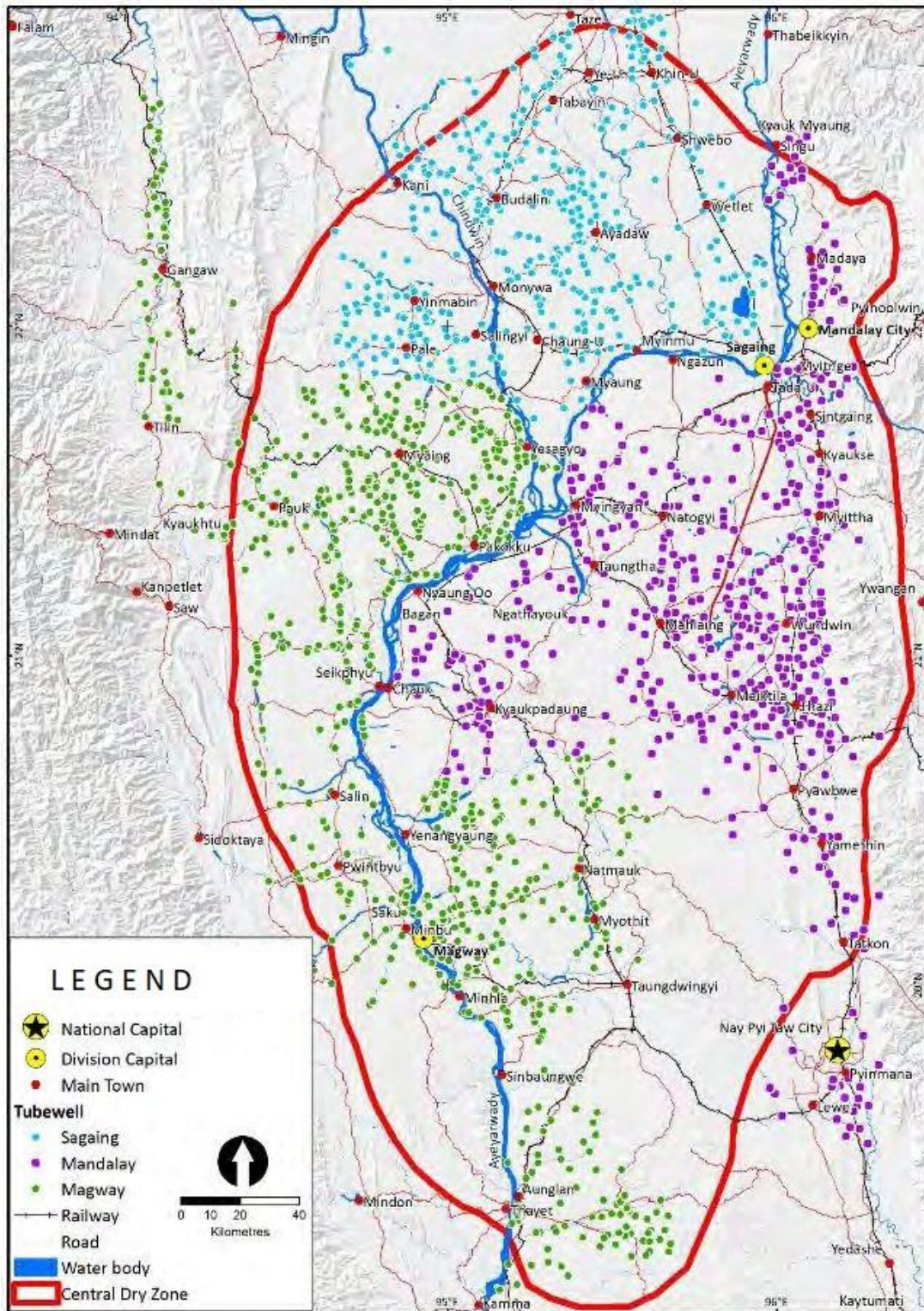


Figure 4-4 Townships of Central Myanmar Dry Zone⁵

According to the geotectonic feature, this dry zone is divided into three sections as per below;

² Dr. Drury.L.W. Hydrogeology of the Dry Zone_Central Myanmar. The Australian Water Partnership.

Central Cenozoic Belt/ Central Lowlands	Western Trough (Inter Arc Trough)	Within Dry Zone
	Central Volcanic Line (Inner Volcanic Arc)	
	Eastern Trough (Back Arc Basin)	

The Western Trough is located east of the Western Fold Belt and consists of Upper Cretaceous to Middle Tertiary marine and non-marine deposits overlain by Upper Miocene to Recent continental classic sediments. The Minbu (Central) and Chindwin basins are located within this Inter Arc Trough System.

The Central Volcanic Line is characterized by a series of NNW-SSE oriented igneous rocks in Thayetmyo, Mount Popa, Shinmataung Range, Salingyi and volcanoes at Monywa. The igneous rocks can be intermittently traced along this volcanic arc extending for more than 400 kilometers.

The Eastern Trough can be divided into several sedimentary basins including the Sittaung Basin, Bago Yoma Anticlinorium and the Shwebo – Monywa Basin. All basins are filled with Tertiary marine sediment with an increase in continental sediments to the north.

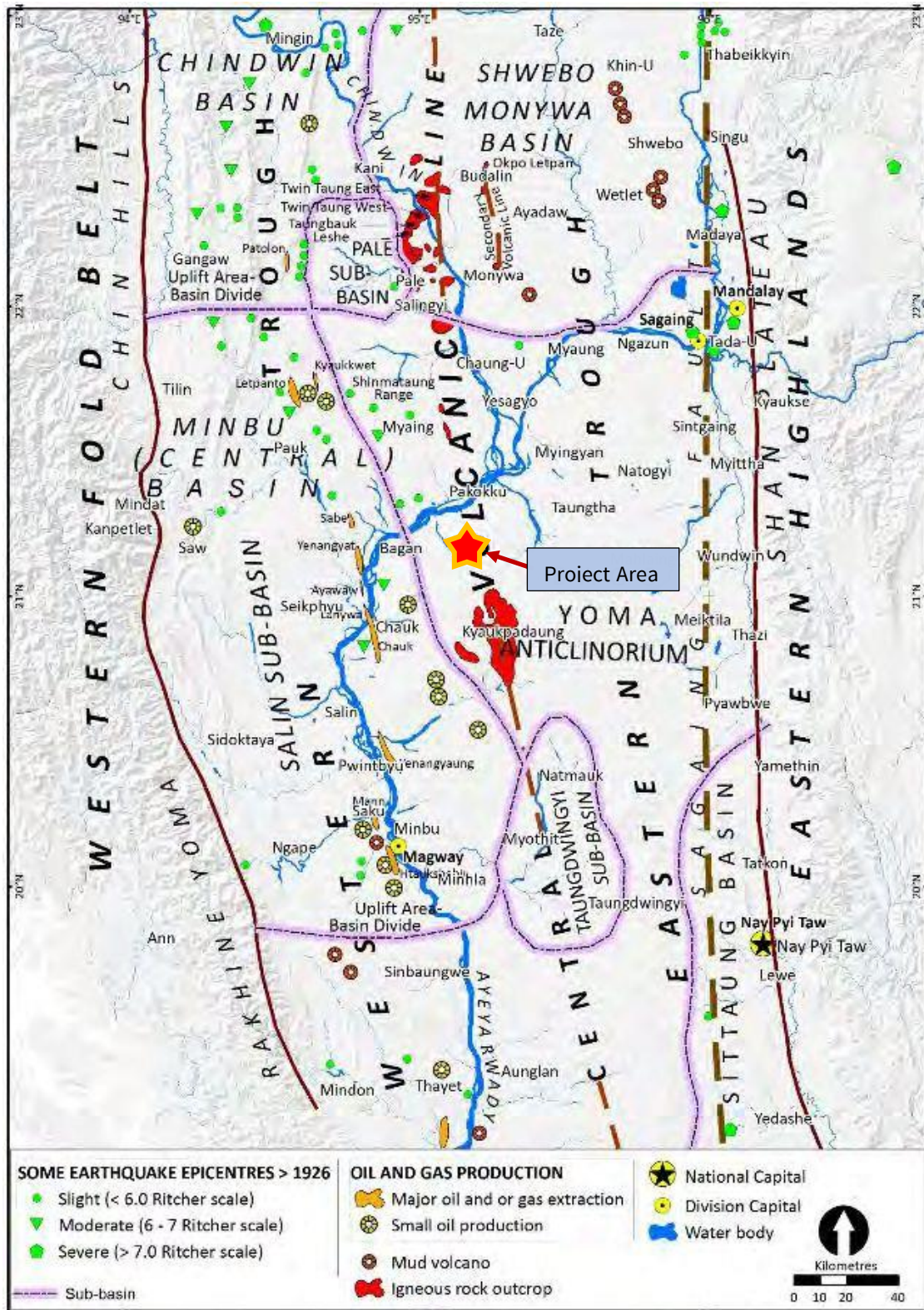


Figure 4-5 Central Volcanic Line near Project Area⁶

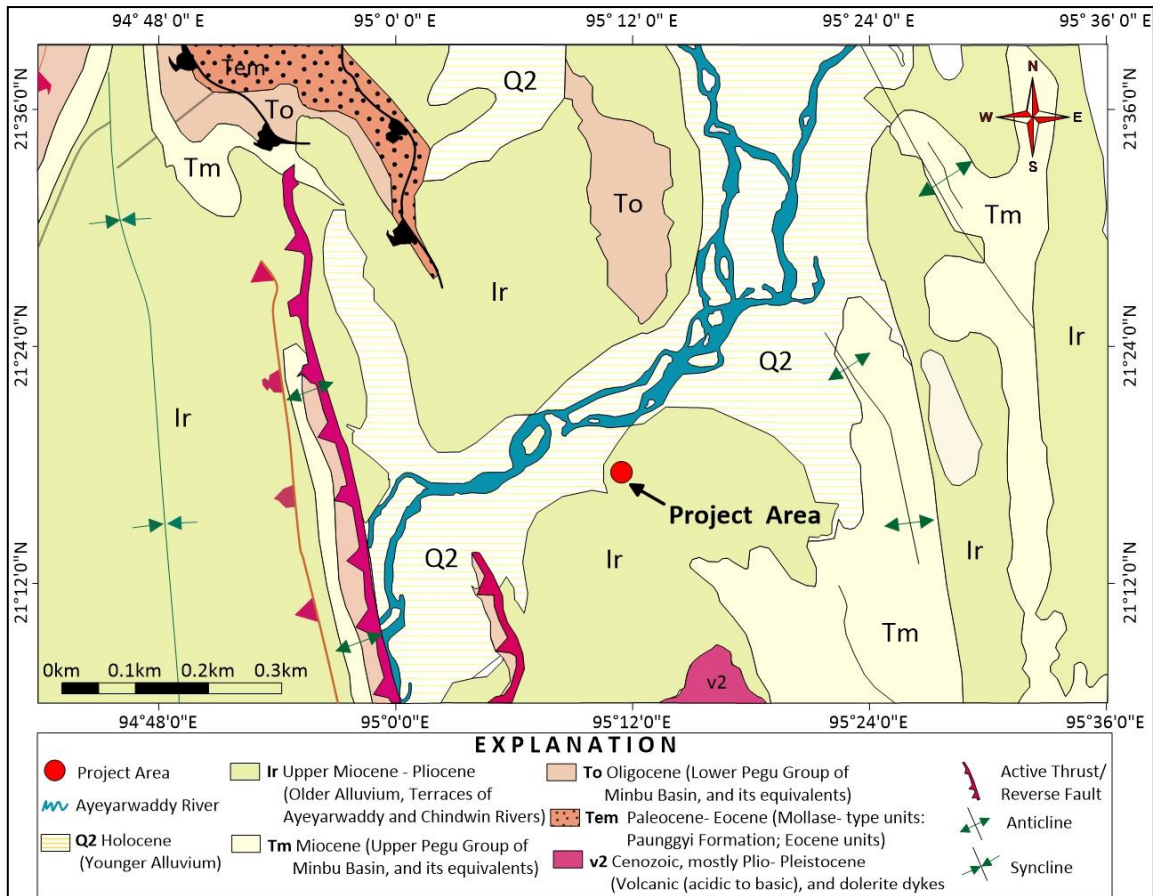
As per above Figure 4-5, the study area is located between the Central Volcanic Line and the Sagaing fault (about 67 miles). The Sagaing fault is a continental transform fault

⁶ Dr. Drury.L.W. Hydrogeology of the Dry Zone_Central Myanmar. The Australian Water Partnership

between the India and Sunda plates that connects spreading centers in the Andaman Sea and the continental convergence zone along the Himalayan front. Therefore, the regional area of proposed project is located within a tectonically active area.

Lithological, the surrounding area of the study area is made up of Irrawaddy formation of Upper Miocene to Pliocene age. In addition, the study area is mainly composed of medium to coarse grained, yellow-brown to blue grey sand and gravel loosely cemented, current bedded, abundant fossil wood and calcareous nodules, clay beds, minor red bed and fluvialite. Among them, yellow brown sand and gravel, clay and silt are abundance in this proposed study area.

The alluvial soil of younger alluvium (Holocene age) occurred in the north, west and eastern part of the study area. Younger alluvium overlies the Irrawaddy Formation of older alluvium, Upper Miocene -Pliocene age, and followed by the Upper Pegu Group of Minbu Basin, and its equivalents (Miocene age). Younger alluvium consists of stream deposits, gravel deposits, silty clay and light colour sandy soils. Miocene age, Upper Pegu Group of Minbu Basin consists of Pyawbwe formation, Kyaukkok formation and Obogon formation. In these three formations include the alternating blue-grey shale, fine to medium grained sandstone, minor gypsum and rich molluscan fauna. The geological map of the study area is shown in Figure 4-6.



Source: Geological Map of Myanmar, MGS

Modified by HA Team

Figure 4-6 Geological Map of the Study Area

4.3.4. Hydrogeology

Myingyan area is the one of the places of the central Dry Zone. Historically, this area has been hydro geologically renowned for its high salinity, low groundwater yielding aquifers and low success rate in locating potable suitable for irrigation and human consumption. The Ayeyarwaddy River is the main source of irrigation water. There are many large-scale river pumping stations for irrigation between Nyaung U and Myingyan. In the vicinity of proposed study area, there is one river pumping station for irrigation (Figure 4-7).



Source: Google Earth Photo

Figure 4-7 Irrigation Canal near Project Area

Regionally, groundwater occurs in the Pegu Group, Irrawaddy Formation and unconsolidated Alluvium. Locally, the groundwater of the project area occurs in Irrawaddy Formation. The Irrawaddy Formation is in synclinal basins between the Pegu Group hills and on the flanks. These rocks of Upper Miocene to Lower Pleistocene age consist of poorly cemented, massive, current-bedded, medium to coarse grained sand, poorly bedded clay and shale and calcareous nodules. Fossil wood, up to 15 meters in length is occasionally observed.

Operational problems include river level fluctuations, shifting sand bars, absence of stable banks, widespread floods, high bed load, power availability, lack of water delivery to the channel ends and farmer affordability or willingness to pay. Domestic water supply from the Ayeyarwady River also faces additional constraints, including bacteriological and agricultural pollution, turbidity and high cost of treatment. Other surface water sources come from reservoirs, tanks, lakes and ponds.

In this saline environment, the general rules to locate low salinity water include:

- drill away from Pegu Group outcrop;
- avoid areas where the Obogon Formation occurs at a shallow depth; and
- terminate drilling in the shallowest aquifer of the Irrawaddy Formation, geophysical log the tube well and test for quality and quantity. Do not drill deeper unless necessary.

The municipal water of Taungtha Township is used by the both of surface and groundwater. Surface water used from the Taungtha and Bonsinyoe dams in the Wet season.

Ground water of the Taungtha Township is at the base of the Taungtha Anticline drilled through Alluvium and into Irrawaddy Formation. The water is slightly brackish. The schematic hydrogeological map of Myingyan-Ngazun and Mahlaing is shown in Figure 4-8.

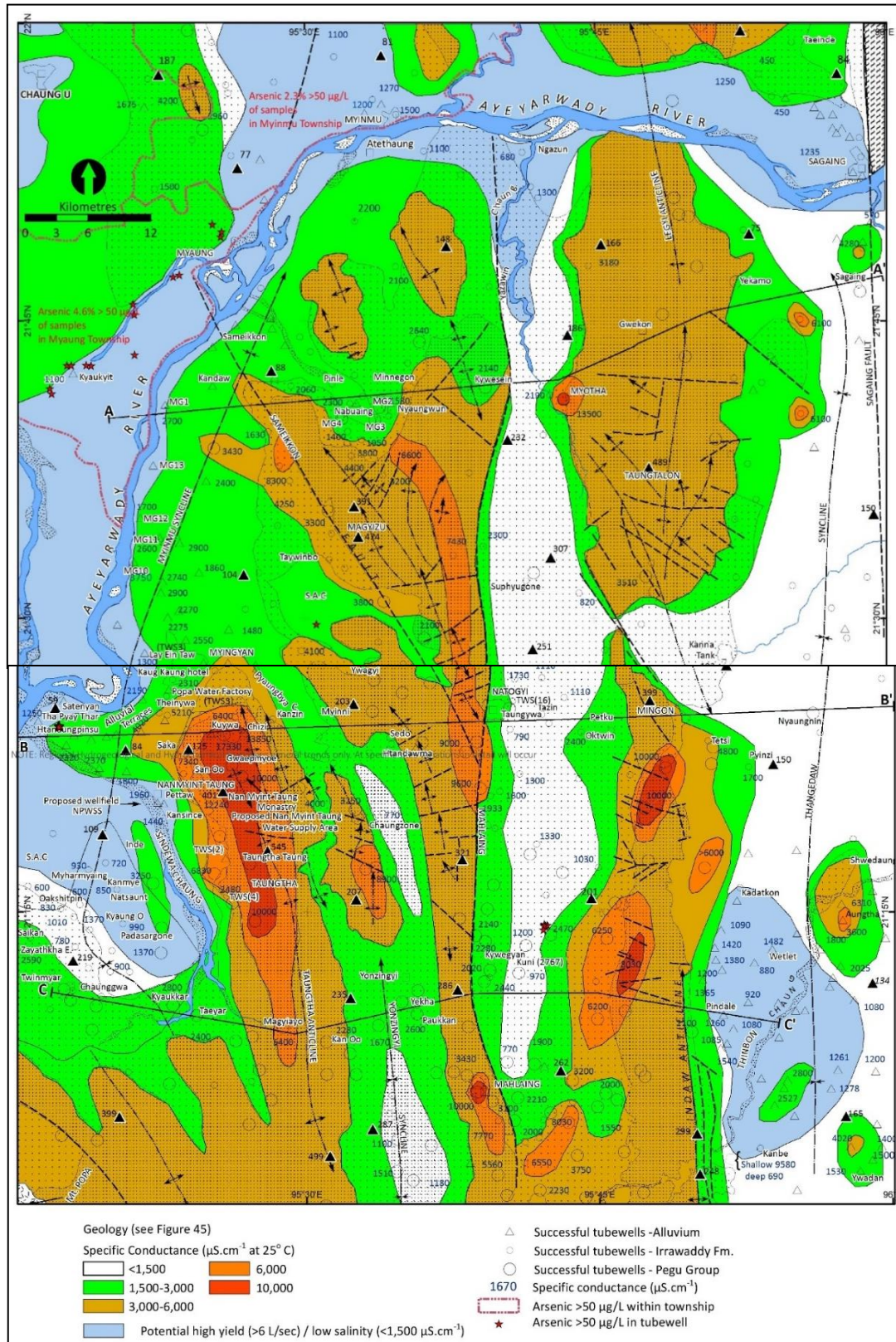


Figure 4-8 Schematic Hydrogeological Map of Myingyan-Ngazun-Mahlaing

4.3.5. Soil

The project area is located in Myingyan district, Mandalay Region. Therefore, soil types and characteristics of Mandalay region is shown in Table 4-3 and Figure 4-9.

Table 4-3 Soil Types and Characteristics of Mandalay Region

Sr. No.	Soil Type	Land Use Type	Class	Land Form	Soil Depth	Texture	Soil pH	Plant Nutrients			Suitable Crops	Amelioratic Measures Required
								N	P	H		
1.	Meadow & Meadow alluvial soils	Rice Land, Kaing	Fair	Plain	Thick	Silty clay, Clay	6.0-8.0	L	L	H	Rice, Vegetables, Pulses, Cotton, Sesame, Corn, Sugarcane	Moderate dose of mineral fertilizer application
2.	Red brown forest soils	Forest	Fair	Hilly	Med	Clay loam, Sandy Loam	5.0-6.5	M	L	H	Forest	Soil conservation
3.	Yellow brown forest soils	Forest	Fair	Hill	Med	Clay loam, Sandy Loam	5.0 - 6	M	L	H	Forest	Soil conservation
4.	Yellow brown dry forest & Indaing soils	Forest, Upland	Fair	Hilly & slope	Med	Sandy loam, Clay		L	L	M	Forest, Orchards, Groundnut, sesame	Soil conservation
5.	Light forest soils	Forest	Fair	Hilly & slope	Med	Sandy loam, Clay		L	L	M	Forest, Orchards, Groundnut, sesame	Soil conservation
6.	Catena of Savana soils on slopes & Compact Soils on depressions	Upland, Rice land	Good/ Fair	Undulating upland Plain	Thick	Sandy loam, Clay	7.5-8.5	M	L	M	Rice, Chili, Sugarcane, Cotton, Vegetables, Groundnut, Sesame, Pulses	Wind erosion control Planting wind break, High does of mineral and organic matter application
7.	Compact soils	Rice land, Upland	Fair	Plain	Thick	Clay	7.5-8.5	M	L	M	---do---	Drainage & irrigation, moderate does of fertilizer application
8.	Red earths & Yellow earths	Upland, plantation	Good	Slope, Plateau on hills	Thick	Sandy loam, Clay loam	6 - 7	M	L	M	Groundnut, Sesame, Soybean, Orchards	Soil conservation, Moderate dose of fertilizer application
9.	Mountainous red forest soils	Forest	Good	Steeply dissected	Med	Sandy loam, Clay with gravel	5 - 5.5	M	L	H	Forest	Forest & Soil conservation
10.	Popa complex	Forest	Fair	Steeply dissected	Med	Clay loam,	5 - 7				Forest	Forest & Soil conservation

Sr. No.	Soil Type	Land Use Type	Class	Land Form	Soil Depth	Texture	Soil pH	Plant Nutrients			Suitable Crops	Amelioratic Measures Required
								N	P	H		
	soils					Clay						
11.	Primitive crushed stone soils	Pasture	Fair	Hilly	Med	Sandy & Gravel, Loamy sand					Pasture	Pasture establishments

Source: Soil Types and Characteristics of Myanmar, Ministry of Agriculture and Irrigation

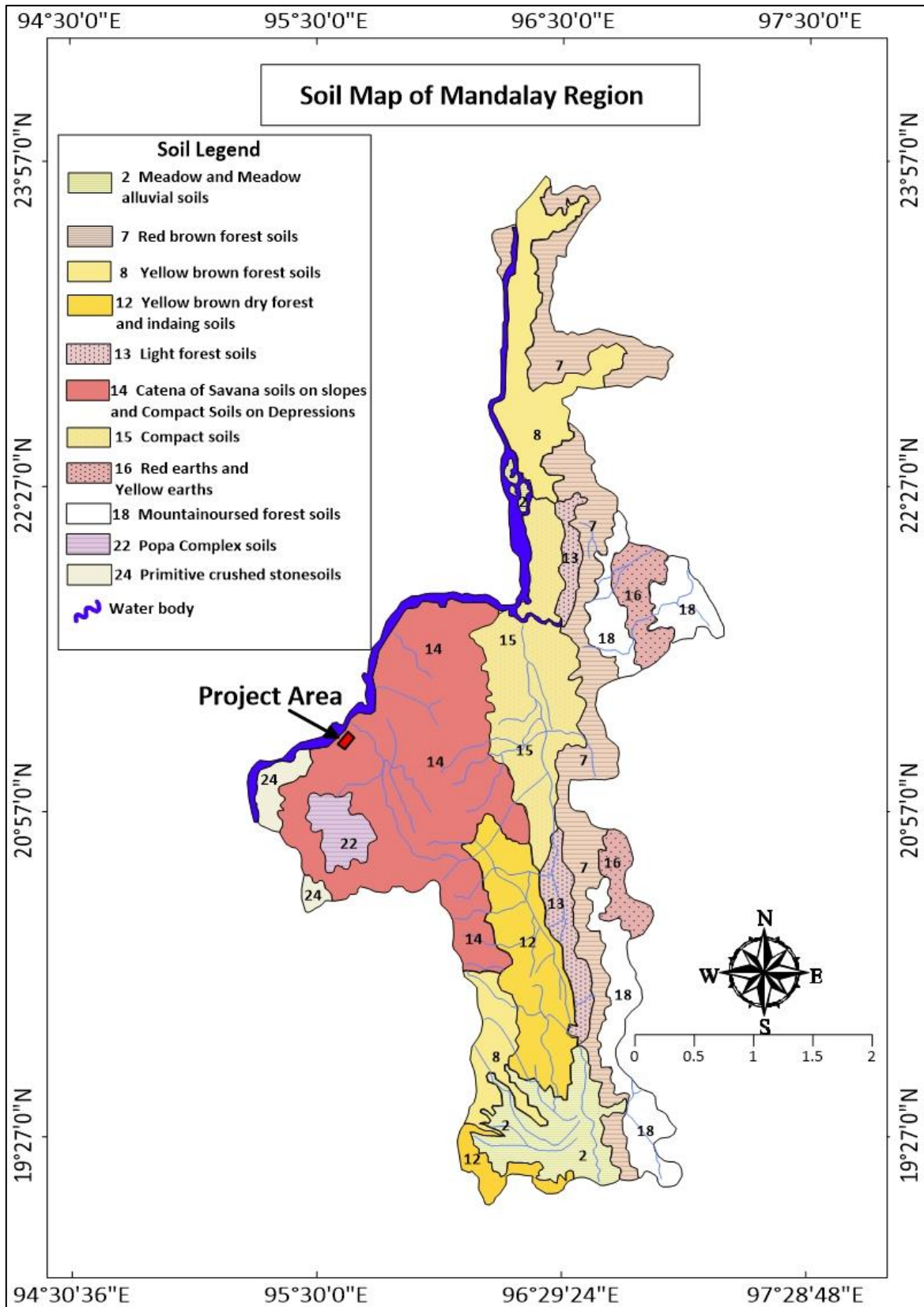


Figure 4-9 Soil Map of Mandalay Region

4.3.6. Seismic Background

Myanmar is particularly earthquake-prone as it lies in one of the two main earthquake belts of the world, known as the Alpide Belt, that starts from the northern Mediterranean in the west, and then extends eastwards through Turkey, Iran, Afghanistan, the Himalayas and Myanmar to finally Indonesia. According to the below Figure 4-10, there are some seismic activities with magnitude (M) ≥ 5 , ≥ 6 , ≥ 7 near the project region since the Saging fault is located through the Central Myanmar.

According the recorded data, there are the seismic activities near the project area that are shown in Table 4-4. The nearest two earthquakes in project area are occurred on September 29, 2001 with moderate magnitude (4.5) and on February 11, 1997 with light magnitude (4).

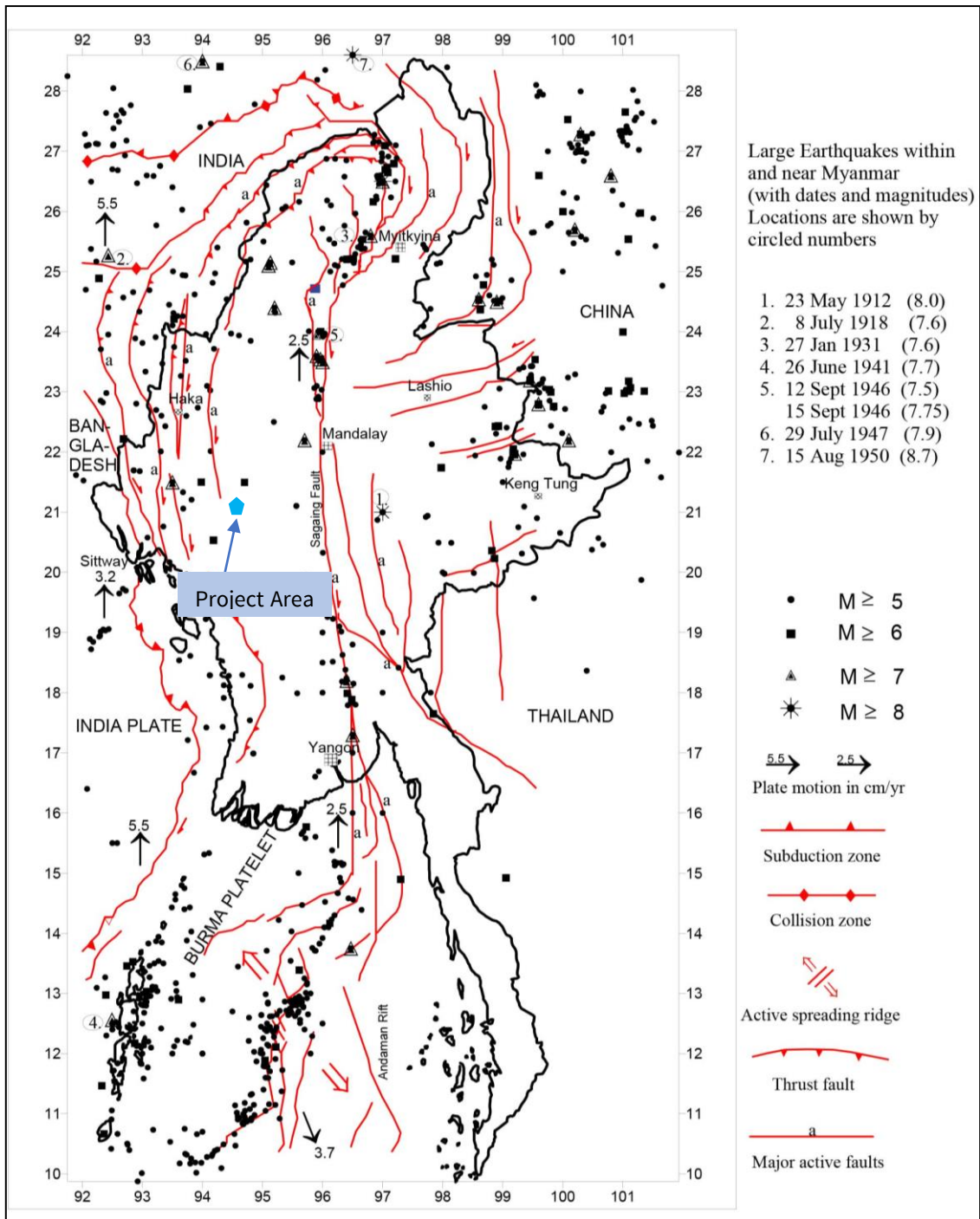


Figure 4-10 Seismotectonic Map of Myanmar Region⁷

⁷ Earthquake data: NEIC for the period 1964 – 2004; from other sources for 1912 – 1963. Tectonic boundaries and fault locations are mainly based on GIAC reports (1997, 2000)

Table 4-4 Recorded Seismic Activities near Myingyan Region during the past 30 years

No.	Date & Time	Magnitude and Depth	Location
1	Sep 2, 2021, 8:31	3.3 10km	17 km east of Meiktila, Mandalay Region, Myanmar (Burma)
2	February 11, 2021, 13:31	3.2 5km	22 km northeast of Myingyan, Mandalay Region, Myanmar (Burma)
3	Mar 7, 2016, 03:13	4.8 120 km	Nyaung-U District, Mandalay Region, 15 km E of Chauk, Myanmar (Burma)
4	Aug 1, 2016, 10:01	4.8 134 km	23 km SW of Pakokku, Magway Region, Myanmar (Burma)
5	Jul 11, 1997, 14:54	5.4 138 km	Pakokku District, Magway Region, 41 km SW of Monywa, Myanmar (Burma)
6	Jul 27, 1996, 08:45	5.2 110 km	29 km W of Pakokku, Magway Region, Myanmar (Burma)
7	Jul 8, 1996 11:40	5.1 102 km	31 km NW of Pakokku, Magway Region, Myanmar (Burma)
8	Jul 17, 2005 01:04	5.0 120 km	Nyaung-U District, Mandalay Region, 22 km NE of Chauk, Myanmar (Burma)
9	Mar 29, 2012 00:23	4.5 120 km	47 km NW of Pakokku, Magway Region, Myanmar (Burma)
10	Oct 28, 2012 11:03	4.6 52 km	27 km SE of Monywa, Sagaing Region, Myanmar (Burma)
11	Sep 29, 2001 17:44	4.5 33 km	Myingyan District, Mandalay Region, 16 km E of Pakokku, Myanmar (Burma)
12	Aug 4, 2001 15:25	4.4 151 km	4.4 km NE of Pakokku, Magway Region, Myanmar (Burma)

Source: www.volcanodiscovery.com

4.3.7. Natural Disaster

Taungtha Township is located in the tropical low rainy climate of central Myanmar, so there are no tremendous natural disasters. The danger level of the Irrawaddy River in Taungtha Township is 1152 cm. Natural disasters in Taungtha Township which is located project area experienced two cyclones, one flood and five fire break out in 2020. The project area is about 1.5 km from the Irrawaddy River therefore, the possibility of flooding from the river is considerably low. The damage was as shown in Table 4-5.

Table 4-5 List of Natural Hazards, experienced during 2019 in Taungtha township

No.	Type	Frequency	Death-toll	Damaged Buildings	Loss (Kyat)
1	Cyclone	2	-	18	15.50
2	Tsunami	-	-	-	-
3	Earthquake	-	-	-	-
4	Flood	1	-	-	-
5	Fire	5	-	8	0.85
Total		8	-	26	16.35

(Source: Regional Data, Administrative Department, TaungthaTownship, Mandalay Region, September 30, 2019)

4.4. BASELINE QUALITY MEASUREMENT

The purpose of the baseline quality measurement is to assess the existing environmental conditions in the project area. This section will be provided to proponent and employees to assist them in carrying out the project to avoid or mitigate the impacts on the environment. Environmental baseline quality (air quality, stack heigh emission, light, noise, vibration, temperature, odor, water quality and soil quality) is used to assess the environmental impact of the operation phase and monitored. The baseline noise quality measurement was carried out twice, once in September, 2021 during the wet season and once in May, 2023 during the dry season. Outlines of the monitoring process are shown in Table 4-6 and Table 4-7. The outdoor air quality location map is shown in Figure 4-11.

Table 4-6 Outlines of Monitoring Item in the Monitoring Report for Wet Season

Monitoring Date	Monitoring Item	Parameters	Number of Point	Location	Monitoring Methodology
15 th September – 16 th September, 2021	Outdoor Air Quality	Gas Emission: O ₃ , SO ₂ , NO ₂ , CO, CO ₂ , TVOC Dust Emission: PM ₁₀ , PM _{2.5} , TSP,	1	MCCM Project Area,	On site measurement by Air Quality Monitoring Station (AQM-09)

Monitoring Date	Monitoring Item	Parameters	Number of Point	Location	Monitoring Methodology
		Meteorology: RH%, Temperature, Wind Speed, Wind Direction			
	Indoor Air Quality	PM ₁ , PM ₁₀ , PM _{2.5} , CO ₂ , TVOC, HCHO, Humidity, Temperature	5	MCCM Project Area	On site measurement by Indoor Air Quality Devices
15 th September – 16 th September, 2021	Noise Quality	dB (A)	1	MCCM Project Area	On site measurement by GM-1356 Digital Sound Level Meter
15 th September – 16 th September, 2021	Domestic Wastewater	pH, Total Suspended Solid, BOD, COD, Ammonia, Total Chlorine, Arsenic, Oil and Grease, Iron	1	MCCM Project Area Effluent from kitchen, canteen and bathroom form the accommodation	Collect sample water to send the laboratory
	Operation Wastewater	pH, Total Suspended Solid, BOD, COD, Total Phosphorous, Lead, Sulfide, Oil and Grease, Total Nitrogen, Chromium (Hexavalent)	1	Wastewater produced form the operation of the petroleum refining processes	
	Ground Water Quality	pH, Total Suspended Solid, Conductivity, Ammonia, Total Chlorine, Iron, Arsenic	1	Ground water in the project area	

Table 4-7 Outlines of Monitoring Item in the Monitoring Report for Dry Season

Monitoring Date	Monitoring Item	Parameters	Number of Point	Location	Monitoring Methodology
10 th May – 12 th May, 2023	Outdoor Air Quality	Gas Emission: O ₃ , SO ₂ , NO ₂ , CO, CO ₂ , TVOC Dust Emission: PM ₁₀ , PM _{2.5} , TSP, Meteorology: RH%, Temperature, Wind Speed, Wind Direction	3	MCCM Project Area, Kyaw Zi Village, Malar Village	On site measurement by Air Quality Monitoring Station (AQM- 09)
	Indoor Air Quality	PM ₁ , PM ₁₀ , PM _{2.5} , CO ₂ , TVOC, HCHO, Humidity, Temperature	5	MCCM Project Area	On site measurement by Indoor Air Quality Devices
10 th May – 12 th May, 2023	Outdoor Noise Quality	dB (A)	3	MCCM Project Area, Kyaw Zi Village, Malar Village	On site measurement by GM-1356 Digital Sound Level Meter
	Indoor Noise Quality		5	MCCM Project Area	
10 th May – 12 th May, 2023	Surface Water Quality from Ayeyarwady River	pH, Temperature, Ture Color, Turbidity, Total Suspended Solid, Total Dissolved Solid, Conductivity, Hardness, Dissolved Oxygen, Free Chlorine, Phosphorus, Arsenic, Iron, Lead, Oil and Grease, Total Nitrogen	2	Upstream and Downstream of Ayeyarwady River, Kyaw Zi Village	On site measurement by Hanna Instrument and collect sample water to send the laboratory
	Ground Water Quality	pH, Total Suspended Solid, Total Dissolved Solid, Hardness, Conductivity, Ammonia,	3	Ground water in the project area, Kyaw Zi Village, Malar Village	On site measurement by Hanna Instrument and collect sample water to send the

Monitoring Date	Monitoring Item	Parameters	Number of Point	Location	Monitoring Methodology
		Dissolved Oxygen, Free Chlorine, Phosphorus, Iron, Arsenic, Total Coliform			laboratory



Figure 4-11 Air Quality Measurement Location Map

4.4.1. Ambient Air Quality Monitoring in Wet Season

Outdoor air quality assessment was conducted 24 hours measuring from 15th September to 16th September 2021, which could identify sources of air emissions and assess the potential effects on sensitive receptors due to proposed project. The monitoring point is located in front of the production process machines. The detailed location of outdoor air quality survey point is presented Table 4-8.

During this survey, Particulate Matters (PM₁₀ and PM_{2.5}) and gases Carbon monoxide (CO), Ozone (O₃), Sulphur dioxide (SO₂), Nitrogen dioxide (NO₂), Total suspended particulate (TSP), Relative humidity (Rh), Air pressure and Temperature have been measured using the OCEANUS-AQM09. The results were compared with National Environmental Quality (Emission) Guidelines (NEQEG), World Health Organization Guideline, 2021, National Environmental Quality (Emission) Guidelines (2015) (General), National Environmental Quality (Emission) Guidelines (2015) (Petroleum Refining). The measurement station for air quality is displayed in Figure 4-12.

Table 4-8 Air quality Location Point for Wet Season

Item	Locations	Parameters
Air Quality Monitoring Point on 15 th – 16 th September, 2021	MCCM Project Site Area	Gas Emission: O ₃ , SO ₂ , NO ₂ , CO, CO ₂ , Dust Emission: PM ₁₀ , PM _{2.5} , TSP, Meteorology: RH%, Temperature, Air Pressure



Figure 4-12 Air Quality Monitoring Photo

4.4.1.1. Result of the Study

The emission of harmful gaseous pollutants into the atmosphere is a major health issue. The refining processes of the factories generate different kinds of air pollution depending on the kinds of fuels used in generators and furnaces. These measurements were made in accordance with the guidelines of the National Environmental Quality (Emission) Guidelines in the project site area. Both results of the study and guidelines are as shown in Table 4-9. The analyzed result of the outdoor air measurement by the survey team has been attached to the **Appendix E**. Result of the demonstration graph of particulate matters (PM₁₀ and PM_{2.5}) and Sulphur dioxide (SO₂) are shown in Figure 4-13, Figure 4-14 and Figure 4-20 respectively.

Table 4-9 Results of the Ambient Air Quality Measurement in Wet Season (15th to 16th September, 2021)

No	Parameter	Analyze Period	Result	Unit	Average Period		WHO Guideline Value, 2021 ¹	NEQEG ² Guideline Value	NEQEG ³ Guideline Value (Petroleum Refining)	Remark
1	Particulate Matter PM ₁₀	24-Hour	15.73	µg/m ³	1 24	Year Hour	*15 µg/m ³ *45 µg/m ³	*20 µg/m ³ *50 µg/m ³	50 µg/m ³	Under the guideline
2	Particulate Matter PM _{2.5}	24-Hour	10.45	µg/m ³	1 24	Year Hour	*5 µg/m ³ *15 µg/m ³	*10 µg/m ³ *25 µg/m ³	NG	Under the guideline
3	Total Suspended Particulate (TSP)	24-Hour	18.72	µg/m ³	24 Hours		NG	NG	NG	-
4	Sulphur Dioxide (SO ₂)	24-Hour	7.86	µg/m ³	10 24	Mins Hours	* 500 µg/m ³ * 40 µg/m ³	* 500 µg/m ³ * 20 µg/m ³	NG	Under the guideline
5	Nitrogen Dioxide (NO ₂)	1-Hour	82.26	µg/m ³	1 1 24	Year Hour Hour	*10 µg/m ³ *200 µg/m ³ *25 µg/m ³	*40 µg/m ³ *200 µg/m ³	NG	Under the guideline
6	Carbon Monoxide (CO)	24-Hour	0.33	ppm	15 1 8 24	Min Hour Hour Hour	*100 µg/m ³ *35 µg/m ³ *10 µg/m ³ *4 µg/m ³	NG	NG	Under the guideline

No	Parameter	Analyze Period	Result	Unit	Average Period	WHO Guideline Value, 2021 ¹	NEQEG ² Guideline Value	NEQEG ³ Guideline Value (Petroleum Refining)	Remark
7	Ozone (O ₃)	8-Hour	104.83	µg/m ³	8 Hours	100 ug/m ³	100 ug/m ³	NG	Above the guide line
8	Relative Humidity	24-Hour	82.86	%RH	24 Hours	NG	NG	NG	-
9	Temperature	24-Hour	30	°C	24 Hours	NG	NG	NG	-
10	Air Pressure	24-Hour	996.04	hPa	24 Hours	NG	NG	NG	-

¹World Health Organization Guideline, 2021,

² National Environmental Quality (Emission) Guidelines (2015) (General)

³National Environmental Quality (Emission) Guidelines (2015) (Petroleum Refining)

NG=No Guideline

Average measurement result (Time Interval= 1 hour, Duration= 24 hours)

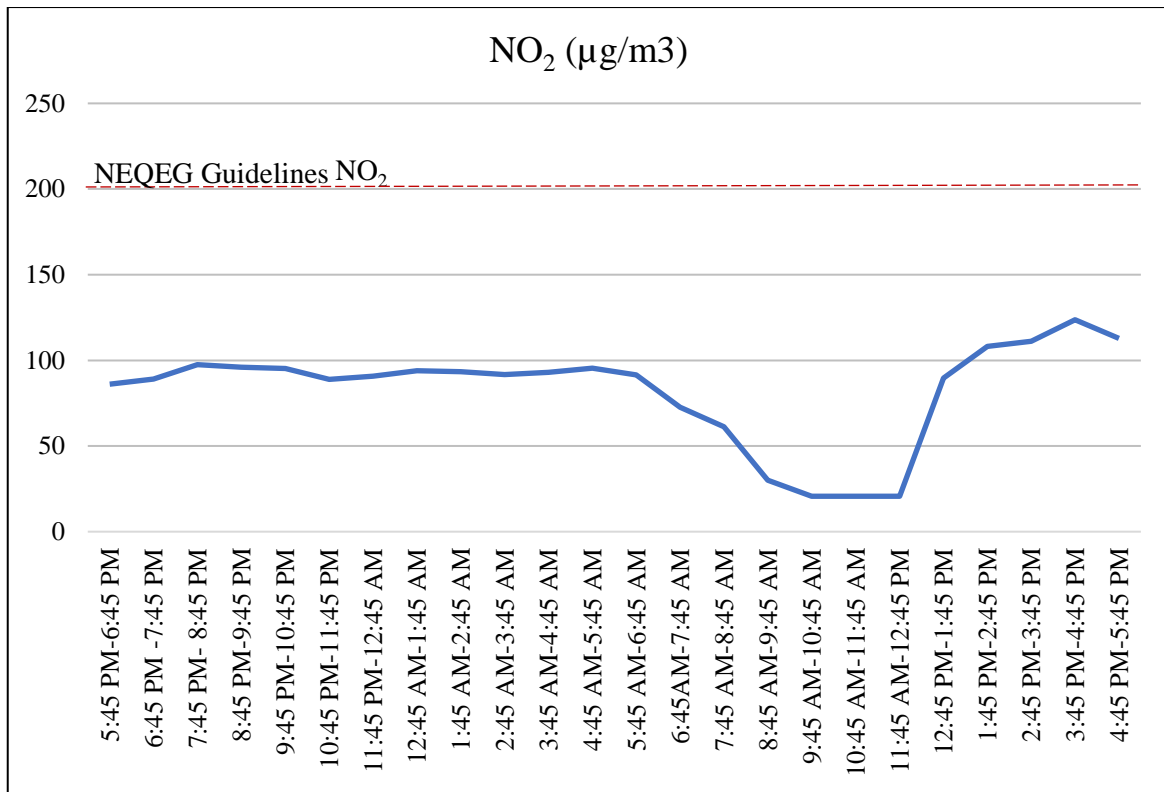


Figure 4-13 Demonstration Graphs of NO₂ Emission (24 hours measurement) at MCCM Project Site Area

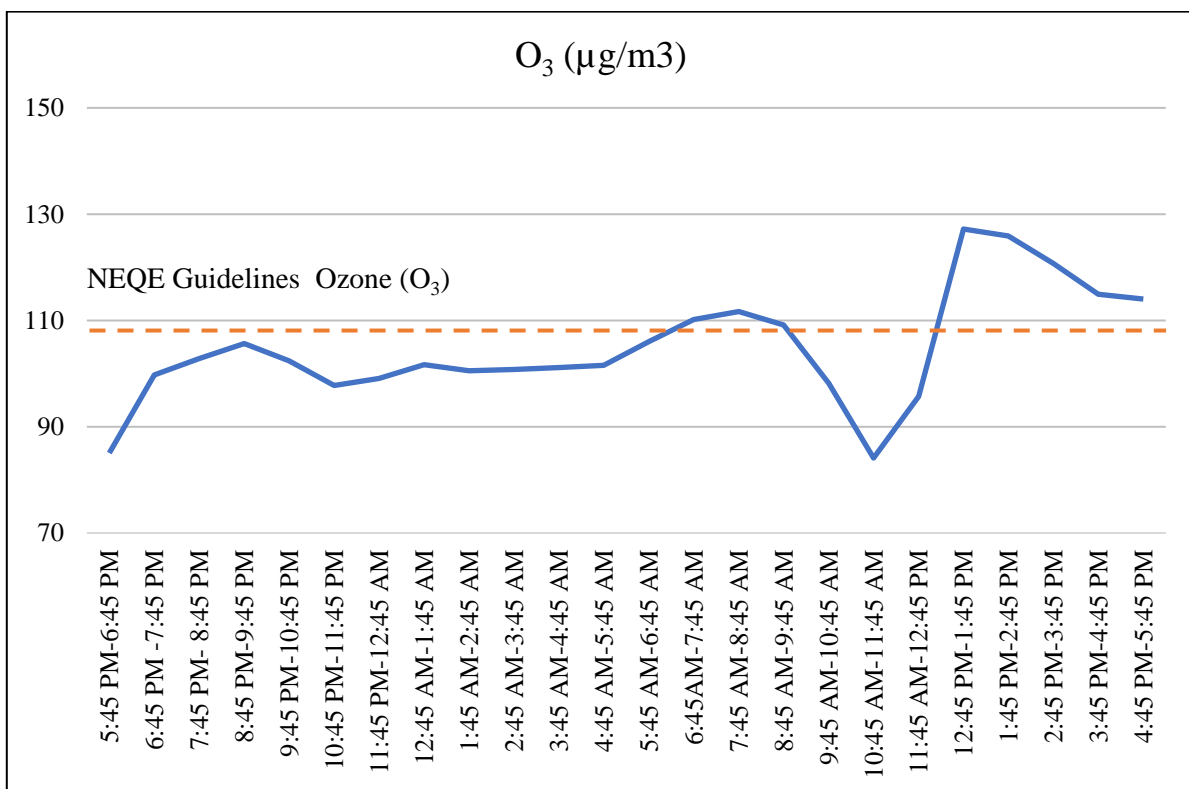


Figure 4-14 Demonstration Graphs of O₃ Emission at MCCM Project Site Area

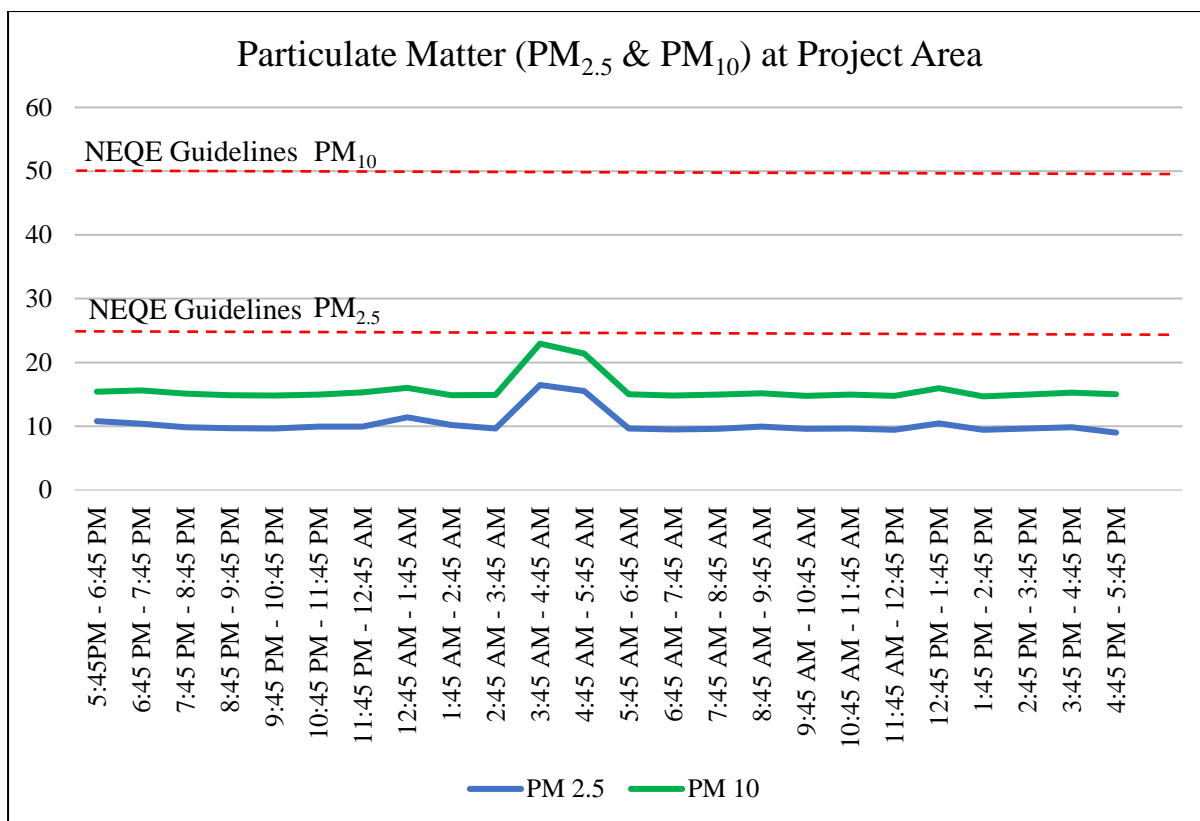


Figure 4-15 Demonstration Graphs of Particulate Matter as PM_{2.5} and PM₁₀ at Project Area

Remark: O₃ is exceeding above the guidelines due to create by chemical reactions between oxides of nitrogen (NO₂) and volatile organic compound (VOC), and sunlight, especially in crude oil storage areas, refining area, waste disposal areas of silica gel, and raw and product storage areas. Therefore, there is need to cover the source of VOCs and NO₂ emissions in project site.

4.4.1.2. Wind Speed and Wind Direction

Wind is an integral part of the thermodynamic mechanism of the atmosphere by which cloud, heat, moisture, and particles are carried from one place to another. The exchange of pollutants and other environmentally important trace gases are also affected by wind speed and wind direction. The data are collected by using OCEANUS-AQM09 inside the area of the MCCM mini petroleum refinery plant. The observation period is from 15th Sep – 16th Sep, 2021.

Wind speed and wind direction's average values of project area is 0.17 m/s and 156° (S/SE) respectively. The result of the analyzed wind speed is shown in Figure 4-16.

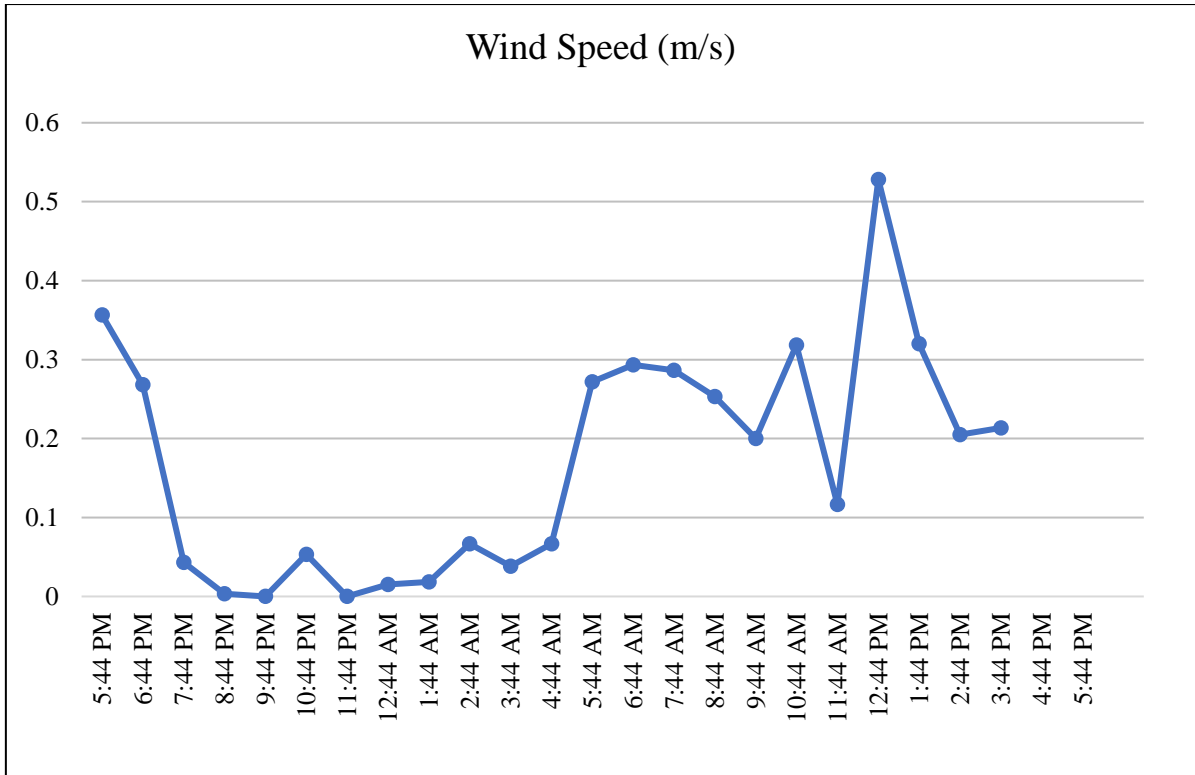


Figure 4-16 Demonstration Graphs of Wind Speed (24 hours measurement)

4.4.2. Ambient Air Quality Monitoring in Dry Season

The second time measurement of outdoor air quality assessment was conducted 24 hours measuring from 10th to 13th May 2023, which could identify sources of air emissions and assess the potential effects on sensitive receptors due to proposed project. The air quality measurement was conducted at three locations as Project area site, Kyaw Zi village, and Malar village which are the nearest villages to the project site.

According to the ECD RT meeting comment, third time outdoor air quality assessment was conducted 24 hours measuring from 15th to 18th February 2024 at project area, Kyaw Zi village, and Malar village. The outdoor air quality measurement was conducted at February instead of March because the report submission deadline is at the end of February.

4.4.2.1. Method and Methodology

Air quality measurement was conducted during the dry season of 10th to 13th May, 2023 and 15th to 18th February 2024. During this survey, Particulate Matters (PM₁₀ and PM_{2.5}) and gases Carbon monoxide (CO), Carbon dioxide (CO₂), Ozone (O₃), Sulphur dioxide (SO₂), Nitrogen dioxide (NO₂), VOC, Total suspended particulate (TSP), Wind speed (WS), Wind direction (WD), Relative humidity (Rh), Air pressure and Temperature have been measured using the OCEANUS-AQM09. The results were compared with World Health Organization Guideline, 2021, Occupational Safety and Health Administration; Permissible Exposure Limit (PEL), National Environmental Quality (Emission) Guidelines (2015) (Petroleum Refining). The measurement station for air quality is displayed in Table 4-10.

Outdoor air quality monitoring location map is as shown in Figure 4-11. The outdoor air quality monitoring photos of the project site as shown in Figure 4-17.

Table 4-10 Air quality Location Point for Dry Season

Item	GPS Coordinates	Locations	Parameters
Air Quality Monitoring Point on 10 th – 11 th May, 2023	21°17'54.14"N 95°10'24.84"E	MCCM Project Site Area	Gas Emission: O ₃ , SO ₂ , NO ₂ , CO, CO ₂ , TVOC Dust Emission: PM ₁₀ , PM _{2.5} , TSP, Meteorology: RH%, Temperature, Wind Speed, Wind Direction
Air Quality Monitoring Point on 11 th – 12 th May, 2023	21°18'56.10"N 95°10'41.46"E	Kyaw Zi Village	
Air Quality Monitoring Point on 12 th – 13 th May, 2023	21°17'59.87"N 95°8'41.19"E	Malar Village	
Air Quality Monitoring Point on 15 th – 16 th February, 2024	21°17'54.14"N 95°10'24.84"E	MCCM Project Site Area	
Air Quality Monitoring Point on 16 th – 17 th February, 2024	21°18'56.10"N 95°10'41.46"E	Kyaw Zi Village	
Air Quality Monitoring Point on 17 th – 18 th February, 2024	21°17'59.87"N 95°8'41.19"E	Malar Village	



Figure 4-17 Air Quality Monitoring Photo

4.4.2.2. Result of the Study

The emission of harmful gaseous pollutants into the atmosphere is a major health issue. The refining processes of the factories generate different kinds of air pollution depending on the kinds of fuels used in generators and furnaces. These measurements were made in accordance with the guidelines of the National Environmental Quality (Emission) Guidelines in the project site area, nearest villages such as Kyaw Zi village and Malar Village. Both results of the study and guidelines are as shown in Table 4-11. The outdoor air measurement results which conduct according to the ECD RT meeting comment is shown in Table 4-12.

The analyzed result of the outdoor air measurement by the survey team has been attached to **Appendix F**. Result of the demonstration graph of particulate matters (PM₁₀ and PM_{2.5}) and Sulphur dioxide (SO₂) are shown in Figure 4-18 to Figure 4-23 respectively.

Table 4-11 Results of the Ambient Air Quality Measurement in Dry Season (10th to 13th May, 2023)

No.	Parameter	Analyze Period	Result at MCCM Project Area	Result at Kyaw Zi Village	Result at Malar Village	Unit	Average Period		WHO Global Air Quality Guidelines 2021 ¹	OSHA (PEL) Guidelines ²	NEQ(E)G Guideline Value (Petroleum Refining) ³	Remark
1	Particulate Matter (PM ₁₀)	24-Hour	20.98	30.98	23.47	µg/m ³	1 24	Year Hour	*5 µg/m ³ *15 µg/m ³	NG	50 µg/m ³	Within the Guideline
2	Particulate Matter (PM _{2.5})	24-Hour	11.17	7.51	7.07	µg/m ³	1 24	Year Hour	*15 µg/m ³ *45 µg/m ³	NG	NG	Within the Guideline
3	Total Suspended Particulate (TSP)	24-Hour	28.89	45.56	34.22	µg/m ³	24 Hours		NG	NG	NG	-
4	Sulphur Dioxide (SO ₂)	24-Hour	19.86	10.99	4.29	µg/m ³	10 24	Mins Hour	*500 µg/m ³ *40 µg/m ³	NG	NG	Within the Guideline
5	Nitrogen Dioxide (NO ₂)	1-Hour	5.35	19.17	4.24	µg/m ³	1 1 24	Year Hour Hour	*10 µg/m ³ *200 µg/m ³ *25 µg/m ³	NG	NG	Within the Guideline
6	Ozone (O ₃)	8-Hour	42.95	53.38	27.15	µg/m ³	8 Hour daily maximum		*100 µg/m ³	NG	NG	-
7	Carbon Monoxide (CO)	24-Hour	0.32	0.06	0.38	ppm	15 1	Min Year	*100 µg/m ³ *35 µg/m ³	50 ppm	NG	-

No.	Parameter	Analyze Period	Result at MCCM Project Area	Result at Kyaw Zi Village	Result at Malar Village	Unit	Average Period		WHO Global Air Quality Guidelines 2021 ¹	OSHA (PEL) Guidelines ²	NEQ(E)G Guideline Value (Petroleum Refining) ³	Remark
							8 Hour	24 Hour				
							8 Hour		*10 µg/m ³			
							24 Hour		*4 µg/m ³			
8	Carbon Dioxide (CO ₂)	24-Hour	279.69	267.02	277.29	ppm	-		NG	5000 ppm	NG	Within the Guideline
9	Volatile Organic Compound (VOC)	24-Hour	0.46	0.27	0.41	ppm	-		NG	NG	NG	-
10	Relative humidity	24-Hour	33.28	58.94	34.83	RH%	-		NG	NG	NG	-
11	Temperature	24-Hour	33.31	32.98	39.62	°C	-		NG	NG	NG	-
12	Wind Speed	24-Hour	1.09	0.61	0.87	m/s	-		NG	NG	NG	-
13	Wind Direction	24-Hour	221.43	254.62	290.36	Degree	-		NG	NG	NG	-

¹World Health Organization Guideline, 2021,

²Occupational Safety and Health Administration; PEL=Permissible Exposure Limit

³National Environmental Quality (Emission) Guidelines (2015) (Petroleum Refining)

NG=No Guideline

Table 4-12 Results of the Ambient Air Quality Measurement in Dry Season (15th to 18th February, 2024)

No.	Parameter	Analyze Period	Result at MCCM Project Area	Result at Kyaw Zi Village	Result at Malar Village	Unit	Average Period		WHO Global Air Quality Guidelines 2021 ¹	OSHA (PEL) Guidelines ²	NEQ(E)G Guideline Value (Petroleum Refining) ³	Remark
1	Particulate Matter (PM _{2.5})	24-Hour	10.1	8.36	9.25	µg/m ³	1 24	Year Hour	*5 µg/m ³ *15 µg/m ³	NG	25 µg/m ^{3 a}	Within the Guideline
2	Particulate Matter (PM ₁₀)	24-Hour	25.65	23.68	27.47	µg/m ³	1 24	Year Hour	*15 µg/m ³ *45 µg/m ³	NG	50 mg/Nm ³	Within the Guideline
3	Total Suspended Particulate (TSP)	24-Hour	35.69	41.25	37.89	µg/m ³	24 Hours		NG	NG	NG	-
4	Sulphur Dioxide (SO ₂)	24-Hour	30.12	8.45	5.64	µg/m ³	10 24	Mins Hour	*500 µg/m ³ *40 µg/m ³	NG	20 µg/m ^{3 a} 500 µg/m ^{3 a}	Within the Guideline
5	Nitrogen Dioxide (NO ₂)	1-Hour	10.25	5.36	6.25	µg/m ³	1 1 24	Year Hour Hour	*10 µg/m ³ *200 µg/m ³ *25 µg/m ³	NG	40 µg/m ^{3 a} 200 µg/m ^{3 a}	Within the Guideline
	Carbon Monoxide (CO)	24-Hour	2.3	0.7	0.53	ppm	15 1 8 24	Min Year Hour Hour	*100 µg/m ³ *35 µg/m ³ *10 µg/m ³ *4 µg/m ³	NG	NG	Within the Guideline
	Carbon Dioxide	24-Hour	346.12	201.9	246.78	ppm	-		NG	5000 ppm	NG	Within the Guideline

No.	Parameter	Analyze Period	Result at MCCM Project Area	Result at Kyaw Zi Village	Result at Malar Village	Unit	Average Period	WHO Global Air Quality Guidelines 2021 ¹	OSHA (PEL) Guidelines ²	NEQ(E)G Guideline Value (Petroleum Refining) ³	Remark
	(CO ₂)										
6	Ozone (O ₃)	8-Hour	40.9	36.4	31.2	µg/m ³	8 Hour daily maximum	*100 µg/m ³	NG	100 µg/m ³	Within the Guideline -
9	Volatile Organic Compound (VOC)	24-Hour	0.3	0.16	0.38	ppm	-	NG	NG	NG	-
10	Relative humidity	24-Hour	31.56	41.87	32.64	RH%	-	NG	NG	NG	-
11	Temperature	24-Hour	33.11	31.45	32.1	°C	-	NG	NG	NG	-
12	Wind Speed	24-Hour	2.69	1.75	0.71	m/s	-	NG	NG	NG	-
13	Wind Direction	24-Hour	254.63	268.41	364.01	Degree	-	NG	NG	NG	-

a General Air Emission Guidelines

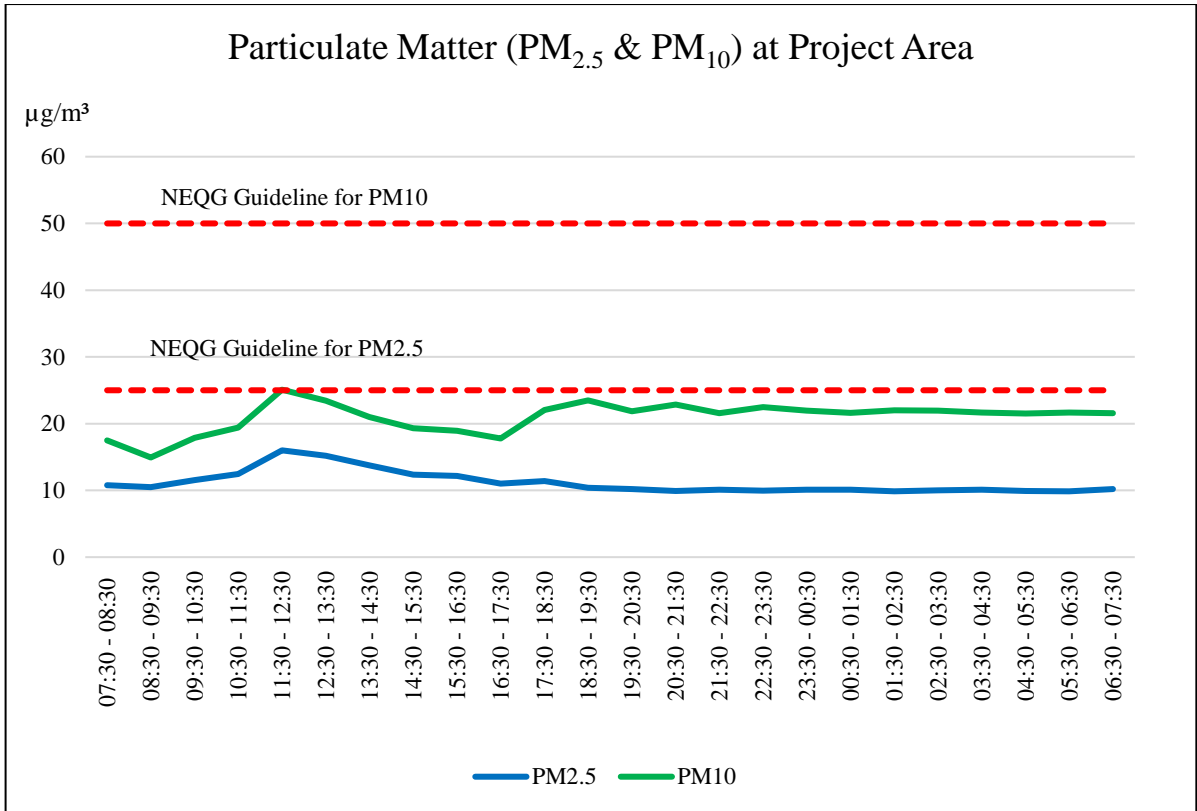


Figure 4-18 Demonstration Graphs of Particulate Matter as PM_{2.5} and PM₁₀ at MCCM Project Site Area

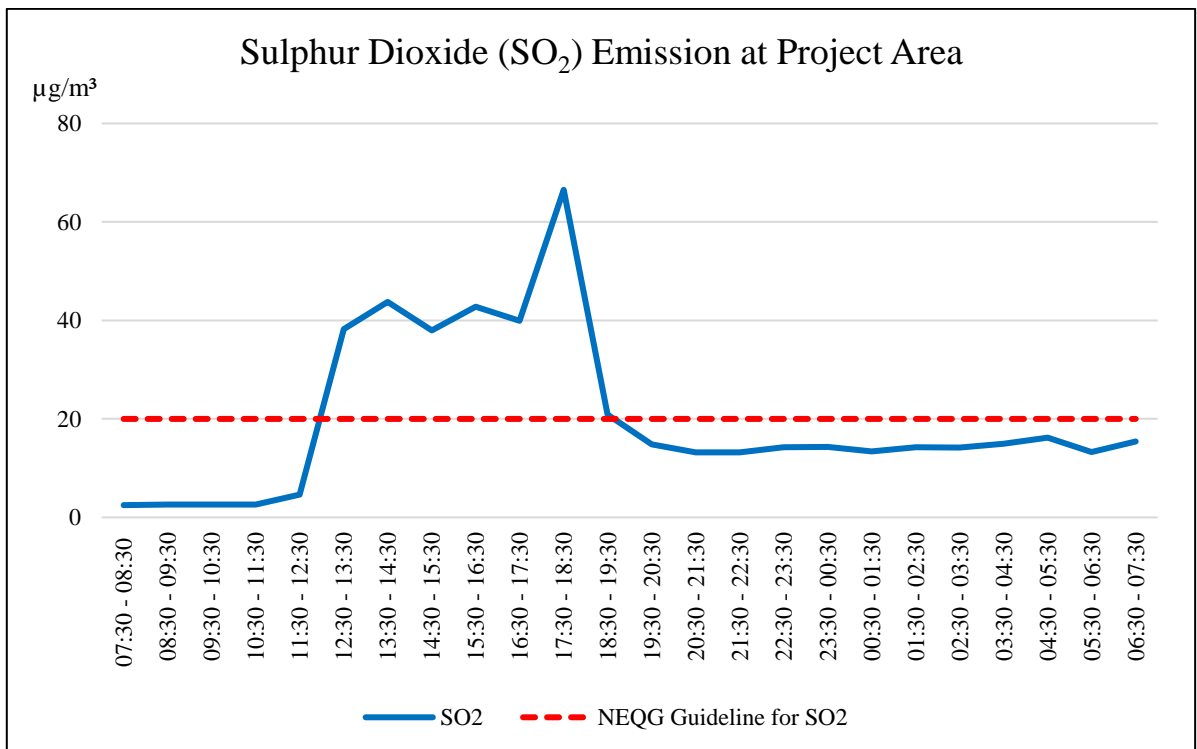


Figure 4-19 Demonstration Graphs of SO₂ Emission at MCCM Project Site Area

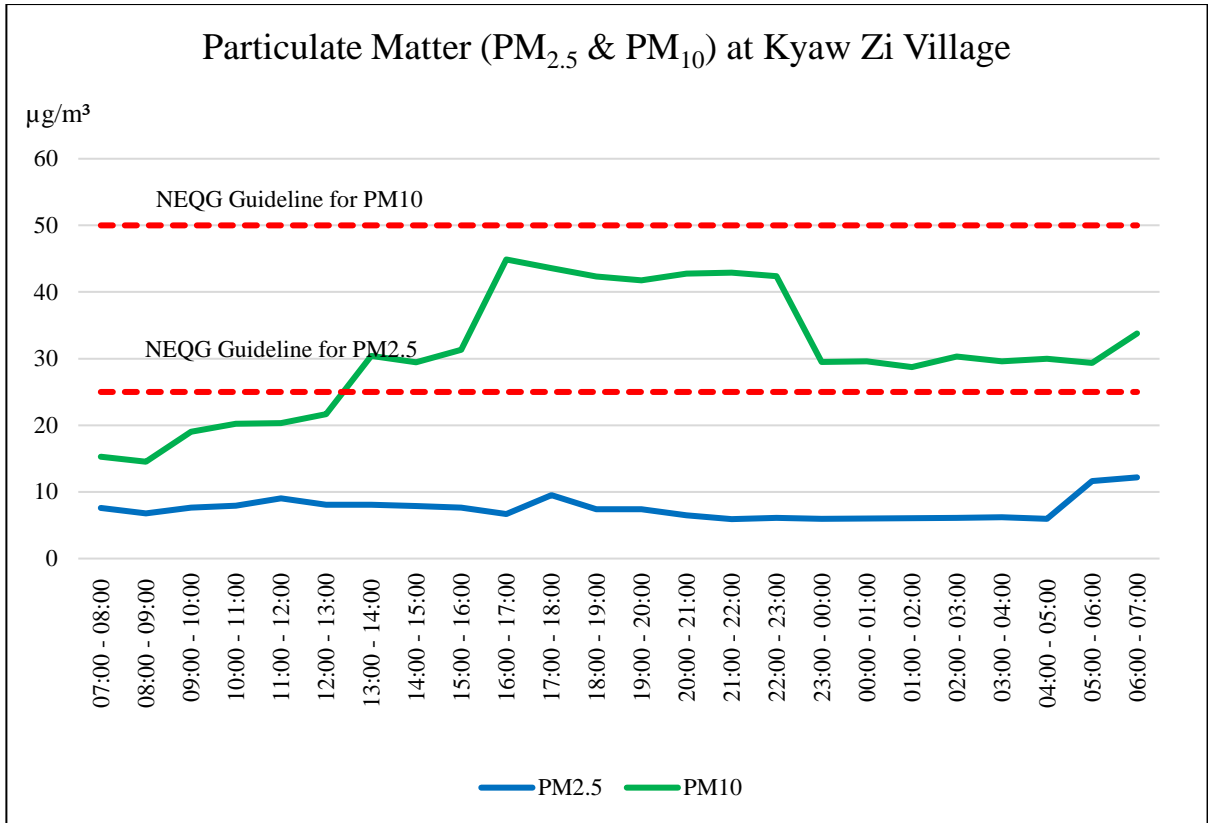


Figure 4-20 Demonstration Graphs of Particulate Matter as PM_{2.5} and PM₁₀ at Kyaw Zi Village

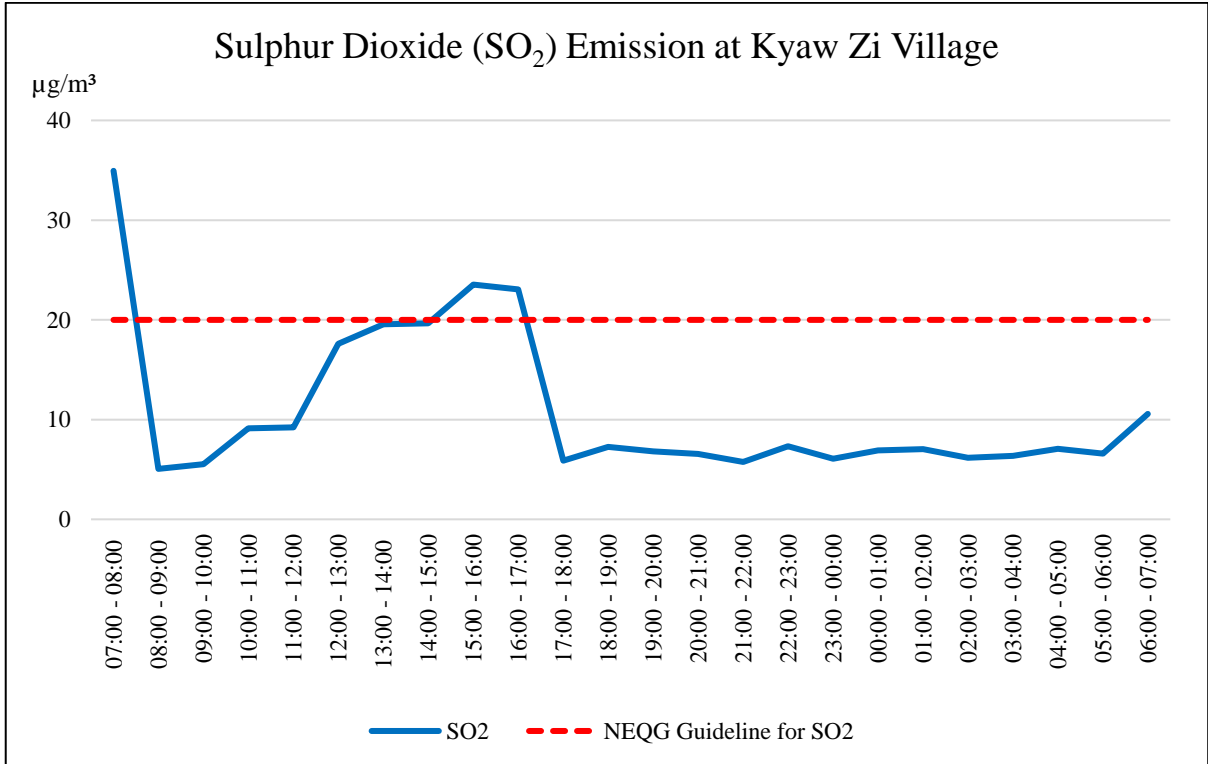


Figure 4-21 Demonstration Graphs of SO₂ Emission at Kyaw Zi Village

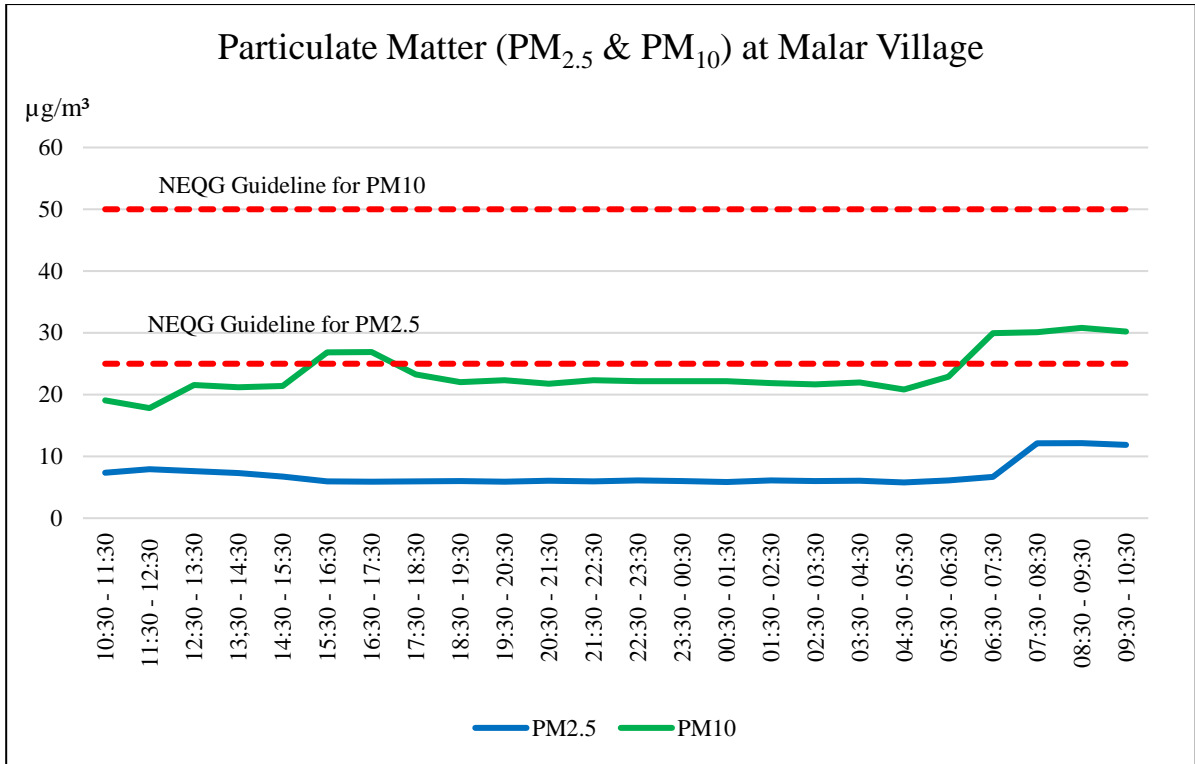


Figure 4-22 Demonstration Graphs of Particulate Matter as PM_{2.5} and PM₁₀ at Malar Village

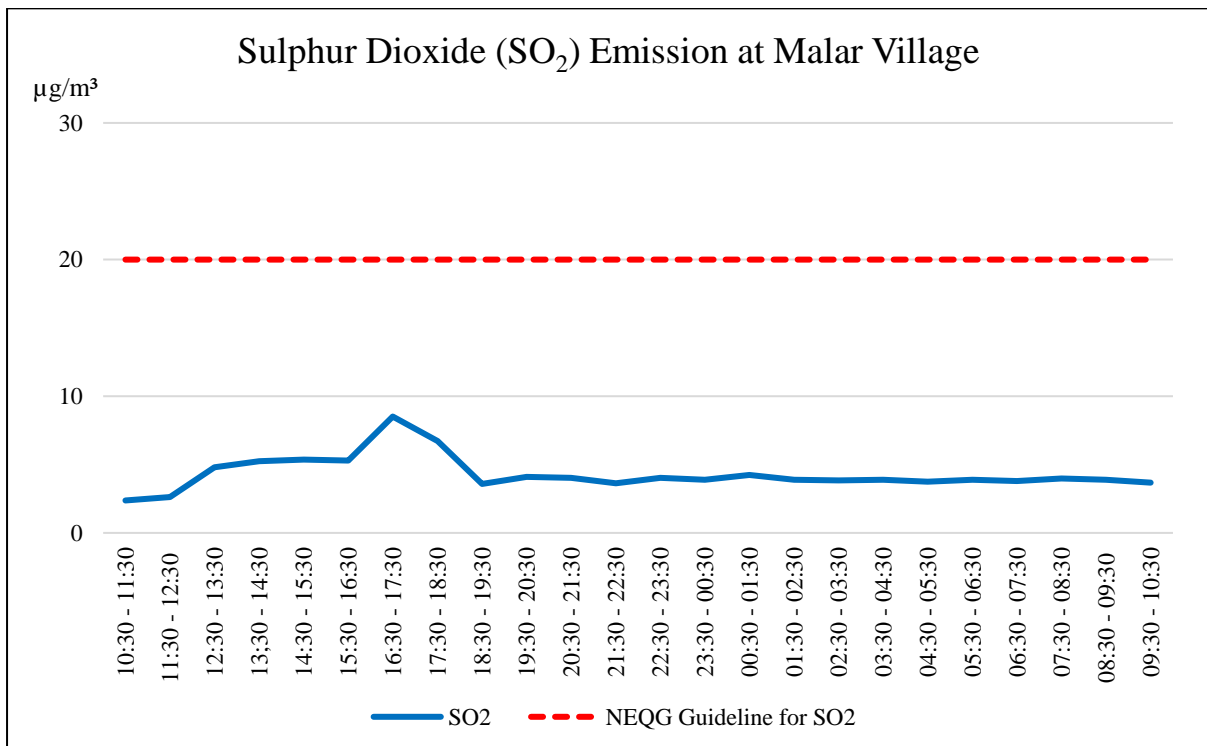


Figure 4-23 Demonstration Graphs of SO₂ Emission at Malar Village

The air quality measurement was conducted at three locations as Project area site, Kyaw Zi village, and Malar village. According to the air quality analysis, the ambient air

parameters are within the guidelines of National Environmental Quality (Emission) Guidelines. The highest results of SO₂ in project area as shown in Figure 4-21 are found at around 05:00 PM, but the 24-hour average result of Sulphur Dioxide (SO₂) are still relevant to the guidelines. The point source of emission and SO₂ is that vehicular passing through on the roads of the project area occasionally. Based on the findings, both 8-hour daily maximum result of Ozone (O₃) and 1-hour average result of Nitrogen dioxide (NO₂) are not exceeding the guideline values of NEQ(E)G Guidelines.

4.4.2.3. Wind Speed and Wind Direction

Wind is an integral part of the thermodynamic mechanism of the atmosphere by which cloud, heat, moisture, and particles are carried from one place to another. The exchange of pollutants and other environmentally important trace gases are also affected by wind speed and wind direction. The data are collected by using OCEANUS-AQM09 in the project area, Kyaw Zi Village and Malar Village. The observation period is from 10th to 13th May, 2023.

Wind speed and wind direction's average values of project area is 1.09 m/s and 221.43° (SE/SW) respectively. The wind is generally blowing from the South East and South West direction. The result of the analyzed wind speed and wind direction is shown in **Figure 4-24**.

Wind speed and wind direction's average values of Kyaw Zi Village is 0.61 m/s and 254.62° (SW/NW) respectively. The wind is generally blowing from the South West and North West direction. The result of the analyzed wind speed and wind direction is shown in **Figure 4-25**.

Wind speed and wind direction's average values of Malar Village is 0.87 m/s and 290.36° (SE/NW) respectively. The wind is generally blowing from the South East and North West direction. The result of the analyzed wind speed and wind direction is shown in **Figure 4-26**.

The dry season measurement period which measure according to the ECD RT meeting comments at 15th to 18th February 2024. Wind speed and wind direction's average values of project area is 2.69 m/s and 254.63° respectively. The wind is generally blowing from the South and West direction. The result of the analyzed wind speed and wind direction is shown in **Figure 4-27**.

Wind speed and wind direction's average values of Kyaw Zi Village is 1.75 m/s and 268.41° respectively. The wind is generally blowing from the West direction. The result of the analyzed wind speed and wind direction is shown in **Figure 4-28**.

Wind speed and wind direction's average values of Malar Village is 0.71 m/s and 364.01° respectively. The wind is generally blowing from the North and South direction. The result of the analyzed wind speed and wind direction is shown in **Figure 4-29**.

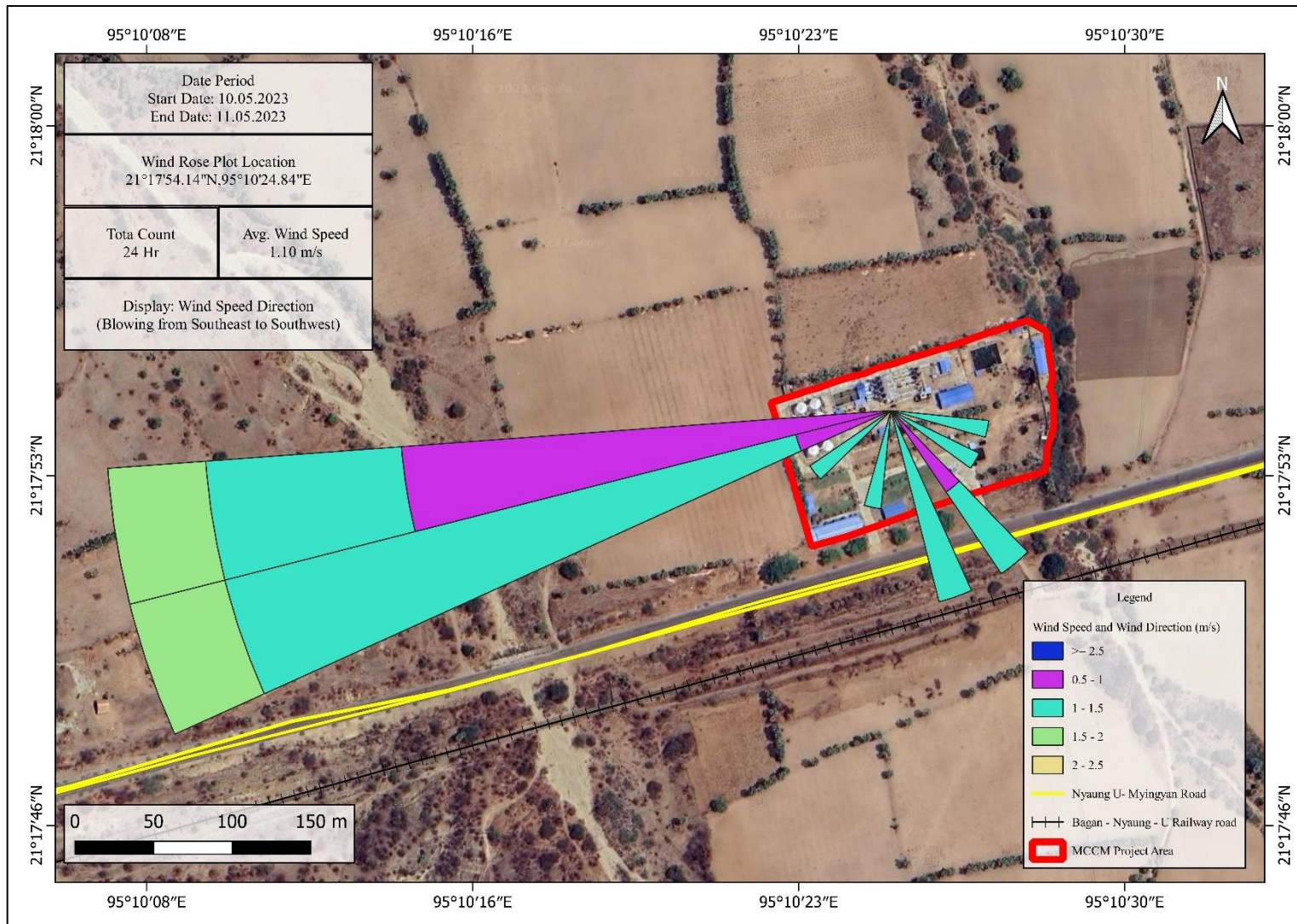


Figure 4-24 Wind Speed and Wind Direction of MCCM Project Site



Figure 4-25 Wind Speed and Wind Direction of Kyaw Zi Village

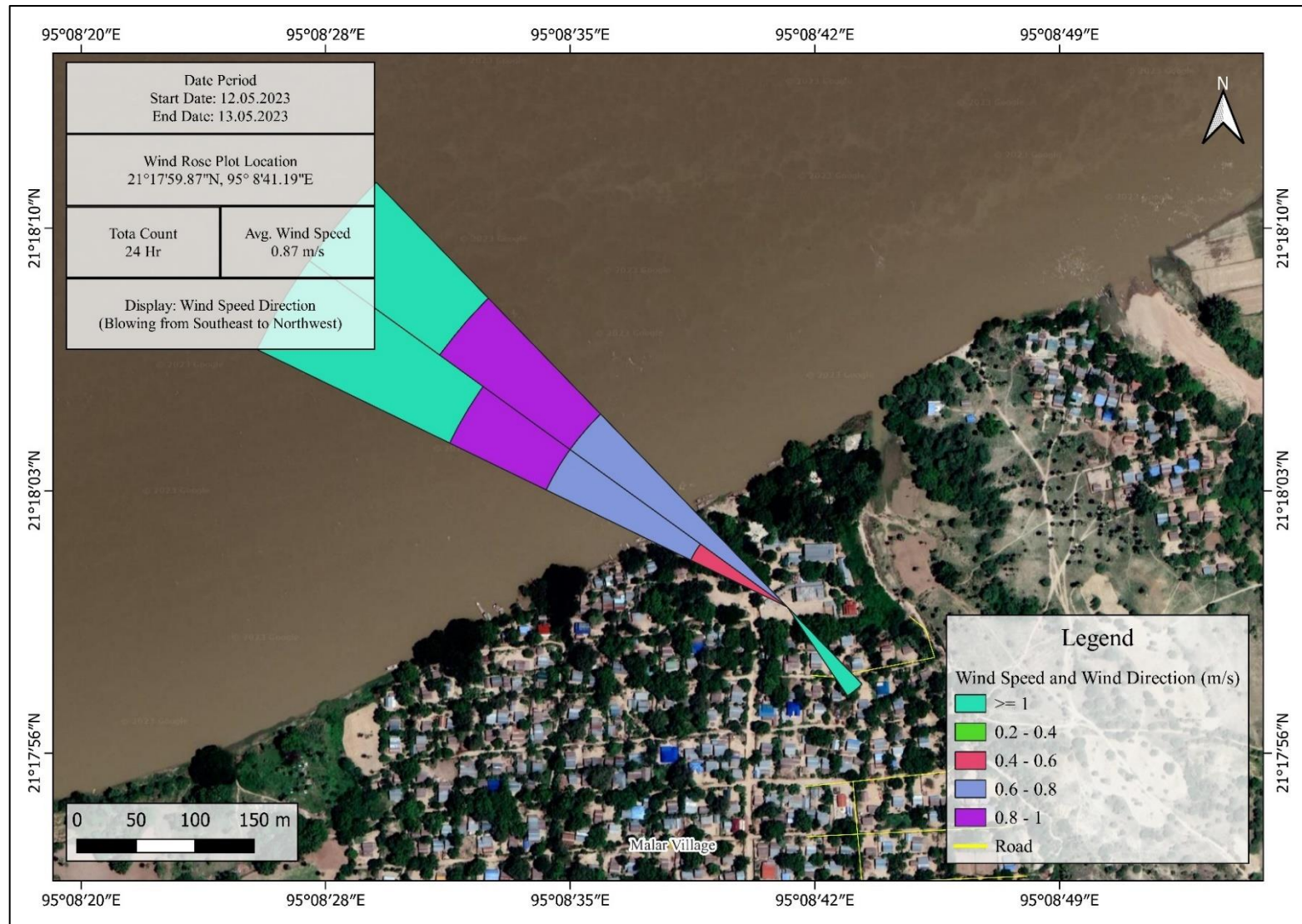


Figure 4-26 Wind Speed and Wind Direction of Malar Village

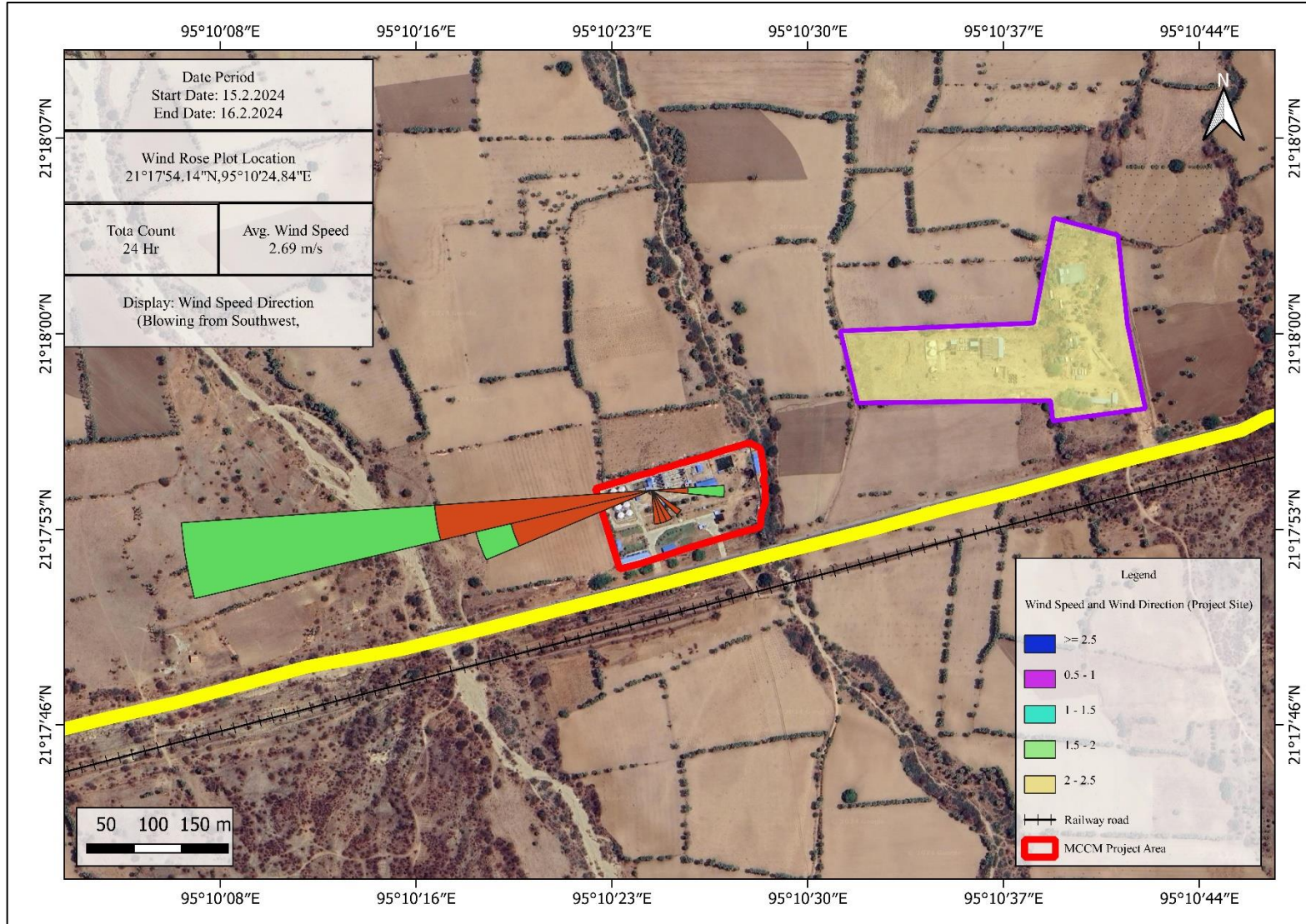


Figure 4-27 Wind Speed and Wind Direction of MCCM Project Site

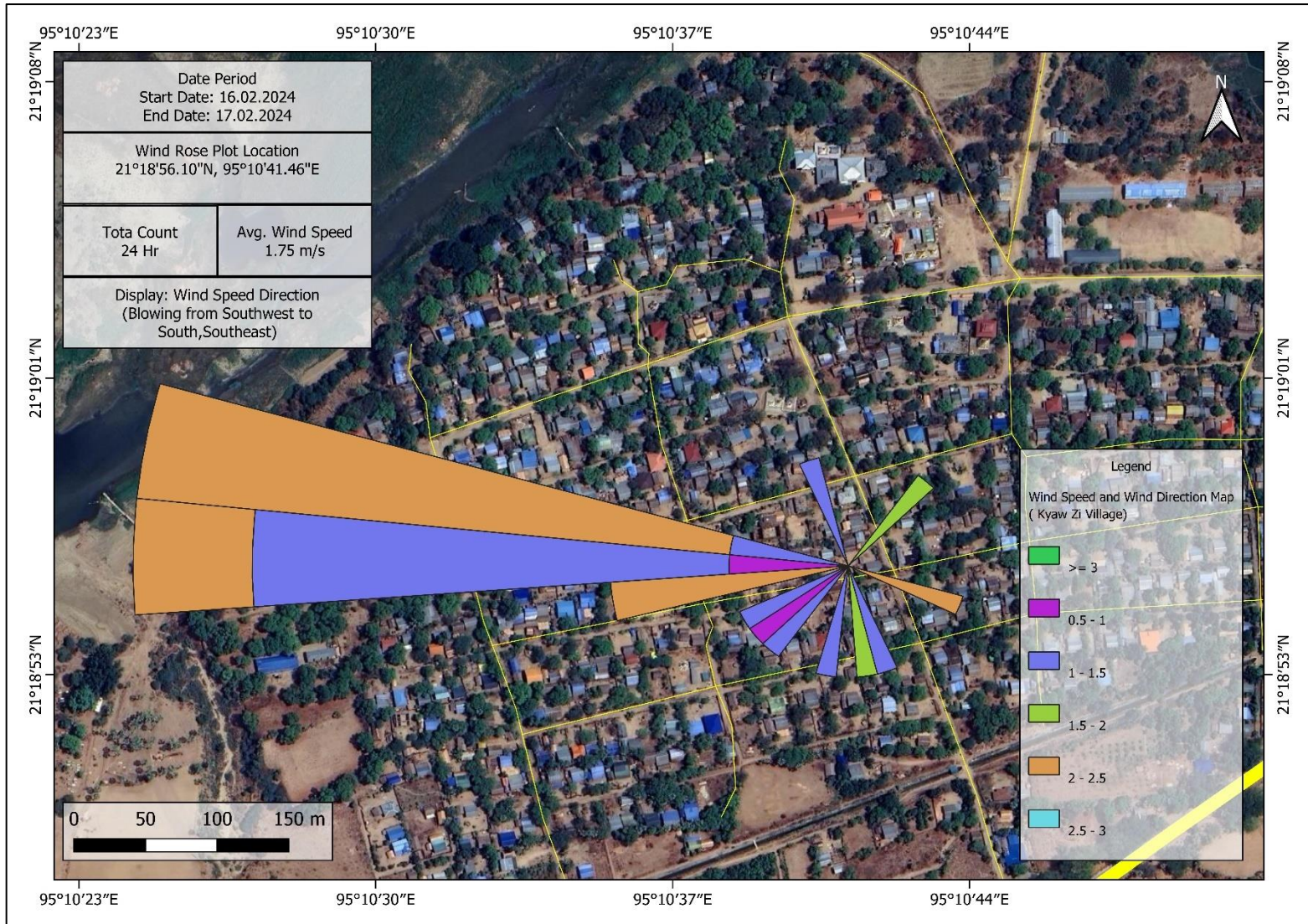


Figure 4-28 Wind Speed and Wind Direction of Kyaw Zi Village



Figure 4-29 Wind Speed and Wind Direction of Malar Village

4.4.2.4. Indoor Air Quality Measurement

The term "indoor air quality" describes the standard of the air in a building, such as a house, business, workplace or school. For a number of reasons, the possible effects of indoor air quality on human health may be significant. Indoor air quality is monitored in order to assess the magnitude to which workers are impacted.

4.4.2.5. Method and Methodology for Indoor Air Quality Monitoring

Carbon dioxide (CO₂) is monitored using Smart sensor AR8200 Carbon Dioxide Detector as well as indoor air quality parameters (PM₁, PM_{2.5}, PM₁₀, TVOCs and HCHO) are also monitored using a multifunctional air quality detector.

The indoor air quality measurement was carried out twice, once in September, 2021 during the wet season and once in May, 2023 during the dry season. The measurement of indoor air quality monitoring was conducted in (5) points within the factory. These are office, kitchen, control room, silica gel store room and machinery store in which monitoring parameters are Particulate Matters as PM₁, PM_{2.5}, PM₁₀, Total Volatile Organic Compounds (TVOCs), formaldehyde (HCHO), and carbon dioxide (CO₂), humidity and temperature. Indoor air qualities are measured at the following places mentioned in Table 4-13 and measurement devices is shown in Figure 4-31. The detailed air results are shown in Table 4-18 and Table 4-19.

Indoor air quality measurement point location map is shown in Figure 4-30. The standard parameter for carbon dioxide, air quality index for particulate matters, formaldehyde and total volatile organic compound are as shown in Table 4-13 to Table 4-17.

Table 4-13 Indoor Air Quality Measurement Points

No	GPS Coordinates	Indoor Air Quality Measurement Points
1	21°17'54.36"N, 95°10'25.94"E	Office
2	21°17'54.43"N, 95°10'26.25"E	Kitchen
3	21°17'54.51"N, 95°10'26.57"E	Control Room
4	21°17'51.59"N, 95°10'23.37"E	Silica Gel Store Room
5	21°17'51.77"N, 95°10'23.98"E	Machinery Store



Figure 4-30 Indoor Air Quality Measurement Points



Figure 4-31 Indoor Air Quality Monitoring Devices

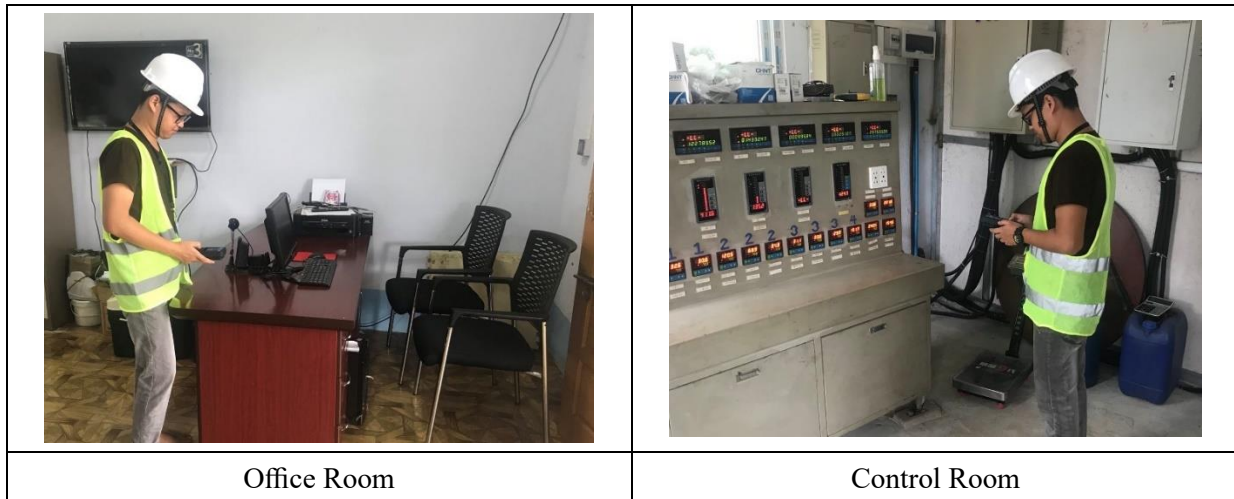


Figure 4-32 Indoor Air Quality Monitoring within the Factory in Wet Season



Figure 4-33 Indoor Air Quality Monitoring within the Factory in Dry Season

Table 4-14 Standard Parameter for Carbon Dioxide

Ranges	Unit	Potential Health Problems	Impact
250 - 350	ppm	Normal	Normal
350 – 1000		Typical level found in occupied spaces with good air exchange	Good
1000 – 2000		Level associated with complaints of drowsiness and poor air.	Fair
2000 – 5000		Level associated with headaches, sleepiness, and stagnant, stale, stuffy air; poor concentration, loss of attention, increased heart rate and slight nausea may also be present.	Low
> 5000		Unusual air conditions where high levels of other gases also could be present. Toxicity or oxygen deprivation could occur. This is the permissible exposure limit for daily workplace exposures	Medium
> 40000		Immediately harmful due to oxygen deprivation	High

Source: Carbon Dioxide Detection and Indoor Air Quality Control by OHS

Table 4-15 Indoor Air Quality Index for Particulate Matters (AQI)

Index Value	Descriptor	Revised Breakpoints ($\mu\text{g}/\text{m}^3$, 24-hour average)		Cautionary Statements
		PM2.5	PM10	
0 – 50	Good	0.0 - 12.0	0.0 - 54.9	None
51 - 100	Moderate	12.1 - 35.4	55 – 154.9	Unusually sensitive people should consider limiting prolonged exposure
101 - 150	Unhealthy for sensitive groups	35.5 - 55.4	155 – 254.9	Children and adults with respiratory disease should limit the exposure
151 - 200	Unhealthy	55.5 - 150.4	255 – 354.9	Both children and adults should limit the exposure
201 - 300	Very unhealthy	150.5 - 250.4	355 – 424.9	All ages of people with respiratory disease should avoid all the exposure
301 - 500	Hazardous	250.5 - 500	425 – 604.9	Everyone should avoid all exertion/ may experience more serious health effects

Source: A Guide to Air Quality Index by U.S Environmental Protection Agency (EPA)

Table 4-16 Standard Parameter for Formaldehyde (HCHO)

Standard Guideline	Unit	Range
0.101-0.200	mg/m^3	Low
0.201-0.300		Medium
0.301 or more		high

Source: A Guide to Air Quality Index by U.S Environmental Protection Agency (EPA)

Table 4-17 Standard Parameter for Total Volatile Organic Compound (TVOC)

Standard Guideline	Unit	Range
0.600	mg/m^3	Safe
0.601 or more		Danger

Source: A Guide to Air Quality Index by U.S Environmental Protection Agency (EPA)

4.4.2.6. Result of the Study on Indoor Air Quality in Wet Season

The parameters include dust ($\text{PM}_{2.5}$ and PM_{10}), formaldehyde (HCHO) along with volatile organic compound (VOC) were detected as an indoor air quality. Measuring the $\text{PM}_{2.5}$ and PM_{10} , then VOCs have a variety of chemicals, some of which may have short- and long-term adverse health effects, long-term HCHO exposure may experience cancer with the purpose of protecting respiratory tract diseases to the staffs near the main operation areas. The results of indoor air quality, as PM_1 , $\text{PM}_{2.5}$, PM_{10} , TVOCs and HCHO are also scrutinized with A Guide to Air Quality Index by U.S Environmental Protection Agency (EPA). The

analyzed of the indoor air quality results and monitoring photos are shown in the Table 4-18 and Figure 4-32.

The results of the indoor air quality (Particulate Matters as PM₁, PM_{2.5}, PM₁₀, Total Volatile Organic Compounds (TVOCs), and formaldehyde (HCHO) are within the guidelines of “A Guide to Air Quality Index by U.S Environmental Protection Agency (EPA)”. The results of carbon dioxide (CO₂) are also within “the Carbon Dioxide Detection and Indoor Air Quality Control by OHS”.

Table 4-18 Indoor Air Quality Result in Wet Season

No.	Location	Parameter	Activities	Result	*EPA (Air Quality Index, AQI)
1	Office Area	Particulate Matter (PM _{1.0})	Office activities	1.1 ug/m ³	NG
		Particulate Matter (PM _{2.5})		2.3 ug/m ³	Good
		Particulate Matter (PM ₁₀)		2.2 ug/m ³	
		Total Volatile Organic Compound (TVOC)		0.054 mg/m ³	Safe
		Formaldehyde (HCHO)		0.0086 mg/m ³	Light
		Carbon Dioxide (CO ₂)		618 ppm	Good
2	Control Room	Particulate Matter (PM _{1.0})	Operation activities	1.9 ug/m ³	NG
		Particulate Matter (PM _{2.5})		4 ug/m ³	Good
		Particulate Matter (PM ₁₀)		4.3 ug/m ³	
		Total Volatile Organic Compound (TVOC)		0.0884 mg/m ³	Safe
		Formaldehyde (HCHO)		0.0136 mg/m ³	Light
		Carbon Dioxide (CO ₂)		607.6 ppm	Good
3	Storage Room	Particulate Matter (PM _{1.0})	No activity	1.5 ug/m ³	NG
		Particulate Matter (PM _{2.5})		4 ug/m ³	Good

No.	Location	Parameter	Activities	Result	*EPA (Air Quality Index, AQI)
		Particulate Matter (PM ₁₀)		5 ug/m ³	
		Total Volatile Organic Compound (TVOC)		0.07 mg/m ³	Safe
		Formaldehyde (HCHO)		0.01 mg/m ³	Light
		Carbon Dioxide (CO ₂)		609.4 ppm	Good
4	Kitchen	Particulate Matter (PM _{1.0})	Employees working in	1.9 ug/m ³	NG
		Particulate Matter (PM _{2.5})		3.6 ug/m ³	Good
		Particulate Matter (PM ₁₀)		4.1 ug/m ³	
		Total Volatile Organic Compound (TVOC)		0.0633 mg/m ³	Safe
		Formaldehyde (HCHO)		0.0096 mg/m ³	Light
		Carbon Dioxide (CO ₂)		641.9 ppm	Good

¹ A Guide to Air Quality Index by U.S Environmental Protection Agency (EPA),

²Carbon Dioxide Detection and Indoor Air Quality Control by OHS/ Modified by HA Team

4.4.2.7. Result of the Study on Indoor Air Quality in Dry Season

Indoor air quality monitoring was conducted in (5) points mentioned in above and analyzed. The results of carbon dioxide (CO₂) are scrutinized with Carbon Dioxide Detection and Indoor Air Quality Control by OHS and indoor air quality results. And the results of indoor air quality, as PM₁, PM_{2.5}, PM₁₀, TVOCs and HCHO are also scrutinized with A Guide to Air Quality Index by U.S Environmental Protection Agency (EPA). The analyzed of the indoor air quality results are shown in the Table 4-19 and Figure 4-33.

According to the results, the results of the indoor air quality (Particulate Matters as PM 1, PM 2.5, PM 10, Total Volatile Organic Compounds (TVOCs), and formaldehyde (HCHO)) are within the guidelines of “A Guide to Air Quality Index by U.S Environmental Protection Agency (EPA)”. The results of carbon dioxide (CO₂) are also within “the Carbon Dioxide Detection and Indoor Air Quality Control by OHS”.

Table 4-19 Indoor Air Quality Results in Dry Season

Indoor air quality results						
No	Location	Activities	Parameter	Results	¹ EPA (Air Quality Index, AQI)	² OHS Guideline for CO ₂
1	Office	-	Carbon dioxide (CO ₂)	1293.00 ppm	NG	Fair
			Particulate Matter (PM ₁)	15.50 µg/m ³	NG	NG
			Particulate Matter (PM ₁₀)	34.50 µg/m ³	Good	NG
			Particulate Matter (PM _{2.5})	26.50 µg/m ³	Moderate	NG
			Total Volatile Organic Compound (TVOC)	0.05 mg/m ³	Safe	NG
			Formaldehyde (HCHO)	0.04 mg/m ³	Low	NG
			Humidity	32.25	NG	NG
2	Kitchen	-	Carbon dioxide (CO ₂)	1290.25 ppm	NG	Fair
			Particulate Matter (PM ₁)	17.50 µg/m ³	NG	NG
			Particulate Matter (PM ₁₀)	37.75 µg/m ³	Good	NG
			Particulate Matter (PM _{2.5})	29.75 µg/m ³	Moderate	NG
			Total Volatile Organic Compound (TVOC)	0.01 mg/m ³	Safe	NG
			Formaldehyde (HCHO)	0.00 mg/m ³	Low	NG
			Humidity	34.50	NG	NG
3	Control Room	-	Carbon dioxide (CO ₂)	1262.50 ppm	NG	Fair
			Particulate Matter (PM ₁)	16.75 µg/m ³	NG	NG
			Particulate Matter (PM ₁₀)	36.25 µg/m ³	Good	NG

Indoor air quality results						
			Particulate Matter (PM _{2.5})	28.75 µg/m ³	Moderate	NG
			Total Volatile Organic Compound (TVOC)	0.04 mg/m ³	Safe	NG
			Formaldehyde (HCHO)	0.00 mg/m ³	Low	NG
			Humidity	33.25	NG	NG
4	Silica Gel Store Room	-	Carbon dioxide (CO ₂)	1261.25 ppm	NG	Fair
			Particulate Matter (PM ₁)	18.00 µg/m ³	NG	NG
			Particulate Matter (PM ₁₀)	37.00 µg/m ³	Good	NG
			Particulate Matter (PM _{2.5})	28.75 µg/m ³	Moderate	NG
			Total Volatile Organic Compound (TVOC)	0.11 mg/m ³	Safe	NG
			Formaldehyde (HCHO)	0.02 mg/m ³	Low	NG
			Humidity	40.25	NG	NG
5	Machinery Store	-	Carbon dioxide (CO ₂)	1155.25 ppm	NG	Fair
			Particulate Matter (PM ₁)	13.25 µg/m ³	NG	NG
			Particulate Matter (PM ₁₀)	26.50 µg/m ³	Good	NG
			Particulate Matter (PM _{2.5})	19.50 µg/m ³	Moderate	NG
			Total Volatile Organic Compound (TVOC)	0.09 mg/m ³	Safe	NG
			Formaldehyde (HCHO)	0.01 mg/m ³	Low	NG
			Humidity	41.00	NG	NG

¹ A Guide to Air Quality Index by U.S Environmental Protection Agency (EPA),

²Carbon Dioxide Detection and Indoor Air Quality Control by OHS/ Modified by HA Team

4.4.3. Stack Heigh Emission

Stack emissions was conducted in this study, which could identify sources of air emissions and assess the potential effects on sensitive receptors due to operation of generator stack and furnace stack.

4.4.3.1. Method and Methodology

Stack emission measurement was conducted at the project area on 11th May, 2023. During this survey, Methane (CH₄), Hydrogen Sulphide (H₂S), Nitrogen Oxide (NO_x), Ammonia (NH₃), Carbon monoxide (CO), Oxygen (O₂), Sulphur dioxide (SO₂) were monitored. The measurements are conducted at the furnace stack emission and generator stack emission and it is measured by Oceanus OC-1000 as shown in Figure 4-34. Stack emission monitoring location map is as shown in Figure 4-36 and measuring activities are shown in Figure 4-35.



Figure 4-34 Stack Height Emission Monitoring Equipment (Oceanus OC-1000)



Generator Stack



Figure 4-35 Stack Height Emission Measurement Photos

Table 4-20 Stack Emission Measurement Point

Item	GPS Coordinates	Locations	Parameters
Furnace Stack Emission	21°17'54.96"N 95°10'25.37"E	Diesel Furnace	Methane (CH ₄), Hydrogen Sulphide (H ₂ S), Nitrogen Oxide (NO _x), Ammonia (NH ₃), Carbon monoxide (CO), Oxygen (O ₂), Sulphur dioxide (SO ₂)
Generator Stack Emission	21°17'55.72"N 95°10'27.53"E	Generator Room	



Figure 4-36 Stack Height Emission Measuring Map

4.4.3.2. Result of the Study

These measurements were made in accordance with the guidelines of IFC General EHS Guidelines by International Finance Corporation (World Bank Group), 30th April 2007 and NEQEG Guidelines - Petroleum Refining (2015), Methane (CH₄), Hydrogen Sulphide (H₂S), Nitrogen Oxide (NO_x), Ammonia (NH₃), Carbon monoxide (CO), Oxygen (O₂), Sulphur dioxide (SO₂) were monitored. The measurement results are described in Table 4-21. According to the results, the parameters are within the guidelines.

Table 4-21 Results of Stack Emission Measurement

No.	Parameter	Units	Furnace Stack	Generator Stack	IFC Standards ¹	NEQEG (2015) ²	Remark
1	Methane (CH ₄)	% LEL	0	0	NA	NA	-
2	Hydrogen Sulphide (H ₂ S)	mg/Nm ³	2.1	4.03	NA	10 mg/ Nm3	Within the guideline
3	Nitrogen Oxide (NO _x)	mg/Nm ³	0.01	0	320 mg/ Nm3	450 mg/ Nm3	Within the guideline
4	Ammonia (NH ₃)	mg/Nm ³	0	0	NA	30 mg/ Nm3	-
5	Oxygen (O ₂)	% Vol	22.8	21.33	At least 3 %	NA	Within the guideline
6	Carbon monoxide (CO)	ppm	0.5	0.32	NA	NA	-
7	Sulphur dioxide (SO ₂)	ppm	0.3	0.7	NA	NA	-

¹International Finance Corporation (IFC) General EHS Guideline,2007

²National Environmental Quality (Emission) Guidelines; 2015 (Petroleum Refining)

N/A – No Emissions Guideline

4.4.4. Water Quality Monitoring

The water quality data are collected and analyzed, focusing on physical, biological and chemical contamination. The objectives of water quality are to investigate the seasonal change of water quality and to confirm water quality whether it is suitable for domestic water supply. Surface water and groundwater may be impacted by the project due to solid waste and liquid waste released from the project. Water samplings are made at Ayeyarwady Rivers and existing tube wells. The water samples are sent to the laboratory for measuring the water quality parameters.

4.4.4.1. Method and Methodology for Collection of Surface Water and Groundwater

The water quality measurement was carried twice, once in September, 2021 during the wet season and once in May, 2023 during the dry season. For the first time survey, there is limited conditions to study the quality of water due to Covid-19 endemic there are three survey sites available for water quality, so operation wastewater, domestic wastewater and ground water were collected as sample. Natural water bodies like ponds, lakes are not located in within 1km of the MCCM mini refinery plant. Dry sand creeks situated in east and west side of the plant and water flows quickly only when it rains heavily during the wet season. The Ayeyarwady river is located about 1.5 km North of the MCCM mini refinery plant.

For the second time survey, the process of collecting sample water in the project area was carried out from two locations for surface water and three locations for groundwater on 11th May, 2023 and sent to the laboratory. When collecting samples, the operator wears gloves and rinse the bottle and cap for three times with sample water. And collected (2) Liter of sample water as its will be tested for surface water; pH, Temperature, Ture Color, Turbidity, Total Suspended Solid, Total Dissolved Solid, Conductivity, Hardness, Dissolved Oxygen, Free Chlorine, Phosphorus, Arsenic, Iron, Lead, Oil and Grease, Total Nitrogen and pH, Total Suspended Solid, Total Dissolved Solid, Hardness, Conductivity, Ammonia, Dissolved Oxygen, Free Chlorine, Phosphorus, Iron, Arsenic, Total Coliform for groundwater. After collection, place the samples into cooler box with ice and immediately deliver to the laboratory within (24) hour. During the second assessment, the factory was temporarily not operating, and thus no measurement was carried out for operation wastewater and domestic wastewater.

In addition, on-site water quality measurement of the tube well water and surface water on river bank was measured with the Hanna instrument (HI98129) within the project area and measuring temperature, pH, EC (Electric Conductivity) and TDS (Total Dissolved Solids). Water quality sample collected locations are shown in Table 4-22, Table 4-23 and Table 4-24 and Figure 4-37, Figure 4-38. The laboratory test result is attached in **Appendix E and Appendix F**.

Table 4-22 Water Sample Collection Points in Wet Season

Type	GPS Location	Location	Method	Parameters	Date
Groundwater (Tube Well)	21°17'52.03"N 95°10'22.95"E	Water from the overhead tank used daily in accommodation and kitchen	Collect Samples and Send to Lab	pH, Total Suspended Solid, Conductivity, Ammonia, Total Chlorine, Iron, Arsenic	16 th September, 2021

Type	GPS Location	Location	Method	Parameters	Date
Domestic Wastewater	21°17'52.00"N 95°10'25.27"E	Effluent from kitchen, canteen and bathroom from the accommodation		pH, Total Suspended Solid, BOD, COD, Ammonia, Total Chlorine, Arsenic, Oil and Grease, Iron	
Operation Wastewater	21°17'55.83"N 95°10'27.82"E	Wastewater produced from the operation of the petroleum refining processes		pH, Total Suspended Solid, BOD, COD, Total Phosphorous, Lead, Sulfide, Oil and Grease, Total Nitrogen, Chromium (Hexavalent),	

Table 4-23 Water Sample Collection Points in Dry Season

Type	GPS Location	Location	Method	Parameters	Date
Surface Water-1	21°18'6.602"N 95°08'42.998"E	Downstream of Ayeyarwady River	Collect Samples and Send to Lab	pH, Temperature, True Color, Turbidity, Total Suspended Solid, Total Dissolved Solid, Conductivity, Hardness, Dissolved Oxygen, Free Chlorine, Phosphorus, Arsenic, Iron, Lead, Oil and Grease, Total Nitrogen	11 th May, 2023
Surface Water-2	21°18'51.20"N 95°10'4.68"E	Upstream of Ayeyarwady River			
Groundwater (1)	21°18'54.03"N 95°10'42.84"E	Groundwater at Kyaw Zi Village			
Groundwater (2)	21°17'51.934"N 95°08'39.595"E	Groundwater at Malar Village			
Groundwater (3)	21°17'51.94"N 95°10'23.10"E	Groundwater at Project Area			

Type	GPS Location	Location	Method	Parameters	Date
Operation Wastewater	21°17'55.83"N 95°10'27.82"E	Wastewater produced from the operation of the petroleum refining processes		Mercury, Iron, Phenol, Temperature increase, Nickel, Chromium (Total)	4 th February, 2024

Table 4-24 On-site Water Quality Measurement Points

Type	GPS Location	Location	Method	Parameters	Date
Groundwater-1	21°17'52.03"N 95°10'22.95"E	Groundwater at Project Area	On-site Water Quality Measurement	Temperature, pH, EC and TDS	11 th May, 2023
Surface Water-1	21°18'51.20"N 95°10'4.68"E	Upstream of Ayeyarwady River			
Surface Water-2	21°18'6.602"N 95°08'42.998"E	Groundwater at Kyaw Zi Village			
Groundwater-2	21°18'54.03"N 95°10'42.84"E	Downstream of Ayeyarwady River			
Groundwater-3	21°17'51.934"N 95°08'39.595"E	Groundwater at Malar Village			



Figure 4-37 Map of Water Quality Monitoring Points in Wet Season

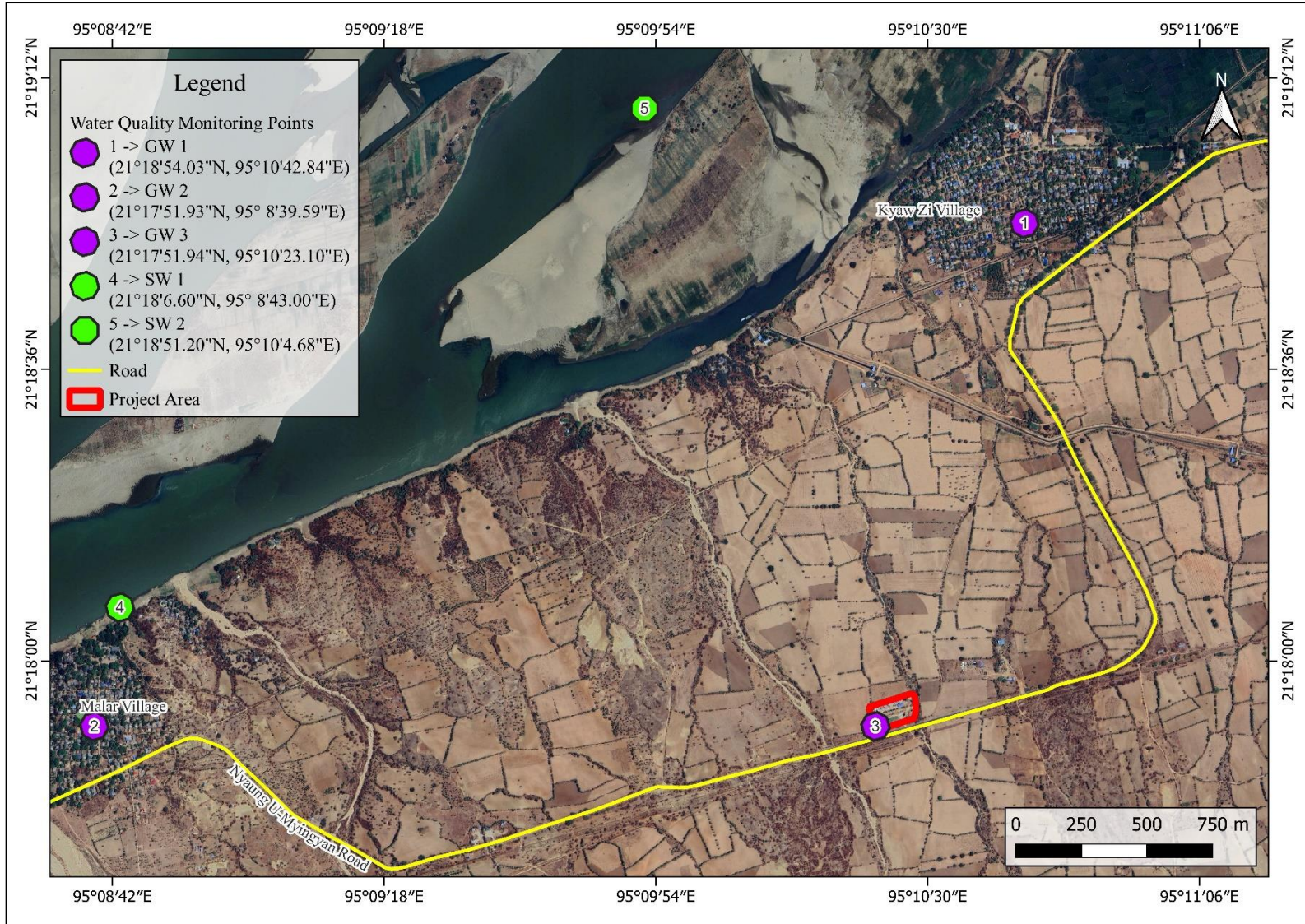


Figure 4-38 Map of Water Quality Monitoring Points in Dry Season



Figure 4-39 Water Sample Collection Photos in Wet Season



On-site Water Quality Measurement



Figure 4-40 Water Sample Collection Photos in Dry Season

4.4.4.2. Result of Water Quality in Wet Season

The analyzed parameters of the water samples, Ammonia, Arsenic, Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Chromium (Hexavalent), Conductivity, Iron, Lead, Oil and Grease, pH, Sulfide, Total Chlorine, Total Nitrogen, Total Phosphorous, and Total Suspended Solid (TSS) are tested in the ALARM Ecological Laboratory. The results are described in the followings Table 4-27, Table 4-28 and Table 4-29. Water sample collection photos are in following Figure 4-39. The analytic methods and laboratory method are shown in Table 4-25 and Table 4-26.

Table 4-25 Analytic Methods for Water Quality

Index	Instrument/ Method	References/ Descriptions
1	pH Meter	Electrode Method (Approved by EPA, ISO, ASTM), Hanna Electrode Meter Certified by 2014 EMS, Certified by QMS
2	DO Meter	Electrochemical Probe Method, Dissolved Oxygen Probe Measurement (Approved by EPA, ISO, ASTM), Horiba DO electrode certified with IP67 standards and measures
3	Spectro direct Methods	Lovibond brand reagent testing methods, precision of the methods are identical to the precision specified in the standard literature of AWWA and ISO
4	TDS Meter	Electrode method (Approved by EPA, ISO, ASTM), Hanna electrode meter certified by 2014 EMS, certified by QMS
5	Conductivity Meter	Electrode method, conductivity cell (Approved by EPA, ISO, ASTM), Hanna electrode meter certified by 2014 EMS, certified by QMS
6	BOD Testing Method	Method 405.1, USEPA Method for chemical analysis of water and waste water
7	Atomic Adsorption Spectrophotometer	Shimadzu AA-6200, which is based on the Japan Water Standard Testing Method also approved by EPA and ASTM
8	Arsenic Test Kit	Lovibond brand arsenic test kit certified by DIN ISO 1997/ follow procedure: Meets WHO requirements:
9	Liquid-Liquid Partition Gravimetric Method	Test Method for Oil and Grease (Solvent Extractable Substances) in water (EPA 1664) by using n-Hexane

Table 4-26 Laboratory Standard Method

Index	Standard Names	Standards References
a	WHO Standard for Drinking Water (2011)	Guidelines for drinking-water quality 4rd edition, World Health Organization, 2011
b	US EPA Drinking Water Standard 2018	2018 Edition of the Drinking Water Standards and Health Advisories, EPA 822-F-18-001, Office of Water, USEPA, Washington, DC, March 2018
c	Myanmar National Drinking Water Quality Standard	Myanmar National Standard Department, Department of Research and Innovation, Ministry of Education
d	Myanmar Emission Guideline (2015)	Nation Environmental Quality (Emission) Guidelines, Order No. (615/2015) MOECAAF, 2015, December 29.
*	At the edge of a scientifically established mixing zone which takes into account ambient water quality, receiving water use, potential receptors and assimilative capacity; when the zone is not defined, use 100 meters from the point of discharge	

Table 4-27 Result of Domestic Wastewater Quality in Wet Season

Serial No.	Quality Parameter	Results	Units	Emission Standards	Remarks
1	pH	7.3	S. U	6.0 – 9.0	Normal
2	TSS (Total Suspended Solid)	20	mg/L	≤50	Normal
3	BOD (Biological oxygen demand)	41	mg/L	≤50	Normal
4	COD (Chemical oxygen demand)	67	mg/L	≤250	Normal
5	Ammonia	<0.02	mg/L	≤10	Normal
6	Total Chlorine	<0.02	mg/L	—	—
7	Arsenic	0.05	mg/L	≤0.1	Normal
8	Oil and Grease	2	mg/L	≤10	Normal
9	Iron	0.13	mg/L	≤3.5	Normal

“ND” = Not Detected

“LOD” = Lower limit of detection

“—” = No References Standard

Table 4-28 Result of Operation Wastewater Quality in Wet Season

Serial No.	Quality Parameter	Results	Units	Emission Standards	Remarks
1	pH	8	S. U	6.0 – 9.0	Normal
2	TSS (Total Suspended Solid)	24	mg/L	≤50	Normal
3	BOD (Biological oxygen demand)	78	mg/L	≤50	Above the limit
4	COD (Chemical oxygen demand)	240	mg/L	≤250	Normal
5	Total Phosphorous	<1.5	mg/L	≤2	Normal
6	Lead	ND	mg/L	≤0.1	LOD=0.1mg/L
7	Sulfide	<0.04	mg/L	≤1	Normal
8	Oil & Grease	4	mg/L	≤10	Normal
9	Total Nitrogen	<0.5	mg/L	—	—
10	Chromium (Hexavalent)	0	mg/L	≤0.1	Normal

“ND” = Not Detected

“LOD” = Lower limit of detection

“—” = No References Standard

Table 4-29 Groundwater Quality Monitoring Results in Wet Season

Serial No.	Quality Parameter	Results	Units	Drinking Standards	Remarks
1	pH	7.2	S. U	6.5 – 8.5	Normal
2	TSS (Total Suspended Solids)	0	mg/L	—	—
3	Conductivity	0.8	mS/cm	≤ 2.5	Normal
4	Ammonia	<0.02	mg/L	—	—
5	Total Chlorine	<0.02	mg/L	—	—
6	Iron	0.38	mg/L	≤1	Normal
7	Arsenic	0	mg/L	≤ 0.05	Normal

“ND” = Not Detected

“LOD” = Lower limit of detection

“—” = No References Standard

After comparing of the result of ground water, domestic wastewater and operation wastewater with their corresponding standards and guidelines, the quality of ground water and domestic wastewater are in the normal conditions, except the BOD level of operation wastewater is beyond the limit. Due to the wastewater filtration pond capacity is insufficient for the filtering process from silica gel. Therefore, we recommend to constructed the sufficient filtration tank and now, No.3 (filtering tank) was constructed. The operation wastewater will be monitored twice a year, which is also written in the monitoring report.

4.4.4.3. Result of Water Quality in Dry Season

The analyzed parameters of the water samples pH, temperature, true color, turbidity, total dissolved solid, total suspended solid, conductivity, hardness, dissolved oxygen, free chlorine, phosphorous, arsenic, iron, lead, oil and grease and total nitrogen are tested in the ALARM Ecological Laboratory. Surface water quality result and groundwater quality result are as shown in Table 4-31 and Table 4-32. The surface water results are compared with TCVN 5942 : 1995 Water Quality Standards (Vietnam) and National Surface Water Quality Standard. Ground water results are compared with the National Drinking Water Quality Standard of Myanmar (2019) and operation wastewater results are compared with National Environmental Quality (Emission) Guidelines 2015. The water sample collection photos are in following Figure 4-40. For on-site measurement, Hanna instrument water quality meter was used for the measurement of the parameters as mentioned in Table 4-30.

Table 4-30 Water Quality Result of On-site Measurement with Hanna instrument (HI98129)

No	Parameter	Onsite Groundwater Quality Result on Project Area	Onsite Surface Water Quality Result (Upstream)	Onsite Surface Water Quality Result (Downstream)	Onsite Groundwater Quality Result at Kyaw Zi Village	Onsite Groundwater Quality Result at Malar Village	Unit	WHO Guidelines (2018) ¹	Remark
1.	pH	7.54	8.24	7.83	8.24	7.83	-	6.5-8.5	Within the guideline
2.	TDS	461	147	63	147	63	ppm	1000 mg/l	Within the guideline
3.	Electric conductivity	853	295	127	295	127	μS/cm	2500 μS/cm	Within the guideline
4.	Temperature	30.5	33.2	30.8	33.2	30.8	°C	25°C	Above the guideline

¹ World Health Organization (WHO) Guidelines 2018

Table 4-31 Result of Surface Water Quality in Dry Season

No.	Parameter	Result of Surface Water (Upstream of Ayeyarwady River)	Result of Surface Water (Downstream of Ayeyarwady River)	Unit	TCVN 5942 : 1995 Surface Water Quality Standards (Vietnam)*	National Surface Water Quality Standard **	Remark
1	pH ¹	7.9	8	S.U	5.5 - 9	-	Normal
2	Temperature ²	25.8	25.5	°C	-	-	-
3	True Color ³	0	18	HU	-	15	-
4	Turbidity ³	< 5	< 5	FAU	-	5	Within the guideline
5	Total Dissolved Solid ⁴	296	131	mg/L	-	500	Within the guideline
6	Total Suspended Solid ³	2	3	mg/L	80	-	Within the guideline
7	Conductivity ⁵	0.82	0.32	mS/cm	-	1	Within the guideline
8	Hardness ³	180	200	mg/L	-	-	-
9	Dissolved Oxygen ²	6.22	6.42	mg/L	≥2	-	Within the guideline
10	Free Chlorine ³	0.15	0.98	mg/L	-	-	-
11	Phosphorus ³	2.9	2.3	mg/L	-	-	-
12	Arsenic ³	0.005	0.005	mg/L	0.1	0.05***	Within the guideline
13	Iron ⁷	<0.1	<0.1	mg/L	2	-	Within the guideline
14	Lead ⁷	ND	0.1	mg/L	0.1	0.01***	Above the guideline in

No.	Parameter	Result of Surface Water (Upstream of Ayeyarwady River)	Result of Surface Water (Downstream of Ayeyarwady River)	Unit	TCVN 5942 : 1995 Surface Water Quality Standards (Vietnam)*	National Surface Water Quality Standard **	Remark
							Downstream
15	Oil & Grease ⁹	4	6	mg/L	0.3	-	Above the guideline
16	Total Nitrogen ³	2.3	1.5	mg/L	-	-	-

* TCVN 5942-1995: Water Quality-Surface Quality Standard

**National Surface Water Quality Standard (Class I)

***Standard Values of Parameters for Human Health

Table 4-32 Groundwater Quality Monitoring Results in Dry Season

No.	Parameter	Groundwater Result (at Kyaw Zi Village)	Groundwater Result (at Malar Village)	Groundwater Result (at Project Area)	Unit	National Drinking Water Quality Standards of Myanmar (2019)	Remark
1	pH ¹	8	7.7	7.5	S. U	6.5-8.5 ^c	Normal
2	Total Dissolved Solid ⁴	1128	718	891	mg/L	≤ 1000 ^c	Above the limit
3	Total Suspended Solid ³	0	0	0	mg/L	-	-
4	Conductivity ⁵	3.26	1.8	2.1	mS/cm	≤ 2.5 ^b	Normal
5	Hardness ³	360	250	220	mg/L	≤ 500 ^c	Normal
6	Ammonia ³	0.2	2.3	0.6	mg/L	-	Normal
7	Dissolved Oxygen ²	6.12	6.34	6.58	mg/L	-	-
8	Free Chlorine ³	0.25	0.07	0.09	mg/L	≤ 0.2 ^a	Normal

No.	Parameter	Groundwater Result (at Kyaw Zi Village)	Groundwater Result (at Malar Village)	Groundwater Result (at Project Area)	Unit	National Drinking Water Quality Standards of Myanmar (2019)	Remark
9	Phosphorus ³	0.2	1.9	1.3	mg/L	-	Normal
10	Arsenic ⁸	0.01	0.005	0.005	mg/L	≤ 0.05 ^a	Normal
11	Iron ⁷	<0.1	<0.1	<0.1	mg/L	≤ 1 ^c	Normal
12	Total Coliform	>1100	150	0	MPN/100 ml	MPN/100 ml	Above the limit
13	Turbidity	2.3	1.7	1.12	NTU	5	Normal
14	Color	13	11	9	TCU	15	Normal
15	Lead	0	0	0	mg/L	0.01	Normal
16	Fecal Coliform	0	0	0	MPN/100 ml	0	Normal
17	Manganese	0	0	0	mg/L	0.4	Normal
18	Chloride	56.2	47.6	34.6	mg/L	250	Normal
19	Sulphate	29.1	23.4	17.2	mg/L	250	Normal
20	Nitrate	12	8.7	5.21	mg/L	50	Normal

* National Environmental Quality (Emission) Guideline-Wastewater, Storm Water Runoff, Effluent and Sanitary Discharges - 2015(Petroleum Refining)

*a, b, c, d – Laboratory Test Method

*1 to 9 – Analytical Method for Water Quality

Table 4-33 Result of Operation Wastewater Quality in Dry Season

Serial No.	Quality Parameter	Results	Units	Emission Standards	Remarks
1	Mercury	0	mg/L	6.0 – 9.0	Within the guideline
2	Iron	2.1	mg/L	3	Within the guideline
3	Phenol	0	mg/L	0.2	Within the guideline
4	Temperature increase	27	°C	≤3	-
5	Nickel	0.112	mg/L	0.5	Within the guideline
6	Chromium (Total)	0	mg/L	0.5	Within the guideline

“ND” = Not Detected

“LOD” = Lower limit of detection

“—” = No References Standard

After comparing of the result of ground water, surface water and operation wastewater with their corresponding standards and guidelines, the quality of surface water (Ayeyarwady River) is in the normal conditions, except oil & grease. Oil & grease is high due to waste residual from the upper side of the river. In addition, lead parameter in downstream is little over the National Surface Water Quality standard. The quality of groundwater in the project area, Malar Village and Kyaw Zi Village are in normal condition. But the total dissolved solids and total coliform in Kyaw Zi Village are a little bit higher than the guideline. The operation wastewater is also within the guideline except from temperature increase.

4.4.5. Noise Quality Monitoring

4.4.5.1. Noise

World Health Organization (WHO) has described noise pollution as an underestimated threat that can cause hearing loss, cardiovascular problems, cognitive impairment, stress and suffering from depression. Noise pollution can affect people in several ways, some of which are hearing loss, cardiovascular diseases, and sleep disturbances.

MONREC (Ministry of Natural Resources and Environmental Conservation) has issued National Environmental Quality (Emission) Guidelines to provide the basis for regulations and control of noise level. Noise impacts should not exceed the levels presented in Table 4-34.

4.4.5.2. Method and Methodology for Noise Monitoring

In order to find out whether the noise from the project area reaches the outside and to know whether the noise level in the project area affects the workers, noise levels are monitored as 24-hr outdoor noise monitoring by using GM-1356 Digital Sound Level Meter shown in Figure 4-41. The baseline noise quality measurement was carried out twice, once in September, 2021 during the wet season and once in May, 2023 during the dry season. Noise monitoring points are shown in Table 4-35 and map of noise quality monitoring is described in Figure 4-44.

Table 4-34 Noise Level Standard of NEQ(E)G Guideline

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

Table 4-35 Noise Monitoring Points

No	GPS Coordinates	Noise Quality Measurement Location	Duration
First Time 24-hr Outdoor Noise Monitoring			
1	21°17'54.24"N 95°10'24.26"E	MCCM Project Area	Noise Quality Monitoring Point on 15 th – 16 th September, 2021
Second Time 24-hr Outdoor Noise Monitoring			
1	21°17'54.24"N 95°10'24.26"E	MCCM Project Area	Noise Quality Monitoring Point on 10 th – 11 th May, 2023
2	21°18'56.10"N 95°10'41.46"E	Kyaw Zi Village	Noise Quality Monitoring Point on 11 th – 12 th May, 2023
3	21°17'59.87"N 95°8'41.19"E	Malar Village	Noise Quality Monitoring Point on 12 th – 13 th May, 2023
Indoor Manual Noise Monitoring			
1	21°17'54.36"N 95°10'25.94"E	Office	Measured 5-minute interval for 7 times
2	21°17'54.43"N 95°10'26.25"E	Kitchen	
3	21°17'54.51"N 95°10'23.57"E	Control Room	
4	21°17'51.59"N 95°10'23.37"E	Silica Gel Room	
5	21°17'51.77"N 95°10'23.98"E	Machinery Store	



Figure 4-41 Noise Measuring Equipment (GM-1356 Digital Sound Level Meter)



Figure 4-42 24 Hour Outdoor Noise Measurement Activities in Wet Season



Figure 4-43 24 Hour Outdoor Noise Measurement Activities in Dry Season



Figure 4-44 Noise Quality Monitoring Points

4.4.5.3. Result of Outdoor Noise Monitoring in Wet Season

The measurements of noise quality were made in the operation area of the MCCM refinery plant. The description of noise results will be divided into those which are relevant to the guidelines and some are irrelevant to the guidelines. Thus, the measurements were relevant to the standard noise level.

After analyzing the results of noise monitoring, the values were ranging from 49.30 to 87.10 dBA. Those were moderately higher than the guideline. While making the noise survey, there were operation activities. The measurements made in the field visit are shown in Figure 4-42. The result table of noise monitoring is described in Table 4-36 and demonstration graphs are shown in Figure 4-45 and Figure 4-46.

Table 4-36 Average Results of Outdoor Noise Measurement in Dry Season

No.	Measurement Place	Current activity during monitoring	Noise Level (dBA)		NEQG ¹ standard	
			Day Time	Night Time	Residential, Institutional, educational	Industrial, commercial
			*Average Noise Measurement Result (dBA)	*Average Noise Measurement Result (dBA)		
1	Operation Area	Employees Working & Operation Activities	62.6	63.4	55	70

¹National Environmental Quality (Emission) Guidelines; 2015

Average measurement result (Time Interval= 1 hour, Duration= 24 hours)

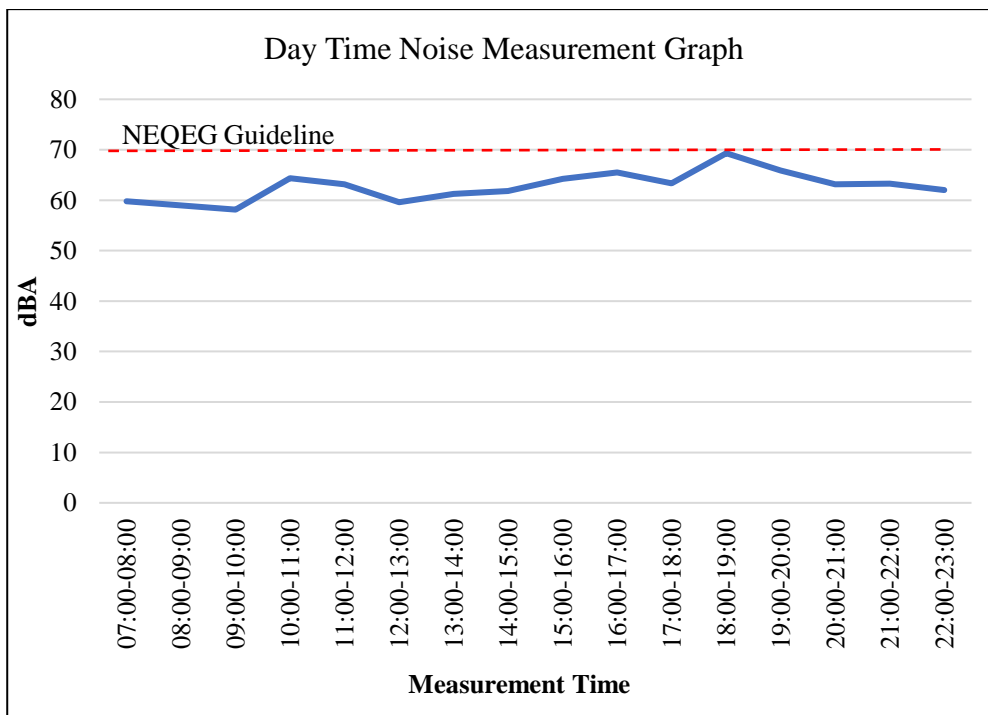


Figure 4-45 Daytime Noise Level Demonstration Graph in Wet Season

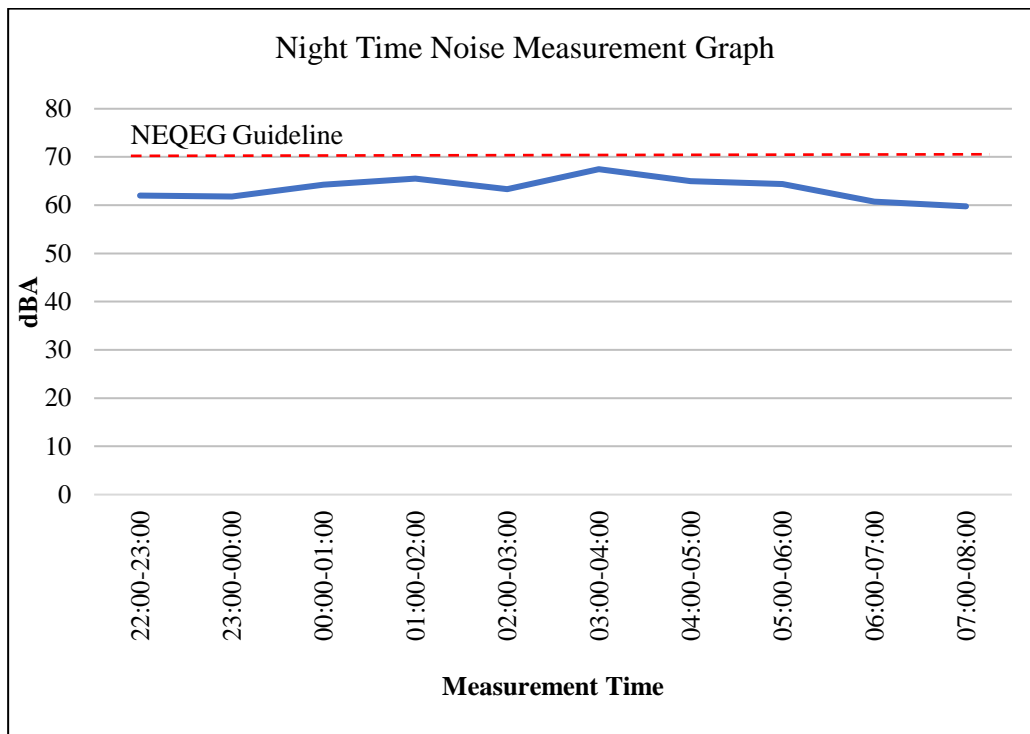


Figure 4-46 Nighttime Noise Level Demonstration Graph in Wet Season

According to the above 24-hour day and night noise measurement graphs, the results are within the guideline and safe for workers and environments around the project area.

4.4.5.4. Result of Outdoor Noise Monitoring in Dry Season

The 24-hour outdoor noise measurements were conducted in 10th to 13th May, 2023 in the proposed project site and the nearest village Kyaw Zi Village and Malar Village. The results are scrutinized with the National Environmental Quality (Emission) Guideline.

After analyzing the results of noise monitoring in the project area, Kyaw Zi Village and Malar Village, the values were within the guideline and safe for workers and environments. The result of daytime and nighttime in outdoor air noise is shown Table 4-37 and the demonstration graph of daytime and nighttime noise data results are as shown in Figure 4-47 and Figure 4-48. The measurements made in the field visit are shown in Figure 4-43.

Table 4-37 Average Results of Outdoor Noise Measurement in Dry Season

No.	Measurement Place	Noise Level (dBA)		NEQ(E)G ¹ standard	
		Day Time (07:00-22:00) Average (dBA)	Night Time (22:00-07:00) Average (dBA)	Industrial, commercial	
				Day Time (07:00-22:00)	Nighttime (22:00-07:00)
1	MCCM Project Area	48.04	51.81	70	70
2	Kyaw Zi Village	45.17	34.11		

No.	Measurement Place	Noise Level (dBA)		NEQ(E)G ¹ standard	
		Day Time (07:00-22:00) Average (dBA)	Night Time (22:00-07:00) Average (dBA)	Industrial, commercial	
				Day Time (07:00-22:00)	Nighttime (22:00-07:00)
3	Malar Village	49.53	31.25		

¹National Environmental Quality (Emission) Guidelines; 2015

Average measurement result (Time Interval= 1 hour, Duration= 24 hours)

Table 4-38 Noise Measurement Results at Project Area

Time	Noise Level (dBA)	National Environmental Quality (Emission) Guidelines, Industrial, commercial
Day Time (07:00-22:00)		70
07:12 - 08:08	53.20	
08:12 - 09:08	54.33	
09:12 - 10:08	52.27	
10:12 - 11:08	53.20	
11:12 - 12:08	51.33	
12:12 - 13:08	53.07	
13:12 - 14:08	51.13	
14:12 - 15:08	50.53	
15:12 - 16:08	55.60	
16:12 - 17:08	38.40	
17:12 - 18:08	34.33	
18:12 - 19:08	33.73	
19:12 - 20:08	35.87	
20:12 - 21:08	52.73	
21:12 - 22:08	50.87	
Night Time (22:00-07:00)		70
22:12 - 23:08	52.60	
23:12 - 00:08	53.47	
00:12 - 01:08	50.80	
01:12 - 02:08	50.13	
02:12 - 03:08	54.27	
03:12 - 04:08	50.53	
04:12 - 05:08	52.13	
05:12 - 06:08	53.33	
06:12 - 07:08	49.00	

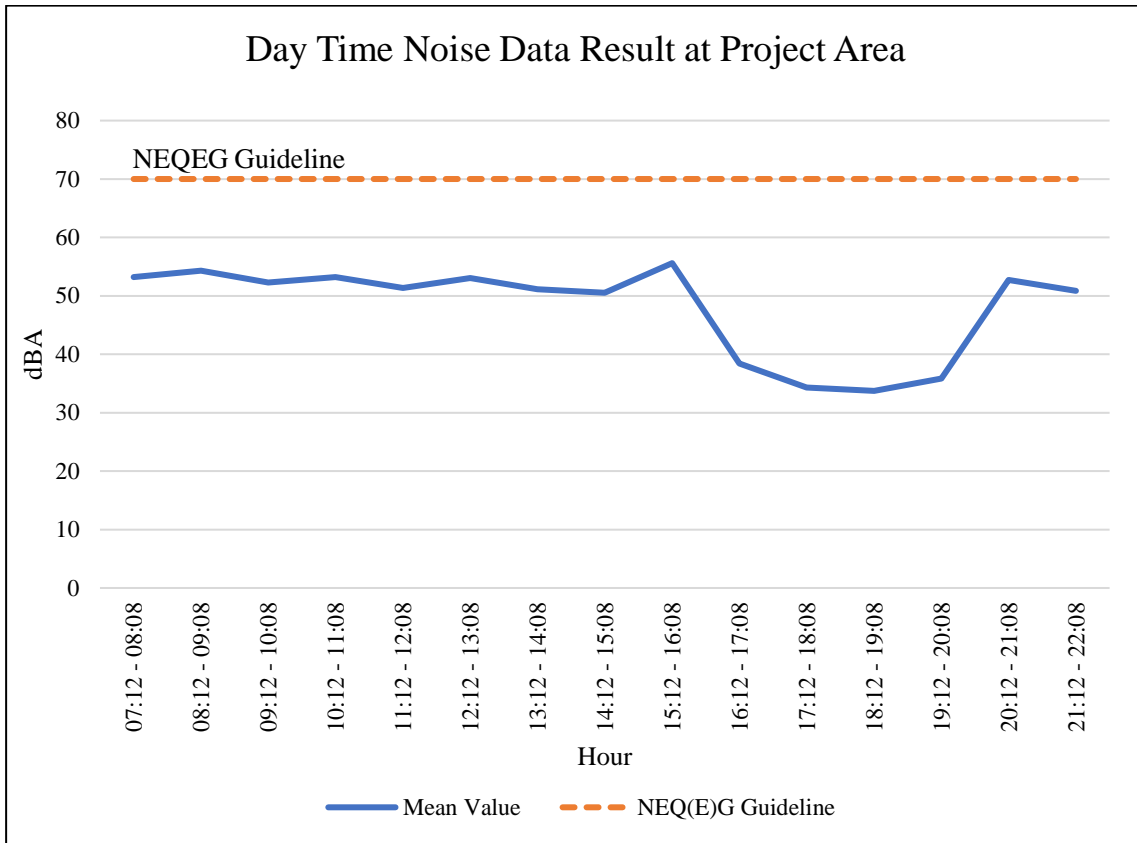


Figure 4-47 Daytime Noise Level Demonstration Graph for Project Area

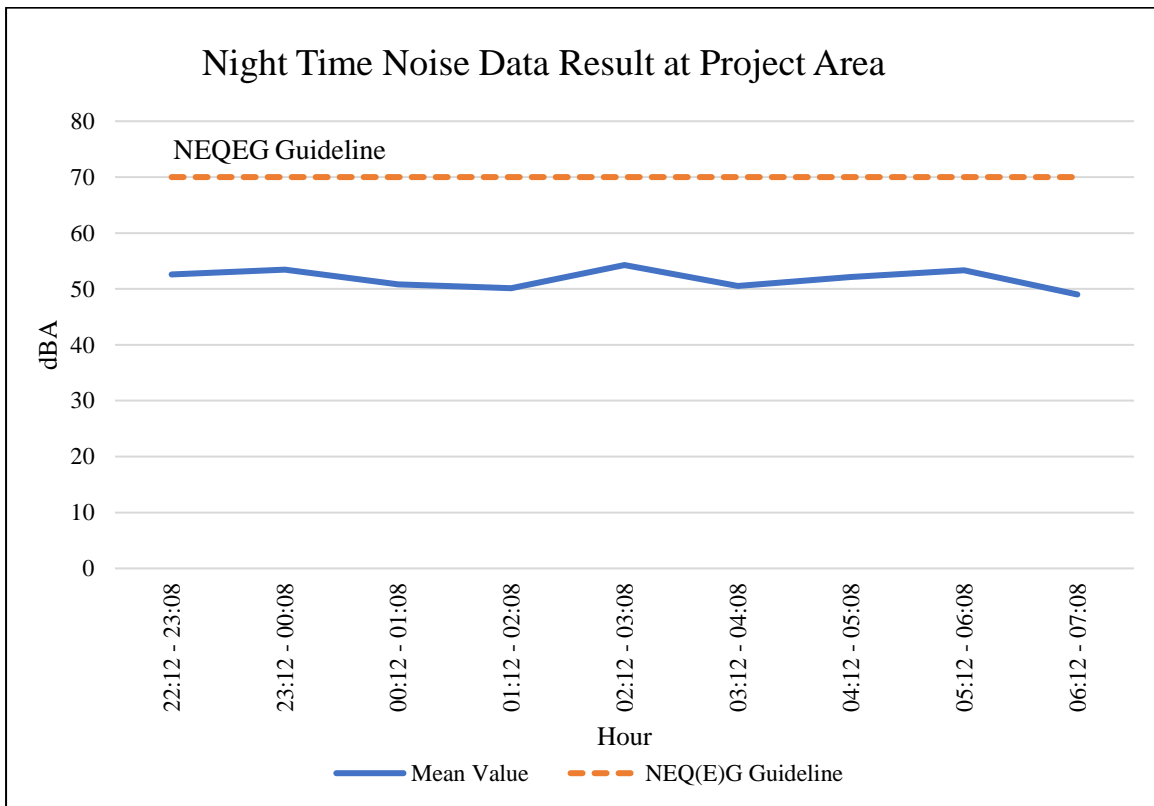


Figure 4-48 Nighttime Noise Level Demonstration Graph for Project Area

Table 4-39 Noise Measurement Results at Kyaw Zi Village

Time	Noise Level (dBA)	National Environmental Quality (Emission) Guidelines, Industrial, commercial
Day Time (07:00-22:00)		70
07:15 - 08:11	50.47	
08:15 - 09:11	48.93	
09:15 - 10:11	48.13	
10:15 - 11:11	45.67	
11:15 - 12:11	52.60	
12:15 - 13:11	42.80	
13:15 - 14:11	45.20	
14:15 - 15:11	43.33	
15:15 - 16:11	44.27	
16:15 - 17:11	47.20	
17:15 - 18:11	44.00	
18:15 - 19:11	48.20	
19:15 - 20:11	40.13	
20:15 - 21:11	38.93	
21:15 - 22:11	37.67	
Night Time (22:00-07:00)		70
22:15 - 23:11	37.93	
23:15 - 00:11	35.27	
00:15 - 01:11	29.60	
01:15 - 02:11	29.13	
02:15 - 03:11	29.40	
03:15 - 04:11	32.00	
04:15 - 05:11	29.47	
05:15 - 06:11	32.80	
06:15 - 07:11	51.40	

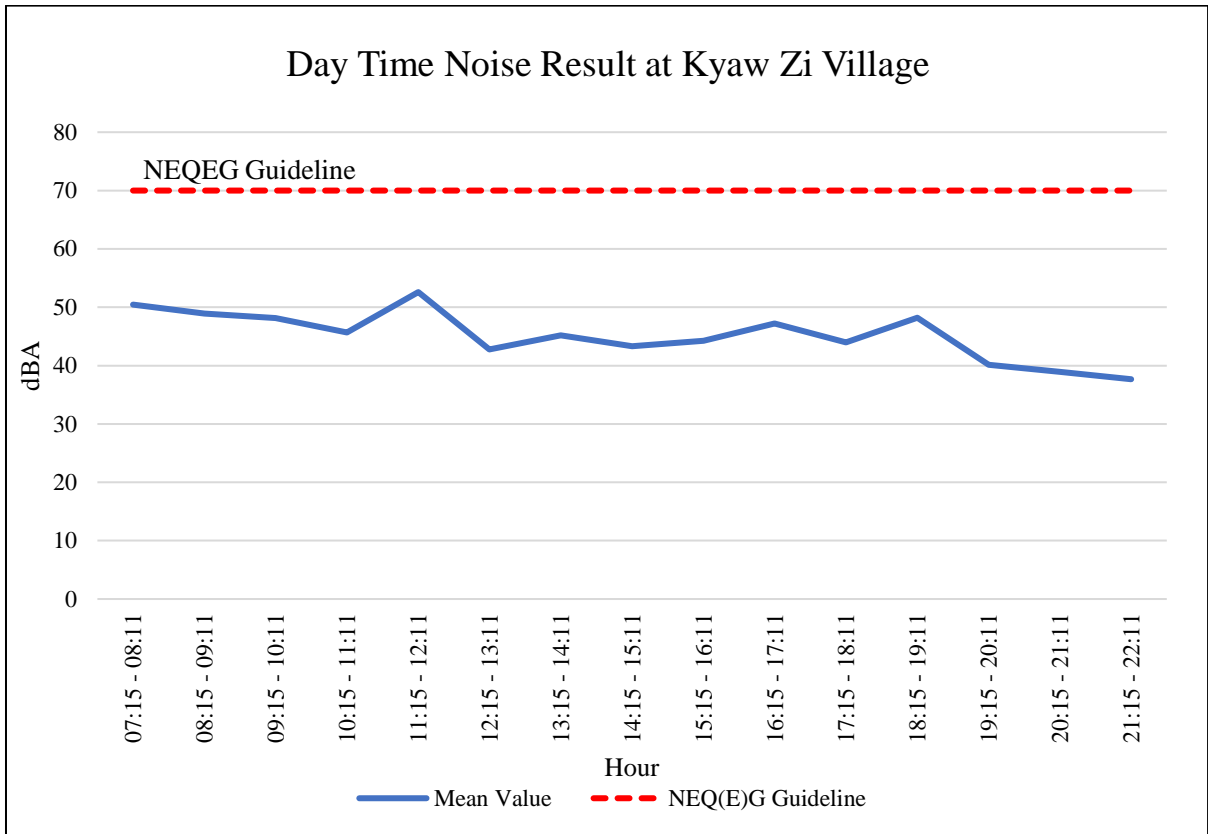


Figure 4-49 Daytime Noise Level Demonstration Graph for Kyaw Zi Village

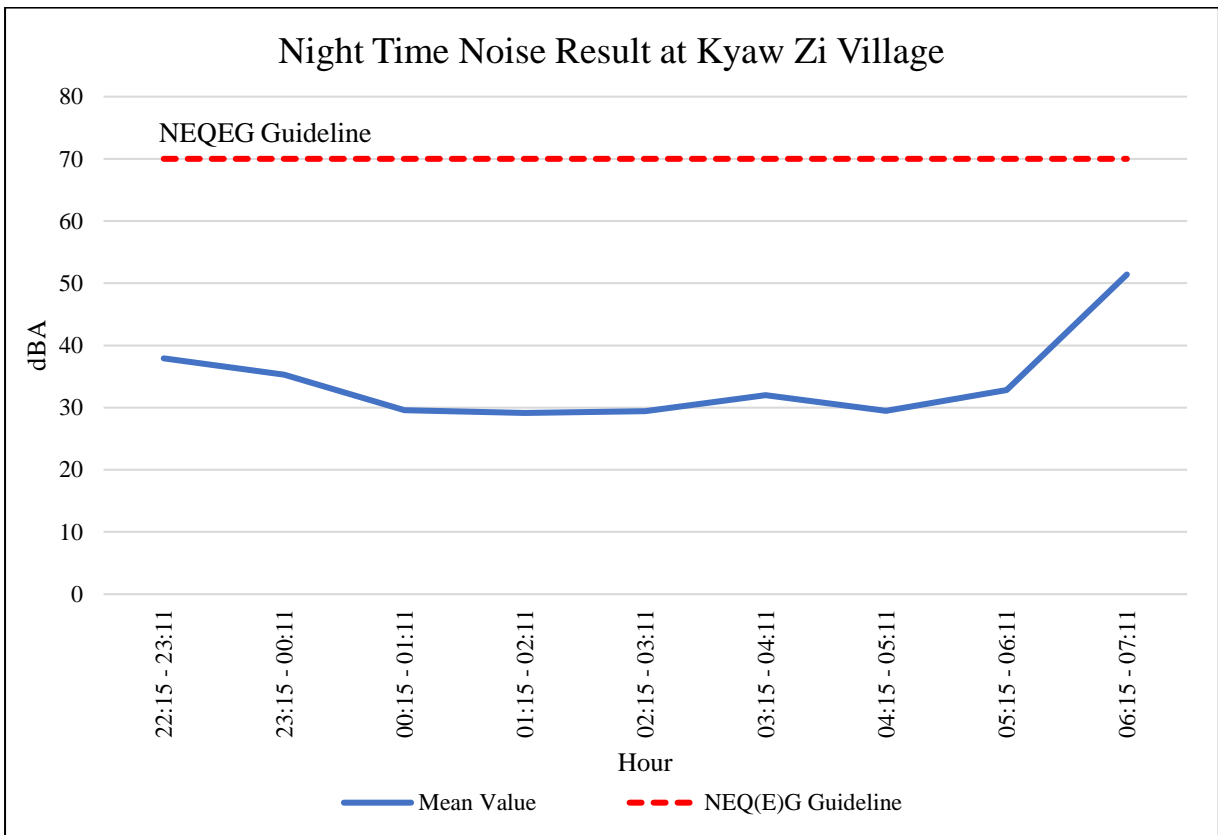


Figure 4-50 Nighttime Noise Level Demonstration Graph for Kyaw Zi Village

Table 4-40 Noise Measurement Results at Malar Village

Time	Noise Level (dBA)	National Environmental Quality (Emission) Guidelines, Industrial, commercial
Day Time (07:00-22:00)		70
07:15 - 08:11	55.47	
08:15 - 09:11	57.27	
09:15 - 10:11	56.93	
10:15 - 11:11	57.40	
11:15 - 12:11	57.73	
12:15 - 13:11	58.13	
13:15 - 14:11	57.60	
14:15 - 15:11	58.87	
15:15 - 16:11	56.40	
16:15 - 17:11	51.53	
17:15 - 18:11	33.80	
18:15 - 19:11	35.40	
19:15 - 20:11	35.60	
20:15 -21:11	35.00	
21:15 - 22:11	35.80	
Night Time (22:00-07:00)		70
22:15 - 23:11	35.20	
23:15 - 00:11	29.07	
00:15 - 01:11	27.80	
01:15 - 02:11	27.27	
02:15 - 03:11	25.07	
03:15 - 04:11	27.53	
04:15 - 05:11	27.13	
05:15 - 06:11	30.73	
06:15 - 07:11	51.47	

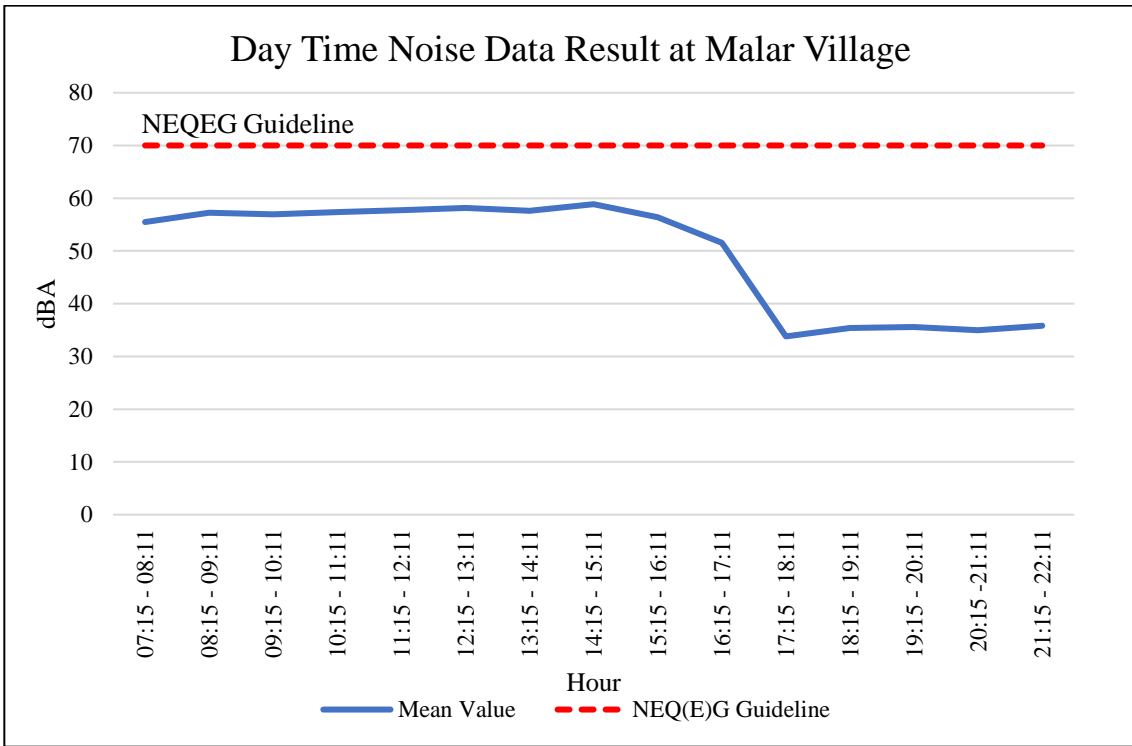


Figure 4-51 Daytime Noise Level Demonstration Graph for Malar Village

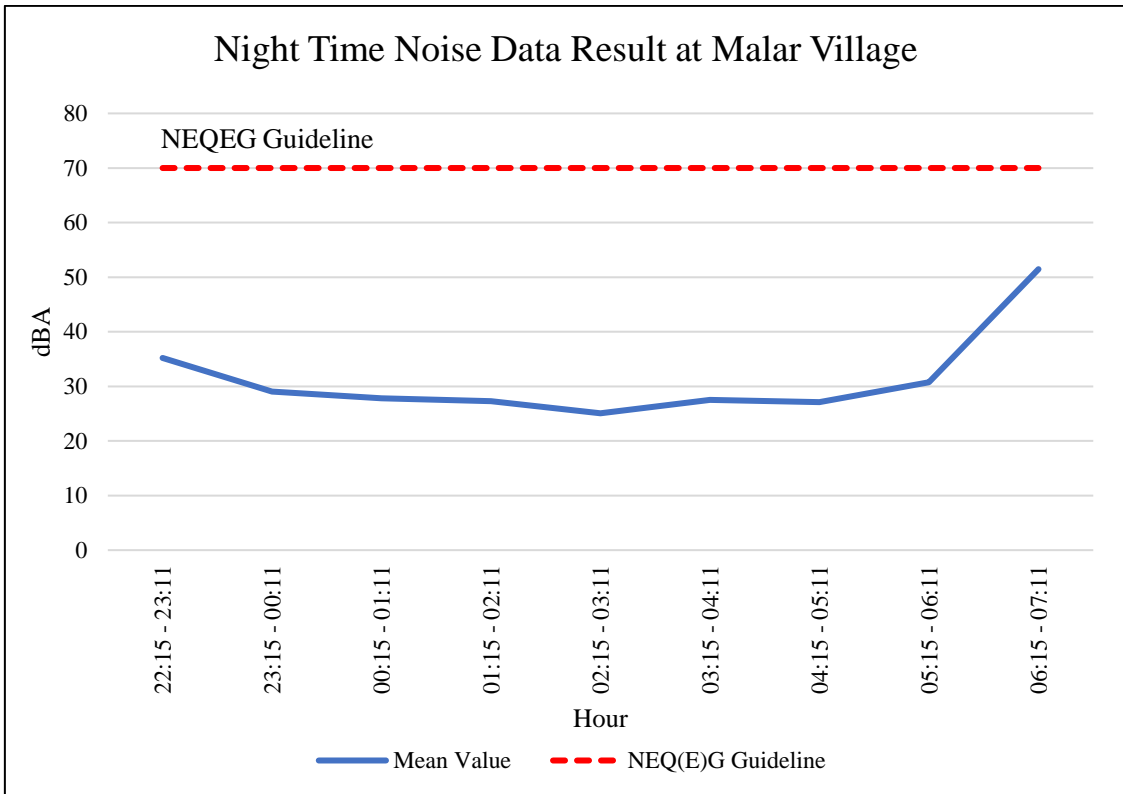


Figure 4-52 Nighttime Noise Level Demonstration Graph for Malar Village

4.4.5.5. Indoor Noise Measurement

The measurement was made by using GM-1356 Digital Sound Level Meter for indoor noise quality on 11th May, 2023 displayed in Figure 4-53 and monitoring photos are shown in Figure 4-54. The measurement stations include office, kitchen, control room, silica

gel store room and machinery store. The average indoor noise quality results were compared with National Environmental Quality (Emission) Guidelines. The measurement places are fundamental operating areas in the factory. According to the results, all the stations are compliance with the standard guidelines. The results are as shown in Table 4-41. The location map of noise monitoring map is shown in Figure 4-55.



Figure 4-53 GM-1356 Digital Sound Level Meter



Office



Kitchen



Control Room



Silica Gel Store Room



Machinery Store

Figure 4-54 **Indoor Noise Monitoring Photos**

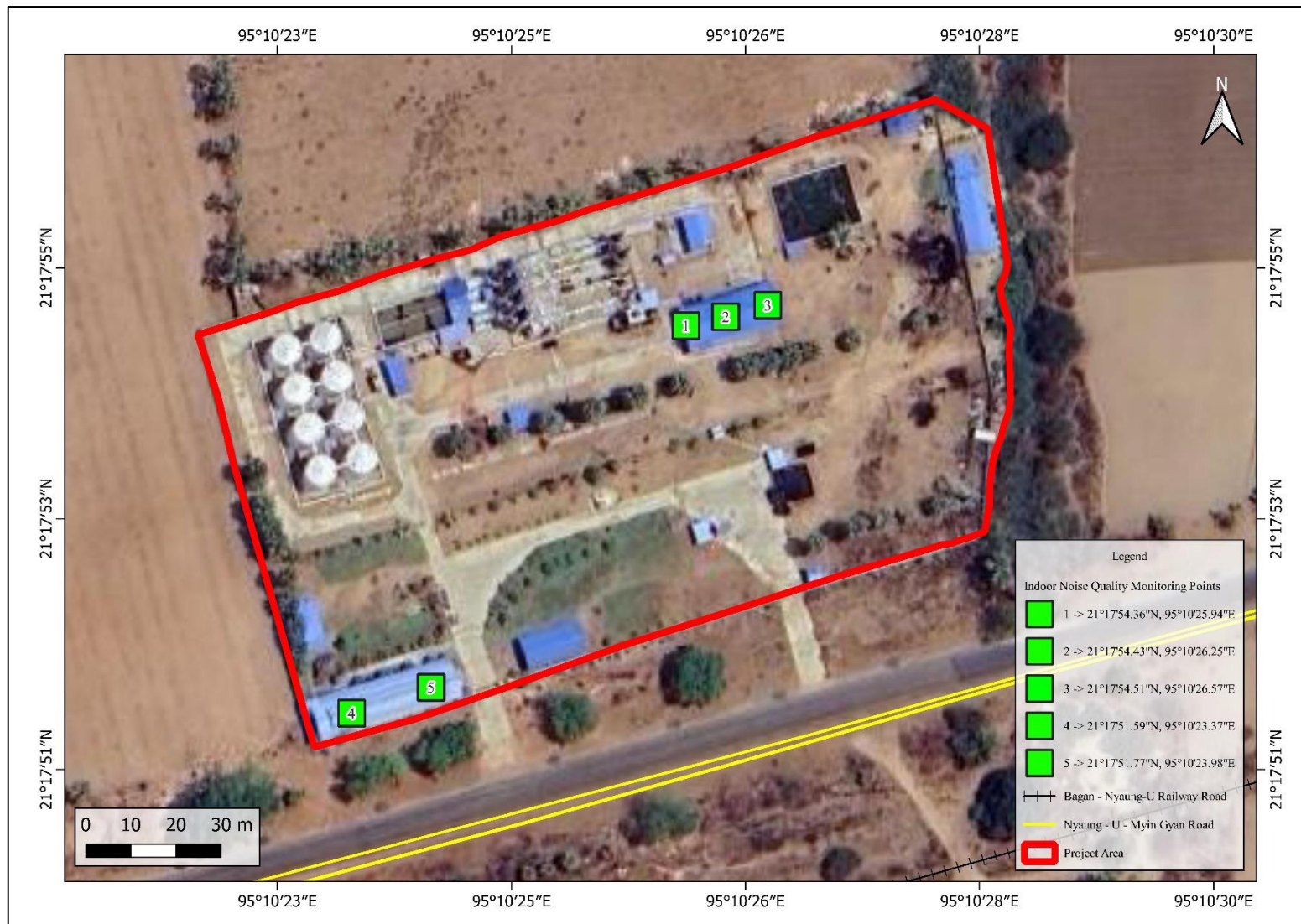


Figure 4-55 Indoor Noise Monitoring Points

Table 4-41 Indoor Noise Measurement Results

No.	Measurement Place	Current activity during monitoring	Noise Level (dBA)		NEQ(E)G Guidelines
			Day Time		Industrial, commercial
			Minimum dBA	Maximum dBA	
1	Office	Vehicle passing	41.66	61.24	70
2	Kitchen	Vehicle passing	52.13	58.29	
3	Control Room	Non-operation	36.86	61.64	
4	Silica Gel Store	Non-operation	51.59	61.40	
5	Machinery Store	Non-operation	47.14	51.00	

4.4.6. Vibration Measurement

Vibration in building can be caused by many different external sources, including industrial, construction and transportation activities. The vibration may be continuous (with magnitudes, varying or remaining constant with time), impulsive (such as in shocks), or intermittent (with the magnitude of each event being either constant or varying with time).

4.4.6.1. Method and Methodology for Vibration Measurement

In order to assess the potential impact generated from vibration, vibration of the project is measured by using vibration monitoring device as shown in Figure 4-56 and the measurement photos are shown in Figure 4-57. The location and measurement station for vibration monitoring is displayed in Table 4-42 and Figure 4-58.



Figure 4-56 BENETECH Vibration Monitoring Equipment



Figure 4-57 Vibration Measurement Photos



Figure 4-58 Location of Vibration Monitoring

Table 4-42 Vibration Monitoring Points

No.	Location	Description	Coordinate Points	Parameter	Dry Season
1	Vibration - 1	Measurement on production area of steel column	21°17'54.28"N 95°10'24.68"E	Velocity and Acceleration	On site Measurement, 11 th May, 2023
2	Vibration - 2	Measurement on distillation column	21°17'54.45"N 95°10'24.60"E	Velocity and Acceleration	
3	Vibration - 3	Measurement on production area of steel column	21°17'54.84"N 95°10'24.71"E	Velocity and Acceleration	

4.4.6.2. Result of Vibration Measurement

The vibration measurements were conducted on 11th May, 2023 at three measuring points. The vibration meter BENETECH Vibration Monitoring Equipment was used for vibration measurements. The vibration measurement result at the project site is shown in Table 4-43.

According to the field survey results, evaluation results of vibration levels for all stations found no significant effects, and the factory was in a non-operational stage.

Table 4-43 Result of Vibration with Criteria

No.	Location	Result		*Criteria for Workshop				Source
		Acceleration (m/s ²)	Velocity (mm/s)	Acceleration (m/s ²) (dB re 10 ⁻⁶ m/s ²)		Velocity (mm/s) (dB re 10 ⁻⁶ m/s ²)		
				Preferred	Max	Preferred	Max	
1.	Vibration - 1	0.03	0.3	0.040 (92 dB)	0.080 (98 dB)	0.80 (118 dB)	1.6 (124 dB)	Measurement on production area of steel column
2.	Vibration - 2	0.02	0.5	0.040 (92 dB)	0.080 (98 dB)	0.80 (118 dB)	1.6 (124 dB)	Measurement on distillation column
3.	Vibration - 3	0.005	0.2	0.040 (92 dB)	0.080 (98 dB)	0.80 (118 dB)	1.6 (124 dB)	Measurement on production area of steel column

* Assessing Vibration: a technical guideline, 2006, Department of Environment and Conservation, NSW (New South Wales), Australia guideline

4.4.7. Light Measurement

The workplace environment comprises an important aspect of an individual's overall wellbeing. Good lighting in the workplace can promote and reduced risk of occupational accidents, health problems, better concentration and accuracy in work.

4.4.7.1. Method and Methodology for Light Measurement

According to the “Good Practices for Garment Factories” established by IFC (International Finance Corporation) proper lighting conditions are critical for good productivity. Conversely, poor lighting can cause eye strain, fatigue and headache. Moreover, work area light intensity should be adequate for the general purpose of the location and type of activity, and should be supplemented with dedicated work station illumination, as needed.

As stated in General EHS Guidelines by International Finance Corporation (World Bank Group) on 30th April 2007, the minimum limits of illumination intensity for precision work such as office, moderately difficult assembly, sorting and checking are required to have 500 Lux at least. The general EHS guidelines of occupational health and safety are shown in Table 4-44.

The light quality measurement was carried out twice, once in September, 2021 during the wet season and once in May, 2023 during the dry season. Light monitoring was conducted in (5) points within the factory. Light quality of office room, control room, silica gel store room, machinery room and kitchen were examined whether the light level meets the standard light level because those are the main operation features of in the factory. The light monitoring equipment AS-823 Lux Meter was used for light measurements and detailed location these places are shown in Table 4-45 and Figure 4-62. The guideline values for light quality are shown in Table 4-44. Light monitoring activities are shown in Figure 4-60 and Figure 4-61.



Figure 4-59 AS-823 Lux Meter



Figure 4-60 Photos of Light Monitoring in the Factory in Wet Season



Figure 4-61 Photos of Light Monitoring in the Factory in Dry Season

Table 4-44 General EHS Guideline: Occupational Health and Safety

Location / Activity	Light Intensity (Lux)
Emergency Light	10
Out Door Non-Working Area	20
Simple orientation and temporary visits (machine storage, garage, warehouse)	50
Workspace with occasional visual tasks only (Corridors, stairways, lobby, elevator, auditorium, etc.)	100
Medium precision work (simple assembly, rough machine works, welding, packing, etc.)	200
Precision work (reading, moderately difficult assembly, sorting, checking, medium bench and machine works, etc.), offices.	500
High precision work (difficult assembly, sewing, color inspection, fine sorting etc.)	1000-3000

World Bank Group and IFC (April 30, 2007)

Table 4-45 Light Monitoring Points

No	GPS Coordinates	Measurement Location
1	21°17'54.36"N 95°10'25.94"E	Office
2	21°17'54.43"N 95°10'26.25"E	Kitchen
3	21°17'54.51"N 95°10'23.37"E	Control Room
4	21°17'51.59"N 95°10'23.37"E	Silica Gel Store Room
5	21°17'51.77"N 95°10'23.98"E	Machinery Store

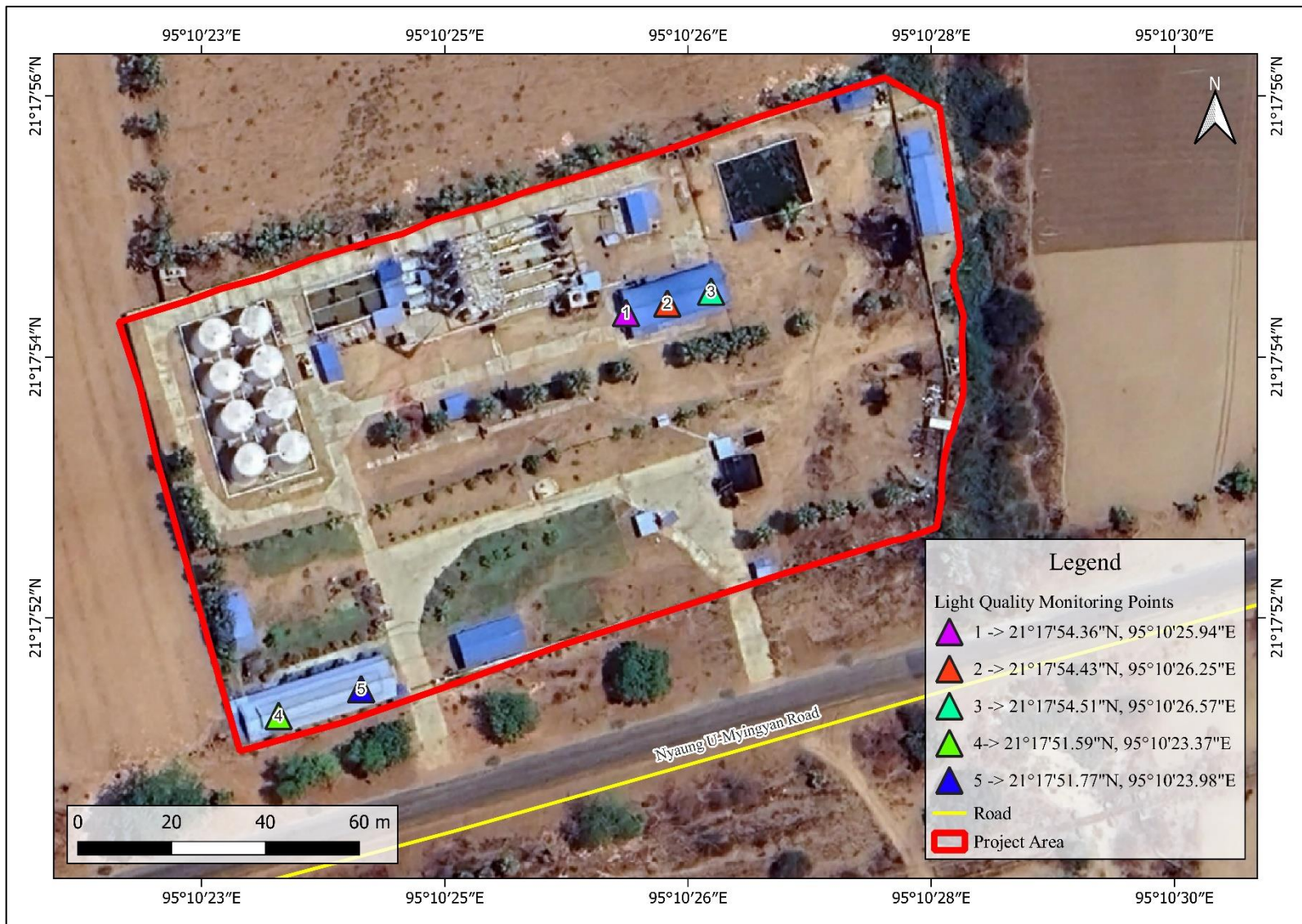


Figure 4-62 Light Monitoring Points

4.4.7.2. Result of the Study on Light Monitoring in Wet Season

Light quality of office room, control room, store, and kitchen were examined whether the light level meets the standard light level because those are the main operation features of in the factory. It is necessary for all the employees to see in a clear vision and to have better concentration in work. The measurements were carried out in every working section. The measurement values of office, control room and kitchen are lower than the standard value. The value of office room is 296.2 lux which is lower than the standard value. The value of control room is 298.3 lux which is lower than the standard value of 500 Lux. The result of monitored data of all light measurements are as shown in Table 4-46.

Table 4-46 Light Measurement Results

No	Location/Activity	Measure Value (Lux) in Wet Season	*IFC Standard Value (Lux)
1	Office	296.2	500
2	Kitchen	164.2	200
3	Control Room	298.3	500
4	Store Room	133	100
5	Machinery Store	124.5	100

*General EHS Guidelines by International Finance Corporation (World Bank Group) on 30th April 2007

4.4.7.3. Result of the Study on Light Monitoring in Dry Season

The results are scrutinized with the standard value of minimum limits for workplace illumination intensity of International Finance Corporation (IFC). The measurements were carried out in every working section. The measurement value of office room is 421.33 lux which is slightly lower than the standard value. Office is an important place for all kinds of office procedures, the measured values does not meet the minimum light intensity for a workplace, and the result are not applicable to the general purpose of the location and type of activity because the recommended level for office is within the range of 500 Lux. The results are shown in Table 4-47. Light monitoring device and light monitoring activities are shown in Figure 4-61.

Table 4-47 Light Measurement Results

No	Location/Activity	Measure Value (Lux) in Dry Season	*Standard Value (Lux)
1	Office	421.33	500
2	Kitchen	295.33	200
3	Control Room	956.00	500
4	Silica Gel Store Room	335.67	100
5	Machinery Store	157.67	100

4.4.8. Temperature Measurement

Activities of the workers in the factory are highly dependent on the temperature for better work performance and occupational health. Improper temperature levels can affect productivity and health negatively.

4.4.8.1. Method and Methodology for Temperature Measurement

The baseline temperature measurement was carried out twice, once in September, 2021 during the wet season and once in May, 2023 during the dry season. Temperature measurement was conducted in (5) points within the factory. These are office, kitchen, control room, silica gel store room and machinery store by using ROHS-Infrared Thermometer and detailed location of these places are shown in Table 4-48 and Figure 4-63. The temperature measuring activities are shown in Figure 4-64 and Figure 4-65.

Table 4-48 Temperature Measurement Points

No	GPS Coordinates	Measurement Location
1	21°17'54.36"N 95°10'25.94"E	Office
2	21°17'54.43"N 95°10'26.25"E	Kitchen
3	21°17'54.51"N 95°10'23.37"E	Control Room
4	21°17'51.59"N 95°10'23.37"E	Silica Gel Store Room
5	21°17'51.77"N 95°10'23.98"E	Machinery Store



Figure 4-63 Temperature Measuring Device



Survey Team Measuring the Quality of Light in the Compound of Petroleum Refinery Plant

Figure 4-64 Temperature Measuring Photos in Wet Season



Control Room



Silica Gel Store Room



Machinery Room

Figure 4-65 Temperature Measuring Photos in Dry Season



Figure 4-66 Temperature Measurement Locations

4.4.8.2. Result of the Study in Wet Season

The places measured above are fundamental operating areas in the factory, because temperature plays a big role in whether employees are comfortable, focused and productive. The monitored data of temperature measurement are scrutinized with the Standard Guideline of International Labor Organization (ILO) and result are shown in Table 4-49. According to the collected data, all stations are compliance with the standard guidelines.

Table 4-49 Temperature Measurement Results in Wet Season

No	Location	Measure Value (°C) in Wet Season	(ILO) Standard Value* (°C)
1	Office	26.56	32
2	Kitchen	26.37	
3	Control Room	26.09	
4	Machinery Store	26.10	
5	Store Room	25.04	

* Standard Guideline of International Labor Organization (ILO)

4.4.8.3. Result of the Study in Dry Season

There is a total of 5 stations for measurements of temperature in office area, control room, silica store room, machinery store and kitchen areas. The monitored data of temperature measurement are scrutinized with the Standard Guideline of International Labor Organization (ILO) and result are shown in Table 4-50. According to the collected data from measuring, the temperatures of all locations are higher than the guidelines of ILO Standards because of the outside weather conditions. The equipment used in measuring temperature and the temperature measuring activities are shown in Figure 4-64 and Figure 4-65.

Table 4-50 Temperature Measurement Results in Dry Season

No	Location	Measure Value (°C) in Dry Season	(ILO) Standard Value* (°C)
1	Office	35.5	32
2	Kitchen	35.25	
3	Control Room	36	
4	Silica Gel Store Room	35	
5	Machinery Store	33	

* Standard Guideline of International Labor Organization (ILO)

4.4.9. Odor Measurement

The effects of persistent odor exposure on health might be negative. Additionally, if we are forced to breathe offensive odors for an extended period of time, we may feel dizzy, headache and may experience discomfort.

Odor measurement in the project area was carried out in on 11th May, 2023. Odor measurements were taken at seven locations listed in Table 4-51. The measured results will be compared with the national environmental quality (emission) guidelines, 2015. The location map and odor monitoring activities are also shown in Figure 4-69 and Figure 4-68.

MONREC has provided National Environmental Quality (Emission) Guidelines for the rules and control of odors in industrial sectors. The odor in this project factory is not an issue since there's no textiles dyeing and printing which can produce various types of smell.

Table 4-51 Odor Monitoring Point

No	GPS Coordinates	Odour Monitoring Location
1	21°17'54.96"N 95°10'25.37"E	Furnace Stack
2	21°17'54.73"N 95°10'25.36"E	Furnace
3	21°17'54.50"N 95°10'24.87"E	Condenser
4	21°17'54.39"N 95°10'25.92"E	Control Room
5	21°17'57.34"N 95°10'25.50"E	Outside Factory
6	21°17'51.14"N 95°10'25.01"E	Outside factory plantation area
7	21°17'49.45"N 95°10'18.31"E	Outside factory next to the road

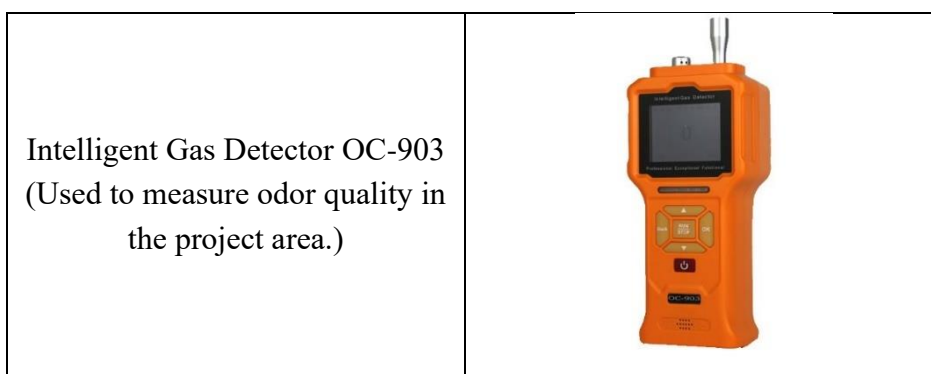


Figure 4-67 Odor Measurement Equipment



Figure 4-68 **Photos of Odor Measurement Result of the study**

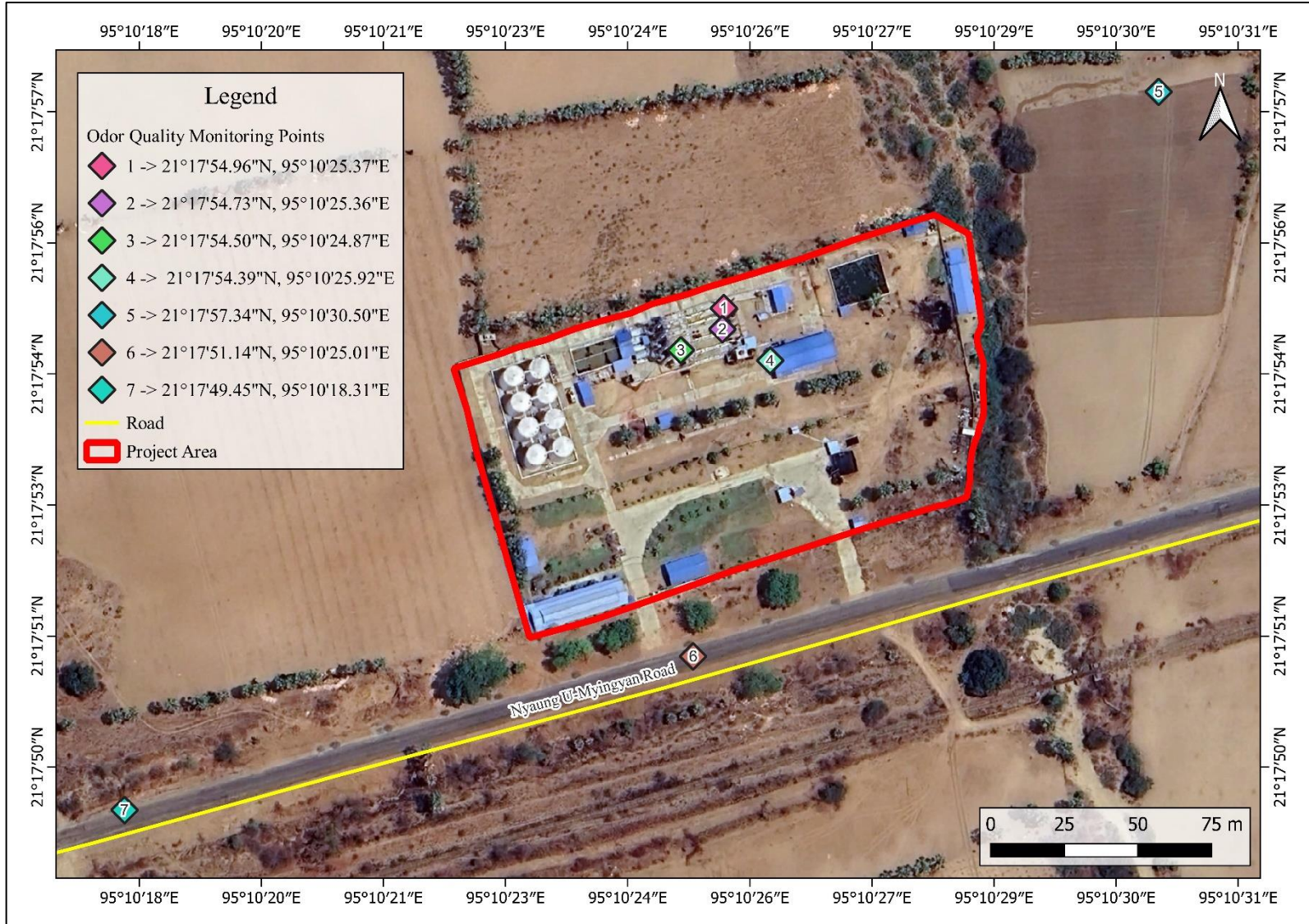


Figure 4-69 Odor Measurement Location Points

4.4.9.1. Method and Methodology for Odor Measurement

In order to find out whether the odor from the operation of the factory reaches the outside and to know whether the odor level in the factory affects the workers and environments are monitored as 3 minutes interval with manual monitoring within the factory compound between toilet by using Intelligent Gas Detector OC-903 shown in Figure 4-67.

Odor measurement was carried out in furnace stack, furnace, condenser, control room, outside of the factory, outside factory (plantation area), outside factory next to the road and the average results obtained were compared to national environmental quality emission guidelines. As results, the odor quality at the above locations is within the NEQEG (2015) guideline and no significant effects on the environment as described in Table 4-52.

Table 4-52 Odor Measurement Result

No	Location/Activity	Result (ppm)	NEQEG (2015) *
1	Furnace Stack	0.01	5-10
2	Furnace	0.02	
3	Condenser	0	
4	Control Room	0	
5	Outside Factory	0	
6	Outside Factory Plantation Area	0	
7	Outside factory next to the road	0	

*National Environmental Quality (Emission) Guidelines; 2015

4.4.10. Soil Quality Measurement

Soil pH is a measure of the amount of acidity or alkalinity (basicity) that is presented in the soil. Soil pH measure on a scale of 0 to 14 with pH level below 7 being acid while pH level above 7 being alkaline (or Basic). pH of 7 is considered neutral (neither acidic nor alkaline). Soil pH is a very important soil property due to its ability to determine the availability of nutrients for plant uptake. Different soil nutrients are available at acidic pH while others are available at alkaline pH levels. The Soil pH level that allows for a wider nutrient availability to crops is in the 5.5 to 7.5 range.

4.4.10.1. Method and Methodology for Collection of Soil Quality Monitoring

The process of collecting sample soil in the project area was carried out from four locations on 11th May, 2023 and sent to the laboratory. The soil measurement location points and location map are as shown in Table 4-53 and Figure 4-72 respectively. In order to investigate the quality of the soil in the project area, soil samples were dug to a depth of about 2 feet and collected soil samples. The sample were sent in a sealed and labelled plastic bag to the central land use laboratory, Department of Agriculture and tested for pH, moisture,

texture, total nitrogen (N) and Cation exchange capacity (CEC). The lab results are as shown in Table 4-56.

In addition, on-site soil quality measurement was conducted in factory compound by using on site soil survey instrument as shown in Figure 4-70 and measured temperature, pH and moisture are scrutinized with a guideline to soil pH by Food and Agriculture Organization of the United States (FAO) as mentioned in Table 4-54. The soil survey activities are shown in Figure 4-71.



Figure 4-70 4 in 1 Soil Survey Instrument



Figure 4-71 Soil Sampling Photos



Figure 4-72 Location Map of Soil Quality Measurement

Table 4-53 Soil Measurement Points

No	GPS Coordinates	Measurement Location
1	21°17'55.74"N 95°10'28.29"E	Wastewater final discharge point
2	21°17'53.52"N 95°10'26.99"E	Discharge point at near preliminary tank

Table 4-54 Standard Guideline for Soil Quality Measurement

No	Standard Range	Guideline Description (FAO*)
1	> 8.5	Alkaline soils
2	7.2 – 8.5	Neutral soils to Alkaline
3	5.5 – 7.2	Acid to neutral soils
4	4.5 – 5.5	Very Acid Soils
5	< 4.5	Extremely Acidic

*FAO= Food and Agriculture Organization of the United Nations

4.4.10.2. Result of the Study

Soil pH is important because the acidity or alkalinity of the soil determines the availability of the nutrients to plant roots. When the soil is too acidic or too alkaline, plant nutrients cannot be dissolved in the soil. The Soil pH level that allows for a wider nutrient availability to crops is in the 5.5 to 7.5 range. The soil reaction is usually acid to neutral soil reaction which occur near the river plains with occasional tidal floods are non-carbonate. They are suitable for plantation crops.

Cation exchange capacity (CEC) refers to the total capacity of soil to hold, absorb and exchange cations. The CEC of soils varies according the type of clay, soil pH and amount of organic matter. In this study, CEC varies from 14.26 meq/100g to 14.42 meq/100g. According to the result of the soil quality measurement, the pH is slightly alkaline and near neutral. The Soil pH level that allows for a wider nutrient availability to crops is in the 7 to 8 range. It is a well-drained luvisol. The subsoils are mildly saline, while the topsoil is moderately acidic and contain highly magnesium and calcium.

Table 4-55 On-Site Soil Quality Measurement Results

No	Sample	GPS Coordinates	Measurement Location	Result			Standard Guidelines (FAO)*
				pH	Temperature	Moisture	
1	Sample-1	21°17'55.74"N 95°10'28.29"E	Wastewater final discharge point	6.65	37	Dry (+)	Slightly Acidic
1	Sample-2	21°17'53.52"N 95°10'26.99"E	Discharge Point, Near preliminary	6.4	36	Dry (+)	Slightly Acidic

*FAO= Food and Agriculture Organization of the United States

Table 4-56 Laboratory Results of Soil Quality Monitoring

No	Sample	Soil Parameter	Result	Standard Guidelines for Soil pH (FAO)*	Organic Carbon	Remark Total N	Remark CEC	
1	Sample-1	Moisture (%)	0.63	-	-	-	-	
		pH (Soil: Water - 1:2.5)	7.2	Slightly Alkaline	-	-	-	
		Organic Carbon (%)	0.25	-	Very Low	-	-	
		Humus (%)	0.42	-	-	-	-	
		Total N (%)	0.108	-	-	Low	-	
		CEC (meq/100gm)	14.42	-	-	-	Medium	
		Exchangeable Cations (meq/100gm)	Ca ⁺⁺	6.85	-	-		-
			Mg ⁺⁺	6.85	-	-		-
			K ⁺	0.20	-	-		-
			Na ⁺	0.51	-	-		-
H ⁺	-		-	-	-			
Al ³⁺	-	-	-	-	-			
2	Sample-2	Moisture (%)	1.59	-	-	-	-	
		pH (Soil: Water - 1:2.5)	8.92	Slightly Alkaline	-	-	-	
		Organic Carbon (%)	0.28	-	Very Low	--	-	
		Humus (%)	0.48	-	-	-	-	

No	Sample	Soil Parameter	Result	Standard Guidelines for Soil pH (FAO)*	Organic Carbon	Remark Total N	Remark CEC
		Total N (%)	0.087	-	-	Very Low	-
		CEC (meq/100gm)	14.26	-	-	-	Medium
		Exchangeable Cations (meq/100gm)	Ca ⁺⁺	10.72	-	-	
			Mg ⁺⁺	2.68	-	-	
			K ⁺	0.09	-	-	
			Na ⁺	0.77	-	-	
			H ⁺	-	-	-	
			Al ³⁺	-	-	-	-

4.5. BIOLOGICAL COMPONENT

4.5.1. Introduction

This sector is the study of biodiversity of the proposed project area within 3 km with the sector of identifying the flora and fauna species, identification of IUCN Red List status, species diversity of avifauna, and seasonal occurrence of fauna species in the proposed project area, located in Thaungtha Township, Myingyan District. When studying the flora species, desktop survey, and ground census data were collected and analyze to identify the vegetation cover, vegetation type and flora species of the proposed project area. Fauna species are studied on ground for dry seasons, and classification, identification of the collected fauna species and diversity of the bioindicator, avifauna are analyzed and depicted. The operation of the petroleum refinery processes in the proposed project area which might cause the impact on the exiting fauna and flora. In order to assess the significant impact, or conserve the exiting biodiversity status, biodiversity survey, analysis and assessment are conducted and results data are described in the following sector.

4.5.2. Objective

The following relevant ecological and biodiversity concerns were investigated using an on-site field survey, data analysis, and desktop evaluation to provide trustworthy information and proof for the field survey findings:

- To describe the biological components according to the EIA procedure paragraph 63, Section 5.6, descriptions and maps on fauna and flora, including abundance, spatial distribution of rare, endangered, and vulnerable species, species of economic and

health/nutritional value, and maps and descriptions of valued or sensitive environmental areas and habitats.

- To identify and characterize the biodiversity and ecological aspects of proposed project area.
- To identify about the flora and fauna of the proposed project and its surrounding area, located in the Taungtha Township, Myingyan District.
- To identify of all fauna and flora species with IUCN red list that could exist present on the study area.
- To identify of places with protected biodiversity within a 5-kilometer range of the proposed project (to indicate the status of the protected biodiversity sites (i.e., whether they are protected globally, nationally, or regionally)
- To identify of unprotected areas around the site that will be vulnerable/sensitive to the proposed project (for example, watercourses and wetland habitats)
- To study the vegetation types and habitats of the study area.
- To assess the biodiversity impact evaluation on the study area's flora and fauna.
- To investigate the variety, richness, occurrence, habitat types, and species composition of the study's flora and fauna.

4.5.3. Flora

4.5.3.1. Literature Review

In Myanmar, about 7000 species of vascular plants exist and about 1696 species of climbers, 65 species of rattan, 841 species of orchids and 85 species of trees (premium quality timber) comprises. For animals, more than 25,000 species in total and about 300 species of mammals, 360 species of reptiles and 1000 species of birds can be found (FAO, 1985).

Trees species that grow in the Dry Zone are mainly of the dry forest type, with the predominance of the thorny species. There are also isolated areas of the Dry Upper Mixed Deciduous Forest type, mostly on the hills where the forests have not degraded so severely. There are also belts of Lower Mixed and Moist Upper Mixed Deciduous forests on the fringe areas, especially to the west and the northwest. The prominent tree species that grow naturally in the Dry Zone are: *Chukrasia tabularis*, *Homalium longifolium*, *Azadirachta indica*, *Cassia siamca*, *Tamarindus indica*, *Acacia leucophloea*, *Acacia catechu*, *Acacia arabica*, *Albizzia procera*, *Albizzia lebbek*, *Albizzia chinensis*, *Zizyphus jujuba*, *Terminalia oliveri* etc. *Pterocarpus macrocarpus* grows mainly in the fringe of Lower Mixed Deciduous forests but several locations 4 can be found within the Dry Zone proper where they grow relatively well. *Tectona grandis* (Teak) is widespread but the development of the trees and quality of timber does not measure up to those that grow in the moister areas (Tun, Jan,2000).

The dry zone of Myanmar lies in the central portion of the country astride the mighty Ayeyarwady River, between latitudes 19° 20' to 22° 50' and longitudes 93° 40' to 96°30'. Incorporating 57 townships in Sagaing, Mandalay, Naypyitaw and Magway Divisions, the dry zone covers a total area of 33,680 sq-miles (Tun, Jan,2000). Most of the

land in dry zone is flat and undulating, making it suitable for extensive agriculture. The fact that ancient civilizations thrived on these plains, can perhaps, be taken as an indication that the region's soil once was productive. Major soil types are sandy loam and loamy sand with most of the land covered with a yellowish and brownish colored crushed sandstone. Hard clay slate can be found in some areas, whereas areas adjacent to Mount Popa are covered with volcanic lava that is more productive (Tun, Jan,2000).

The Rangoon-based Biodiversity and Nature Conservation Association (BANCA) alerts that Myanmar is meeting a deforestation crisis because of natural disasters (tsunamis, floods, drought and fires), human activities (logging, slash-and-burn agriculture, cutting trees for fuel, mining operations, dam building, clearing land for livestock grazing and oil extraction) and over population. If deforestation cannot be controlled by government, the result could be very disastrous. It has negative impacts on environmental degradation and direct biodiversity loss (Anon., 2015). All reserved forest and forest land have converted into farm for people from country site in past. Over 50 million of people did Taung-ya encroachment.

4.5.3.1.1 Vegetation Type

The reserved forest coverage of Taungtha Township, situated in the northernmost part of it is 10911 acres and of protected public forest is 1318 acres. The growing vegetations in the reserved forest and protected public forest are *Acacia arabica* (Subyu), *Acacia catechu* (Sha), *Acacia chundra* (Gandaya), *Acacia leucophloea* (Tanaung), *Tectona hamiltoniana* (Dahat), and *Terminalia oliveri* (Than).

Currently, forest cover is 3.38% in Taungtha Township. The following is the list of forest land in Taungtha Township shown in Table Table 4-57.

Table 4-57 Vegetation Coverage of the Taungtha Township

No	Type	Area (Acres)	Vegetation
1	Reserved Forest	10,911	<i>Acacia arabica</i> (Subyu) <i>Acacia catechu</i> (Sha) <i>Acacia chundra</i> (Gandaya) <i>Acacia leucophloea</i> (Tanaung) <i>Tectona hamiltoniana</i> (Dahat) <i>Terminalia oliveri</i> (Than)
2	Protected Public Forest	1,318	<i>Acacia arabica</i> (Subyu) <i>Acacia catechu</i> (Sha) <i>Acacia chundra</i> (Gandaya) <i>Acacia leucophloea</i> (Tanaung) <i>Tectona hamiltoniana</i> (Dahat) <i>Terminalia oliveri</i> (Than)

(Source: Regional Data, Administrative Department, TaungthaTownship, Mandalay Region, September 30, 2020)

Arid and semi-arid regions of Myanmar can be found in the central part of the country and are collectively known as Dry Zone of Central Myanmar. The original vegetation of central dry zone is described as Savannah woodland. This consisted of short deciduous trees often widely spaced and a ground flora composed of different species of grasses. As a result of long settlement, over population, annual and periodic fires and other human activities very little of the original natural vegetation remains and a degraded form of tree Savannah is what now exists in many places.

The prominent tree species that grow naturally in the Dry Zone are : *Acacia arabica* (Subyu), *Acacia catechu* (Sha), *Acacia leucophloea* (Tanaung), *Albizia chinensis* (Bonmeza), *Albizia lebbek* (Anya-koko), *Albizia procera* (Sit), *Azadirachta indica* (Tama), *Bauhinia monandra* (Swedaw), *Caesalpinia pulcherrina* (Seinban-gale), *Cassia fistula* (Ngu-shwe), *Cassia siamea* (Mezali), *Chukrasia tabularis* (Yinma), *Delonix regia* (Seinban), *Erythrina arborescens* (Kathit), *Ficus* spp., *Hesperethusa crenulate* (Thanaka), *Homalium longifolium* (Pyauk-seik), *Santalum album* (Santagu), *Syzygium lineatum* (Tha-bye), *Tamarindus indica* (Ma-gyi), *Tectona hamiltoniana* (Dahat), *Terminalia oliveri* (Than), *Zizyphus jujuba* (Ze), etc. (Win & Kaung, Jan, 2005)

4.5.3.1.1.1 Method and Methodology

We used direct measurement and square design method in the field. Each plot is selected as randomly and each side of the square is 15m long and. And then we have collected 18 sample plots. The location of collected sample plots and field measurement action photos are shown in Figure 4-73 and Figure 4-74.

Information about land use collected from secondary sources in combination with ground truth surveys. The survey helps to verify and fill gaps of the secondary information. The biodiversity land use and sample plot are investigated and collected within 1 km radius from the project area. It was investigated to know the different types of land surrounding the project area. Garmin GPSMAP78s was used to mark the way points of the collected sample plots. The points and data acquired from the GPS was analyzed and separated dependence on the types of each land use. We collected trees and measured the diameters of the trees that equal and greater than 5 cm. Moreover, we collected shrubs, herbs, and natural vegetations in the sample plots. The following variables and methods are used to identify, classify and analyze the collected floral species.

Variables

- Name
- Diameter at breast-height
- Height
- Basal area
- Dominant species
- Species richness

Materials

We collected the data by using these instruments.

Instruments which we used are –

- Diameter tape
- Camera
- Compass
- Plastic rope
- Binocular and
- GPS

Data Analysis

Since the study area has dry zone climate, the plants species which can grow in dry region are abundant, and unlike any other location, there are less undergrowth. As a consequence of this ecological context, the assessment of Important Value Index (IVI) and diversity will be specifically directed towards the analysis of tree species. This approach allows for a focused examination of the ecological system within the study area, highlighting the dominance and significance of tree species, while simultaneously presenting a comprehensive dataset that encapsulates the broader botanical diversity present across different habits. Data analysis and description of the collected for the various habits will be described in the following Table 4-58.

Table 4-58 Data Analysis Description for Various Habitats.

Habits Types	Data Analysis and Description
Tree Species	Species Composition Relative Frequency Relative Abundance Relative Dominance Shannon Diversity Index Simpson Diversity Index IUCN Red List Status
Shrubs, Climbers, and Herbs	Species Composition IUCN Red List Status

Basal area

Basal area is importantly used for calculation of volume of a tree.

$$\text{Basal area} = \pi d^2 / 4$$

Importance Value Index (IVI)

The importance value index is used as a tool to accurately indicate and identify the important species in a community. The importance value index (IVI) measures how dominant a species is in a given forest area. The importance value index (IVI) of tree species was determined as the sum of relative frequency, relative density, and relative dominance. Each of these values is expressed as a percent and ranges from 0 to 100.

IVI=Relative frequency+ Relative abundance + Relative dominance

$$\text{Relative Frequency (RF)} = \frac{\text{No. of occurrence of the species}}{\text{No. of occurrences of all the species}} \times 100$$

$$\text{Relative Abundance} = \frac{\text{No. of individuals per species}}{\text{Total number of individuals}} \times 100$$

$$\text{Relative Dominance (Rd)} = \frac{\text{Basal area of a species}}{\text{Basal area of all species}} \times 100$$

Shannon Diversity Index

The Shannon diversity index is sensitive to rare species. A plant community is said to be diverse when the number of species and the proportion of individual occurrence are nearly equal.

$$H' = - \sum p_i \ln p_i$$

Where, p_i = proportional abundance of i^{th} species

$$P_i = \frac{n_i}{N}$$

Where, n_i = the number of individuals of i^{th} species

N=the total number of individuals

Simpson Diversity Index

Simpson's index is heavily weighted towards the most abundant species in the sample.

$$D = 1 - \sum \left[\frac{n_i(n_i-1)}{N(N-1)} \right]$$

Where, n_i = the number of individuals in the species

N= the total number of individuals



Measuring GBH of the trees



Studying the Floral Species

Figure 4-73 Field Survey Measurements for Floral Species

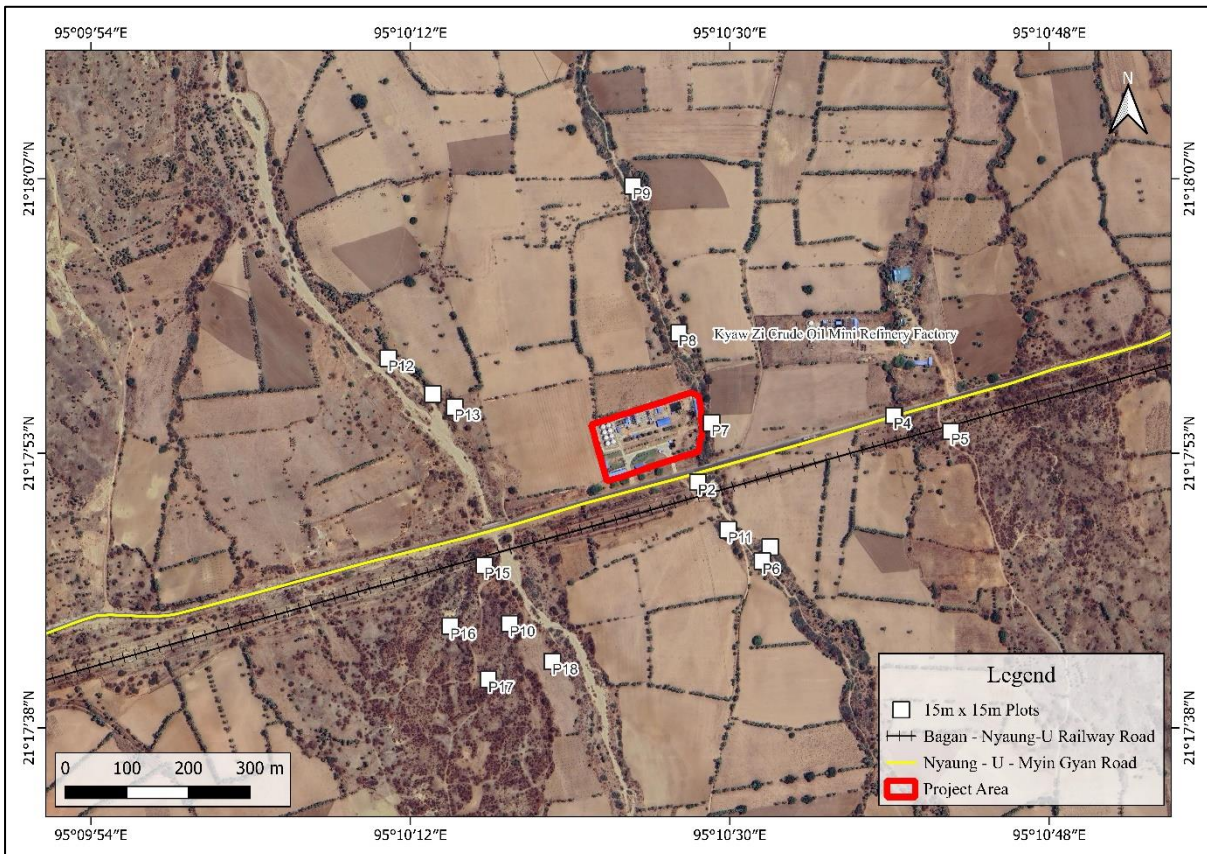


Figure 4-74 Location of the Collected Sample Plots

4.5.3.1.1.2 Field Survey Results

4.5.3.1.1.3 Species Composition

The species composition was analyzed based on all plant species (trees, herbs and shrubs) collected in the sample plots. Based on the field survey, a total of (31) species distributed under (29) genera, (19) families and (14) orders have been identified. These species are categorized into different types, including trees, shrubs, herbs, and climbers/creepers. In terms of trees, a total of (18) distinct species were documented. Shrub species were represented by (7) different types. Additionally, (4) species of herbs and (2) species of climbers/creepers are identified and the results are shown in Figure 4-76.

The highest composition of species was recorded in Order Fabales (29%) followed by order Rosales (13%), Lamiales with 10%, Brassicales, Malpighiales, Solanales and Sapindales (each with 6%), Arecales, Cucurbitales, Magnoliales, Malvales, Myrtales, Violales, Zygophyllales (each with 3%), which are shown in Figure 4-75 and Table 4-59.

Table 4-59 Total number species in family, genus, species and composition of the recorded tree species

No	Order	Family	Genus	Species
1	Arecales	1	1	1
2	Brassicales	2	2	2
3	Cucurbitales	1	1	1
4	Fabales	1	7	9
5	Lamiales	2	3	3
6	Magnoliales	1	1	1
7	Malpighiales	1	1	1
8	Malvales	1	1	1
9	Myrtales	1	1	1
10	Rosales	3	4	4
11	Sapindales	2	2	2
12	Solanales	1	2	2
13	Violales	1	1	1
14	Zygophyllales	1	1	1
Total		19	29	31

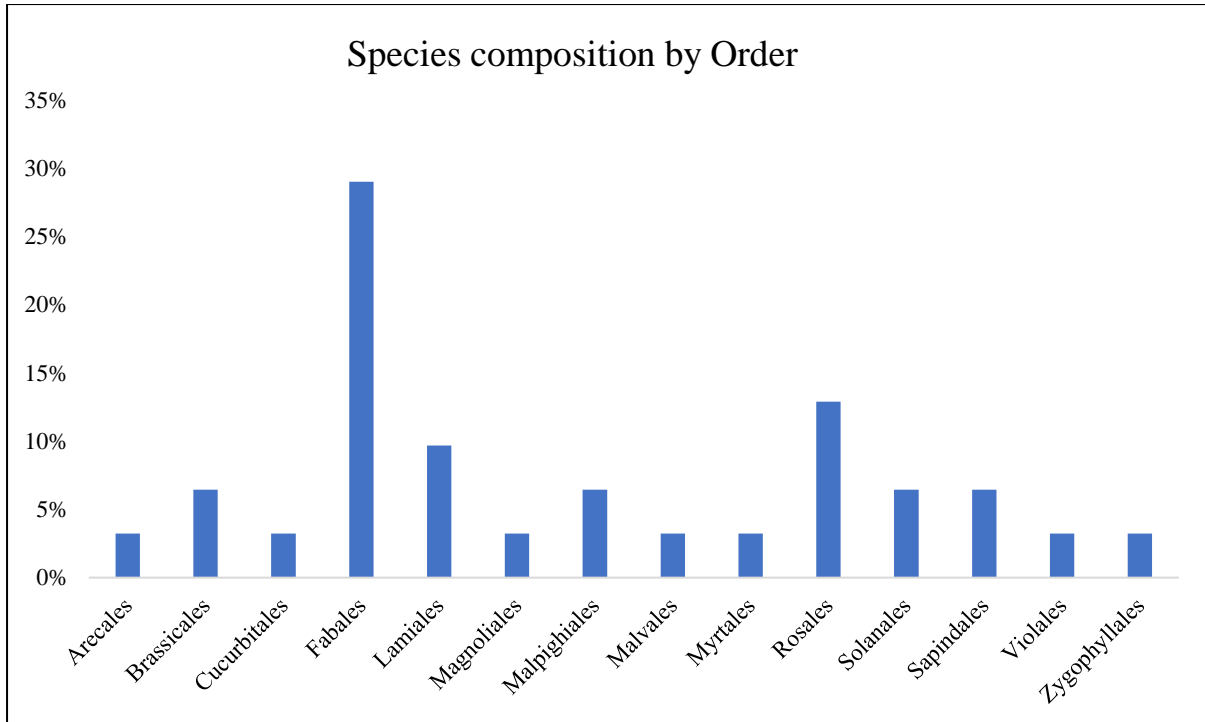


Figure 4-75 Species Composition of the Collected Floral Species

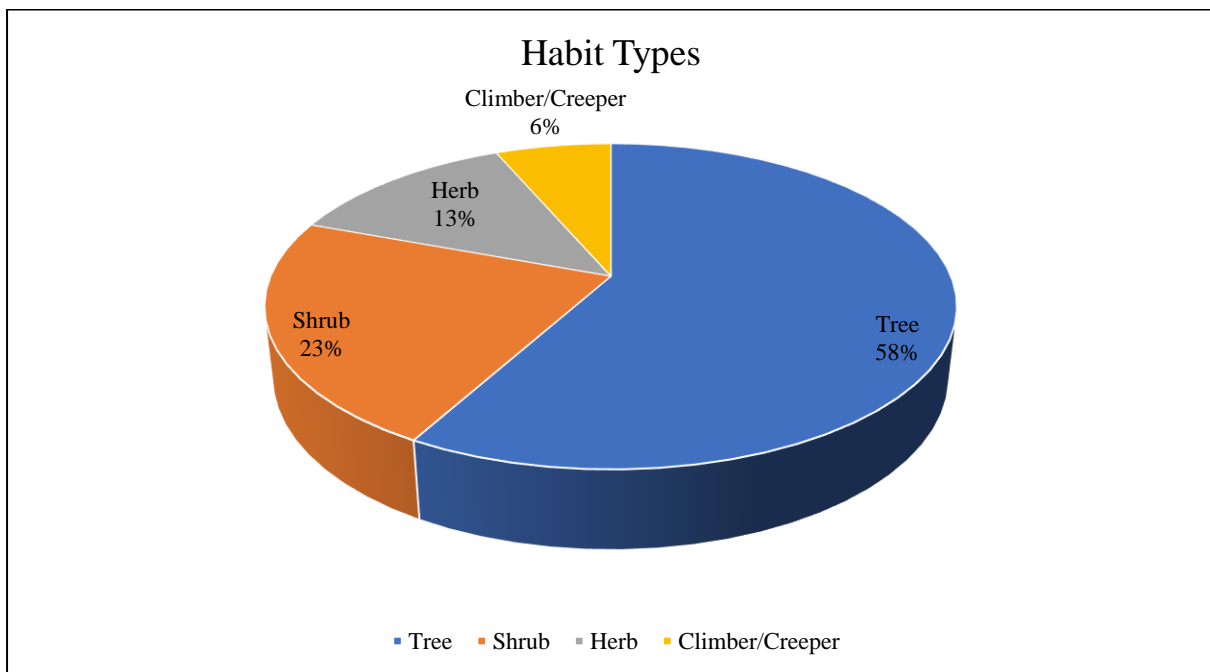


Figure 4-76 Habit Types of the Collected Species

According to the results, Order Fabales is the most common species order in the study area. The order Fabales is frequently observed in the central dry zone of Myanmar due to its well-adapted characteristics to the prevailing environmental conditions in that region. One of the primary reasons for the presence of Fabales in this area is their ability to efficiently fix atmospheric nitrogen through a symbiotic relationship with nitrogen-fixing bacteria. This nitrogen-fixation process provides a crucial nutrient source for these plants in

nutrient-poor soils, which are common in arid regions. Moreover, Fabales (*Senegalia catechu*, *S. chundra*, *S. pennata*, *Dalbergia paniculate*, *Albiza lebbek*, and *Tamarindus indica*) have drought-resistant features, such as deep root systems that allow them to access water stored in deeper soil layers. This adaptability to limited water availability is a key factor in their successful establishment and growth in the central dry zone. Overall, the combination of nitrogen-fixation abilities, drought resistance, and nutrient-efficient strategies has favored the prevalence of Fabales in the central dry zone of Myanmar.

Order Rosales, the second abundant species in the study area. Species like *Ficus*, *Celtis*, and *Ziziphus* in the Order Rosales have the adaptations to survive in arid conditions and which are also capable of Nitrogen-Fixing abilities.

4.5.3.1.1.4 Relative frequency

Frequency is the occurrence or absence of a given species in a sample plot. We calculated frequencies of the tree species in the sample plots in order to give an approximate indication of the homogeneity of a stand. The result of relative frequency is shown in Figure 4-77.

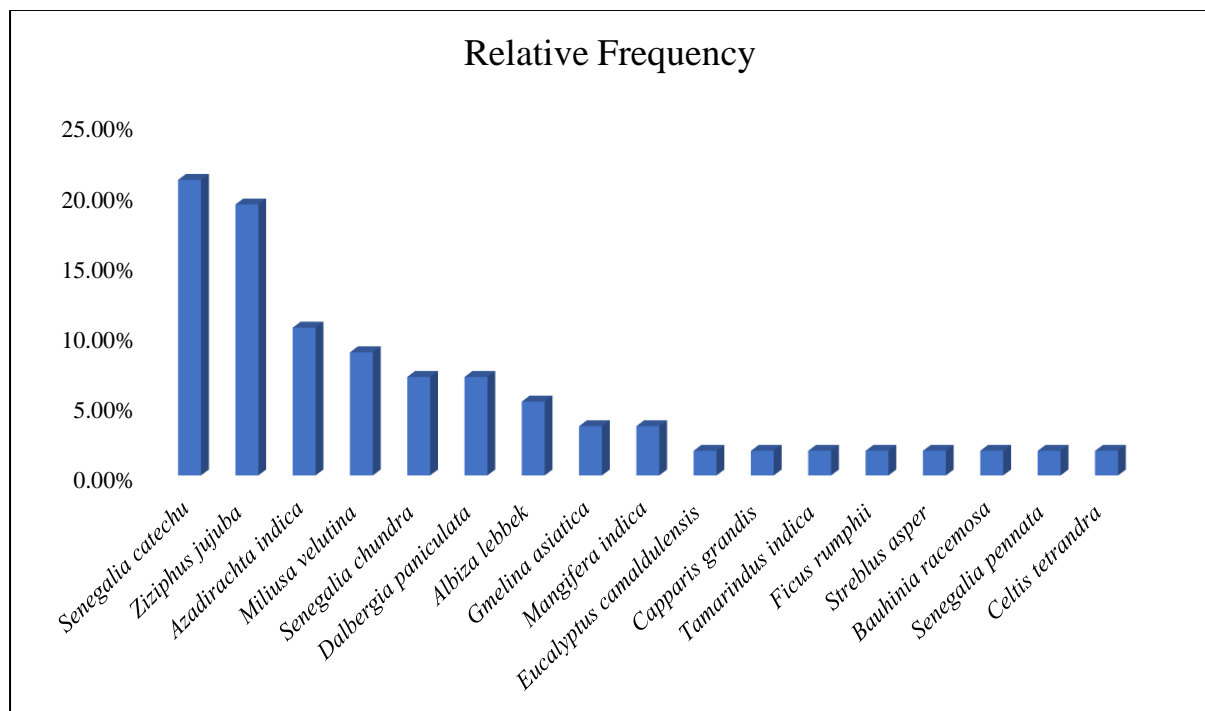


Figure 4-77 Relative Frequency of Tree Species

The findings of the study reveal that Sha (*Senegalia catechu*) and Zi (*Ziziphus jujube*) are the predominant species across the majority of plots within the study area. This dominance can be attributed to their status as most common species, coupled with their remarkable ability to withstand drought conditions and limited rainfall. Their natural resilience has allowed them to flourish even in environments where other species may

struggle to survive. This capacity for successful growth under adverse conditions underscores their suitability for the local habitat.

In conclusion, the prevalence of *S. catechu* and *Z. jujuba* as the most common species in the study area is a result of their native status within the dry deciduous forest ecosystem. Their capacity to thrive under the arid conditions and circumstances has enabled them to establish a strong presence and contribute significantly to the ecological system of the region.

4.5.3.1.1.5 Relative abundance

In this study, the abundance values represent the stem number of tree species in the study area. The relative abundance can be calculated as percentage of the total stem number. The result is shown in Figure 4-78.

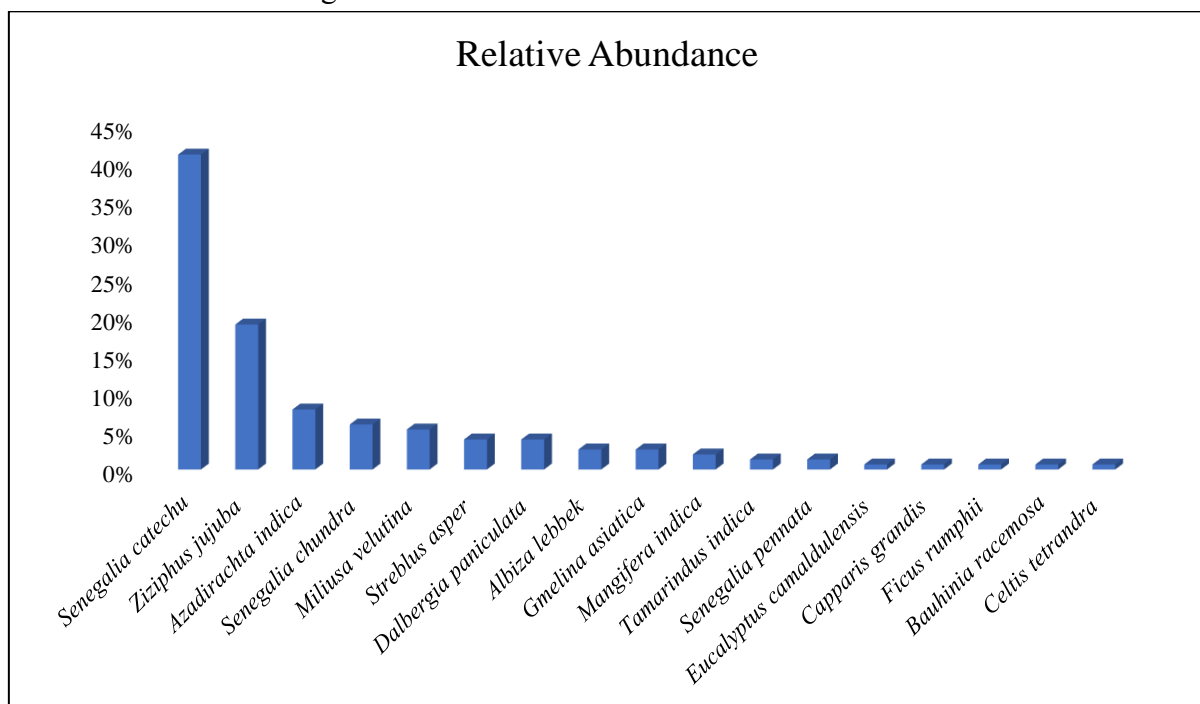


Figure 4-78 Relative Abundance of Tree Species

According to the results, *S. catechu* and *Z. jujuba* species hold the highest abundance in this study area. The dry zone's environment plays a vital role in controlling the dominance of Sha and Zi species. These plants have naturally adapted to thrive under the conditions in this region, which typically include arid climate and drought. As a result, these species are adapted to extract necessary nutrients and moisture from the soil, enabling them to flourish and regenerate. In summary, the study results highlighted *S. catechu*, *Z. jujuba*, *Azadirachta indica* species as the most abundance in the study area due to their ability to thrive within the environment of the dry zone, as well as they are also the common tree species of the dry zone of Central Myanmar.

4.5.3.1.1.6 Relative dominance

Dominance is the degree of coverage of a species as an expression of the space it occupies. Relative dominance is calculated as the percentage of tree species of the total measured stem basal area in the collected sample plots.

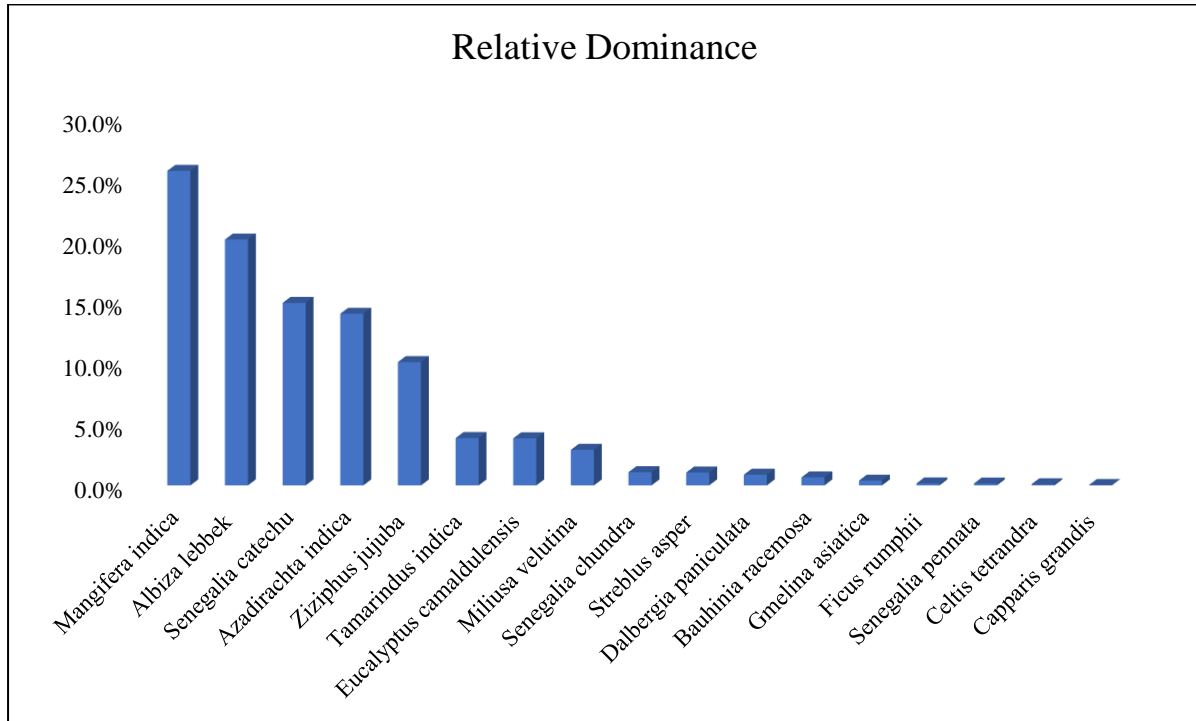


Figure 4-79 Relative Dominance of Tree Species

Based on the findings of the study, Thayet (*Mangifera indica*) and Anya Koko (*Albizia lebbek*) emerge as the dominance species within the study area. Despite their relatively less frequent occurrence, their significant basal area as tree species establishes their dominant presence within the sample plots. This dominance is attributed to specific factors associated with their characteristics and utilization.

Notably, both Thayet and Anya Koko species exhibit substantial basal areas as a result of big tree. In the local, a distinctive feature that contributes to the dominance of Thayet and Anya Koko is their utilization primarily as food, fodder and shade tree in dry regions, rather than timber for construction or other purposes. To summarize, Thayet (*M. indica*) and Anya Koko (*A. lebbek*) constitute a dominant role within the study area due to their substantial basal areas as tree species.

4.5.3.1.1.7 Importance Value Index (IVI)

Importance Value Index (IVI) provides a way to evaluate the significance of individual plant species in a community and understand their impact on the overall structure and dynamics of that community. To identify key species that play vital roles in the study area, the IVI of the individual species are analyzed and shown in Figure 4-80.

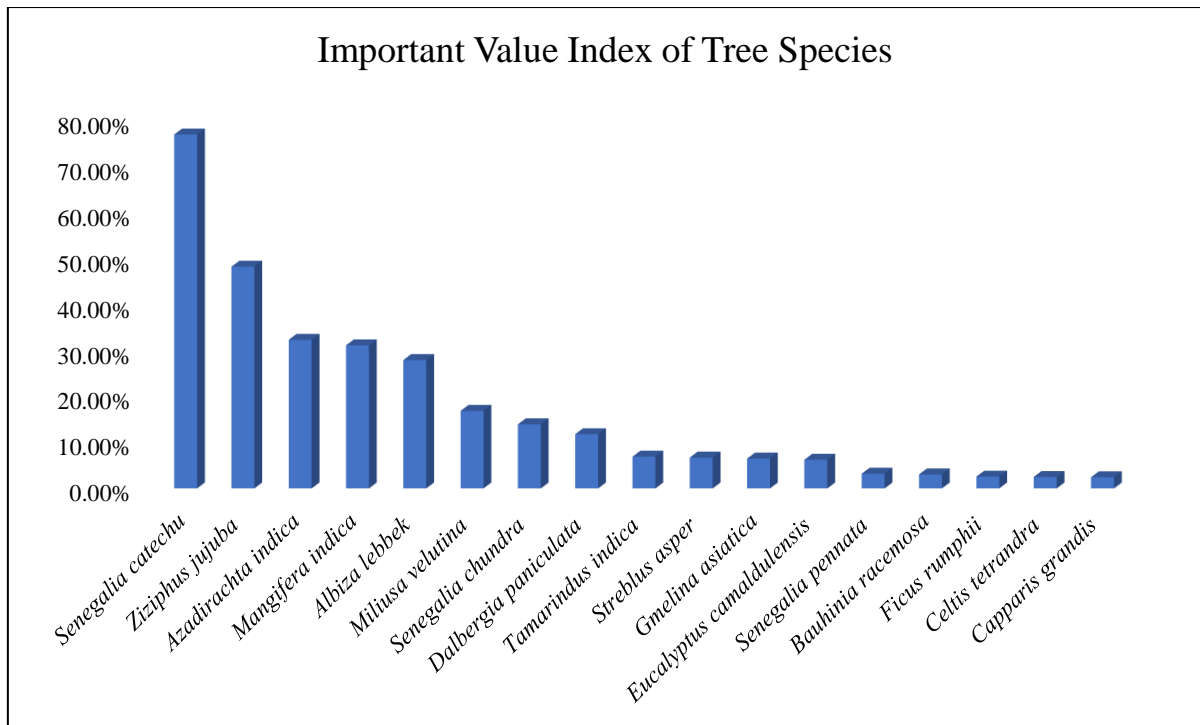


Figure 4-80 Importance Value Index of Tree Species

IVI allows to identify the ecological roles of floral species, if the species is indicator for the environmental conditions or species that contribute significantly to overall diversity. Additionally, IVI aids in monitoring changes in forest community composition over time and in making management decisions for environmental conservation efforts.

Based on the Importance Value Index (IVI) results, specific plant species, Sha (*Senegalia catechu* Wild.) and Zi (*Ziziphus jujuba* Mill.) have emerged as the most important and dominant species within the ecosystem. This implies that they exhibit high abundance, are frequently present in the surveyed plots. It's likely that these species play crucial roles in the ecosystem's functions and interactions.

Khaung lay (*Capparis grandis* L.f.), on the other hand, has been identified as a rare species based on the IVI results. It had lower abundance, less frequent occurrence in the surveyed plots, and a relatively smaller contribution to the overall dominance.

The dominance of certain species like Sha and Zi suggests their significance in the ecological balance, while the rarity of Khaung lay highlights its distinctive nature within the community.

4.5.3.1.1.8 Simpson Diversity Index

In this study, the assessment of biodiversity was facilitated through the utilization of the Simpson Diversity Index, ranging between 0 and 1, the index value offers valuable insights into the composition and dominance of species within the examined community. As the Simpson Diversity Index value escalates, it signifies an augmentation in the presence of common species. This is in alignment with the interpretation that a value of 0 indicates the existence of numerous rare species within the community, whereas a value of 1 signifies the

dominance of common species. The result of Simpson Diversity Index is shown in Table 4-60.

Table 4-60 Results of Simpson Diversity Index for Tree Species

Species	Simpson Diversity Index
<i>Senegalia catechu</i>	0.167957
<i>Ziziphus jujuba</i>	0.034916
<i>Azadirachta indica</i>	0.005676
<i>Senegalia chundra</i>	0.003096
<i>Miliusa velutina</i>	0.002408
<i>Streblus asper</i>	0.001290
<i>Dalbergia paniculata</i>	0.001290
<i>Albiza lebbek</i>	0.000516
<i>Gmelina asiatica</i>	0.000516
<i>Mangifera indica</i>	0.000258
<i>Tamarindus indica</i>	0.000086
<i>Senegalia pennata</i>	0.000086
<i>Eucalyptus camaldulensis</i>	0.000000
<i>Capparis grandis</i>	0.000000
<i>Ficus rumphii</i>	0.000000
<i>Bauhinia racemosa</i>	0.000000
<i>Celtis tetrandra</i>	0.000000
Total	0.218094
1-D	0.781906

Analyzing the results of investigation, the calculated Simpson Diversity Index value was determined to be 0.781906, thereby indicating a medium level of diversity within the assessed area. This finding showed a balanced distribution of dominant and less dominant species.

Notably, among the species encountered, Sha (*Senegalia catechu* Wild.) and Zi (*Ziziphus jujuba* Mill.) exhibited the highest Simpson Diversity Index values of 0.167957 and 0.034916, respectively. These values showed their relatively even distribution and dominance within the ecosystem. Contrastingly, species such as *Eucalyptus camaldulensis*, *Capparis grandis*, *Ficus rumphii*, *Bauhinia racemose* and *Celtis tetrandra* showed the lowest values of diversity.

4.5.3.1.1.9 Shannon Diversity Index

In the context of assessing species diversity within a specific community, the Shannon Diversity Index (H) emerges as a pivotal metric. The higher the index values, where

a higher H value corresponds to an increased richness and diversity of species within the community. Conversely, a lower H value is indicative of reduced diversity. Remarkably, an H value of 0 represents a community that exclusively comprises a singular species. The results of the Shannon Diversity Index are shown in Table 4-61.

Table 4-61 Results of Shannon Diversity Index for Tree Species







Species	Shannon Diversity Index
<i>Eucalyptus camaldulensis</i>	-0.032879
<i>Capparis grandis</i>	-0.032879
<i>Ficus rumphii</i>	-0.032879
<i>Bauhinia racemosa</i>	-0.032879
<i>Celtis tetrandra</i>	-0.032879
<i>Tamarindus indica</i>	-0.056697
<i>Senegalia pennata</i>	-0.056697
<i>Mangifera indica</i>	-0.077095
<i>Albiza lebbek</i>	-0.095272
<i>Gmelina asiatica</i>	-0.095272
<i>Streblus asper</i>	-0.127007
<i>Dalbergia paniculata</i>	-0.127007
<i>Miliusa velutina</i>	-0.154300
<i>Senegalia chundra</i>	-0.166660
<i>Azadirachta indica</i>	-0.199650
<i>Ziziphus jujuba</i>	-0.315236
<i>Senegalia catechu</i>	-0.365360
	-2.000644
	2.000644

The Shannon Diversity Index values are typically observed to fall within the range of 1.5 to 3.5. In our study, the calculated Shannon diversity index value is 2.000644, signifying a medium range of diversity within the surveyed area.

Intriguingly, among the observed species, *Eucalyptus camaldulensis*, *Capparis grandis*, *Ficus rumphii*, *Bauhinia racemosa*, and *Celtis tetrandra* were identified as rare species within the studied region. Their scarcity emphasizes their limited presence and contribution to the overall diversity of the community. In contrast, Sha (*Senegalia catechu*) and Zi (*Ziziphus jujuba* Mill.) stand out as abundant species within the ecosystem, exerting a notable influence on the diversity dynamics of the study area.

4.5.3.1.1.10 Photos of Recorded Species and Vegetation Areas

In this study, a comprehensive documentation of the study area's flora has been undertaken using Camera. The visual representations, as depicted in the figures, not only serve to provide a vivid record of the botanical composition within the study area but also contribute to vegetation types of the study area. The photos of recorded species are shown in Figure 4-81.

	
<p>A Community of Most Common Species, Sha (<i>Senegalia catechu</i>)</p>	<p>A Community of <i>Vitex trifolia</i> L. (Kyaungpankalay)</p>
	
	
<p>Vegetation type found near the proposed project area</p>	



Htan
Borassus flabellifer L.



Tapauk
Dalbergia paniculata Roxb.



Gandaya
Acacia chundra Willd.



Anya koko
Albizia lebbek (L.) Benth.











Sha
Senegalia catechu Wild.











Palan
Bauhinia racemosa Lam.



Gmelina asiatica L.

	
<p>Suyit <i>Acacia pennata</i> (L.) Willd.</p>	<p>Leik-su-ywe <i>Barleria prionitis</i> L.</p>
	
<p>Gant-galar /Hin galar <i>cleome gynandra</i> L.</p>	<p>Me- yaing <i>Tephrosia purpurea</i> Pers.</p>
	
<p>Eu-ca-lit <i>Eucalyptus camaldulensis</i> Dehnh.</p>	
	
<p>Zi <i>Ziziphus jujuba</i> Mill.</p>	<p>Tama <i>Azadirachta indica</i> A.juss</p>

	
<p>Thayet <i>Mangifera indica</i> L.</p>	<p>Kasit kha <i>Citrullus colocynthis</i> (L.) Schrad.</p>
	
<p>Mye-bok-hkayan <i>Solanum virginianum</i> L.</p>	<p>Tsu-lay <i>Tribulus terrestris</i> L.</p>
	
<p>Tama <i>Azadirachta indica</i> A.juss</p>	
	
<p>Thabut <i>Milium velutinum</i> (DC.) Hook.f. & Thomson</p>	<p>Kyetsu-kanako <i>Jatropha gossypifolia</i> L.</p>

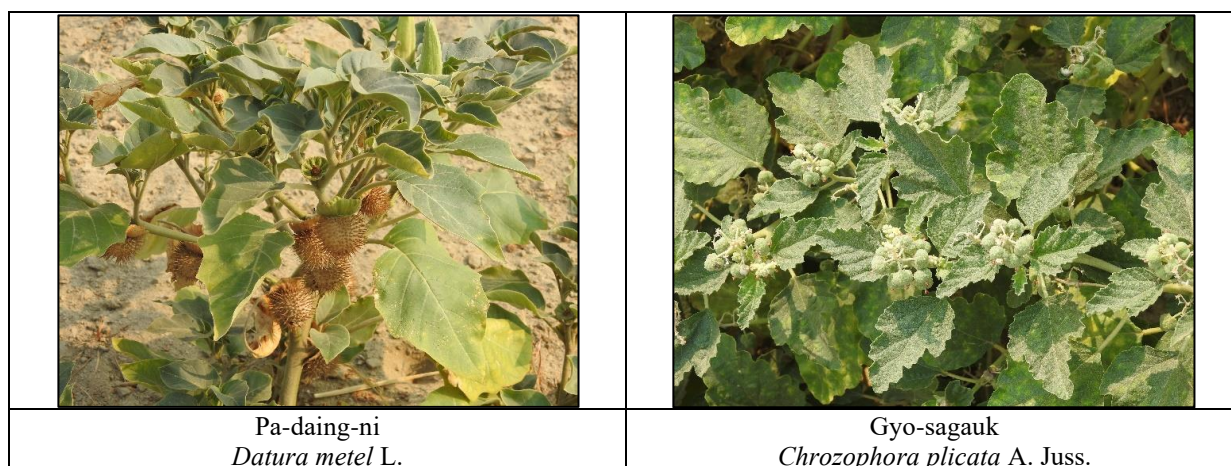


Figure 4-81 Photos of Recorded Species

4.5.3.1.1.11 IUCN Red List

The floral species which occur in this area that include in IUCN red list of tree species are described in the following Table 4-62.

Table 4-62 IUCN Red List of the Recorded Species

No.	Local name	Species	Habit	IUCN Red List
1	Htan	<i>Borassus flabellifer</i> L.	Tree	EN
2	Khaung Lay	<i>Capparis grandis</i> L.f.	Small tree	DD
3	Hin-Galar	<i>Cleome gynandra</i> L.	Herb	-
4	Taw-kinmon	<i>Cephalandra indica</i> Naud.	Climber/Creeper	-
5	Anya koko	<i>Albizia lebbek</i> (L.) Benth.	Tree	LC
6	Gandaya	<i>Senegalia chundra</i> (Roxb. ex Rottler) Maslin	Tree	LC
7	Magyi	<i>Tamarindus indica</i> L.	Tree	LC
8	Palan	<i>Bauhinia racemosa</i> Lam.	Small tree	LC
9	Sha	<i>Senegalia catechu</i> Wild.	Tree	LC
10	Suyit	<i>Senegalia pennata</i> (L.) Maslin	Tree	LC
11	Tapauk	<i>Dalbergia paniculata</i> Roxb.	Tree	LC
12	Me-yaing	<i>Tephrosia purpurea</i> Pers.	Shrub	-
13	Myay-pe	<i>Arachis hypogea</i> L.	Herb	-
14	Kyaungpankalay	<i>Vitex trifolia</i> L.	Shrub	-
15	-	<i>Gmelina asiatica</i> L.	Tree	LC
16	Late-su-shwe	<i>Barleria prionitis</i> L.	Shrub	LC
17	Thabutgyi	<i>Miliusa velutina</i> (DC.) Hook.f. & Thomson	Small Tree	-
18	Kyetsu-kanako	<i>Jatropha gossypifolia</i> L.	Shrub	LC
19	Wetchi-pane	<i>Urena lobata</i> L.	Shrub	LC
20	Eu-ca-lit	<i>Eucalyptus camaldulensis</i> Dehnh.	Tree	NT

No.	Local name	Species	Habit	IUCN Red List
21	Nyaung-phyu	<i>Ficus rumphii</i> Blume.	Tree	-
22	Okhne	<i>Streblus asper</i> Lour.	Small tree	LC
23	Thitpok	<i>Celtis tetrandra</i> Roxb.	Tree	LC
24	Zi	<i>Ziziphus jujuba</i> Mill.	Small tree	LC
25	Tama	<i>Azadirachta indica</i> A.juss	Tree	LC
26	Thayet	<i>Mangifera indica</i> L.	Tree	DD
27	Ka sit kha	<i>Citrullus colocynthis</i> (L.) Schrad.	Climber/Creeper	LC
28	Tsu-lay	<i>Tribulus terrestris</i> L.	Herb	LC
29	Mye-bok-hkayan	<i>Solanum virginianum</i> L.	Herb	-
30	Pa-daing	<i>Datura metel</i> L.	Shrub	-
31	Gyo-sagauk	<i>Chrozophora plicata</i> A. Juss.	Shrub	-

EN-Endangered species

NT-Nearly Threatened species

LC-Least Concern species

DD-Data Deficient

The categorization of species within the study area based on their conservation status, among the identified species, a total of 2 have been labeled as "Data Deficient." Concurrently, one species falls under the category of "Endangered," and conversely, a significant portion, comprising 17 species, has been classified as "Least Concern," indicating a relatively stable status within the study area. Furthermore, the assessment reveals one species categorized as "Nearly Threatened". Notably, 10 species are denoting "Not Applicable" on the IUCN Red List Status.

As per the IUCN Red List assessment of tree species evaluated, it has been categorized that Htan (*Borassus flabellifer* L.) is classified as an endangered species. Similarly, Eu-ca-lit (*Eucalyptus camaldulensis* Dehnh.) has been categorized as a species that is nearly threatened. Tha-yet (*Mangifera indica* L.) and Khaung Lay (*Capparis grandis* L.f.), on the other hand, have been labeled as data deficient species. Among the assessed species, the remaining (17) species have been classified as Least Concern. This status suggests that their populations are relatively stable and not facing imminent threats of extinction. However, this does not imply that conservation efforts are unnecessary. Lastly, it's noteworthy that certain (10) species have not been included in the IUCN Red List assessment.

4.5.3.1.1.12 Medicinal and Economic Values

Most of the plant species have their own medicinal and economic values respectively. Floral species that occur in area we conducted also have medicinal and economic values.

Medicinal Value:

Numerous species in this region contribute to traditional medicinal practices. Their parts, such as leaves, bark, roots, and fruits, often contain bioactive compounds that have

therapeutic properties. The local communities have used these species to address various health concerns, ranging from digestive disorders to respiratory ailments as folk-medicine.

Economic Value:

Many of these species yield valuable resources that drive local economies and support livelihoods. Timber, for instance, is a fundamental resource extracted from trees for construction, furniture, and various wood-based uses. Additionally, certain species yield non-timber forest products such as resins, gums, fruits, and nuts, which are used in food, and crafts. The sustainable management and utilization of these resources contribute to rural economies and provide employment opportunities.

Furthermore, floral species also play a vital role in ecosystem services, contributing to soil stability, water regulation, carbon sequestration, and habitat provision for various wildlife. By preserving these species, we not only safeguard traditional knowledge and cultural practices but also contribute to the well-being of local communities and the broader environment.

Table 4-63 Medicinal Values of Floral Species

No	Local name	Species	Medicinal values
1	Htan	<i>Borassus flabellifer</i> L.	It has innumerable medicinal uses for all parts of the Palmyra palm. The plant is said to relieve biliousness, dysentery, and gonorrhoea. Young roots are diuretic and anthelmintic, and a decoction is given for certain respiratory diseases. The ash of the spadix is taken to relieve heart burn and enlarged spleen and liver. The bark decoction with salt is used as mouth wash, and charcoal made of the bark serves as a dentifrice. Sap from the flower stalk is prized as tonic, diuretic, stimulants, laxative and anti-phlegmatic, and amebicide. Sugar made from this sap is used to counteract poisoning and it is remedy for coughs and various pulmonary complaint. Fresh toddy heated to promote fermentation, is bandaged on to all kinds of ulcers. The pulp of the mature fruit relieves dermatitis.
2	Khaung Lay	<i>Capparis grandis</i> L.f.	Leaf: swelling; eruption Bark: swelling; eruption. Capparis species, as a large spontaneous plant, has a wide range of applications in traditional medicine. To treat rheumatism, madness, snakebite, chest pain, jaundice, malaria, headache, coughs, pneumonia, constipation, infertility, and to prevent abortions. Fresh leaves are cooked and eaten as vegetable soup to treat skin eruptions. Fresh leaves are crushed and the pulp is applied to insect bites.
3	Hin-Galar	<i>Cleome gynandra</i> L.	Leaf: Rubefacient and vesicant. Seed: Febrifuge. In The whole plant is used for scorpion sting; the leaf for rheumatism, neuralgia, stiff neck, diseases of the ear, pyorrhoea, skin diseases, also vermifuge; the seed is used for cough; and an unspecified plant part is used for asthma and fever. The oil extracts therefore become valuable in cosmetic, flavoring, fragrance, perfumery, pesticide, and pharmaceutical industries
4	Taw-kinmon	<i>Cephalandra indica</i> Naud.	Whole plant: The liquid from the whole boiled plant is well-known as an effective expectorant. Fruit: The bitter fruit, known for cooling and laxative properties, is considered good for phlegm and bile. Leaf: The astringent and bitter leaves stimulate nerves and promote growth. The green leaves are stir-fried and eaten by diabetics. Leaves boiled with equal parts of coriander seeds are used in deworming preparations and as a laxative. They are also used in medicines to treat bile problems and lung ailments. The juice is applied frequently on cold sores to cure them. Fruit: Used to promote lactation in new mothers, to alleviate gas and blood diseases, and to treat asthma and bronchitis. Root: Can be used to

No	Local name	Species	Medicinal values
			reduce fever and to treat diarrhea.
5	Anya koko	<i>Albizia lebbek</i> (L.) Benth.	Used to treat dysentery and boils. Leaf and Seed: Used for ophthalmia. The bark is used for diarrhea and dysentery; the leaf for night blindness; the flower is put on boils, carbuncles, swellings; the seed is used for plies, diarrhea, and gonorrhea; and the root is placed on spongy, ulcerated gums. The bark and seeds are used to treat dysentery, diarrhea, and hemorrhoids; the flowers are emollient, and applied in poultices to boils
6	Gandaya	<i>Senegalia chundra</i> (Roxb. ex Rottler) Maslin	the bark is used to treat sores in the mouth, chest pain, strangulation of the intestine, and to facilitate childbirth. The heartwood is applied in a thick decoction for cancerous sores. The resin is used as a febrifuge, sialagogue, stimulant, styptic, antiphlogistic, astringent, corrective, and expectorant.
7	Magyi	<i>Tamarindus indica</i> L.	Root: Used in treating gonorrhoea, urinary diseases, hemorrhoids, jaundice, and shooting or dull pains in the stomach. Bark: The entire bark can be made into an ash and taken with water after meals to cure vomiting and gastric problems. The bark ash can be mixed with honey to cure shooting or dull stomach pains. Indigestion can be cured if the outer bark is baked until burnt, made into a powder, and taken with warm water. Applying a paste made from the bark with water will cure sore eyes, sores, and bites of venomous creatures. Leaf: The juice from the leaves can be cooked with sesame oil and a small amount applied into the ear to cure earaches.
8	Palan	<i>Bauhinia racemosa</i> Lam.	<i>B. racemosa</i> has been used for medicinal purposes since ancient times; hence, it has a long history with therapeutic purposes. Parts of this plant, such as whole, stem bark, leaves, and bark, are used for diabetes, stomach pain, piles, and intestinal ulcers by different ethnic groups. In addition, parts of the plant are documented as traditional medicines for dysentery, diarrhea, malaria, influenza, epilepsy, vomiting, edema, constipation, gastric, dyspepsia, and convalescents.
9	Sha	<i>Senegalia catechu</i> Wild.	Leaves, Bark and Heartwood. In a Study Pawar et -al explained a dentifrice herbal tooth powder which removed plaque, stain or patches and cleaned and polished tooth surfaces without any abrasive action. The powder of <i>Acacia catechu</i> was used to remove tarter, plaque and stain and in cleansing and polishing tooth surface without any abrasion action.

No	Local name	Species	Medicinal values
			Acacia catechu heartwood extract is found to be an effective antibacterial agent
10	Suyit	<i>Senegalia pennata</i> (L.) Maslin	Bark: Used to treat asthma and bronchitis. Mixed with other medicinal ingredients to neutralize snake venom. Leaf: Ingested to prevent formation of calluses and to control gas, as well as to treat indigestion and bleeding gums. Leaf and Root: Bitter and astringent, they are employed to correct irregularities in the blood, treat gas and bile problems, relieve coughs, stimulate appetite, and alleviate female disorders. Root: Made into a paste, together with the gall bladder of a python, and used to cure tongue sores or roughness. Also, an ingredient in medicines used to treat urinary disorders and enlargement of the testicles.
11	Tapauk	<i>Dalbergia paniculata</i> Roxb.	Bark is used in body pain, and whole plant is used in diarrhea, dyspepsia, leprosy and obesity. Whole plant is also used as stomachic, anthelmintic and bitter tonic.
12	Me-yaing	<i>Tephrosia purpurea</i> Pers.	The whole plant is used as a tonic for impotency and gonorrhea; a decoction, employed as a vermifuge, is made from the fruit. Oil obtained from the seeds is used for scabies, itch, eczema, and other skin diseases. The root is used for dyspepsia, diarrhea, rheumatism, fever, snakebite, asthma, urinary disorders, colic; also, as a liniment on elephantiasis. An unspecified plant part is used as a tonic, laxative, and diuretic; also, for bronchitis, febrile effects, bleeding piles, boils, and pimples
13	Myay-pe	<i>Arachis hypogea</i> L.	The fruit is used as an astringent (its oil is also astringent to the bowels), an aperient, and an emollient; also, unripe nuts are used for a lactagogue. The use of the seed for an oil aperient, emollient, and for gonorrhea (given in milk); applied externally for rheumatism; considered demulcent, pectoral, and peptic.
14	Kyaungpankalay	<i>Vitex trifolia</i> L.	Leaf: Used to treat skin infections, disorders of the spleen, and rheumatism. Also used in preparations to regulate menstruation and bowel function, stimulate healing of sores, control fevers, neutralize poisons, and promote vitality. The crushed leaf juice and stir-fried leaves are used to treat varicose veins and other circulatory conditions. The leaf juice is applied topically to heal chronic sores; mixed with a bit of sesame oil and honey, and swabbed

No	Local name	Species	Medicinal values
			inside the ear to alleviate earaches and to clear ear infection; taken by itself for skin conditions and together with the juice from ground roots of thet-yin-gyi (<i>Croton persimilis</i>) for bloating and edema. Water from boiling the leaves is ingested for weakness and weight loss, malaria, menstrual problems, and conditions related to birthing, as well as for coughs and colds in infants and young children. A salad of the leaves mixed with garlic is eaten to relieve bloating, indigestion, and dysentery. Pillows stuffed with the dried leaves are used for insomnia and brain conditions. Leaf and Flower: Used as febrifuge and emetic. Root: Ground, and a paste made from them is given to children for ingesting or inhaling to reduce fever and treat cooking fume-related sickness.
15	Late-su-shwe	<i>Barleria prionitis</i> L.	Bitter and astringent in taste, highly beneficial for skin and blood diseases. Whole plant: Crushed, cooked with sesame oil and applied to itches, ringworm and boils. Leaf: Used as diuretic in dropsy and as febrifuge. Stem and Leaf: Crushing the leaves together with the stems and branches, stewing them in a mixture of one part sesame oil to two parts water and straining the mixture provides an oil that can be applied to long-standing sores. Leaf: Made into an ash and taken with fermented rice washing water to bring down swelling from edemas and dropsy; mixed with butter and applied to longstanding sores, to help them heal quickly. Leaves boiled to make a strong tea, and the mixture held in the mouth to strengthen loose teeth. Juice from crushing leaves- applied to scorpion sting will neutralize the poison, also used to treat inflamed areas; mixed with either honey, sugar, or warm water and given to cure children with coughs, fever and bronchitis; also used to treat chronic cough.
16	Thabut	<i>Miliusa velutina</i> (DC.) Hook.f. & Thomson	Plant-derived natural products are being used in clinical practices for over the past couple of decades: for the treatment of inflammation and inflammation-induced cancers.
17	Kyetsu-kanako	<i>Jatropha gossypifolia</i> L.	Leaf: Used to treat skin diseases. Root: Used as a purgative. This species produces jatrophone, a macrocyclic diterpenoid with tumor inhibiting properties. A medicinal plant used throughout its range to treat fevers and has antibiotic properties. Leaves and roots are applied in traditional medicine against stomach-ache, abdominal pains, skin diseases.
18	Wetchi-pane	<i>Urena lobata</i> L.	Bark: Dried and powdered, combined in equal amounts with sugar, and taken with milk twice daily to increase virility and sperm production. Twig: Chewed for toothaches. Leaf: A

No	Local name	Species	Medicinal values
			mixture of the crushed leaves and black pepper is taken once each morning and each night to remedy weight loss and low energy or with equal amounts of black sesame seeds and cooked over a slow fire to make an ointment applied to reduce edema. Leaf, Root: Used as a diuretic and expectorant
19	Eu-ca-lit	<i>Eucalyptus camaldulensis</i> Dehnh.	Used for centuries as a traditional Aboriginal herbal remedy, eucalyptus leaves and their essential oils have found various applications in everyday life due to their antiseptic, anti-inflammatory and antipyretic properties. Its essential oils are reported to be anesthetic, antiseptic and astringent.
20	Nyaung-phyu	<i>Ficus rumphii</i> Blume.	Fruit: Used to reduce fever. Juice from the whole plant is used to kill worms; it also is taken internally with turmeric, pepper and ghee to treat asthma. Bark is used for snake bites.
21	Okhne	<i>Streblus asper</i> Lour.	The latex is employed for pneumonia, as astringent and antiseptic for curing sore heels, swellings, applied on temples as a sedative for neuralgia; the bark is used for diarrhea, slow pulse, gravel (with two other species), other urinary diseases, colic, menorrhagia, cholera (with one other species), and dysentery; the stem is used for toothache; the leaf as a galactagogue, poultice for swellings, and for eye diseases; the seed is used for piles, diarrhea, epistaxia, and locally on leucoderma; the root is used on ulcers, boils, and swellings, and for dysentery
22	Thitpok	<i>Celtis tetrandra</i> Roxb.	The juice from the seeds is used in the treatment of indigestion. Use as a folk medicine for the treatment of lumbago, gastric disease, abdominal pain, and urticarial eczema, among other diseases in eastern Asia.
23	Zi	<i>Ziziphus jujuba</i> Mill.	Bark: Used as a remedy for diarrhea. Leaf: Used for scorpion stings. Leaf, Fruit: Used as a laxative and blood purifier. Fruit: Considered to be pectoral. Root: Used for fever
24	Tama	<i>Azadirachta indica</i> A.juss	Whole plant: Bitter in taste, hot and sharp when digested, and with cooling properties, the flowers, sap, oil, bark, leaves, fruits, stems, and twigs are known to dispel gas, phlegm, and bile. Sap: Used in making tonics and digestives. The oil, which is applied topically for itching and rashes, is ingested for deworming. Gum: Used as a demulcent and tonic. Bark: Used as a tonic. Also, made into a paste and taken with salt to reduce fever. The inner bark is also made into a paste but applied topically to alleviate joint aches and pains. A decoction of the bark reduced to one-third its starting volume is used as a mouthwash to relieve

No	Local name	Species	Medicinal values
			toothaches. Leaf, Bark, and Oil: Used in treatment of skin diseases; also, as a tonic, anthelmintic, and insecticide. Leaf: Crushed leaves are made into a poultice applied as a remedy for scabies and boils. A decoction of the leaves is used as a wash to alleviate rashes, itching, and bumps on the skin.
25	Thayet	<i>Mangifera indica</i> L.	Bark: Used as an astringent. Fruit: Ripe fruit used as laxative and rind used as tonic. Seed: Employed as an antiasthmatic.
26	Ka sit kha	<i>Citrullus colocynthis</i> (L.) Schrad.	It has been used to treat gastrointestinal disorders like indigestion, gastroenteritis, and intestinal parasites. <i>C. colocynthis</i> also has excellent pharmacological properties, such as being a laxative and purgative; it is anti-diabetic, anti-inflammatory, anthelmintic, and anti-cancerous.
27	Tsu-lay	<i>Tribulus terrestris</i> L.	Is commonly used as to improve sexual performance and sexual dysfunction in traditional medicine. Positive effect on cardiovascular system health: lower blood pressure and reduce total cholesterol and triglyceride levels. Reduce inflammation in the body and protect against oxidative stress.
28	Mye-bok-hkayan	<i>Solanum virginianum</i> L.	The seeds are expectorant. They are used in the treatment of asthma and catarrh. In some traditional practices, plant's leaves, roots and fruits have been used in folk remedies for various ailments, such as skin conditions, inflammation, and pain relief.
29	Pa-daing-ni	<i>Datura metel</i> L.	The plant's leaves and flowers have been used topically or as poultices to alleviate pain and induce numbing effects. <i>Datura metel</i> has been used cautiously for its potential bronchodilatory effects in treating respiratory conditions like asthma.
30	Gyo-sagauk	<i>Chrozophora plicata</i> A. Juss.	Extracts from <i>Chrozophora plicata</i> possess anti-inflammatory properties, which can be beneficial in treating inflammatory conditions such as arthritis and rheumatism. Its extracts are known to promote tissue regeneration and accelerate the healing process. <i>Chrozophora plicata</i> extracts have demonstrated antimicrobial activity against certain bacteria and fungi, suggesting potential applications in treating infections.
31	-	<i>Gmelina asiatica</i> L.	The flowers of <i>M. velutina</i> were extracted with ethanol to obtain a crude extract that was consecutively extracted using n-hexane, dichloromethane, ethyl acetate and water. The crude extract and fractions were studied for the chemical composition and antioxidant and

No	Local name	Species	Medicinal values
			antidiabetic activities. The extracts had various phytoconstituents, namely steroids, flavonoids, tannins, saponins, alkaloids and glycosides. Some research showed that the aqueous extract of <i>M. velutina</i> flowers can be a promising candidate for the control of diabetes and oxidative stress. This is the first report about the chemical components and antioxidant and antidiabetic activities of <i>M. velutina</i> flower extracts.

Economic Values

The economic values of tree species in this area are as follows;

Figure 4-82 Economic Values of Floral Species

No.	Local name	Species	Economic Values
1	Htan	<i>Borassus flabellifer</i> L.	Toddy is obtained by tapping the tip of the inflorescence and collecting the dripping juice in hanging earthen pots. The toddy palm wine is an alcoholic beverage made using the fermented flower sap of palm trees. Toddy wine is white and sweet with a strong smell but mild taste. The leaves are used for thatching roofs, screening as fence, as mats, baskets, fans, hats, umbrellas, buckets, sandals etc. Senesced leaves are utilized as fuel for cooking. The leaves after using for thatching and fencing when replaced are used by the farmers as organic fertilizer. Trunks are used either as live poles in construction of thatch sheds or as timber in replacement of wooden poles
2	Khaung Lay	<i>Capparis grandis</i> L.f.	The unopened flower buds of <i>Capparis grandis</i> are harvested and pickled to produce capers, which are widely used as a condiment in various cuisines
3	Hin-Galar	<i>Cleome gynandra</i> L.	Have no traceable trading record internationally, it can play an important role in regional food security. It is supplied in abundance during summer season and there is a steady consumption of traditional vegetables during the same period, thus income generating for many producers.

No.	Local name	Species	Economic Values
4	Taw-kinmon	<i>Cephalandra indica</i> Naud.	Export Potential: In regions where <i>Cephalandra indica</i> is abundant and cultivated on a commercial scale, there may be opportunities for export to countries with demand for this vegetable. It can contribute to international trade and generate income for growers and exporters.
5	Anya koko	<i>Albizia lebbek</i> (L.) Benth.	A. lebbeck agroforestry practice would significantly increase production, touching financial benefit and ensuring sound environmental quality using the vacant woodlot space. Used as timber, furniture making, and musical instruments etc. Also use as fodder and forage: rich in nutrients and proteins for animals.
6	Gandaya	<i>Senegalia chundra</i> (Roxb. ex Rottler) Maslin	The wood is termite-assistant and suitable for construction. Leaves, twigs and pods are food sources for livestock. The valuable source of gum Arabic, a natural gum that is widely used as a stabilizer, emulsifier, and thickener in food and beverage products. A good source for fuel.
7	Magyi	<i>Tamarindus indica</i> L.	The wood from this tree is generally strong, insect resistant and durable; making it ideal for furniture and the making of tools. Among its less obvious uses, the leaves of the tamarind are useful as fodder for livestock
8	Palan	<i>Bauhinia racemosa</i> Lam.	The leaves of <i>Bauhinia racemosa</i> are used for making bidis, thus the plant is commonly known as Bidi leaf tree. <i>Bauhinia racemosa</i> is planted for its value as well as for its extreme beauty. The tree is staggeringly beautiful when in bloom and it blooms for several months. The plant is used as fodder for goats, sheep and cattle. The tree also yields useful fibers and gum. The bark is used for tanning and dyeing. The wood is hard and heavy, thus used for making plough and yokes and also used as fuel.
9	Sha	<i>Senegalia catechu</i> Wild.	The heartwood of the tree is mainly used for extracting Katha and Cutch (decoction obtained after filtration) which are sold in the market. A. catechu is a valuable bioresources and has been exploited commercially in tannin and Katha industry for decades. Rural people are dependent on this plant to fulfill their day to day need of fuel, fodder, building material and others.
10	Suyit	<i>Senegalia pennata</i> (L.) Maslin	A. Pennata known for their durable and strong wood, which can be used for various purposes such as furniture, flooring and construction. Acacia species are a source of tannins which used in tanning industries to process leather. A natural gum that is widely used as a

No.	Local name	Species	Economic Values
			stabilizer, emulsifier, and thickener in food and beverage products.
11	Tapauk	<i>Dalbergia paniculata</i> Roxb.	The wood is white or yellowish-white, with no clearly defines heartwood. The wood is used for tool-handles, boats, rafters, scantlings, packaging, and other general purposes
12	Me-yaing	<i>Tephrosia purpurea</i> Pers.	It can be used in alley cropping to improve soil fertility, prevent soil erosion and conserve moisture while its leaves provide supplementary protein for ruminants. It is used as fodder but its value is debated, probably due to its poisonous content (rotenone and tephrosin). Its pounded leaves make a potent fish poison that is used for fishing
13	Myay-pe	<i>Arachis hypogea</i> L.	Groundnut oil is an important edible oil. It is used for the manufacture of vanaspati. This oil is used for cooking. Groundnut kernel is a source of vegetable protein. Peanut butter is prepared by grinding roasted and blanched kernels. It is the nutritious and healthy source of food. The oil from groundnut is used as a lubricant, oil cake is used as animal feed and organic manure. Groundnut shell is used in the manufacture of activated carbon.
14	Kyaungpankaly	<i>Vitex trifolia</i> L.	The flower of vitex trifolia is used as a source of nectar and pollen, making it a potential resource for honeybees and other pollinators. It can contribute to honey population and support pollinator populations. Due to its ability to tolerate sandy and coastal environments, V.trifolia is sometimes used in erosion control and coastal restoration projects.
15	Late-su-shwe	<i>Barleria prionitis</i> L.	It used not only as an ornamental but also as a hedge and extensively as a component of folk medicines.
16	Thabut	<i>Uvaria grandiflora</i>	The fruits are aromatic, eaten raw or preserved.
17	Kyetsu-kanako	<i>Jatropha gossypifolia</i> L.	Climbing stems said to be good substitute for rattans. The fruits are aromatic, eaten raw or preserved.
18	Wetchi-pane	<i>Urena lobata</i> L.	Lobata is widely used as a local source of cordage and coarse textiles and industrially as a substitute for jute (<i>Corchorus</i> spp.), e.g. for making sacks, carpets, cordage and upholstery. It is often used mixed with jute.
19	Eu-ca-lit	<i>Eucalyptus camaldulensis</i> Dehnh.	It gives a good fuel wood having calorific value of 4962 kcal/kg. The charcoal maybe used for producing gas plants, in pigments, fireworks, gun-powder, rubber-production, animal

No.	Local name	Species	Economic Values
			feeds, and some other chemical industries. The wood yields a brownish pulp useful in the manufacture of wrapping paper and card-board.
20	Nyaung-phyu	<i>Ficus rumphii</i> Blume.	Planted as ornamental trees due to shaded properties.
21	Okhne	<i>Streblus asper</i> Lour.	The extract of the stem bark of <i>S. asper</i> was observed to exhibit insecticidal activity. Fibre obtained from the bark of <i>S. asper</i> is used for papermaking and slate-making. The dry leaves of <i>S. asper</i> can be converted to vermicompost with a high nutritional value containing nitrogen, phosphorus, sodium, calcium, and sulphur.
22	Thitpok	<i>Celtis tetrandra</i> Roxb. ex Hornem	Wood is used in furniture making due to its durable, lightweight. Also used as fuelwood.
23	Zi	<i>Ziziphus jujuba</i> Mill.	Fruit are consumed both fresh and dried and used to make juice, wine, and herbal teas. Used in cosmetics because of their antioxidant and moisturizing effects on the skin. Leaves and fruits used as a supplementary feed for livestock.
24	Tama	<i>Azadirachta indica</i> A.juss	The wood peels well and is found useful for making shuttering grade plywood. Tree is grown for fuel wood purposes. A residue after extraction of the oil is valued as a fertilizer and repellent for insects. If is also regarded as a good fodder tree and heavily lopped for goats and sometimes for cattle also, the cattle relish only in the absence of other fodders
25	Thayet	<i>Mangifera indica</i> L.	The socioeconomic importance of mango is great, not only for local societies in rural producing regions, but also increasingly in countries that benefit from its trade and consumption.
26	Ka sit kha	<i>Citrullus colocynthis</i> (L.) Schrad.	<i>C.colocythis</i> extracts are used in the cosmetics and skincare industry due to their astringent properties and used in production toners. Compounds derived from <i>C.colocythis</i> can be used in the development of natural pesticides and insecticides. Dry fruit also used as a source of natural dye
27	Tsu-lay	<i>Tribulus terrestris</i> L.	Extracts from <i>Tribulus terrestris</i> are sometime used in cosmetic and personal care products. It also used as a feed supplement for livestock and poultry. It is used for erosion control in areas with disturbed or degraded land.
28	Mye-bok-hkayan	<i>Solanum virginianum</i> L.	Serves as a food source for certain wildlife, including birds, small mammals, and insect.

No.	Local name	Species	Economic Values
29	Pa-daing-ni	<i>Datura metel</i> L.	It does not have significant commercial value, it has been used for ornamental purposes in gardens and landscaping due to its large, showy, trumpet shaped flowers and attractive foliage.
30	Gyo-sagauk	<i>Chrozophora plicata</i> A. Juss.	The plant contains natural dyes that can be extracted from its roots and leaves. These dyes have been used for coloring textiles, fibers, and other materials. <i>Chrozophora plicata</i> extracts are utilized in the cosmetics and soap industry. They can be incorporated into formulations for their skin-conditioning properties.
31	-	<i>Gmelina asiatica</i> L.	Some species in the Annonaceae family, including <i>Miliusa</i> species, might have wood that is used for various purposes, such as construction, furniture making, and crafting.



Plucking flowers of *Vitex trifolia* to sell to the Traditional Medicine Production Business



Vitex trifolia L Flower

Figure 4-83 Medicinal plant, *Vitex trifolia* L., which is used by the locals for medicinal and economic purposes.

4.5.3.1.1.13 Discussion and Conclusion

By the results of our data, tree species in this region are prominent with Sha (*Senegalia catechu* Wild.) and Zi (*Ziziphus jujuba* Mill.) which are resistant to drought and environment condition of dry zone. As a result of human activities, most forests of central dry zone can occur as degraded forest with girth limit.

In species composition analysis that we conducted, order Fabales and Rosales are the most prominent. The trees in these orders possess nitrogen fixation capabilities which have symbiotic association with nitrogen fixing bacteria (*Rhizobium spp*) that improve soil quality.

And also, Sha (*Senegalia catechu* Wild.) and Zi (*Ziziphus jujuba* Mill.) are the most occurrence and abundance species in most plots of the study area. It means that they are the dominant species of the study which have more vitality than other species.

But in relative dominance, Thayet (*Mangifera indica* L.) and Anya koko (*Albizia lebbek* (L.) Benth.) have highest relative dominance because relative dominance is based on basal area of trees. Although the occurrence and abundance of Sha and Zi are high, their basal area are small when comparing with Thayet (*Mangifera indica* L.) and Anya koko (*Albizia lebbek* (L.) Benth.). In dry regions, Sha charcoal is the popular fuelwood in Myanmar. They are cut down at various stages of trees and no longer have time for larger girth limit. On the other hand, Thayet (*Mangifera indica* L.) and Anya koko (*Albizia lebbek* (L.) Benth.) only have for use as a food sources like fruits, fodders and used as ornamental and shaded trees.

The result of IVI; Sha (*Senegalia catechu* Wild, Zi (*Ziziphus jujuba* Mill.) and Tama (*Azadirachta indica* A.juss) indicate these species are ecologically and economically importance to ecosystem at these areas. The Simpson diversity index 0.781906 and Shannon diversity index 2.00644 indicate medium range of diversity. Sha (*Senegalia catechu*) and Zi (*Ziziphus jujuba* Mill.) are the most diverse in tree species of in this area. Khaung lay (*Capparis grandis* L.f.), Thit pok (*Celtis tetrandra*), Nyaung phyu (*Ficus rumphii* Blume.) are the lowest abundance species with lowest IVI values.

4.5.4 Fauna

4.5.4.1 Mammals

Mammals, belonging to the class Mammalia, are a diverse group of vertebrate animals characterized by several unique features (Nowak, 1999). They possess mammary glands that produce milk, hair or fur covering their bodies, and the ability to regulate their body temperature internally. With over 6,400 species, mammals exhibit remarkable diversity in size, shape, behavior, and ecological roles (Vaughan et al., 2013). They have successfully adapted to a wide range of habitats and are found on every continent on Earth. The three major groups of mammals are monotremes, marsupials, and placentals. Monotremes, such as the platypus and echidnas, are egg-laying mammals found in Australia and New Guinea. Marsupials, including kangaroos and koalas, give birth to relatively undeveloped young and carry them in a pouch. Placental mammals, which include humans, elephants, and dolphins, give birth to fully developed live young after a gestation period. Mammals play crucial ecological roles as predators, prey, and seed dispersers, influencing food webs and maintaining ecosystem balance. They have important cultural and economic significance for humans as companions, sources of food and materials, and subjects of scientific research and conservation efforts (Feldhamer et al., 2014). Extensive research across disciplines has contributed to our understanding of mammalian biology, ecology, behavior, and conservation.

4.5.4.1.1 Methodologies

With the assistance of the local guide at the research location, the specimens were documented and photographed during the study period. No life specimens were gathered from locals and hunters. The location, habitat, coloring, and physical characteristics were noted. At the research sites, the photographs were taken as soon as they were in a fresh state.

4.5.4.1.1.12 Results

Mammals were photographed and recorded while birds were studied. Small animals are observed while performing the bird species census.



Tupaia sp.

Figure 4-84 Photos of Recorded Small Mammal Species

Table 4-64 List of recorded small mammal species

Class	Order	Family	Genus	Species	Common Name	IUCN Status
Mammalia	Scandentia	Tupaiidae	<i>Tupaia</i>	<i>Tupaia sp.</i>	Treesheiw	-

4.5.4.1.1.13 Discussion and conclusion

Tupaia sp., as treeshrews, are a group of small mammals belonging to the family Tupaiidae. Found in the study area, which is agile and arboreal creatures. *Tupaia sp.* is a genus within the Tupaiidae family, comprising several species such as *T. belangeri*, *T. glis*, and *T. tana*. These treeshrews are primarily distributed across Southeast Asia, including regions of Indonesia, Malaysia, Thailand, and the Philippines.

Treeshrews are adapted to a diverse range of habitats, including tropical rainforests, montane forests, and secondary growth forests. Their ability to thrive in various environments raises questions about their adaptability and the specific ecological roles they play within these ecosystems. *Tupaia sp.* exhibits an omnivorous diet, feeding on a variety of items such as insects, fruits, nectar, and small vertebrates.

4.5.4.2. Birds

Introduction

Myanmar, located in Southeast Asia, is a country known for its rich biodiversity, and it is home to a diverse range of bird species (Blaauw et al., 2018). The avifauna of Myanmar showcases a fascinating array of birds, including both resident and migratory species. The country's varied habitats, which encompass tropical forests, wetlands, mountains, and coastal areas, provide a suitable environment for numerous bird species to thrive. Myanmar's strategic location along major migratory flyways further enhances its significance as a birding hotspot.

The avian diversity in Myanmar includes species from various families, such as pheasants, kingfishers, hornbills, eagles, and many more. Among the notable bird species found in Myanmar is the critically endangered Myanmar Jerdon's Babbler (*Chrysomma altirostre*), which was rediscovered in the country after being thought extinct for over 70 years (Eames et al., 2019). Other significant species include the White-throated Babbler (*Turdoides gularis*), Green Peafowl (*Pavo muticus*), and Hooded Treepie (*Crypsirina cucullata*), to name a few.

The central dry zone of Myanmar, located in the heart of the country, is a region characterized by its arid climate and sparse vegetation. Despite the challenging environmental conditions, this area is home to a diverse range of bird species that have adapted to thrive in this unique habitat (Maung et al., 2017). The avifauna of the central dry zone showcases the remarkable resilience and adaptability of birds.

Among the notable bird species found in this region is the Jerdon's Minivet (*Pericrocotus albifrons*). This small, colorful passerine bird is a resident species that is commonly sighted in the dry forests and scrublands of the central dry zone (Blaauw et al., 2018). The male Jerdon's Minivet boasts striking black and orange plumage, while the female displays a combination of gray, white, and orange tones. Their melodious calls can often be heard echoing through the dry forests, adding to the vibrant atmosphere of the region.

Another bird species frequently encountered in the central dry zone is the Burmese Bushlark (*Mirafra microptera*). This ground-dwelling bird is well-adapted to the arid conditions, with its cryptic plumage providing camouflage amidst the dry grasses and sandy terrain (BirdLife International, 2020). The Burmese Bushlark is known for its distinct song, which consists of a series of melodious notes that can be heard during its aerial display flights.

The central dry zone is also a favored habitat for various raptor species, including the Short-toed Snake Eagle (*Circaetus gallicus*) and the Crested Serpent Eagle (*Spilornis cheela*). These majestic birds of prey can be spotted soaring high above the arid landscape, their keen eyes scanning for prey on the ground below (Blaauw et al., 2018). Their presence adds a touch of awe-inspiring grace to the region's birdlife.

Conservation efforts are essential to ensure the preservation of the bird species in the central dry zone. Habitat loss and degradation due to agriculture, deforestation, and urbanization pose significant challenges to the survival of these birds (BirdLife International,

2020). It is crucial to raise awareness about the importance of conserving their unique habitat and implementing sustainable land management practices.

The birds found in the central dry zone of Myanmar demonstrate the incredible diversity and resilience of avian life in challenging environments. These species have adapted to thrive amidst arid conditions and have developed unique characteristics and behaviors that make them well-suited to the region. By understanding and appreciating the avifauna of the central dry zone, we can work towards their conservation and ensure the continued existence of these fascinating bird species for future generations.

4.5.4.2.1 Method and Methodology

In order to find out the bird species, relative abundance, species richness, and diversity, the study method that will match the study area has been adapted based on the current situations. The study area, study method and data analysis method are described as below.

4.5.4.2.2 Study Area

The proposed project area is situated near the Kyaw Zi village, Taungtha Township, Myingyan district, Mandalay. Most parts of the studied area are covered with sesame, and groundnut crop field. The study area lies between 21°19'28.39"N to 21°16'18.21"N and 95°10'3.76"E to 95°10'36.04"E. Study areas were stratified based on the habitat type. Three study sites were allocated to observe bird species in proposed project and its environs shown in Figure 4-85 as Line I, Line II and Line III. Description and location of allocated transect lines are shown in Table 4-65.

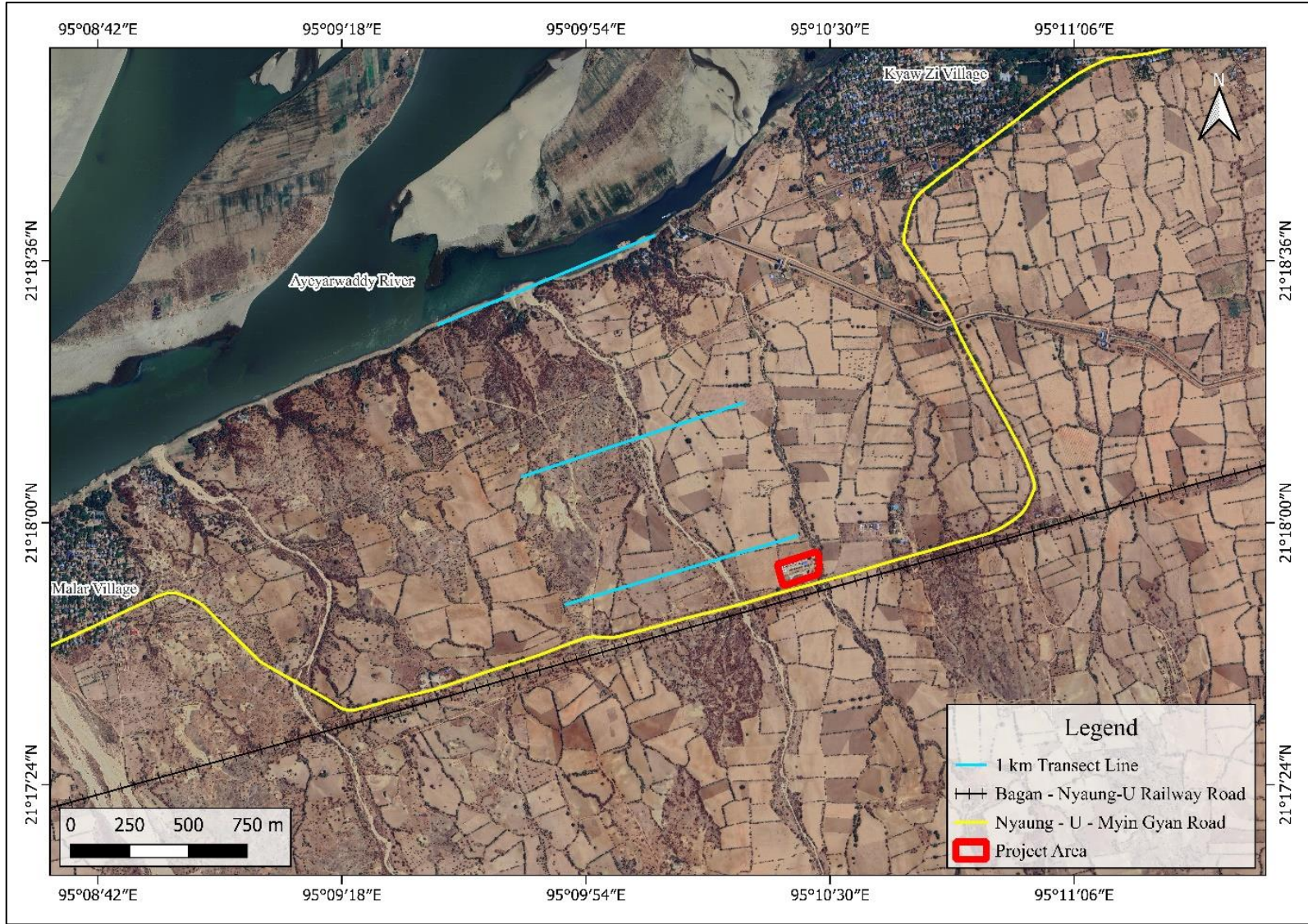


Figure 4-85 Bird Study Area

Table 4-65 Description and location of allocated transect lines

No.	Transect Lines	Description	Coordinates
1	Line I	Along the Ayeyarwady River side area.	21°18'32.65"N 95° 9'46.07"E
2	Line II	Cultivated field, between Ayeyarwady River and project area.	21°18'11.83"N 95°10'2.22"E
3	Line III.	Cultivated field, adjacent to the project area.	21°17'53.82"N 95°10'9.67"E

4.5.4.2.3 Study Period

Currently, Myanmar experiences a tropical-monsoon climate with three dominant seasons: the March-to-May hot season, the June-to-October wet season and the November-to-February cool season (Horton, e.t., al, 2017). The field survey was conducted for Hot Season, from May 10th to 15th.

4.5.4.2.4 Study Design and Data Collection

The collection of data was made using the line transect method. Birds are counted while walking the transect. The transects are 1,000 m long, with a fixed transect width of 50 m on both sides. The birds are recorded along three transect lines at each site. In each transect, 250 m apart were allocated to avoid counting the same bird again.

Binoculars (60 x 90) were used to view the birds, and a Nikon P-900 digital camera was used to capture pictures of them. A bird census was done between the hours of 6 a.m. to 10 a.m. in the morning. when avian activity is most noticeable. Bird-watching activities were avoided during the time period of 3 p.m. to 6 p.m. due to prevailing local safety and security concerns. The characteristics of the plumage, size, shape, and color were also recorded. Counting was done by estimating blocks and then verifying with photos for big flocks in flight or at a roost.

Identification of specimens

Identification was done based on the bird's body color, morphological features, call, and flight pattern. Identification and classification of the bird species followed that of Smythies, (2001), Robson, (2007) and (2015), Avebase (2022).

Data analysis

Data entry was done using Microsoft excel and analysis was calculated using species composition formula, relative abundance formula, population density formula, evenness, and diversity formula.

Species Composition

$$\text{Species Composition} = \frac{\text{Total number of species in particular family or order}}{\text{Total number of all species recorded}} \times 100$$

Relative Abundance

$$\text{Relative Abundance} = \frac{\text{Number of individuals of a species}}{\text{Total number of individuals of all the species}} \times 100$$

4.5.4.2.5 Species Evenness and Richness

Species diversity increases with the complexity of habitat. This diversity considers both the richness and evenness of species. Evenness is a measure of the relative abundance of different species making up the richness of an area. This evenness is an important component of diversity indices (Hill, 1973; Turchi et al., 1995; Leinster and Cobbold, 2012) and expresses evenly distribution of the individuals among different species.

Species Richness (Margalef's (1958) method

$$\text{Species richness index (R)} = \frac{S-1}{\ln N}$$

Where, R is index of species richness (Margalef),

S is total number of species observed,

ln is natural logarithm value

N is total number of individuals (all types observed),

Criteria for Richness Index Values

Classification of Margalef richness index values using criteria as presented in Table 4-66.

Table 4-66 Criteria for Margalef Richness Index Values

Index Value	Category
R < 2.5	Low species richness
2.5 > R < 4	Medium species richness
R > 4	High species richness

Evenness (J')

“Evenness Index intended to find out how the data on the number of individuals of one type (abundance of species) is spread out among the many species found (abundance of all types). This is to find out how the number of individuals of one type is scattered in a data sample (community). If all types in a data sample have an individual number that goes to the same number or has the same number of numbers; it shows that the evenness index is equal or not difference. If all types really reach the same number (one number); means that evenness is perfect, and will go to zero (0) as an abundance of uneven or unequal species” (Latumahina, Mardiatmoko and Sahusilawane, 2020). Pielou’s Evenness uses the following formula

$$J' = \frac{H'}{\ln S}$$

Where,

J is Pielou’s evenness index,

H’ is value of Shannon-Wiener’s index,

S is total number of species.

Criteria for Evenness Index Value

The evenness index value classification uses the criteria shown in Table 4-67.

Table 4-67 Criteria for Evenness Index Value

Index Value	Category
J' approaches 0	The distribution of individuals between species is uneven / unequal. Unstable species abundance distribution conditions.
J' approaches 1	Distribution of individuals between types is evenly distributed. Stable species abundance distribution conditions.

4.5.4.2.5.1 Diversity

Species evenness, richness, and diversity indices as Shannon-Weiner (Shannon and “Weaver, 1949) and Simpson Index (Simpson, 1949) were used to evaluate the bird species diversity. Shannon-Weiner Index assumes that individuals are randomly sampled from an independent large population and all the species are represented in the sample. Shannon diversity is very widely used index for comparing diversity between various habitats (Clarke and Warwick, 2001). It was calculated in order to know the species diversity in different habitat (Hutchison, 1970) based on the abundance of the species by the following formula”:

Shannon-Weiner Index (1949)

$$H' = \sum_{i=1}^s \left(\frac{n1}{n}\right) Ln \left(\frac{n1}{n}\right)$$

Where,

H' is Shannon-Wiener Index of Diversity,

S is number of species, n1 is number of individuals in the ith species in the sample

n is total number of individuals in the sample

The presence of one individual of a species is not necessarily indicative of the species being present in a large number. The value of Shannon Weiner Diversity Index usually falls between 1.5 and 3.5, only rarely it surpasses 4.5. A value near 4.6 would indicate that the numbers of individuals are evenly distributed between all the species.

Table 4-68 Criteria for Diversity Index Values

Index Value	Category
H' < 1	Low diversity
1 > H' < 3	Medium diversity
H' > 3	High diversity

Simpson's Index of Diversity (1949)

The value of this index also ranges between 0 and 1, the greater the value, the greater the sample diversity. It has been measured by the given formula:

$$D = 1 - \sum_{i=1}^x \left(\frac{n1(n1 - 1)}{n(n - 1)}\right)$$

Where,

D is Simpson's Index of Diversity

n_i is the number of individuals in the ith species

n is the total number of individuals of all species

Population Density

$$Density = \frac{Number\ of\ Birds}{2 \times L \times W}$$

Where,

D is Density,

L is Total length of transect,

W is 1/2 Width of Transect

4.5.4.2.6 Field Survey Results

4.5.4.2.6.1 Species Composition

A total of 28 bird species distributed under 23 genera, 19 families and 10 orders were identified and recorded during this study.

The highest composition of species was recorded in order Passeriformes (46.43%), followed by Pelecaniformes (14.29%), Coraciiformes (10.71 %), Cuculiformes (7.14 %), Caprimulgiformes, Charadriiformes, Ciconiiformes, Strigiformes (each with 3.57%). In the present study, the order Passeriformes constitute the highest number of species (13), followed by Pelecaniformes with (4) species, Coraciiformes with (3) species, Cuculiformes with (2) species, while the remaining (5) orders were represented by (1) species only. Demonstration graph for the species composition by the order is shown in Figure 4-86.

There are (28) kinds of birds in total, all of the recorded species are resident. There are also 6 waterbirds to be spotted and listed as shown in Table 4-70. With respect to the number of species encountered at each study site, the largest number of species (64) was encountered in Line (I), followed by those of Line (II) with (14) species, and Site (III) with (12) species.

Table 4-69 Total Number Species in Family, Genus, Species and Composition of the Recorded Bird Species

Order	Total Number			Species Composition
	Family	Genus	Species	
Passeriformes	1	9	9	46.43
Pelecaniformes	1	1	4	14.29
Coraciiformes	1	2	2	10.71
Cuculiformes	1	1	2	7.14
Caprimulgiformes	1	1	1	3.57
Charadriiformes	1	1	1	3.57
Ciconiiformes	1	1	1	3.57
Columbiformes	1	1	1	3.57

Order	Total Number			Species Composition
	Family	Genus	Species	
Strigiformes	1	1	1	3.57
Suliformes	1	1	1	3.57
Total	19	23	28	100

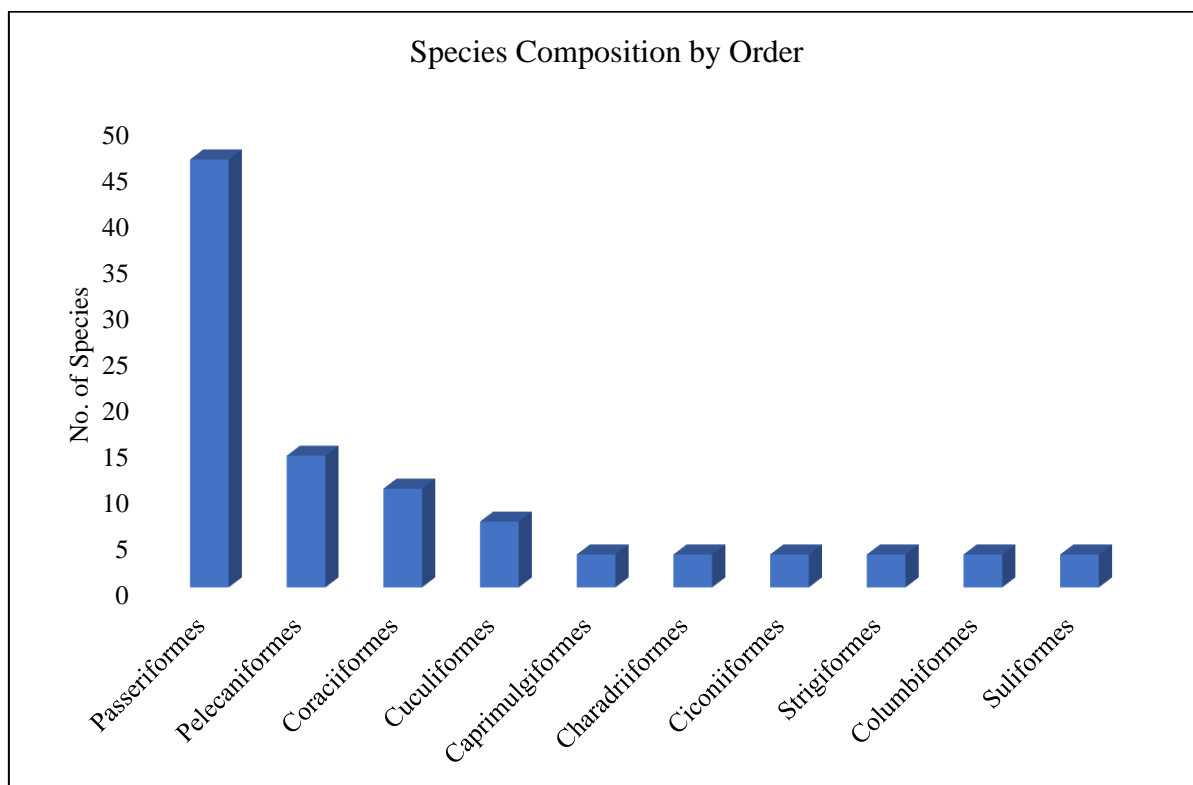


Figure 4-86 Species Composition by Order of the Recorded Bird Species

Table 4-70 List of birds observed in the study area

No.	Common Name	Scientific Name	Family	Order	Study Area		
					Line-I	Line-II	Line-III
1.	Asian Koel	<i>Eudynamys scolopaceus</i>	Cuculidae	Cuculiformes	✓	-	-
2.	Asian Openbill	<i>Anastomus oscitans</i>	Ciconiidae	Ciconiiformes	✓	-	-
3.	Ayeyarwady Bulbul	<i>Pycnonotus blanfordi</i>	Pycnonotidae	Passeriformes	✓	✓	✓
4.	Black Drongo	<i>Dicrurus macrocercus</i>	Dicruridae	Passeriformes	✓	✓	✓
5.	Blue-tailed Bee-eater	<i>Merops philippinus</i>	Meropidae	Coraciiformes	✓	✓	-
6.	Cattle Egret	<i>Bubulcus ibis</i>	Ardeidae	Pelecaniformes	✓	-	-
7.	Cinnamon Bittern	<i>Ixobrychus cinnamomeus</i>	Ardeidae	Pelecaniformes	✓	-	-
8.	Common iora	<i>Aegithina tiphia</i>	Aegithinidae	Passeriformes	✓	-	-
9.	Common Myna	<i>Acridotheres tristis</i>	Sturnidae	Passeriformes	✓	✓	✓
10.	Common TailorBird	<i>Orthotomus sutorius</i>	Cisticolidae	Passeriformes	✓	-	-
11.	Greater Coucal	<i>Centropus sinensis</i>	Cuculidae	Cuculiformes	✓	-	-
12.	Green Bee Eater	<i>Merops orientalis</i>	Meropidae	Coraciiformes	✓	✓	✓
13.	House Crow	<i>Corvus splendens</i>	Corvidae	Passeriformes	✓	✓	✓
14.	House sparrow	<i>Passer domesticus</i>	Passeridae	Passeriformes	✓	✓	✓
15.	House Swift	<i>Apus affinis</i>	Apodidae	Caprimulgiformes	✓	✓	✓
16.	Intermediate Egret	<i>Ardea intermedia</i>	Ardeidae	Pelecaniformes	✓		
17.	Large-billed Crow	<i>Corvus macrorhynchos</i>	Corvidae	Passeriformes	✓	✓	✓
18.	Little Comorant	<i>Microcarbo niger</i>	Phalacrocoracidae	Suliformes	✓	-	-

19.	Little Egret	<i>Egretta garzetta</i>	Ardeidae	Pelecaniformes	✓	-	-
20.	Oriental Magpie Robin	<i>Copsychus saularis</i>	Muscicapidae	Passeriformes	✓	-	-
21.	Redvented Bulbul	<i>Pycnonotus cafer</i>	Pycnonotidae	Passeriformes	✓	✓	✓
22.	Red-wattled Lapwing	<i>Vanellus indicus</i>	Charadriidae	Charadriiformes	✓	-	-
23.	Rock Pigeon	<i>Columba livia</i>	Columbidae	Columbiformes	✓	✓	✓
24.	Spotted owlet	<i>Athene brama</i>	Strigidae	Strigiformes	✓	-	-
25.	Vinous Breasted Myna	<i>Acridotheres burmannicus</i>	Sturnidae	Passeriformes	✓	✓	-
26.	White Throated Kingfisher	<i>Halcyon smyrnensis</i>	Alcedinidae	Coraciiformes	✓	-	-
27.	White vented myna	<i>Acridotheres grandis</i>	Sturnidae	Passeriformes	✓	✓	✓
28.	White-throated Babbler	<i>Turdoides gularis</i>	Leiothrichidae	Passeriformes	✓	✓	✓

4.5.4.2.6.2 Relative Abundance

Among the species observed, those classified as common, such as the Ayeyarwady Bulbul, Black Drongo, Blue-tailed Bee-eater, Cinnamon Bittern, Little Cormorant, Red vented Bulbul, Red-wattled Lapwing, and White-throated Babbler, showcase a level of adaptability that enables them to be frequently encountered within their respective habitats.

On the other, very common species like the Common Myna, Green Bee Eater, House Crow, House Sparrow, House Swift, Large-billed Crow, Rock Pigeon, Vinous Breasted Myna, and White-vented Myna demonstrate an ability to coexist harmoniously with environments.

In contrast, the Asian Koel, Asian Openbill, Cattle Egret, Common Iora, Common Tailorbird, Greater Coucal, Intermediate Egret, Little Egret, Oriental Magpie Robin, Spotted Owllet, and White Throated Kingfisher are recorded as rare and uncommon in the proposed study area.

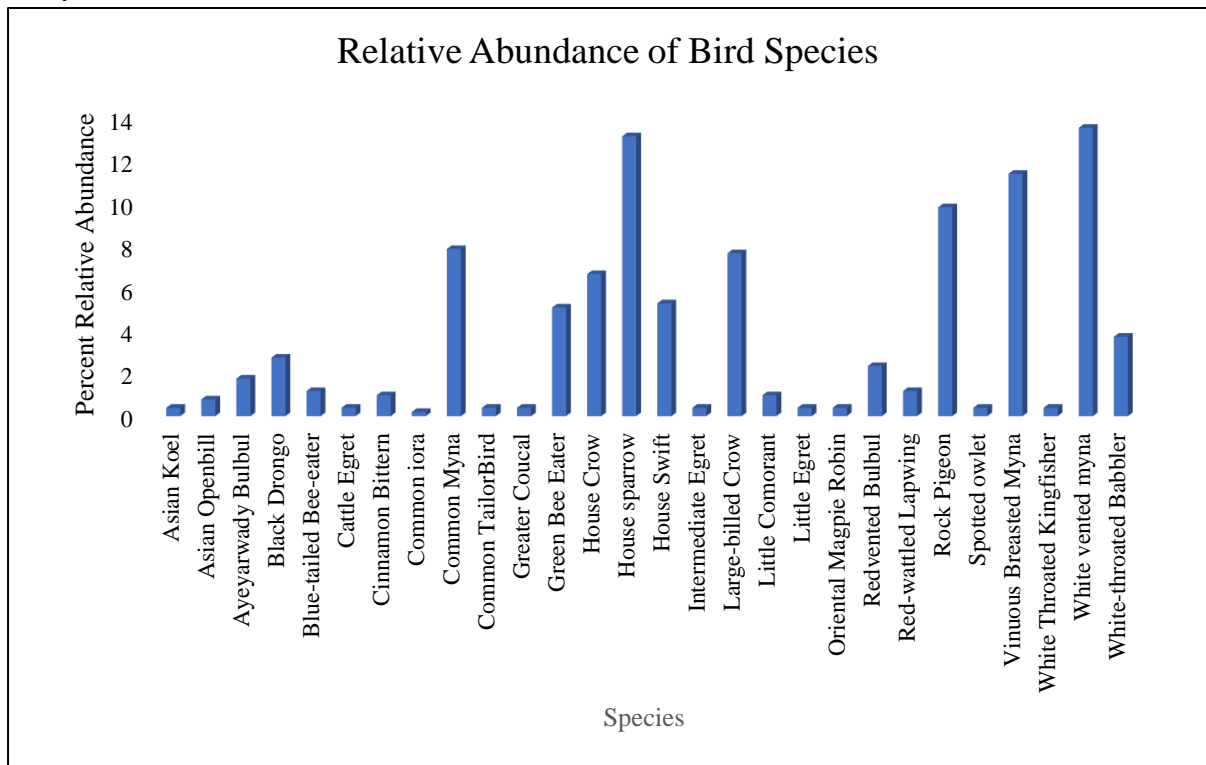


Figure 4-87 Relative Abundance of Bird Species

4.5.4.2.6.3 Population Density

The findings presented in Figure 4-88 underscore a distinct pattern of population density among various bird species within the studied area. Notably, the White-vented myna represented as the most densely populated species with a density of 690 individuals per square kilometer (690/km²). Following closely are the house sparrow, vinous-breasted myna, and rock pigeon, exhibiting population densities of 670/km², 580/km², and 500/km², respectively. These prominent bird species collectively exhibit a strong presence along Line-1, which runs parallel to the Ayeyarwady River. This population within Line-1 shows that the

bank side of the Ayeyarwady provides a highly favorable habitat characterized by the availability of essential resources such as shelter, food, and water, contributing to the robust population of these species. So, the study's transect lines, Line-1, adjacent to the Ayeyarwady River, stands out as the most abundant habitat for avian species.

Conversely, Line-2, characterized as a cultivated area, and Line-3, in the vicinity of a project area, reveal distinct patterns of bird population abundance, which is shown in Figure 4-89. Specifically, rock pigeons are notably prevalent in the cultivated area (Line-2), while house crows are common in the environment near the project area (Line-3). These contrasting preferences shown that certain bird species possess adaptability to specific habitat conditions. These findings contributed to a comprehensive understanding of the relationships between different bird species and the diverse habitats within the studied landscape.

In the study of avian populations along distinct transect lines, it evident that a majority of bird species are prominently observed along the expanse of transect line-1, which closely follows the course of the Ayeyarwady river bank. Conversely, the analysis data reveals that transect lines 2 and 3 exhibit relatively lower levels of avian density. This investigation shown the distribution patterns of bird species along these transects, particularly accentuating the prevalence of avian life in the transect line-1 which traces along the Ayeyarwady river bank.

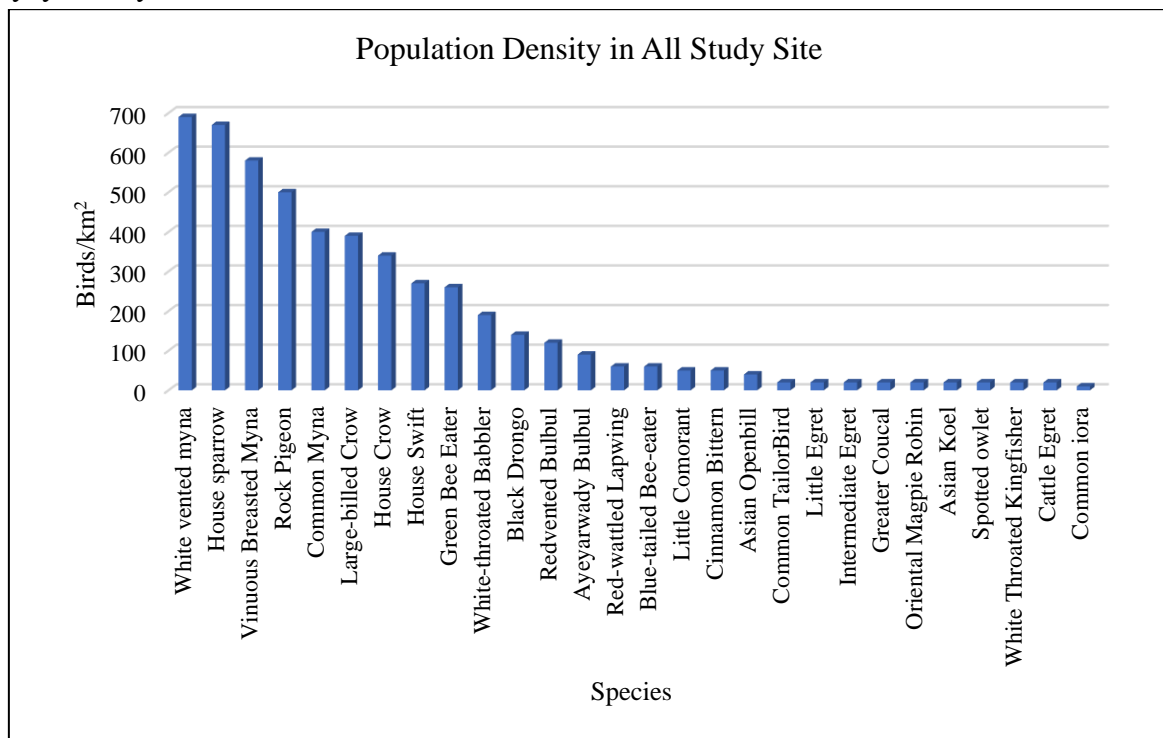


Figure 4-88 Population Density in the Study Area

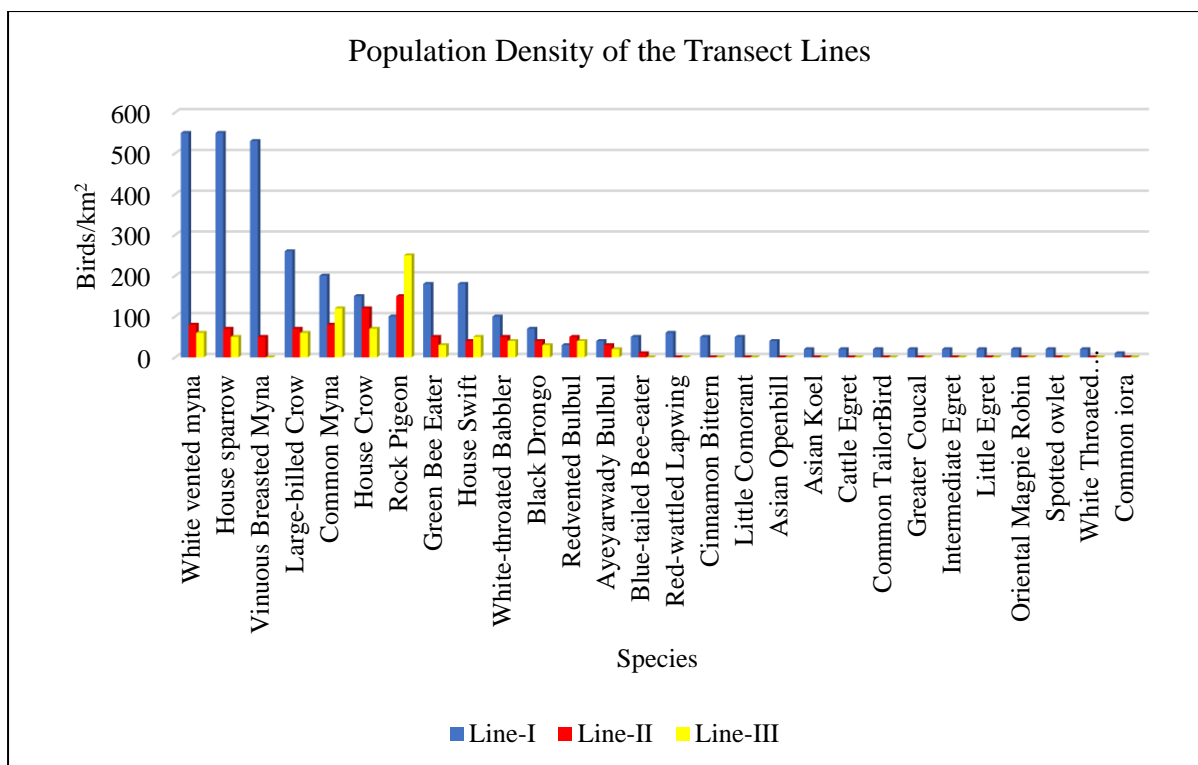


Figure 4-89 Population Density of the Transect Lines

4.5.4.2.6.4 Diversity

Species richness, evenness, diversity indices of recorded bird species is shown in Table 4-71.

Table 4-71 Diversity indices of recorded species

No. of Species	No. of Individuals	Species Richness (R)	Evenness (J')	Shannon-Wiener (H')	Simpson Diversity (D)
28	509	4.332	0.025	2.721	0.918

Margalef Richness Index (R)

The analysis of the Margalef Richness Index Value (R) underscores the avian species diversity within the study area. The observed values surpassing the threshold of the richness index ($R > 4$), indicating a notable level of bird species richness. This outcome showed that the ecological significance of the study area, supporting a thriving avian community and a favorable habitat for diverse bird species.

Shanon-Weiner Diversity Index (H')

The assessment of the Shannon-Weiner Diversity Index Value (H') revealed a moderate species diversity index within the study area, reflected by the recorded diversity index value of 2.721. This result indicates a balanced combination of species richness and evenness, signifying a moderate level of diversity among the species present in the study area. This outcome indicated that the study area harbors a considerable variety of species while maintaining a moderate balance among their respective populations, contributing to the ecological complexity of the ecosystem.

Simpson's Index of Diversity (D)

The range of the diversity index (D) lies between 0 and 1, with 1 symbolizing complete diversity and 0 indicating complete uniformity. As indicated in Table 4-71, the study area is characterized by a D value of 0.918, signifying a notable degree of species diversity. This outcome underscores the high level of ecological heterogeneity within the study area, showcasing a rich diversity of species.

4.5.4.2.6.5 IUCN Red List and Protected Status

Table 4-72 presents a status of the IUCN Red List and protective status for the recorded species. According to the IUCN Red List, all recorded species are categorized as least concern species, indicating their favorable conservation status. Moreover, under the List of Protected Animals, as detailed in Decree No. 690/2020 dated March 4th, 2020, by The Forest Department, specific species hold varying levels of protection.

Among these species, the Asian Openbill, Black Drongo, Red-wattled Lapwing, Spotted Owlet, and White-throated Kingfisher, along with the White-throated Babbler, are recognized as full protection status, signifying their heightened conservation priority. Similarly, species such as the Blue-tailed Bee-eater, Cattle Egret, Cinnamon Bittern, Green Bee Eater, Intermediate Egret, Little Egret, Vinous-breasted Myna, and White-vented Myna are listed as protected species.

Further, the Asian Koel, Little Cormorant, Oriental Magpie Robin, and Red-vented Bulbul are recognized as seasonally protected animals, indicating that their conservation measures are aligned from March 15th to September 30.

Table 4-72 IUCN Red List and Protected Status







No.	Common Name	IUCN Red List Status*	Status	Protected Status by the Forest Department**		
				Totally Protected Animals	Protected Animals	Seasonally Protected Animals (Mar 15 to Sep 30)
1.	Asian Koel	Least Concern	Resident	-	-	✓
2.	Asian Openbill	Least Concern	Resident	✓	-	-
3.	Ayeyarwady Bulbul	Least Concern	Endemic resident	-	-	-
4.	Black Drongo	Least Concern	Resident	✓	-	-
5.	Blue-tailed Bee-eater	Least Concern	Resident	-	✓	-
6.	Cattle Egret	Least Concern	Resident	-	✓	-
7.	Cinnamon Bittern	Least Concern	Resident	-	✓	-
8.	Common Iora	Least Concern	Resident	-	-	-
9.	Common Myna	Least Concern	Resident	-	-	-
10.	Common Tailorbird	Least Concern	Resident	-	-	-
11.	Greater Coucal	Least Concern	Resident	-	-	-
12.	Green Bee Eater	Least Concern	Resident	-	✓	-
13.	House Crow	Least Concern	Resident	-	-	-
14.	House sparrow	Least Concern	Resident	-	-	-
15.	House Swift	Least Concern	Resident	-	-	-
16.	Intermediate Egret	Least Concern	Resident	-	✓	-
17.	Large-billed Crow	Least Concern	Resident	-	-	-

18.	Little Cormorant	Least Concern	Resident	-	-	✓
19.	Little Egret	Least Concern	Resident	-	✓	-
20.	Oriental Magpie Robin	Least Concern	Resident	-	-	✓
21.	Red vented Bulbul	Least Concern	Resident	-	-	✓
22.	Red-wattled Lapwing	Least Concern	Resident	✓	-	-
23.	Rock Pigeon	Least Concern	Resident	-	-	-
24.	Spotted owlet	Least Concern	Resident	✓	-	-
25.	Vinous Breasted Myna	Least Concern	Endemic resident	-	✓	-
26.	White Throated Kingfisher	Least Concern	Resident	✓	-	-
27.	White vented myna	Least Concern	Resident	-	✓	-
28.	White-throated Babbler	Least Concern	Endemic resident	✓	-	-

*IUCN 2023. The IUCN Red List of Threatened Species. Version 2022-2. <https://www.iucnredlist.org>

**List of Protected Animals. The Forest Department Issued by the Decree No. 690/2020 dated on Mar 4th, 2020. Ministry of Natural Resources and Environmental Conservation.

4.5.4.2.7 Photos of Recorded Species

	
<p>White Throated Babbler</p>	<p>House Crow</p>
	
<p>House Swift</p>	<p>Red vented Bulbul</p>
	
<p>Cattle Egret</p>	<p>Little Egret</p>



White vented myna



Oriental Magpie Robin



Common Iora



Irrawaddy Bulbul



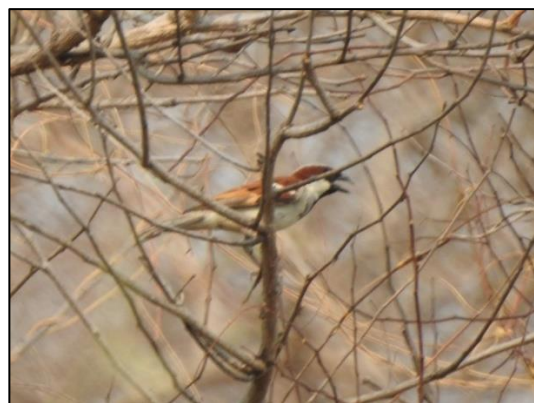
Red-wattled Lapwing



Asian Openbill



Little Cormorant



House Sparrow







	
<p>White Throated Kingfisher</p>	<p>Little Green Bee-Eater</p>
	
<p>Large-billed Crow</p>	<p>Common Myna</p>
	
<p>Rock Pigeon</p>	<p>Vinous Breasted Myna with White Vented Myna</p>

Figure 4-90 Photos of Recorded Species

4.5.4.2.7.1 Discussion and Conclusion

A total of 28 bird species distributed under 23 genera, 19 families and 10 orders were identified and recorded during this study. The highest composition of species was recorded in order Passeriformes (46.43%), followed by Pelecaniformes (14.29%), Coraciiformes (10.71 %), Cuculiformes (7.14 %), Caprimulgiformes, Charadriiformes, Ciconiiformes, Strigiformes (each with 3.57%). In the present study, the order Passeriformes constitute the highest number of species (13), followed by Pelecaniformes with (4) species,

Coraciiformes with (3) species, Cuculiformes with (2) species, while the remaining (5) orders were represented by (1) species only. There are 28 kinds of birds in total, all of the recorded species are resident. Passeriformes, commonly known as perching birds or songbirds, emerged as a prominent presence within the study area, exhibiting a considerable abundance. Passerines feed mainly on insects, nuts and seeds collected from trees and shrubs in summer. In winter their feeding behavior changes and they feed on berries and fruits. (Roberts 1992). So, their prevalence can be attributed to their remarkable adaptability to a diverse range of terrestrial environments.

Among the species observed, those classified as common, such as the Ayeyarwady Bulbul, Black Drongo, Blue-tailed Bee-eater, Cinnamon Bittern, Little Cormorant, Red vented Bulbul, Red-wattled Lapwing, and White-throated Babbler. On the other, very common species like the Common Myna, Green Bee Eater, House Crow, House Sparrow, House Swift, Large-billed Crow, Rock Pigeon, Vinous Breasted Myna, and White-vented Myna. In contrast, the Asian Koel, Asian Openbill, Cattle Egret, Common Iora, Common Tailorbird, Greater Coucal, Intermediate Egret, Little Egret, Oriental Magpie Robin, Spotted Owlet, and White Throated Kingfisher are recorded as rare and uncommon in the proposed study area.

In the study of avian populations along distinct transect lines, it evident that a majority of bird species are prominently observed along the expanse of transect line-1, which closely follows the course of the Ayeyarwady river bank. Conversely, the analysis data reveals that transect lines 2 and 3 exhibit relatively lower levels of avian density. This investigation shown the distribution patterns of bird species along these transects, particularly accentuating the prevalence of avian life in the transect line-1 which traces along the Ayeyarwady river bank.

The assessment of avian diversity and conservation status in the study area involves a analysis based on various indices. The Margalef Richness Index Value indicating the richness of bird species, with observed values reflecting level of species richness. The Shanon-Weiner Diversity Index (H') underscores a moderate level of species diversity within the study region. Meanwhile, the Simpson's Index of Diversity (D) signifies a robust and diverse array of avian species present.

In terms of conservation status, it is noteworthy that all species have been categorized as "least concern" according to the IUCN Red List, indicating a stable outlook for these avian populations. According to the list of Protected Animals by The Forest Department, designates certain species for distinct levels of protection. Notably, species such as the Asian Openbill, Black Drongo, Red-wattled Lapwing, Spotted Owlet, White-throated Kingfisher, and White-throated Babbler have been granted full protection status, emphasizing the significance of safeguarding their populations. Additionally, species including the Blue-tailed Bee-eater, Cattle Egret, Cinnamon Bittern, Green Bee Eater, Intermediate Egret, Little Egret, Vinous-breasted Myna, and White-vented Myna hold a protected status under regulations. Further species emerge in the seasonal protection status, wherein species like the Asian Koel, Little Cormorant, Oriental Magpie Robin, and Red-vented Bulbul are recognized as seasonally protected animals.

In summary, the research outcomes illuminate significant associations between bird species and their respective habitats. The Ayeyarwady River-adjacent habitat (Line-1) emerges as a critical site of avian diversity, reinforcing and providing the importance of this habitat's ecological characteristics. This study underscores the intricate interplay between habitat attributes and bird populations, shedding light on the delicate balance that governs their distribution and abundance.

4.5.4.2.8 Phytoplankton, Zooplankton and Benthic Macroinvertebrates

Introduction

Freshwater phytoplanktons occur in freshwater ecosystems. It can be distinguished between limnoplankton (lake phytoplankton), heleoplankton (phytoplankton in ponds), and potamoplankton (river phytoplankton). They differ in size as the environment around them changes (Reynolds, 1984).

Hans (1998) reported that phytoplankton and zooplankton are two of the common biological parameters collected because they form the base of the aquatic food web and influence other aspects of the lake including color and clarity of the water. Phytoplanktons are microscopic plants that are an integral part of the lake and river community. Phytoplankton use nutrients in water and sunlight to grow and are the base of the aquatic food web. Plankton forms the first ring of food chain in aquatic environment affecting the efficiency of this environment. Phytoplankton species are used as an indicator for determining the nutrient level which is the basis for preparing and monitoring the strategies of the management in the aquatic ecosystem. Phytoplankton are widely present in freshwater environments, such as lakes and rivers, where they are typically present as microorganisms-visible only with the aid of a light microscope. They have a major importance in the freshwater environment, both in terms of fundamental ecology and in relation to human use of natural resources (Bellinger and Sigeo, 2010).

Zooplankton communities are typically diverse and occur in almost all lakes and ponds. Zooplanktons are tiny animals that feed on phytoplankton and other zooplankton. They are vital to the aquatic community and form the second level in the food web. Major group of zooplankton are rotifers, copepods and cladocerans. Among them, rotifers are smallest of the three. They are important in the aquatic food web because of their abundance, distribution and wide range of feeding habits. Rotifers are important food for most fish and prawn (Singh, 2014). Copepods and cladocerans are larger zooplankton and members of the class Crustacean. Copepods are the most diverse group of crustaceans (Hans, 1998). Rotifers are represented 99.4% of the zooplankton community in eutrophic water body (Jose De Paggi, 1976).

4.5.4.2.8.1 Materials and Methods

4.5.4.2.8.1.1 Study Area

Study area is located in Taungtha Township, Myingyan District in Mandalay Region. Two study sites are designated to collect the specimens at the bank of the

Ayeyarwady River near Western Part of Kyawzi Village and Malar Village. Specimens sample collection are shown in Figure 4-91. The coordinate points of the study area are shown in Table 4-73.

Table 4-73 Location points of the study area for Phytoplankton, Zooplankton and Benthic Macroinvertebrates

Study Site	Coordinates	Description
Site I	21°18'39.23"N 95°10'1.27"E	Ayeyarwady River bank, Western Part of Kyawzi Village, Taungtha Township, Myingyan District, Mandalay Region
Site II	21°18'7.30"N 95° 8'42.98"E	Ayeyarwady River bank, Western Part of Malar Village, Taungtha Township, Myingyan District, Mandalay Region



Figure 4-91 Specimens Sample Collection Photos

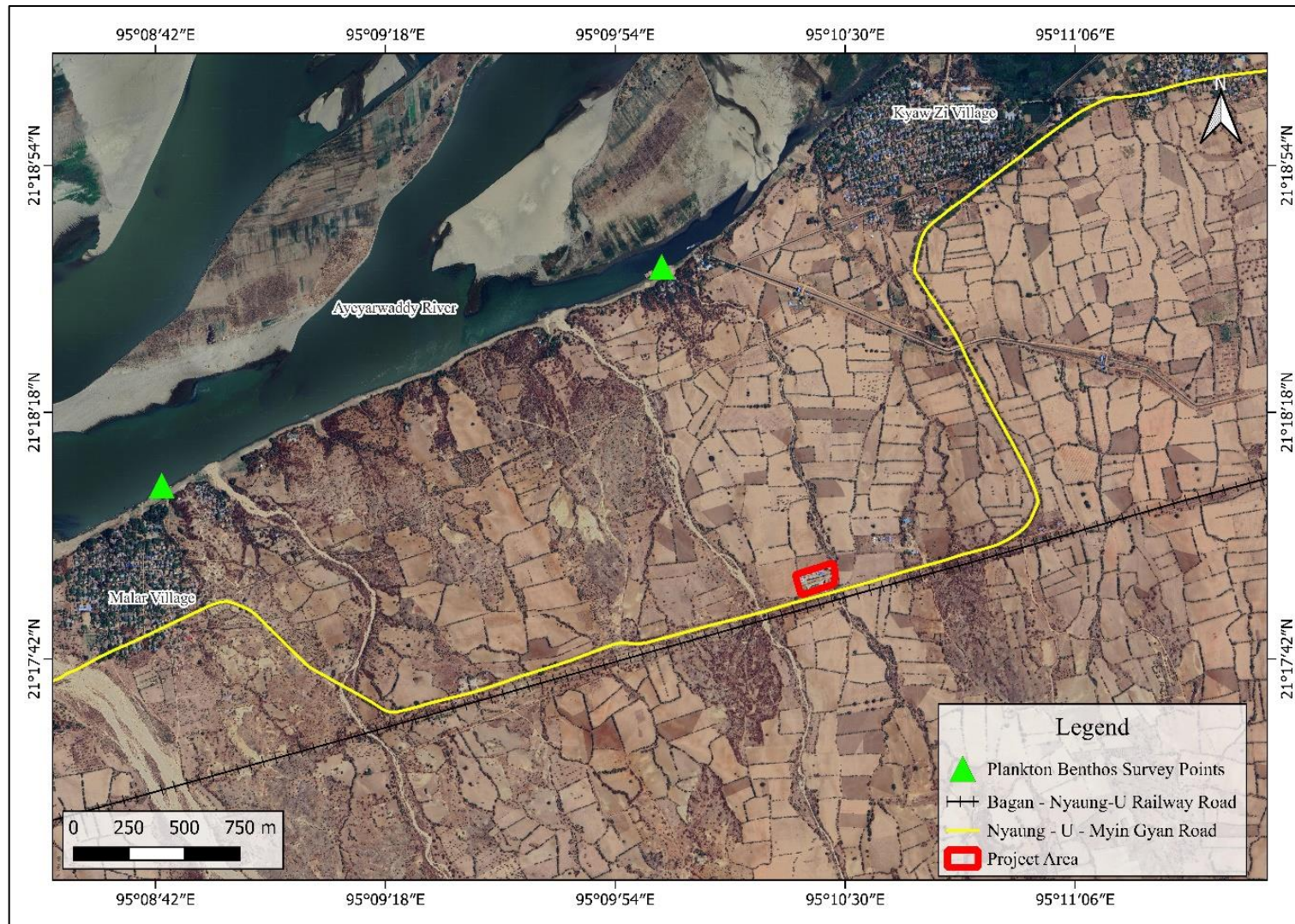


Figure 4-92 Map of study area for Phytoplankton, Zooplankton and Benthic Macroinvertebrates

4.5.4.2.8.1.2 Study period

This study was carried out in 1st May, 2023 during the dry season.

4.5.4.2.8.1.3 Method of Sample Collection and Identification

Two study sites are designated to collect the specimens at the bank of the Ayeyarwady River near Western Part of Kyawzi Village and Malar Village, Taungtha Township, Myingyan District, in Mandalay Region. (Figure. 1). When collection the sample, the plankton net has to pull horizontally along with the water surface by using plankton with (75) cm length and (30) cm width, the mesh size of (30) micro-meter. Water samples containing microorganisms were collected during 7:00 – 8:00 am by using the plastic basket and then put into one-liter plastic bottle.

The plastic bottle containing water samples were opened and then allowed to settle for sedimentation about four hours. The supernatant water was removed and the remaining water including sediment was put into the beaker. The water sample (one drop) in beaker was collected with micropipette and placed on a glass slide and then covered by cover slip for the observation of microorganisms. Examination of water sample was done at least 20 slides under light microscope for each site. Water samples containing microorganisms were preserved in 4% formalin solution.

Microorganisms were examined using a compound microscope (CE DA1 – 180M) under various magnifications of x40, x100 and x400. Taxonomic determination of microorganisms was performed with a light microscope on living materials and photomicrographs were taken with microscope (CE DA 1 -180M).

Identification of specimens

Identification was done based on the specimen size, color, and microscopical features. Identification and classification of the collected species followed that of Bellinger and Sigeo (2010), Desikachary (1959), Otsuka *et al.* (2000) and classification of zooplankton was followed by Singh *et al* (2014).

Data Analysis

Data entry was done by using Microsoft excel and analysis was done species composition, and occurrence.

Species Composition

$$SpeciesComposition = \frac{Total\ number\ of\ specie\ particular\ family/order}{Total\ number\ of\ all\ species\ recorded} \times 100$$

Results of Phytoplankton and Zooplankton

During the study, (8) species of phytoplankton belonging to (7) genera, (7) families, (5) orders and (3) classes under (3) phyla, namely Chlorophyta, Euglenophyta and Cyanophyta. For zooplankton, (8) species of zooplanktons belonging to (8) genera, (6) families, (2) orders, and (2) classes under (2) phyla, namely Arthropoda and Rotifera were observed. List of recorded species of phytoplankton and zooplankton was shown in Table 4-74.

In this study, the largest number of species (14) was recorded in Site (I). (Table. 3 and Figure. 2). The highest composition of species was recorded in Phylum Rotifera (38%), followed by Chlorophyta (25%), Arthropoda (13%), Cyanophyta (12%) and Euglenophyta (12%). The results are shown in Table 4-75. The occurrence of the collected species are shown in Figure 4-93, Figure 4-94 and Figure 4-95.

Table 4-74 List of Recorded Microorganisms

No .	Phylum	Class	Order	Family	Genus / Species
1	Chlorophyta	Chlorophyceae	Chlorococcales	Coelastraceae	<i>Coelastrum</i> sp.
2				Hydrodictyaceae	<i>Pediastrum</i> sp.
3				Scenedesmaceae	<i>Scenedesmus</i> sp.
4			Zygnematales	Zygnemataceae	<i>Spirogyra</i> sp.
5	Euglenophyta	Euglenophyceae	Euglenales	Euglenaceae	<i>Euglena viridis</i>
6					<i>Euglena areuginosa</i>
7	Cyanophyta	Cyanophyceae	Oscillatoriales	Oscillatoria	<i>Oscillatoria</i> sp.
8			Chroococcales	Chroococcaceae	<i>Microcystis</i> sp.
9	Arthropoda	Copepoda	Cyclopoida	Cyclopidae	<i>Mesocyclops leuckarti</i>
10					<i>Microcyclops</i> sp.
11	Rotifera	Monogononta	Ploima	Brachionidae	<i>Keratella cochlearis</i>
12					<i>Branchionus faleatus</i>
13				Lecanidae	<i>Monostyla bulla</i>
14				Trichocercidae	<i>Trichocerca similis</i>
15				Notommatidae	<i>Monomata</i> sp.
16				Synchaetidae	<i>Polyarthra vulgaris</i>

Table 4-75 Occurrence of Recorded Microorganisms

Genus/ Species	Site I	Site II
<i>Pediastrum</i> sp.	✓	✓
<i>Scenedesmus</i> sp.	✓	✓
<i>Microcystis</i> sp.	✓	-
<i>Oscillatoria</i> sp.	✓	-
<i>Euglena viridis</i>	✓	✓
<i>Euglena areugenosa</i>	✓	-
<i>Coelastrum</i> sp.	✓	✓
<i>Spirogyra</i> sp.	✓	✓
<i>Brachionus falcatus</i>	✓	-
<i>Keratella cochlearis</i>	✓	✓
<i>Monostyla bulla</i>	-	✓
<i>Trichocerca iernis</i>	✓	-
<i>Polyarthra vulgaris</i>	-	✓
<i>Monommata</i> sp.	✓	✓
<i>Mesocyclops leuckarti</i>	✓	-
<i>Microcyclops</i> sp	✓	✓
Total	14	10

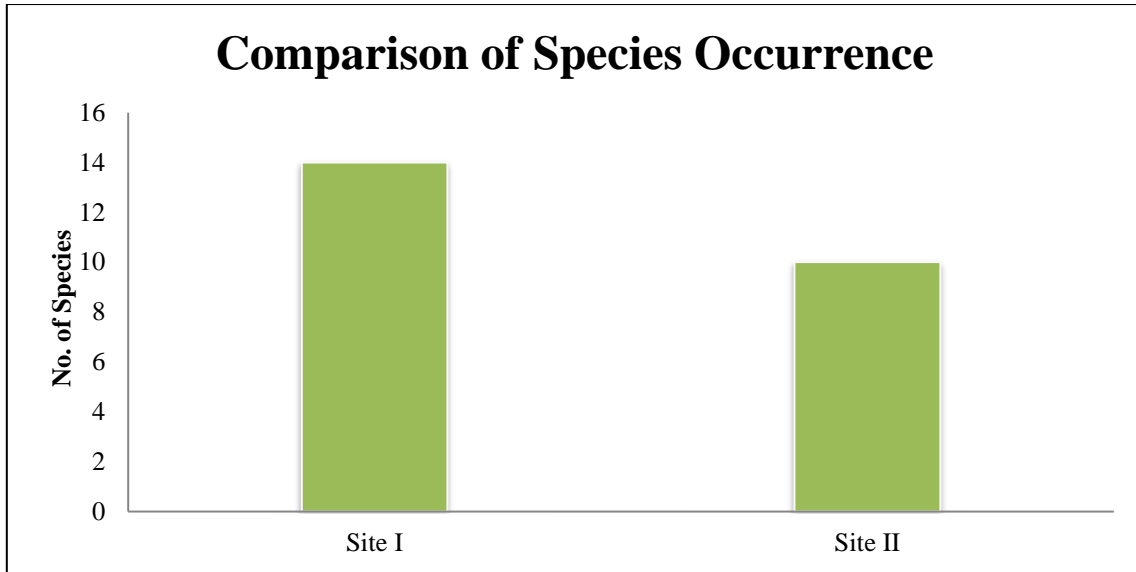


Figure 4-93 Comparison of Species Occurrence of Phytoplankton and Zooplankton

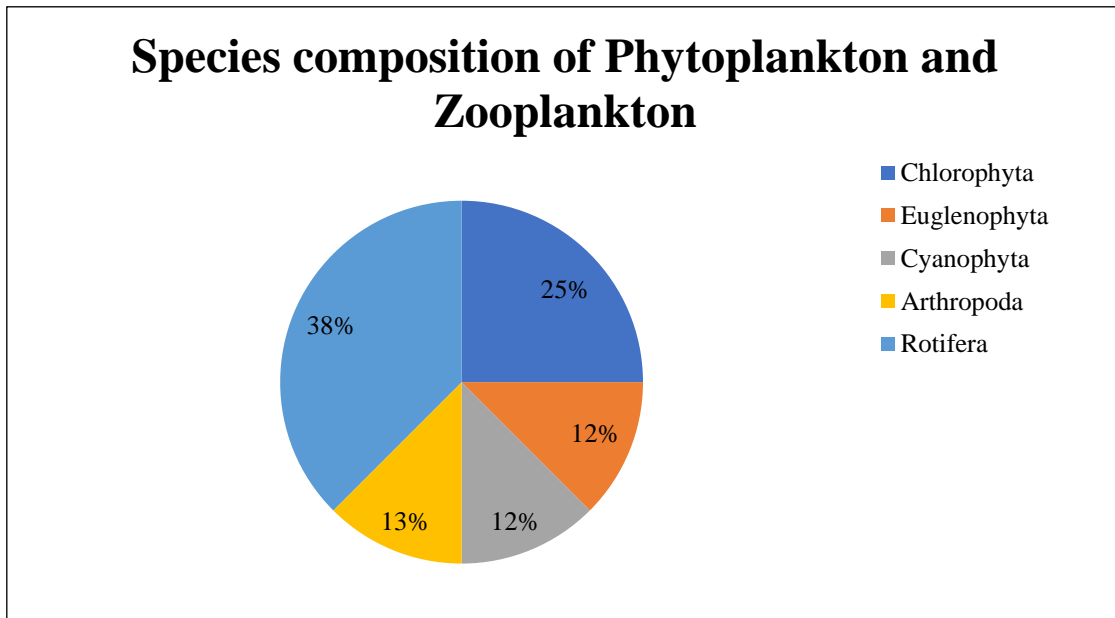
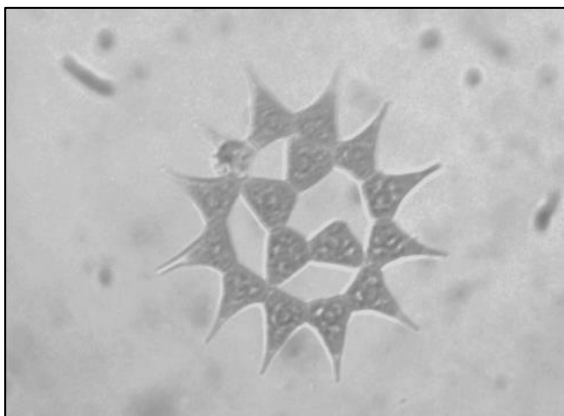


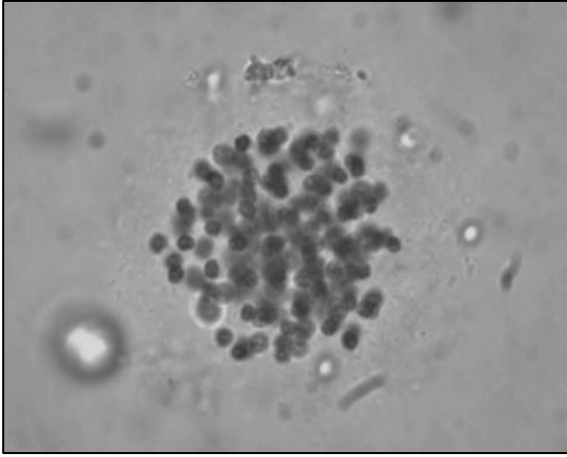
Figure 4-94 Species Composition of Phytoplankton and Zooplankton



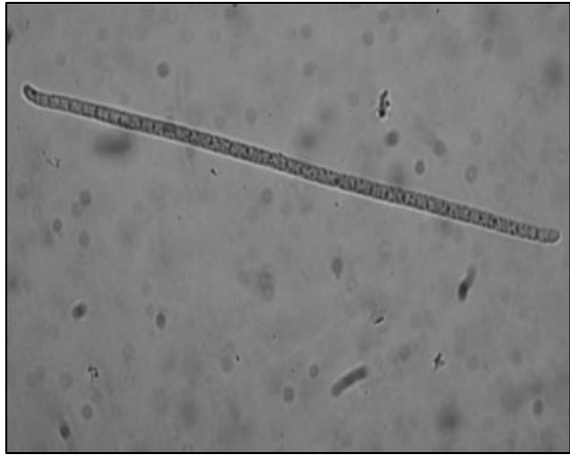
Pediatrum sp.



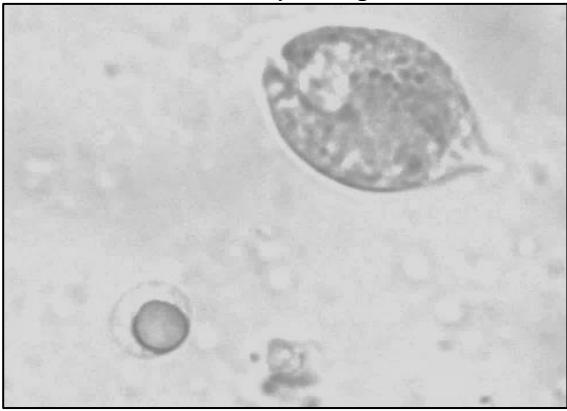
Scenedesmus sp.



Microcystis sp.



Oscillatoria sp



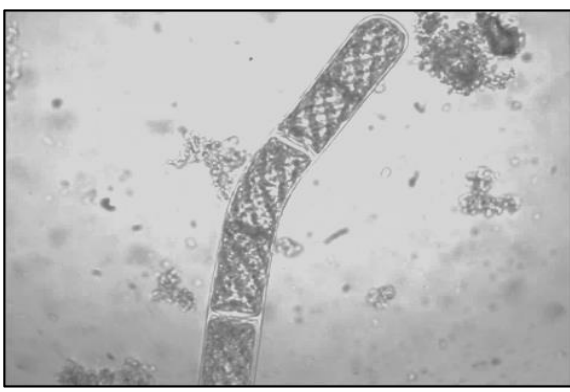
Euglena viridis



Euglena areugenosa



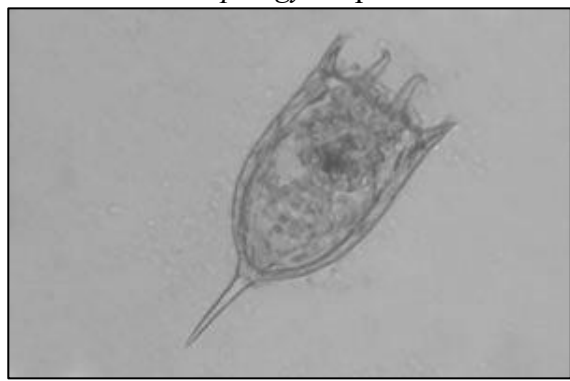
Coelastrum sp



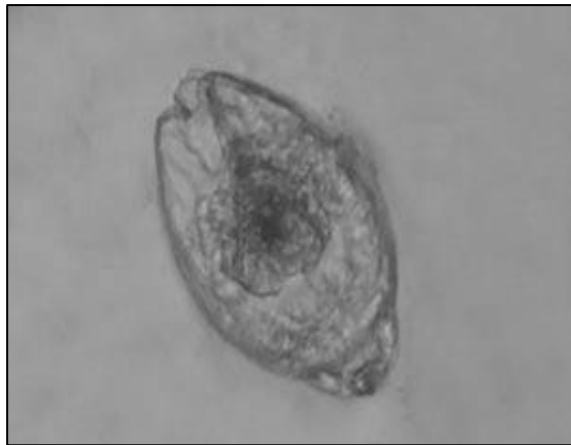
Spirogyra sp



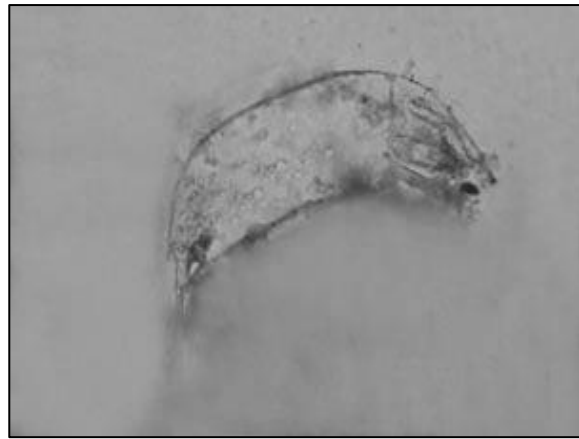
Brachionus falcatus



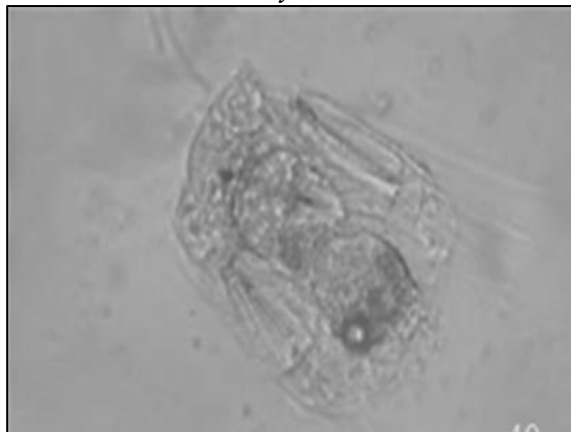
Keratella cochlearis



Monostyla bulla



Trichocerca iernis



Polyarthra vulgaris



Monommata sp.



Mesocyclops leuckarti



Microcyclops sp.

Figure 4-95 Recorded Phytoplankton and Zooplankton in Site I and II

4.5.4.2.8.1.4 Discussion and Conclusion

The present study investigated the occurrence of microorganisms in two sample collection sites near Western Part of Kyawzi Village and Malar Village, Taungtha Township, Myingyan District, in Mandalay Region. In this work, many microorganisms such as phytoplanktons and zooplanktons were recorded from two sample collection sites.

Under phylum Rotifera and Arthropoda, cladoceran, copepods and rotifers were recorded in this work. The highest composition of species was recorded in Phylum Rotifera (38%), followed by Chlorophyta (25%). In this study, the largest number of species (14) was

recorded in Site (I). Herzig (1987) reported that rotifers are group of primary freshwater invertebrates. Rotifers play a vital role in many freshwater ecosystems. They also serve as an essential food source for invertebrate and vertebrate predators. Singh *et al* (2014) also reported rotifers are important part of the freshwater zooplankton being a major food source for aquatic organisms such as fish and prawn.

In the present study, four genera of Chlorophyta such as *Pediastrum* sp., *Coelastrum* sp., *Spirogyra* spp. and *Scenedesmus* sp. were recorded in site I and Site II. The presence of microalgae in natural and artificial water bodies has been frequently reported from different regions of the world. Microalgae are primary producers at the base of food web of an aquatic ecosystem. On the other hand, microalgae are live foods for zooplankton and fishes. Some microalgae and filamentous algae are useful as natural food, live food and supplemental food for fishes in freshwater ecosystem (Hans, 1998).

The most common physical water quality indicators are dissolved oxygen, water temperature and pH. The water quality of unpolluted water bodies depends on the local geological, biological and climatological condition. Individual aquatic organisms have different requirements with respect to these physical and chemical characteristics of a water body (White, 2005). The pH is a measure of acidity or alkalinity of water. The pH scale ranged from 0 to 14. The pH scale 7 is neutral. For water supply, that is used as a drinking supply should have its pH adjusted to between 6 and 8 for aquatic microorganisms (Shapiro, 2006). During the study period, pH values of water ranged between 7.5 and 8.0 in two sample collection sites, at the bank of the Ayeyarwady River near Western Part of Kyawzi Village and Malar Village. This finding show pH value of water is suitable for aquatic microorganisms and water supply.

4.5.4.2.9 Benthic Macroinvertebrates (Snails and Mussels)

Introduction

Benthic macroinvertebrates provide a more precise understanding of changes in aquatic conditions when compared to chemical and microbiological data, which rather present short-term fluctuations (Addo-Bediako et al. 2018). Benthic macroinvertebrates are a highly diverse faunal group that inhabit many niches and habitats in freshwater systems. The distribution of macroinvertebrate taxa across a river system is mainly dependent on the availability of microhabitats and food resources. In addition, their distribution also is influenced by the interactions among habitat characteristics, physicochemical variables, structural and hydrological characteristics, and by human activities. Therefore, changes in water body characteristics, habitat, and environmental resources can strongly influence patterns of distribution in benthic communities (Buss et al. 2002).

Many studies have used macroinvertebrate abundance and richness (e.g. family richness) to detect environmental responses because of their variable sensitivity towards multiple disturbances (Rasifudi et al. 2018). Thus, changes in the macroinvertebrate composition and community structures can be used to establish environmental alterations in rivers. Freshwater snails are gastropods that live in fresh water. There are many different families. They are found throughout the world in various habitats, ranging from ephemeral

pools to the largest lakes, and from small seeps and springs to major rivers. The great majority of freshwater gastropods have a shell, with very few exceptions. Some groups of snails that live in freshwater respire using gills, whereas other groups need to reach the surface to breathe air (Gargominy et al, 2008). Mussel, any of numerous bivalve mollusks belonging to the marine family Mytilidae and to the freshwater family Unionidae. The Unionidae are a family of freshwater mussels, the largest in the order Unionida, the bivalve molluscs sometimes known as river mussels, or simply as unionids. The range of distribution for this family is world-wide. It is at its most diverse in North America, with about 297 recognized taxa, but China and Southeast Asia also support very diverse faunas. Freshwater mussels occupy a wide range of habitats, but most often occupy lotic waters, i.e. flowing water such as rivers, streams and creeks. (Huber, Markus, 2010). Benthic macroinvertebrates (Snail and mussels) are studied to identify and record. They are found in the Ayeyarwady River, near project area, to assess the existing species for the ecological assessment.

4.5.4.2.9.1 Study area and Study period

Study area and study period for snail and mollusks are shown in materials and methods of phytoplankton and zooplankton.

4.5.4.2.9.2 Method of Sample Collection and Identification

The snails were collected using two methods: hand picking and scooping. While conducting the sample collection, the surveyor wore rubber gloves to reduce the chances of coming into contact with the snails or any of their excretions, which could cause a parasitic or bacterial infection. The collected snails and mussels are put into plastic containers for macroscopic identification.

Identification was done based on the specimen size, color, and morphological features. Identification and classification of the collected species followed that of Burnhill (2006).

4.5.4.2.9.3 Species Composition

A total of 10 species distributed under (5) genera, (5) families and (5) orders were identified and recorded during this study. List of recorded species are shown in Table 1.

The highest composition of species was recorded in order Neotaenioglossa (40%), followed by Unionida (30%), Venerida (10%), Architaenioglossa (10%), Unionida (30%) and Hygrophila (10%). With respect to the number of species encountered at each study site, the largest number of species (6) was encountered in Site (I), followed by those of Site (II). Species occurrence of the study area is shown in Figure 4-96, Figure 4-97, and Figure 4-98. Result of collected species are shown in Table 4-76 and Table 4-77.

Table 4-76 List of recorded species found in two sample collection sites

No.	Phylum	Class	Order	Family	Genus/Species
1	Mollusca	Bivalvia	Venerida	Cyrenidae	<i>Corbicula</i> sp.

No.	Phylum	Class	Order	Family	Genus/Species
2			Unionida	Unionoidae	<i>Lamellidens</i> sp.1
3					<i>Lamellidens</i> sp.2
4					<i>Lamellidens</i> sp.3
5			Gastropoda	Architaenioglossa	Viviparidae
6		Neotaenioglossa		Thiaridae	<i>Melanoides</i> sp. 1
7					<i>Melanoides</i> sp. 2
8					<i>Melanoides</i> sp. 3
9					<i>Melanoides</i> sp. 4
10		Hygrophila		Lymnaeidae	<i>Peregriana peregra</i>

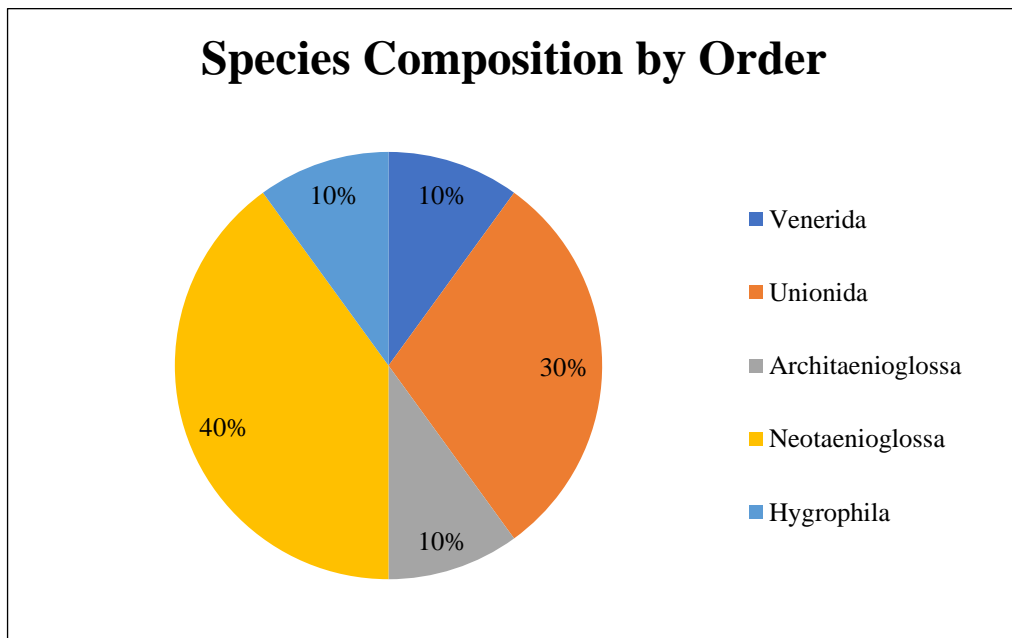


Figure 4-96 Species composition by order of snails and mussels

Table 4-77 Occurrence of Recorded Species found in Two Sample Collection Sites

Species	Site I	Site II
Corbicula sp.	-	✓
Lamellidens sp.1	✓	-
Lamellidens sp.2	✓	-
Lamellidens sp.3	-	✓
Viviparus sp.	✓	-
Melanoides sp. 1	✓	-
Melanoides sp. 2	✓	-
Melanoides sp. 3	-	✓
Melanoides sp. 4	-	✓
Peregriana peregra	✓	✓
Total	6	5

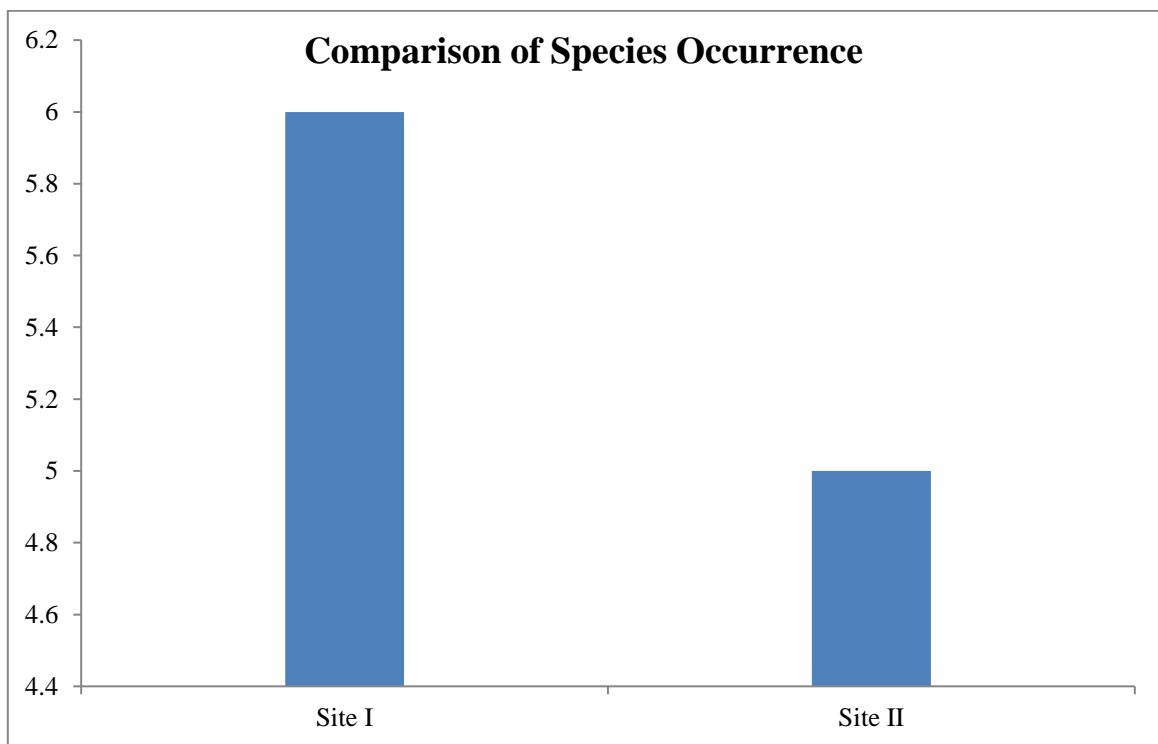


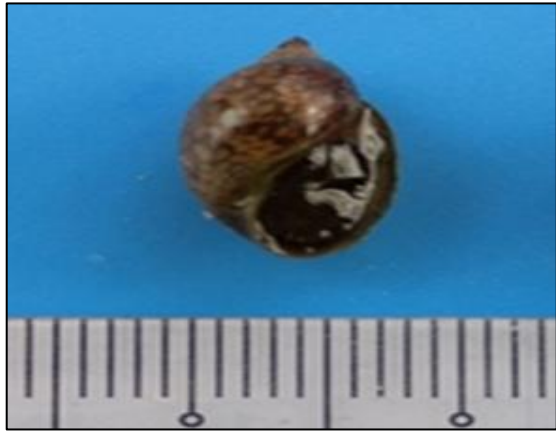
Figure 4-97 Comparison of species occurrence of snail and mussels

4.5.4.2.9.4 Recorded snails and mussels

	
<p><i>Lamellidens sp.1</i> (Dorsal View)</p>	<p><i>Lamellidens sp.1</i> (Ventral View)</p>
	
<p><i>Lamellidens sp.2</i> (Dorsal View)</p>	<p><i>Lamellidens sp.2</i> (Ventral View)</p>
	
<p><i>Viviparus sp.</i> (Dorsal View)</p>	<p><i>Viviparus sp.</i> (Ventral View)</p>



Lymnaea peregra (Dorsal view)



Lymnaea peregra (Ventral view)



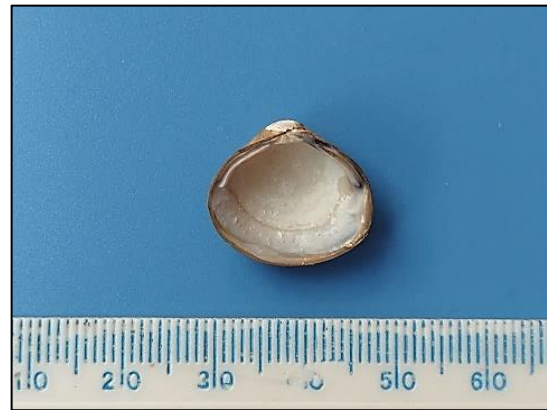
Melanoides sp.1



Melanoides sp.2



Corbicula sp. 1 (Dorsal View)



Corbicula sp. 1 (Ventral View)

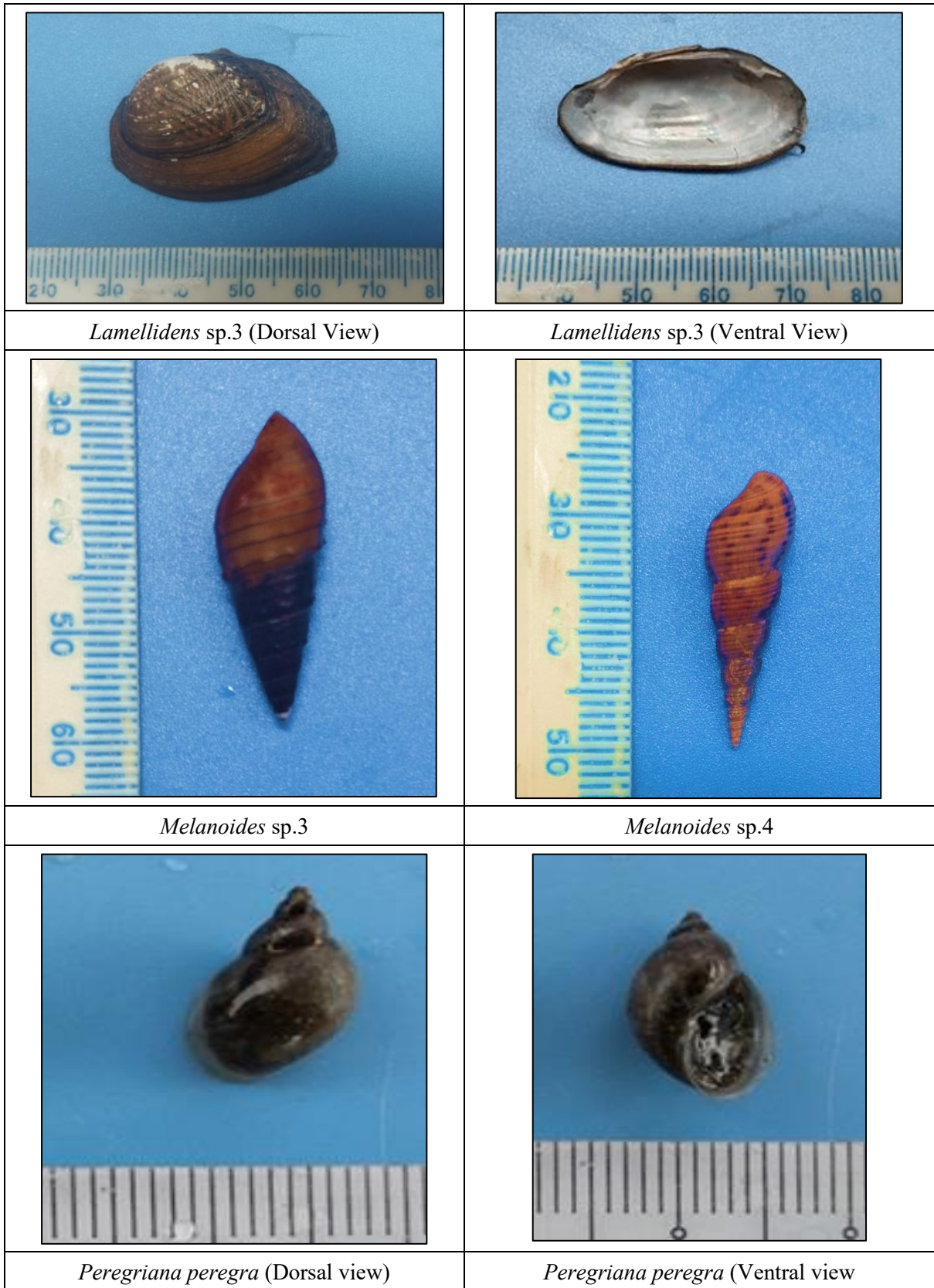


Figure 4-98 Photos of Recorded Snails and Mussels

4.5.4.2.9.5 Discussion and Conclusion

In the present study, *Lamellidens* sp.1, *Lamellidens* sp.2, *Viviparus* sp., *Melanoides* sp. 1, *Melanoides* sp. 2 and *Peregriana peregra* are found in Site I. *Corbicula* sp., *Lamellidens* sp.3, *Melanoides* sp. 3, *Melanoides* sp. 4 and *Peregriana peregra* are found in Site II.

Bivalve mollusk that inhabits freshwater rivers and ponds and lakes. It burrows in a furrow in sand with the help of a hatchet-shaped foot, keeping the inhalant and exhalent siphons above the sandy surface for maintaining a current of water. Lewin (2014) reported freshwater gastropods, which are hololimnic organisms, have limited mobility and therefore could be used as bioindicators of changes in their habitats. They reflect the abiotic or biotic state of water habitats, which represents the impact of environmental changes on the habitat, the community and the ecosystem.

In this study, recorded snails and mussels are found in the sandy bank area of the Ayeyarwady River. Study Site I and Site II are located at the bank of the Ayeyarwady River near Western Part of Kyawzi Village and Malar Village where anthropogenic activities (fishing, solid wastes, wastewater, and environmental disturbance activities) are found. Anthropogenic activities in the river might have a negative impact leading to habitat change of freshwater snails and mussels. It can be concluded that the habitats, feeding grounds, nesting sites of aquatic organisms like snails and mollusks are affected by human activities.

4.5.4.2.10 Fish

Introduction

Freshwater capture fisheries (harvest from wild stocks in inland waters) provide income and nutrition for hundreds of millions of people worldwide (FAO 2014). In Myanmar, fishes are economically important for people consumption as well as for livelihood of fishermen. Main food of Myanmar is rice and the second is fish in the diet because of its high protein. Therefore, fish and fish products are repeated references to the crucial importance in the nutrition of Myanmar people. People fish more and more for consumption and their livelihood.

Fishes occupy a significant position in the socio- economic fabric of the south and south East Asia countries by providing the population not only the nutritious food but also income and employment opportunities. The livelihood of over 500 million people in developing countries depends on fisheries and aquaculture directly or indirectly. 508 freshwater fishes and 518 marine species are known to inhabit Myanmar waters. Fishes form one of the most important groups of vertebrates, influencing its life in various ways. Fish diet provides protein, fats and vitamins A and D. A large amount of phosphorous and other elements are also present in it. They have a good taste and are easily digestible (Humbe *et al.*, 2014).

The fish constitute one of the main food items of substance for many people of Myanmar. They provide a staple diet and supplement of protein. Fish constitute almost half of the total number of vertebrates of world (Jayaram, 2013). Myanmar is rich in fish fauna both inland freshwater and marine water. Myanmar fish fauna was investigated by scientists from

both abroad and local temporally and spatially. According to Fishbase (2022) 525 species were listed in the check list of Myanmar.

A variety of river, lake and high estuary ecosystems supports rich fish diversity, the true scope of which has only recently begun to be understood (Rainboth, 1996). Freshwater is one of the most important natural resources and there is no substitute for it. River and floodplain resources are exploited largely by people living along the river. Freshwater fisheries and aquaculture are considered as important section in the national economy.

Overfishing and illegal use of fishing gear is therefore considered the biggest threat to the fishes in relative areas. For the proper management of natural resources, it is needed the information on the number of species and their identification (Kottelat, 2013).

In the present study, Site I and Site II are located at the bank of the Ayeyarwady River near Western Part of Kyawzi Village and Malar Village and the fish from two study sites is caught by local fishermen from Ayeyarwady River.

4.5.4.2.10.1 Materials and Methods

Study Area

There are two study sites in this study. Site I and Site II are located at the bank of the Ayeyarwady River near Western Part of Kyawzi Village and Malar Village in Taungtha Township, Myingyan District in Mandalay Region.

Study Period

This study was carried out in 1st May, 2023 during the dry season.

Study Design and Data Collection

Fishes were collected from two study sites, site I and site II during hot season. The fishes were collected with the help of the local fishermen by implementing fishing gears in two sampling sites. Different types of fishing gears were utilized in this sample sites depending on the size of fishes as size varied from species to species. Specifically, 1/8– 1/4-inch fishing net, 1/2 – 3/4-inch fishing net and 1 – 1 1/2 inches fishing net are used to catch fishes.

The length, body weight and morphometric characteristics were collected for at least two individual specimens from each species. The collected specimens were examined and recorded by photographed immediately before the body natural color disappeared. The local names of the species studied were also noted down as informed by the local fishermen. Then, specimens were preserved in 10% formalin and if the specimens were larger, 10 % formalin were injected on the side of the abdomen for identification of fish.

Identification of specimens

Identification and classification of the collected fish species were made according to Jayaram (2013), Talwar and Jhingran (1991) and Fishbase (2022).

Data Analysis

Data entry was done using Microsoft excel and analysis was done using species composition, and occurrence.

$$SpeciesComposition = \frac{Total\ number\ of\ specie\ particular\ family/order}{Total\ number\ of\ all\ species\ recorded} \times 100$$



Figure 4-99 Photos of Fishing gears and measurement photos

4.5.4.2.10.2 Field Survey Results of Fish Species

A total number of 20 fish species were observed the most at site I, followed by site II with 17 species. (Figure. 1 and Table 1). List of Fish Observed in Study Site I and Site II and IUCN status are shown in Table 2. Species Composition at Site I and Site II is shown in Table 4-78 and Figure 4-9.

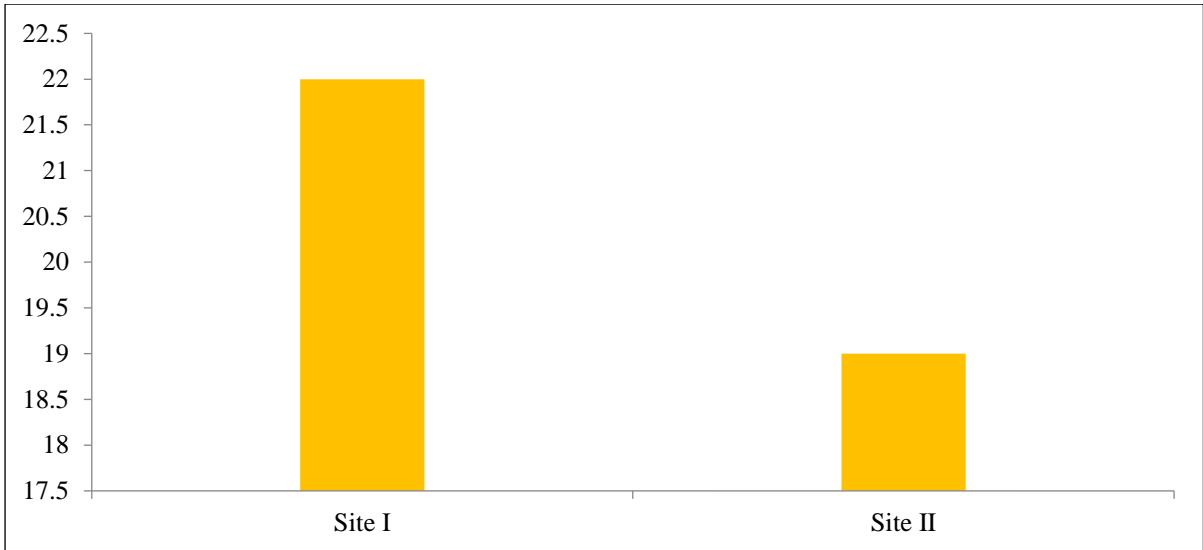


Figure 4-100 Occurrence of Fish Species at Different Sites

Table 4-78 Classification of recorded fish species in Site I and Site II

No.	Order	Family	Scientific Name	Common Name	Local Name	
1	Osteoglossiformes	Notopteridae	<i>Notopterus notopterus</i>	Bronze Feather back	Nga-phe	
2	Clupeiformes	Cluperidae	<i>Gudisia variegata</i>	Burmese river shad	Nga-La-bi bay gar	
3	Cypriniformes	Cyprinidae	<i>Gibelion catla</i>	Catla	Hin-ngan	
4			<i>Labeo calbasu</i>	Black rohus	Nga-net-pyar	
5			<i>Labeo bago</i>	Bago labeo	Nga-Luu	
6			<i>Osteobrama belangeri</i>	Manipur osterobrama	Nga-phant-wine	
7			<i>Osteobrama cunma</i>	Cunma osteobrama	Nga-lay-daung	
8			<i>Cirrhinus mrigala</i>	Mrigal	Nga-gyin phyu	
9			<i>Raiamas guttatus</i>	Burmeses trout	Nga-La-war	
10			<i>Systomus sophore</i>	Spotfin Swamp barb	Nga-khon-ma	
11			Cobitidae	<i>Lepidocephalichthys thermalis</i>	Mulabar-loach	Nga-tha-le-doe
12			Siluriformes	Bagridae	<i>Mystus cavasius</i>	Genetic mystus
13	<i>Mystus pulcher</i>	Genetic mystus pulcher			Nga-zin-yaing kyet-chay	
14	<i>Mystus leucophasis</i>	Sittaung mystus			Nga-nount-thwar	
15	<i>Sperata aor</i>	Long whiskered catfish			Nga-gaung	
16	Siluridae	<i>Ompok bimaculatus</i>		Indian Butter Catfish	Nga-Nu-than	
17		<i>Wallago attu</i>		Boal	Nga-but	
18	Sisoridae	<i>Bagarius yarrelli</i>		Goonch Freshwates Shark	Nga-maung-ma	
19	Mugiliformes	Mugilidae		<i>Rhinomugil corsuta</i>	Corsula mullet	Nga-zin-lone
20	Perciformes	Cichlidae	<i>Oreochromis sp.</i>	Talapia	Sa-la-pai	
21		Ambassidae	<i>Parambassis ranga</i>	Indian glassy fish	Nga-zin-zat	
22		Gobiidae	<i>Glossogobius giuris</i>	Tank goby	Ka-tha-boe	

Table 4-79 List of Fish Observed in Study Site I and Site II and IUCN Status

No	Common Name	Scientific Name	Site I	Site II	IUCN Status
1	Bronze Feather back	<i>Notopterus notopterus</i>	✓	-	LC
2	Burmese river shad	<i>Gudisia variegata</i>	✓	✓	LC
3	Catla	<i>Gibelion catla</i>	✓	✓	LC
4	Black rohus	<i>Labeo calbasu</i>	✓	✓	LC
5	Bago labeo	<i>Labeo bago</i>	✓	✓	LC
6	Manipur osterobrama	<i>Osteobrama belangeri</i>	✓	✓	NT
7	Cunma osteobrama	<i>Osteobrama cunma</i>	✓	✓	LC
8	Mrigal	<i>Cirrhinus mrigala</i>	✓	✓	LC
9	Burmeses trout	<i>Raiamas guttatus</i>	✓	✓	LC
10	Spotfin Swamp barb	<i>Systemus sophore</i>	✓	✓	LC
11	Mulabar-loach	<i>Lepidocephalichthys thermalis</i>	✓	✓	LC
12	Genetic mystus	<i>Mystus cavasius</i>	✓	✓	LC
13	Genetic mystus pulcher	<i>Mystus pulcher</i>	✓	✓	LC
14	Sittaung mystus	<i>Mystus leucophasis</i>	✓	✓	LC
15	Long whiskered catfish	<i>Sperata aor</i>	✓	✓	LC
16	Indian Butter Catfish	<i>Ompok bimaculatus</i>	✓	✓	NT
17	Boal	<i>Wallago attu</i>	✓	-	VU
18	Goonch Freshwates Shark	<i>Bagarius yarrelli</i>	✓	✓	VU
19	Corsula mullet	<i>Rhinomugil corsuta</i>	✓	✓	LC
20	Talapia	<i>Oreochromis sp.</i>	✓	-	-
21	Indian glassy fish	<i>Parambassis ranga</i>	✓	✓	LC
22	Tank goby	<i>Glossogobius giuris</i>	✓	✓	LC

Table 4-80 Species Composition at Site I and Site II

No	Order	Site I	Site II
1	Osteoglossiformes	1	0
2	Clupeiformes	1	1
3	Cypriniformes	9	9
4	Siluriformes	7	6
5	Mugiliformes	1	1
6	Perciformes	3	2
Total		22	19

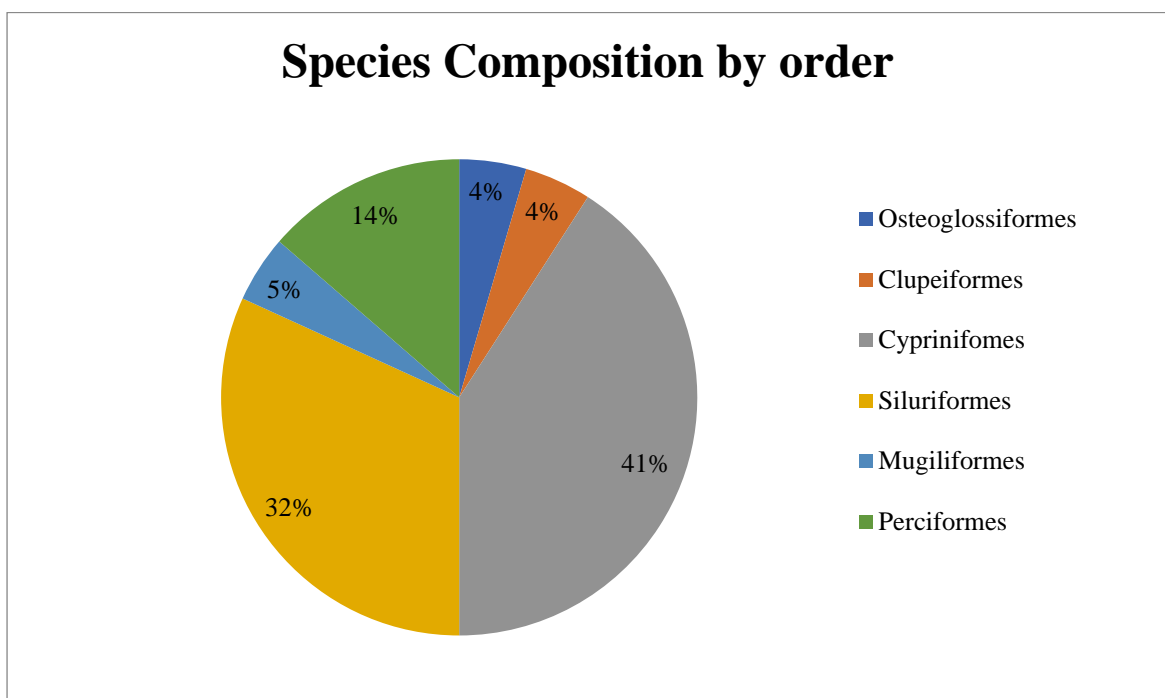
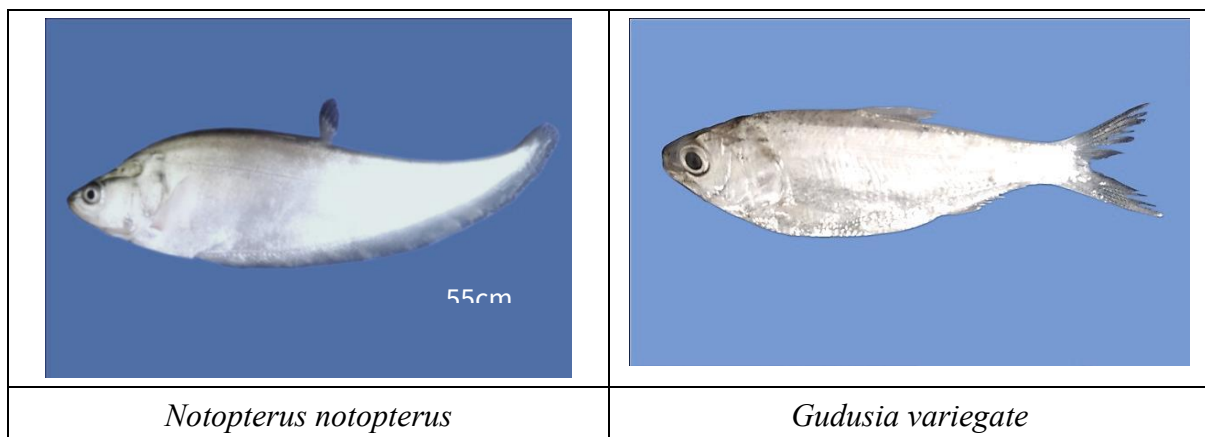

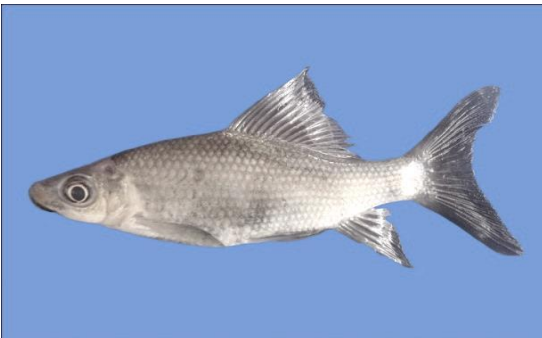

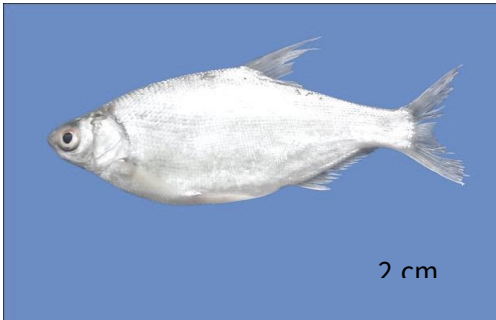
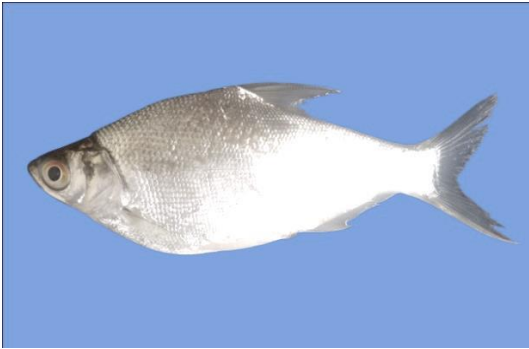
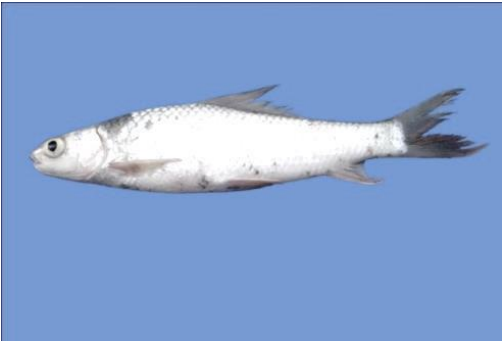


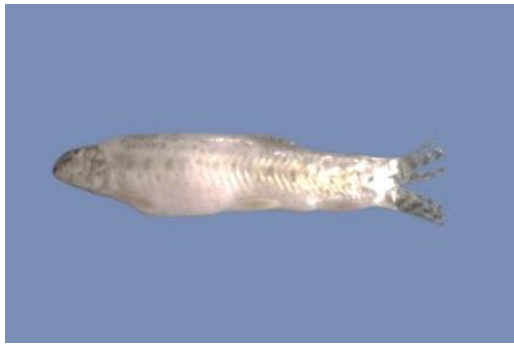
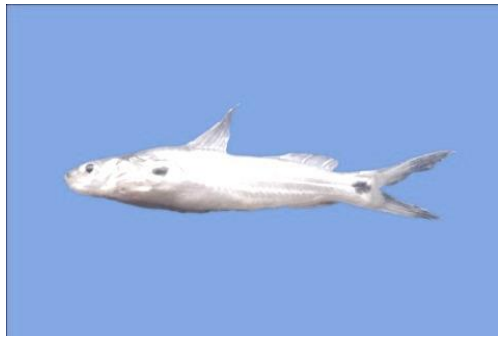
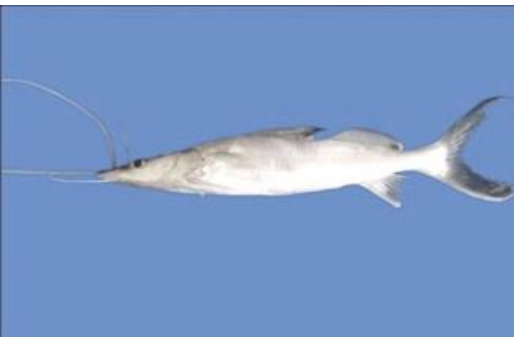

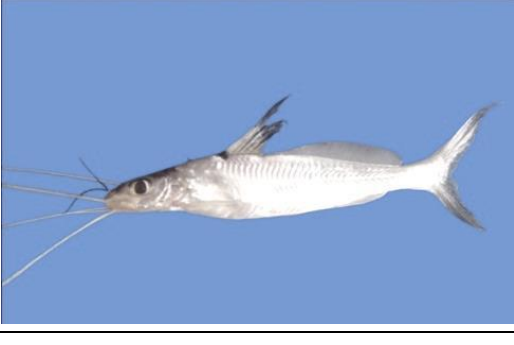
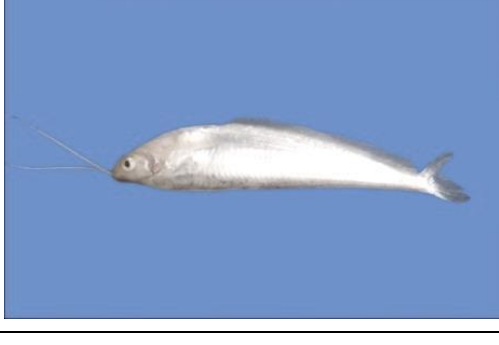
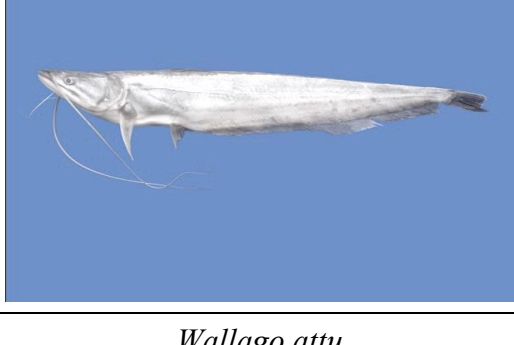



Table 4-81 Species composition of recorded fish species in different order

Recorded Fish Species



	
<p><i>Gibelion catla</i></p>	<p><i>Labeo calbasu</i></p>
	
<p><i>Labeo boga</i></p>	<p><i>Osteobrama belangeri</i></p>
	
<p><i>Osteobrama cunma</i></p>	<p><i>Cirrhinus mrigala</i></p>
	
<p><i>Raiamas guttatus</i></p>	<p><i>Systemus sophore</i></p>

	
<p><i>Lepidocephalichthys thermalis</i></p>	<p><i>Mystus pulcher</i></p>
	
<p><i>Sperata aor</i></p>	<p><i>Mystus leucophasis</i></p>
	
<p><i>Mystus cavasius</i></p>	<p><i>Ompok bimuculatus</i></p>
	
<p><i>Wallago attu</i></p>	<p><i>Bagarius yarrelli</i></p>


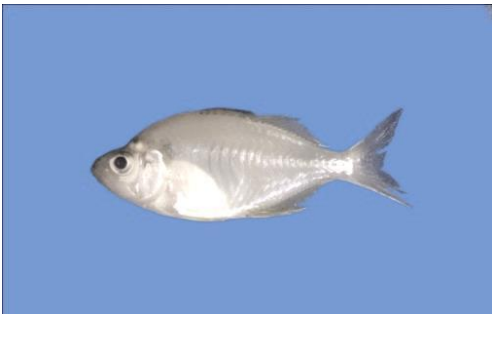
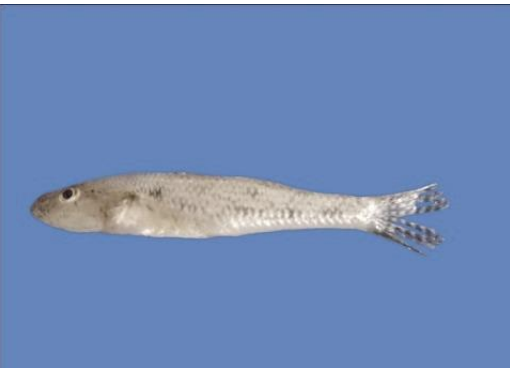
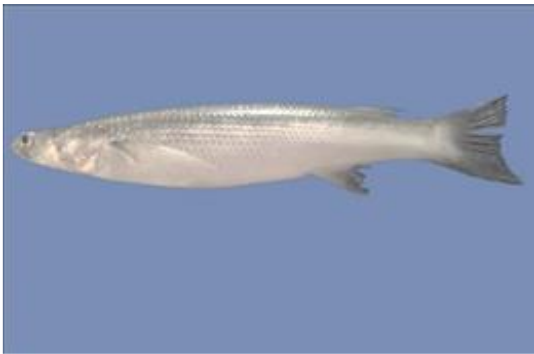
	
<i>Oreochromis sp.</i>	<i>Parambassis ranga</i>
	
<i>Glossogobius giuris</i>	<i>Rhinomugil corsula</i>

Figure 4-101 Photos of Recorded Fish Species

4.5.4.2.10.3 Discussion and Conclusion

A total number of (22) fish species were observed the most at site I, followed by site II with 19 species during the study period.

Among recorded orders, the Order Cypriniformes and Siluriformes are the highest number of fish species. Compare with these two orders, the individual number of species of Cypriniformes is higher than Siluriformes. Various workers reported that the similar result in their studies of fish communities in adjacent country. Bakalial et al (2014) reported that family Cyprinidae was dominant over other families in lower Subansiri River, Northeast India.

During the study period, in of the order Osteoglossiformes, Mugiliformes, Clupeiformes only a single species each was recorded. In the present study, species composition of order Cypriniformes was the most dominant (41%) and the species composition of following order Siluriformes (32%), orders perciformes (14%) and species composition of order Mugiliformes (5%), Osteoglossiformes (4%) and Clupeiformes (4%) were the lowest.

Cypriniformes is the most dominant order holding maximum number of species in percentage when compared to other orders. Talwar and Jhingram (1991) reported that Cypriniformes is the largest order of freshwater fish group.

According to IUCN Red List, *Ompok pabo* and *Osteobrama belangeri* species are nearly threatened and *Wallago attu* species is vulnerable. The fish species recorded from two study sites, the following are considering as economically important fishes including,

Notopterus notopectus, Cirrhinus mrigala, Ompok pabo, Wallago attu, Labeo rohita, Glossogobius giuris. Therefore, it appeared that the study sites provide an important food source for consumers of the local people.

The present finding of the occurrence of fish species from the study area is hoped to knowledge and information for further studies of fish species in relation to environmental effect in natural water resources.

4.6. SOCIO ECONOMIC COMPONENT

This section describes the baseline data to define socio-economic profile and primary survey of the study area. The project area is situated in Taungtha Township, Myingyan District, Mandalay Region, Myanmar.

The socio-economic survey was conducted and 5 members included in the survey team. The survey team was collected the household information, village profile and economic condition from Kyaw Zi village and Malar village which include within 3-kilometer radius of the project site.

The survey team was collected the data for social, cultural and visual characteristics around the project area and project township by using questionnaires and investigation. The 5 team members also involve in survey team and they were collected the historical area, historical building, religious building, shrine, protected area and so on for cultural condition. In addition, the significant landmark, landscaping and view point for visual characteristics was invested during survey.

4.6.1. Field Survey Approach

The primary surveys are undertaken afresh and the field survey team collects data directly from the field. In primary surveys, the survey team has got the liberty to set the goals for procuring the relevant facts. During survey period, survey team conducted together with some authorities including village administrators and project representatives.

On the other hand, in the secondary surveys, the overview and combined data of the whole township only examines the facts which are already available but some are missing information that related to the project. If considered from the view point of reliability, primary surveys are always more reliable than, the secondary type of surveys especially in Myanmar.

Desk review and most of secondary data have been collected by HA survey team in May, 2023 to get Township and village level general information in study area and households general socio-economic situation including transportation, access roads for their education, health situation and business etc. in the study area. Questionnaires survey form which asked in villages are attached in **Appendix M**. Almost all local community has positive point of views on the proposed project. Positive aspects are good for their region and new generation. Better transportation and infrastructure will be developed, and there will be an advantage for business and health care emergency cases. The project is good for local and national development, and the preference to implement it faster is better.



Source: HA survey team, May, 2023

Figure 4-102 Socio-economic Survey Activity in the Study Villages

4.6.1.1. Demographic Information of Taungtha Twonship

The updated number of populations and religions comprised in September 2019 data of Administrative Department, Taungtha Township, Mandalay Division. Taungtha Township includes (6) wards, (77) village groups and (243) villages. The number of households are as shown in Table 4-82.

Table 4-82 List of the number of households in Taungtha Township

Item	Number of House	Household	Quarter	Village Tract	Village
Town	3,110	3,205	6	-	-
Village	42,131	42,539	-	77	243
Total	45,241	45,744	6	77	243

(Source: Regional Data, Administrative Department, Taungtha Township, Mandalay Region, September 2019)

During field survey in the study villages, there are 3,379 populations and 1,917 household will be beneficiary group of the project development as described in Table 4-83.

Table 4-83 List of the number of households in Taungtha Township

No	Township	Village	Population	Households
1	Taungtha	Kyaw Zi Village	3,379	753
2	Taungtha	Malar Village	1,917	542
		Total	5,296	1,295

(Source: HA survey team, May, 2023)

4.6.1.2. Age Group and Gender Issues

In Myanmar, population is disaggregated by age for election purposes (i.e., under and over 18 years old). Based on the data provided by GAD, generally in township, village tract and village administrators have two age group as under 18 years, above 18 years including over 85 years old. The population of Taungtha Township is as mentioned in Table 4-84.

Table 4-84 Population of Taungtha Township

No	Location	Age above (18) year			Age number (18) year			Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
1	Town	4,434	5,713	10,147	3,594	3,599	7,193	8,028	9,312	17,340
2	Village	60,218	74,459	134,677	47,518	48,369	95,887	107,736	122,828	230,564
	Total	64,652	80,172	144,824	51,112	51,968	103,080	115,764	132,140	247,904

(Source: Regional Data, Administrative Department, Taungtha Township, Mandalay Region, September 2019)

According to field survey data, the total number of male and female population is almost the same as 2,351 and 2,743 in total 5,094 in the study area. It is difficult to make a ratio by age because disaggregated data were missing in some villages. The survey team

found that there are no gender issues in the study area and the population by age group in study area are shown in Table 4-85.

Table 4-85 Population by Age Group and Gender Disaggregation in the Study Area

No	Township	Village	Sex		Age		
			Male	Female	Under 18 Years	Over 18 Years	Over 85 Years
1	Taungtha	Kyaw Zi	1,567	1,802	-	-	-
2	Taungtha	Malar	784	941	1,192	1,725	-
		Total	2,351	2,743	1,192	1,725	-

(Source: HA survey team, May, 2023)

4.6.1.3. Vulnerable Groups

There are many vulnerable types in the study area such as disable persons including handicap, blind, deaf and dump etc. also in total number 29. Some villages missing to report data of women headed households (WHH) live alone and older persons of senior citizens who age over 65 years etc. It was shown in Table 4-86. It seems that the figure of vulnerable group is the nearest number in the study area. Although some data were not reported from the community, most villages possess household head over 65 years old of senior citizens are higher than other groups of disable like handicap and live alone.

Table 4-86 Vulnerable Groups in study area

No.	Village	Disabled in family	Head of households over 60 years old	Women headed household	Only one person lives alone in a household	Homeless	Others (Specified)
1	Kyaw Zi	9	120	30	20	-	-
2	Malar	20	-	20	20	-	-
	Grand Total	29	120	50	40	-	-

(Source: HA survey team, May, 2023)

4.6.2. Cultural/ Religious Characteristics

According to secondary data from Township General Administration Department most of the people who live in Taungtha township are Burma and relatively small numbers of other races are listed in the area. The number of religions and nationality in Taungtha Township are as shown in Table 4-87 and Table 4-88.

When field survey in May 2023, existing primary population from local village administrators not reported yet because of the weak documentation.

Table 4-87 List of the Religions in Taungtha Township

Township	Buddhist	Christian	Hindu	Islam	Other	Total
Taungtha	247,883	8	-	13	-	247,904

(Source: Regional Data, Administrative Department, Taungtha Township, Mandalay Region, September 2019)

Table 4-88 Ethnicity of Taungtha Township

Township	Kachin	Kayah	Kayin	Chin	Mon	Burmese	Rakhine	Shan	Other
Taungtha	6	-	-	-	10	-	25	-	-

(Source: Regional Data, Administrative Department, Taungtha Township, Mandalay Region, September 2019)

4.6.2.1. Culture Heritage

There is no cultural heritage site designated by the United Nations Educational, Scientific and Cultural Organization (UNESCO) in this area. The list of major historical monuments of Taungtha Township is shown in Table 4-89 and Table 4-90.

Table 4-89 List of Famous Pagoda and Buddhist Temple in Taungtha Township

No.	Historical Pagoda	Address
1	Mya See Khone Pagoda	Zay Quarter
2	Shwe Ou Min Pagoda	Wae Laung Village
3	Shwe See Khone Pagoda	Kone Pahtoe Village
4	Shin Pin Ant Kyaw Zaw Pagoda	Kyout Yin Village
5	Shwe Ku Gyi Pagoda	Kyout Sout Village
6	Hta Naung Ohn Pagoda	Magyi Cho Village
7	Yan Aung Myin Pagoda	Kywel Zin Village
8	Mahar Bawdi Pagoda	Kyout Kar village
9	Tha Yat Khan Pagoda	Kyaw Zi Village
10	Pyi Lone Aung Chan Thar Pagoda	Min Su Quarter
11	Law Ka Marazane Pagoda	Tharyargyi Vollage

(Source: Regional Data, Administrative Department, Taungtha Township, Mandalay Region, September 2019)

Table 4-90 List of Historical Monuments in Taungtha Township

No.	Historical Monuments	Address
1	Thar Thanar Muulikar Yarma Kyaung Thit	Tan Myint Kyaung Ward
2	Mahar Withutar Yarma Yay Lal Monument	Tan Myint Kyaung Ward

(Source: Regional Data, Administrative Department, Taungtha Township, Mandalay Region, September 2019)

Table 4-91 Religious Places in the Project Area

No.	Name of Village	Historic Places	Archeological Places	Religious Places
1	Kyaw Zi	-	-	Thayakkhan Pagoda
2	Malar	-	-	Shwe Kan Phyu-Ant Kyaw Swar pagoda, Mote Lone Taung Pagoda
	Grand Total	-	-	2

(Source: HA survey team, May, 2023)

When field survey in May 2023, local and regional information from local people were collected all possible cultural sites and examined their importance or accessed cultural values as listed in Table 4-91. There is no historic places and archeological places in the study villages. The photo of religious places of Taungtha Township is shown in Figure 4-103.

If any ancient evidence is discovered during the project' operation, it will be reported to the Department of Archeology and the National Museum, Mandalay Branch as well as the closest administrative offices.



Figure 4-103 Historical Pagodas and Monuments in the Study Village

4.6.2.2. Visual Components

As the whole area is generally dominated by scrub forests, agricultural land, village areas, vacant and virgin land. Although there is no significant landmark as mountain or rock, palm trees and Acacia species are naturally growing near the agricultural land and on both side of the roads. There are no large historical monuments or building in the area. According to field survey data, Kyaw Zi Village has a visual component that includes Son Tan Dam and the view of the Ayeyarwady River.

The project proponent has grown ornamental plants (Areca palm, Bougainvillea, Buddha Belly Bamboo, Coconut trees, Croton), shady plants and fruit trees for landscaping and greening of the factory zone. The planting of the trees and grass and creation of green landscape will mitigate the impact on the visual component and will enhance the aesthetic beauty of the area. In addition, there is no valuable environmental and social area, vulnerable area, community, cultural and visual characteristic near the project site. For that reason, the project factory is located in the vacant land types and away from the residential area.

4.6.3. Education level

The majority of people in the project area have completed primary, middle, high school and university level. There is no higher education institution in the area. The numbers of schools, the number of students and teacher to student ratio are listed in Table 4-92.

Table 4-92 List of Literacy Rate

No	Township	Township Population	Population of aged over 25	Literacy Rate (Person)	Literacy Rate (Percent)
1	Taungtha	247,904	148,794	148,030	99.49%
	Total	247,904	148,794	148,030	99.49%

(Source: Regional Data, Administrative Department, Taungtha Township, Mandalay Region, September 2019)

Table 4-93 List of School in Taungtha Township

Township	Primary and Post Primary School				High School				Private School			
	No of Schools	No of Teachers	No of Students	Teacher to Student Ratio	No of Schools	No of Teachers	No of Students	Teacher to Student Ratio	No of Schools	No of Teachers	No of Students	Teacher to Student Ratio
Taungtha	129	736	9,803	1:13	36	366	7,593	1:20	45	1,035	24,199	1:23

(Source: Regional Data, Administrative Department, Taungtha Township, Mandalay Region, September 2019)

During field survey, there are one education high schools for each village and four private schools in Kyaw Zi Village as described in Table 4-95. With the existing high schools, students can access higher education within the study area. The average ratio of teacher and students is 1:11 and 1:24 respectively. The ratio of teacher and student in the study area is listed in Table 4-94. The photos of education infrastructure in the study are as shown in Figure 4-104.

Table 4-94 Ratio of Teacher and Student in the Study Area

No.	Name of Village	Total Number of School	Total Number of Teachers	Total Number of Students	Teacher to Student Ratio
1	Kyaw Zi	1	38	400	1:11
2	Malar	1	17	Over 400	1:24

(Source: HA survey team, May, 2023)

Table 4-95 Education Centers in the Study Area

No.	Name of Village	Kindergarten	Primary School	Post Primary School	Middle School	High School	Private School
1	Kyaw Zi	-	-	-	-	1	4
2	Malar	-	-	-	-	1	-
	Grand Total	-	-	-	-	2	4

(Source: HA survey team, May, 2023)



Figure 4-104 Education Infrastructure

4.6.4. Economic Condition

Taungtha Township is located in the arid zone of central Myanmar and is a moderately economically developed township. The local people in the township are engaged in agriculture, and livestock. The list of agriculture and livestock farming are described in following tables.

Table 4-96 List of Agriculture Sector

No.	Name of Harvested	2018-2019 Proposed Acres		2018-2019			
				Grow	Harvest	Product Rate	Total Product (Basket)
1	Paddy	Summer	700	541	541	91.38	49,437
		Rainy	5,000	4,412	4,412	87.04	384,025
2	Peanut	Rainy	48,450	89,666	89,666	48.75	4,371,218
		Winter	18,014	10,855	10,855	58.80	638,274
3	Sesame	Rainy	42,259	48,969	48,969	5.58	273,247
		Winter	11,241	8,986	8,986	6.68	60,026
		Summer	675	439	439	14.07	6,176
4	Sunflower	Rainy	350	220	220	23.08	5,078
		Winter	8,000	7,420	7,420	22.60	167,692
5	Mung Bean	-	-	-	-	-	-
6	Green Gram	Rainy	34,500	29,067	29,067	8.38	243,581
		Winter	500	343	343	7.85	2,693
7	Pigeon Pea	Rainy	26,000	19,933	19,933	11.85	236,206
8	Cotton	Rainy	7,000	4,686	4,686	242.62	1,136,917
9	Sugarcane	-	-	-	-	-	-
10	Maize & Grain	Rainy	-	33	33	75.21	2,482
		Winter	1,000	750	750	74.10	55,575
Grand Total			203,689	226,320	226,320	33.72	7,632,627

(Source: Regional Data, Administrative Department, Taungtha Township, Mandalay Region, September 2019)

Table 4-97 List of Long-Term Crop

No.	Name of Crop	Grow	Harvest	Product Rate	Total Production Rate (basket)
1	Palm	3,840	2,018	-	-
2	Mango	93	7	12,100.00	84,700
3	Plum	50	20	3,120.00	156,000
4	Tamarid	63	63	4,124.13	259,820
Total		4,046	2,138	-	500,520

(Source: Regional Data, Administrative Department, Taungtha Township, Mandalay Region, September 2019)

Table 4-98 List of Commercial Harvested Crop

No.	Name of Crop	Grow	Harvest	Product Rate	Total Production Rate (basket)
1	Onion	10,010	10,009	3,565.09	35,682,996
Total		10,010	10,009	3,565.09	35,682,996

(Source: Regional Data, Administrative Department, Taungtha Township, Mandalay Region, September 2019)

Table 4-99 List of Farming Sector in Taungtha Township

No.	Township	Year	Buffalo	Cow	Pig	Sheep/Goat	Chicken	Duck	Quail
1	Taungtha	2018 - 2019	9,900	116,409	43,161	2,378,853	1,596,367	3,735	-
Total			9,900	116,409	43,161	2,378,853	1,596,367	3,735	-

(Source: Regional Data, Administrative Department, Taungtha Township, Mandalay Region, September 2019)

Table 4-100 List of Factory in Taungtha Township

No.	Township	Name of Factory	Type	Government	Private	Work Force
1	Taungtha	No. (10) Garment Factory	Garment	Government	-	356
2		Cotton Mill	Cotton	Government	-	3
Total			2	Government	-	359

(Source: Regional Data, Administrative Department, Taungtha Township, Mandalay Region, September 2019)

During field survey in May, 2023, most of the villagers are farmers and mainly grows peanut, onion and bean especially in wet season. More than 125 acres of seasonal rice as the rice grown from May to June can be classified as rain rice which are planted in September and October, and spring rice is grown by irrigation water, so the rice grown from March and harvested in May.

Table 4-101 Cropping Pattern in the Study Villages

No	Name of Village	Type of Crop	Farming Period (Month)	Harvest Period (month)	Area (Acres)	Yield
1	Kyaw Zi	Rice	Summer-February, Rain-May/June	May	125	Summer 100 baskets per acres/ Rain 80 baskets per acres
		Penut	May/June	September/October	500	15 baskets per acres

		Green bean	May/June	September/October	500	10 baskets per acres
		Bean Curd	May/June	September/October	500	11 baskets per acres
2	Malar	Peanut	March	November	1000	10 baskets per acres
		Green Beans	June	October	30	15 baskets per acres
		Onion	-	-	4	-
		Plam	-	-	-	-

(Source: HA survey team, May, 2023)

4.6.4.1. Income and Livelihoods

There are many small-scale industries to enable people to earn income and to be able to operate businesses that they can own and produce in their homes. In Taungtha Township, the proportion of livelihood persons working in the sector of “Agriculture” is the highest with 53,950. The second highest sector is “Farming Sector” at 13,033 persons as described in Table 4-103. The per capita income and type of livelihoods of Taungtha Township is as mentioned in Table 4-102.

Table 4-102 Capita Per Income of Taungtha Township

No.	2016-17	2017-2018	2018-2019
1	1,035,444	1,249,897	1,323,297

(Source: Regional Data, Administrative Department, Taungtha Township, Mandalay Region, September 2019)

Table 4-103 Type of Livelihood in Taungtha Township

No	Township	Civil Servant	Service Activities	Water Sector	Agriculture Sector	Farming Sector	Commercial and Trade Sector	Technical Sector	Random	Other
1	Taungtha Township	4,775	1,542	30	53,950	13,033	7,700	1,710	15,410	446,696
		4,775	1,542	30	53,950	13,033	7,700	1,710	15,410	446,696

(Source: Regional Data, Administrative Department, Taungtha Township, Mandalay Region, September 2019)

In the study area, the highest population represented agriculture as more than 500 in Kyaw Zi Village, follow by agricultural sector over 150 in Malar village including small trading, government services, general wage labor and company employee activities. The government staff and general wage labour in Kyaw Zi is more than 150 while company

employee about 70 respectively in Table 4-104. The photo of economic in the study area is as shown in Figure 4-105.

Table 4-104 Occupations in the Study Villages

No.	Name of Village	Agriculture	Small Trading	Trade	Government Services	General Wage Labour	Company Employee	Others
1	Kyaw Zi	500	6	-	150	150	70	-
2	Malar	150	150	-	50	-	3	-

(Source: HA survey team, May, 2023)



Figure 4-105 Economic Activities in the Study Villages

4.6.4.2. Employment

In Taungtha Township, the proportion of employed persons working is 149,569 persons and the unemployment percentage is 3.17 percent. The rate of employment in Taungtha Township is as shown in Table 4-105. During the field survey, the survey team listed the work force and unemployment population in the study area as described in Table 4-106.

Table 4-105 Rate of Employment Person in Taungtha Township

No	Township	Employment Person	Skill Worker	Rate of Unemployment Person	Rate of Unemployment Percent
1	Taungtha Township	149,569	144,824	4,745	3.17
Total		149,569	144,824	4,745	3.17

(Source: Regional Data, Administrative Department, Taungtha Township, Mandalay Region, September 2019)

Table 4-106 Employment and Wage in the Village (Skilled and Unskilled Labor)

No	Name of Village	Young People (Male) (Age - 18 to 25)		Young People (Female) (Age - 18 to 25)		Middle Aged (Male) (Age - 25 to 45)		Middle Aged (Female) (Age - 25 to 45)		Elderly Male (Age above 45)		Elderly Female (Age above 45)	
		Skilled Labour	Unskilled Labour	Skilled Labour	Unskilled Labour	Skilled Labour	Unskilled Labour	Skilled Labour	Unskilled Labour	Skilled Labour	Unskilled Labour	Skilled Labour	Unskilled Labour
1	Kyaw Zi Village	8,000/ 20,000	8,000	5,000	4,000	5,000	4,000	5,000	4,000	8,000/ 10,000	4,000	8,000/ 10,000	4,000
2	Malar Village	80,000/ 100,000	80,000	70,000	-	-	-	-	-	6,000	-	5,000	-

(Source: HA survey team, May, 2023)

4.6.5. Health Sector

4.6.5.1. Public Health Components

In implementing the objective of uplifting the health status in township, the Ministry of Health is taking the responsibility of providing comprehensive health care services covering activities for promoting health, preventing diseases, providing effective treatment and rehabilitation to raise the health status of the population. The list of hospital in Taungtha Township is described in Table 4-107. The diseases of high prevalence reported in 2019 are Diarrhea. The common diseases, and rate of morbidity and mortality is mentioned in Table 4-108 and Table 4-109.

Table 4-107 List of Hospitals in Taungtha Township

Hospital Name	Beds	Responsible
Taungtha Hospital	50	Government
Kyawzi Hospital	16	Government
Waelaung Hospital	16	Government
Zagyan Hospital	16	Government
Yonesigy Hospital	16	Government
Total	114	-

(Source: Regional Data, Administrative Department, Taungtha Township, Mandalay Region, September 2019)

Table 4-108 Common Diseases in Taungtha Township

Diseases	Morbidity	Mortality
Malaria	4	-
Diarrhea	1867	-
Tuberculosis (TB)	252	10
Dysentery	319	-
Hepatitis B virus (HBV)	20	-

(Source: Regional Data, Administrative Department, Taungtha Township, Mandalay Region, September 2019)

Table 4-109 HIV/AIDS Diseases in Taungtha Township

Diseases	Morbidity	Mortality
HIV/AIDS (2017-2018)	17	3
HIV/AIDS (2018-2019)	18	16

(Source: Regional Data, Administrative Department, Taungtha Township, Mandalay Region, September 2019)

During field survey period, survey team collected health care access, infrastructures and health service access in the study area as shown in Table 4-110. The village has one healthcare center in Malar Village and 1 public hospital in Kyaw Zi Village. The community people highly dependency on government health care service when they face the health problems.

According to the village headmen, no serious health problem is present in the study village and the most common seasonal disease is flu as shown in Table 4-111. A low mortality and morbidity rate compared as a whole. When serious cases happen, these are transferred to better healthcare access in Mandalay.

Table 4-110 Health Service in the Study Area

No.	Name of Village	Hospital (Public)	Hospital (Private)	Clinic	Rural health centre	Pharmacy	Other
1	Kyaw Zi Village*	1	-	-	-	-	-
2	Malar Village	-	-	-	1	-	-

(Source: HA survey team, May, 2023), * Data missing during field visit

Table 4-111 Common Diseases in the Study Area

No.	Name of Village	Diarrhea	Dysentery	Pruritus	Malaria	Conjunctivitis	Typhoid	Gastric Disease	COVID-19	Respiratory Disease	Dengue Fever	Other
1	Kyaw Zi	-	-	-	-	-	-	-	-	-	-	Seasonal Flu
2	Malar*	-	-	-	-	-	-	-	-	-	-	-

(Source: HA survey team, May, 2023), * Data missing during field visit

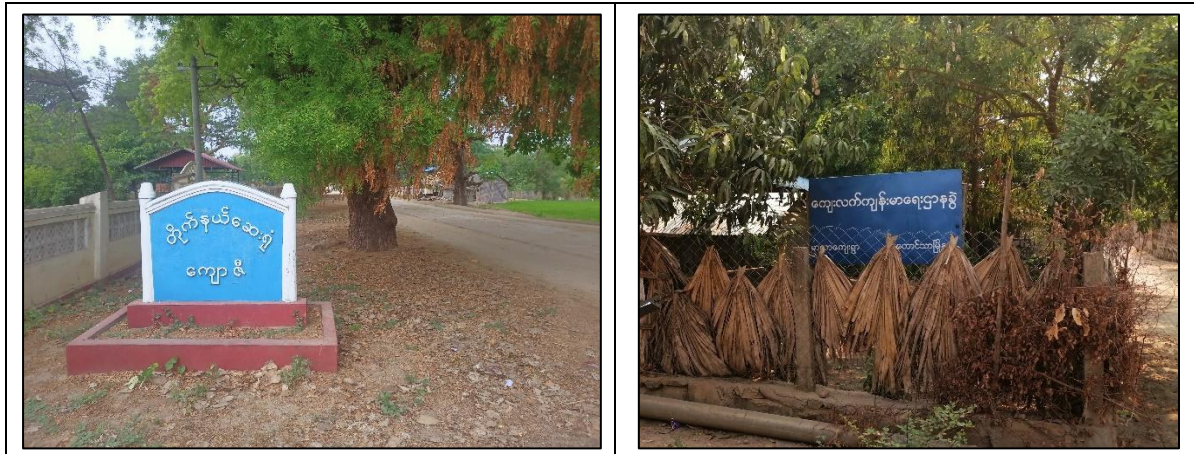


Figure 4-106 Rural Health Care Center

4.5.5 Suggestion from local People

The project area was previously used as agricultural land. The species of animals found near the project area are sparrow, squirrel, pigeon, vulture and Asian Koel. Mango, Thanaka and lemon plantations are used for commercial purposes and common Blue Vitex, (Kyaungpankalay, Kyaungpan) which are found as medicinal herbs. Among the natural disasters, Bagan Earthquake was found in 2002 and 2015 in the study village.

Based on survey team has made discussion with some of these villagers suggested from their needs are collected as described in Table 4-112. According to their answers and suggestions, they suggested that priority village development needs such as road improvement, systematically designed drainage, mitigation measures for dust emissions and odor, assessing the impacts on local people, the natural environment, and fire awareness, and the presence of water barrier to prevent erosion. When discussing with villagers, most of the local people are willing to support the development of the village and expect to get job opportunities. Therefore, they would like to encourage the project development since the potential benefits is more than negative impacts by the project.

Table 4-112 Requirement for Local People

No	Name of Villge	Priority village development needs	Do you know about the project factory? If so, how do you know? (From friends, self or others)	Awareness of the potential for the project factory development and of the type of social impacts that may ensue	Are you pleased with how the project developed? Please describe your expectations for the project.
1	Kyaw Zi	To pave concrete road, to have electricity.	Yes	Know about air pollution and fire awareness.	Yes, job opportunities will increase.
2	Malar	To have water barrier from erosion, to pave concrete roads, to dig drainage beside the roads.	Yes, by himself and visualize	Not too impact, having smell impact when near the factories.	Yes, expect work opportunities.

(Source: HA survey team, May, 2023)

4.7. CHARACTERISTICS OF RESIDENTIAL AREA

4.7.1. Type and Size of Infrastructure

Road construction, a storm drainage system, a water supply system, a wastewater system, a solid waste system, a power supply system, and communication are the infrastructure projects.

The area of effect for the land area was calculated to be within a 3 km radius of the project's total area boundary. Three kilometers from the project's overall border is regarded to be the region of influence for the socioeconomic environment. The project is a well-planned, environmentally friendly urban core for commercial purposes that will be harmoniously integrated with the local environments.

According to survey information in the study area, survey team listed the existing infrastructure in the study area such as commercial spaces, factory, market, dump site, drainage, residential spaces, retail shops and religious infrastructure as described in Table 4-113. There is a religious town hall for each village and one cemetery in Malar village.

Table 4-113 Community Services

No .	Name of Village	Water Point	Tube Wells	Commercial Space	Residential Spaces	Recreation Space	Drainage	Dump Site	Market	Retail Shops	Factory	Cemetery	Village Meeting Hall/ Religious Hall
1	Kyaw Zi	Ayeyarwady River and tube wells	500	Sandstone mining in the river, Rice Mill, Fishery and Groundnut Oil Mills	Shwe Pyithar Ward, Pinma Mula Ward, Shwe Thiri Ward, Min Mahaw Ward	-	-	-	-	15	Two Refinery Factory, Three Oil Mills, Three Rice Mills	-	1
2	Malar	Ayeyarwady River	150	Sandstone mining in the river	-	-	-	Garbage Burning	-	25	MCCM Refinery Factory, Stone Crushing Plant	1	1

(Source: HA survey team, May, 2023)

4.7.1.1. Water Supply System

The Township Development Affairs Committee distributes as the following Table 4-114 for the access of drinking water.

Table 4-114 List of Factory Distributing the Drinking Water in Taungtha Township

No.	Township	Factory Name	Location	Type	Daily Production Rate (gallon)	Distributions per households
1	Taungtha	Township Distribution Part (1)	Bonesinyo Dam	Homogeneous Embarkment Type + Tube Well (5)	220,000	753
2	Taungtha	Township Distribution Part (2)	Tanmyintkyaung Ward	Wells (4)	180,000	302
3	Taungtha	Township Distribution Part (3)	Nabekan Dam	Homogeneous Embarkment Type	120,000	433
Total		3	-	-	520,000	1,488

(Source: Regional Data, Administrative Department, Taungtha Township, Mandalay Region, September 2019)

In Taungtha Township, 75.1 per cent of households use improved sources of drinking water (tap water/piped, tube well, borehole, protected well/spring and bottled water/water purifier). Compared to other townships in Mandalay Region, it is in the range of 72-84 per cent group and it is higher than the Union average (69.5%). Some 47.3 per cent of the households use water from tube well, borehole and 25.0 per cent use water from protected well/spring. Some 24.9 per cent of the households use water from unimproved sources. In rural areas, 21.2 per cent of the households use water from unimproved sources for drinking water.⁸

⁸ The 2014 Myanmar Population and Housing Census Mandalay Region, Myingyan District Taungtha Township Report

Table 4-115 List of Conventional Households by Source of Drinking Water by Urban/Rural

Source of Drinking Water		Total	Urban	Rural
Tap water/ Piped		2.2	13.6	1.2
Tube well, borehole		47.3	3.2	51
Protected well/Spring		25	6	26.6
Bottled water/Water purifier		0.6	8.1	*
Total improved drinking water		75.1	30.9	78.8
Unprotected well/ Spring		1.9	0.3	2.0
Pool/Pond/Lake		12.8	22.6	12.0
River/Stream/Canal		5.0	1.7	5.2
Waterfall/Rain water		3.7	25.3	1.9
Other		1.5	19.2	0.1
Total unimproved drinking water		24.9	69.1	21.2
Total	Percent	100.0	100.0	100.0
	Number	49,852	3,863	45, 989

The 2014 Myanmar Population and Housing Census Mandalay region, Myingyan district, Taungtha Township Report

*Less than 0.1 per cent

Based on survey team in order to get detail information from the community, almost all villages depend on rivers and tube well in both wet and dry seasons. As dominant agricultural activity areas every village use water not only in agriculture and livestock but also in some villages face insufficient water especially during dry season.

Table 4-116 shows that different purpose of domestic and drinking water supply in study area. Their main source of water for domestic water use is tube well. Some communities are fetching not only from the natural water sources such as Ayeyarwady River but also from tube well of ground water. In addition, drinking water is mostly rely on purified water bottles. But the water quality test especially drinking water is still a big challenge. The water source needs to be big enough to allow for pumping and storage within a reasonable time.

Table 4-116 Water Supply in the Study Villages

No.	Name of Village	Domestic Water Resource	Drinking Water Source	Water Scarcity Problem	Water usage from Ayeyarwady River
1	Kyaw Zi	Tube Well	Tube Well	No	Farming during summer and rain
2	Malar	Tube Well	River	No	Drinking water by self service

(Source: HA survey team, May, 2023)



Figure 4-107 Water Resources in the Study Villages

4.7.1.2. Electricity and Energy Consumption

Myingyan district is downstream of Mandalay on the Ayeyarwady River and located in an area planned to be part of the Bangladesh-China-India-Myanmar Economic Corridor. Its urban area has a population of 170,000.

This township is a transit point for a gas pipeline with a total length of 2,500 km, which starts in Kyuakpyu and reaches China. There is a plan to construct a thermal power plant using gas. The electricity supply, demand, distribution substation, number of distribution facilities, listed by cities in Mandalay Region are shown in Table 4-117.

Based on survey data, Table 4-121 and Figure 4-108 showed that most of the villages have Myingyan Government Grid of Electricity with government payment rate. Fuel for cooking is electricity, charcoal and firewood. Electricity in the study village is given by the government but some have no electricity at homes.

Table 4-117 Peak Demand and Annual Electricity Sale by Cities in Mandalay Region

Region	City	Peak Demand (MW)			Annual Electricity Sales (MWh)	Population of Township (Ten thousand people)
		FY2012	FY2013	FY2014		
Mandalay	Mandalay	174	197	248	1,049,837	172.6
	Pyinoolwin	35.4	38.8	50.8	90,168	25.1
	Myingyan	59.9	64.9	63.4	77,278	27.6
	Meiktila	33.5	34.7	41.2	10,764	30.9
	Pyinmana	8.0	10.1	12.4	66,634	18.7

*Preparatory Survey on Distribution System Improvement Project in Main Cities

Table 4-118 List of ESE's Distribution Substations by Cities in Mandalay Region

Region	City	Distribution Substation	Voltage (kV)	Capacity (MVA)	Maximum Load (MW)	Capacity Utilization Rate (%)	Remark
Mandalay	Meiktila	Industrial Zone (2)	33/11	2	1.0	69%	
		Aung Sann	33/11	10	3.0	33%	
		Winn Zinn (1)	33/11	10 5	5.0 3.0	56% 67%	
		Industrial Zone (1)	33/11	5 5	2.5 2.5	56% 56%	
		Total		37	-	-	
	Myingyan	Saan Lon	66/11	10	4.0	44%	
		Kan Oe	33/11	10	5.5	61%	
		Se Me Khone(1)	66/11	5	1.5	33%	
		Se Me Khone(2)	66/11	10	2.5	28%	
		Sate Nyunt	66/11	10	0.5	6%	
		Total		50	-	-	
	Pyinmann a	Pyinmana	33/11	10	7.5	56%	
		Paung Laung(2)	33/11	10	5.5	61%	
		Taung Tha	33/11	10	1.5	17%	
		Total		30	-	-	
	Pyinoolwi	Myowa	33/11	10	6.2	69%	

	n	Ngayantchaung	33/11	5	4.5	100%	
		TatNal	33/11	10	6.5	72%	
		Padaytha	33/11	10	2.9	32%	
		Kyuntapin	33/11	5	1.3	29%	connecte d to Watwon Hydro P/S (0.225M W×2)
		Yadanarbon	33/11	5	0.4	9%	
		21miles	33/11	1.25	0.2	16%	
		AnisokanMain	33/11	5	3.6	80%	
		Yadanarpon	33/11	10	2.0	22%	
		Total			61	-	-

*ESE = Myanmar Electricity Supply Enterprise

Preparatory Survey on Distribution System Improvement Project in Main Cities

Table 4-119 Distribution Loss Rate of Each City

Region	City	Distribution Loss Rate (%)
Mandalay	Mandalay	20.5
	Meiktila	18.4
	Myingyan	29.3
	Pyinmana	13.1
	Pyinoolwin	21.1

Preparatory Survey on Distribution System Improvement Project in Main Cities

Table 4-120 The Number of Distribution Facilities in Mandalay Region (33kv, 11kv, and 400V)

Region	City	Transformers (11/0.4kV)		Line Span Length (km)			No. of Poles		
		Total Capacity (MVA) [(average (kVA)]	No.	33kV line	11kV line	400 V line	33 kV line	11kV line	400V line
Mandalay	Mandalay	760.3 (267)	2,847	384 (66)	689 (52)	1,265 (51)	6,060	13,294	24,773
	Meiktila	93.0 (213)	436	442 (73)	344 (46)	382 (32)	6,070	7,458	11,864
	Myingyan	54.0 (323)	172	21 (54)	136 (41)	126 (39)	391	3,342	3,235
	Pyinmana	45.5 (215)	212	9 (39)	125 (37)	113 (31)	231	3,376	3,656
	Pyinoolwin	99.0 (204)	485	166 (61)	181 (29)	260 (36)	2,742	6,308	7,138

Preparatory Survey on Distribution System Improvement Project in Main Cities

Table 4-121 Electricity and Energy Consumption

No	Name of Village	Available Electricity	Source of Electricity	Electricity	Firewood	Charcoal	Gas	Other
1	Kyaw Zi Village	Yes	Myingyan	Yes	Yes	Yes	-	-
2	Malar Village	Yes	Myingyan	Yes	Yes	-	-	-

(Source: HA survey team, May, 2023)



Figure 4-108 Electricity in the Study Villages

4.7.1.3. Waste Disposal of Taungtha Township

Waste disposal system of Taungtha Township is as following Table 4-122. The waste disposal sites in the study villages are not fixed and waste management system is not systematic.

Table 4-122 Waste Disposal of Taungtha Township

No.	Township	Machines & Equipment used in Waste Management				Number of Workers
		Garbage Truck	Sewage Truck	Vacuum Machine	Water Pump	
1	Taungtha	5	1	-	-	9
Total		5	1	-	-	9

(Source: Regional Data, Administrative Department, Taungtha Township, Mandalay Region, September 2019)

4.7.1.4. Major Access Road

The project factory is easily accessible by car as it is located on the road of Nyaung-U to Myaingyan. The transportation is not an issue for this factory.

4.7.1.5. Public Utilities and Services

Public transportation systems include a variety of transit options such as airways, high-ways, major roads, streets, railways, and maritime transport. These systems are available to the general public. But Taungtha Township have no airways and maritime transport services. The available public transport services of Taungtha Township are shown in Table 4-123 and Table 4-124.

Table 4-123 List of Highway Roads in Taungtha Township

No.	Road	Township		Length (mile)
		From	To	
1	Kyaukpadaung – Taungtha	Taungtha	Kyaukpadaung border	21/1
2	Meiktila – Mahlaing – Taungtha	Taungtha	Mahlaing border	15/0
3	Myingyan – Nyaung-U	Nyaung-U	Taungtha border	16/2
4	Taungtha - Myingyan	Taungtha	Myaingyan border	6/1
5	Taungtha – Natogyi	Taungtha	Natogyi border	7/1
	Total	5	-	65/5

(Source: Regional Data, Administrative Department, Taungtha Township, Mandalay Region, September 2019)

Table 4-124 Railway and Train Stations

No.	Route	Township		Length (mile)	Number of Station	
		From	To		Large	Small
1	Myingyan-Tharse	Thanmani	Yonesigy	23	1	2
2	Myingyan-Nyaung-u	Nyaungkan	Kyawzi	13	-	2
Total				36	1	4

(Source: Regional Data, Administrative Department, Taungtha Township, Mandalay Region, September 2019)

Table 4-125 List of Bus Terminals in Taungtha Township

No.	Township	Terminal	Route	Type of Vehicle	Number of Vehicle
1	Taungtha	Taungthaman	Taungtha-Mandalay	Express	8
2	Taungtha	Shwethiha	Taungtha-Mandaly	Express	2
3	Taungtha	OK	Taungtha-Mandalay	Mini-Bus	10
4	Taungtha	Lapyawon	Waelaung-Taungtha-Mandalay	Mini-Bus	9
5	Taungtha	Taungtha Htila	Taungtha-Meiktila	Dyna	2
6	Taungtha	Shwesinhein	Waelaung-Hopong	Mini-Bus	6
7	Taungtha	Moetaukhtun	Taungtha-Mandalay	Mini-Bus	5
8	Taungtha	Aungtharaphu	Taungtha-Mandalay	Mini-Bus	13
Total					55

(Source: Regional Data, Administrative Department, Taungtha Township, Mandalay Region, September 2019)

Table 4-126 List of Township-to-Township Roads

No.	Road	Length (mile)	Road Type		Remark
			Bituminous Road	Macadam Road	
1	Taungtha – Natogyi	7/1	7/1	-	-
2	Myingyan – Nyaung-U	16/2	16/2	-	-
3	Taungtha – Myingyan	6/1	6/1	-	-
4	Taungtha – Mahlaing	15/0	15/0	-	-
5	Taungtha - Kaukpadaung	21/1	21/1	-	-
Total		65/5	65/5	-	-

(Source: Regional Data, Administrative Department, Taungtha Township, Mandalay Region, September 2019)

Table 4-127 List of Bridges in Taungtha Township (Upper 180-feet)

No.	Bridge Name	Length (feet)	Type	Built Year	Allowable Load Capacity
1	Waelaung	300	Reinforced Concrete (R/C)	2011	Car
2	Sintewa	820	Reinforced Concrete (R/C)	1996	Car/Train
3	Chaungkaukwayt	200	Truss Bridge	1945	Train
4	Myinkyachaung	730	Truss Bridge	1996	Train
5	Semikan	240	Reinforced Concrete (R/C)	2014	Car
6	Kaingchaung	420	Reinforced Concrete (R/C)	2014	Car
7	Taungtha	240	Reinforced Concrete (R/C)	2016	Car
8	Sintewa	935	Reinforced Concrete (R/C)	2017	Car
Total	8	3885			

(Source: Regional Data, Administrative Department, Taungtha Township, Mandalay Region, September, 2019)

Table 4-128 List of Bridges in Taungtha Township (Under 180-feet)

No.	Bridge Name (From 50 to 180 ft)	Length (feet)	Type	Built Year	Allowable Load Vehicle
1	Nwartatgyi	50	Reinforced Concrete (R/C)	1997	Car
2	Nanmyint	60	Reinforced Concrete (R/C)	1998	Car
3	Leinpin	100	Bailey Bridge	1980-81	Car
Total	3	210			

(Source: Regional Data, Administrative Department, Taungtha Township, Mandalay Region, September, 2019)

Land road transportation is only reliable and accessible way not only within the region but also to connect other adjacent regions. But in some areas could be allowed on earthen and gravel roads which are connected towns and villages as well. Roads are necessary to renovate in some village because if the road in rural areas were good, there would be improvements in economic conditions, education standards and healthcare facilities. Majority of the local people use motorbike to go other villages or towns. The transportation facilities in the study area are as shown in Figure 4-109 and Table 4-129.

Table 4-129 Transportation Facilities in the Study Area

No.	Name of Village	Types of vehicles used in the village / quarter	Classification of roads in the village / quarter
1	Kyaw Zi	Bicycle	concrete road (3000ft), Earth Road
		Bus	
		Cattle	
		Tractor	
2	Malar	Bicycle	Stone paving stone/ Earth Road
		Car	
		Tricycle	

(Source: HA survey team, May, 2023)



Figure 4-109 Transportation System in the Study Villages

4.7.2. Land Use

4.7.2.1. Method

Information about land use collected from secondary sources in combination with ground truth surveys. The survey helps to verify and fill gaps of the secondary information. The land use is investigated 3 km radius from the project area because current report is EIA report. It was investigated to know the different types of land surrounding the project area. GPS device was used to mark the points of surrounding area during the land use investigation. The points and data acquired from the GPS was analyzed and separated dependence on the types of each land use.

4.7.2.2. Secondary Data Collection

Secondary data on land use compiled from the following sources:

- Satellite image of GOOGLE EARTH PRO
- Geographic Information System Map of Taungtha Township, Mandalay Region
- Factory Layout Plan by using AutoCAD Drawing Software

Based on the secondary data, initial land use map was prepared and used as a basis for subsequent ground truth surveys.

4.7.2.3. Field Survey

Field survey was performed by the study team at the project factory on from 11th to 13th May, 2023 and the study of surrounding environment within 3 km radius marginal area around the project area, was performed by the study team on that day. It is used to verify the land use information in identifying land use types. QGIS mapping software was used to produce the results for rechecking, revising, and modifying the accuracy of each type of land use. Eventually, the land use map generated accordingly is as shown in Figure 4-110. In the land use map, drainage channels in the dry and winter season is shown. Drainage channel pattern in wet season is shown in Figure 4-111.

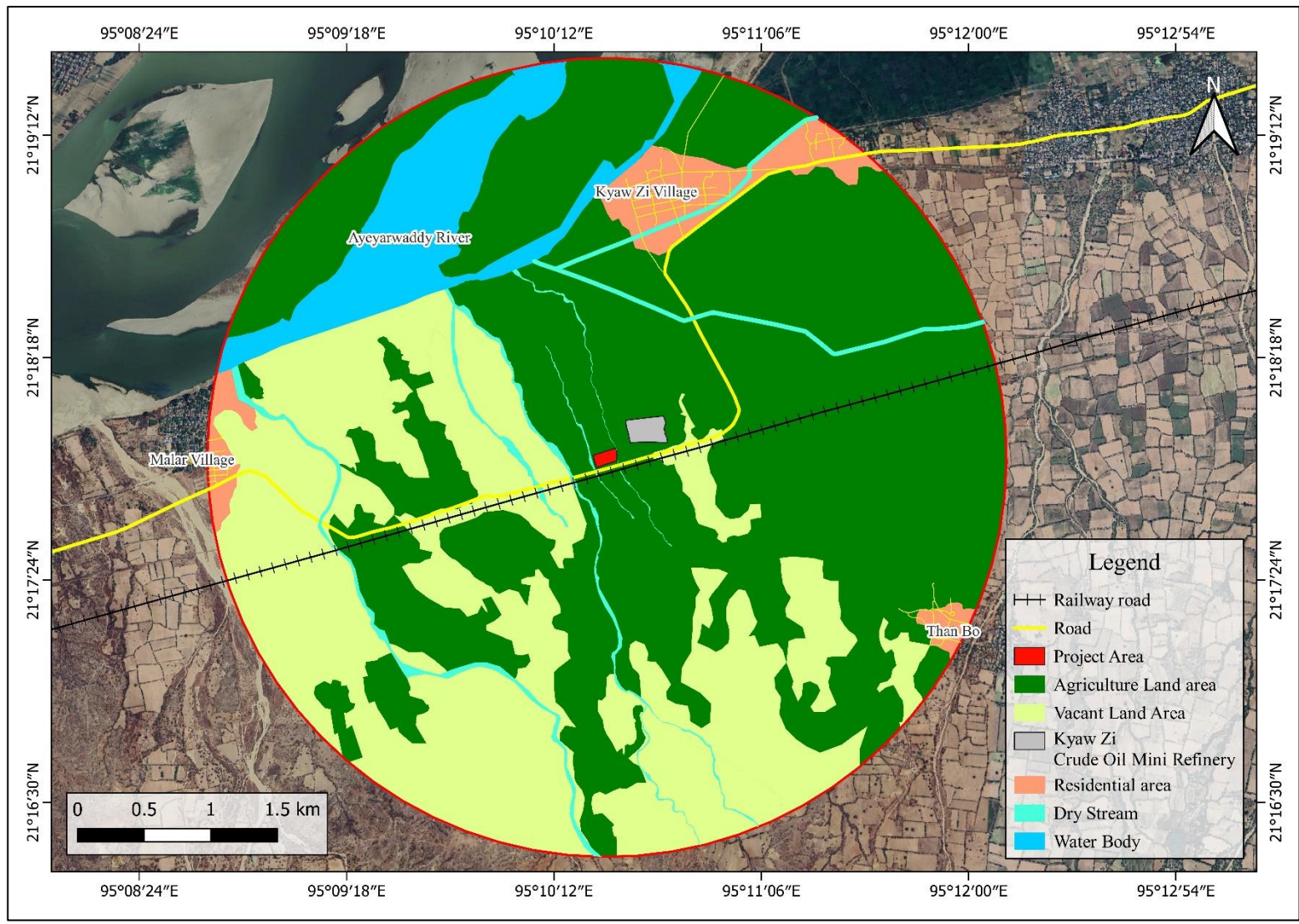


Figure 4-110 Land Use Map of Project Area

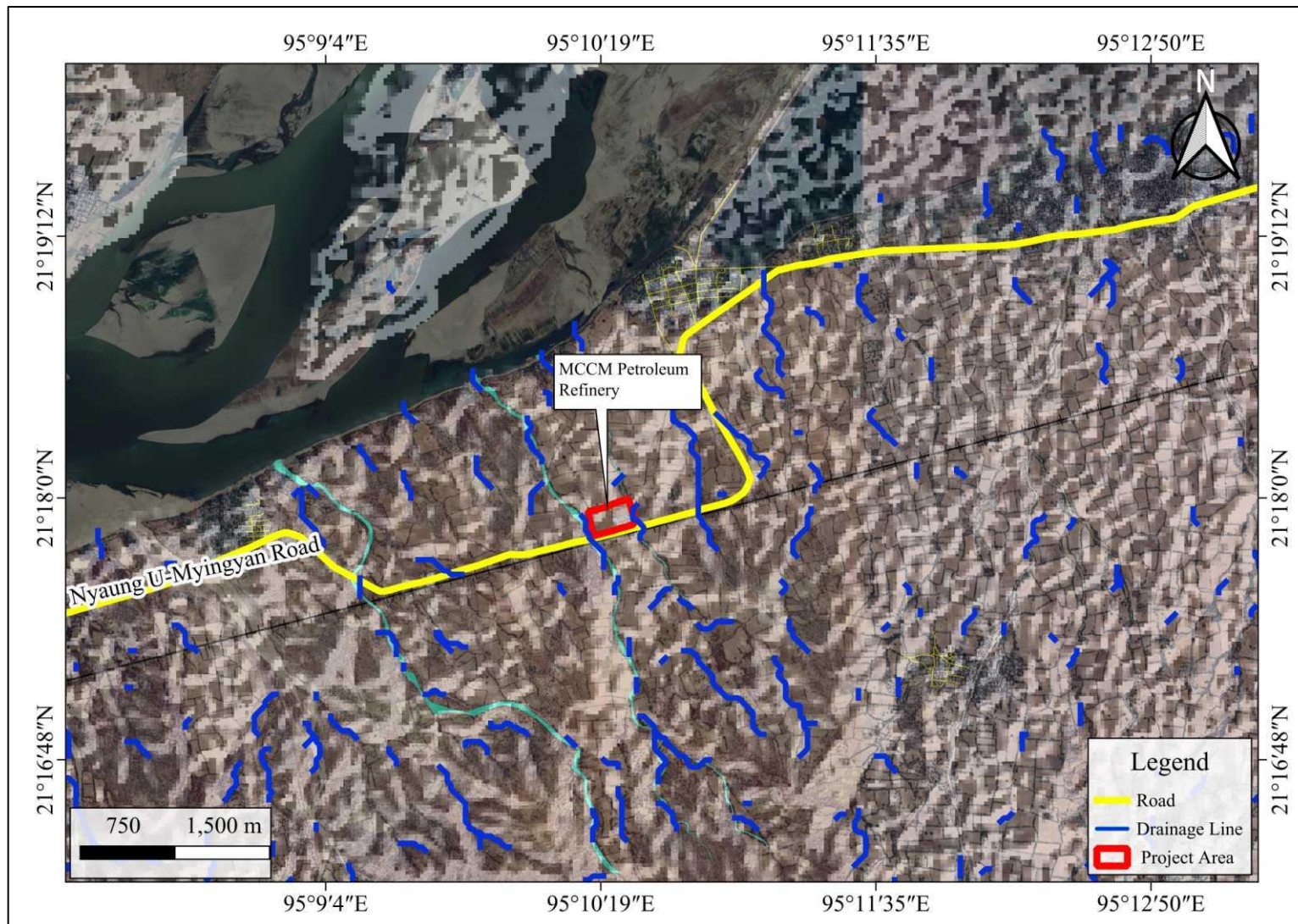


Figure 4-111 Drainage channel Pattern in Wet Season

4.7.2.4. Result of the Study

Result of land use type investigation on project site by the study area of 3 km radius are described in this section. As the project factory is located in the Kyaw Zi Village, Thaung Thar Township, Myingyan District, it is surrounded by undeveloped area (vacant and virgin land and agricultural land), industrial area, and water body. The study area consists of the proposed project factory for about 3.98 acres and six types of land use are recognized in the study area, 3 km radius. First of all, the project area occupies a total of 0.06 %. The agriculture land area follows as largest portion with occupancy of 55.52 % of study area and 33.42 % of the study area is vacant land. The water body is occupying of 6.35 % and dry stream is 0.43 % of study area. Area and different types of land use within the study area are shown in Table 4-130. Characteristic features of this factory area include the nature of buildings, the presence of crude oil and product storage tanks, power sources (transformers, generators) and furnaces.

Table 4-130 Type of Land use in the Project Area

Name	Area (Acres)	Percentage (%)
Project Area	3.98	0.06
Agriculture Land Area	3713.18	55.52
Vacant Land	2234.73	33.42
Industrial Area (Kyaw Zi Crude Oil Mini Refinery)	12.77	0.19
Residential Area	269.39	4.03
Dry Stream	28.99	0.43
Water Body	424.61	6.35
Total	6687.67	100 %





Water Body Area



Vacant Land



Cultivated Area



Figure 4-112 Existing Land Use within the Study Area

4.7.3. Traffic

4.7.3.1. Review on Current Condition

The Taungtha township is located in Myingyan District, Mandalay Region, is one of the townships in Myanmar with various cultural and historical significance. In this township, there are several prominent attractions and landmarks, including the Myasigon pagoda, Shwesigon pagoda, Shwe U Mhin Pagoda and Lawkamarazein Pagoda that showcase the rich Buddhist heritage of the region. According to Regional data, this township population is nearly 250,000 and over 90 % is living in rural area. Taungtha is known for its traditional products such as jaggery from palm trees and byproducts of Zi which is the major products and economy from local people. The township is also having a major production of crops such as onion which have been cultivated in large amount and produced. Two major rail networks can be used in transportation sector. Moreover, there are eight highway terminals are located in this township. Five major highways such as Kyaukphataung-Taungtha highway, Meitthila-Mahlaing-Taungtha highway, Myingyan-Nyaung U highway, Taungtha-Myingyan highway, and Taungtha-Natogyi Highway are passed through in this township.

The project is located in Taungtha Township and this area is surrounded by Ayeyarwady River on the North and Nyaung U-Myingyan Highway on the South and the rests are cultivated lands. The project area can be mainly accessed from highway road which is connected from Myingyan to Nyaung U.

4.7.3.2. Problem Statements

Some transport related problems may arise during and after construction phases.

Most residents in this project area are engaged in agriculture and livestock and also trade in handicrafts. For trading these products, transportation becomes a major sector. As already mentioned, two transport modes can be applied in this area. However, due to the restriction of land use, rail transport cannot be widely used for transporting

goods and passengers. Therefore, highway roads become the major transport role for land users in this area.

According to statical data in Taungtha, the rapid growth of vehicle registration affects traffic volume and traffic growth condition. Furthermore, 249,027 persons are targeted to accommodate in this area in which most of residents in this compound are medium and high income-person households. As a complex project planning with residential areas, commercial areas, business areas and recreational area, the number of road users (users who apply roads with any type of transport mode) must increase gradually.

As previous known, the most popular transport mode in this area is highway road. The vehicles use for carrying raw materials and products from proposed projects and automobiles use for trading by local people must use only these same routes for transportation. Therefore, traffic analysis is conducted for the main road, Myingyan-Nyaung U highway road in front of the project area.

4.7.3.3. Data Collection

To estimate future traffic volume, current traffic volume is counted firstly. Among various methods of counting, manual traffic count was used. This collection was done on 18 Sep 2021 (Wet Season) and 11 May 2023 (Dry Season) at one same location on Myingyan-Nyaung U highway road around the project area. The specific traffic surveying locations and records are shown in Table 4-131, Figure 4-113 and Figure 4-114.

Table 4-131 Traffic Surveying Locations

No	Station	Direction	Coordinates
1	In front of factory	Myingyan to Nyaung U Nyaung U to Myingyan	21°17' 51.38" 95°10'26.72"

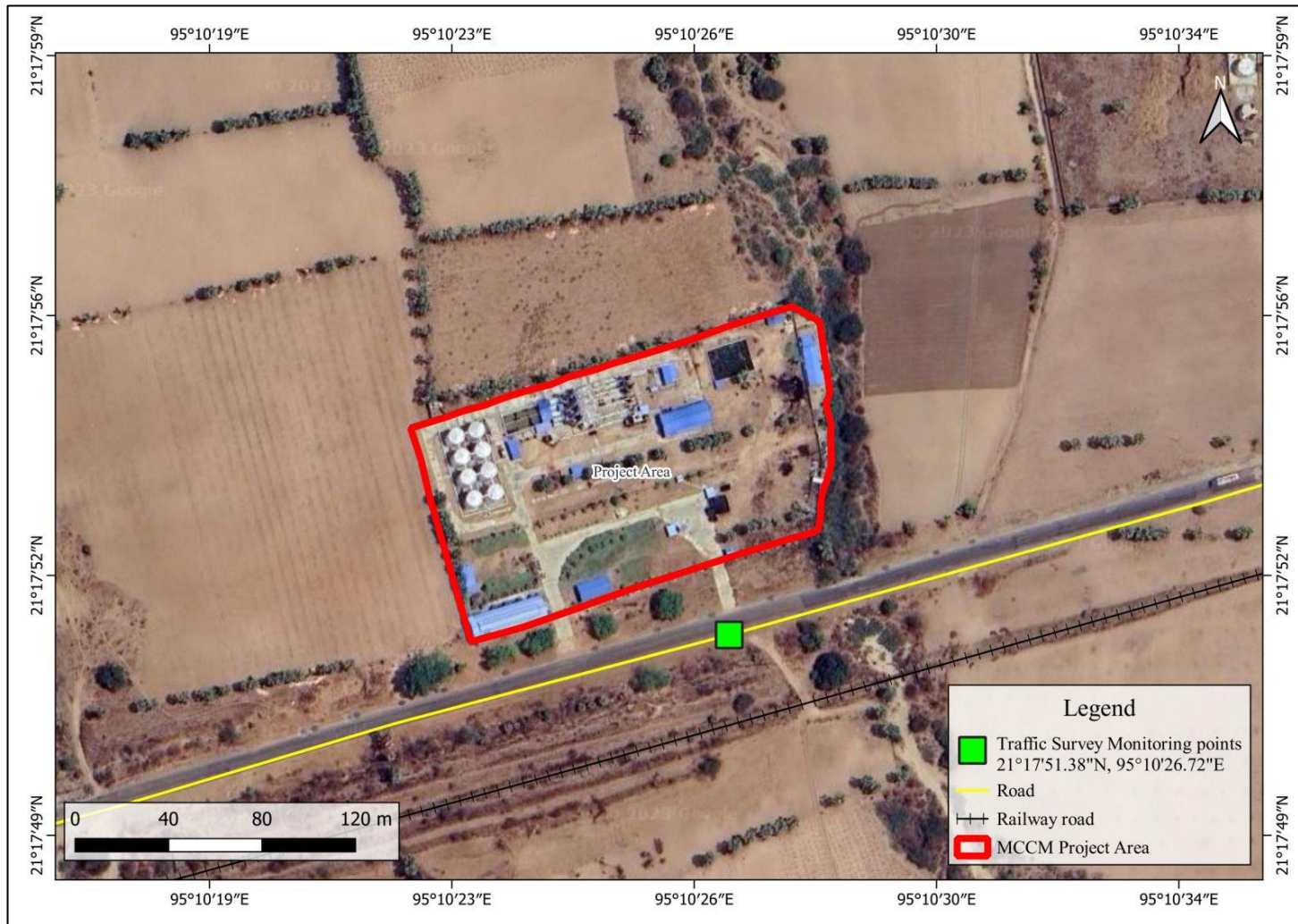


Figure 4-113 Traffic Surveying Locations



Figure 4-114 Traffic Surveying Records

Traffic survey was conducted by manually by 4 surveyors and the surveying period is from 6 a.m. to 6 p.m. During the surveying period, the number and type of vehicles were recorded by tally method. Vehicles are classified as six group such as (1) Saloon, Van, Light Truck, Taxi, (2) Small Passenger Car, (3) 6/8/9 Wheels Truck, (4) 12 Wheels Truck, (5) 22/24 Wheel Truck, (6) Express, (7) Motor Cycle.

4.7.3.4. Methodology

Traffic Volume

To forecast future traffic volume, the following equations can be used.

$$\text{Future ADT} = \text{Current ADT} + \text{Traffic increase} \quad (1)$$

-ADT = Average Daily Traffic

-Traffic increase depend on Normal traffic growth, Development in traffic, Generated traffic

$$\text{Future ADT} = \text{Current ADT} \times \text{Traffic Projection Factor} \quad (2)$$

$$\text{Traffic Projection Factor} = (1 + r)^{n+x} \quad (3)$$

n= traffic analysis period (design life)

r= rate of annual growth in traffic

x= years required for design & construction

Volume/Capacity Ratio

The counted traffic data are used to calculate the V/C ratios which is traffic volume relative to road capacity. This ratio will be used to measure the effects of the project's impact on local traffic and is thought of as a baseline for traffic flow conditions.

$$V/C = \frac{\text{Traffic Volume}}{\text{Carrying Capacity of Respective Road}} \quad (4)$$

Level of Service (LOS)

Traffic conditions that influence capacities and service levels include vehicle type of lane and directional distribution.

According to Highway Capacity Manual,

Base conditions assume good weather, good pavement conditions, users familiar with the facility, and no impediments to traffic flow.

Table 4-132 Level of Service

Level of Service (LOS)	Volume/ Capacity Ratio (V/C)	Natuer of flow
A	<0.3	Free flow
B	0.3 – 0.5	Reasonably free flow
C	0.5 – 0.7	Stable flow
D	0.7 – 0.9	Approaching unstable flow
E	1	Unstable flow
F	>1	Forced flow

Source: Gaijar R, and Mohandas D (2016)

Before LOS determination, it is required to confirm highway type.

- Freeways - functional system is one or two, and full access control exists, then the section is a freeway

- Multilane highways - stop signs exist, then the section is stop controlled

- Rural two-lane highways - signals exist, the section is signalized

- Signalized highways - through lanes are greater than or equal to four, the section is multilane

- Stop-controlled highways -through lanes are equal to two or three and the urban code indicates rural, the section is rural two lanes

4.7.3.5. Analysis

Traffic Volume

Wet Season

Myingyan-Nyaung U highway road - Roadway is a 2-lane in two-direction. This point was selected to review the current traffic conditions from Myingyan to Nyaung U in both directions in wet season.

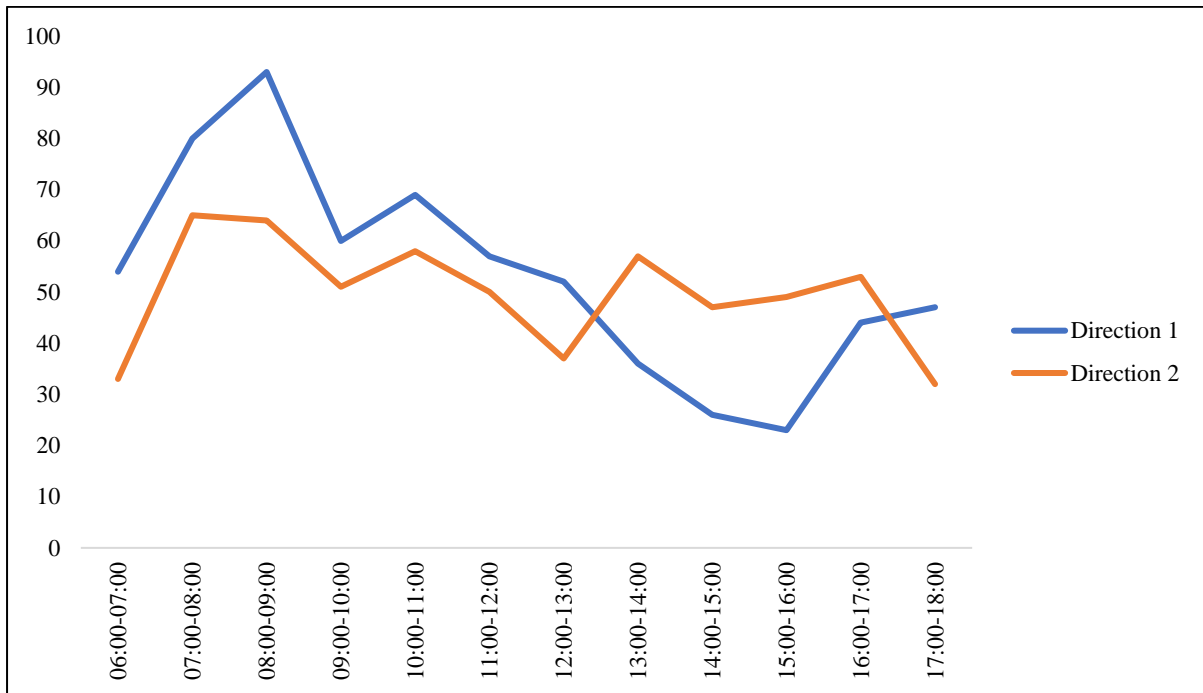


Figure 4-115 Traffic Flow at Myingyan-Nyaung U highway road (Wet Season)

The Myingyan- Nyaung U (direction I) and Nyaung U-Myingyan (direction II) traffic were not much different each other. According to Figure 4-115, the traffic volume was decreased from morning 8 to 9 a.m. The highest volume could be seen within 7am to 9am. Morning volume is higher than evening one. The lowest traffic volume could be seen within 3pm to 6pm.

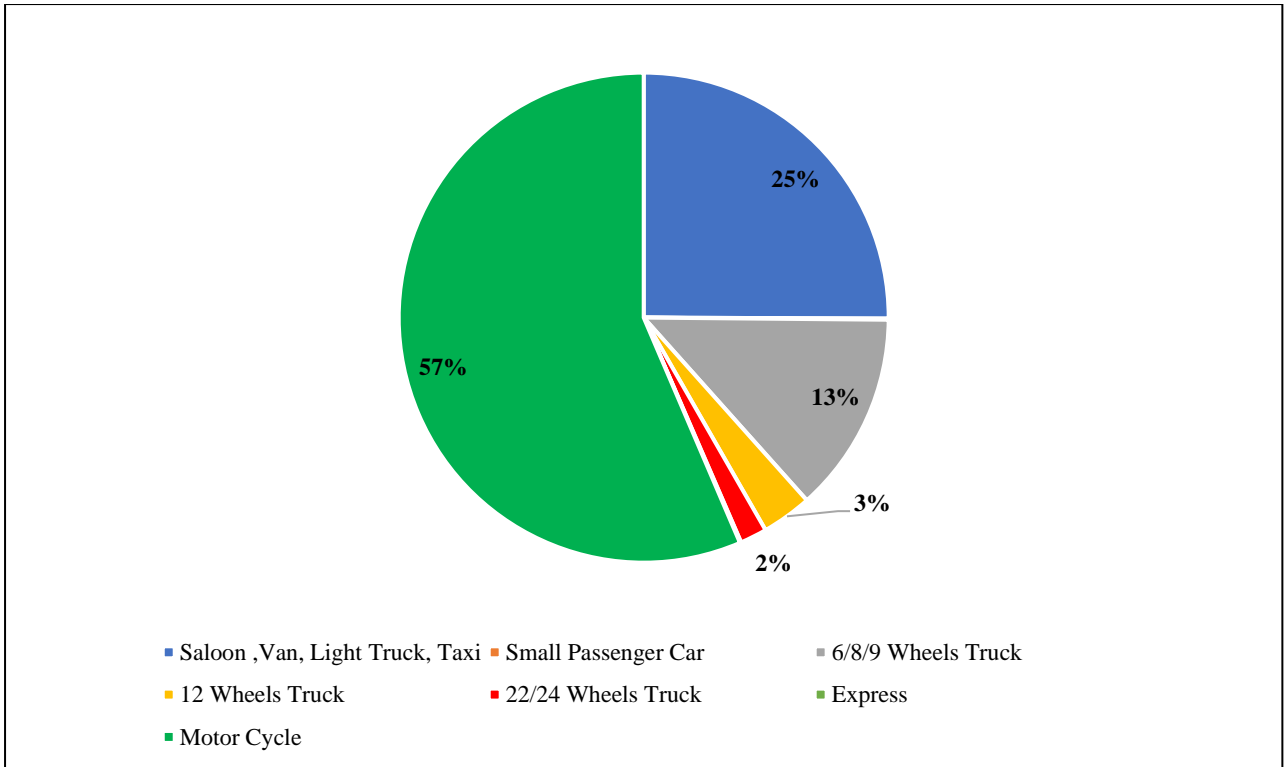


Figure 4-116 Vehicle Composition (Wet Season)

From the Figure 4-116, type 7 (Motor Cycle) occupied the highest percentage among the other type of vehicles. Type 1 (Saloon, Van, Light Truck, Taxi) and type 3 (6/8/9 Wheels Truck) are not slightly different (25 % and 13 % respectively). Type 2 (Small Passenger Car) and Type 6 (Express) occur the lowest percentage of 0 % respectively due to the number is only 1 vehicle.

Dry Season

Myingyan-Nyaung U highway road - Roadway is a 2-lane in two-direction. This point was selected to review the current traffic conditions from Myingyan to Nyaung U in both directions in dry season.

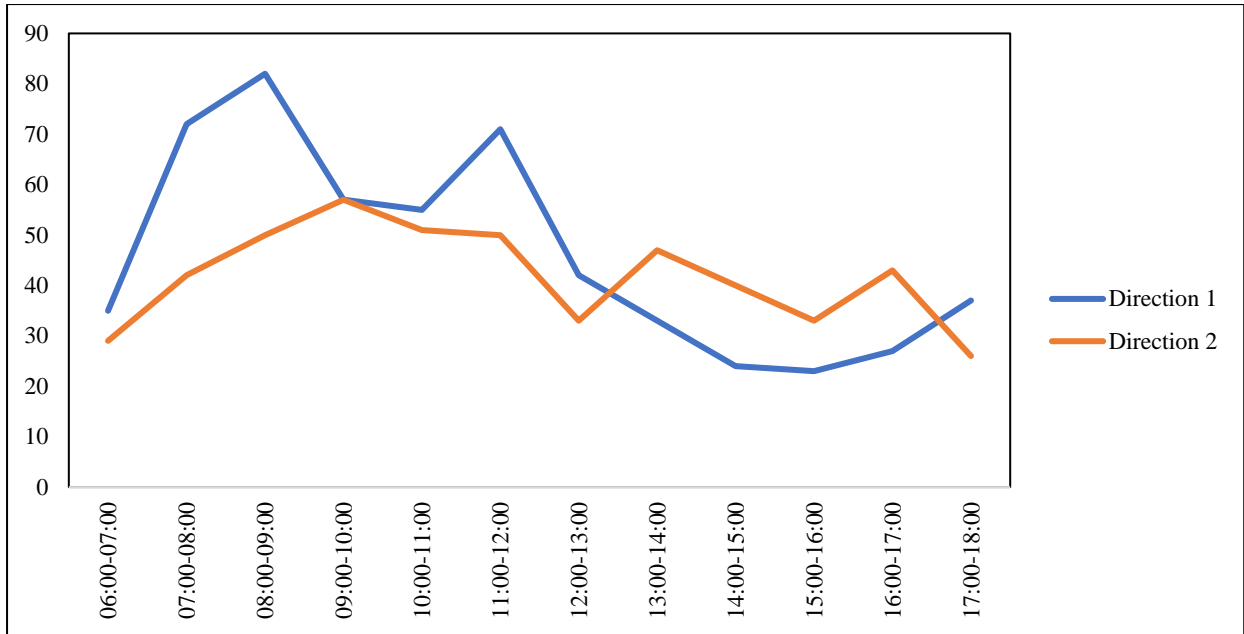


Figure 4-117 Traffic Flow at Myingyan-Nyaung U highway road (Dry Season)

According to Figure 4-117, the traffic volume increase between the time of 7 am to 9 am. The volume also increases at 11 am to 12 am and decrease dramatically. The volume at morning and afternoon is greater than the evening time. The traffic volume of Myingyan-Nyaung U (direction 1) is greater than the Nyaung U - Myingyan (direction 2) in the morning but not slightly different in the evening.

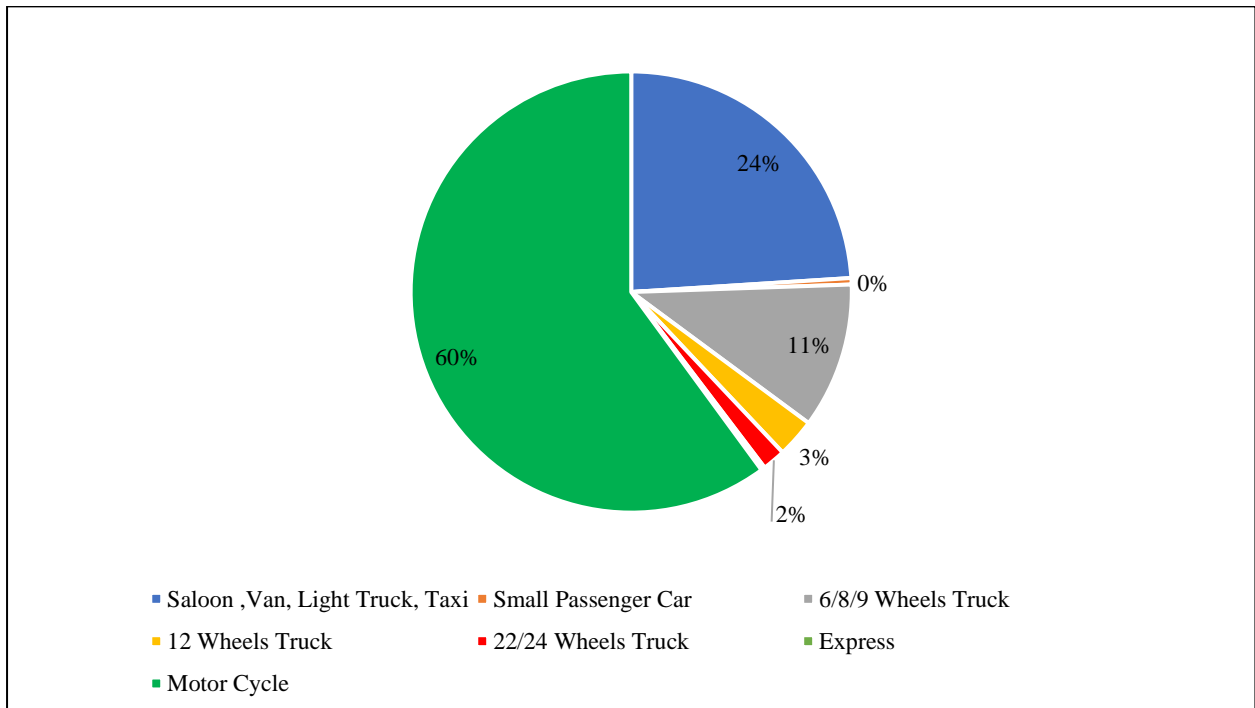


Figure 4-118 Vehicle Composition (Dry Season)

From the Figure 4-118, type 7 (motor cycle) occupies the highest amount of percentage among other types of vehicles. Secondly, type 1 (Saloon, Van, Light Truck, Taxi)

and type 3 (6/8/9 Wheels Truck) are followed by 24% and 11% respectively. Type 6 (Express) have the lowest percentage of 0 % and the number of vehicles is 3.

Calculation of Future Traffic Volume

To forecast future traffic, the following should be made-

Firstly, it was needed to take current ADT. The term ADT is the average number of vehicles traveling through a location during a period shorter than a year. The traffic volume was taken as current ADT.

Table 4-133 Future Traffic Volume

Location	2023	2033	2043
In front of factory (Myingyan – Nyaung U Highway)	1,237	4,366	5,108

The rate of annual growth in annual traffic depends on population growth, economic development, urbanization, land use and development patterns, infrastructure development, vehicle ownership and usage, demographics changes and so on. In this case, growth rate was calculated based on population growth. Based on statistical data, the population growth rate was 3.2 % per year. So, the rate of annual growth rate in traffic was assumed as 3.2 %. The volume was calculated based on 10 year and 20 year of traffic analysis periods. At present, major repair was not required and design year or maintenance year was assumed as 10-year interval.

Volume/Capacity Ratio

The following table was used to calculate V/C ratio of Myingyan-Nyaung U highway road.

Table 4-134 Referenced Capacity for Urban Roads

No	Types of Carriageway	Total Design Service Volumes for Different Categories of Urban Roads		
		Arterial	Sub-Arterial	Collector
1	2- Lane (One way)	2,400	1,900	1,400
2	2- Lane (Two way)	1,500	1,200	900
3	3- Lane (One way)	3,600	2,900	2,200
4	4-Lane Undivided (Two way)	3,000	2,400	1,800
5	4-Lane Divided (Two way)	3,600	2,900	-
6	6- Lane Undivided (Two way)	4,800	3,800	-
7	6-Lane Divided (Two way)	5,400	4,300	-
8	8-Lane Divided (Two way)	7,200	-	-

Source: IRC 106:1990

The proposed project area could be accessed on only Myingyan - Nyaung U highway road. Myingyan - Nyaung U highway road is an arterial road and 2- Lane (Two way) road type.

By application of equation (4), the results were as follow;

Table 4-135 V/C Ratio on Myingyan-Nyaung U highway road

Location	Season	V/C Ratio	Remark
In front of factory (Myingyan – Nyaung U Highway)	Wet	0.82	<1
	Dry	0.71	<1
	Average result	0.77	<1

According to table 1.5, V/C ratio was less than 1 that it means capacity was greater than current volume. The current traffic could flow freely without disturbance.

Level of Service Determination

The level of service was determined using V/C ratio as shown in Table 4-136.

Table 4-136 LOS on road

Points	V/C ratio	Remark	LOS
Myingyan – Nyaung U Highway)	0.77	Approaching unstable flow	D

From the results of LOS, approaching unstable flow condition was seen in the current conditions but most of the vehicle are motor cycles.

4.7.3.6. Results and Conclusion

Traffic Volume Analysis

From current traffic volume study, the following factors could be pointed out-

- The average traffic flow was nearly 31 vehicles/hr. (max- 49, min.- 16)
- The peak hour was around 7 a.m to 8 a.m.
- The lowest traffic hour was around 5 p.m.
- Motorcycles were seen as the highest demand around project area.
- Saloon, Van, light truck and taxi were used as second highest vehicle type.
- Among wheel trucks, six-wheeled, eight-wheeled and nine-wheeled trucks were more applied than the other trucks.
- Being the third place of vehicle application, twelve wheeled truck should be considered as major factor in geometric design considerations.
- The road directions (Myingyan to Nyaung U direction and Nyaung U to Myingyan direction) flow was not significantly difference.

Future ADT

Concerning with future ADT,

- Traffic demand on Myingyan-Nyaung U Highway would be increased 3.5 times within 10 years over.
- Major repair was not required on current situations.
- Minor repair was not significantly influenced on Future ADT.
- If natural hazards (earthquake, strong wind), geometric conditions and political conditions would be changed and V/C ration will be varied.
- Due to the limitation of factors, future ADT could be varied on other factors.

V/C Ratio

Traffic conditions related with V/C ratio, it could be pointed out that

- Current roadway capacity was higher than actual running vehicles.
- V/C ratio was calculated based on 2-lane in two-direction.
- The ratio between volume and capacity would be changed if lane widths were restricted.

Level of Service

Due to the implementation of the project, LOS determined whether the road condition needed to repair or road facilities. Regarding with LOS on Myingyan-Nyaung U Road,

- Traffic was approaching unstable flow. But most vehicle of the total vehicles are motor cycle.
- The traffic flow pattern would be changed if a new extension project is constructed on the highway.

Conclusion

Based on the results of study, the usage of motorcycles was the highest demand. Trucks should be considered in major sector on Myingyan-Nyaung U Road. Due to the increase in vehicle growth rate, lane widths should be controlled. Although current capacity was adequate, traffic flow would be changed within 10 years where v/c ratio could be varied (>1). After 10 years, level of service would be changed due to traffic growth and inadequate land use.

CHAPTER 5

ENVIRONMENTAL, SOCIAL AND HELATH IMPACT ASSESSMENT AND MITIGATION MEASURES

5.1. INTRODUCTION

Environmental Impact Assessment (EIA) mainly focuses on physical, biological and social dimension along with their complex interactions, which affects individuals, communities and ultimately determines their forms, character, relationship, and survival. In EIA context, impact can be defined as adverse impact or positive impact. The project activity process may cause the potential environmental impacts. In this chapter, the potential impact and mitigation measures of the construction, operation and decommission phase of the project are described.

5.2. OBJECTIVES OF ENVIRONMENTAL IMPACT ASSESSMENT

The following are the objectives of an environmental impact assessment and a description of potential environmental impacts:

- To ensure that the environmental considerations are explicitly addressed and incorporated into the development and decision-making process;
- To anticipate and avoid, minimize or offset the adverse significant physical, biological, social and other relevant effects of development;
- To protect the natural systems like water flow and ecosystem services
- To promote development that is sustainable and optimizes resource use as well as management opportunities.

The environments which could be affected by the proposed project include physical environment, biological environment and social environment. The receptors of the physical environment are air, noise, water and soil, whereas those of biological environment are flora, fauna and ecosystem. Social environment includes livelihood of the people, cultural and health sectors.

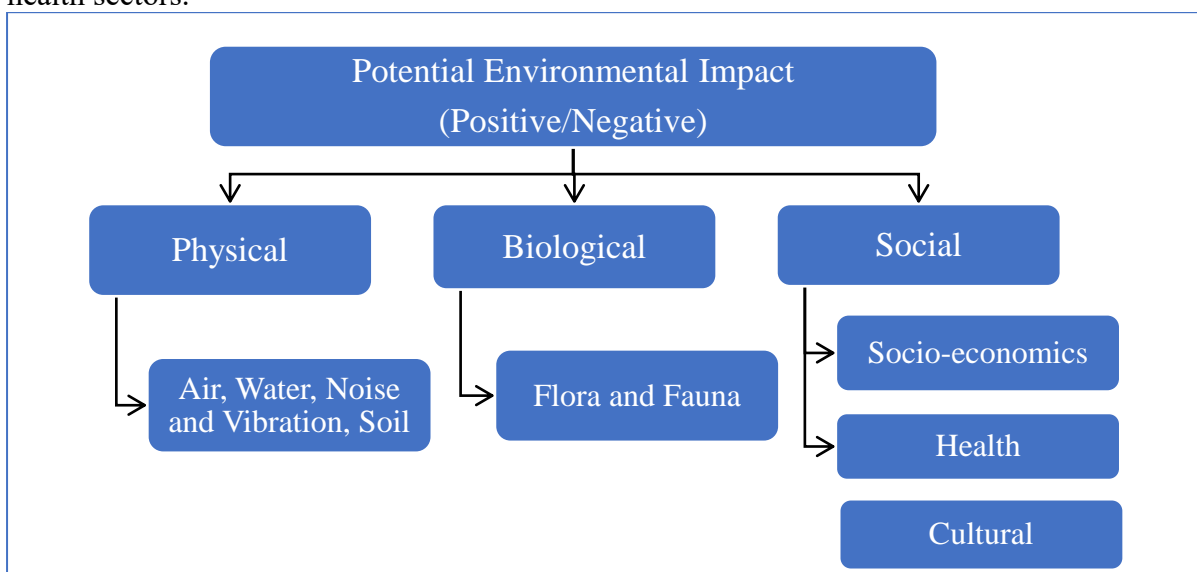


Figure 5-1 Potential Impacts of the Proposed Project

5.3. MITIGATION METHOD

Firstly, the impacts of project implementation are identified and classified. And mitigation measures (Avoid, Management and Monitoring) are conducted. In other way, it is identifying the best method to avoid and reduce the negative impacts. The steps of mitigation measure are shown in below.

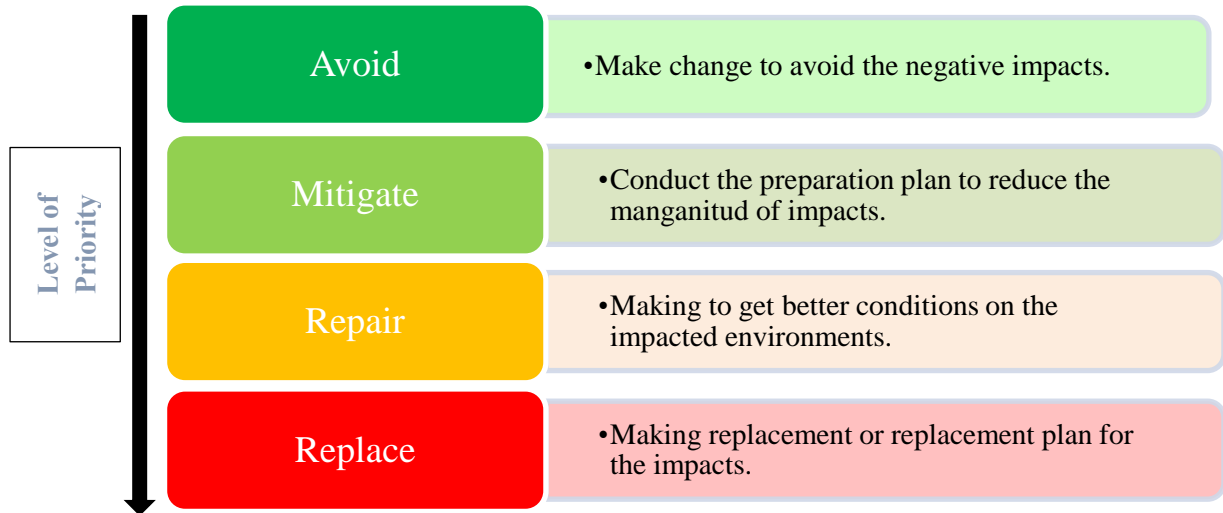


Figure 5-2 The steps of mitigation measure

5.4. METHOD OF ASSESSING IMPACTS

The impact assessment methodology is guided by the requirements of South African Heritage Resources Information System (SAHRIS)⁹. The broad approach to the significance rating methodology is to determine the environmental impact (EI) by considering the consequence (C) of each impact (comprising Nature, Extent, Duration, Magnitude, and Reversibility) and relate this to the probability/ likelihood (P) of the impact occurring. This determines the environmental risk. In addition, other factors, including cumulative impacts, public concern, and potential for irreplaceable loss of resources, are used to determine a prioritization factor (PF) which is applied to the ER to determine the overall significance (S).

5.4.1. Determination of Environmental Risk

The significance (S) of an impact is determined by applying a prioritisation factor (PF) to the environmental risk (ER).

The environmental risk is dependent on the consequence (C) of the particular impact and the probability (P) of the impact occurring. Consequence is determined through the consideration of the Nature (N), Extend (E), Duration (D), Magnitude (M), and reversibility (R) applicable to the specific impact.

For the purpose of this methodology the consequence of the impact is represented by:

$$C = \frac{(E+D+M+R) \times N}{4}$$

⁹ Sahris. (n.d.). The Impact Assessment Methodology. <https://sahris.sahra.org.za/sites/default/files/additionaldocs/Appendix F1 - Impact Assessment Methodology.pdf>

Each individual aspect in the determination of the consequence is represented by a rating scale as defined in Table 5-1, Table 5-2, Table 5-3, Table 5-4 and Table 5-5.

Table 5-1 Criteria for determination of impact Nature

Aspect	Score	Definition
Nature	-1	Likely to result in a negative/ detrimental impact
	+1	Likely to result in a positive/ beneficial impact

Table 5-2: Criteria for determination of impact Extent

Aspect	Score	Definition
Extent	1	Activity (i.e., limited to the area applicable to the specific activity)
	2	Site (i.e., within the development property boundary)
	3	Local (i.e., the area within 5km of the site)
	4	Regional (i.e., extends between 5 and 50km from the site)
	5	Provincial/ National (i.e., extends beyond 50km from the site)

Table 5-3: Criteria for determination of impact Duration

Aspect	Score	Definition
Duration	1	Immediate (<1 year)
	2	Short term (1-5 years)
	3	Medium term (6-15 years)
	4	Long term (the impact will cease after the operational life span of the project)
	5	Permanent (no mitigation measure of natural process will reduce the impact after construction)

Table 5-4: Criteria for determination of impact Magnitude/ Intensity

Aspect	Score	Definition
Magnitude/ Intensity	1	Minor (where the impact affects the environment in such a way that natural, cultural and social functions and processes are not affected)
	2	Low (where the impact affects the environment in such a way that natural, cultural and social functions and processes are slightly affected)
	3	Moderate (where the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way)
	4	High (where natural, cultural or social functions or processes are altered to the extent that it will temporarily cease), or
	5	Very high/ don't know (where natural, cultural or social functions or processes are altered to the extent that it will permanently cease)

Table 5-5: Criteria for determination of impact Reversibility

Aspect	Score	Definition
Reversibility	1	Impact is reversible without any time and cost
	2	Impact is reversible without incurring significant time and cost
	3	Impact is reversible only by incurring significant time and cost
	4	Impact is reversible only by incurring prohibitively high time and cost
	5	Irreversible Impact

Once the C has been determined the ER is determined in accordance with the standard risk assessment relationship by multiplying the C and the P (refer to Figure 1). Probability is rated/scored as per Table 5-6.

Table 5-6: Probability scoring

Aspect	Score	Definition
Probability	1	Improbable (the possibility of the impact materialising is very low as a result of design, historic experience, or implementation of adequate corrective actions; <25%),
	2	Low probability (there is a possibility that the impact will occur; >25% and <50%),
	3	Medium probability (the impact may occur; >50% and <75%),
	4	High probability (it is most likely that the impact will occur- > 75% probability), or
	5	Definite (the impact will occur),

The result is a qualitative representation of relative ER associated with the impact. ER is therefore calculated as follows:

$$ER = C \times P$$

The outcome of the environmental risk assessment will result in a range of scores, ranging from 1 through to 25. These ER scores are then grouped into respective classes as described in Table 5-7.

Table 5-7 Significance classes

Environmental Risk Score	
Value	Description
< 9	Low (i.e., where this impact is unlikely to be a significant environmental risk)
≥9; <17	Medium (i.e., where the impact could have a significant environmental risk),
≥ 17	High (i.e., where the impact will have a significant environmental risk).

The impact ER will be determined for each impact without relevant management and mitigation measures (pre-mitigation), as well as post implementation of relevant management and mitigation measures (post-mitigation). This allows for a prediction in the degree to which the impact can be managed/ mitigated.

5.4.2. Impact Prioritization

In accordance with the requirements of Regulation 31 (2)(l) of the EIA Regulations (GNR 543), and further to the assessment criteria presented in below, it is necessary to assess each potentially significant impact in terms of:

- Cumulative impacts; and
- The degree to which the impact may cause irreplaceable loss of resources.

In addition, it is important that the public opinion and sentiment regarding a prospective development and consequent potential impacts is considered in the decision-making process.

In an effort to ensure that these factors are considered, an impact prioritisation factor (PF) will be applied to each impact ER (post-mitigation). This prioritisation factor does not aim to detract from the risk ratings but rather to focus the attention of the decision-making authority on the higher priority / significance issues and impacts. The PF will be applied to the ER score based on the assumption that relevant suggested management/ mitigation impacts are implemented.

Consequence	5	5	10	15	20	25
	4	4	8	12	16	20
	3	3	6	9	12	15
	2	2	4	6	8	10
	1	1	2	3	4	5
		1	2	3	4	5
	Probability					

Table 5-8 Criteria for the determination of public response (PR)

Aspect	Score	Definition
Public response (PR)	Low (1)	Not raised as a concern by the I&AP's
	Medium (2)	Issue/ impact raised by the I&AP's
	High (3)	Significant and meaningful response from the I&AP's

Table 5-9 Criteria for the determination of Cumulative Impact (CI)

Aspect	Score	Definition
Cumulative Impact (CI)	Low (1)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is unlikely that the impact will result in spatial and temporal cumulative change
	Medium (2)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is probable that the impact will result in spatial and temporal cumulative change
	High (3)	Considering the potential incremental, interactive,

		sequential, and synergistic cumulative impacts, it is highly probable/definite that the impact will result in spatial and temporal cumulative change
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Table 5-10 Criteria for the determination of Irreplaceable loss of resources (LR)

Aspect	Score	Definition
Irreplaceable loss of resources (LR)	Low (1)	Where the impact is unlikely to result in irreplaceable loss of resources
	Medium (2)	Where the impact may result in the irreplaceable loss (cannot be replaced or substituted) of resources but the value (service and/or functions) of these resources is limited
	High (3)	Where the impact may result in the irreplaceable loss of resources of high value (services and/or functions)

The value for the final impact priority is represented as a single consolidated priority, determined as the sum of each individual criteria represented in Table 5-8, Table 5-9 and Table 5-10. The impact priority is therefore determined as follows:

$$\text{Priority} = PR + CI + LR$$

The result is a priority score which ranges from 3 to 9 and a consequent PF ranging from 1 to 2 (refer to **Table 5-11**).

Table 5-11 Determination of prioritization factor

Priority	Ranking	Prioritisation Factor
=3	Low	1
3-8	Medium	1.5
=9	High	2

In order to determine the final impact significance, the prioritisation factor (PF) is multiplied by the EI of the post mitigation scoring. The ultimate aim of the PF is to be able to increase the post mitigation environmental impact rating by a full rankin class, if all the priority attributes are high (i.e., if an impact comes out with a medium environmental impact after the conventional impact rating, but there is significant cumulative impact potential, significant public response, and significant potential for irreplaceable loss of resources, then the net result would be too upscale the impact to a high significance). The result is the environmental significance rating (ESR) as shown in Table 5-12.

$$\text{ESR} = \text{PF} \times \text{EI}(\text{Post} - \text{Mitigation Score})$$

Table 5-12 Environmental Significance Rating

Environmental Significance Rating	
Value	Description
<15	Low (i.e., where this impact would not have a direct influence on the decision to develop in the area),
≥15; <30	Medium (i.e., where the impact could influence the decision to develop in

	the area),
≥ 30	High (i.e., where the impact must have an influence on the decision process to develop in the area)

The significance ratings and additional considerations applied to each impact will be used to provide a quantitative comparative assessment of the alternatives being considered. In addition, professional expertise and opinion of the specialists and the environmental consultants will be applied to provide a qualitative comparison of the alternatives under consideration. This process will identify the best alternative for the proposed project.

5.5. IDENTIFYING THE POTENTIAL ENVIRONMENTAL IMPACTS OF THE PROJECT

Project activities and requirements that could cause changes to the on-site and off-site environment were identified to the basis of information on the field survey and the baseline environmental conditions of the project area. The table below lists the potential impact and sources of pre-construction, construction and operation/maintenance and decommission phase for environmental and biological components that could result from the Project. The survey results and nature of the proposed project implied that there will be some negative impacts particularly due to the air pollution, solid waste, wastewater and traffic volume due to the project. In general, the occurrence of negative impacts is concerned with the following project implementation:

5.5.1. Pre-construction Phase

The potential environmental impacts have been identified during preconstruction based on previously documented operations including site clearance, elevation measurement, loading/unloading, and tube well drilling. But the project site is already finished pre-construction phase. Therefore, according to the assessment made by the environmental consultants (EIA) team, there are no negative impacts on physical, biological and social environment impact for the pre-construction phase of the project.

5.5.2. Construction Phase

During Construction phase, the impacts resulting from construction activities including digging, excavation, land filling, earth work and civil work activities, loading/unloading of construction material, welding and machine installation, transportation activities etc.

5.5.3. Operation Phase

During Operation phase, the potential impacts are associated with the operation activities such as loading/unloading process for raw material, final product delivery, storage tank, operation and production process, use of heavy machinery and vehicle, compressor, generator etc.

5.5.4. Decommission Phase

Decommissioning phase of the proposed project will have the minimum environmental impacts. This impact will be caused from demolition of infrastructures and use

of heavy equipment and vehicle in project area. In addition, soil contamination from petroleum waste residues and get back to unemployment situation will be caused in decommissioning phase. Therefore, according to the assessment made by the environmental consultants (EIA) team, there are no negative impacts on physical, biological and social environment impact for the decommission phase of the project.

5.6. POTENTIAL IMPACTS AND SOURCES FOR EACH PROJECT PHASE

Potential Impacts and sources of them on construction, operation and decommission phases are identified and classified as shown in Table 5-13.

Table 5-13 Potential Impacts on Construction and Operation/Maintenance phases

Group Type	Potential Impacts	Source/ Context
Physical Components	(1) Air Pollution (Particulate Matters and Other gases)	<p>Construction Phase</p> <ul style="list-style-type: none"> ❖ Site Clearance ❖ Earth work and civil work activities ❖ Ground levelling activities ❖ Land reclaiming process ❖ Temporary access road construction ❖ Emissions from construction equipment and vehicles ❖ Loading/ Unloading processes ❖ Land filling activities ❖ Transportation vehicles ❖ Dust arising from construction activities <p>Operation Phase</p> <ul style="list-style-type: none"> ❖ Emission from operation activities ❖ Using vehicles and generators ❖ Furnaces from refinery process ❖ Raw and product storage area ❖ Heating oil (FO) storage area ❖ Temporary waste disposal area ❖ Uses of aircon

Group Type	Potential Impacts	Source/ Context
		<ul style="list-style-type: none"> ❖ Uses of kitchen ❖ Loading/ Unloading processes ❖ Transportation vehicles <p>Decommission Phase</p> <ul style="list-style-type: none"> ❖ Air pollution from demolition activities from demolition of buildings, driving equipment, use of vehicles, water pumps and cutters ❖ Particulate emissions from loading/unloading process, cleaning activities ❖ Emission from demolition activities ❖ Uses of kitchen ❖ Transportation vehicles
	(2) Water Pollution	<p>Construction Phase</p> <ul style="list-style-type: none"> ❖ Temporary toilet of the worker's camp ❖ Improper handling of lubricants and fuel ❖ Muddy water and polluted water from construction inflows to outside ❖ Lubricant and fuel spill ❖ Water polluted from temporary toilet ❖ Civil work activities <p>Operation Phase</p> <ul style="list-style-type: none"> ❖ Wastewater from the operation and production process of the project area ❖ Crude oil settlement area ❖ Reheating process of silica gel ❖ Cooling water tank ❖ Domestic wastewater from kitchen ❖ Wastewater from worker's usage and drink (Basin) ❖ Wastewater from staff accommodation and toilet

Group Type	Potential Impacts	Source/ Context
		<ul style="list-style-type: none"> ❖ Sewage water from septic tank ❖ Storm water running out <p>Decommission Phase</p> <ul style="list-style-type: none"> ❖ Contaminated water from temporary toilets and water from workers' use ❖ Demolition activities ❖ Uses of kitchen
	(3) Solid Waste Pollution	<p>Non-Hazardous Waste</p> <p>Construction Phase</p> <ul style="list-style-type: none"> ❖ Site clearing activities ❖ Removal of vegetation and tree for access road in the project area ❖ Disposal of ground-leveling waste ❖ Earth work activities ❖ Generation of solid waste by land clearance and cut earth work ❖ Solid waste generated from construction activities ❖ Domestic solid waste from worker <p>Operation Phase</p> <ul style="list-style-type: none"> ❖ Generation of solid wastes from operation and production process ❖ Domestic waste from worker includes food waste, plastic, paper, glass, leather, and cardboard etc. <p>Decommission Phase</p> <ul style="list-style-type: none"> ❖ Generation of solid wastes from demolition activities such as packaging materials, leather, and cardboard etc. ❖ Domestic waste from worker includes food waste, plastic, paper, sanitary pads, toilet waste and ash etc. <p>Hazardous Waste</p> <p>Construction and Decommission Phase</p>

Group Type	Potential Impacts	Source/ Context
		<ul style="list-style-type: none"> ❖ Generation from construction and demolition activities such as wood debris, concrete blocks, empty cement bags, empty paint containers, scrap metal, nails, fuel oil cans and wall paint cans etc. ❖ Electronic wastes such as wires, batteries, electrical lamp, and bulb etc. ❖ Domestic solid waste from worker <p>Operation Phase</p> <ul style="list-style-type: none"> ❖ Generation of solid wastes from crude oil refinery process such as silica gel with oil, oil sample bottle and cans etc. ❖ Hazardous waste from refinery process and factory's Lab ❖ Fuel usage and leakage ❖ Domestic waste from worker includes glass, metals, and juice containers etc. ❖ Electronic wastes such as wires, batteries, electrical lamp, and bulb etc. ❖ Detergent uses in staff accommodation and kitchen
	(4) Offensive Odor	<p>Construction and Decommission Phase</p> <ul style="list-style-type: none"> ❖ Temporary toilet of the worker's camp ❖ Odor polluted from the temporary waste storage tanks and waste bins ❖ Odor polluted from septic tanks. <p>Operation Phase</p> <ul style="list-style-type: none"> ❖ Odor from the crude oil refinery process of the project area ❖ Storage and sedimentation crude oil ❖ Temporary storage of product ❖ Septic tank ❖ Worker accommodation and toilets ❖ Use of kitchen
	(5) Noise and Vibration	Construction Phase

Group Type	Potential Impacts	Source/ Context
		<ul style="list-style-type: none"> ❖ Construction activities mainly site leveling and excavation ❖ Civil work activities using vehicle and equipment ❖ Transportation activities include the delivery of raw material ❖ Loading/ Unloading processes <p>Operation Phase</p> <ul style="list-style-type: none"> ❖ Noise and vibration generate from production activities ❖ Noise generated from the operation of machinery such as pumps, generators, and air compressor etc. ❖ Loading/ Unloading processes <p>Decommission Phase</p> <ul style="list-style-type: none"> ❖ Demolition activities ❖ Using heavy machinery and vehicle ❖ Transportation activities include the delivery of demolition material ❖ Loading/ Unloading process
	<p>(6) Soil Pollution</p>	<p>Construction and Decommission Phase</p> <ul style="list-style-type: none"> ❖ Construction activities mainly site leveling and excavation ❖ Land filling and land reclamation process ❖ Temporary construction site office ❖ Civil work activities using vehicle and equipment ❖ Concrete residue during construction phase ❖ Soil contamination from liquid waste of the temporary waste disposal site <p>Operation Phase</p> <ul style="list-style-type: none"> ❖ Leakage of oil & grease due to the intense use of heavy machinery and vehicles ❖ Crude oil settlement area ❖ Disposal area of silica gel ❖ Waste disposal area of production process

Group Type	Potential Impacts	Source/ Context
		<ul style="list-style-type: none"> ❖ Oil spill from vehicles and equipment used in maintenance ❖ Residue of paint during operation process ❖ Soil contamination from liquid waste during operation period <p>Decommission Phase</p> <ul style="list-style-type: none"> ❖ Contamination of soil from spillage of machinery used in demolition of buildings and fuel spillage stored for vehicles ❖ Contamination of soil from leakage of fuel tanks stored for water pumps and used equipment ❖ Contaminating the soil by seeping the liquid from the temporary waste disposal site
Biological Components	Biodiversity	<p>Construction/ Decommission Phase</p> <ul style="list-style-type: none"> ❖ Loss of all plant and animal species due to the land leveling and excavation ❖ Cutting activities of bushes and small trees ❖ Vegetation loss for soil contamination due to disposal of oils and waste ❖ Habitat loss or destruction during construction works ❖ Loss of individuals through emigration ❖ Changes in abiotic conditions and habitats <p>Operation Phase</p> <ul style="list-style-type: none"> ❖ Vegetation loss due to the disposal of waste ❖ Disturbance to the flora and fauna carried on by noise, traffic, or human presence during the operation period
Socio-Economical Components	Random Relocation	No
	Regional Economy (Employment and Vocational)	<p>Construction/ Decommission and Operation Phase</p> <ul style="list-style-type: none"> ❖ Job creation and employment opportunities for local people ❖ Economy and livelihood ❖ Social infrastructure and services, Children's right ❖ Community development

Group Type	Potential Impacts	Source/ Context
		❖ Safe working environment, accidents, and health provisions
	Indigenous Peoples and Tribes	No
	Existing social services and infrastructures	Operation Phase/ Decommission Phase ❖ Project area is free from road area, electricity lines and drainage channels.
	Occurrence of local in the project area	No
	Cultural Heritage	No
	Benefits and Damages	Operation Phase/ Decommission Phase Benefits <ul style="list-style-type: none"> ❖ Improving Local economy ❖ Development of technologies according to business sector in the region ❖ Getting employment for locals. ❖ Earning foreign income. ❖ Increase in national budget due to tax revenue. ❖ Development in nearby villages or quarters due to CSR programs. Damages <ul style="list-style-type: none"> ❖ Air pollution, water pollution and noise pollution due to project implementation ❖ Harm to aquatic life from waste and fuel spills without proper supervision. ❖ Accidental injury in the workplace. ❖ Can block traffic near the project.

Group Type	Potential Impacts	Source/ Context
Health	Occupational Health and safety	<p>Operation Phase</p> <ul style="list-style-type: none"> ❖ Impacting the natural environment and the health of workers due to the release of particles and gases from project activities. ❖ Accidents with equipment in the workplace, causing accidents. ❖ Health damage caused by the spread of the Covid-19 virus and other infectious diseases. ❖ Bodily harm can cause in loading/ unloading process. ❖ Equipment can burn due to overheating. ❖ Fire can start from the factory. ❖ Damage to workers due to natural disasters such as storm, flood, etc. <p>Construction/ Decommission Phase</p> <ul style="list-style-type: none"> ❖ Accidents with equipment during Construction/ demolition of buildings. ❖ Workers may be injured due to wastes from demolition such as iron scraps, nails, broken lamps. ❖ Workers can be affected by particles and gases from the demolition process.

5.7. ASSESSMENT OF POTENTIAL ENVIRONMENTAL IMPACTS FOR EACH PROJECT PHASE

Based on the methodology, the various impacts of the project are assessed according to the phase by phase of the project activity. During the construction/ decommission and operation phases have been analyzed and identified, so at this stage, the impact levels of these impacts are calculated as shown in Table 5-14 and Table 5-15.

Table 5-14 Calculating the Level of Significance Classes of Environmental Impact During Construction/ Decommission and Operation Phase

Phase	Consequence $C = ((E + D + I + R)/4) * N$						Probability (P)	Environmental Impact Score (EI = C x P)	Significance Classes	Status of Impact
	E	D	I	R	N	C				
Pre-Mitigation of Air Pollution										
Construction/ Decommission Phase	2	2	4	3	-1	-2.75	4	-11	Medium	Negative
Operation Phases	3	4	4	4	-1	-3.75	5	-18.75	High	
Post-Mitigation of Air Pollution										
Construction/ Decommission Phase	1	2	3	2	-1	-2	3	-6	Low	Negative
Operation Phases	2	4	3	3	-1	-3	4	-12	Medium	
Pre-Mitigation of Water Pollution										
Construction/ Decommission Phase	3	2	3	3	-1	-2.75	4	-11	Medium	Negative
Operation Phases	3	4	4	4	-1	-3.75	5	-18.75	High	
Post-Mitigation of Water Pollution										
Construction/ Decommission Phase	2	2	2	2	-1	-2	3	-6	Low	Negative
Operation Phases	2	4	3	3	-1	-3	3	-9	Medium	
Pre-Mitigation of Solid Waste Pollution										
Construction/ Decommission Phase	2	2	3	3	-1	-2.5	5	-12.5	Medium	Negative
Operation Phases	3	4	3	4	-1	-3.5	5	-17.5	High	

Phase	Consequence $C = ((E + D + I + R)/4) * N$						Probability (P)	Environmental Impact Score (EI = C x P)	Significance Classes	Status of Impact
	E	D	I	R	N	C				
Post-Mitigation of Solid Waste Pollution										
Construction/ Decommission Phase	1	3	2	2	-1	-2	4	-8	Low	Negative
Operation Phases	2	4	2	3	-1	-2.75	4	-11	Medium	
Pre-Mitigation of Noise and Vibration										
Construction/ Decommission Phase	3	2	4	4	-1	-3.25	4	-13	Medium	Negative
Operation Phases	3	4	4	3	-1	-3.5	4	-14	Medium	
Post – Mitigation of Noise and Vibration										
Construction/ Decommission Phase	2	2	3	3	-1	-2.5	3	-7.5	Low	Negative
Operation Phases	2	4	3	2	-1	-2.75	3	-8.25	Low	
Pre-Mitigation of Soil Pollution										
Construction/ Decommission Phase	2	2	3	3	-1	-2.5	4	-10	Medium	Negative
Operation Phases	3	4	3	3	-1	-3.25	4	-13	Medium	
Post – Mitigation of Soil Pollution										
Construction/ Decommission Phase	1	2	2	2	-1	-1.75	3	-5.25	Low	Negative
Operation Phases	2	4	2	2	-1	-2.5	3	-7.5	Low	

Phase	Consequence $C = ((E + D + I + R)/4) * N$						Probability (P)	Environmental Impact Score (EI = C x P)	Significance Classes	Status of Impact
	E	D	I	R	N	C				
Pre-Mitigation of Biodiversity										
Construction/ Decommission Phase	1	2	3	3	-1	-2.5	4	-10	Medium	Negative
Operation Phases	3	4	3	4	-1	-3.5	4	-14	Medium	
Post – Mitigation of Biodiversity										
Construction/ Decommission Phase	1	2	2	3	-1	-2	3	-6	Low	Negative
Operation Phases	2	4	3	3	-1	-3	4	-12	Medium	
Livelihood and Socio-economic										
Construction/ Decommission Phase and Operation Phases	3	5	4	3	+1	+3.75	5	+ 18.75	High	Negative

Table 5-15 Calculating the Level of Final Environmental Significance Rating of Environmental Impact During Construction/ Decommission and Operation Phase

No	Priority ($P = PR + CI + LR$)				Ranking	Prioritization Factor (PF)	Environmental Significance (PF*ER)	Rating	Status of Impact
	PR	CI	LR	P					
Air Pollution									
Construction Phase	1	2	1	4	Medium	1.5	-9	Low	Negative
Operation/Maintenance	1	2	3	6	Medium	1.5	-18	Medium	

No	Priority (P = PR + CI+ LR)				Ranking	Prioritization Factor (PF)	Environmental Significance (PF*ER)	Rating	Status of Impact
	PR	CI	LR	P					
Phases									
Water Pollution									
Construction Phase	1	2	3	6	Medium	1.5	-9	Low	Negative
Operation/Maintenance Phases	1	3	3	7	Medium	1.5	-13.5	Low	
Solid Waste Pollution									
Construction Phase	1	3	2	6	Medium	1.5	-12	Low	Negative
Operation/Maintenance Phases	1	2	3	6	Medium	1.5	-16.5	Medium	
Noise and Vibration									
Construction Phase	1	2	2	5	Medium	1.5	-11.25	Low	Negative
Operation/Maintenance Phases	1	3	2	6	Medium	1.5	-12.38	Low	
Soil Pollution									
Construction Phase	1	2	2	5	Medium	1.5	-7.86	Low	Negative
Operation/Maintenance Phases	1	2	2	5	Medium	1.5	-11.25	Low	
Biodiversity									
Construction Phase	2	2	2	6	Medium	1.5	-9	Low	Negative
Operation/Maintenance Phases	2	2	3	7	Medium	1.5	-18	Medium	
Livelihood and Socio-economic									

No	Priority (P = PR + CI+ LR)				Ranking	Prioritization Factor (PF)	Environmental Significance (PF*ER)	Rating	Status of Impact
	PR	CI	LR	P					
Construction and Operation/Maintenance Phases	2	2	2	6	Medium	1.5	+ 28.13	High	Positive

5.8. POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Based on the methodology, the various impacts of the project are calculated to assess the potential environmental impact during various project-related activity phases. According to the assessment result, air pollution, water pollution, solid waste pollution, noise and vibration and soil pollution are major environmental impacts. These impacts can be effected on the environment if the proponent will not take systematically mitigate measure from the project phases. Therefore, project proponents need to make mitigation measures for major environmental impact during various project-related activity phases.

The environmental impact and mitigating measures are covered in this sector. Mitigation measures for only “Major” and “Moderate” levels, and recommendation for “Minor” and “Negligible” Level of impacts that may occur from the implementation of the project are described below.

5.8.1. Impact on Ambient Air Quality

Impacts on ambient air are expected during construction, operation and decommission phases. Emissions from construction and demolition equipment, heavy machinery and vehicles, dust arising from construction, operation and decommission activities may cause some impacts on the ambient air quality. Ambient air quality is measured using AQM-09 equipment. The air quality standard guidelines of Myanmar Emission Guidelines (2015), World Bank/IFC are used in the study for Baseline data.

The primary sources of air pollutants from the various Project activities (construction, operation and decommission phases) consist of:

- Combustion and exhaust emissions from equipment and vehicles for materials transport, and airborne particulates (dust) from soil disturbance of site clearance, ground leveling and land excavations during the construction and decommission phases.
- Combustion and exhaust emissions from vehicular traffic during operation phase and
- Air pollution from construction, operation, and demolition activities.

5.8.1.1. Construction and Decommission Phases

5.8.1.1.1 Significance of Impact

During the construction and decommission phases, the impact on air quality caused by site clearance, land reclaiming, leveling process, temporary access road construction, and demolition of buildings etc. In addition, the movement of bulldozers, backhoes and dozers can be used for clearing the site and are used for digging, earthmoving, and removing debris for leveling the ground, building access roads and demolition of building will be the primary source of air pollution.

Construction and demolition are a source of dust emissions and gases that can have temporary impacts on local air quality. Construction emissions would result from earthmoving (fugitive dust) and heavy equipment use (vehicle exhaust). These emissions

would be generated from land clearing, ground excavation, cut and fill operations, and the construction of the project facilities in addition to vehicular movement. Additionally, the use of heavy machinery, equipment, welding cutters, and vehicle movement during building demolition generates air pollution.

Dust emissions would vary from day to day depending on the level of activity, the specific operations, and the prevailing weather. In addition to particulate emissions from earth moving, combustion emissions from fuel-powered construction equipment, such as PM₁₀, PM_{2.5}, NO₂ SO₂ and CO, may create a temporary impact on local air quality.

Potential combustion emission sources for the construction and decommission phases are listed in the following table. Any electric power needed during the construction and decommission phases shall be supplied by Electric Power Cooperation (EPC); but the project will have generator associated emissions during this phase. The environmental impact (EI) will be determined for air quality without relevant management and mitigation measures (pre-mitigation) during construction and decommission phases as shown in Table 5-16.

Table 5-16 Significance Classes of Air Quality Pre-Mitigation Measures During Construction and Decommission Phases Pre-Mitigation Measures

Sources	Consequence $C = ((E + D + I + R)/4) * N$						Probability (P)	Environmental Impact Score (EI = C x P)	Significance Classes	Status of Impact
	E	D	I	R	N	C				
Dust and Gas emission from construction and demolition activities	2	2	4	3	-1	-2.75	4	-11	Medium	Negative

The significant classes of air quality during pre-mitigation measures are calculated based on construction and demolition activities. Assumed that for extend of impact is within site boundary area at site clearing, earth work activities demolition of building, heavy machine, and equipment. But this impact is a short-term period where natural, cultural or social functions or processes are altered to the extent that it will temporarily cease, and it is reversible only by incurring significant time and cost. Additionally, there is a high possibility that the impact will happen (> 75% probability). According to the assessment, mitigation measures are needed due to this impact is medium. Also, the following mitigation measure needs to be followed by the project proponent.

5.8.1.1.2 Mitigation Measures

Localized air pollution is predicted, and higher pollutant concentrations can be observed close to locations where construction and demolition are occurring rapidly. To reduce the impact of construction and demolition activities on air quality, the following describe below mitigation measures need to be implemented:

- (a) Sprinkling water on un-paved road and any areas that are currently under construction and demolition at least three time per day especially during dry season because of wet suppression can greatly reduce dust emission up to 70%.

- (b) In addition, spray water on un-paved roads and construction and demolition area at least twice per day during wet and cool seasons.
- (c) Maintain a minimum of 60 cm of free board and cover any vehicles transporting soil, sand, and other loose materials.
- (d) Maintain the interior roads compact to reduce dust emission from moving vehicles.
- (e) The speed limit for trucks will be reduced from 30 km/h to 15 km/h to minimize dust emissions by 50%.
- (f) Regular checking the pave, to the extent possible, unpaved access roads, parking areas, and staging areas at construction sites.
- (g) By properly operating and maintaining vehicles and other oil-operated machinery, it is possible to maintain and minimize the emission of particulate matter (PM), SO₂, NO₂, and hydrocarbons from moving vehicles.
- (h) Consistent use by the contractor of equipment/vehicles that are properly created, maintained, and operated, including the use of proper engine fuel mixes, routinely serviced exhaust emission systems, and proper engine tuning.
- (i) Periodically inspect all machinery, including heavy equipment and pumps, as well as the engines of vehicles. Engines that are properly maintained, lubricated, and operated emit reduced smoke.
- (j) Avoid running the engines of vehicles and equipment unnecessarily.
- (k) On construction and demolition equipment should be installed filters for diesel.
- (l) Suspend construction and demolition activities that cause visible dust plumes to extend beyond the project site.
- (m) Maintain a record of the monthly fuel consumption.
- (n) In order to prevent excessive emission of sulfur dioxides, the contractor shall, if possible, purchase diesel fuel with less than 5% sulfur content by weight.

The environmental impact will be predicated for air quality with post implementation of relevant management and mitigation measures (post-mitigation) during construction and decommission phases. According to the result, the significance of classes of air quality with post- mitigation measures is low as shown in Table 5-17.

Table 5-17 Significance Classes of Air Quality Post-Mitigation Measures During Construction and Decommission Phases

Sources	Consequence $C = ((E + D + I + R)/4) * N$						Probability (P)	Environmental Impact Score (EI = C x P)	Significance Classes	Status of Impact
	E	D	I	R	N	C				
Dust and Gas emission from construction and demolition activities	1	2	3	2	-1	-2	3	-6	Low	Negative

5.8.1.1.3 Impact Prioritization

The prioritization factor (PF) and environmental impact (EI) of the post mitigation scoring are multiplied to determine the final impact significance. As a result, the final environmental significance rating for ambient air quality is low during construction and decommission phases as shown in Table 5-18.

Table 5-18 Final Environmental Significance Rating of Air Quality During Construction and Decommission Phases

Sources	Priority (P = PR + CI+ LR)				Ranking	Prioritization Factor (PF)	Environmental Significance (PF*ER)	Rating	Status of Impact
	PR	CI	LR	P					
Dust and Gas emission from construction and demolition activities	1	2	1	4	Medium	1.5	-9	Low	Negative

5.8.1.2. Operation Phase

5.8.1.2.1 Significance of Impact

Refinery industries are generally considered a major source of pollutants in the area where they are located. Potential major sources of hazardous and toxic air pollutants such as BTEX compounds (benzene, toluene, ethylbenzene, and xylene) will be generated from refinery process of proposed project. They are also a major source of criteria air pollutants: particulate matter (PM), nitrogen oxides (NO_x), carbon monoxide (CO), hydrogen sulfide (H₂S), and sulfur dioxide (SO₂).

In addition, some of the reasons to cause the air pollutant are transportation and vehicle movements in project area, furnace, generators, and factory's gates especially in and out of working hours. CO₂, CO, SO₂ and NO_x can be generated from the operation of diesel engine and vehicles movement during transportation of raw materials loading/unloading, final product delivery and distribution.

Among that the first and potential prioritizing significant impact is resulting from the refinery process of MCCM petroleum refinery plant. These refinery processes, especially in furnaces (burning the LPG gas and heating oil) also release fewer toxic hydrocarbons such as natural gas (methane) and other light volatile fuels and oils. The high level of volatile organic compounds (volatile hydrocarbons and oxides of nitrogen) also contributes to harmful ozone formation in the lower atmosphere.

All the above factors of air pollutants may lead to the impact on social and environment. The environmental impacts of major air pollutants from gas emission and potential impact from dust emission are described as Table 5-19 and Table 5-20 especially. The environmental impact (EI) will be determined for air quality without relevant management and mitigation measures (pre-mitigation) during operation phase as shown in Table 5-21.

Table 5-19 Environmental Impacts of Major Air pollutants from Gas Emission

Emission	Environmental Impacts
Oxides of NO ₂	Even in relatively low amounts, NO ₂ is a poisonous gas. Acidic species, which can be deposited by wet and dry processes, are also formed in part by NO _x . When combined with VOCs in the atmosphere illuminated by the sun, NO ₂ can also promote the creation of ozone at ground level. The relatively harmless species NO is of relevance because it serves as a

	precursor to NO ₂ .
Sulphur Dioxide – SO ₂	It is recognized that SO ₂ contributes to acid deposition, both wet and dry, which may have an effect on ecosystems. SO ₂ is a harmful gas. The direct effect on health consequences that could result in respiratory disease.
Particulates PM ₁₀ /PM _{2.5}	Particulate matter is a complex mixture of solid or liquid organic and inorganic materials found in the atmosphere. The inhalation and deposit of particulate matter within the respiratory passages has a number of negative health repercussions. Deep lung penetration is possible for PM ₁₀ (i.e., particulate matter with a diameter of less than 10 µg/m ³). There is a connection between excessive short-term mortality and morbidity rates and increased PM ₁₀ concentrations.
Carbon Monoxide – CO	Colorless and odorless carbon monoxide (CO) is a gas that is slightly less dense than air. When breathed in, the gas enters the bloodstream and reacts with the blood's hemoglobin to create carboxyhemoglobin (COHb). Hemoglobin has an affinity for CO that is more than 200 times larger than its affinity for oxygen. As a result, less O ₂ can bind with hemoglobin, which makes CO act poisonously.

Table 5-20 Potential Impacts from Dust Emission

Target	Potential Impact
Human Health	<ul style="list-style-type: none"> • Asthma • Nose and throat diseases • Eyes irritation • Skin irritation
Environment	Low visibility and haze formation
Infrastructure	<ul style="list-style-type: none"> • Grime deposits • Metal corrosion • Material deterioration

Table 5-21 Significance Classes of Air Quality During Operation Phase Pre-Mitigation Measures

Sources	Consequence $C = ((E + D + I + R)/4) * N$						Probability (P)	Environmental Impact Score (EI = C x P)	Significance Classes	Status of Impact
	E	D	I	R	N	C				
Dust and Gas emission from operation activities	3	4	4	4	-1	-3.75	5	-18.75	High	Negative

The significant classes of air quality pre- mitigation measures are calculated based on operation activities. Assumed that for extend of impact is the area within 5 km of the site because the air quality can be chiefly impacted by the emission of the petroleum refinery process, generator, vehicular movement and visitor's car within the project area. But this impact is a long-term period where natural, cultural or social functions or processes are altered to the extent that it will temporarily cease and it is reversible only by incurring prohibitively high time and cost. Additionally, there is a definite possibility that the impact will occur.

According to the assessment, mitigation measures are needed due to the significant impact is high. Therefore, the following mitigation measure needs to be followed by the project proponent.

5.8.1.2.2 Mitigation Measures

During operation phase, the significant impact on ambient air quality is major impact. Therefore, this impact to be reduced the following mitigation measures will be follow:

- a) Gases filters are installed to reduce the GHG emissions from generators and furnaces.
- b) A huge reduction in emissions from vehicles and equipment can be achieved by upgrading the engines.
- c) Water should be sprayed as suppressants to increase the moisture content at least one time per day (it can be applied in the morning or evening).
- d) Regular maintenance of furnace, equipment, and vehicles.
- e) Limit traffic speeds on any unpaved roads to 30 km/h.
- f) Regular maintain the installed ventilation system especially air-cooling system, fans and window in the office room.
- g) Regular monitoring for air quality parameters (PM_{2.5} and PM₁₀, TSP, SO₂, NO₂, CO₂, VOC, O₃) mentioned in the monitoring program.
- h) Grow efficient air-purifying plants, e.g., areca palm, Aloe Vera, fast-growing tree species and so on.
- i) Enforce to wear PPE to employees who are working in the project area, loading/unloading area that it must wear the 95 mask or surgical mask in their working time.



Figure 5-3 Plantation in the factory

The environmental impact will be predicated for air quality with post implementation of relevant management and mitigation measures (post-mitigation) during operation phase. According to the result, the significance of classes of air quality with post-mitigation measures is medium as shown in Table 5-22.

Table 5-22 Significance Classes of Air Quality During Operation Phase Post-Mitigation Measures

Sources	Consequence $C = ((E + D + I + R)/4) * N$						Probability (P)	Environmental Impact Score (EI = C x P)	Significance Classes	Status of Impact
	E	D	I	R	N	C				
Dust and Gas emission from operation activities	2	4	3	3	-1	-3	4	-12	Medium	Negative

5.8.1.2.3 Impact Prioritization

The prioritization factor (PF) and environmental impact (EI) of the post mitigation scoring are multiplied to determine the final impact significance. As a result, the final environmental significance rating for ambient air quality during operation phase is medium as shown in Table 5-23.

Table 5-23 Final Environmental Significance Rating of Air Quality During Operation Phase

Sources	Priority ($P = PR + CI + LR$)				Ranking	Prioritization Factor (PF)	Environmental Significance (PF*ER)	Rating	Status of Impact
	PR	CI	LR	P					
Dust and Gas emission from operation activities	1	2	3	6	Medium	1.5	-18	Medium	Negative

5.8.2. Greenhouse Gas Emission

A greenhouse gas (abbreviated as GHG) is a gas that absorbs radiant energy at thermal infrared wavelengths. Greenhouse gases cause the greenhouse effect by trapping some of the heat a planet's surface radiates in response to light from its host star (which is the sun in the case of planet Earth). Basically, in calculating greenhouse gas emissions, carbon dioxide, Methane and nitrous oxide are calculated.

In implementation of MCCM petroleum mini refinery project, main source of the gas emission is from generator. Generator is used to operate the process if electricity break. Currently, two diesel generators having a capacity of 250 KVA and 150 KVA are used. The fuel consumption for two generators 189 liters/ per day.

Greenhouse gas emission for the MCCM petroleum mini refinery project is calculated as the stationary combustion emission. GREENHOUSE GAS PROTOCOL Calculation Tool is used to calculate the greenhouse gas emission for the project.¹⁰ IPCC's

¹⁰ <https://ghgprotocol.org/calculation-tools>

Guidelines for National Greenhouse Gas Inventories is based for calculating of greenhouse gas as the data source. The method used in the calculation tool is follow.

$$\text{Emissions GHG, Fuel} = \text{Fuel Consumption Fuel} * \text{Emission Factor GHG, Fuel}$$

The current result of the Greenhouse gas emission calculation according to the fuel usage in generators is 0.508 Tonnes CO₂e/unit per day. In the total GHG emission, carbon dioxide (CO₂) emission is 0.506 Tonnes/ per day, methane (CH₄) emission is 2.05 E-5 Tonnes/ per day and nitrous oxide (N₂O) emission is 4.1 E-6 Tonnes/ per day.

5.8.3. Impact on Water Pollution

Surface water and ground water may be impacted by the project due to wastewater released from the construction and demolition activities and operation process. The process of collecting sample water was carried out 2 points for surface water, 3 points for ground water, 1 point for domestic wastewater and 1 point of operation wastewater. The water samples are sent to the laboratory for measuring the water quality parameters.

5.8.3.1. Construction and Decommission Phases

5.8.3.1.1 Significance of Impact

The surface water body can be affected by muddy water and polluted water from construction and demolition activities such as land reclaiming and leveling, demolition of building. Surface water quality could be affected by several factors during construction and decommission phases.

Surface water pollution is brought on by domestic wastewater discharge and temporary toilet from worker's camp. If they are not adequately managed, all the wastewaters could pollute surface water. During the rainy season, drainage, and seepage from disposal sites for construction and demolition waste could pollute surface waters.

Groundwater distribution and flow may alter as a result of excavation and site drainage. Groundwater and quality may be significantly impacted by construction and demolition activities as well. Oil and fuel leaks have the potential to go into the groundwater. The site could require that it be drained in order to create the perfect situations for the engineering work to take place, which would temporarily change ground flow. Moreover, contaminated soil from prior land use may be disturbed, resulting in the entry of contaminants like heavy metals into ground water. The environmental impact (EI) will be determined for water pollution without relevant management and mitigation measures (pre-mitigation) during the construction and decommission phases as shown in Table 5-24.

Table 5-24 Significance Classes of Water Pollution During Construction and Decommission Phases Pre-Mitigation Measures

Sources	Consequence C = ((E + D + I + R)/4) * N						Probability (P)	Environmental Impact Score (EI = C x P)	Significance Classes	Status of Impact
	E	D	I	R	N	C				
Surface water and ground water pollutant from construction and	3	2	3	3	-1	-2.75	4	-11	Medium	Negative

Sources	Consequence $C = ((E + D + I + R)/4) * N$						Probability (P)	Environmental Impact Score (EI = C x P)	Significance Classes	Status of Impact
	E	D	I	R	N	C				
demolition activities										

The significant classes of water pollution during pre- mitigation measures are calculated based on construction and demolition activities. Assumed that for extend of impact is the area within 5 km of the site because of the water pollution may be affected by the muddy water and polluted water from construction and demolition activities can flow into the Ayeyarwady river. But this impact is a short-term period where the affected environment is altered but natural, cultural, and social functions and processes continue albeit in a modified way and it is reversible only by incurring significant time and cost. Additionally, there is a high possibility that the impact will happen (> 75% probability). According to the assessment, mitigation measures are needed due to this impact is medium. Therefore, the following mitigation measure needs to be followed by the project proponent.

5.8.3.1.2 Mitigation Measures

During construction and decommission phases, the potential impact on water pollution (surface water and ground water body) can be impacted by muddy water and polluted water from construction and demolition activities. The significant impact on water pollution is moderate impact. Therefore, this impact to be preserved the following mitigation measures will be follow:

- a) Access roads should be constructed with the proper materials and avoid riparian areas.
- b) During the construction and demolition period, a suitable water management system is implemented, such as effective land drainage and the usage of artificial ponds for receiving site runoff to reduce the effect of runoff on surrounding watercourses.
- c) Prevent producing excessive wastewater.
- d) If at all possible, use a water meter to reduce the generation of unnecessary wastewater.
- e) Systematic measures will be taken to control seepage water from the waste disposal facility.
- f) Manage the fuel, oil, and lubricant leaks from the construction and demolition site.
- g) To ensure that sewage does not leak out of sewage tanks.
- h) To connect the City Development Committee and dispose of the sewage water produced from the demolition of toilets and sewage water produced from temporary toilets.

The environmental impact will be predicated for water pollution with post implementation of relevant management and mitigation measures (post-mitigation) during construction phase. According to the result, the significance of classes of water pollution with post- mitigation measures is low as shown in Table 5-25.

Table 5-25 Significance Classes of Water Pollution During Construction and Decommission Phases Post-Mitigation Measures

Sources	Consequence $C = ((E + D + I + R)/4) * N$						Probability (P)	Environmental Impact Score (EI = C x P)	Significance Classes	Status of Impact
	E	D	I	R	N	C				
Surface water and ground water pollutant from construction and demolition activities	2	2	2	2	-1	-2	3	-6	Low	Negative

5.8.3.1.3 Impact Prioritization

The prioritization factor (PF) and environmental impact (EI) of the post mitigation scoring are multiplied to determine the final impact significance. As a result, the final environmental significance rating for water pollution during construction phase is low as shown in Table 5-26.

Table 5-26 Final Environmental Significance Rating of Water Pollution During Construction and Decommission Phases

Sources	Priority $(P = PR + CI + LR)$				Ranking	Prioritization Factor (PF)	Environmental Significance (PF*ER)	Rating	Status of Impact
	PR	CI	LR	P					
Surface water and ground water pollutant	1	2	3	6	Medium	1.5	-9	Low	Negative

5.8.3.2. Operation Phase

5.8.3.2.1 Significance of Impact

During operation phase, the potential water pollution will be caused resulting from the implementing of the proposed project especially in crude oil settlement area and reheating process of silica gel after filtering the petroleum.

Crude oil settlement area is a place to settle and segregate the water and oil. In this process, wastewater is generated in this place. The reheating process is a steaming process of silica gel that is generated from petroleum filtering tanks.

In addition, another source of wastewater generation is the cooling water tanks that work to cool down the temperature of petroleum by passing through the condenser. The capacity of a cooling water tank is about 80,000 gallons. The water in the cooling water tank is recycled by passing through the condenser and distillation column. And the vaporing rate is estimated to be about 5,000 to 10,000 gallons in working 10 days. Therefore, the wastewater will be generated when the cooling water tank is cleaned. The cooling water tank is cleaned two times per year.

Wastewater will be generated not only the operation wastewater but also the domestic wastewater which may result in impacts to the water quality into the nearby water bodies (Ayeyarwady river and some intermitted sand creeks) if the proposed project has no systematic treatment or practices.

The domestic wastewater from usage, toilets, storm water and sewage water can be found at the project area. The storm water can be polluted by roofs contaminated with dust, open space, and work areas etc. The surface water is flow into the drainage channels of the project area. Diseases caused by bacteria, typhoid and cholera, etc., are introduced by the wastewater. If they are not adequately managed, all of the waste storage area and waste water treatment may be polluted by surface waters body. The environmental impact (EI) will be determined for water pollution without relevant management and mitigation measures (pre-mitigation) during operation phase as shown in Table 5-27.

Table 5-27 Significance of Classes of Water Pollution During Operation Phase Pre-Mitigation Measures

Sources	Consequence $C = ((E + D + I + R)/4) * N$						Probability (P)	Environmental Impact Score (EI = C x P)	Significance Classes	Status of Impact
	E	D	I	R	N	C				
Operation activities	3	4	4	4	-1	-3.75	5	-18.75	High	Negative

The significant classes of water pollution pre- mitigation measures are calculated based on operation activities. Assumed that for extend of impact is the area within 5 km of the site because of the water pollution may be affected by the operation activities in the project area. Also, a water treatment system will be installed in the project area, and it is a long-term period where natural, cultural, or social functions or processes are altered to the extent that it will temporarily cease. Additionally, the impact is reversible only by incurring prohibitively high time and cost and it is a definite probability that the impact will occur.

Moreover, according to the assessment, mitigation measures are needed because of significant impact is high. Therefore, the following mitigation measure needs to be followed by the project proponent.

5.8.3.2.2 Mitigation Measures

The significance of impact on water pollution may be affected by operational activities. The impact level on water pollution is major. Therefore, project proponents must follow the mitigation measure to reduce the impacts mentioned below.

- a) Wastewater treatment plant shall be installed in operation area.
- b) Discharge outlet shall be equipped with grease traps to enhance wastewater treatment process.
- c) Liquid effluents arising from operations will be treated to the applicable NEQG guideline prior to discharge.
- d) Reduce the amount of water utilized for domestic uses at the project area to a minimum.
- e) Avoid generating unnecessary wastewater.
- f) Use water meter to control the unnecessary wastewater production if possible.
- g) Separate the drainage and pipeline system for sewer line and surface runoff.
- h) Regularly check the septic tank to avoid leakage of sewage.
- i) Control oil and grease generating from the operation activities.
- j) Regular cleaning and checking of all drainage channels in the project area.

- k) All drainage systems are covered, and liquid waste is disposed to the septic to avoid soil contamination.
- l) No untreated sewage will be directly discharged into the drainage channel near the site, waterbodies or disposed of on land, during the project life cycle.
- m) Make a wastewater filtration system before disposing of the drainage channel.
- n) Install silt trap to treat surface run-off prior to discharge to the stormwater system.
- o) To prevent wastewater overflow, mixed wastewater must be stored in holding tanks, and sewage must be transported away whenever the tanks are filled.

The environmental impact will be predicated for water pollution with post implementation of relevant management and mitigation measures (post-mitigation) during operation phase. According to the result, the significance of classes of water pollution with post- mitigation measures is medium as shown in Table 5-28.

Table 5-28 Significance of Classes of Water Pollution During Operation Phase Post-Mitigation Measures

Sources	Consequence $C = ((E + D + I + R) / 4) * N$						Probability (P)	Environmental Impact Score (EI = C x P)	Significance Classes	Status of Impact
	E	D	I	R	N	C				
Operation activities	2	4	3	3	-1	-3	3	-9	Medium	Negative

5.8.3.2.3 Impact Prioritization

The prioritization factor (PF) and environmental impact (EI) of the post mitigation scoring are multiplied to determine the final impact significance. As a result, the final environmental significance rating for water pollution during operation phase is low as shown in Table 5-29.

Table 5-29 Final Environmental Significance Rating of Water Pollution During Operation Phase

Sources	Priority $(P = PR + CI + LR)$				Ranking	Prioritization Factor (PF)	Environmental Significance (PF*ER)	Rating	Status of Impact
	PR	CI	LR	P					
Operation activities	1	3	3	7	Medium	1.5	-13.5	Low	Negative

5.8.4. Impact on Solid Waste Pollution

The following have been recognized as the project's sources both of non-hazardous and hazardous solid waste generation.

- ❖ Solid waste generated from construction and demolition activities.
- ❖ During operation phase, solid waste generation from operation and production process, accommodation, kitchen, and toilet
- ❖ Electronic waste such as wires, batteries, electrical lamps, and bulbs etc. are hazardous waste on the project site.

5.8.4.1. Construction and Decommission Phases

5.8.4.1.1 Significance of Impact

The generation of solid and liquid waste during the construction and decommission phases affects the identification of solid waste pollution. Littering (wood and metal debris, concrete blocks, empty cement bags, empty paint containers and canisters, plastics from extension of electricity cables, etc.), which can be prevented by good housekeeping and behavioral practices, may also have an impact on solid waste pollution during the construction and decommission phase. In addition, possible soil contamination may also be related to how garbage is handled and disposed of while development is taking place. The environmental impact (EI) will be determined for solid waste pollution without relevant management and mitigation measures (pre-mitigation) during construction and decommission phases as shown in Table 5-30.

Table 5-30 Significance Classes of Solid Waste Pollution During Construction and Decommission Phases Pre-Mitigation Measures

Sources	Consequence $C = ((E + D + I + R)/4) * N$						Probability (P)	Environmental Impact Score (EI = C x P)	Significance Classes	Status of Impact
	E	D	I	R	N	C				
solid waste generation	2	2	3	3	-1	-2.5	5	-12.5	Medium	Negative

The significant classes of solid waste pollution during pre- mitigation measures are calculated based on construction and demolition activities. Assumed that for extend of impact is within the site boundary because of the water consumption may be affected by the construction activities in the project area. But this impact is a short-term period where the affected environment is altered but natural, cultural, and social functions and processes continue albeit in a modified way and it is reversible only by incurring significant time and cost. Additionally, there is a definite possibility that the impact will occur. According to the assessment, mitigation measures are needed because this impact is medium. Therefore, the following mitigation measure needs to be followed by the project proponent.

5.8.4.1.2 Mitigation measure

The significance of impact on solid waste pollution may be affected by construction and demolition activities and the impact level is moderate. Therefore, project proponent must follow the mitigation measure as to reduce the impacts in the following below.

- a) Dispose of the wastes from construction and decommission phases as wet waste, dry waste, hazardous waste in orderly manner.
- b) As part of the environmental policy, the loads of all waste streams will be monitored and reported on a monthly basis.
- c) Construction and demolition debris, packaging materials, scraps, and metal fragments are correctly disposed of without being left lying around on the ground.
- d) The project's proponent and contractor are responsible for supervising the waste's transfer from the site to the disposal facility.

- e) To prevent garbage loss during transportation, dump trucks may not be fully loaded.
- f) To make recycling, reuse, and disposal easier and to stop interactions between different forms of garbage, waste is separated and avoided mixing, such as organic waste (food scraps), non-hazardous waste (metal, glass, concrete, plastic, etc.), inert waste (cleaned soil), and hazardous waste (Paints, solvents, oils, batteries, medical waste).
- g) For the safe collection, segregation, and management of all waste streams collected, household and general garbage must be separated on site into combustible (paper, food, cardboard, and wood) and non-combustible (metals, glass, rubble) streams using appropriately designated containers.
- h) To set up temporary disposal tanks and trash cans in the project area.
- i) Food scraps can be used as organic fertilizer to produce plants and feed animals.
- j) When handling the hazardous waste, wear rubber gloves. After handling hazardous, wash your hands with soap.
- k) Informing and training employees on how to handle hazardous waste.
- l) Creating warning sign boards for the area where hazardous and chemical wastes are stored.
- m) Sanitary waste that hasn't been treated shall be dumped on the ground.

The environmental impact will be predicted for solid waste pollution with post implementation of relevant management and mitigation measures (post-mitigation) during construction phase. According to the result, the significance of classes of solid waste pollution with post- mitigation measures is low as shown in Table 5-31.

Table 5-31 Significance Classes of Solid Waste Pollution During Construction and Decommission Phases Post-Mitigation Measures

Sources	Consequence $C = ((E + D + I + R)/4) * N$						Probability (P)	Environmental Impact Score ($EI = C \times P$)	Significance Classes	Status of Impact
	E	D	I	R	N	C				
solid waste generation	1	3	2	2	-1	-2	4	-8	Low	Negative

5.8.4.1.3 Impact Prioritization

The prioritization factor (PF) and environmental impact (EI) of the post mitigation scoring are multiplied to determine the final impact significance. As a result, the final environmental significance rating for solid waste pollution during construction phase is low as shown in Table 5-32.

Table 5-32 Final Environmental Significance Rating of Solid Waste Pollution During Construction and Decommission Phases

Sources	Priority ($P = PR + CI + LR$)				Ranking	Prioritization Factor (PF)	Environmental Significance ($PF * EI$)	Rating	Status of Impact
	PR	CI	LR	P					
solid waste generation	1	3	2	6	Medium	1.5	-12	Low	Negative

5.8.4.2. Operation Phase

5.8.4.2.1 Significance of Impact

Non-Hazardous Waste

In the operation phases, the solid wastes are generated from worker of the project area such as organic, plastic, tissues, glass, sanitary pads and leftovers are generated from workers. Sanitary pads are a type of biological or plastic waste that generates when women use toilets. This waste may cause environmental and social impacts if the process is not managed systematically.

Moreover, solid waste has the adverse effect (blocking the drainage channels) as a result flooding and groundwater pollution can be faced. Some liquid and solid wastes may have negative effects on humans, plants, and other animals. Such toxic wastes have the potential to contaminate the soil, surface waters, and ground waters.

Hazardous Waste

The hazardous waste is generated from operation and production processes such as silica gel with oil, oil sample bottle and lab waste etc. In addition, domestic waste and electronic wastes includes glass, metals scraps, broken glass rods, abandoned electrical containers, motor oil, juice containers, wires, batteries, electrical lamps, and bulbs etc. Therefore, project proponents must follow the mitigation measure to reduce the solid waste pollution. The environmental impact (EI) will be determined for solid waste pollution without relevant management and mitigation measures (pre-mitigation) during operation phase as shown in Table 5-33.

Table 5-33 Significance Classes of Solid Waste Pollution During Operation Phase Pre-Mitigation Measures

Sources	Consequence $C = ((E + D + I + R)/4) * N$						Probability (P)	Environmental Impact Score (EI = C x P)	Significance Classes	Status of Impact
	E	D	I	R	N	C				
solid waste generation	3	4	3	4	-1	-3.5	5	-17.5	High	Negative

The significant classes of solid waste pollution pre- mitigation measures are calculated based on operation activities. Assumed that for extend of impact is the area within 5 km of the site and it is a long-term period where the affected environment is altered but natural, cultural, and social functions and processes continue albeit in a modified way. Additionally, the impact is reversible only by incurring prohibitively high time and cost and there is a definite possibility that the impact will occur. Moreover, according to the assessment, mitigation measures are needed because the significant impact is high. Therefore, the following mitigation measure needs to be followed by the project proponent.

5.8.4.2.2 Mitigation measure

The significance of impact on solid waste pollution may be affected by operation and maintenance activities and the impact level is major. Therefore, project proponent must follow the mitigation measure as to reduce the impacts in the following below.

Mitigation Measures

- a) Provide a separate place for storage where waste can be collected and disposed of at the allowed dumping place.
- b) Build a suitable tent or safe disposal area to avoid liquid leakage from it.
- c) The project supervisor is responsible for supervising the transportation of waste from the site to the disposal facility.
- d) Avoid filling vehicles with too much waste in order to prevent loss of waste during transportation.
- e) To separate hazardous and non-hazardous waste, use designated bins.
- f) Waste must be systematically disposed of into containers after being sorted by type.
- g) The female employee's sanitary pad needs to be packed in paper and disposed of in a timely manner in the trash cans.
- h) Sanitary waste that has not been treated will be dumped on the ground.
- i) Recyclable waste bins need to be available, and recycling trash needs to be sorted properly as a habit.
- j) As part of the spill response strategy, the hazardous waste will be soaked in sawdust and sand.
- k) Reuse, reduce, and recycle (or 3R) should be encouraged among employees through environmental education programs and awareness-raising efforts.
- l) Hazardous waste should be appropriately disposed of and collected in separate bins (chemical bags, containers, etc.).
- m) Awareness to workers on how to deal with hazardous waste.
- n) Prohibition of incineration wastes in the project area.

The environmental impact will be predicated for solid waste pollution with post implementation of relevant management and mitigation measures (post-mitigation) during operation phase. According to the result, the significance of classes of solid waste pollution with post- mitigation measures is medium as shown in Table 5-34.

Table 5-34 Significance of Classes of Solid Waste Pollution During Operation Phase Post-Mitigation Measures

Sources	Consequence $C = ((E + D + I + R)/4) * N$						Probability (P)	Environmental Impact Score (EI = C x P)	Significance Classes	Status of Impact
	E	D	I	R	N	C				
solid waste generation	2	4	2	3	-1	-2.75	4	-11	Medium	Negative

5.8.4.2.3 Impact Prioritization

The prioritization factor (PF) and environmental impact (EI) of the post mitigation scoring are multiplied to determine the final impact significance. As a result, the final environmental significance rating for solid waste pollution during operation phase is medium as shown in Table 5-35.

Table 5-35 Final Environmental Significance Rating of Solid Waste Pollution During Operation Phase

Sources	Priority (P = PR + CI+ LR)				Ranking	Prioritization Factor (PF)	Environmental Significance (PF*ER)	Rating	Status of Impact
	PR	CI	LR	P					
solid waste generation	1	2	3	6	Medium	1.5	-16.5	Medium	Negative

5.8.5. Impact on Noise and Vibration

The noise and vibration impact level have been evaluated as the following:

- ❖ Construction and demolition activities
- ❖ Noise and vibration generate from production activities
- ❖ Using heavy machinery and vehicle
- ❖ Transportation activities include the delivery of raw and demolition material
- ❖ Loading/ Unloading processes

5.8.5.1. Construction and Decommission Phases

5.8.5.1.1 Significance of Impact

The noise and vibration generate from loading and unloading activities, use of heavy machinery and vehicles, civil works activities and demolition of building etc. during the construction and decommission phases. The main sources of noise generate from transportation activities which is delivery of raw material and loading and unloading process. Typical noise levels associated with trucks are reported at 74 dBA according to the British Standard for Noise and Vibration Control on Construction and Operation Sites (BS5228:1997). These levels are normal in general construction sites (that can go up to 85-90 dBA).

Moreover, noise generated from the use of heavy machinery and equipment associated with the construction and demolition activities mainly civil works and demolition work activities. The impacts are also temporary in nature. Most construction and decommission phases would generate average noise levels that would be about 10 to 19 dBA_{Leq} (h) higher than ambient daytime or nighttime traffic noise when these activities occurred within about 20 meters of an adjacent land use. Pile driving activities would generate average noise levels approximately 26-29 dBA higher than ambient daytime or nighttime noise conditions. Maximum instantaneous noise levels generated by construction would typically be 5 to 10 dBA above existing maximum noise levels generated by traffic except for construction phase including the use of a hoe ram or impact pile driver when maximum instantaneous noise levels could exceed existing conditions by 20 to 25 dBA. The environmental impact (EI) will be determined for noise and vibration without relevant management and mitigation measures (pre-mitigation) during construction and decommission phases as shown in Table 5-36.

Table 5-36 Significance Classes of Noise and Vibration During Construction and Decommission Phases Pre-Mitigation Measures

Sources	Consequence $C = ((E + D + I + R)/4) * N$						Probability (P)	Environmental Impact Score (EI = C x P)	Significance Classes	Status of Impact
	E	D	I	R	N	C				
Construction and demolition work	3	2	4	4	-1	-3.25	4	-13	Medium	Negative

The significant classes of noise and vibration during pre- mitigation measures are calculated based on construction and demolition activities. Assumed that for extend of impact is the area within 5 km of the site because of the noise pollution may be affected by the construction activities in the project area. But this impact is a short-term period where natural, cultural, or social functions or processes are altered to the extent that it will temporarily cease, and it is reversible only by incurring prohibitively high time and cost. Additionally, there is a high possibility that the impact will happen (> 75% probability). According to the assessment, mitigation measures are needed because this impact is medium. Therefore, the following mitigation measure needs to be followed by the project proponent.

5.8.5.1.2 Mitigation measure

The significance of impact on noise and vibration may be affected by construction and demolition activities and the impact level is moderate. Therefore, project proponent must follow the mitigation measure as to reduce these impacts in the following below.

- a) Contractor will take measures to reduce noise levels from heavy machinery and vehicle that exceed the NEQG guideline limitations.
- b) To prevent disturbing the surrounding area, movements of trucks and other construction and demolition equipment that generate loud noises must be limited at night. Truck drivers should be instructed not to use their horns at night and to stop playing loud music.
- c) Avoiding the construction and demolition activities at night within 150 meters of sensitive land uses where feasible.
- d) Proper soundproofing boundary walls must be constructed in locations where asphalt/concrete plants generate noise and are adjacent to any locality within 35 meters of residences should be strictly prohibited.
- e) Avoid staging of construction equipment within 60 meters of residences and locate all stationary noise-generating construction equipment, such as air compressors and portable power generators, as far practical from noise sensitive receptors.
- f) Substitution of low noise devices and equipment.
- g) Shutting down unused vehicles and machinery.
- h) Regular inspection and rotation of equipment and machinery.
- i) Reduce speed when driving vehicles and machinery.
- j) Avoid vehicles idling during loading/ unloading operations.
- k) Providing the workers in the construction area appropriate hearing protection, such as ear plugs or earmuffs, and training them in how to use it.

- l) Contractors must adhere to the provided work schedule, keep noisy operations away from sensitive areas, perform routine maintenance and repairs, and strictly follow operation procedures.

The environmental impact will be predicted for noise and vibration with post implementation of relevant management and mitigation measures (post-mitigation) during construction and decommission phases. According to the result, the significance of classes of noise and vibration with post- mitigation measures is low as shown in Table 5-37Table 5-31.

Table 5-37 Significance Classes of Noise and Vibration During Construction Phase Post-Mitigation Measures

Sources	Consequence $C = ((E + D + I + R)/4) * N$						Probability (P)	Environmental Impact Score (EI = C x P)	Significance Classes	Status of Impact
	E	D	I	R	N	C				
Construction and demolition work	2	2	3	3	-1	-2.5	3	-7.5	Low	Negative

5.8.5.1.3 Impact Prioritization

The prioritization factor (PF) and environmental impact (EI) of the post mitigation scoring are multiplied to determine the final impact significance. As a result, the final environmental significance rating for noise and vibration during construction and decommission phases is low as shown in Table 5-38.

Table 5-38 Final Environmental Significance Rating of Noise and Vibration During Construction and Decommission Phases

Sources	Priority $(P = PR + CI + LR)$				Ranking	Prioritization Factor (PF)	Environmental Significance (PF*ER)	Rating	Status of Impact
	PR	CI	LR	P					
construction and demolition work	1	2	2	5	Medium	1.5	-11.25	Low	Negative

5.8.5.2. Operation Phase

5.8.5.2.1 Significance of Impact

Noise and vibration can be generated from operation and production process, pumps, generators, and generators etc. The noise generated from the operation area would not cause any significant environmental impact on the surrounding area. When the operation phase started, the noise pollution would not have noticeably impacts on the workers as well as the environment. It is, however, important to include noise management measures in the overall external design concept to prevent potential impacts on nearby human and environmental receptors. There are no significant sources of noise associated with the operational phase of the proposed project. There may be minor noise from the operation of the power generator.

The negative affect of noise can impact on the employees for occupational health and safety during operation phase including auditory problems, health impacts associated with exposure to noise include non-auditory repercussions such as fatigue, stress, emotional

disturbances, vertigo, and vasoconstriction of the blood vessels in the extremities. If administrative or engineering controls do not reduce levels to the acceptable limit, hearing protection must be provided to employees by the employer. The environmental impact (EI) will be determined for noise and vibration without relevant management and mitigation measures (pre-mitigation) during operation phase as shown in Table 5-39.

Table 5-39 Significance of Classes of Noise and Vibration During Operation Phase Pre-Mitigation Measures

Sources	Consequence $C = ((E + D + I + R)/4) * N$						Probability (P)	Environmental Impact Score (EI = C x P)	Significance Classes	Status of Impact
	E	D	I	R	N	C				
Operation activities	3	4	4	3	-1	-3.5	4	-14	Medium	Negative

The significant classes of noise and vibration pre- mitigation measures are calculated based on operation activities. Assumed that for extent of impact is the area within 5 km of the site and it is a long-term period where natural, cultural, or social functions or processes are altered to the extent that it will temporarily cease. Additionally, the impact is reversible only by incurring significant time and cost and there is a high possibility that the impact will happen (> 75% probability). Moreover, according to the assessment, mitigation measures are needed because the significant impact is medium. Therefore, the following mitigation measure needs to be followed by the project proponent.

5.8.5.2.2 Mitigation measure

The significance of impact on noise pollution may be affected by operation activities and the impact level is moderate. Therefore, project proponent must follow the mitigation measure as to reduce the impacts in the following below.

- a) Use equipment and machines which generate low noise levels.
- b) Record and inspection maintenance for each machine and change the good quality product (if necessary).
- c) Provide adequate ear protection (ear plugs or muffs, Figure 5-4) to workers working in the excessive noise areas. To make sure workers wear ear plug two times a day with 1hour period each time.
- d) No employee should be exposed to a noise level greater than 85 dB(A) for a duration of more than 8 hour per day without hearing protection. In addition, no unprotected ear should be exposed to a peak sound pressure level (instantaneous) of more than 140 dB (C).
- e) Follow noise control hierarchy (Figure 5-5).
- f) Arrange employees on a rotating basis in noisy places.
- g) Regular maintain all exhaust system in good working and machine, use machine and equipment which generate low noise levels, turn off the machine that do not need to be used such as generators, compressor, etc.



Figure 5-4 Noise control Equipment

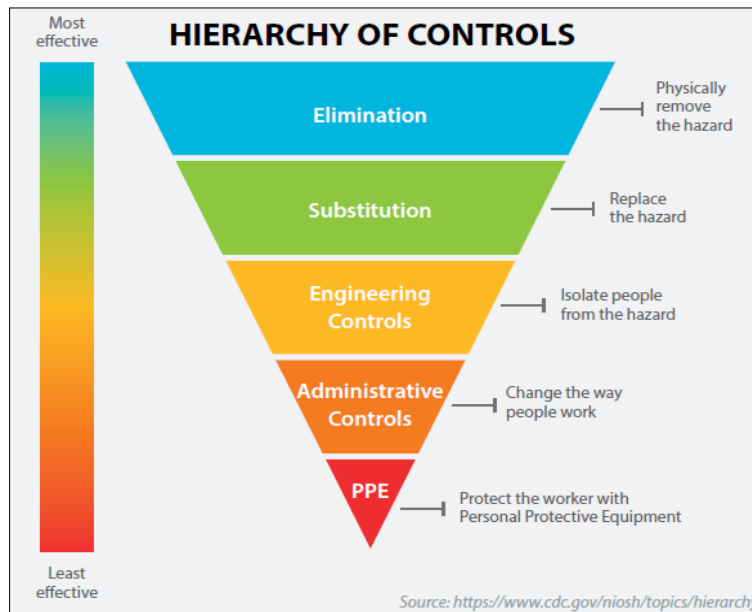


Figure 5-5 Noise control Hierarchy

The environmental impact will be predicated for noise and vibration with post implementation of relevant management and mitigation measures (post-mitigation) during operation phase. According to the result, the significance of classes of noise and vibration with post- mitigation measures is low as shown in Table 5-40.

Table 5-40 Significance of Classes of Noise and Vibration Post-Mitigation Measures During Operation Phase

Sources	Consequence $C = ((E + D + I + R) / 4) * N$						Probability (P)	Environmental Impact Score (EI = C x P)	Significance Classes	Status of Impact
	E	D	I	R	N	C				
Operation and Maintenance activities	2	4	3	2	-1	-2.75	3	-8.25	Low	Negative

5.8.5.2.3 Impact Prioritization

The prioritization factor (PF) and environmental impact (EI) of the post mitigation scoring are multiplied to determine the final impact significance. As a result, the final environmental significance rating for noise and vibration during operation phase is low as shown in Table 5-41.

Table 5-41 Final Environmental Significance Rating of Noise and Vibration During Operation Phase

Sources	Priority (P = PR + CI+ LR)				Ranking	Prioritization Factor (PF)	Environmental Significance (PF*ER)	Rating	Status of Impact
	PR	CI	LR	P					
Operation activities	1	3	2	6	Medium	1.5	-12.38	Low	Negative

5.8.6. Impact on Soil Pollution

The main impacts on the soil Pollution generated by the construction, operation and demolition activities of the project include:

- (1) Physical disturbance of the soil during site leveling and excavation activities.
- (2) Soil contamination associated with waste generation.
- (3) Soil contamination from oil spill from vehicles and heavy machinery.

Excavation and reclamation works would result in direct disturbance of soil including localized alteration of the soil profile within the excavation footprint, soil compaction in the immediate vicinity because of vehicle and construction and demolition equipment operations.

5.8.6.1. Construction and Decommission Phases

5.8.6.1.1 Significance of Impact

During the construction and decommission phases, soil pollution cause by site leveling, excavation, land filling, land reclamation process, leakage of fuel tanks stored for water pumps and used equipment and seeping the liquid from the temporary waste disposal site. In addition, the planned or unexpected leakage of used chemical, gasoline, or oil products (from machinery and vehicles) can potentially cause soil pollution. Such processes should be strictly avoided, and the disposal of such hazardous goods should be done with the greatest care and craftsmanship. Possible soil contamination may also be related to how garbage is handled and disposed of while development is taking place.

Most of the development area is covered in sandy soil, which has a high rate of infiltration and absorption. Pollutants that are leached will therefore easily bind to the soil. With decreasing viscosity and surface tension, waste spillages may either become retained within the topsoil layer or pierce to the subsurface formations. Used diesel filters and containers have the potential to contaminate soil due to leftover spillage. The environmental impact (EI) will be determined for soil pollution without relevant management and mitigation

measures (pre-mitigation) during construction and decommission phases as shown in Table 5-42.

Table 5-42 Significance Classes of Soil Pollution During Construction and Decommission Phases Pre-Mitigation Measures

Sources	Consequence $C = ((E + D + I + R) / 4) * N$						Probability (P)	Environmental Impact Score (EI = C x P)	Significance Classes	Status of Impact
	E	D	I	R	N	C				
Civil works and demolition activities	2	2	3	3	-1	-2.5	4	-10	Medium	Negative

The significant classes of soil pollution during pre-mitigation measures are calculated based on construction and demolition activities. Assumed that for extend of impact is within the site boundary, and it is a short-term period where the affected environment is altered but natural, cultural, and social functions and processes continue albeit in a modified way. But this impact is reversible only by incurring significant time and cost. Additionally, there is a high possibility that the impact will happen (> 75% probability). According to the assessment, mitigation measures are needed because this impact is medium. Therefore, the following mitigation measure needs to be followed by the project proponent.

5.8.6.1.2 Mitigation measure

The significance of impact on soil pollution may be affected by construction and demolition activities and the impact level is moderate. Therefore, project proponent must follow the mitigation measure as to reduce these impacts in the following below.

- a) Planting will be conducted quickly growing native trees with strong roots that can anchor in the soil.
- b) By maintaining heavy machinery, equipment and vehicles in good condition and containing other contaminants in storage tanks and other places, it is possible to prevent soil contamination by minimizing oil spills from vehicles of visitors and staff in the project construction and demolition sites.
- c) Avoiding excessive excavations and limiting excavations to the approved engineering drawings' mentioned sites.
- d) To prevent soil contamination, septic tanks with sufficient capacities should be built to receive and treat wastewater from all temporary worksite toilets and construction camps.
- e) Additionally, construction and demolition camps wastewater disposal should be regularly inspected.

The environmental impact will be predicted for soil pollution with post implementation of relevant management and mitigation measures (post-mitigation) during construction and decommission phases. According to the result, the significance of classes of soil pollution with post-mitigation measures is low as shown in Table 5-43.

Table 5-43 Significance Classes of Soil Pollution Post-Mitigation Measures During Construction Phase

Sources	Consequence $C = ((E + D + I + R)/4) * N$						Probability (P)	Environmental Impact Score (EI = C x P)	Significance Classes	Status of Impact
	E	D	I	R	N	C				
Civil works and demolition activities	1	2	2	2	-1	-1.75	3	-5.25	Low	Negative

5.8.6.1.3 Impact Prioritization

The prioritization factor (PF) and environmental impact (EI) of the post mitigation scoring are multiplied to determine the final impact significance. As a result, the final environmental significance rating for soil pollution during construction phase is low as shown in Table 5-44.

Table 5-44 Final Environmental Significance Rating of Soil Pollution During Construction and Decommission Phases

Sources	Priority $(P = PR + CI + LR)$				Ranking	Prioritization Factor (PF)	Environmental Significance (PF*ER)	Rating	Status of Impact
	PR	CI	LR	P					
Civil works and demolition activities	1	2	2	5	Medium	1.5	-7.86	Low	Negative

5.8.6.2. Operation Phase

5.8.6.2.1 Significance of Impact

Contamination of soils from the refining processes is generally a less significant problem when compared to contamination of air and water. There will be affected on soil quality due to crude oil settlement process and waste disposal area. Although the soil impact will not be impacted in project area, soil contamination can occur due to improper hazardous waste disposal and settle the crude oil if they are not properly managed.

Consequences, the following aspects may lead to harmful of oil-polluted soil; because of the small density, higher viscosity, and lower emulsifying ability of petroleum, it is easy to be absorbed in soil surface, affecting the permeability and porosity of soil. Petroleum is organic matter and impacts the salinity, pH and conductivity of soil. The heavy metals in oil mixtures and high concentrations of salt may lead to damage to the soil environment (e.g. project area, nearest agricultural land area, etc.). The environmental impact (EI) will be determined for soil pollution without relevant management and mitigation measures (pre-mitigation) during operation phase as shown in Table 5-45.

Table 5-45 Significance of Classes of Soil Pollution During Operation Phase Pre-Mitigation Measures

Sources	Consequence $C = ((E + D + I + R)/4) * N$						Probability (P)	Environmental Impact Score (EI = C x P)	Significance Classes	Status of Impact
	E	D	I	R	N	C				
Operation activities	3	4	3	3	-1	-3.25	4	-13	Medium	Negative

The significant classes of soil pollution pre- mitigation measures are calculated based on operation activities. Assumed that for extend of impact is the area within 5 km of the site and it is a long-term period where the affected environment is altered but natural, cultural, and social functions and processes continue albeit in a modified way. Additionally, the impact is reversible only by incurring significant time and cost and there is a high possibility that the impact will happen (> 75% probability). Moreover, according to the assessment, mitigation measures are needed because the significant impact is medium. Therefore, the following mitigation measure needs to be followed by the project proponent.

5.8.6.2.2 Mitigation measure

The significance of impact on soil and landscape may be affected by operation and maintenance activities and the impact level is major. Therefore, project proponent must follow the mitigation measure as to reduce the effect of physical soil disturbance impacts in the following below.

- a) Ensure the proper disposal site area for waste and silica gel.
- b) Regular checking the crude oil raw and product storage area, and waste disposal area
- c) To construct the settlement tank and waste disposal area
- d) Solid waste should only be dumped in the designated locations to avoid hazardous waste contaminating the surroundings.
- e) Maintaining the company's vehicles' engines will help prevent oil spills, and proper management will prevent visitors' and residents' cars from picking up any stray oil.
- f) Control proper oil and paint leakage when doing maintenance tasks.
- g) After the maintenance operation, properly dispose of the waste and paint remains.

The environmental impact will be predicated for soil pollution (post-mitigation) during operation phase. According to the result, the significance of classes of soil pollution with post- mitigation measures is low as shown in Table 5-46.

Table 5-46 Significance of Classes of Soil Pollution Post-Mitigation Measures During Operation Phase

Sources	Consequence $C = ((E + D + I + R)/4) * N$						Probability (P)	Environmental Impact Score (EI = C x P)	Significance Classes	Status of Impact
	E	D	I	R	N	C				
Operation activities	2	4	2	2	-1	-2.5	3	-7.5	Low	Negative

5.8.6.2.3 Impact Prioritization

The prioritization factor (PF) and environmental impact (EI) of the post mitigation scoring are multiplied to determine the final impact significance. As a result, the final environmental significance rating for soil pollution during operation phase is low as shown in Table 5-41.

Table 5-47 Final Environmental Significance Rating Soil Pollution During Operation Phase

Sources	Priority $(P = PR + CI + LR)$				Ranking	Prioritization Factor (PF)	Environmental Significance (PF*ER)	Rating	Status of Impact
	PR	CI	LR	P					
Operation activities	1	2	2	5	Medium	1.5	-11.25	Low	Negative

5.8.7. Impact on Biodiversity

5.8.7.1. Flora and Fauna

The phases of pre-construction, construction, operation and decommission are anticipated to have impact on existing biodiversity. Existing biodiversity may be impacted by land clearing, dust and pollution from automobiles, construction equipment, construction and operational activities. Chapter 4 discusses the findings of an investigation into the project's potential impact on biodiversity. All components of the floral and faunal ecosystem that are thought to be likely to be impacted by the activities of the pre-construction and construction were subjected to the impact assessment. The following are some of the probable pollution-causing project activities during the construction, operation, and decommission phases.

- Land clearance, leveling, and excavation activities during the construction stage
- Generation of wastewater during all stages of the proposed project
- Noise pollution during all stages of the proposed project

5.8.7.1.1 Construction and Decommission Phase

1) Significance of Impact

Placement of building and construction activities within the proposed implemented area can cause more or less impact on the natural vegetation and fauna species. Activities which are likely to negatively affect the biodiversity of the study area are described in the following:

- Destruction of natural vegetation during construction activities
- Particulate matter generated by construction activities
- Exotic floral species invasion in the proposed project area
- Loss of habitat for insects, birds and other small animals

The assessment of impact level on biodiversity during construction phase is **Medium** as shown in Table 5-48.

Table 5-48 Significance Classes of Impact on Biodiversity During Construction and Decommission Phase Pre-Mitigation Measures

Sources	Consequence $C = ((E + D + I + R)/4) * N$						Probability (P)	Environmental Impact Score (EI = C x P)	Significance Classes	Status of Impact
	E	D	I	R	N	C				
Land clearance, leveling Construction Activities	1	2	3	3	-1	-2.5	4	-10	Medium	Negative

Certain amount of biodiversity can be impacted a result of changes in land, and habitat. Natural habitats and feeding ground are going to be transformed into industrialized area. In the construction phase, the flora habitats are replaced with buildings. The following actions can be carried out to preserve the biodiversity and improve the state of green space are as follows.

2) Mitigation Measures

- Implement landscaping areas or green zone in the proposed project area to improve vegetation coverage. This could provide habitats for insects and small animals, which could serve as food and nesting ground for birds, and small mammals.
- Discharge wastewater through treatment system and monitored regularly.
- There must be a drainage system in place to catch stormwater runoff from paved surfaces, access roads, and cleared areas.
- To mitigate topsoil erosion and the destruction of floral habitat, appropriate drainage systems must be integrated into the design of the proposed construction at every stage.
- The construction workers and sub-contractors will be trained to understand and get awareness of nature and biodiversity conservation.
- As far as possible, any disruption of sensitive floral habitat and species of conservation significance must be avoided.
- During land clearing, avoid clearing of rare species and nesting sites.
- Prohibition of bird shooting and hunting of animals within the project area.
- When cleaning the land, if any animals or reptiles (such as snakes) come across, call the related government department (such as the fire department), who will take them into custody and release them in a secure location.
- Throughout all phases, a plan must be developed and put into practice to reduce the effect of dust on the environment.

- A control plan for exotic floral species must be developed and implemented in order to monitor and regulate foreign floral recruitment in disturbed habitats.
- A nursery must be developed in cooperation with a related forest department where indigenous/endemic plant species must be planted with a focus on rehabilitation in degraded and building areas.
- The various kinds of animals cannot be trapped, collected, or hunted at any stages of the proposed project;
- Limit vehicle traffic to designated roads to lessen the environmental effect of building and maintenance work as well as the risk of animal species accidents.
- Prohibit open fire within the operation area
- Large trees must be preserved wherever possible since they serve as nesting and resting places for species found in the area.

The environmental impact will be predicated for biodiversity with post implementation of relevant management and mitigation measures (post-mitigation) during construction phase. According to the result, the significance of classes of impact with post-mitigation measures is low as shown in Table 5-49.

Table 5-49 Significance Classes of Biodiversity During Construction and Decommission Phase Post-Mitigation Measures

Sources	Consequence $C = ((E + D + I + R)/4) * N$						Probability (P)	Environmental Impact Score ($EI = C \times P$)	Significance Classes	Status of Impact
	E	D	I	R	N	C				
Land clearance, leveling Construction Activities	1	2	2	3	-1	-2	3	-6	Low	Negative

3) Impact Prioritization

The prioritization factor (PF) and environmental impact (EI) of the post mitigation scoring are multiplied to determine the final impact significance. As a result, the final environmental significance rating for biodiversity during construction phase is low as shown in Table 5-50.

Table 5-50 Final Environmental Significance Rating of Biodiversity During Construction Phase

Sources	Priority ($P = PR + CI + LR$)				Ranking	Prioritization Factor (PF)	Environmental Significance ($PF * EI$)	Rating	Status of Impact
	PR	CI	LR	P					
Land clearance, leveling, Construction Activities	2	2	2	6	Medium	1.5	-9	Low	Negative

5.8.7.1.2 Operation Phase

1) Significance of Impact

During the construction phase, the existing land and vegetation would have been cleared, and excavation work would have been carried out, so there would be only industrialized area, and buildings in the operation phase. Due to the presence of these buildings, species of birds, small reptiles and mammals that previously in the pastures or land will no longer come to graze. There could be air pollution, noise pollution, generation of wastewater in the proposed project area.

Air pollution can also impact respiratory problems on insect and bird species. Air pollutants such as particulate matter, ozone, sulfur-dioxide, and nitrogen oxides can lead to respiratory issues in fauna species, since they have sensitive respiratory systems, and exposure to pollutants can cause inflammation, irritation and damage to their lungs, leading to reduced lung function and breathing difficulties.

Also, there will be noise pollution which can disrupt communication, foraging, navigation, and cause stress and behavioral changes insects. Insects rely on sound for communication, and mating which could be affected by traffic and construction activities. Noisy environments can disrupt insect's ability to forage for food and navigate. Prolong exposure to loud noise can induce behavior changes, including alternations in feed patterns, and reduce reproductive success.

Birds also rely on vocalizations for communication, and mate attraction. Noise pollution could lead to reduce reproductive success, difficulty in finding mates. Loud noises can disturb nesting birds, leading to nest abandonment, a reduced hatching success rate and increased chick mortality.

Air pollutants can lead to ecosystem changes that impact the availability of food and habitats for birds and reptiles, which could harm vegetation, reduce insect populations, and disrupt food chains. Moreover, air pollutants can weaken the immune systems of fauna, making them more susceptible to diseases and infections.

Wastewater pollution from petroleum refinery plants is a significant environmental concern due to the potential for releasing harmful pollutants. Wastewater containing pollutants such as oil, grease, heavy metals, organic compounds, hydrocarbons and suspended solids can become polluted and harm existing biodiversity and soil quality. Moreover, stormwater that comes into contact with refinery facilities and equipment can pick up pollutants, including oils, chemicals, and heavy metals from the surfaces it runs over. This contaminated water runoff can enter nearby water bodies.

Moreover, there could be accidental spills, leaks and releases from storage tanks, pipelines and equipment that can introduce into the environment, impacting both soil and water quality. Pollutants present in wastewater can settle and accumulate in sediment at the bottom of water bodies over time. This can have long-term effects on aquatic ecosystems.

The assessment of impact level on biodiversity during operation phase before mitigation measures is moderate as shown in Table 5-51.

Table 5-51 Significance Classes of Impacts on Biodiversity During Operation Phase Pre-Mitigation Measures

Sources	Consequence $C = ((E + D + I + R)/4) * N$						Probability (P)	Environmental Impact Score (EI = C x P)	Significance Classes	Status of Impact
	E	D	I	R	N	C				
Vehicle Movement, Water Pollution Air Pollution Habitat Degradation, Noise Pollution	3	4	3	4	-1	-3.5	4	-14	Medium	Negative

Therefore, the impact on biodiversity during the operation of the project is medium. The following actions must be taken during the operation phase to mitigate impact on biodiversity.

2) Mitigation Measures

- Treat operation waste to remove pollutants before discharging it into water bodies or municipal systems.
- Regularly monitor the quality of effluents to ensure compliance with International Standards or NEQEGs.
- Implement rigorous procedures to prevent and manage spills, leaks and releases.
- Implement proper stormwater management systems to minimize the runoff of pollutants into natural water bodies or soil layer.
- Reduce the generation of waste and pollutants through developed operational practices and process optimization.
- Developed a nursery in cooperation with a related forest department where indigenous/endemic plant species must be planted.
- Preservation and cultivation of endangered and rare plant species in or near the project area.
- Even if exotic species of plants have been planted to create landscaping in the gardens and residential building and houses, keeping these species from spreading outside the area of the project.
- If any migratory birds or animals are found entering and sheltering in the project property, avoid arrest and move to safe location in cooperation with the related departments.
- Avoidance of bird shooting and hunting of animals in the project area.

To mitigate the impacts on biodiversity, it's important to implement policies and practices to reduce pollution levels and promote environmental conservation works. These include regulating noise levels in traffics, improving air qualities (monitoring air quality, growing plants, install enough stack height in generators).

Table 5-52 Significance Classes of Biodiversity During Operation Phase Post-Mitigation Measures

Sources	Consequence $C = ((E + D + I + R)/4) * N$						Probability (P)	Environmental Impact Score (EI = C x P)	Significance Classes	Status of Impact
	E	D	I	R	N	C				
Vehicle Movement, Urbanization, Air Pollution, Light Pollution, Noise Pollution, Water Pollution	2	4	3	3	-1	-3	4	-12	Medium	Negative

3) Impact Prioritization

The prioritization factor (PF) and environmental impact (EI) of the post mitigation scoring are multiplied to determine the final impact significance. As a result, the final environmental significance rating for biodiversity during operation phase is low as shown in Table 5-53.

Table 5-53 Final Environmental Significance Rating of Biodiversity During Operation Phase

Sources	Priority $(P = PR + CI + LR)$				Ranking	Prioritization Factor (PF)	Environmental Significance (PF*EI)	Rating	Status of Impact
	PR	CI	LR	P					
Vehicle Movement, Urbanization, Air Pollution, Light Pollution, Noise Pollution, Water Pollution	2	2	3	7	Medium	1.5	-18	Medium	Negative

5.9. POSITIVE IMPACTS

5.9.1. Impact on Livelihood and Socio-economic

The main assets and sources of income for local people in the surrounding area township are engaged in agriculture, and livestock. A few villagers are living on fisheries. The agriculture mainly grows paddy, peanut, sesame, sunflower, green gram and other seasonal crops. According to the Regional Data, Administrative Department, Taungtha Township, Mandalay Region, September 2019, the proportion of livelihood persons working in the sector of “Agriculture” is the highest with 53,950 and second highest sector is “Farming Sector” at 13,033 persons.

The socio-economic impacts considered positive, as more jobs will create during project phases. The workers comprising both skilled and unskilled will recruit from the local population. The environmental impact (EI) will be determined for livelihood and socio-economic during construction, operation and decommission phases are shown in Table 5-54.

Table 5-54 Significance Classes of Livelihood and Socio-economic

Sources	Consequence $C = ((E + D + I + R)/4) * N$						Probability (P)	Environmental Impact Score (EI = C x P)	Significance Classes	Status of Impact
	E	D	I	R	N	C				
Construction, Operation and Decommission activities	3	5	4	3	+1	+3.75	5	+ 18.75	High	Positive

The significant classes of livelihood and socio-economic impacts are calculated based on project activities. Assumed that for extend of impact is the area within 5 km of the site. But this impact is a permanent period where natural, cultural or social functions or processes are altered to the extent that it will temporarily cease and it is reversible only by incurring significant time and cost. Additionally, there is a definite possibility that the impact will occur. According to the assessment, the livelihood and socio-economic impacts is high positive, as more jobs will be created during construction/ decommission and operation phases of the project. In the project area, workers comprising both skilled and unskilled will be recruited from the local population.

The livelihood and socio-economic impacts considered positive, as more jobs will create during construction, operation and decommission phases of the project. In the project area, workers comprising both skilled and unskilled will recruit from the local population.

The project proponent will implement the following practices during operation phase to get better results within the project area.

- Promote the fair treatment, non-discrimination (gender, religion & skin colour, etc.) and equal opportunity for workers;
- The Project plans to increase the production capacity in this years, nearby communities will get benefit by being the source of work force for the project;
- Ensure total compliance with national labor and employment laws;
- To avoid exploitation of child labor by contractor, sub-contractor and supply chain; and,
- Promote safe and healthy working conditions.
- Commitments upon the safety of workers by the management level and providing appropriate the amount of budget.
- The company will continue to implement CSR programs.
- The project proponent should try to eliminate or at least mitigate negative impacts it should, on the other hand, enhance and maximize the positive impacts to their optimum.

5.9.1.1. Impact Prioritization

The prioritization factor (PF) and environmental impact (EI) of the post mitigation scoring are multiplied to determine the final impact significance. As a result, the final environmental significance rating for livelihood and socio-economic during construction, operation and decommission phases is high as shown in Table 5-55.

Table 5-55 Final Environmental Significance Rating of Livelihood and Socio-economic

Sources	Priority (P = PR + CI+ LR)				Ranking	Prioritization Factor (PF)	Environmental Significance (PF*ER)	Rating	Status of Impact
	PR	CI	LR	P					
Construction, Operation and Decommission activities	2	2	2	6	Medium	1.5	+ 28.13	High	Positive

5.10.RISK ASSESSMENT METHODOLOGY

It is important to identify and reduce risks that may arise from the operation activities in the workplace. Risk assessment needs to be done in detail for each type of business and each process. Risk assessment helps to achieve business organizational goals, improving business performance, operational efficiency and it helps to improve occupational safety and health as well as protect the natural environment.

The risk assessment methodology used for the Occupational Safety Risk, Health Impact Assessment and Fire risk is from “General Environmental Impact Assessment Guidelines (September, 2017) issued by the Ministry of Natural Resources and Environmental Conservation¹¹. The steps involved in risk assessment are Hazard Identification, Risk evaluation and Risk control.

5.10.1. Hazard Identification

Risk may occur in operations during the implementation of the project. There is no such thing as a non-hazardous operation. Only a small difference. Potential risks for each process need to be identified and documented in a risk assessment. Information that need to consider when identifying potential risk situation are described below.

- Occupational Safety Risk
- Health Impact
- Fire Hazard

5.10.2. Risk Evaluation

The risk level is calculated based on the severity and likelihood. To get a risk level, multiply the severity and likelihood of the risk and analysis on the resulting answer.

By formula

$$\text{Risk Assessment} = \text{Severity} \times \text{Likelihood}$$

¹¹ Ministry of Natural Resources and Environmental Conservation, September, 2017. General Environmental Impact Assessment Guideline. The Republic of the Union of Myanmar, Version 3. pp (25)

5.10.3. Severity

Determining the severity of potential risk considers existing risk controls and remaining risks. The description of the severity level is as shown in Table 5-56.

Table 5-56 Criteria for rating the status of severity

Level	Severity	Description
5	Catastrophic	Death, fatal occupational disease or exposure, or multiple major injuries
4	Major	Serious injuries, serious occupational diseases or exposure (includes amputations, major fractures, multiple injuries, occupational cancers, diagnosed mental illnesses, acute poisoning, disabilities, and noise-induced hearing loss)
3	Moderate	Injury or ill-health (including mental well-being) requiring medical treatment (includes lacerations, burns, sprains, minor fractures, psychosocial stress, dermatitis, and work-related musculoskeletal disorders)
2	Minor	Injury or ill-health (including mental well-being) requiring first-aid only (includes minor cuts and bruises, irritation, ill-health with temporary discomfort, fatigue)
1	Negligible	Negligible injury

5.10.3.1. Likelihood

Risk assessment considers existing risk controls and remaining risks. The level descriptions that determine likelihood are shown in Table 5-57.

Table 5-57 Criteria for rating the status of likelihood

Level	Severity	Description
5	Almost Certain	Continual or repeating experience.
4	Frequent	Common occurrence.
3	Occasional	Possible or known to occur.
2	Remote	Not likely to occur under normal circumstances.
1	Rare	Not expected to occur but still possible.

5.10.3.2. Risk classification (Risk Matrix)

Control and protection must be done to not include in the red zone (High Risk) before starting work. Additionally, additional risk controls should be implemented. The risk level in the yellow zone (Medium Risk) is medium level and appropriate risk control and

protection must be implemented. The level of risk in the green zone (Low Risk) is low-level risks.

Table 5-58 Risk Assessment Matrix

		Likelihood				
		Improbable/ Rare (1)	Remote/ Unlikely (2)	Occasional (3)	Probable/ Likely (4)	Almost Certain/ Frequent (5)
Severity	Catastrophic (5)	5	10	15	20	25
	Critical (4)	4	8	12	16	20
	Moderate (3)	3	6	9	12	15
	Minor (2)	2	4	6	8	10
	Negligible (1)	1	2	3	4	5

Table 5-59 Criteria for rating the status of Risk Assessment

Risk Reading		Require Action
Index	Rating	
1-3	Low	Acceptable (No additional risk control measure required)
4-12	Medium	Tolerable (Management attention require Reduce risk to as low as reasonably practical)
>12	High	Not acceptable (Reduce to at least medium risk level before start work commence)

5.10.4. Risk Control

Risk control measures should be based on risk control methods (Hierarchy of Control). In possible situations, the risk should be eliminated (Elimination). Substitution, Engineering Control, Administrative Control and Personal Protective Equipment should be used according to this level shown in Figure 5-6 if elimination is not possible.

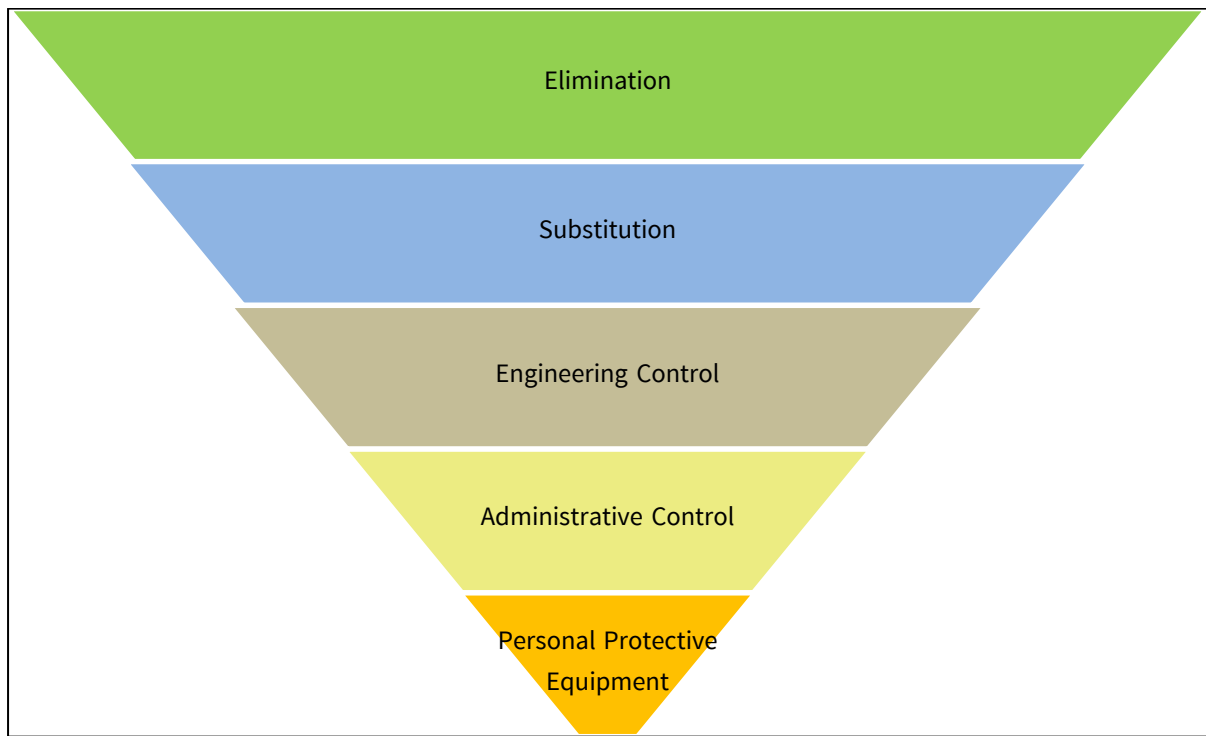


Figure 5-6 Hierarchy of Control

5.11.ASSESSING AND MITIGATING THE RISKS OF THE PROPOSED PROJECT

In the assessment of the risks that may occur during implementation of the project, each project process will be considered and mitigation measures also will be mentioned together. But, the project site is already finished pre-construction phase and currently in operation phase. Therefore, according to the assessment made by the environmental consultants (EIA) team, there are no negative impacts on physical, biological and social environment impact for the pre-construction phase of the project.

5.11.1. Occupational Safety Risk

Construction/ Decommission Phase

Physical risks may occur from the operation process during construction phase due to failure of equipment & machineries, careless using equipment & machineries, etc. Therefore, the risks of each process step are analyzed to reduce the risk level as below.

5.11.1.1. Excavation

Excavation is the first step of the construction phase. In this stage, machineries and equipment are used to remove ground to make foundation of the structure and transport removed soil. The potential physical risks are incidents caused by machineries and equipment, foot injury due to not wearing proper shoes and slip due to the uneven ground in construction site. These risks can cause strain on workers, injure worker body, and can cause severe or may be dead.

The level of severity is assumed as “level 5” due to worker can caused death and fatal as well as the level of likelihood is assumed as “level 3” because the risk is possible or

known to occur. The calculated risk level is “High” and thus, the following mitigation measures must be followed to avoid or reduce causing unwanted harm and damage to the environment and workers. The assessment of risk level during excavation process is shown in Table 5-60.

Table 5-60 Assessment of Risk Level during Excavation

Risk Evaluation for Occupational Health and Safety							
Hazard Identification			Risk Evaluation				Status of Risk
No.	Source	Hazard	Possible injury	Severity	Likelihood	Risk Priority Number (RPN)	
1	Excavation	<ul style="list-style-type: none"> • Accidents caused by machineries and equipment • Foot injury due to not wearing proper shoes. • Slip due to uneven ground in construction site 	<ul style="list-style-type: none"> • Strain to workers • Injury worker body and foot. • Can cause severe or dead. 	5	3	15	High

Mitigation Measure

- ✓ To wear safety shoe or shoe that have good condition grip in construction site.
- ✓ To wear on a safety vest while working in order to see the situation properly.
- ✓ Carefully inspection before driving the machineries and using equipment.
- ✓ Permit only the qualified or certified workers to drive the machineries.
- ✓ Do not permit to enter the irresponsible person in the working area.
- ✓ Check the first aid box every 6 month if medicine is necessary.
- ✓ Plan ahead to send the nearest clinic or hospital if the major injury is happened.
- ✓ Sharing knowledge about health & safety in working area between workers.
- ✓ Arrange first-aid training to worker.

5.11.1.1.1 Residual Risk

The severity of the risk will not be decrease after implement the mitigation measures but the likelihood of the risk will be decrease. The residual likelihood for this process is assumed as “level 2”, not likely to occur under normal circumstances. Therefore, the residual risk level is “Medium” as shown in Table 5-61.

Table 5-61 Residual Risk Level during Excavation

Risk Evaluation for Occupational Health and Safety							
Hazard Identification			Risk Evaluation				Status of Risk
No.	Source	Hazard	Possible injury	Severity	Likelihood	Risk Priority Number (RPN)	
1	Excavation	<ul style="list-style-type: none"> • Accidents caused by machineries and equipment • Foot injury due to not wearing proper shoes. • Slip due to uneven ground in construction site 	<ul style="list-style-type: none"> • Strain to workers • Injury worker body and foot. • Can cause severe or dead. 	5	2	10	Medium

5.11.1.2. Carrying Raw Materials

In construction phase, raw materials that need to constructed were carrying by the trucks. Therefore, it can be risk in the carry raw materials process. The potential risks are injury during loading/ unloading of raw materials as a result of carrying too much weight and inappropriate handling, accident by the trucks and hit by falling object from trucks.

The level of severity is assumed as “level 3” due to worker can caused injury that require medical treatment as well as the level of likelihood is assumed as “level 2” because the risk potential is not likely to occur under normal circumstances. The calculated risk level is “Medium” and thus, the following mitigation measures must be followed to avoid or reduce causing unwanted harm and damage to the environment and workers. The assessment of risk level during carrying raw materials process is shown in Table 5-62.

Table 5-62 Assessment of Risk Level during carrying raw materials

Risk Evaluation for Occupational Health and Safety							
Hazard Identification			Risk Evaluation				Status of Risk
No.	Source	Hazard	Possible injury	Severity	Likelihood	Risk Priority Number (RPN)	
1	Carry Raw Materials	<ul style="list-style-type: none"> • Injury during loading/unloading of raw materials • Accidents caused 	<ul style="list-style-type: none"> • Injury to people due to falling materials from trucks. • Injury to 	3	3	9	Medium

Risk Evaluation for Occupational Health and Safety							
Hazard Identification			Risk Evaluation				Status of Risk
No.	Source	Hazard	Possible injury	Severity	Likelihood	Risk Priority Number (RPN)	
		by machineries and equipment • Hit by falling object from trucks	workers due to carrying over weight and improper handling • Injury worker body.				

Mitigation Measure

- ✓ Cover with tarpaulin or strictly tied up the materials before carrying with truck.
- ✓ Inspect the truck to not overload in transportation.
- ✓ To enforce vehicles that carry materials not to drive more than the specified kilometer on the roads.
- ✓ Regular maintenance the vehicles every 6 months.
- ✓ To carry the materials with proper and safe handling posture.
- ✓ To carry the materials that not exceed than 50 kg per worker.
- ✓ To use forklift or crane to lift the heavy material and objects.

5.11.1.2.1 Residual Risk

The severity of the risk will not be decrease after implement the mitigation measures but the likelihood of the risk will be decrease. The residual likelihood for this process is assumed as “level 2”, not likely to occur under normal circumstances. Therefore, the residual risk level is “Medium” as shown in Table 5-63.

Table 5-63 Residual Risk Level during carrying raw materials

Risk Evaluation for Occupational Health and Safety							
Hazard Identification			Risk Evaluation				Status of Risk
No.	Source	Hazard	Possible injury	Severity	Likelihood	Risk Priority Number (RPN)	
1	Carry Raw Materials	• Injury during loading/unloading of raw materials • Accidents caused	• Injury to people due to falling materials from trucks.	3	2	6	Medium

Risk Evaluation for Occupational Health and Safety							
Hazard Identification			Risk Evaluation				Status of Risk
No.	Source	Hazard	Possible injury	Severity	Likelihood	Risk Priority Number (RPN)	
		by machineries and equipment • Hit by falling object from trucks	• Injury to workers due to carrying over weight and improper handling • Injury worker body.				

5.11.1.3. Structure Construction/ Decommission

During the structure construction stage, civil work, welding and machine installation process were conducted and demolition activities will be conducted during decommission stage. The potential risks are falling from height, slip in construction site, electrocution, eye damage due to not wearing safety glasses, foot injury due to not wearing proper shoes and accidents caused by machineries and equipment.

The level of severity is assumed as “level 3” due to worker can caused injury that require medical treatment as well as the level of likelihood is assumed as “level 2” because the risk potential is not likely to occur under normal circumstances. The calculated risk level is “Medium” and thus, the following mitigation measures must be followed to avoid or reduce causing unwanted harm and damage to the environment and workers. The assessment of risk level during infrastructure construction process is shown in Table 5-64.

Table 5-64 Assessment of Risk Level during Structure Construction

Risk Evaluation for Occupational Health and Safety							
Hazard Identification			Risk Evaluation				Status of Risk
No.	Source	Hazard	Possible injury	Severity	Likelihood	Risk Priority Number (RPN)	
1	Structure Construction	• Falling from height • Slip • Accidents caused by machineries	• Injury from falling height. • Injury by accidents caused by machineries and equipment.	5	2	10	Medium

Risk Evaluation for Occupational Health and Safety							
Hazard Identification			Risk Evaluation				Status of Risk
No.	Source	Hazard	Possible injury	Severity	Likelihood	Risk Priority Number (RPN)	
		and equipment • Electrocutation • Eye damage from welding • Foot injury	• Severe injury or death by electric. • Eye damage • Foot injury due to not wear proper shoe.				

Mitigation Measure

- ✓ Use PPE such as safety helmet, safety shoe, safety belt while working at high places where more than 6 ft.
- ✓ To make flat and smooth the road condition in the construction site.
- ✓ Carefully inspection before driving the machineries.
- ✓ Permit only the qualified or certified workers to drive the machineries.
- ✓ To wear on a safety vest while working in order to see the situation properly.
- ✓ Do not permit to enter the irresponsible person in the working area.
- ✓ Enforce worker to wear the mask and eyes protection glass in welding process.
- ✓ Share knowledge about Occupational Health & Safety and electrical hazard to workers.
- ✓ Enforce worker to wear safety shoe or shoe that have good condition grip in construction places where slip and pierce can happen.
- ✓ To put the emergency contact numbers in public area of project area.
- ✓ Plan ahead to send the nearest clinic or hospital if the major injury is happened.

5.11.1.3.1 Residual Risk

The severity of the risk will not be decrease after implement the mitigation measures but the likelihood of the risk will be decrease. The residual likelihood for this process is assumed as “level 1”, not expected to occur but still possible. Therefore, the residual risk level is “Low” as shown in Table 5-65.

Table 5-65 Residual Risk Level during Structure Construction

Risk Evaluation for Occupational Health and Safety							
Hazard Identification			Risk Evaluation				Status of Risk
No.	Source	Hazard	Possible injury	Severity	Likelihood	Risk Priority Number (RPN)	
1	Structure Construction	<ul style="list-style-type: none"> • Falling from height • Slip • Accidents caused by machineries and equipment • Electrocution • Eye damage from welding • Foot injury 	<ul style="list-style-type: none"> • Injury from falling height. • Injury by accidents caused by machineries and equipment. • Severe injury or death by electric. • Eye damage • Foot injury due to not wear proper shoe. 	5	1	5	Medium

5.11.1.4. Operation Phase

Physical risks may occur from the operation process during operation phase due to electrical hazard, fire hazard, health & safety. Therefore, the risks of each process step are analyzed to reduce the risk level as below.

5.11.1.4.1 Operation and maintaining the Factory

In the operation phase, the oil production is conducted by Chinese Distillation and Refining method and regular maintenance. Crude oil is heated by the furnaces to get the refine gasoline and diesel thus heat burn to worker can happen. The process is running by the electric thus electrocution can happen. In the maintenance processes such as maintaining in height area (distillation column, silo), injuries and accidents such as slips, injury from falling height in maintaining and careless mistakes can happen. Maintaining power supply system, maintaining building and similar process can cause health & safety problem, electrical hazard and fire hazard.

In assessment of physical risk during operation/ maintaining phase, the level of severity is assumed as “level 5” due to worker can caused death and fatal as well as the level of likelihood is assumed as “level 2” because the risk is not likely to occur under normal circumstances. The calculated risk level is “Medium” and thus, the following mitigation measures must be followed to avoid or reduce causing unwanted harm and damage to the

environment and workers. The assessment of risk level during operation/ maintaining factory is shown in Table 5-66.

Table 5-66 Assessment of Risk Level during Operation/ Maintaining factory

Risk Evaluation for Occupational Health and Safety							
Hazard Identification			Risk Evaluation				Status of Risk
No.	Source	Hazard	Possible injury	Severity	Likelihood	Risk Priority Number (RPN)	
1	Operation/ Maintaining Factory	<ul style="list-style-type: none"> • Electrical Hazard • Health & Safety • Hot Screen • Falling from height • Slip 	<ul style="list-style-type: none"> • Death • Bodily injury. • Heat burn • Damage to project properties 	5	2	10	Medium

Mitigation Measure

- ✓ Use PPE such as safety helmet, safety shoe, safety belt while working at high places more than 6 ft.
- ✓ To maintain the electrical wire and devices with electrician.
- ✓ To repair immediately the damage wire and electrical devices.
- ✓ Sufficient fire protection equipment and fire extinguishers are provided to prevent electrical related fire hazard
- ✓ Place the warning sign board that can happen potential risk.
- ✓ To put the emergency contact numbers in public area of project area.
- ✓ Make risk assessment for operation process if anything changes.
- ✓ Make backup arrangement the Emergency medicine boxes (First-Aid Box).
- ✓ Arrange for delivery to the clinic or nearest hospital for emergency

5.11.1.4.2 Residual Risk

The severity of the risk will not be decrease after implement the mitigation measures but the likelihood of the risk will be decrease. The residual likelihood for this process is assumed as “level 1”, not expected to occur but still possible. Therefore, the residual risk level is “Medium” as shown in Table 5-67.

Table 5-67 Residual Risk Level during Operation/ Maintaining factory

Risk Evaluation for Occupational Health and Safety							
Hazard Identification			Risk Evaluation				Status of Risk
No.	Source	Hazard	Possible injury	Severity	Like-likelihood	Risk Priority Number (RPN)	
1	Operation/ Maintaining Factory	<ul style="list-style-type: none"> • Electrical Hazard • Health & Safety • Hot Screen • Falling from height • Slip 	<ul style="list-style-type: none"> • Death • Bodily injury. • Damage to project properties 	5	1	5	Medium

5.11.2. Community Safety Risk

5.11.2.1. Accident from Raw Material Transport (Construction/Decommission & Operation Phase)

People near the project area can injury due to falling materials from trucks that carries raw materials and other materials. In addition, accident can cause to people near the project area due to the vehicles.

According to the assessment, the level of severity is assumed as “level 3” due to the resident near the project area can caused ill-health with (including mental well-being) as well as the level of likelihood is assumed as “level 2” because the risk potential is not likely to occur under normal circumstances. The calculated risk level is “Medium” and thus, the following mitigation measures must be followed to avoid or reduce causing unwanted harm and damage to the environment and workers. The assessment of public health & safety impact level for accident from vehicles is shown in Table 5-68.

Table 5-68 Assessment of Public Health & Safety Impact level

Risk Evaluation for Occupational Health and Safety							
Hazard Identification			Risk Evaluation				Status of Risk
No.	Source	Hazard	Possible injury	Severity	Like-likelihood	Risk Priority Number (RPN)	
1	Accident from vehicles	<ul style="list-style-type: none"> Accident due to carrying raw materials used. 	<ul style="list-style-type: none"> Injury to people due to falling materials from trucks. Accident by vehicle 	3	2	6	Medium

Mitigation Measure

- ✓ Cover with tarpaulin or strictly tied up the materials before carrying with truck.
- ✓ Inspect the truck to not overload in transportation.
- ✓ To enforce vehicles that carry materials not to drive more than the specified kilometer on the roads.
- ✓ Regular maintenance the vehicles every 6 months.

5.11.2.2. Residual Risk

The severity of the risk will not be decrease after implement the mitigation measures but the likelihood of the risk will be decrease. The residual likelihood for this process is assumed as “level 1”, not expected to occur but still possible. Therefore, the residual risk level is “Low” as shown in Table 5-69.

Table 5-69 Residual Public Health & Safety Impact level

Risk Evaluation for Occupational Health and Safety							
Hazard Identification			Risk Evaluation				Status of Risk
No.	Source	Hazard	Possible injury	Severity	Likelihood	Risk Priority Number (RPN)	
1	Accident from vehicles	<ul style="list-style-type: none"> • Accident due to carrying raw materials used in construction. 	<ul style="list-style-type: none"> • Injury to people due to falling materials from trucks. • Accident by vehicle 	3	1	3	Low

5.11.3. Health Impact Assessment

Health Impact Assessment (HIA) is a practical approach used to judge the potential health effects of the project on a population, particularly on vulnerable or disadvantaged groups. Health impact assessment is divided into two sectors which is occupational health and public health.

5.11.3.1. Occupational Health

Occupational health is focus on the residents, staff and worker’s health issues in the project area due to operation processes. In the construction phase, construction activities, soil improvement and infectious diseases can affect on the staff and worker’s health.

5.11.3.2. Construction/ Decommission activities (Construction/ Decommission Phase)

Construction processes activities such as excavation, civil work, carrying raw material and welding processes can cause dust and noise emission. Worker’s health can affect if there is a large amount dust emission is exceeded. Worker can irritate the nose, throat and eyes due to large particles. Small particles less than 2.5 micrometers (PM_{2.5}) and small particles less than 10 micrometers (PM₁₀) can cause eye damage and respiration problems such as coughing, difficulty breathing, reduced lung function, etc. In addition, worker hearing can also damage due to noise operation process if the noise level is exceeded. According to the air and noise measurements, the results of air and noise are within the National Environmental Quality (Emission) Guidelines.

According to the health impact assessment, the level of severity is assumed as “level 2” due to worker can caused irritation, ill-health with temporary discomfort, fatigue as well as the level of likelihood is assumed as “level 2” because the risk potential is not likely to occur under normal circumstances. The calculated risk level is “Medium” and thus, the following mitigation measures must be followed to avoid or reduce causing unwanted harm and damage

to the environment and workers. The assessment of risk level during construction/ decommission activities is shown in Table 5-70.

Table 5-70 Assessment of Health Impact level during Construction/ Decommission activities

Risk Evaluation for Occupational Health and Safety							
Hazard Identification			Risk Evaluation				Status of Risk
No.	Source	Hazard	Possible injury	Severity	Like-lihood	Risk Priority Number (RPN)	
1	Construction/ Decommission Activities	<ul style="list-style-type: none"> • Eye damage and respiration problem due to dust emission in land reclaiming and leveling process activities 	<ul style="list-style-type: none"> • Damage to worker eyes and respiration 	2	2	4	Medium

Mitigation Measure

- ✓ Enforce worker to wear the mask and eyes protection glass working in high dust emission area.
- ✓ Repair and maintain machinery every (6) months to prevent noise due to equipment failure.
- ✓ Do not operate equipment and machinery simultaneously unless necessary.
- ✓ Monitor machinery to ensure that it is not left on unnecessarily.
- ✓ Providing earplugs or ear muffs to workers working in noisy areas and enforce to wear the PPEs that provided.

5.11.3.2.1.1 Residual Risk

The severity of the risk will not be decrease after implement the mitigation measures but the likelihood of the risk will be decrease. The residual likelihood for this process is assumed as “level 1”, not expected to occur but still possible. Therefore, the residual risk level is “Low” as shown in Table 5-71.

Table 5-71 Residual Health Impact Level during Construction/ Decommission activities

Risk Evaluation for Occupational Health and Safety							
Hazard Identification			Risk Evaluation				Status of Risk
No.	Source	Hazard	Possible injury	Severity	Likelihood	Risk Priority Number (RPN)	
1	Construction Activities	<ul style="list-style-type: none"> Eye damage and respiration problem due to dust emission in land reclaiming and leveling process activities 	<ul style="list-style-type: none"> Damage to worker eyes and respiration 	2	1	2	Low

5.11.3.3. Heat Stress (Construction/ Decommission & Operation Phase)

Heat stress is also consideration factor for the occupational health. Since most of the construction/ decommission works are conducted in the outside area, worker can cause heat-related health problems such as exhaustion, sleep disturbances, dehydration, heat edema during high temperature period days.

According to the health impact assessment, the level of severity is assumed as “level 2” due to worker can caused irritation, ill-health with temporary discomfort, fatigue as well as the level of likelihood is assumed as “level 3” because the risk potential is not likely to occur under normal circumstances. The calculated risk level is “Medium” and thus, the following mitigation measures must be followed to avoid or reduce causing unwanted harm and damage to the environment and workers. The assessment of risk level for heat stress is shown in Table 5-72.

Table 5-72 Assessment of Health Impact level for heat stress

Risk Evaluation for Occupational Health and Safety							
Hazard Identification			Risk Evaluation				Status of Risk
No.	Source	Hazard	Possible injury	Severity	Likelihood	Risk Priority Number (RPN)	
1	Heat Stress	<ul style="list-style-type: none"> Heat edema, heat rashes, heat cramps, heat syncope, 	<ul style="list-style-type: none"> Strain to workers Dehydration Eye damage 	2	3	6	Medium

Risk Evaluation for Occupational Health and Safety							
Hazard Identification			Risk Evaluation				Status of Risk
No.	Source	Hazard	Possible injury	Severity	Likelihood	Risk Priority Number (RPN)	
		stroke and so on. <ul style="list-style-type: none"> Chronic heat exhaustion, sleep disturbances 					

Mitigation Measure

- ✓ Enforce worker to wear the mask and eyes protection glass working in high dust emission area.
- ✓ Supply the sufficient drinking water and Oral Rehydration salt pack.
- ✓ Construct the rest places near the working area.
- ✓ Worker who work under the sun must wear long-sleeved shirts, long pants, hats. (Applying Thanaka and sun cream, wearing sunglass can also be used)
- ✓ Assign the worker with working shift when day temperature is high.
- ✓ If necessary, heat-protective clothing, insulthood gloves and shoes have to provide sufficiently during high temperature.

5.11.3.3.1 Residual Risk

The severity of the risk will not be decrease after implement the mitigation measures but the likelihood of the risk will be decrease. The residual likelihood for this process is assumed as “level 1”, not expected to occur but still possible. Therefore, the residual risk level is “Low” as shown in Table 5-73.

Table 5-73 Residual Health Impact Level for Heat Stress

Risk Evaluation for Occupational Health and Safety							
Hazard Identification			Risk Evaluation				Status of Risk
No.	Source	Hazard	Possible injury	Severity	Likelihood	Risk Priority Number (RPN)	
1	Heat Stress	<ul style="list-style-type: none"> Heat edema, heat rashes, heat cramps, heat syncope, heat 	<ul style="list-style-type: none"> Strain to workers Dehydration Eye damage 	2	1	3	Low

Risk Evaluation for Occupational Health and Safety							
Hazard Identification			Risk Evaluation				Status of Risk
No.	Source	Hazard	Possible injury	Severity	Like-likelihood	Risk Priority Number (RPN)	
		stroke and so on. <ul style="list-style-type: none"> Chronic heat exhaustion, sleep disturbances 					

5.11.3.4. Infectious disease risks (Construction Phase/ Decommission & Operation Phase)

Operation area can expose workers to various biological hazards due to exposure to bacteria, viruses, insects, plants, birds, animals, and even humans. These biological hazards can result in various health issues, such as skin irritations, allergies and serious infectious diseases.

According to the health impact assessment, the level of severity is assumed as “level 3” due to worker can caused ill-health with (including mental well-being) as well as the level of likelihood is assumed as “level 2” because the risk potential is not likely to occur under normal circumstances. The calculated risk level is “Medium” and thus, the following mitigation measures must be followed to avoid or reduce causing unwanted harm and damage to the environment and workers. The assessment of risk level for infectious disease risk is shown in Table 5-74.

Table 5-74 Assessment of Health Impact level for Infectious disease risk

Risk Evaluation for Occupational Health and Safety							
Hazard Identification			Risk Evaluation				Status of Risk
No.	Source	Hazard	Possible injury	Severity	Like-likelihood	Risk Priority Number (RPN)	
1	Infectious disease risks	<ul style="list-style-type: none"> Cholera diseases Hepatitis Covid-19 disease, etc. 	<ul style="list-style-type: none"> Worker fatigue due to disease. Affecting workers. 	3	2	6	Medium

Mitigation Measure

- ✓ Provide workers with clean drinking water to prevent diarrheal diseases caused by impure drinking water.

- ✓ Sharing health education knowledge to workers about communicable diseases such as Covid-19, Hepatitis.
- ✓ Supply hand washing soap, hand sanitizers, masks and oral rehydration salt.

5.11.3.4.1 Residual Risk

The severity of the risk will not be decrease after implement the mitigation measures but the likelihood of the risk will be decrease. The residual likelihood for this process is assumed as “level 1”, not expected to occur but still possible. Therefore, the residual risk level is “Low” as shown in Table 5-75.

Table 5-75 Residual Health Impact Level for Infectious disease risk

Risk Evaluation for Occupational Health and Safety							
Hazard Identification			Risk Evaluation				Status of Risk
No.	Source	Hazard	Possible injury	Severity	Like- lihood	Risk Priority Number (RPN)	
1	Infectious disease risks	<ul style="list-style-type: none"> • Cholera diseases • Hepatitis • Covid-19 disease, etc. 	<ul style="list-style-type: none"> • Worker fatigue due to disease. • Affecting workers. 	3	1	3	Low

5.11.3.5. Community Health

Public health & safety is focus on the health and safety issues of the people near the project area due to operation processes.

5.11.3.5.1 Air Pollution/ Noise Pollution to Surrounding area

One of the potential impacts is that air pollution from construction process (dust and gas) and noise from construction process can disperse with wind to residents near the project area. It can be cause respiratory problems and hearing problem to residents near the project area but the probability is few since the project area is far from the resident area.

According to the assessment, the level of severity is assumed as “level 2” due to the resident near the project area can caused ill-health with temporary discomfort, fatigue as well as the level of likelihood is assumed as “level 1” because the risk potential is not likely to occur but still possible. The calculated risk level is “Low” and thus, the following mitigation measures should be followed to avoid or reduce causing unwanted harm and damage to the environment and the residents. The assessment of public health & safety impact level due to air pollution/ noise pollution to surrounding area is shown in Table 5-76.

Table 5-76 Assessment of Public Health & Safety Impact level

Risk Evaluation for Occupational Health and Safety							
Hazard Identification			Risk Evaluation				Status of Risk
No.	Source	Hazard	Possible injury	Severity	Like-likelihood	Risk Priority Number (RPN)	
1	Air Pollution/ Noise Pollution to Surrounding area	<ul style="list-style-type: none"> Impact on the surrounding environment due to dust and noise generated from operations. 	<ul style="list-style-type: none"> Dispersing particles in the surrounding air and affecting the respiratory tract. Particles can pollute the surrounding water and harm people who use it. Disturbing nearby people, insomnia hearing damage due to noise. 	2	1	2	Low

Mitigation Measure

- ✓ Spraying water twice a day on dusty area near the working site and the roads with high traffic.
- ✓ Protect with green filter cloth in windy and dusty areas.
- ✓ Slow down the speed of machinery and transport vehicles.
- ✓ Do not operate till night.

5.11.3.5.2 Residual Risk

The severity of the risk will not be decrease after implement the mitigation measures but the likelihood of the risk will be decrease. The residual likelihood for this process is assumed as “level 1”, not expected to occur but still possible. Therefore, the residual risk level is “Low” as shown in Table 5-77.

Table 5-77 Residual Public Health & Safety Impact level

Risk Evaluation for Occupational Health and Safety							
Hazard Identification			Risk Evaluation				Status of Risk
No.	Source	Hazard	Possible injury	Severity	Like-likelihood	Risk Priority Number (RPN)	

Risk Evaluation for Occupational Health and Safety							
Hazard Identification			Risk Evaluation				Status of Risk
No.	Source	Hazard	Possible injury	Severity	Likelihood	Risk Priority Number (RPN)	
1	Accident from vehicles	<ul style="list-style-type: none"> Accident due to carrying raw materials used in construction. 	<ul style="list-style-type: none"> Injury to people due to falling materials from trucks. Accident by vehicle 	2	1	2	Low

5.11.4. Fire Hazard (Construction/ Decommission & Operation Phase)

Fire risk is the important factor to consider in analyzing risk factor. During the project establishment, the source places of fire in project area are preliminary tank, operation area, silo area and waste storage area (silica gel store and crude oil residual). The behaviors of workers (e.g, smoking, careless using electricity & electronic devices) and arson are also sources of fire. Fire hazard can cause damage to workers and project properties and even death.

The level of severity is assumed as “level 5” due to worker can caused death and fatal as well as the level of likelihood is assumed as “level 3” because the risk potential is possible or known to occur. The calculated risk level is “High” and thus, the following mitigation measures must be followed to avoid or reduce causing unwanted harm and damage to the environment and workers. The assessment of fire risk level is shown in Table 5-78.

Table 5-78 Assessment of Fire Risk Level

Risk Evaluation for Occupational Health and Safety							
Hazard Identification			Risk Evaluation				Status of Risk
No.	Source	Hazard	Possible injury	Severity	Likelihood	Risk Priority Number (RPN)	
1	<ul style="list-style-type: none"> Fire from preliminary tank, operation area, silo area and waste storage area Worker behaviors (e.g, Smoking, careless using electricity & electronic 	<ul style="list-style-type: none"> Fire hazard Explosion 	<ul style="list-style-type: none"> Can cause death Damage to worker and project properties due to fire 	5	3	15	High

Risk Evaluation for Occupational Health and Safety							
Hazard Identification			Risk Evaluation				Status of Risk
No.	Source	Hazard	Possible injury	Severity	Like- lihood	Risk Priority Number (RPN)	
	devices) • Arson						

Mitigation Measure

- ✓ Sufficient fire protection equipment and fire extinguishers are provided.
- ✓ Combustible wastes are disposed regularly and stored separately.
- ✓ Awareness about do's and don'ts for waste storage and fuel storage is given.
- ✓ To train the fire drill for emergency cases every 6 month.
- ✓ To put the safety & warning signs at fuel storage areas, generator, etc.
- ✓ To repair the broken electronic devices and wires immediately by electrician.
- ✓ Only permit person allow to access to fuel storage area.
- ✓ To put the emergency contact numbers in public area of project area.

5.11.4.1. Residual Risk

The severity of the risk will not be decrease after implement the mitigation measures but the likelihood of the risk will be decrease. The residual likelihood for this process is assumed as “level 2”, not likely to occur under normal circumstances. Therefore, the residual risk level is “Medium” as shown in Table 5-79.

Table 5-79 Residual Fire Risk Level

Risk Evaluation for Occupational Health and Safety							
Hazard Identification			Risk Evaluation				Status of Risk
No.	Source	Hazard	Possible injury	Severity	Like- lihood	Risk Priority Number (RPN)	
1	<ul style="list-style-type: none"> • Fire from preliminary tank, operation area, silo area and waste storage area • Worker behaviors (e.g, Smoking, careless using electricity & 	<ul style="list-style-type: none"> • Fire hazard • Explosion 	<ul style="list-style-type: none"> • Can cause death • Damage to worker and project properties due to fire 	5	2	5	Medium

Risk Evaluation for Occupational Health and Safety							
Hazard Identification			Risk Evaluation				Status of Risk
No.	Source	Hazard	Possible injury	Severity	Like-likelihood	Risk Priority Number (RPN)	
	electronic devices) • Arson						

5.12.RISK ASSESSMENT METHODOLOGY FOR NATURAL DISASTER RISK

A qualitative or quantitative approach to determine the nature and extent of disaster risk by analyzing potential hazards and evaluating existing conditions of exposure and vulnerability that together could harm people, property, services, livelihoods and the environment on which they depend. The risk assessment methodology for natural disaster risk is 5 × 5 Matrix Risk assessment methodology based on likelihood and consequences.¹² A type of risk matrix that is visually represented as a table or a grid, a 5x5 risk matrix has 5 categories each for consequences (along the X axis) and likelihood (along the Y axis), all following a scale of low to high.

5.12.1. Consequences

Consequences are used to determine the criticality of the risk. The consequences of this methodology are based on the number of injuries, potential damages and financial impacts. The level of consequences is insignificant, minor, moderate, major and catastrophic. The specific criteria of each level are shown in Table 5-80.

Table 5-80 Criteria for rating the status of consequences

Severity	Description
Catastrophic	Death or Major Injuries Toxic Environmental Damage >> \$1,000,000 Damage
Major	Extensive Injuries High Environmental Damage << \$ 1,000,000 Damage
Moderate	External Medical Medium Environmental Damage << \$ 100,000 Damage
Minor	Some First Aid required Low Environmental Damage <<\$10,000 Damage
Insignificant	No injuries First Aid No Environmental Damage << \$ 1,000 Damage

¹² *kevinian.com*

5.12.2. Likelihood

Likelihood is the probability that something might happen. The level of likelihood is rare, unlikely, possible, likely and almost certain. The specific criteria of each level is shown in Table 5-81.

Table 5-81 Criteria for rating the status of likelihood

Severity	Description
Almost Certain	Expected in normal circumstances (100%)
Likely	Probably occur in most circumstances (10%)
Possible	Might occur at some time. (1%)
Unlikely	Could occur at some future time. (0.1 %)
Rare	Only in exceptional circumstances (0.01 %)

5.12.3. Risk Classification (5 × 5 Risk Matrix)

The first step is to assign the value from insignificant to catastrophic in consequence and the value from rare to almost certain in likelihood. Insignificant is the lowest and catastrophic is the highest value in consequence. Rare is the lowest and almost certain is the highest value in likelihood.

The green zone is a low danger level, the yellow zone is a moderate risk level, the orange zone is a high-risk level, and the red zone is a critical risk level. The detail descriptions are shown in Table 5-82.

Table 5-82 Risk Assessment Matrix for Natural Disasters

		CONSEQUENCES				
		Insignificant	Minor	Moderate	Major	Catastrophic
LIKELIHOOD	Almost Certain	Moderate Risk	High Risk	High Risk	Critical Risk	Critical Risk
	Likely	Moderate Risk	Moderate Risk	High Risk	High Risk	Critical Risk
	Possible	Low Risk	Moderate Risk	High Risk	High Risk	Critical Risk

		CONSEQUENCES				
		Insignificant	Minor	Moderate	Major	Catastrophic
	Unlikely	Low Risk	Moderate Risk	Moderate Risk	High Risk	High Risk
	Rare	Low Risk	Low Risk	Moderate Risk	Moderate Risk	High Risk

5.13.ASSESSING AND MITIGATING NATURAL DISASTER RISK

5.13.1. Earthquake

The major tectonics of Myanmar comprises of the subduction zone of Indian Plate beneath Burma Plate in the west, and the collision zone of Indian Plate with Eurasia Plate in the north. The rate of subduction is 35 – 50 mm/yr and the direction of subduction is NE to NNE [1]. The other major structures present within Myanmar are the major fault systems of well-known Sagaing fault, Kyaukkyan fault, Gwegyo thrust, and West BagoYoma fault. Most of the earthquakes, which occurred in the central region of Myanmar, are related with Sagaing fault, and in the eastern part, the focal depth is not greater than 40 km while the earthquakes in the western portion include from shallow, through intermediate to deep focus earthquakes. The Sagaing fault is an active right lateral strike slip fault crossing from north to south through Myanmar. Shallow strong earthquakes occur along the Sagaing fault.

5.13.1.1. Construction/ Decommission Phase

In the construction phase, worker can cause injuries and damage to project properties by earthquake. Liquefaction and ground subsidence can also occur due to the earthquake. The level of consequence is assumed as “Minor” due to low environmental damage and some first aid required. The level of likelihood is assumed as “Likely” because the risk potential is probably occurred in most circumstances. The calculated risk level is “Moderate” and thus, the following mitigation measures must be followed to avoid or reduce causing unwanted harm and damage to the environment and workers. The assessment of earthquake risk level is shown in Table 5-83.

Table 5-83 Assessment of Earthquake Risk Level on construction/ decommission phase

Risk Evaluation for Occupational Health and Safety						
Hazard Identification			Risk Evaluation			Status of Risk
No.	Source	Hazard	Possible injury	Consequence	Like-likelihood	
1	<ul style="list-style-type: none"> Natural Hazard 	<ul style="list-style-type: none"> Earthquake Liquification and ground subsidence due to Earthquake 	<ul style="list-style-type: none"> Worker Injuries Damage to project properties 	Minor	Likely	Moderate Risk

Mitigation Measure

- ✓ Make and follow the emergency plan for the evacuation and rescue of individuals.
- ✓ Make backup arrangement the Emergency medicine boxes (First-Aid Box).
- ✓ Arrange for delivery to the clinic or nearest hospital for emergency.
- ✓ Greater focus on geotechnical investigations to reduce the risk of unsatisfactory foundation performance in project area.
- ✓ Long term and short-term earthquake monitoring system or earthquake warning system should be installed in place based on the precursors of an earthquake such as the sudden rise of groundwater, the changes of elasticity in rocks and soils, etc.

5.13.1.1.1 Residual Risk

The likelihood of the risk will not be decrease after implement the mitigation measures but consequence of the risk will be decrease. The residual consequence for this process is assumed as “Insignificant”, no injuries first aid and no environmental damage. Therefore, the residual risk level is “Moderate” as shown in Table 5-84.

Table 5-84 Residual Earthquake Risk Level

Risk Evaluation for Occupational Health and Safety						
Hazard Identification			Risk Evaluation			Status of Risk
No.	Source	Hazard	Possible injury	Consequence	Like-lihood	
1	• Natural Hazard	<ul style="list-style-type: none"> • Earthquake • Liquification and ground subsidence due to Earthquake 	<ul style="list-style-type: none"> • Worker Injuries • Damage to project properties 	Insignificant	Likely	Moderate Risk

5.13.1.2. Operation Phase

In the operation/ maintaining phase, worker can cause injuries as well as damage to project properties by earthquake due to collapse of factory structure. The level of consequence is assumed as “Major” due to high environmental damage and extensive injuries can cause. The level of likelihood is assumed as “Likely” because the risk potential is probably occurred in most circumstances. The calculated risk level is “High” and thus, the following mitigation measures must be followed to avoid or reduce causing unwanted harm and damage to the environment and workers. The assessment of earthquake risk level is shown in Table 5-85.

Table 5-85 Assessment of Earthquake Risk Level on operation phase

Risk Evaluation for Occupational Health and Safety						
Hazard Identification			Risk Evaluation			Status of Risk
No.	Source	Hazard	Possible injury	Consequence	Like-lihood	
1	• Natural Hazard	<ul style="list-style-type: none"> • Earthquake • Liquification and ground subsidence due to Earthquake 	<ul style="list-style-type: none"> • Extensive Injuries/ High Environmental Damage • Damage to project properties 	Major	Likely	High Risk

Mitigation Measure

- ✓ Make and follow the emergency plan for the evacuation and rescue of individuals.
- ✓ Make backup arrangement the Emergency medicine boxes (First-Aid Box).
- ✓ Arrange for delivery to the clinic or nearest hospital for emergency.

5.13.1.2.1 Residual Risk

The likelihood of the risk will not be decrease after implement the mitigation measures but consequence of the risk will be decrease. The residual consequence for this process is assumed as “Insignificant”, no injuries first aid and no environmental damage. Therefore, the residual risk level is “Moderate” as shown in Table 5-86.

Table 5-86 Residual Earthquake Risk Level

Risk Evaluation for Occupational Health and Safety						
Hazard Identification			Risk Evaluation			Status of Risk
No.	Source	Hazard	Possible injury	Consequence	Likelihood	
1	• Natural Hazard	• Earthquake • Liquification and ground subsidence due to Earthquake	• Worker Injuries • Damage to project properties	Insignificant	Likely	Moderate Risk

5.13.2. Floods

5.13.2.1. Construction/ Decommission and Operation Phase

In assessment of flood risk on construction/ decommission and operation phase, the level of consequence is assumed as “Minor” due to low environmental damage and some first aid required. The level of likelihood is assumed as “Possible” because the risk potential might occur at some time. The calculated risk level is “Moderate” and thus, the following mitigation measures must be followed to avoid or reduce causing unwanted harm and damage to the environment and workers. The assessment of flood risk level is shown in Table 5-87.

Table 5-87 Assessment of Flood Risk Level on construction/ decommission and operation phase

Risk Evaluation for Occupational Health and Safety						
Hazard Identification			Risk Evaluation			Status of Risk
No.	Source	Hazard	Possible injury	Consequence	Like-lihood	
1	• Natural Hazard	• Flood	<ul style="list-style-type: none"> • Worker Injuries • Damage to project properties 	Minor	Possible	Moderate Risk

Mitigation Measure

- ✓ Make and follow the emergency plan for the evacuation and rescue of individuals.
- ✓ Constantly listening the weather reports to know the possibility of natural disasters such as storms and flood.
- ✓ Make backup arrangement the Emergency medicine boxes (First-Aid Box).
- ✓ Arrange for delivery to the clinic or nearest hospital for emergency.

5.13.2.1.1 Residual Risk

The likelihood of the risk will not be decrease after implement the mitigation measures but consequence of the risk will be decrease. The residual consequence for this process is assumed as “Insignificant”, no injuries first aid and no environmental damage. Therefore, the residual risk level is “Low” as shown in Table 5-88.

Table 5-88 Residual Flood Risk Level

Risk Evaluation for Occupational Health and Safety						
Hazard Identification			Risk Evaluation			Status of Risk
No.	Source	Hazard	Possible injury	Consequence	Like-lihood	
1	• Natural Hazard	• Flood	<ul style="list-style-type: none"> • Worker Injuries • Damage to project properties 	Insignificant	Possible	Low Risk

5.13.3. Ground Subsidence

Ground Subsidence takes place when loosely packed, water-logged sediments at or near the ground surface lose their strength in response to strong ground shaking. Ground Subsidence and liquefaction occurring beneath buildings and other structures can cause major damage during earthquakes. In addition, overexploitation of groundwater is also a contributing factor to liquefaction. There is the potential liquefaction risk in the project area if not proper soil compaction because the project area is situated along the river side.

5.13.3.1. Construction/ Decommission Phase

In the construction phase, there is no significant risk in the project area due to ground subsidence and liquefaction. In assessment of ground subsidence risk, the level of consequence is assumed as “Insignificant” due to no injuries first aid and no environmental damage. The level of likelihood is assumed as “Unlikely” because the risk occurs at some future time. The calculated risk level is “Low” but the following mitigation measures must be followed to avoid or reduce causing unwanted harm and damage to the environment and workers in the operation phase. The assessment of ground subsidence risk level is shown in Table 5-89.

Table 5-89 Assessment of ground subsidence Risk Level

Risk Evaluation for Occupational Health and Safety						
Hazard Identification			Risk Evaluation			Status of Risk
No.	Source	Hazard	Possible injury	Consequence	Likelihood	
1	<ul style="list-style-type: none"> • Natural Hazard 	<ul style="list-style-type: none"> • Ground Subsidence • Liquefaction 	<ul style="list-style-type: none"> • Damage to project properties 	Insignificant	Unlikely	Low Risk

Mitigation Measure

- ✓ Greater focus on geotechnical investigations to reduce the risk of unsatisfactory foundation performance of each building site.
- ✓ Deep piles should be designed to accommodate an appropriate level of lateral movement of the surface crust even if they are far from any watercourse where there is a possibility of severe liquefaction.
- ✓ Groundwater use should not exceed the amount of water that can be extracted based on the results of the pumping test.
- ✓ Strictly checking and conducting soil improving process.

5.13.3.1.1 Residual Risk

The severity of the risk will not be decrease after implement the mitigation measures but the likelihood of the risk will be decrease. The residual likelihood for this process is assumed as “Rare”, not likely to occur under normal circumstances. Therefore, the residual risk level is “Low” as shown in Table 5-90.

Table 5-90 Residual ground subsidence Risk Level

Risk Evaluation for Occupational Health and Safety						
Hazard Identification			Risk Evaluation			Status of Risk
No.	Source	Hazard	Possible injury	Consequence	Likelihood	
1	<ul style="list-style-type: none"> Natural Hazard 	<ul style="list-style-type: none"> Ground Subsidence Liquefaction 	<ul style="list-style-type: none"> Damage to project properties 	Insignificant	Rare	Low Risk

5.13.3.2. Operation Phase

In the operation/ maintaining phase, water usage in the project area is supply from underground water. Therefore, there is a potential liquification risk along the operation phase due to extraction water from aquifer. But, the water usage in the operation process and domestic usage is little. In assessment of ground subsidence risk on operation phase, the level of consequence is assumed as “Moderate” due to it can be medium environmental damage. The level of likelihood is assumed as “Unlikely” because the risk occurs at some future time. The calculated risk level is “High” but the following mitigation measures must be followed to avoid or reduce causing unwanted harm and damage to the environment and workers in the operation phase. The assessment of ground subsidence risk level is shown in Table 5-91.

Table 5-91 Assessment of ground subsidence Risk Level

Industrial Risk Evaluation for Occupational Health and Safety						
Hazard Identification			Risk Evaluation			Status of Risk
No.	Source	Hazard	Possible injury	Consequence	Like- lihood	
1	<ul style="list-style-type: none"> Natural Hazard 	<ul style="list-style-type: none"> Ground Subsidence Liquefaction 	<ul style="list-style-type: none"> Damage to project properties 	Moderate	Unlikely	Moderate Risk

Mitigation Measure

- ✓ Conduct ground level geotechnical survey annually.
- ✓ Conduct survey to know the water store in aquafer.
- ✓ Groundwater use should not exceed the amount of water that can be extracted based on the results of the survey.

5.13.3.2.1 Residual Risk

The severity of the risk will not be decrease after implement the mitigation measures but the likelihood of the risk will be decrease. The residual likelihood for this process is assumed as “Rare”, not likely to occur under normal circumstances. Therefore, the residual risk level is “Moderate” as shown in Table 5-92.

Table 5-92 Residual ground subsidence Risk Level

Risk Evaluation for Occupational Health and Safety						
Hazard Identification			Risk Evaluation			Status of Risk
No.	Source	Hazard	Possible injury	Consequence	Likelihood	
1	<ul style="list-style-type: none"> • Natural Hazard 	<ul style="list-style-type: none"> • Ground Subsidence • Liquefaction 	<ul style="list-style-type: none"> • Damage to project properties 	Moderate	Rare	Moderate Risk

5.13.4. WildFire Risk

5.13.4.1. Construction/ Decommission and Operation Phase

The project process operates at high temperatures and is located in a dry zone; therefore, wildfire risk should be considered. The project proponent clears the factory's surrounding area to prevent fires and arranges fire hydrants around the factory compound. In assessment of wildfire risk on construction/ decommission and operation phase, the level of consequence is assumed as “Moderate” due to medium environmental damage and external medical required. The level of likelihood is assumed as “Possible” because the risk potential might occur at some time. The calculated risk level is “High” and thus, the following mitigation measures must be followed to avoid or reduce causing unwanted harm and damage to the environment and workers. The assessment of flood risk level is shown in Table 5-93.

Table 5-93 Assessment of Wildfire Risk Level on construction/ decommission and operation phase

Risk Evaluation for Occupational Health and Safety						
Hazard Identification			Risk Evaluation			Status of Risk
No.	Source	Hazard	Possible injury	Consequence	Like-likelihood	
1	• Natural Hazard	• Wildfire	<ul style="list-style-type: none"> • Worker Injuries • Damage to project properties • Environmental Damage 	Moderate	Possible	High Risk

Mitigation Measure

- ✓ Ensure in good condition of fire extinguishers and hydrants are readily arranged and employees are trained in their use.
- ✓ Make and follow the emergency plan for the evacuation and rescue of individuals.
- ✓ Clear the factory's surrounding area regularly to reduce the risk of wildfires spreading to the factory.
- ✓ Make backup arrangement the Emergency medicine boxes (First-Aid Box).
- ✓ Arrange for delivery to the clinic or nearest hospital for emergency.
- ✓ Arrange to call and notify to Fire Services Department immediately if the wildfire occur.

5.13.4.1.1 Residual Risk

The likelihood of the risk will not be decrease after implement the mitigation measures but consequence of the risk will be decrease. The residual consequence for this process is assumed as “Insignificant”, no injuries first aid and no environmental damage. Therefore, the residual risk level is “Low” as shown in Table 5-94.

Table 5-94 Residual Flood Risk Level

Risk Evaluation for Occupational Health and Safety						
Hazard Identification			Risk Evaluation			Status of Risk
No.	Source	Hazard	Possible injury	Consequence	Like-lihood	
1	<ul style="list-style-type: none"> Natural Hazard 	<ul style="list-style-type: none"> Wildfire 	<ul style="list-style-type: none"> Worker Injuries Damage to project properties Environmental Damage 	Minor	Possible	Moderate Risk

5.14.CUMULATIVE IMPACT ASSESSMENT

The project area is located in Taungtha Township, Mandalay Region as described in the previous chapter. The three locations source which are Kyawzi Curde Oil Mini Refinery Co., Ltd, Nyaung U – Myingyan Road and Bagan – Nyaung U Railway Road can be affected on the cumulative impact near project area. The Kyawzi Curde Oil Mini Refinery Co., Ltd is situated in the north east direction of the factory. In addition, Nyaung U – Myingyan Road and Bagan – Nyaung U Railway Road are located in front of the project factory respectively. When evaluating the Project's effects on a specific resource, it is necessary to consider the cumulative effects that could arise from various types of projects operating nearby to the Project in the future. The description and photos of cumulative source information is presented in Table 5-95, Figure 5-7 and Figure 5-8.

Table 5-95 Brief description of cumulative impacts source

No.	Source Name	Description
1.	Kyawzi Crude Oil Mini Refinery Co., Ltd	Manufacturing and distribution crude oil
2.	Road near project site	<p>Vehicles passing through the Nyaung U – Myingyan Road</p> <p>According to the survey result of HA survey team, currently, the average traffic flow was nearly 31 vehicles/hr in the study area. (max-49, min.- 16)</p>
3.	Bagan – Nyaung U Railway Road	<p>The railway is 13 miles long from Myingan to Bagan- Nyaung U.</p> <p>There are two small stations in the road.</p> <p>Currently, there is no transportation in the study area because current situation of the country.</p> <p>However, it may be planned to transport in the future.</p>



Kyawzi Crude Oil Mini Refinery Co., Ltd

Vehicles from Nyaung U – Myingyan Road

Figure 5-7 Photos of cumulative impact source

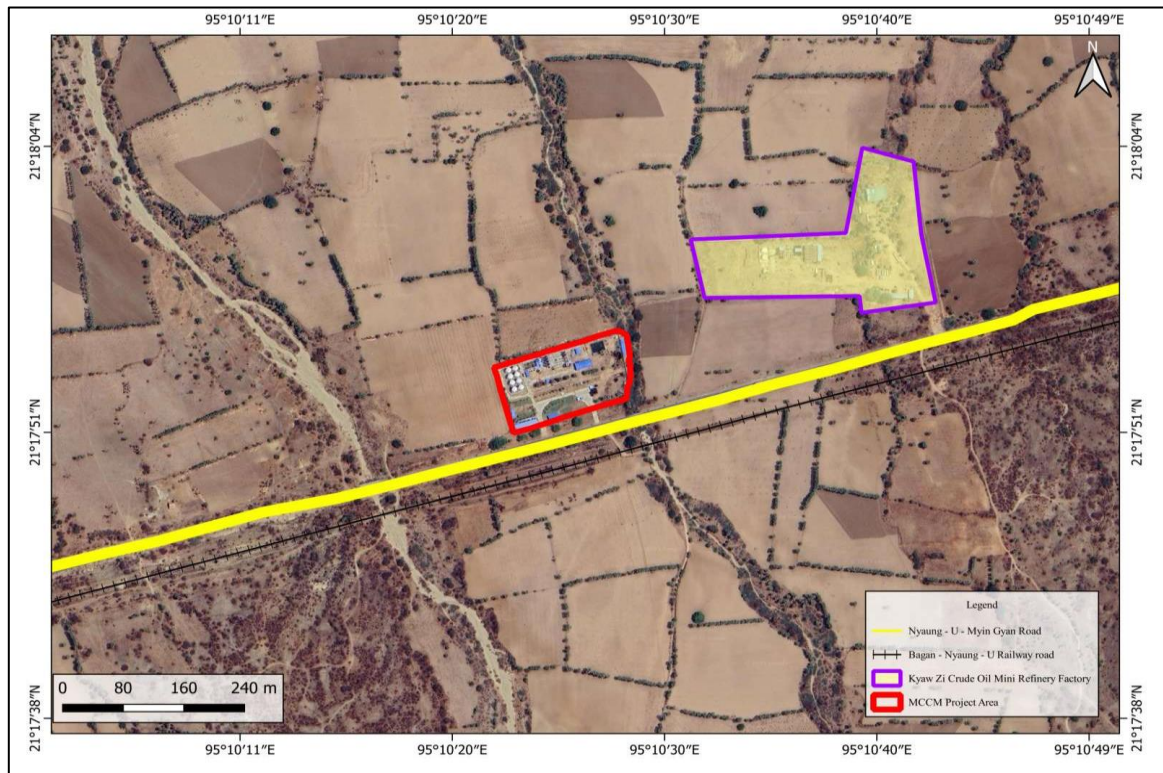


Figure 5-8 cumulative impacts assessment map

5.14.1. Impact Assessment of the cumulative sources

The three-source included in the study area were recognized as having the cumulative effects on the following environmental items, which should be taken into account. The methodology of impact assessment is presented in Section (5.4) and the result of the assessment is described in Table 5-96 and Table 5-97. Summarizes the assessment of each items are shown in the following Table 5-98.

Table 5-96 Cumulative Impact Assessment of all three projects

No	Consequence C = ((E + D + I + R)/4) *N						Probability (P)	Environmental Impact Score (EI = C x P)	Significance Classes	Status of Impact
	E	D	I	R	N	C				
Pre-Mitigation of Air Pollution										
Construction Phase	3	2	4	3	-1	-3	4	-12	Medium	Negative
Operation/Maintenance Phases	3	4	4	4	-1	-3.75	5	-18.75	High	
Post-Mitigation of Air Pollution										
Construction Phase	3	2	3	2	-1	-2	3	-7.5	Low	Negative
Operation/Maintenance Phases	3	4	3	3	-1	-3	4	-13	Medium	
Pre-Mitigation of Water Pollution										
Construction Phase	3	2	3	3	-1	-2.75	4	-11	Medium	Negative
Operation/Maintenance Phases	3	4	4	4	-1	-3.75	5	-18.75	High	
Post-Mitigation of Water Pollution										
Construction Phase	3	2	2	2	-1	-2.25	3	-6.75	Low	Negative
Operation/Maintenance Phases	3	4	3	3	-1	-3.25	3	-13	Medium	
Pre-Mitigation of Solid Waste Pollution										
Construction Phase	3	2	3	3	-1	-2.75	5	-13.75	Medium	Negative
Operation/Maintenance Phases	3	4	4	4	-1	-3.75	5	-18.75	High	
Post-Mitigation of Solid Waste Pollution										

No	Consequence $C = ((E + D + I + R)/4) * N$						Probability (P)	Environmental Impact Score (EI = C x P)	Significance Classes	Status of Impact
	E	D	I	R	N	C				
Construction Phase	3	3	3	2	-1	-2.75	4	-11	Medium	Negative
Operation/Maintenance Phases	3	4	3	3	-1	-3.25	4	-13	Medium	
Pre-Mitigation of Noise and Vibration										
Construction Phase	3	2	4	4	-1	-3.25	4	-13	Medium	Negative
Operation/Maintenance Phases	3	4	4	3	-1	-3.5	4	-14	Medium	
Post – Mitigation of Noise and Vibration										
Construction Phase	3	2	3	3	-1	-2.75	3	-8.25	Low	Negative
Operation/Maintenance Phases	3	4	3	2	-1	-3	3	-9	Medium	
Pre-Mitigation of Soil Pollution										
Construction Phase	3	2	3	3	-1	-2.75	4	-11	Medium	Negative
Operation/Maintenance Phases	3	4	4	3	-1	-3.25	4	-14	Medium	
Post – Mitigation of Soil Pollution										
Construction Phase	3	2	3	2	-1	-2.5	3	-7.5	Low	Negative
Operation/Maintenance Phases	3	4	3	3	-1	-3.25	3	-9.75	Medium	
Pre-Mitigation of Biodiversity										

No	Consequence $C = ((E + D + I + R)/4) * N$						Probability (P)	Environmental Impact Score (EI = C x P)	Significance Classes	Status of Impact
	E	D	I	R	N	C				
Construction Phase	3	2	3	3	-1	-2.75	4	-11	Medium	Negative
Operation/Maintenance Phases	3	4	3	4	-1	-3.5	4	-14	Medium	
Post – Mitigation of Biodiversity										
Construction Phase	3	2	2	3	-1	-2.5	3	-7.5	Low	Negative
Operation/Maintenance Phases	3	4	3	3	-1	-3.25	4	-13	Medium	

Table 5-97 Final Environmental Significance Rating of all Three Projects

No	Priority (P = PR + CI + LR)				Ranking	Prioritization Factor (PF)	Environmental Significance (PF*ER)	Rating	Status of Impact
	PR	CI	LR	P					
Air Pollution									
Construction Phase	2	2	1	5	Medium	1.5	-11.25	Low	Negative
Operation/Maintenance Phases	2	2	3	7	Medium	1.5	-19.5	Medium	
Water Pollution									
Construction Phase	1	2	3	6	Medium	1.5	-10.125	Low	Negative
Operation/Maintenance Phases	2	3	3	8	Medium	1.5	-19.5	Medium	
Solid Waste Pollution									

No	Priority (P = PR + CI+ LR)				Ranking	Prioritization Factor (PF)	Environmental Significance (PF*ER)	Rating	Status of Impact
	PR	CI	LR	P					
Construction Phase	2	3	2	7	Medium	1.5	-16.5	Medium	Negative
Operation/Maintenance Phases	2	2	3	7	Medium	1.5	-19.5	Medium	
Noise and Vibration									
Construction Phase	1	2	2	5	Medium	1.5	-12.375	Low	Negative
Operation/Maintenance Phases	1	3	2	6	Medium	1.5	-13.5	Low	
Soil Pollution									
Construction Phase	1	2	2	5	Medium	1.5	-11.25	Low	Negative
Operation/Maintenance Phases	1	3	2	6	Medium	1.5	-14.625	Low	
Biodiversity									
Construction Phase	2	2	2	6	Medium	1.5	-11.25	Low	Negative
Operation/Maintenance Phases	2	3	3	8	Medium	1.5	-19.5	Medium	

Table 5-98 Summarizes the assessment of each items

No.	Environmental Item	Impact Assessment
1.	Air Quality	<p>When all three sources start their operation and all the tenants in the Loading & un loading, commercial areas and transportation activities of three sources start their operation, the air pollution can impact on the surrounding area. In addition, traffic volume will be increased cumulatively in and around the study area. For that reason, the gas emission can impact on the surrounding area.</p> <p>In this assessment, CO₂, SO₂, NO₂ and PM concentration was selected to be estimated due to vehicle traffic and transportation vehicles increased by the road, railway and proposed projects.</p> <p>Therefore, impact on air quality generation from these three projects should be assessed.</p>
2.	Water Quality	<p>Although there is no significant water pollution from Road and Railway, the wastewater will generate from the Kyawzi mini crude oil factory and proposed project factory.</p> <p>In addition, the drainage water and wastewater from the factories will enter to the nearest stream beside of the factory and it can flow to the Ayeyarwady River.</p> <p>Therefore, cumulative impact should be assessed on water quality of Ayeyarwaddy River when all of three sources start their operation.</p>
3.	Waste	<p>When all factories operation is going to increase, amount of domestic and operation waste generated from the projects will proportionately be increased. Additionally, waste from passengers in transportation vehicles may be produced.</p> <p>Therefore, it is needed to evaluate impact of generated wastes of the projects.</p>
4.	Noise and Vibration	<p>When all sources start their operation and machineries, the noise and vibration pollution can be impacted on the environment.</p> <p>Traffic volume due to transportation activities will be increased cumulatively in and around the project area.</p> <p>Therefore, impact of noise and vibration generation from all sources should be assessed.</p>
5.	Soil	<p>Soil contamination from spillage of diesel oil, chemical and oil products (from machinery, equipment washing and vehicles)</p> <p>The oil & grease leakage and spill due to the intense use of heavy machinery and vehicles used can be caused soil pollution.</p>
6.	Biodiversity	<p>Change of land use and reduction of the habitat of species in the Project area will impact on ecosystem.</p> <p>Since land reclamation of the project, it had already conducted when this assessment started, cumulative impacts on ecosystem will be assessed by considering the change of each land area including grass land, shrub, and reservoirs caused by the development of whole project.</p> <p>Moreover, the aquatic animals can be mainly impacted due to the three project activities.</p>

CHAPTER 6

PUBLIC CONSULTATION AND DISCLOSURE

6.1. OBJECTIVE AND APPROACH FOR PUBLIC CONSULTATION AND DISCLOSURE

The objective of public consultation is to provide project information and potential environmental impacts to the regulators, authorities and stakeholders. In this study, various stakeholders' participations were made. This chapter presents the results of the public consultation and information disclosures, and plans for future public consultation and information disclosure during the period of the Environmental Impact Assessment (EIA) procedure (29 December 2015). The presentation, suggestion letter and relevant documents are sent to the government, villages and surrounding area to do public disclosure process.

The main objective of the meeting was to share project's planned activities and their associated potential impacts on the environment and society. The consultation program, participants feedback was also received which reflected the necessity and demand of the proposed project. Information dissemination and information sharing techniques used to inform the stakeholders regarding the action being taken in a program area through personal communication to make them aware about the project. Focused Group Discussions (FGDs) conducted in public consultation to cover different components of the project aims to increase local awareness about the forthcoming project as well as to incorporate their views, needs, priorities considering different positive and negative impact of the project. In addition, the comment and suggestion from meeting considered during the project implementation process.

There are two times public consultation meeting and disclosure in EIA process which one time in Scoping Stage and another is in EIA stage. In the scoping stage, the public disclosure was conducted in Township development committee, Taungtha township and Environmental Conservation Department, Nyaung U district. The disclosure period is 13 days long including Saturday and Sunday holidays from 10th February to 23rd February, 2022. The public consultation in scoping stage was conducted with zoom meeting due to the Covid-19 Pandemic.

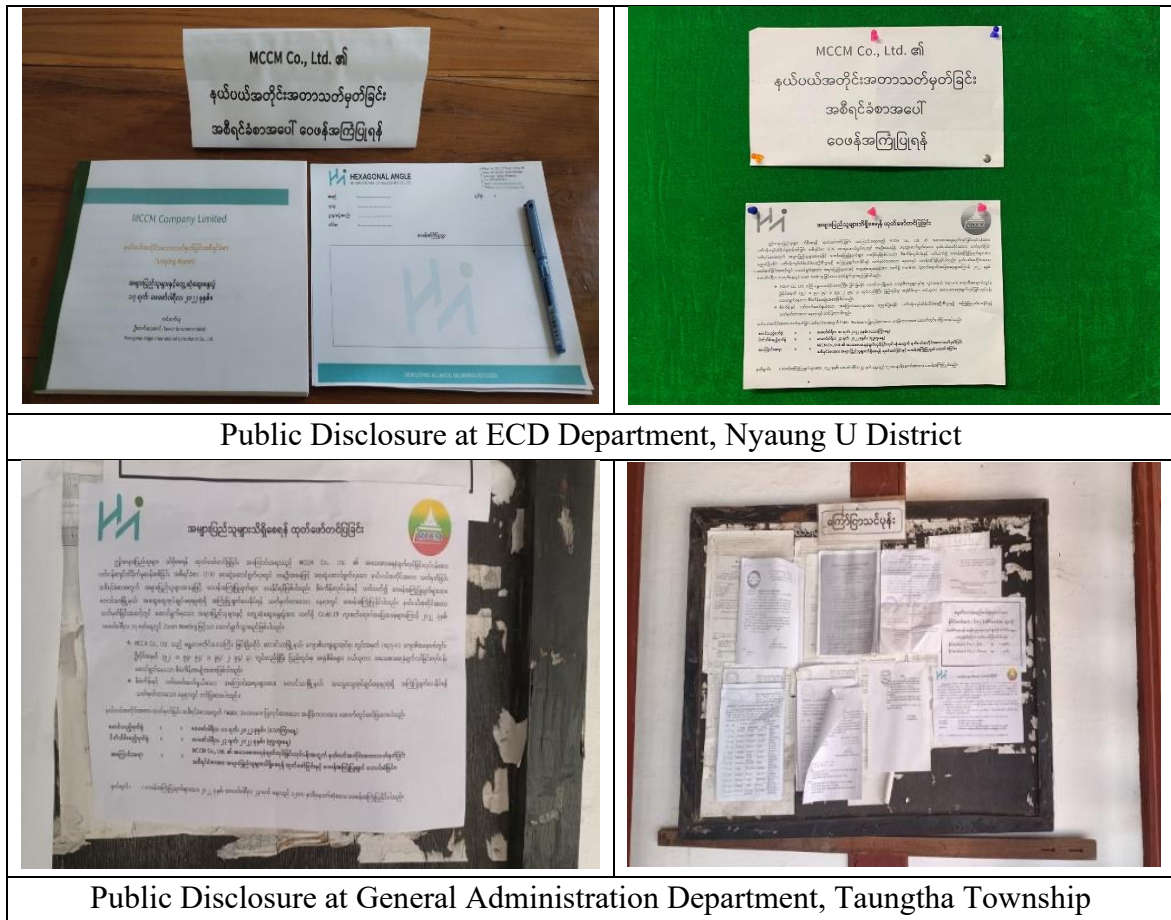
In EIA stage, the public disclosures were conducted in Government Organization of three townships which are Nyaung U, Taungtha and Myingyan township and local people of villages which are located near the project. The public consultation meeting in EIA stage was conducted at Zin Yaw Hotel, Myingyan Township, Mandalay Division.

6.2. PUBLIC CONSULTATION AND DISCLOSURE IN SCOPING STAGE

6.2.1. Methodology of Public Disclosure in Scoping Stage

The methodology for the PD and PCM follows the guidelines of Environmental procedure (2015). Comments form for the PD is developed and printed for distribution. The public disclosure in the scoping report and the suggestion receiving are made at the General

Administration Office, Taungtha Township and Environmental Conservation Department; Nyaung U Township as shown in Figure 6-1.



Public Disclosure at ECD Department, Nyaung U District

Public Disclosure at General Administration Department, Taungtha Township

Figure 6-1 Public Disclosure for Scoping Stage

6.2.2. Summary of Public Disclosure in Scoping Stage

The summary of the public disclosure is as shown in the following Table 6-1.

Table 6-1 Summary of the Public Disclosure in Scoping Stage

Disclosure Period	10 th February to 23 rd February, 2022
Disclosure Place	<ul style="list-style-type: none"> General Administration Office, Taungtha Township Environmental Conservation Department, Nyung Oo District
Language	Myanmar Language
Submission Method	Comments and suggestions can be submitted into the suggestion box that are installed at the disclosure places.

6.2.3. Result of Public Disclosure in Scoping Stage

The public disclosure in scoping stage was undertaken from 10th February 2022 to 23rd February 2022 at General Administration Office, Taungtha Township and Environmental Conservation Department, Nyaung U District. There are some comments and suggestions made from the government departments in the comment forms, which were received from the public disclosure. The major comments and suggestions are written in the collected feedback forms and these forms are attached in **Appendix H**. According to the public disclosure,

mostly participants suggested to be aware of wastewater generation, wastes and fire safety issues, implement the proper mitigation measures, etc. Details of Suggestions from Public Disclosure for scoping stage are presented in the following Table 6-2.

Table 6-2 Suggestion from Public Disclosure for Scoping Stage

No.	Participants	Suggestions and Comments
1.	Daw Kay Khine Thin Zar (Assistant Deputy Staff Officer) (ECD Nyaung U District)	<ul style="list-style-type: none"> ✓ The waste water should be stored in the tanks and should be made treatment. ✓ The water should be reused after treatment. ✓ The gas cylinders should be stored properly.
2.	Daw Myat Noe Wai (Staff Officer) (ECD Nyaung U District)	<ul style="list-style-type: none"> ✓ To store the silica gel that are used in filtering gas under the cover. ✓ To make temporary settling tank for the waste water and monitor not to discharge into the stream without treatment. ✓ To install waste water treatment plant in the future. ✓ To dispose the residuals from the production process properly. ✓ To handle the diesel and gasoline properly because spillage can be harmful to the environment. ✓ To use control device and sound proof generator to reduce the noise level. ✓ To dispose the waste properly. ✓ To disclose the information on the website of the project proponent. ✓ The third-party should commit to completely preparing this scoping report in accordance with Myanmar Environmental Law, Rules and Procedure in order to protect the environmental quality and community development for the future generation.
3.	Daw Myat Noe Wai (Staff Officer) (ECD Nyaung U District)	<ul style="list-style-type: none"> ✓ The hazardous waste should be disposed properly in accordance with Pollution Control and Cleansing Department. ✓ The domestic waste should be stored properly inside the factory area before disposing. ✓ The air quality and water quality should be monitored bi annually and submitted to the Nyaung-U ECD.
4.	Daw Ei Mon Kyaw (Deputy Staff Officer) (ECD Nyaung U District)	<ul style="list-style-type: none"> ✓ The MCCM Co., Ltd. is a helpful type of industry for the daily energy usage. ✓ But third-party should commit to completely preparing this scoping report in accordance with Myanmar Environmental Law, Rules and Procedure in order to protect the environmental quality and community development for the future generation.
5.	U Win Ko (Deputy Staff Officer) (ECD Nyaung U District)	<ul style="list-style-type: none"> ✓ The waste water should be treated and reuse to water the plant inside the factory compound. ✓ The containers which are used in the laboratory should be made of glass instead of plastic. ✓ The fire extinguishers should be placed in such a way that they are easily accessible.

No.	Participants	Suggestions and Comments
		<ul style="list-style-type: none"> ✓ The residuals should be disposed properly.
6.	Daw Thwe Thwe San (Deputy Staff Officer) (ECD Nyaung U District)	<ul style="list-style-type: none"> ✓ The residuals should be disposed properly. ✓ To handle the diesel and gasoline properly because spillage can be harmful to the environment. ✓ The waste water should be treated and tested before discharging. ✓ The domestic waste should be stored properly inside the factory area before disposing.
7	Daw Nyunt Nyunt Wai (Staff Officer) Public Health Department, Taungtha Township	<ul style="list-style-type: none"> ✓ To ensure and perform the proper mitigation measures on air pollution impact because this can cause the health impact on human. ✓ For the wastewater disposal system, the wastewater management needs to be developed. ✓ The best way is to use the red color garbage bin. ✓ To provide and wear the ear plug and conduct a regular check up on workers once every three months. ✓ If there is a plan to have a clinic in the project area, the best way is to hire the permanent doctors and nurses rather than use E-medical box.
8	U Han Thura Deputy Township Officer, General Administration Department, Taungtha Township	<ul style="list-style-type: none"> ✓ Since the sustainable project development, the project proponent should perform community development, pay the appropriate wages to workers, and provide job opportunities.
9	U Kyaw Min Min Tun (Executive Officer) Committee Development Department	<ul style="list-style-type: none"> ✓ There should be treated operation wastewater and discharge as well. ✓ There should be separate waste (such as dry waste, industrial waste, kitchen waste, etc.) and then there would be a need to burn the plastic waste on vacant land far from the project site. ✓ To make the waste disposal tank for the proposed project.
10	U Kyaw Swar (Staff Officer) Fire Service Department	<ul style="list-style-type: none"> ✓ Following fire laws, rules, and regulations, as well as conducting a regular check inspection once a year ✓ Once a month, workers will participate in an on-site fire drill ✓ Workers' capacity for firefighting and fire safety management must be built ✓ To install sufficient foam fire extinguishers, fire pumps, and fire hydrants in the project area

6.2.4. Methodology of Public Consultation Meeting in Scoping Stage

Public consultation meeting was conducted on 17th Feb 2022, with zoom meeting due to the Covid-19 period in accordance with the Covid-19 pandemic procedure of MONREC. The event was planned to be held from 10:00 AM to 12:00 PM. The invitation

letters were sent to the government organizations and villages which are located near the project area. The acceptance invitation letter and attendance list are shown in **Appendix G**.

6.2.5. Summary of Public Consultation Meeting in Scoping Stage

Public Consultation meeting was started by the introduction speech of Daw Ei Ei Zaw (Environmental and Social Specialist of Hexagonal Angle International Consultants Co., Ltd) as shown Figure 6-2. Then, the findings and results were presented by U Htet Wai Aung, Senior Environmentalist from Hexagonal Angle International Consultants Co., Ltd as shown in Figure 6-3. The summary of public consultation meeting and presentation photos can be seen in the following from Figure 6-2 to Figure 6-5.

Table 6-3 Summary of Public Consultation Meeting

Time and Date	Thursday, 17 th February 2022 Introduction Speech Session: 10:00 – 10:10 Presentation Session : 10:10 – 11:30 Q&A Session : 11:30 – 12:00
Venue	Zoom Meeting
Invited Persons	<ul style="list-style-type: none"> ❖ General Administration Office, Taungtha Township ❖ Ministry of Factory and General Labour Laws Inspection, Taungtha Township ❖ Myanmar Fire Services Department, Taungtha Township ❖ Township Development Committee, Taungtha Township ❖ Environmental Conservation Department, Nyaung U District ❖ Department of Health, Taungtha Township ❖ Locals and neighbors from Kyaw Zi Township
Agenda	<ul style="list-style-type: none"> ❖ Brief explanation on the scoping EIA process ❖ Presentation on the Background Information of Project, Project Description, Environmental Issues, Preliminary Impact Assessment and Term of References ❖ Receiving questions, feedback and suggestions from participants
Attendees	13 people Government – 5 persons MCCM Co., Ltd- 4 persons HA Company Ltd.- 4 persons



Figure 6-2 Opening Remark by Daw Ei Ei Zaw (Environmental and Social Specialist, Hexagonal Angle Co., Ltd.)

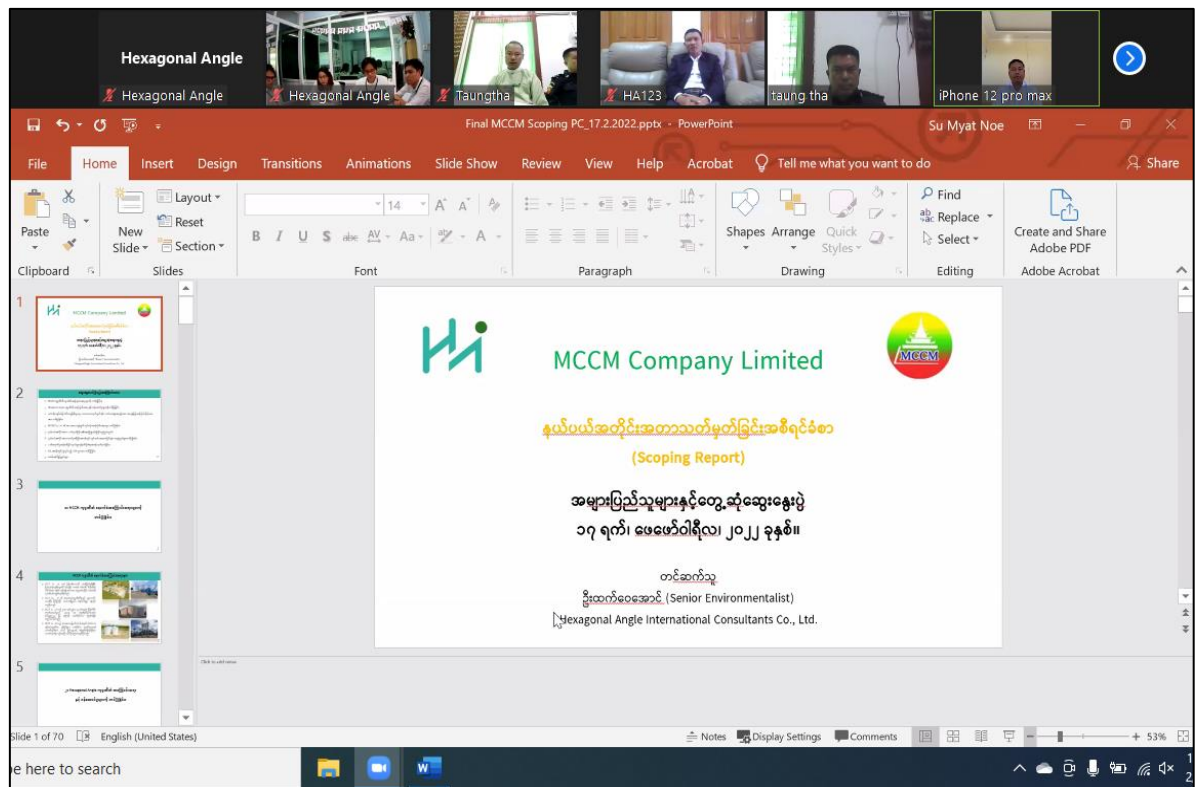


Figure 6-3 Presentation by U Htet Wai Aung (Senior Environmentalist, Hexagonal Angle Co., Ltd.)



Figure 6-4 Presentation about Project Information and Potential Impacts

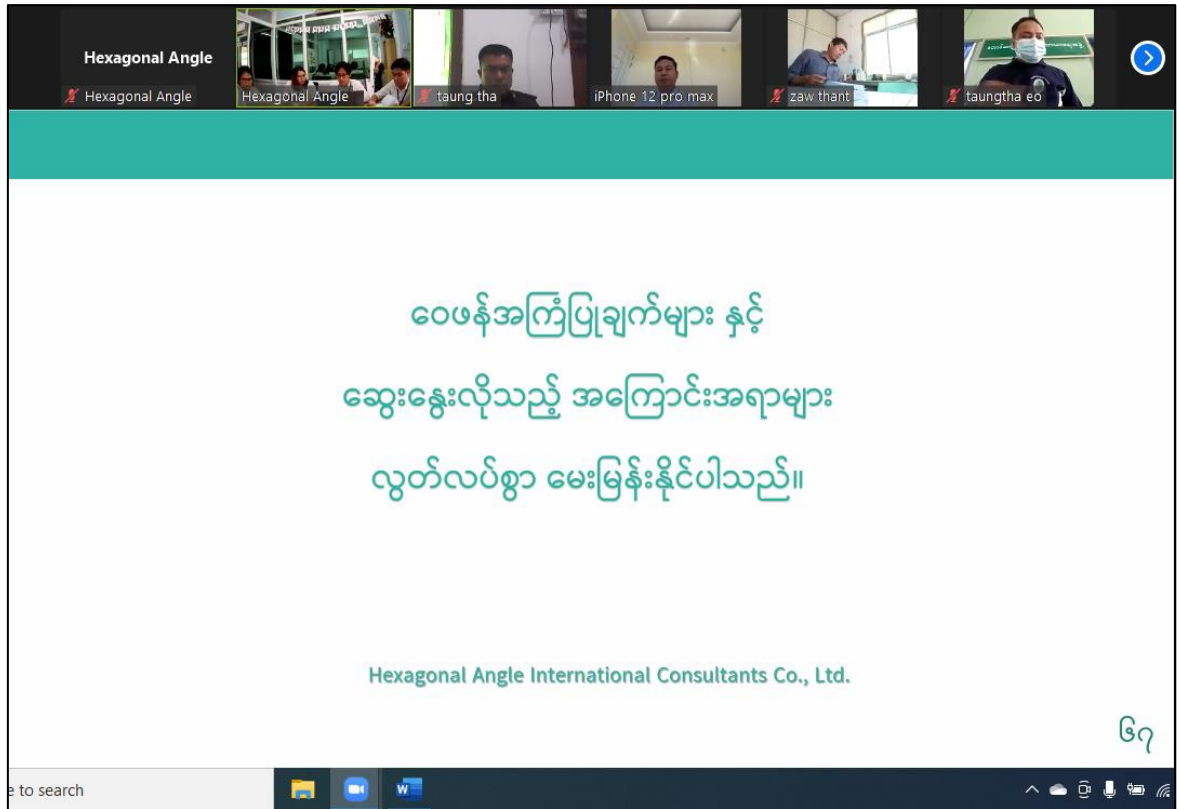


Figure 6-5 Q & A Section

6.2.6. Question & Answer nad Feedbacks Section in Scoping Stage

The questions and the feedbacks from the participants are as shown in the following Table 6-4.

Table 6-4 Summary of Questions and Feedbacks for Scoping Report

No.	Participants	Questions/Suggestions/Comments	Response
1.	U Kyaw Swar (Staff Officer) Fire Service Department	Is there any emergency fire drill at the factory?	The emergency fire drill is conducted once every month. (U Thant Zin, Director of MCCM Co., Ltd.)
2.	U Kyaw Min Min Tun (Executive Officer) Committee Development Department	The domestic waste should be disposed properly in factory compound by landfilling method.	The temporary waste disposal site will be constructed near factory compound. (U Thant Zin, Director of MCCM Co., Ltd.)
3.	U Zaw Htun (Deputy Staff Officer) General Administrative Office	The MCCM Company should make development programs to the surrounding and neighbouring villages.	The company will provide development programs in the future. (U Thant Zin, Director of MCCM Co., Ltd.)
4.	Daw Myat Noe Wai (Staff Officer) Nyaung-U ECD	The silica gel should be stored under the cover properly in order to prevent generating dusts.	The cover for the storage of Silica Gel will be constructed in the future. (U Thant Zin, Director of MCCM Co., Ltd.)
5.	Daw Myat Noe Wai (Staff Officer) Nyaung-U ECD	The waste water treatment plant should be installed when the factory is fully operational.	The waste water treatment plant will be constructed when the factory is fully operational. (U Thant Zin, Director of MCCM Co., Ltd.)
6.	Daw Myat Noe Wai (Staff Officer) Nyaung-U ECD	The scoping report, the project information and public disclosure should be available online via company website and also install notice board for disclosure.	The notice board will be installed and the company website will be available in the future. (U Thant Zin, Director of MCCM Co., Ltd.)
7.	Daw Myat Noe Wai (Staff Officer) Nyaung-U ECD	The monitoring for the water quality should be made bi annually.	The water quality will be monitored bi annually in the EIA Stage. (U Htet Wai Aung, Senior Environmentalist)

No.	Participants	Questions/Suggestions/Comments	Response
8	U Thant Zin (Director of MCCM Co., Ltd.)	Is there any question or suggestion to my proposed project? We would like to request the suggestion to implement the project.	As per proponent of the project, we would like to request for developing the social, worker and community development. (U Han Thura, Deputy Township Officer, General Administration Department)

6.3. PUBLIC CONSULTATION AND DISCLOSURE IN EIA STAGE

6.3.1. Methodology of Public Disclosure in EIA Stage

The public disclosure is carried out in the three townships which are Myingyan Township, Taungtha Township, Nyaung U Township and local people of villages (Kyaw Zi Village and Malar Village) which are located near the project. The suggestions Boxes are provided at the disclosure places and the feedbacks can be submitted into the boxes.

The methods and approaches of conducting Public Disclosure are the followings.

- Discussion with the project proponent to held Public Disclosure
- After that, method to conduct meeting is selected.
- Preparing presentation slides with Myanmar Version and invitation letters for the Public Disclosure
- Inviting local people and governments one week in advance to the Public Disclosure
- Sending letters of recommendation and suggestion, presentation slides to relevant government departments and surrounding villages
- Collecting letters of recommendation and suggestion by the specified deadline
- Adding suggestions and comments gotten from Public Disclosure

Table 6-5 Methodology for the Public Disclosure

Stage	Item	Description
EIA Report	Announcement	❖ Date will be announced 1 week before the public consultation meeting to conduct public disclosure
	Place	❖ Myingyan Township, Taungtha Township and Nyaung U Township
	Suggestions Collecting Method	❖ The suggestions Boxes are provided at the disclosure places and the feedbacks can be submitted into the boxes.

6.3.2. Methodology for Public Consultation Meeting in EIA Stage

The public consultation meeting is carried out at Zin Yaw Hotel in Myingyan Township. The methods and approaches of conducting Public Consultation Meeting are the followings.

- Discussion with the project proponent to held Public Consultation Meeting
- Location and Date to hold meeting is chosen.
- Preparing presentation slides with Myanmar Version and invitation letters for the meeting
- Inviting from National Newspaper (Figure 6-6)
- Inviting local people and governments one week in advance to the meeting
- Then, holding Public Consultation Meeting with PowerPoint presentation about project description, potential impact assessment and management process.
- Discussion with attendees about suggestion and comments for the meeting
- Adding suggestions and comments gotten from Public Consultation Meeting into the reports.

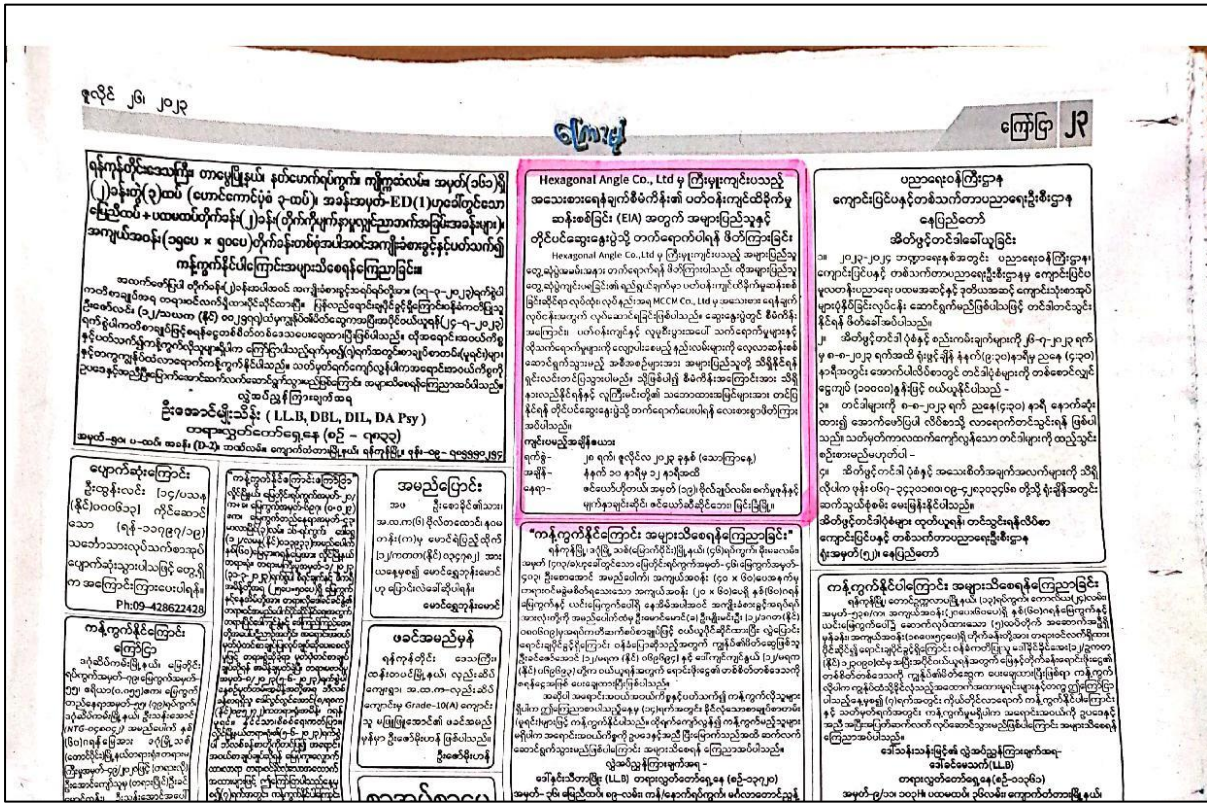


Figure 6-6 PCM invitation from Newspaper

Table 6-6 Methodology for Public Consultation Meeting

Stage	Item	Description
EIA Stage	Location	No (19), Bogyoke Street, the opposite side of Industrial Zone, Zin Yaw Hotel, Myingyan Township
	Agenda	<ul style="list-style-type: none"> Brief explanation on the EIA process Presentation on the Background Information of Project, Project Description, Environmental Issues and Environmental Management Plan, Impact Assessment and mitigation measure of EIA Report Receiving questions, feedback and suggestions from participants
	Invited Departments and Organizations	<ul style="list-style-type: none"> Locals and neighbors from Kyaw Zi Village and Malar Village General Administrative Department, Taungtha Township and Myingyan Township Ministry of Electric Power, Myingyan Township Taungtha Township Development Committee Ministry of Natural Resource and Environmental Conservation, Environmental Conservation Department, Nyaung U District Mandalay Division Ministry of Agriculture, Livestock and irrigation, Irrigation and Water Utilization Management Department, Myingyan Township Ministry of Health, Department of Medicinal Services,

Stage	Item	Description
		Taungtha Township and Myingyan Township <ul style="list-style-type: none"> • Ministry of Industry, Department of Industrial Supervision and Inspection, Myingyan Township • Myanmar Fire Services Department, Taungtha Township and Myingyan Township • Ministry of Labour, Ministry of Factory and General Labour Laws Inspection Taungtha Township and Myingyan Township • MCCM Company Limited • Hexagonal Angle International Consultants Co., Ltd.
	Language	Burmese

6.4. RESULT OF PUBLIC DISCLOSURE FOR EIA

6.4.1. Public Disclosure Activities in EIA Stage

The public disclosure is a part of the public consultation. The information of the project, the project background, project description, potential impact assessment and management process was sent to the local people of villages which are located near the project area and organization of relevant department on July 24, 2023 and then, the letters of suggestion and recommendations were collected on July 27, 2023. For EIA report, organizations and villages sending the letters of suggestions and recommendation are shown in Table 6-7.

Table 6-7 Organizations and Villages sending letters of suggestions and recommendations

Organization	Address
Local people	<ul style="list-style-type: none"> • Kyaw Zi Village • Malar Village
Government Organizations	<ul style="list-style-type: none"> • General Administrative Department, Taungtha Township and Myingyan Township • Ministry of Electric Power, Myingyan Township • Taungtha Township Development Committee • Ministry of Natural Resource and Environmental Conservation, Environmental Conservation Department, Nyaung U District Mandalay Division • Ministry of Agriculture, Livestock and irrigation, Irrigation and Water Utilization Management Department, Myingyan Township • Social Security Board • Ministry of Health, Department of Medicinal Services, Taungtha Township and Myingyan Township

Organization	Address
	<ul style="list-style-type: none"> • Ministry of Industry, Department of Industrial Supervision and Inspection, Myingyan Township • Myanmar Fire Services Department, Taungtha Township and Myingyan Township • Ministry of Labour, Ministry of Factory and General Labour Laws Inspection Taungtha Township and Myingyan Township

6.4.2. Summary of Public Disclosure in EIA Stage

After sending the project background, project description, potential impact assessment and management process, suggestions of local people of villages which are located near the project area and relevant government organization were obtained. These suggestions are shown in Table 6-8. Photos of public disclosure are shown in Figure 6-7. The suggestions are attached in the **Appendix(H)**.

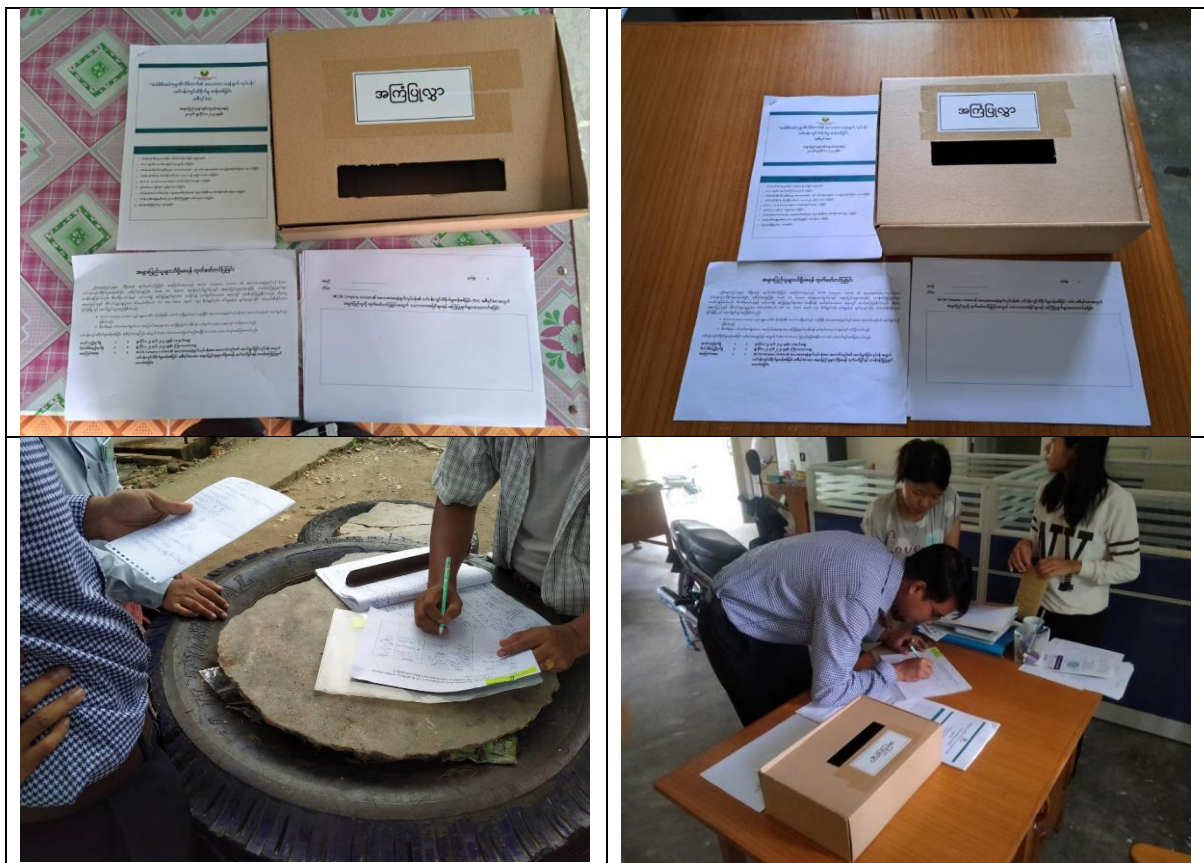




Figure 6-7 Photos of Public Disclosure

Table 6-8 Suggestions and Comments from Public Disclosure

No.	Participants	Department/Address	Suggestions and Comments
1.	U Kyaw Swar	<ul style="list-style-type: none"> ✓ Myanmar Fire Services Department, Taungtha Township 	<p><u>Comments</u></p> <ul style="list-style-type: none"> ✓ Obeying Systematic Fire Prevention Activities with rules and laws from Fire Services Department ✓ Setting up a fire fighting team to respond to an emergency ✓ Keeping Adequate Tools, Chemical Foam and Fire Extinguisher <p>Due to these above, big fire hazard cannot be caused.</p> <p><u>Suggestions</u></p> <ul style="list-style-type: none"> ✓ To clean waste, grass and leaves near the store and the factory for fire epidemic ✓ Foam Inlet and Fixed Installation Foam Inlet System should be prepared in the Main Factory and Petrol Storage tanks ✓ To buy and place Foam Tender or Fire truck to manage fire hazard immediately if fire causes ✓ To place enough fire safety tools such fireman hook, ladder, fire extinguishers, shovel and so on at Fire Points near the factory and petrol stored tanks ✓ To place enough Dry Chemical Powder ✓ To show the store amount in factory and storage tank and display fire safety Board with red word and White background in the restricted area ✓ To place main valve to block immediately fire hazard ✓ To attend fire safety Manager class for office staff ✓ To replace new fire safety tools instead of old fire safety tools ✓ To obey suggestions of Fire Services Department, Myanmar Oil and Gas Enterprise, Auothorities
2.	Daw Thawe Thawe San	<ul style="list-style-type: none"> ✓ Deputy chief of staff, Environmental Conservation Department 	<ul style="list-style-type: none"> ✓ To manage minimum impacts during operation ✓ To maintain biodiversity near the project ✓ To think and act in suggestions of Local People ✓ To explain clearly impacts due to the project and how to recover the impacts due to the project
3.	Daw Zin Mar Tun	<ul style="list-style-type: none"> ✓ Environmental Conservation Department 	<ul style="list-style-type: none"> ✓ To make to attend the PAPs person to the PC of MCCM ✓ To emphasize and make the suggestions and comments of PAPs person ✓ To manage no pollution of underground water resource and not flowing to the canals that is flowing to the Ayeyawaddy River which is freshwater resource ✓ To manage and separate which project causing the impacts on the environments because MCCM Petroleum Refinery Project is located neat the Kyaw Zi's small petroleum Refinery

No.	Participants	Department/Address	Suggestions and Comments
			<ul style="list-style-type: none"> ✓ To do safety first for workers and to cure quickly the respiratory system if it causes
4.	U Min Naing Oo	<ul style="list-style-type: none"> ✓ Assistant Director, Environmental Conservation Department 	<ul style="list-style-type: none"> ✓ To reuse for watering the plant in the area of the factory and to refine systematically waste water from production process of petroleum and petroleum storage tanks with waste water Treatment System ✓ To construct concrete layer under the loading/ unloading area not to impact soil and water quality. ✓ To maintain and monitor the machines and truck not to spilt fuel. ✓ To make systematically waste system by doing tanks for waste and not to directly touch the soil by Silica Gel and waste of petroleum after using ✓ To dispose of waste separately the types of waste and to use 3Rs (Reuse, Recycle, Reduce) for waste. Should include market-based system for recycle wastes ✓ To use Sound Proof Type (Silence Type) of Generators, to do not cause air pollution emission from operation stage and to make suitable height of stack for the health of PAPs ✓ To make good Monitoring system of Air quality and to emit Gas with control device ✓ To add suggestions of Government organizations according to township development plan and locals for CSR in EIA report ✓ To design and write complete waste management system in EIA report and make to not dispose directly solid wastes and waste water to the rivers and canals
5.	U Win Ko	<ul style="list-style-type: none"> ✓ Environmental Conservation Department 	<ul style="list-style-type: none"> ✓ To use waste water treatment system for no impact on the environment due to waste water and wasted petroleum from storage tanks of petroleum and to use grease traps ✓ Not to dispose silica gel and waste of petroleum oil to the ground directly and place with waste tanks and dispose properly. ✓ To use generator with sound proof type ✓ To use suitable height of stack because acid rain caused by air pollution of petroleum operation process make crop yield reduce ✓ To plant fast growing trees species for reducing of air pollution
6.	Daw Myat Noe Wai	<ul style="list-style-type: none"> ✓ Environmental Conservation Department 	<ul style="list-style-type: none"> ✓ Not to discharge directly waste water which include petroleum oil on the ground, to make waste storage tanks by using sediment tanks and to use grease trap and waste water treatment system ✓ To plant shaded trees and native trees to reduce air and noise pollution ✓ To make suitable stack height mentioned EIA report ✓ To emphasize and think suggestions and comments from PC and PD

6.5. RESULTS OF PUBLIC CONSULTATION MEETING IN EIA STAGE

6.5.1. Public Consultation Meeting Activities in EIA Stage

The public consultation meeting was held on July 28, 2023. The invitation letters were sent to the government organizations and villages which are located near the project site. The presentation of the meeting is printed out in Myanmar language and handed out to the invitees. Information of MCCM Company, information of third-party company and project information and project background are presented. Consultations and suggestions were discussed and collected. The acceptance invitation letters and attendance lists are shown in **Appendix (K)**. The list of organization and local people sending invitation letters is shown in Table 6-9.

Table 6-9 List of organization and local people sending invitation letters

No	Organization
(A) Government Organization	
1.	General Administrative Department (a) General Administrative Department, Taungtha Township (b) General Administrative Department, Myingyan Township
2.	Ministry of Electric Power (a) Ministry of Electric Power, Myingyan Township
3.	(a) Development Committee, Taungtha Township (b) Development Committee, Myingyan Township
4.	Ministry of Natural Resource and Environmental Conservation, Environmental Conservation Department (a) Environmental Conservation Department, Nyaung U District
5.	Social Security Board (a) Myingyan Township
6.	Ministry of Agriculture, Livestock and irrigation, Irrigation and Water Utilization Management Department (a) Myingyan Township
7.	Ministry of Health, Department of Medicinal Services (a) Taungtha Township (b) Myingyan Township
8.	Ministry of Industry, Department of Industrial Supervision and Inspection (a) Myingyan Township
9.	Myanmar Fire Services Department (a) Taungtha Township (b) Myingyan Township
10.	Ministry of Labour, Ministry of Factory and General Labour Laws Inspection (a) Taungtha Township (b) Myingyan Township
11.	MCCM Co., Ltd.
12.	Hexagonal Angle International Consultants Co., Ltd.
(B) PAPs	
13.	Locals, Neighbors and villages near project 1. Kyaw Zi Village 2. Malar Village

6.5.2. Summary of Public Consultation Meeting in EIA Stage

Public Consultation Meeting of MCCM Co., Ltd. was held at Zin Yaw Hotel, Myingyan Township. Zin Yaw Hotel is located in No (19), Bogyoke Street, the opposite side of Industrial Zone, Myingyan Township, Mandalay Region. The event was planned to be held starting from 10:00 am to 12:00 pm.

The ceremony was started by the introduction speech for the project was given by U Zaw Thant (Manager of MCCM Co., Ltd.) as shown in Figure 6-8. Then, the information of third-party company was given by Daw Thu Thu Aung (Managing Director of Hexagonal Angle International Consultants Co., Ltd.) as shown in Figure 6-9. And then, the project background, project description, potential impact assessment and management process was presented by U Win Thein (Deputy Environmental Team Leader of Hexagonal Angle International Consultants Co., Ltd.) as shown in Figure 6-10. The summary of public consultation meeting can be seen in the following Table 6-10 and presentation slides are shown in **Appendix(I)**.

Table 6-10 Summary of Public Consultation Meeting

Time and Date	,FridayJuly ,282023	
	Collecting the attendance lists	10:00-10:15 Am
	Announcing the agenda of the ceremony from HA Company	10:15-10:20 Am
	Talking about the introduction speech for the project by the responsibility person of MCCM company	10:20-10:30 Am
	Talking about the HA Company by Managing Director of HA Company	10:30-10:50 Am
	Presenting about the project background, project description, potential impact assessment and management process by HA Company	10:50-11:30 Am
	Questions & Answers Session	11:30-12:00 pm
	Announcing the End of the ceremony	12:00-12:05 pm
Location	No (19), Bogyoke Street, the opposite side of Industrial Zone, Zin Yaw Hotel, Myingyan Township	
Government organizations and villages attending the meeting	<ul style="list-style-type: none"> • Ministry of Factory and General Labor Laws Inspection • Myanmar Fire Services Department • Environmental Conservation Department • Department of Industrial Supervision and Inspection • Social Security Board • Kyaw Zi Village • Malar Village • HA company • MCCM Company 	

<p>Agenda</p>	<ul style="list-style-type: none"> • Brief explanation on the EIA process • Presentation on the Background Information of Project, Project Description, Environmental Issues, Potential Impact Assessment and Term of References • Receiving questions, feedback and suggestions from participants
<p>Attendees</p>	<p>22 people Governments- 13 persons MCCM Co., Ltd- 2 persons HA Co., Ltd- 3 persons KyawZi Village- 2 persons Malar Village- 2 persons</p>



Figure 6-8 Photos of introduction speech for the project



Figure 6-9 Photos of Speaking about HA Company



Figure 6-10 Photos of presentation of the project background, project description, potential impact assessment and management process

6.5.3. Questions & Answers and Feedbacks Session in EIA Stage



After the presenting of the project background, project description, potential impact assessment and management process, questions and answers from the participants are as follows. Questions & Answers and Suggestions of public consultation meeting can be seen in Table 6-11. Suggestions letter from the participants can be seen in Table 6-12. Photos of Public Consultation Meeting are shown as Figure 6-11. These suggestions are attached in **Appendix(K)**.








Figure 6-11 Photos of Public Consultation Meeting

Table 6-11 Questions & Answers and Suggestions of Public Consultation Meeting

NO	DESCRIPTION	PHOTO
1	<p><u>Suggestions</u> U Than Myint (Chief of Staff, Myanmar Fire Services Department)</p> <ul style="list-style-type: none"> - To attend fire safety Manager training - To share fire safety knowledges to workers - To obtain Fire Safety Certificate 	
2	<p><u>Question & Suggestions</u> Daw Myat Noe Wai (Chief of Staff, Environmental Conservation Department)</p> <ul style="list-style-type: none"> - To treat waste water using waste water treatment system by making waste water tanks and to dispose only after treating. How is the waste water treatment condition in factory? - To dispose solid waste separately in plastic, paper, chemical waste and so on and to use 3Rs system to leading economic income from waste for Villagers. - How do you make about the suggestion from the previous zoom meeting in which to add stack height to 30m height? - To manage and separate the impacts causing from Kyaw Zi's Mini petroleum Refinery project because MCCM Petroleum Refinery Project is located near it. - To follow the commitments of EIA report. 	

NO	DESCRIPTION	PHOTO
	<p><u>Answer</u></p> <p>U Win Thein (Deputy Environmental Team Leader, Hexagonal Angle International Consultants Co., Ltd.)</p> <ul style="list-style-type: none"> - Sediment tanks were made for waste water treatment. - Solid waste disposal place was constructed in factory to dispose the operation waste such as silica gel. <p>Daw Thu Thu Aung (Managing Director, Hexagonal Angle International Consultants Co., Ltd.)</p> <ul style="list-style-type: none"> - The project proponent conducted as the suggestions and mitigation measures in scoping report but the operation process was stopped because of political situation, difficult to get electricity and raw materials. As the consultant, we will suggest and write to mitigate the impacts to client if the factory is operating. - As the job opportunities for villagers, the proponent was recruited since the construction phase of the factory and will also give job opportunities in future. 	 <p>The photograph shows a man in a striped shirt standing in a meeting room, holding a microphone and presenting. He is positioned to the right of a large projector screen. The screen displays a presentation slide with a green background and some text. In the foreground, there is a table with a red tablecloth, water bottles, and other items. The room has a white wall with a framed picture and a window with blinds.</p>

NO	DESCRIPTION	PHOTO
	<ul style="list-style-type: none"> - As for the CSR, CSR program and estimated budgets were planned and give job opportunities. The alternative ways will also think and conducted. - As for the Stack height, we have already explained to Environmental Conservation Department of Naypyitaw about that 30m of stack height. 30 m means that the stack height needs to higher than the building around 30 m. Therefore, we assume that the current stack height is enough according to the calculation because there is no higher building and the nearest resident area is over 1 km. - If the factory is located near our project starts the operation process, we will think about the cumulative impacts caused by this factory in the future and we recorded the baseline quality measurement of our project to compare the stage of operation and the pausing stage of Kyaw Zi's Mini petroleum Refinery project. - Monitoring process will be conducted 1 time in every 6 months. - If there will be impacts on the environment, the project proponent will control and manage these conditions. 	
3	<p><u>Question</u> Daw Zin Mar Tun (Deputy chief of staff, Environmental Conservation Department) Local people, villagers and PAs are needed to attend in Public Consultation Meeting to know impacts. Were they invited and attended meeting?</p>	


NO	DESCRIPTION	PHOTO
	<p><u>Answer</u> U Win Thein (Deputy Environmental Team Leader, Hexagonal Angle International Consultants Co., Ltd.) We invited the villagers and village heads of Kyaw Zi Village and Malar Village to Public Consultation Meeting. We also explained about the project to villagers and display the power point slide at village's administrative office. We also request to give suggestions of local people when we conduct social surveys in that villages. However, small number of villagers attend this Public Consultation because of various reasons.</p>	

Table 6-12 Suggestions Letter of Public Consultation Meeting

No.	Participants	Department/Address	Suggestions and Comments
1	U Than Myint	✓ Chief of Staff, Myanmar Fire Services Department	<ul style="list-style-type: none"> ✓ To dispose systematically and store Flammable solid waste and to build fire blocking roads. ✓ To fill fire points with fire fighting equipment and fire extinguishers ✓ To build and fill the tanks for fire with water and to place foam nozzle, foam chemical, fire extinguisher and pipes for emergency ✓ To wait with fire extinguishers during the unloading of raw materials of petroleum because of sparking during the cargo time. ✓ To add Emergency Contact list with water proof ✓ To maintain the old electronic ropes and electric materials with technician ✓ To attend and inform fire safety manager training if the operation process starts ✓ To obtain Fire Safety Certificate ✓ To do exercises and pre-trainings by grouping Fire Safety Emergency Group ✓ To make restricted area and to inform these areas with paper board

6.5.4. Summary of Public Consultation Meeting for Local people in EIA Stage

Public Consultation Meeting for local people of MCCM Co., Ltd. was held at Kyaw Zi Village and Malar Village, Thaug Thar Township, Myingyan District, Mandalay Region. The event was held starting from 10:00 am to 12:00 pm in Kyawzi village and from 1:00 pm to 3:00 pm in Malar Village.

In the meeting, the project background, project description, potential impact assessment and management process was presented by U Win Naing Oo (Deputy Environmental Team Leader of Hexagonal Angle International Consultants Co., Ltd.) as shown in. The summary of public consultation meeting and suggestion letters of local people can be seen in the following Table 6-13, Table 6-14 and Figure 6-12 and suggestion documents are shown in **Appendix(L)**.

Table 6-13 Summary of Meeting for Local People

Location	Kyaw Zi Village and Malar Village
Date	5.2.2024
villages attending the meeting	<ul style="list-style-type: none"> • Kyaw Zi Village • Malar Village
Agenda	<ul style="list-style-type: none"> • Brief explanation on the EIA process • Presentation on the Background Information of Project, Project Description, Environmental Issues, Potential Impact Assessment and Term of References • Receiving questions, feedback and suggestions from participants
Attendees	Kyaw Zi Village (6) persons Malar Village (5) persons





Malar Village

Figure 6-12 Photos of Public Consultation Meeting for Local People

Table 6-14 Suggestion Letter of Local People

No.	Participants	Address	Suggestions and Comments
1	U Hla Win	Kyaw Zi Village	<ul style="list-style-type: none"> ✓ To provide job opportunities for local people ✓ To help the contribution of better transportation system for the village ✓ To provide the electricity and good livelihood for the local people
2	U Min Min	Kyaw Zi Village	<ul style="list-style-type: none"> ✓ To support in village's economic opportunities and social events ✓ To provide water to village during water scarcity period (Summer) ✓ To create job opportunities for local people ✓ To control vehicle usage when the transportation use in the village
3	U Zaw Min Naing	Kyaw Zi Village	<ul style="list-style-type: none"> ✓ To help the contribution of better transportation system for the village ✓ To support the village's electricity system ✓ To provide job opportunities for the locals
4	U Khin Maung Myint	Kyaw Zi Village	<ul style="list-style-type: none"> ✓ To develop the street lamps on the Main roads of the factory ✓ To participate in social activities of village ✓ To prepare the fire management plan ✓ To control the waste disposals of the factory
5	U Paing Zin	Kyaw Zi Village	<ul style="list-style-type: none"> ✓ To conduct the regular managements for the cleaning of village's environment ✓ To dispose the wastes systematically ✓ To participate in different events of the village ✓ To support the health care programs for the village
6	Daw Than Than Aye	Kyaw Zi Village	<ul style="list-style-type: none"> ✓ To participate in Social and religious events of the village ✓ To help the development programs of village ✓ To keep the environment of the factory clean ✓ To provide the job opportunities for the locals
7	Ko Naing Zaw	Malar village	<ul style="list-style-type: none"> ✓ To prevent the fire hazard of factory through operation processes ✓ To set up fire fighting equipment in the factory ✓ To prevent the waster disposals from the factory from entering the village's environment

No.	Participants	Address	Suggestions and Comments
			✓ To provide the job opportunities for the locals
8	U Thaung Naing Oo	Malar village	<ul style="list-style-type: none"> ✓ To provide job opportunities for locals ✓ To participate in Village's development programs of the village ✓ To dispose the wastes systematically ✓ To conduct the regular monitoring plan of the environment ✓ To prevent the contamination of the environment
9	U Naing Lin Tun	Malar village	<ul style="list-style-type: none"> ✓ To dispose the wastes systematically ✓ To provide job opportunities for the villagers ✓ To set up and check the fire fighting equipment regularly ✓ To help and support the better livelihoods of the villagers
10	U Tin Naing	Malar village	<ul style="list-style-type: none"> ✓ To help for improving the economic status of the villagers ✓ To participate in religious and social events of the village ✓ To have nature understanding of the factory for villagers
11	U Kyi Maung	Malar village	<ul style="list-style-type: none"> ✓ To develop the street lamps on the Main roads of the factory ✓ To participate in social activities of village ✓ To prepare the fire management plan ✓ To control the waste disposals of the factory

6.6. SUMMARIZE THE RESULT OF PUBLIC DISCLOSURE AND CONSULTATION MEETING IN EIA STAGE

According to the meeting, the responsible from two government department which are Myanmar Fire Services Department, and Environmental Conservation Department suggest to the project proponent during project implementation. The Myanmar Fire Services Department suggest that follow the fire prevention relevant rule and laws of the government, to install the various kinds of firefighting equipment within the factory compound and to train the worker for fire prevention with safety manager. In addition, the Environmental Conservation Department suggest that to do wastewater treatment system in the factory and do proper waste management system as well as to make good monitoring system for the environmental quality. There is no suggestion and comment from local people near project area. Consequently, the project proponent will be carried out this comment during project implementation. Besides, these comments have been taken into account in the report's preparation.

6.7. THE FUTURE PLAN FOR PUBLIC CONSULTING MEETINGS

The project proponent or project responsibilities will conduct the public consulting meetings regularly with the local persons. The consulting meeting will conduct to increase the awareness and it aims to reflects their needs and concerns with the project. Information

dissemination and information sharing will be used to inform the people for the status of the project. The project opponents will also contribute Corporate Social Responsibilities both for the development of community and for the needs with their concerns on the ongoing status of the project. In addition, the suggestion and feedback boxes will be placed in front of factory for the awareness and concerns of the local people on the project.

6.8. ACTION PLAN OF PUBLIC CONSULTING MEETING

The project's proponent provides donations for and takes part in religious events in KyawZi village. The project's proponent supplied water to the nearby village during the summer. Additionally, the factory has enough firefighting equipment. The project's proponent will then hire locals to work in the factory.

CHAPTER 7

ENVIRONMENTAL MANAGEMENT PLAN

7.1. INTRODUCTION

In order to manage the environmental impacts identified in the impact assessment, the project proponent is responsible to implement an Environmental Impact Assessment of the project (EIA). This management plan will form the basis for the development of an integrated management system for environmental and community issues. The environmental Management Plan (EMP) ensures that the project implementation is carried out in accordance with the design by taking appropriate mitigation actions to reduce adverse environmental impacts during its life cycle. In addition, this EMP used to ensure compliance with statutory requirement and corporate safety and environmental policies.

The Environmental Management Plan for proposed project mainly includes the following sector.

- (a) Environmental Monitoring Plan
- (b) Environmental Management Plan
- (c) Emergency Response Plan
- (d) Fire Safety Management Plan
- (e) Corporate Social Responsibility (CSR) Program

7.2. SCOPE OF THE ENVIRONMENTAL MANAGEMENT

The objective of the environmental management is to ensure potential environmental issues managed by proper mitigation measures in compliance with the relevant laws and regulations stipulated by national authorities. Environmental management based on the basic principles of management known as the PDCA cycle (see **Figure 7-1**). Environmental management consists of four related tasks as described below:

➤ **Plan (P) - What need to be done**

Mitigation measures for the potential environmental impacts of the project, such as air emission, noise, solid waste, wastewater and health and safety at work are described in this chapter. The Project Proponent will follow the plan for the mitigation measures according to the scheduled time.

➤ **Do (D) - Implement the plan**

The Project Proponent as described in this chapter will implement the mitigation measures for the potential environmental impacts appropriately.

➤ **Check (C) - Monitor and evaluate the results of implementation**

The effectiveness of the mitigation measures will be monitored, evaluated and documented.

➤ **Act (A) - Taking corrective actions to improve the results, if found inadequate**

If nonconformities noted with reference to the environmental monitoring benchmarks, corrective actions need to plan to mitigate the existing environmental impacts.

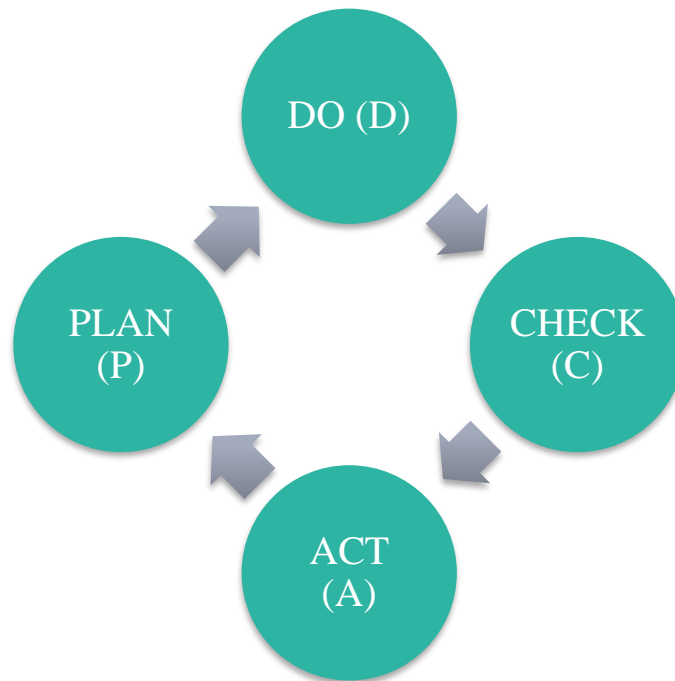


Figure 7-1 P.D.C. A cycle

7.3. MONITORING PROGRAM

The purpose of environmental monitoring is to evaluate the effectiveness of implementation of Environmental Management Plan (EMP) by periodically monitoring the important environmental parameters within the impact area, so that any adverse effects are detected and timely action can be taken. It focuses on the work environment which includes, waste management, health and safety of workers, safety of the facilities and the socio-economic component of the environment. The objectives of environmental monitoring are as followed:

- Monitor discharge sources (gas emission, wastewater and solid waste) in order to ensure that these activities will comply with legislative requirements;
- Check monitoring process in accordance with pollution prevention and control
- Propose appropriate environment protection measures based on results of environmental monitoring.
- Overcome and repair all weak-points based on results of environment monitoring program.
- Determine the effectiveness of mitigation measures and other measures

7.3.1. Environmental Monitoring Team

The environmental monitoring team should be comprised to accomplish regular monitoring and check-up. The leader of the team should be fully responsible for the

environmental affairs. The responsibility for the monitoring team as shown in Table 7-1 and Estimated Budget for Environmental Monitoring Plan as shown in Table 7-2 respectively.

Table 7-1 Responsibility for Environmental Monitoring Team

No.	Name	Position	Responsibility
1.	U Ko Ko Oo (Director)	Monitoring Leader	<ul style="list-style-type: none"> ✓ Environmental quality measurement planning; ✓ The implementation of mitigation measure in the environmental management plan ✓ complying with the instructions of relevant government departments ✓ Reporting of operational conditions ✓ Providing employees with their basic needs
2.	U Thant Zin (Director)	Occupation Health and Safety Leader	<ul style="list-style-type: none"> ✓ Inspection of internal operation process ✓ Reporting of project process ✓ Recording of employees needs ✓ Arranging training on occupational safety ✓ Implementation of waste management plan ✓ Supervision of occupational safety reduction
3.	U Zaw Thant (Manager)	Assistant Leader	<ul style="list-style-type: none"> ✓ Inspection and implementation of fire prevention ✓ Monitoring of equipment and vehicles ✓ Reporting to the team leader if a workplace accident occurs

Table 7-2 Estimated Budget for Environmental Monitoring Plan

No	Monitoring Items	Annually estimated budget (MMK)
Environmental Monitoring (construction /operation)		
1.	Air quality monitoring	4,000,000
2.	Wastewater quality monitoring	500,000
3.	Noise quality monitoring	500,000
4.	Soild waste monitoring	500,000
5.	Vibration monitoring	500,000
6.	Odor monitoring	500,000
7.	Stack height emission monitoring	1,000,000

No	Monitoring Items	Annually estimated budget (MMK)
7.	Health and safety (Occupational & Community)	500,000
8.	Fire Hazard	500,000
	Emergency Condition	500,000
Total		9,000,000

Apart from having an EMP, it is necessary to have a permanent staff who is in charge of ensuring its effective implementation of mitigation measures and to conduct environmental monitoring. According to the above table, it is necessary to assign staffs who have the background knowledge for the regular check-up. Training program for safety issues should be completed if necessary. Environmental monitoring can also be done by registered third party monitoring agency. The major duties and responsibilities of the person who is responsible for environmental monitoring of MCCM Co., Ltd. should be as given below:

- (a) To ensure regular operation and maintenance of pollution control devices.
- (b) To minimize environmental impacts of operations by true dedication to the EMP.
- (c) To initiate environmental monitoring as per approved schedule.
- (d) Review and interpretation of monitored results and corrective measures in case monitored results are above the specified limit.
- (e) Maintain environmental related records.
- (f) Coordination with regulatory agencies, external consultants, monitoring laboratories.
- (g) Ready to solve any complaints from guest, local people, neighborhood or government authorities about environmental and social issues especially in wastewater and solid waste.

7.3.2. Summary of Environmental Monitoring Program

The following **Table 7-3** described the detailed monitoring plan for construction/ decommission phase and operation phase of proposed project. The project proponent must obey it to mitigate impact on the environment and meet with standard and guideline. In addition to monitoring plan, there should be auditing plan in the form of internal and external environmental audit. The audits will assess the environmental performance of the operation in complying with environmental laws, rules and regulations. The environmental monitoring report as per monitoring program must submit to ECD in every six months after receiving the approval letter for EIA from MONERC.

Table 7-3 Environmental Monitoring Program for Construction/ Decommission Phase and Operation Phases

Monitoring Item	Phases	Monitoring Parameter	Area to be Monitored	Frequency	Responsible Organization
Outdoor air quality	Construction/ Decommission	For 24 hours PM _{2.5} and PM ₁₀ , TSP, NO ₂ , SO ₂ , CO ₂ , CO, VOC, O ₃	Within the Project Site (Construction/ Decommission)	Twice a year	Contractor/ Project Proponent
	Operation		Project Site Lat:21°17'54.24"N Long: 95°10'24.26"E	Twice a year	Project Proponent
			Kyaw Zi Village Lat:21°18'56.10"N Long: 95°10'41.46"E Malar Village Lat:21°17'59.87"N Long: 95°8'41.19"E	Once a year	
Wastewater	Construction/ Decommission	pH, Total Suspended Solid, BOD, COD, Total Phosphorous, Lead, Sulfide, Oil and Grease, Total Nitrogen, Chromium (Hexavalent)	Final water discharge point from construction site	Twice a year	Contractor/ Project Proponent Project Proponent
	Operation		Operation Wastewater Lat:21°17'55.83"N Long: 95°10'27.82"E	Twice a year	Project Proponent
Noise	Construction/ Decommission	For 24 hours Noise level (dB(A) scale)	Within the Project Site (Construction/ Decommission)	Twice a year	Contractor/ Project Proponent Project Proponent

Monitoring Item	Phases	Monitoring Parameter	Area to be Monitored	Frequency	Responsible Organization
	Operation		Project Site Lat:21°17'54.24"N Long: 95°10'24.26"E	Twice a year	Project Proponent
Temperature	Operation	Heat level	Within the factory	Twice a year	Project Proponent
Odor	Operation	Odor Quality	Furnace Stack Lat:21°17'54.96"N Long: 95°10'25.37"E	Twice a year	Project Proponent
Solid waste and Hazardous waste	Construction/ Decommission	<ul style="list-style-type: none"> ✓ The amount of waste generation and classification ✓ Daily weighing and recording of segregated waste ✓ Recording the quantity and method of waste disposal 	Waste generation source of each operation process at project area (eg. Wood pieces, iron scarp, cement bags, etc) and waste disposal site within the project area	Daily	Contractor/ Project Proponent Project Proponent
	Operation	<ul style="list-style-type: none"> ✓ Checking whether or not there is a systematic disposal of waste ✓ Checking the waste burning or not 	Waste disposal area within the project site		Project Proponent
Vibration	Operation	<ul style="list-style-type: none"> ✓ For Vibration level Acceleration (m/s²) Velocity (mm/s) 	Generator Lat:21°17'55.72"N Long: 95°10'27.53"E	Twice a year	Project Proponent
Soil	Operation	<ul style="list-style-type: none"> ✓ pH, Moisture (%), Total Nitrogen (CEC) 	Final Discharge Point Lat:21°17'55.74"N Long: 95°10'28.29"E	Twice a year	Project Proponent

Monitoring Item	Phases	Monitoring Parameter	Area to be Monitored	Frequency	Responsible Organization
Stack Emission Height	Operation	Methane (CH ₄), Hydrogen Sulphide (H ₂ S), Nitrogen Oxide (NO _x), Ammonia (NH ₃), Carbon monoxide (CO), Oxygen (O ₂), Sulphur dioxide (SO ₂)	Furnace Stack Lat:21°17'54.96"N Long: 95°10'25.37"E Generator Lat:21°17'55.72"N Long: 95°10'27.53"E	Twice a year	Project Proponent
Occupational Health and Safety	Construction/ Decommission	<ul style="list-style-type: none"> ✓ Provide personal protective equipment in the workplace (or) check whether or not protective equipment is wearing ✓ Keeping work attendance records 	Within project area <ul style="list-style-type: none"> ✓ Condition the supply PPE ✓ Condition the place of warning sign ✓ Condition the place of reflection sign ✓ First aid-kit ✓ Emergency contact numbers 	Monthly	Contractor/ Project Proponent
	Operation	<ul style="list-style-type: none"> ✓ Placing hazard warning signs ✓ Place emergency contact number in workplace 			
Fire Hazard	Construction/ Decommission & Operation	<ul style="list-style-type: none"> ✓ Monthly inspection of the pressure gauge, and seal on fire extinguishers ✓ Place the fire extinguisher near the potential fire hazard places. ✓ Place sufficient fire extinguishing equipment such as fire extinguisher, fire hose, fire hydrant. ✓ Clear the project entrance road to enter the fire truck. 	Within project area	Twice a year	Project Proponent

Monitoring Item	Phases	Monitoring Parameter	Area to be Monitored	Frequency	Responsible Organization
Emergency Risks	Construction/ Decommission & Operation	<ul style="list-style-type: none"> ✓ Practicing emergency drill ✓ Education and training ✓ Addresses of organizations that should be contacted in an emergency; phone numbers should be easily accessible 	Within project area	Twice a year	Project Proponent

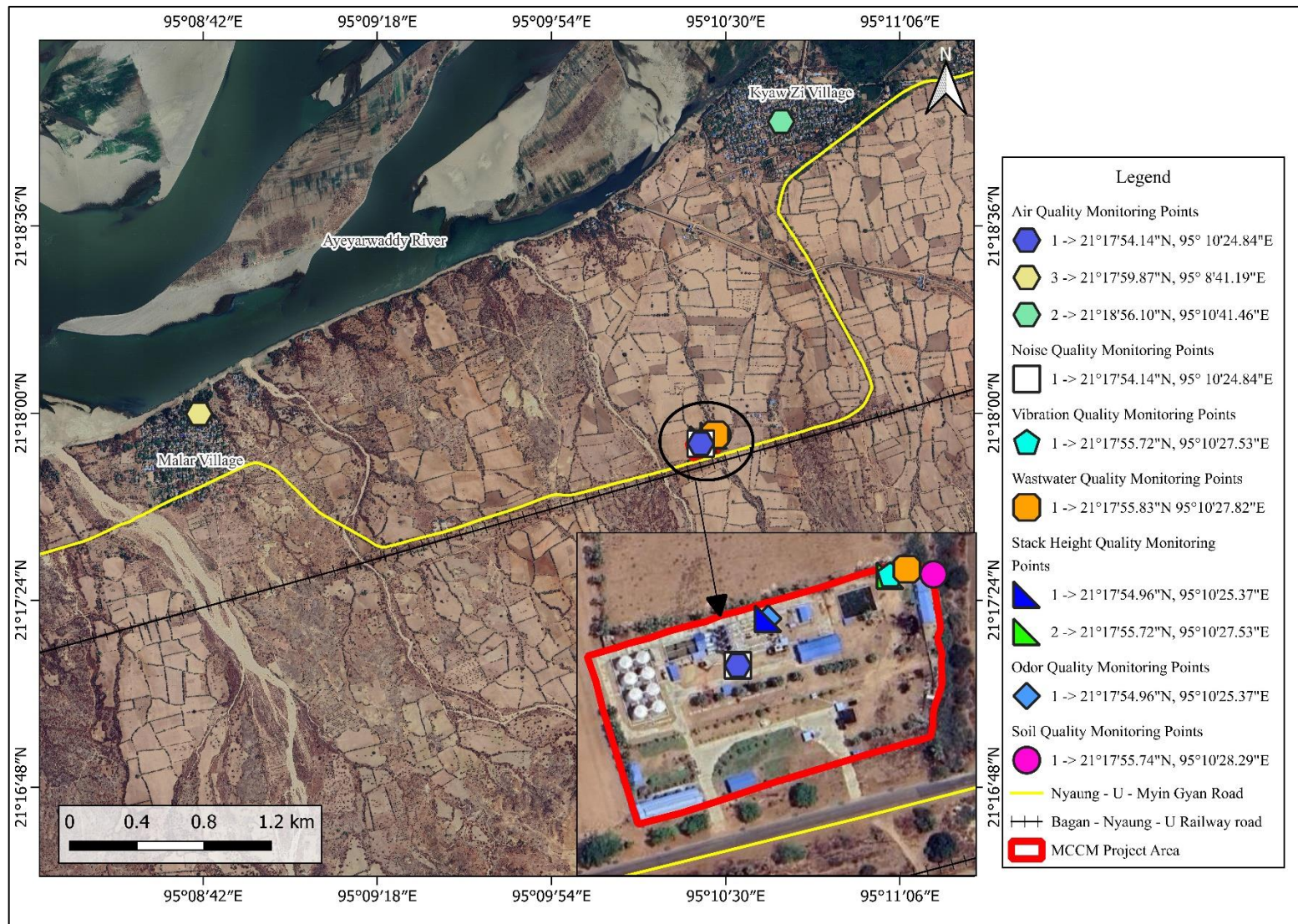


Figure 7-2 Environmental Monitoring Points

7.3.3. Importance Point for Environmental Monitoring Program

The following factors need to be considered in the environmental monitoring program according to the Article 108, Article 109 and Article 110 described in Environmental Impact Assessment Procedure (2019, December).

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

Article 109. The monitoring reports shall include:

- a) documentation of compliance with all conditions;
- b) progress made to date on implementation of the EMP against the submitted implementation schedule;
- c) difficulties encountered in implementing the EMP and recommendations for remedying those difficulties and steps proposed to prevent or avoid similar future difficulties;
- d) number and type of non-compliance with the EMP and proposed remedial measures and timelines for completion of remediation;
- e) accidents or incidents relating to the occupational and community health and safety, and the environment; and
- f) monitoring data of environmental parameters and conditions as committed in the EMP or otherwise required.

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

The project proponent has to implement monitoring program and submit monitoring program to ECD twice a year.

7.4. ENVIRONMENTAL MANAGEMENT PLAN

Based on the project period, the EMP includes the mitigation measure of impact of environmental qualities such as air, wastewater, solid waste, noise and vibration, soil, social, occupational health and safety, natural hazards etc. The project proponent must follow, as practical as possible environmental health and safety guidelines and international standard for the project. There is the own program for capacity building and training covering good working practices and good safety practices. Moreover, the project proponent must obey the monitoring plan and mitigation measure mentioned in the EIA Report.

Although the proposed project of the proposed project has a number of adverse impacts on the surrounding environment, all of the impacts will be reduced to some extent by related proper mitigation measures. However, the unavoidable impacts would evolve from Occupational Health and Safety of workers in the aspect of physical hazards with long term and short-term working. Therefore, environmental impacts and mitigation measures plan, and

estimated budget of construction/ decommission phase and operation phase are mentioned in the below. These activities shall be carried out to show that the project operations comply with the maximum allowable environmental norms and standards.

7.4.1. Organization of EMP

A small EMP cell consisting of 2–5 members have formed. In the project, the manager should be the EMP cell leader. Other cell member will be consisting into technicians together with employees. If possible, some of these cell members should deploy for doing monitoring and inspection works effectively implement EMP. The team for implementation environmental management plan of proposed project is described in Table 7-4.

Table 7-4 Team for Implementation Environmental Management Plan

No.	Group Member	Position & Responsibilities
1.	U Ko Ko Oo (Director)	<p><u>Team Leader</u></p> <ul style="list-style-type: none"> ✓ Supervise and implement the mitigation measures, fire protection system, emergency response plan and CSR programs. ✓ Follow the instructions of the relevant government departments. ✓ Implementation and supervision of occupational health and safety
2.	U Thant Zin (Director)	<p><u>Deputy Team Leader</u></p> <ul style="list-style-type: none"> ✓ Implementation of environmental monitoring programs contain in the Environmental Management Plan. ✓ Follow the instructions of the relevant government departments. ✓ Implementation of waste management plan ✓ Inspection and implementation measures of occupational health and safety.
3.	U Zaw Thant (Manager)	<p><u>Member</u></p> <ul style="list-style-type: none"> ✓ Supervise and monitoring of waste management ✓ Monitoring and reporting Occupational Health and Safety issues to leader ✓ Implementation of mitigation measures
4.	U Myo Thant (Head Worker)	<p><u>Member</u></p> <ul style="list-style-type: none"> ✓ Inspection and supervision of fire protection equipment, protection measures and emergency response plans ✓ Implement the systematic maintenance programs of equipment, boiler, machinery and vehicles ✓ Reporting to the team leader if a workplace accident

No.	Group Member	Position & Responsibilities
		<p>occurs</p> <ul style="list-style-type: none"> ✓ Monitoring of equipment and vehicles
5.	U Thet Paing Htwe (Head Worker)	<p><u>Member</u></p> <ul style="list-style-type: none"> ✓ Inspection and supervision of fire protection equipment, protection measures and emergency response plans ✓ Implement the systematic maintenance programs of equipment, boiler, machinery and vehicles ✓ Reporting to the team leader if a workplace accident occurs ✓ Monitoring of equipment and vehicles

7.4.2. Air Quality Management Plan

7.4.2.1. Construction/ Decommission Phase

The construction phase of a project can raise concerns about air pollution. Dust and particle matter can enter the air as a result of site clearance, land reclaiming, leveling process, temporary access road construction, and demolition of building, etc. Particularly when it's windy and dry outside, these activities can produce a lot of dust. In addition, the movement of bulldozers, backhoes and dozers can be used for clearing the site and are used for digging, earthmoving, and removing debris for leveling the ground, building access roads and demolition of building will be the primary source of air pollution.

Construction and demolition are a source of dust emissions and gases that can have temporary impacts on local air quality. Construction emissions would result from earthmoving (fugitive dust) and heavy equipment use (vehicle exhaust). These emissions would be generated from land clearing, ground excavation, cut and fill operations, and the construction of the project facilities in addition to vehicular movement. Additionally, the use of heavy machinery, equipment, welding cutters, and vehicle movement during building demolition generates air pollution.

To be able to mitigate the detrimental impacts of air pollution, control measures, such as sprinkling water on un-paved road and any areas that are currently under construction and demolition at least three time per day especially during dry season and at least twice per day during wet and cool seasons, consistent use by the contractor of equipment/vehicles that are properly created, maintained, and operated, including the use of proper engine fuel mixes, routinely serviced exhaust emission systems, and proper engine tuning, periodically inspect all machinery, including heavy equipment and pumps, as well as the engines of vehicles, avoid running the engines of vehicles and equipment unnecessarily and maintain a record of the monthly fuel consumption.

7.4.2.2. Operation Phase

In the operation phase, the potential major sources of hazardous and toxic air pollutants such as BTEX compounds (benzene, toluene, ethylbenzene, and xylene) will be generated from refinery process of proposed project. These refinery processes, especially in furnaces (burning the LPG gas and heating oil) also release fewer toxic hydrocarbons such as natural gas (methane) and other light volatile fuels and oils. In addition, transportation and vehicle movements in the project area, furnace, generators can emit air pollution.

As for the stack height, the height of the furnace's stack needs to be higher than the buildings around 30 m. Therefore, the stack elevation is sufficient for operation process in the project site that is constructed according to the approval letter for technological rules and safety plan of Myanmar Petrochemical Enterprise, Ministry of Electricity and Energy as presented in **Appendix N**. Moreover, the project proponent is followed this instruction constantly.

Air quality must be monitored to ensure the project area is compliance with the standards. If not, the project proponent has to mitigate the air pollution by following the mitigation measures. Regular maintenance of furnaces, equipment, and vehicles, limiting traffic speeds on any unpaved roads to 30 km/h, and regular monitoring for air quality parameters (PM2.5 and PM10, TSP, SO2, NO2, CO2, VOC, O3) mentioned in the monitoring program are all need to implement. In addition to that, efficient air-purifying plants must be planted in the vacant area of the project.

7.4.2.3. Sub-Plan for Air Quality

The environmental management sub-plan of air quality is shown in Table 7-5.

Table 7-5 Environmental Management Sub-Plan for Air Quality

1	Objective	To prevent and mitigate the impacts of air pollution and enhance air quality of the proposed project.	
2	Legal Framework	National Environmental Quality (Emission) Guideline (2015) Environmental Conservation Rules (2014) Environmental Impact Assessment Procedure (2019)	
3	Maps	Location Maps are shown in Figure 1-1 Air quality measurement map is shown in Figure 4-11 Monitoring Point Map is shown in Figure 7-2	
4	Implementation Schedule	Construction/ Decommission Phase	Operation Phase
5	Management Actions	<ul style="list-style-type: none"> ✓ Sprinkling water on un-paved road and any areas that are currently under construction and demolition at least three time per day especially during dry season because of wet suppression can greatly reduce dust emission up to 70%. ✓ In addition, spray water on un-paved roads and construction and demolition area at least twice per day during wet and cool seasons. ✓ Maintain a minimum of 60 cm of free board and cover any vehicles transporting soil, sand, and other loose materials. ✓ Maintain the interior roads compact to reduce dust emission from moving vehicles. ✓ The speed limit for trucks will be reduced from 30 km/h to 15 km/h to minimize dust emissions by 	<ul style="list-style-type: none"> ✓ Gases filters are installed to reduce the GHG emissions from generators and furnaces. ✓ A huge reduction in emissions from vehicles and equipment can be achieved by upgrading the engines. ✓ Water should be sprayed as suppressants to increase the moisture content at least one time per day (it can be applied in the morning or evening). ✓ Regular maintenance of furnace, equipment, and vehicles. ✓ Limit traffic speeds on any unpaved roads to 30 km/h. ✓ Regular maintain the installed ventilation system especially air-cooling system, fans and window in the office room. ✓ Regular monitoring for air quality parameters

		<p>50%.</p> <ul style="list-style-type: none"> ✓ Regular checking the pave, to the extent possible, unpaved access roads, parking areas, and staging areas at construction sites. ✓ By properly operating and maintaining vehicles and other oil-operated machinery, it is possible to maintain and minimize the emission of particulate matter (PM), SO₂, NO₂, and hydrocarbons from moving vehicles. ✓ Consistent use by the contractor of equipment/vehicles that are properly created, maintained, and operated, including the use of proper engine fuel mixes, routinely serviced exhaust emission systems, and proper engine tuning. ✓ Periodically inspect all machinery, including heavy equipment and pumps, as well as the engines of vehicles. Engines that are properly maintained, lubricated, and operated emit reduced smoke. ✓ Avoid running the engines of vehicles and equipment unnecessarily. ✓ On construction and demolition equipment should be installed filters for diesel. 	<p>(PM_{2.5} and PM₁₀, TSP, SO₂, NO₂, CO₂, VOC, O₃) mentioned in the monitoring program.</p> <ul style="list-style-type: none"> ✓ Grow efficient air-purifying plants, e.g., areca palm, Aloe Vera, fast-growing tree species and so on. ✓ Enforce to wear PPE to employees who are working in the project area, loading/ unloading area that it must wear the 95 mask or surgical mask in their working time.
6	Monitoring Frequency	Once a year	Twice a year (Project Area) Once a year (Kyaw Zi Village, Malar Village)
7	Responsible Person	Contractor/ Project Proponent	Project Proponent
8	Estimated budgets	Implementing mitigation measures –500,000 MMK Monitoring - 4,000,000 MMK	Implementing mitigation measures –500,000 MMK Monitoring - 4,000,000 MMK

7.4.3. Water Pollution Management Plan

7.4.3.1. Construction/ Decommission Phase

During the construction stage, construction and demolition activities such as land reclaiming and leveling, demolition of building can be generated muddy water and wastewater. Surface water pollution is brought on by domestic wastewater discharge and temporary toilet from worker's camp. If they are not adequately managed, all the wastewaters could pollute surface water. During the rainy season, drainage, and seepage from disposal sites for construction and demolition waste could pollute surface waters.

Surface runoff included sediment and debris could be polluted to nearest waterbody if those are not properly managed. Therefore, a suitable water management system is need to implement, such as effective land drainage and the usage of artificial ponds for receiving site runoff to reduce the effect of runoff on surrounding watercourses during the construction and demolition period. In addition, excessive wastewater production needs to prevent and use the water meter to reduce the generation of unnecessary wastewater.

7.4.3.2. Operation Phase

Wastewater will be generated from operation phase are wastewater generating from the implementing of the proposed project especially in crude oil settlement area and reheating process of silica gel after filtering the petroleum. Wastewater can also generate from cooling water tanks that work to cool down the temperature of petroleum by passing through the condenser. The water in the cooling water tank is recycled by passing through the condenser and distillation column. Therefore, the wastewater will be generated when the cooling water tank is cleaned. The cooling water tank is cleaned two times per year. Usage of toilets and kitchen can generate domestic wastewater as well as storm water and sewage water can generate in project area. These wastewaters may result in impacts to the water quality into the nearby water bodies (Ayeyarwady river and some intermitted sand creeks) if the proposed project has no systematic treatment or practices.

Therefore, the mitigation measure for wastewater pollution is that wastewater treatment plant shall be installed in operation area, discharge outlet shall be equipped with grease traps to enhance wastewater treatment process, liquid effluents arising from operations will be treated to the applicable NEQG guideline prior to discharge and regularly check the septic tank to avoid leakage of sewage. In addition, all drainage systems are covered, and liquid waste is disposed to the septic to avoid soil contamination.

7.4.3.3. Sub-Plan for Water Quality

The environmental management sub-plan of water quality is shown in Table 7-6.

Table 7-6 Environmental Management Sub-Plan for Water Quality

1	Objective	To prevent and mitigate the impacts of water pollution and enhance wastewater quality of the proposed project.	
2	Legal Framework	National Environmental Quality (Emission) Guideline (2015) Environmental Conservation Rules (2014) Environmental Impact Assessment Procedure (2015) Water Resources and Rivers Conservation Act (2016) (Amended 2017)	
3	Maps	Location Maps are shown in Figure 1-1. Water quality measurement map is shown in Figure 4-34 and Figure 4-35 Monitoring Point Map is shown in Figure 7-2.	
4	Implementation Schedule	Construction/ Decommission Phase	Operation Phase
5	Management Actions	<ul style="list-style-type: none"> ✓ Access roads should be constructed with the proper materials and avoid riparian areas. ✓ During the construction and demolition period, a suitable water management system needs to implement, such as effective land drainage and the usage of artificial ponds for receiving site runoff to reduce the effect of runoff on surrounding watercourses. ✓ Prevent producing excessive wastewater. ✓ If at all possible, use a water meter to reduce the generation of unnecessary wastewater. ✓ Systematic measures will be taken to control seepage water from the waste disposal facility. 	<ul style="list-style-type: none"> ✓ Wastewater treatment plant shall be installed in operation area. ✓ Discharge outlet shall be equipped with grease traps to enhance wastewater treatment process. ✓ Liquid effluents arising from operations will be treated to the applicable NEQG guideline prior to discharge. ✓ Reduce the amount of water utilized for domestic uses at the project area to a minimum. ✓ Avoid generating unnecessary wastewater.

		<ul style="list-style-type: none"> ✓ Manage the fuel, oil, and lubricant leaks from the construction and demolition site. ✓ To ensure that sewage does not leak out of sewage tanks. ✓ To connect the City Development Committee and dispose of the sewage water produced from the demolition of toilets and sewage water produced from temporary toilets. 	<ul style="list-style-type: none"> ✓ Use water meter to control the unnecessary wastewater production if possible. ✓ Regularly check the septic tank to avoid leakage of sewage. ✓ Regular cleaning and checking of all drainage channels in the project area. ✓ All drainage systems are covered, and liquid waste is disposed to the septic to avoid soil contamination. ✓ Make a wastewater filtration system before disposing of the drainage channel. ✓ Install silt trap to treat surface run-off prior to discharge to the stormwater system.
6	Monitoring Frequency	Once a year	Twice a year
7	Responsible Person	Contractor/ Project Proponent	Project Proponent
8	Estimated budgets	Implementing mitigation measures –500,000 MMK Monitoring - 500,000 MMK	Implementing mitigation measures –500,000 MMK Monitoring - 500,000 MMK

7.4.4. Solid Waste Management Plan

7.4.4.1. Construction/ Decommission Phase

In the construction/ decommission phase, construction/ decommission activities can generate solid waste such as wood and metal debris, concrete blocks, empty cement bags, empty paint containers and canisters, plastics from extension of electricity cables, etc. If these items are not adequately managed, recycled, or repurposed, they may enter the solid waste stream. In addition, waste produced by the workers (plastic bags, cans, soft drink cans, plastic ropes, tissues, food remains, etc.) can be generated in construction phase.

Therefore, the recycling and reuse of excess construction materials such as concrete, metal, wood, and plastics should be promoted. Sufficient garbage bins and temporary dispose tank must be provided in the project area and dispose of the wastes from construction and decommission phases as wet waste, dry waste, hazardous waste in orderly manner. Food leftovers generated from the construction workers must be used as natural fertilizer in planting trees in the project area.

7.4.4.2. Operation Phase

There are two types of solid wastes, hazardous wastes from operation process and non-hazardous waste from other activities.

Hazardous Waste

Hazardous wastes are silica gel with oil, oil sample bottle, lab waste, etc. In addition, domestic waste and electronic wastes includes glass, metals scraps, broken glass rods, abandoned electrical containers, motor oil, juice containers, wires, batteries, electrical lamps, and bulbs etc. These hazardous wastes are need to appropriately disposed of and collected in separate bins (chemical bags, containers, etc.). Worker who handles the hazardous waste need to be awareness and prohibited the incineration of waste in the project area.

Non-Hazardous Waste

Generally, most of the domestic wastes can be assume as non-hazardous wastes. Domestic wastes such as organic, plastic, tissues, glass, sanitary pads and leftovers are generated from workers. Sanitary pads are a type of biological or plastic waste that generates when women use toilets. This waste may cause environmental and social impacts if the process is not managed systematically. Moreover, solid waste has the adverse effect (blocking the drainage channels) as a result flooding and groundwater pollution can be faced. Some liquid and solid wastes may have negative effects on humans, plants, and other animals. Such toxic wastes have the potential to contaminate the soil, surface waters, and ground waters.

Therefore, the mitigation measure for environmental pollution due to solid waste generation is to minimize it, provide separate place for storage where waste can be collected and disposed of at the allowed dumping place, build a suitable tend or safe disposal area to control the liquid leaches from wastes, use marked bins to segregate hazardous and non-hazardous wastes and waste must be separated by type of waste and systematically disposed into containers.

Recyclable waste bins must be supplied and a good practice of waste sorting habit must introduce and officially legislate the practice within the project, in Table 7-3. Garbage bins are provided in suitable place nearby canteen, toilet, operation area etc.



Figure 7-3 Solid Waste Generation

7.4.4.3. Sub-Plan for solid waste

The environmental management sub-plan of solid waste is shown in Table 7-7.

Table 7-7 Environmental Management Sub-Plan for solid waste

1	Objective	To prevent and mitigate the impacts of solid waste and enhance solid waste management system of the proposed project.	
2	Legal Framework	National Environmental Quality (Emission) Guideline (2015) Environmental Conservation Rules (2014) Environmental Impact Assessment Procedure (2015) National Waste Management Strategy and Master Plan for Myanmar	
3	Maps	Location Maps are shown in Figure 1-1. Monitoring Point Map is shown in Figure 7-2.	
4	Implementation Schedule	Construction/ Decommission Phase	Operation Phase
5	Management Actions	<ul style="list-style-type: none"> ✓ Dispose of the wastes from construction and decommission phases as wet waste, dry waste, hazardous waste in orderly manner. ✓ As part of the environmental policy, the loads of all waste streams will be monitored and reported on a monthly basis. ✓ Construction and demolition debris, packaging materials, scraps, and metal fragments are correctly disposed of without being left lying around on the ground. ✓ The project's proponent and contractor are responsible for supervising the waste's 	<ul style="list-style-type: none"> ✓ Provide a separate place for storage where waste can be collected and disposed of at the allowed dumping place. ✓ Build a suitable tent or safe disposal area to avoid liquid leakage from it. ✓ The project supervisor is responsible for supervising the transportation of waste from the site to the disposal facility. ✓ Avoid filling vehicles with too much waste in order to prevent loss of waste during transportation. ✓ To separate hazardous and non-hazardous waste, use designated bins. ✓ Waste must be systematically disposed of into

		<p>transfer from the site to the disposal facility.</p> <ul style="list-style-type: none"> ✓ To prevent garbage loss during transportation, dump trucks may not be fully loaded. ✓ To make recycling, reuse, and disposal easier and to stop interactions between different forms of garbage, waste is separated and avoided mixing, such as organic waste (food scraps), non-hazardous waste (metal, glass, concrete, plastic, etc.), inert waste (cleaned soil), and hazardous waste (Paints, solvents, oils, batteries, medical waste). ✓ For the safe collection, segregation, and management of all waste streams collected, household and general garbage must be separated on site into combustible (paper, food, cardboard, and wood) and non-combustible (metals, glass, rubble) streams using appropriately designated containers. 	<p>containers after being sorted by type.</p> <ul style="list-style-type: none"> ✓ The female employee's sanitary pad needs to be packed in paper and disposed of in a timely manner in the trash cans. ✓ To generate the waste that it connected with MCDC ✓ Recyclable waste bins need to be available and recycling trash needs to be sorted properly as a habit. ✓ As part of the spill response strategy, the chemicals will be soaked in sawdust and sand. ✓ Reuse, reduce, and recycle (or 3R) should be encouraged among employees through environmental education programs and awareness-raising efforts. ✓ Chemical wastes should be appropriately disposed of and collected in separate bins (chemical bags, containers, etc.). ✓ Awareness to workers on how to deal with hazardous chemicals and waste. ✓ Prohibition of incineration wastes in the project area.
6	Monitoring Frequency	Daily	Daily
7	Responsible Person	Contractor/ Project Proponent	Project Proponent
8	Estimated budgets	Implementing mitigation measures –500,000 MMK Monitoring - 500,000 MMK	Implementing mitigation measures –500,000 MMK Monitoring - 500,000 MMK

7.4.5. Noise and Vibration Management Plan

7.4.5.1. Construction/ Decommission Phase

During construction phase, the operation of various machines and activities such as use of heavy machinery and vehicles, civil works activities and demolition of building can produce noise and vibration. The main sources of noise generate from transportation activities which is delivery of raw material and loading and unloading process. To control noise level, movements of trucks and other construction and demolition equipment that generate loud noises must be limited at night, shutting down unused vehicles and machinery, regular inspection and rotation of equipment and machinery and contractors must adhere to the provided work schedule, keep noisy operations away from sensitive areas, perform routine maintenance and repairs, and strictly follow operation procedures.

7.4.5.2. Operation Phase

Noise and vibration can be generated from operation and production process, pumps, generators, and generators, etc. The exceed noise and vibration can affect environmental and workers in the project area. Long-term exposure to noisy workplaces can cause hearing loss or other health problems in workers. Therefore, noise and vibration measurement are conducted within the project in dry and wet seasons and the results are within the National Environmental Quality (Emission) Guidelines. Although, there is no significant impact to environmental and workers, mitigation measures need to follow to get better work environment. As the mitigation measures, equipment and machines which generate low noise levels should be used, record and inspection maintenance for each machine and change the good quality product if necessary and arrange employee on a rotating basis in noisy places.

7.4.5.3.Sub-Plan for Noise and Vibration

The environmental management sub-plan of noise and vibration quality is shown in Table 7-8.

Table 7-8 Environmental Management Sub-Plan for Noise Quality and Vibration

1	Objective	To prevent and mitigate the impacts of noise and vibration pollution	
2	Legal Requirement	National Environmental Quality (Emission) Guideline (2015) Environmental Conservation Rules (2014) Environmental Impact Assessment Procedure (2015)	
3	Maps	Location Maps are shown in Figure 1-1. Noise quality measurement map is shown in Figure 4-41 Monitoring Point Map is shown in Figure 7-2.	
4	Implementation Schedule	Construction/ Decommission Phase	Operation Phase
5	Management Actions	<ul style="list-style-type: none"> ✓ Contractor will take measures to reduce noise levels from heavy machinery and vehicle that exceed the NEQG guideline limitations. ✓ To prevent disturbing the surrounding area, movements of trucks and other construction and demolition equipment that generate loud noises must be limited at night. Truck drivers should be instructed not to use their horns at night and to stop playing loud music. ✓ Avoiding the construction and demolition activities at night within 150 meters of sensitive land uses where feasible. ✓ Substitution of low noise devices and equipment. 	<ul style="list-style-type: none"> ✓ Use equipment and machines which generate low noise levels. ✓ Record and inspection maintenance for each machine and change the good quality product (if necessary). ✓ Provide adequate ear protection (ear plugs or muffs, Figure 5 4) to workers working in the excessive noise areas. To make sure workers wear ear plug two times a day with 1hour period each time. ✓ No employee should be exposed to a noise level greater than 85 dB(A) for a duration of more than 8 hour per day without hearing protection. In addition, no unprotected ear should be exposed to a peak sound pressure level (instantaneous) of more than 140 dB (C). ✓ Follow noise control hierarchy (Figure 5 5).

		<ul style="list-style-type: none"> ✓ Shutting down unused vehicles and machinery. ✓ Regular inspection and rotation of equipment and machinery. ✓ Reduce speed when driving vehicles and machinery. ✓ Avoid vehicles idling during loading/ unloading operations. ✓ Providing the workers in the construction area appropriate hearing protection, such as ear plugs or earmuffs, and training them in how to use it. ✓ Contractors must adhere to the provided work schedule, keep noisy operations away from sensitive areas, perform routine maintenance and repairs, and strictly follow operation procedures. 	<ul style="list-style-type: none"> ✓ Arrange employees on a rotating basis in noisy places. ✓ Regular maintain all exhaust system in good working and machine, use machine and equipment which generate low noise levels, turn off the machine that do not need to be used such as generators, compressor, etc.
6	Monitoring Plan	Once a year	Twice a year
7	Responsible Person	Contractor/ Project Proponent	Project Proponent
8	Projected Budgets	Implementing mitigation measures –500,000 MMK Monitoring – 1,000,000 MMK	Implementing mitigation measures –500,000 MMK Monitoring – 1,000,000 MMK

7.4.6. Soil Contamination and Landscaping Management Plan

7.4.6.1. Construction/ Decommission Phase

The main impacts on the soil pollution in the construction/ decommission phase are due to the site leveling, excavation, land filling, land reclamation process, leakage of fuel tanks stored for water pumps and used equipment and seeping the liquid from the temporary waste disposal site. Most of the development area is covered in sandy soil, which has a high rate of infiltration and absorption. Pollutants that are leached will therefore easily bind to the soil. With decreasing viscosity and surface tension, waste spillages may either become retained within the topsoil layer or pierce to the subsurface formations. Used diesel filters and containers have the potential to contaminate soil due to leftover spillage. In addition, the planned or unexpected leakage of used chemical, gasoline, or oil products (from machinery and vehicles) can potentially cause soil pollution. To reduce soil pollution during the construction/decommission phase, heavy machinery, equipment, and vehicles must be kept in good condition, oil spills from visitors' and staff's vehicles in the project construction and demolition sites must be minimized, and septic tanks with sufficient capacity should be built to receive and treat wastewater from all temporary worksite toilets and construction camps.

7.4.6.2. Operation Phase

Soil pollution will occur during the operation phase due to the crude oil settlement process and in the waste disposal area. Although the soil impact will not be impacted in project area, soil contamination can occur due to improper hazardous waste disposal and settle the crude oil if they are not properly managed. Therefore, regular checking the crude oil raw and product storage area, and waste disposal area to reduce the soil pollution. In addition, the settlement tank and waste disposal area must be construct and wastes should only be dumped in the designated locations to avoid hazardous waste contaminating the surroundings.

7.4.6.3. Sub-Plan for Soil Contamination and Landscaping

The environmental management sub-plan of soil contamination is shown in Table 7-9.

Table 7-9 Environmental Management Sub-Plan for Soil Contamination and Landscaping

1	Objective	To prevent and mitigate the impacts of project on soil.	
2	Legal Requirement	National Environmental Quality (Emission) Guideline (2015) Environmental Conservation Rules (2014) Environmental Impact Assessment Procedure (2015)	
3	Maps	Location maps of project area are shown in Figure 1-1. Measurement of soil is shown in Figure 4-69	
4	Implementation Schedule	Construction/ Decommission Phase	Operation Phase
5	Management Actions	<ul style="list-style-type: none"> ✓ Planting will be conducted quickly growing native trees with strong roots that can anchor in the soil. ✓ By maintaining heavy machinery, equipment and vehicles in good condition and containing other contaminants in storage tanks and other places, it is possible to prevent soil contamination by minimizing oil spills from vehicles of visitors and staff in the project construction and demolition sites. ✓ Avoiding excessive excavations and limiting excavations to the approved engineering drawings' mentioned sites. ✓ To prevent soil contamination, septic tanks with sufficient capacities should be built to receive and treat wastewater from all temporary worksite toilets and construction camps. 	<ul style="list-style-type: none"> ✓ Ensure the proper disposal site area for waste and silica gel. ✓ Regular checking the crude oil raw and product storage area, and waste disposal area ✓ To construct the settlement tank and waste disposal area ✓ Solid waste should only be dumped in the designated locations to avoid hazardous waste contaminating the surroundings. ✓ Maintaining the company's vehicles' engines will help prevent oil spills, and proper management will prevent visitors' and residents' cars from picking up any stray oil. ✓ Control proper oil and paint leakage when doing maintenance tasks. ✓ After the maintenance operation, properly dispose of the waste and paint remains.

		✓ Additionally, construction and demolition camps wastewater disposal should be regularly inspected.	
6	Monitoring Plan	-	Twice a year
7	Responsible Person	Contractor/ Project Proponent	Project Proponent
8	Projected Budgets	Implementing mitigation measures –500,000 MMK	Implementing mitigation measures –500,000 MMK Monitoring – 500,000 MMK

7.4.7. Biodiversity Management Plan

7.4.7.1. Construction/ Decommission Phase

The main impacts on the biodiversity in the construction/ decommission phase are due to the site leveling, excavation, land filling, land reclamation process, leakage of fuel tanks, and using heavy machinery. Construction projects often require clearing land and removing vegetation to make way for infrastructure, could lead to habitat destruction, soil erosion and loss of vegetations. Construction activities, especially those involving excavation, and demolition can generate dust and particulate matter. The airborne particles can have negative effects on air quality, human health, and nearby biodiversity. Construction activities can introduce invasive plant species to the area, which can successfully survive in degraded land such as *Acacia* spp. They can outcompete native plants, disrupting the balance of local ecosystems. Moreover, construction projects often result in the destruction or fragmentation of habitats, affecting insects, birds, small mammals, and other animal species. This can lead to reduced biodiversity and decreased populations size.

7.4.7.2. Operation Phase

The project's operation process brings potential air, noise, and water pollution. Air pollution, including particulate matter and gases can affect insect and bird respiratory systems, and leading to inflammation and lung function. Noise pollution could disrupt communication, navigation, mating, altering behavior and reducing reproductive success in insects. Bird's vocalizations, communication, and mating are also impacted by noise. Air pollutants can alter ecosystems, affecting food availability and weakening the animals' immune systems. Wastewater from petroleum refinery plants, containing oil, metals and compounds, harms biodiversity and soil quality. Accidental spills from equipment introduce pollutants, impacting soil and water quality, with pollutants settling in sediment over time, affecting aquatic ecosystem.

7.4.7.3.Sub-Plan for Biodiversity Conservation

Biodiversity conservation includes protecting and maintaining the diversity of flora and fauna species. To the conserve or improved the status of existing biodiversity of the proposed project area, these are the sub-plan for biodiversity conservation which are shown in Table 7-10.

Table 7-10 Environmental Management Sub-Plan for Biodiversity Conservation

1	Objective	To prevent and mitigate the impacts of project on biodiversity	
2	Legal Requirement	National Environmental Quality (Emission) Guideline (2015) Environmental Conservation Rules (2014) Environmental Impact Assessment Procedure (2015) The Conservation of Biodiversity and Protected Area Law (2018) Forest Law (2018) Forest Rules (1995) The Conservation of Biodiversity and Protected Area Law (2018)	
3	Maps	-	
4	Implementation Schedule	Construction/ Decommission Phase	Operation Phase
5	Management Actions	<p><u>Species Protection and Management</u></p> <ul style="list-style-type: none"> ✓ Avoidance of bird shooting and hunting of animals in the project area. ✓ Even if exotic species of plants have been planted to create landscaping in the gardens and residential building, keeping these species from spreading outside the area of the project. ✓ Growing native trees that can improve the soil quality and prevent soil erosion. ✓ If any migratory birds or animals are found entering and sheltering in the project property, avoid arrest and move 	<p><u>Species Protection and Management</u></p> <ul style="list-style-type: none"> ✓ Avoidance of bird shooting and hunting of animals in the project area. ✓ Even if exotic species of plants have been planted to create landscaping in the gardens and residential building and houses, keeping these species from spreading outside the area of the project. ✓ If any migratory birds or animals are found entering and sheltering in the project property, avoid arrest and move to safe location in cooperation with the related departments.

		<p>to safe location in cooperation with the related departments.</p> <ul style="list-style-type: none"> ✓ Implement dust control techniques, such as water spraying or covering materials, to minimize particulate matter emissions. ✓ Plan for habitat restoration and re-vegetation in impacted areas after construction/demolitions to promote the return of native flora and fauna. ✓ Raise awareness among construction workers and the local community about the importance of minimizing environmental impacts. ✓ The various kinds of animals cannot be trapped, collected, or hunted at any stages of the proposed project. <p><u>Pollution Control (Solid waste and Wastewater)</u></p> <ul style="list-style-type: none"> ✓ By maintaining heavy machinery, equipment and vehicles in good condition and containing other contaminants in storage tanks and other places, it is possible to prevent soil contamination by minimizing oil spills from vehicles of visitors and staff in the project construction and demolition sites. ✓ Implement rigorous procedures to prevent and manage spills, leaks and releases. ✓ Large trees must be preserved wherever possible since they serve as nesting and resting places for species found in the area. ✓ Limit vehicle traffic to designated roads to lessen the environmental effect of building and maintenance work as well as the risk of animal species accidents. 	<ul style="list-style-type: none"> ✓ Implement dust control techniques, such as water spraying or covering materials, to minimize particulate matter emissions in operation phase. ✓ Implementing species-specific conservation plans for endangered or threatened species to ensure their survival and recovery ✓ Large trees must be preserved wherever possible since they serve as nesting and resting places for species found in the area. ✓ Managing and controlling invasive species that threaten native biodiversity by outcompeting local species or disrupting ecosystems. ✓ Preservation and cultivation of endangered and rare plant species in or near the project area. <p><u>Pollution Control (Solid waste and Wastewater)</u></p> <ul style="list-style-type: none"> ✓ After the operation, properly dispose of the waste and hazardous wastes to prevent impact to aquatic system. ✓ Control proper oil leakage when doing maintenance tasks to prevent impact to aquatic system. ✓ Ensure the proper disposal site area for waste and silica gel. ✓ Establish a long-term monitoring program to access to the ongoing impacts of the project on wildlife, aquatic, air quality, noise levels and water quality. ✓ Implement rigorous wastewater treatment processes to minimize pollutants before discharge, and prevent accidental spills through proper maintenance and safety protocols. ✓ Maintaining the company's vehicles' engines will help
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		<ul style="list-style-type: none"> ✓ Prohibit open fire within the operation area ✓ Regularly monitor the quality of effluents to ensure compliance with NEQEGs. ✓ Throughout all phases, a plan must be developed and put into practice to reduce the effect of dust on the environment. ✓ Treat operation waste to remove pollutants before discharging it into water bodies or municipal systems. ✓ When cleaning the land, if any animals or reptiles (such as snakes) come across, call the related government department (such as the fire department), who will take them into custody and release them in a secure location. 	<p>prevent oil spills, and proper management will prevent visitors' and residents' cars from picking up any stray oil.</p> <ul style="list-style-type: none"> ✓ Regular checking the crude oil raw and product storage area, and waste disposal area ✓ Regularly monitor the quality of effluents to ensure compliance with NEQEGs. ✓ Solid waste should only be dumped in the designated locations to avoid hazardous waste contaminating the surroundings and to avoid impact to aquatic. ✓ To construct the settlement tank and waste disposal area
6	Monitoring Plan	-	-
7	Responsible Person	Contractor/ Project Proponent	Project Proponent
8	Projected Budgets	-	-

7.5. RISK MANAGEMENT PLAN

The risk management plan includes two sectors which are health and safety risks, and natural disaster risk. The health and safety risks contain occupational safety risks, community safety risks, health impact and fire risk. In addition, natural disaster risks comprise earthquake, floods and ground subsidence. The detail management plan and sub-plan of them are following.

7.5.1. Health and Safety Management Plan

7.5.1.1. Construction/ Decommission Phase

Health and safety is the important factor for the project to develop business, to get good working environment and less affect to surrounding people. To safeguard the health and safety of workers, occupational health and safety (O.H.S.) is an essential component of the construction/ decommission process. Construction/ decommission sites are inherently dangerous places with a range of risks and hazards. In the construction/ decommission phase, the main process that can cause risks are excavation, carrying raw materials and structure construction/ decommission activities. In these processes, worker can injury due to machineries and equipment, not wearing proper shoes, slip, loading/ unloading process, hit by falling object from trucks, electrocution, etc.

Therefore, mitigation measures such as wearing safety shoes or shoes with good grip on the building site, thoroughly inspecting before driving the machineries and utilizing equipment, and allowing only qualified or certified people to drive the machineries must be implemented. In addition, covering with tarpaulin or strictly tied up the materials before carrying truck and carrying the materials with proper and safe handling posture, etc. need to follow to reduce the occupational health and safety risks.

As the community health and safety risk, people near the project area can injury due to falling materials from trucks that carries raw materials and other materials. In addition, accident can cause to people near the project area due to the vehicles. To reduce the community health and safety risks, the trucks are need to cover with tarpaulin or strictly tied up the materials before carrying, inspect the truck not to overload in transportation, to enforce vehicles that carry materials not to drive more than the specified kilometer on the roads and perform regular maintenance the vehicles every 6 months.

7.5.1.2. Operation Phase

During operation phase, regular maintenance process can cause health & safety problem, electrical hazard and fire hazard. In addition, accident can cause to people near the project area due to the vehicles. Due to the hazards, worker can cause bodily injury, heat burn and death. To reduce risks, use personal protective equipment (PPE) such as a safety helmet, safety shoes, and a safety belt when working at heights greater than 6 feet, maintain electrical wire and devices with an electrician, post a warning sign board indicating potential hazards, and arrange for emergency delivery to the clinic or nearest hospital.

7.5.1.3.Sub-Plan for Health and Safety risk

The environmental management sub-plan of occupational Risk is shown in Table 7-11.

Table 7-11 Sub-Plan for Occupational risk

1	Objective	To prevent and mitigate the injuries and hazard.	
2	Legal Requirement	National Environmental Quality (Emission) Guideline (2015) Environmental Conservation Rules (2014) Environmental Impact Assessment Procedure (2015) The Occupational Safety and Health Law (2019)	
3	Maps	Location maps of project area are shown in Figure 1-1.	
4	Implementation Schedule	Construction/ Decommission Phase	Operation Phase
5	Management Actions	<u>Excavation/</u> <u>Carrying Raw Materials/</u> <u>Infrastructure Construction/ Decommission</u> <ul style="list-style-type: none"> ✓ To wear safety shoe or shoe that have good condition grip in construction site. ✓ To wear on a safety vest while working in order to see the situation properly. ✓ Carefully inspection before driving the machineries and using equipment. ✓ Permit only the qualified or certified workers to drive the machineries. ✓ Regular maintenance the vehicles every 6 months. ✓ To carry the materials with proper and safe handling posture. ✓ To carry the materials that not exceed than 50 kg 	<u>Operation and Maintaining the factory</u> <ul style="list-style-type: none"> ✓ Use PPE such as safety helmet, safety shoe, safety belt while working at high places more than 6 ft. ✓ To maintain the electrical wire and devices with electrician. ✓ To repair immediately the damage wire and electrical devices. ✓ Sufficient fire protection equipment and fire extinguishers are provided to prevent electrical related fire hazard ✓ Place the warning sign board that can happen

		<p>per worker.</p> <ul style="list-style-type: none"> ✓ To use forklift or crane to lift the heavy material and objects. ✓ Use PPE such as safety helmet, safety shoe, safety belt while working at high places where more than 6 ft. ✓ To make flat and smooth the road condition in the construction site. ✓ To put the emergency contact numbers in public area of project area. ✓ Plan ahead to send the nearest clinic or hospital if the major injury is happened. 	<p>potential risk.</p> <ul style="list-style-type: none"> ✓ To put the emergency contact numbers in public area of project area. ✓ Make risk assessment for operation process if anything changes. ✓ Make backup arrangement the Emergency medicine boxes (First-Aid Box). ✓ Arrange for delivery to the clinic or nearest hospital for emergency
6	Monitoring Plan	Monthly	Monthly
7	Responsible Person	Contractor/ Project Proponent	Project Proponent
8	Projected Budgets	Implementing mitigation measures –1,000,000 MMK Monitoring – 500,000 MMK	Implementing mitigation measures –1,000,000 MMK Monitoring – 500,000 MMK

7.5.2. Health Impact Management Plan

In health impact management, occupational health and community health are divided. Occupational health is focus on the residents, staff and worker's health issues in the project area due to operation processes. In the construction phase, construction activities such as excavation, civil work, carrying raw material and welding processes can cause dust and noise emission. Worker's health can affect if there is a large amount dust emission is exceeded. Worker can irritate the nose, throat and eyes due to large particles. In addition, worker hearing can also damage due to noise operation process if the noise level is exceeded. To reduce the occupational health impact, enforce workers to wear masks and eye protection glasses when working in high dust emission areas, avoid operating equipment and machinery at the same time unless absolutely necessary, and provide earplugs or ear muffs to workers working in noisy areas.

Community health impact is also considered because of the dust and gas emissions and noise from the construction process, which might disperse with wind to inhabitants near the project area. It can be cause respiratory problems and hearing problem to residents near the project area but the probability is few since the project area is far from the resident area. Spraying water twice a day on dusty areas near the working site and high-traffic routes, protecting with green filter cloth in windy and dusty locations, and slowing the speed of machinery and transport trucks are all mitigating methods.

Heat stress and infectious diseases are also including in the health impacts. Since most of the construction/ decommission works are conducted in the outside area, worker can cause heat-related health problems such as exhaustion, sleep disturbances, dehydration, heat edema during high temperature period days. To reduce the heat impact, rest areas near the working area should be built, as well as wearing long-sleeved shirts, long pants, hats, and applying Thanaka and sun cream, as well as wearing sunglasses.

Operation area can expose workers to various biological hazards due to exposure to bacteria, viruses, insects, plants, birds, animals, and even humans. These biological hazards can result in various health issues, such as skin irritations, allergies and serious infectious diseases. To prevent infectious diseases, provide workers with clean drinking water, share health education knowledge about infectious diseases such as Covid-19, Hepatitis, and supply hand washing soap, hand sanitizers, masks, and oral rehydration salt.

7.5.2.1.Sub-Plan for Health Impact Management

The environmental management sub-plan of Community Risk is shown in Table 7-12.

Table 7-12 Sub-plan for Community Safety Risk

1	Objective	To prevent and mitigate the community safety risk.	
2	Legal Requirement	National Environmental Quality (Emission) Guideline (2015) Environmental Conservation Rules (2014) Environmental Impact Assessment Procedure (2015) The Occupational Safety and Health Law (2019)	
3	Maps	Location maps of project area are shown in Figure 1-1.	
4	Implementation Schedule	Construction/ Decommission Phase,	Operation Phase,
5	Management Actions	<p><u>Construction/ Decommission activities (Construction/ Decommission Phase)</u></p> <ul style="list-style-type: none"> ✓ Enforce worker to wear the mask and eyes protection glass working in high dust emission area. ✓ Repair and maintain machinery every (6) months to prevent noise due to equipment failure. ✓ Do not operate equipment and machinery simultaneously unless necessary. ✓ Monitor machinery to ensure that it is not left on unnecessarily. ✓ Providing earplugs or ear muffs to workers working in noisy areas and enforce to wear the PPEs that provided. <p><u>Heat Stress (Construction/ Decommission Phase and Operation Phase)</u></p> <ul style="list-style-type: none"> ✓ Enforce worker to wear the mask and eyes protection glass working in high dust emission area. 	

		<ul style="list-style-type: none"> ✓ Supply the sufficient drinking water and Oral Rehydration salt pack. ✓ Construct the rest places near the working area. ✓ Worker who works under the sun must wear long-sleeved shirts, long pants, hats. (Applying Thanaka and sun cream, wearing sunglass can also be used) ✓ Assign the worker with working shift when day temperature is high. <p><u>Infectious Disease risks (Construction/ Decommission Phase and Operation Phase)</u></p> <ul style="list-style-type: none"> ✓ Provide workers with clean drinking water to prevent diarrheal diseases caused by impure drinking water. ✓ Sharing health education knowledge to workers about communicable diseases such as Covid-19, Hepatitis. ✓ Supply hand washing soap, hand sanitizers, masks and oral rehydration salt. <p><u>Air Pollution/ Noise Pollution to Surrounding area (Construction/ Decommission Phase)</u></p> <ul style="list-style-type: none"> ✓ Spraying water twice a day on dusty area near the working site and the roads with high traffic. ✓ Protect with green filter cloth in windy and dusty areas. ✓ Slow down the speed of machinery and transport vehicles. ✓ Do not operate till night. 	
6	Monitoring Plan	Monthly	Monthly
7	Responsible Person	Contractor/ Project Proponent	Project Proponent
8	Projected Budgets	Implementing mitigation measures –1,000,000 MMK Monitoring – 500,000 MMK	Implementing mitigation measures –1,000,000 MMK Monitoring – 500,000 MMK

7.5.3. Fire Management Plan

Fire management is a crucial aspect in any project, especially when the project area is susceptible to fire hazards. Fires can pose significant threats to life, property, and the environment. The source places of fire in project area are preliminary tank, operation area, silo area and waste storage area (silica gel store and crude oil residual). The behaviors of workers (e.g, smoking) and arson are also sources of fire. Fire hazard can cause damage to workers and project properties and even death.

Furthermore, fire could take place from various accidents; one of them being faulty electricity materials. So, it is important to have a proper fire management system. The regular maintenance of the electrical wiring should be carried out at regular intervals through a professional electrician. The following measures must be taken:

- Posters indicating evacuation routes are displayed in all areas of the project clearly indicating the position of the poster with ‘You are here’ mark. Route of evacuation should be indicated by way of arrows, leading to the assembly point.
- Water storage tanks having appropriate capacity must be provided for firefighting.
- Fire Hydrants, Fire Hoses and Fire Extinguishers must be installed throughout the project as mandated by the Firefighting Department. Portable fire extinguishers of dry chemical powder must be provided in the electric meter rooms.

During fire hazard in any phase of the project, the person who first notices about fire must start extinguishing before fire department and relevant sector arrive. The main electricity must be switched off immediately when fire occur and the relevant sectors must be informed about fire as soon as possible, the responsible person must make sure that all the workers are safe from fire and call the medical team if any injuries. Firefighting procedures must be carried out by the firefighting team (Table 7-13) accordingly. The security staffs must give a guide for direction and help filling water and direct the water storage area.

The seniors who accomplished the health and safety course must share their knowledge and experience through the juniors. Safety manager must establish internal educational campaign with the purpose of being overwhelming the information.

Periodic inspection of safety relief valve provided with pressure vessels and equipment, preventive maintenance, aware the workers about electric shock by necessary training. Prepare an emergency contact directory consisting contact numbers of nearest fire service, local police station, hospitals etc. and displace that everybody can see it. Declaring the project as a “No Smoking Zone”. When plant runs at abnormal situation e.g., if emission level increases than its normal level then immediately inform to HSE officer as well as project manager. Build a safety committee which from firefighting team, rescue team. The committee arranges a meeting every month to discuss about fire safety management. Ensure proper training of the employees about the natural disasters’ management, fire safety as well as occupational health and safety. The notification sign for fire protection described in Figure 7-4.



Figure 7-4 Notification Sign for Fire Protection

Table 7-13 Fire Safety Team

No	Team	Responsibilities
1	U Ko Ko Oo (Director)	Leader
2	U Thant Zin (Director)	Deputy Leader
3	U Zaw Thant (Manager)	Member
4	U Myo Thant (Head Worker)	Member
5	U Thet Paing Htwe (Head Worker)	Member

7.5.3.1.Sub-Plan for Fire Management

The environmental management sub-plan of fire safety management is shown in Table 7-14.

Table 7-14 Environmental Management Sub-Plan for Fire Management

1	Objective	To prevent and mitigate the impacts of fire hazard,	
2	Legal Requirement	National Environmental Quality (Emission) Guideline (2015) Environmental Conservation Rules (2014) Environmental Impact Assessment Procedure (2015) The Myanmar Fire Brigade Law (2015) Natural Disaster Management Law (2013)	
3	Maps	Location maps of project area are shown in Figure 1-1.	
4	Implementation Schedule	Construction/ Decommission phase	Operation Phase
5	Management Actions	<ul style="list-style-type: none"> ✓ Sufficient fire protection equipment and fire extinguishers are provided. ✓ Combustible wastes are disposed regularly and stored separately. ✓ Awareness about do's and don'ts for waste storage and fuel storage is given. ✓ To train the fire drill for emergency cases every 6 month. ✓ To put the safety & warning signs at fuel storage areas, generator, etc. ✓ To repair the broken electronic devices and wires immediately by electrician. ✓ Only permit person allow to access to fuel storage area. ✓ To put the emergency contact numbers in public area of project area. 	
6	Monitoring Plan	Twice a year	Twice a year
7	Responsible Person	Contractor/ Project Proponent	Project Proponent
8	Projected Budgets	Implementing mitigation measures –1,000,000 MMK Monitoring – 500,000 MMK	Implementing mitigation measures –1,000,000 MMK Monitoring – 500,000 MMK

7.5.4. Natural Disasters Management Plan

If any natural disasters occur during the project, there may be losses. In the event of a natural disasters such as storm, earthquake, wildfire, etc., it is necessary to have an emergency response plan for natural disasters prevention. For the project area, detail sub-plan for earthquake, flooding, ground subsidence and wildfire are in the below.

7.5.4.1. Construction/ Decommission Phase and Operation Phase

All phases of the project implementation, worker can cause injuries and damage to project properties by natural disasters. Workers can cause injuries as well as damage to project properties by earthquake due to collapse of building. In the construction/ decommission phase, there is no significant risk in the project area due to ground subsidence and liquefaction. In the operation phase, water usage in the project area is supply from underground water. Therefore, there is a potential liquification risk along the operation phase due to extraction water from aquifer. Wildfire risk also can occur since the project process operates at high temperatures and is located in a dry zone. To reduce the natural disaster risks, the project proponent must follow the disaster relevant rule and regulation of the government and following management action. In addition, the project proponent needs to make and follow the emergency plan for the evacuation and rescue of individuals and arrange for delivery to the clinic or nearest hospital for emergency.

7.5.4.2. Sub-Plan for Natural Disasters

The environmental management sub-plan of Natural Disaster is shown in Table 7-15.

Table 7-15 Environmental Management Sub-Plan for Natural Disaster

1	Objective	To prevent and mitigate the injuries and hazard during natural disaster.
2	Legal Requirement	National Environmental Quality (Emission) Guideline (2015) Environmental Conservation Rules (2014) Environmental Impact Assessment Procedure (2015) Public Health Law (1972) The Prevention and Control of Communicable Diseases Law (1995) Natural Disaster Management Law (2013)
3	Maps	Location maps of project area are shown in Figure 1-1.
4	Implementation Schedule	Construction/ Decommission and Operation Phases
5	Management Actions	<p><u>Earthquake</u></p> <ul style="list-style-type: none"> ✓ Make and follow the emergency plan for the evacuation and rescue of individuals. ✓ Make backup arrangement the Emergency medicine boxes (First-Aid Box). ✓ Arrange for delivery to the clinic or nearest hospital for emergency. ✓ Greater focus on geotechnical investigations to reduce the risk of unsatisfactory foundation performance in project area. ✓ Long term and short-term earthquake monitoring system or earthquake warning system should be installed in place based on the precursors of an earthquake such as the sudden rise of groundwater, the changes of elasticity in rocks and soils, etc.

		<p><u>Food</u></p> <ul style="list-style-type: none"> ✓ Make and follow the emergency plan for the evacuation and rescue of individuals. ✓ Constantly listening the weather reports to know the possibility of natural disasters such as storms and flood. ✓ Make backup arrangement the Emergency medicine boxes (First-Aid Box). ✓ Arrange for delivery to the clinic or nearest hospital for emergency. <p><u>Ground Subsidence</u></p> <ul style="list-style-type: none"> ✓ Greater focus on geotechnical investigations to reduce the risk of unsatisfactory foundation performance of each building site. ✓ Deep piles should be designed to accommodate an appropriate level of lateral movement of the surface crust even if they are far from any watercourse where there is a possibility of severe liquefaction. ✓ Groundwater use should not exceed the amount of water that can be extracted based on the results of the pumping test. ✓ Strictly checking and conducting soil improving process using Vibro-floatation method to get the necessary relative density. <p><u>Wildfire Risk</u></p> <ul style="list-style-type: none"> ✓ Ensure in good condition of fire extinguishers and hydrants are readily arranged and employees are trained in their use. ✓ Make and follow the emergency plan for the evacuation and rescue of individuals. ✓ Clear the factory's surrounding area regularly to reduce the risk of wildfires spreading to the factory. ✓ Make backup arrangement the Emergency medicine boxes (First-Aid Box). ✓ Arrange for delivery to the clinic or nearest hospital for emergency. ✓ Arrange to call and notify to Fire Services Department immediately if the wildfire occur. 	
6	Monitoring Plan	Twice a year	Twice a year

7	Responsible Person	Contractor/ Project Proponent	Project Proponent
8	Projected Budgets And Responsibilities	Implementing mitigation measures –1,000,000 MMK Monitoring – 500,000 MMK	Implementing mitigation measures –1,000,000 MMK Monitoring – 500,000 MMK

7.6. TREE PLANTATION PLAN

The trees are already plant in the factory compound and near the factory's fence. Therefore, these trees are maintained monthly by the project proponents. If the plants are dead, the project proponent will plant new trees in the project area. The plantation in the factory is shown in Figure 5-3.



Figure 7-5 Plantation in the factory

7.7. EMERGENCY RESPONSE PLAN

In case of emergency due to any type of natural hazards a quick and immediate response is essential. In the project area, the persons who will be mainly responsible for the emergency situation must be appointed and planned to be managed in the emergency situation. This response depends on the actions taken by individuals to avoid or mitigate the adverse effects of a hazard and to undertake search and rescue operations.

In order to be able to respond effectively when natural hazards, it is necessary to prepare for emergency situations in advance. In order to know the possibility of natural disasters such as earthquake, storm etc., it is necessary to constantly listen to weather reports. In addition, providing knowledge to respond to emergency situations; employees will be emergency safety and training.

If natural disasters and emergency situations occur, the following will be constructed in order to respond.

- Appointing a responsible person for occupational health and safety
- Setting the assembly point for emergency situation
- Emergency assembly point must be in an open area away from trees, poles, and buildings that could collapse
- In the event of an emergency situation, stop work and go to the assembly point in an orderly manner.
- Regular practice in twice per year of training activities for emergency response plan
- Training activities for the emergency response plan are regularly practiced twice a year.
- The worker must have enough assistance from the first aid kit during the operation, and the worker must receive training.
- The contact numbers of hospitals, the fire department, and other relevant departments must be posted in places visible to all employees.

In the event of an emergency situation, the emergency exit map and assembly point location must be placed in the project area. Therefore, assembly point signboard and emergency exit map for the project area are described in Figure 7-6 and Figure 7-7.



Figure 7-6 Assembly Point Signboard

Emergency procedures are –

- Operate Nearest Fire Alarm
- Leave the building by follow the emergency exit
- Report to the person in charge of assembly point
- If there are any injuries to persons, get in touch with the hospital and the health department as soon as possible, and transfer the patient there.
- To contact with Taung Thar Township hospital, MyinChan Township Hospital and near rural health department of the project.
- To connect with township government department and to implement the instruction of government procedure.
- Do not re-enter the building until authorized to do so.

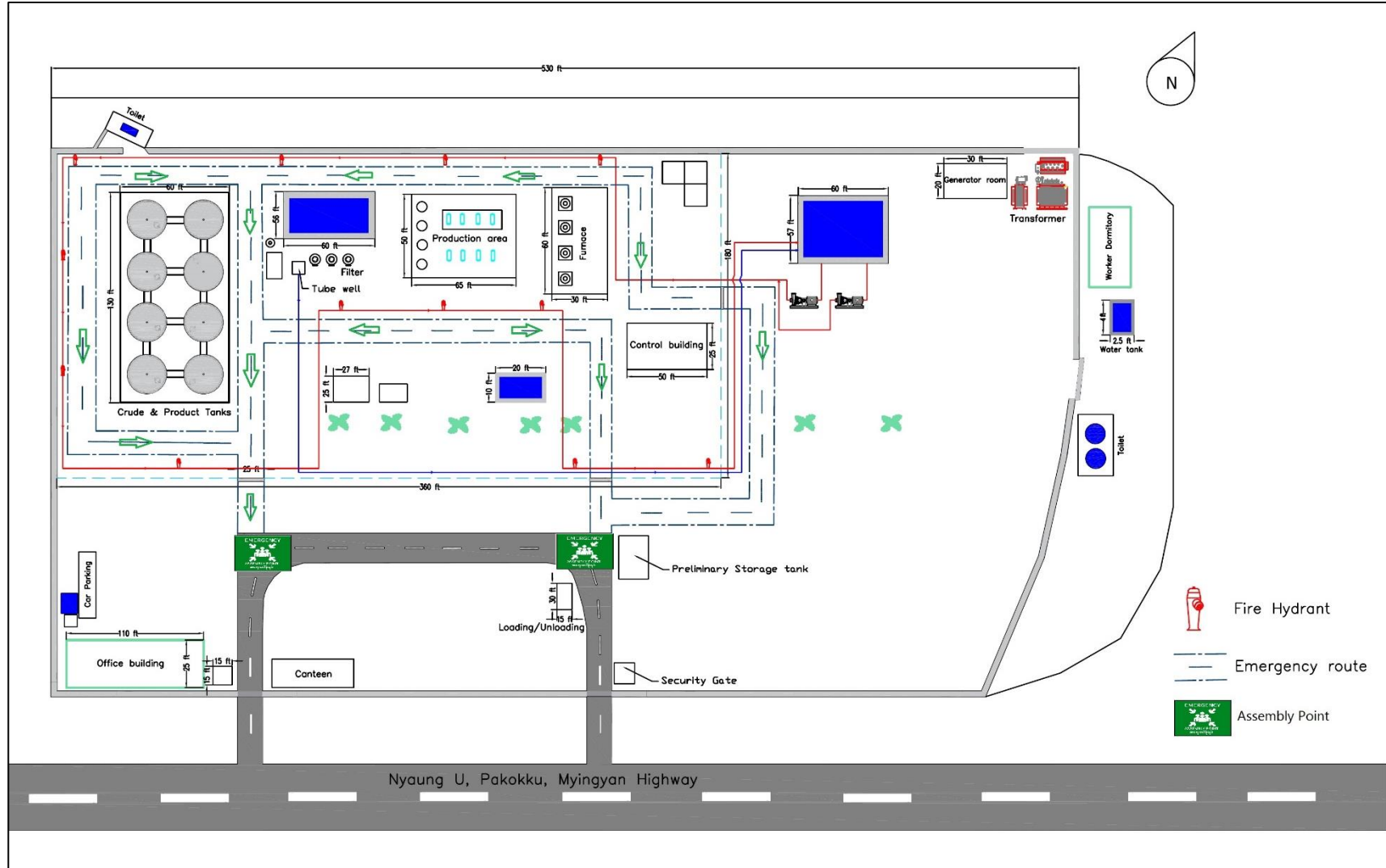


Figure 7-7 Emergency Exit Map

7.8. RECORD KEEPING

Record keeping and reporting of performance is an important management tool for ensuring sustainable operation. Records should be maintained for regulatory, monitoring and operational issues. Typical record keeping requirements for the site is summarized in Table 7-16.

Table 7-16 Record Keeping Requirements

Parameter	Particulars
Resources Use	<ul style="list-style-type: none"> - Daily quantity of electrical power consumption through power meter - Daily quantity of water utilized for domestic through water meter
Solid Waste Handling and Disposal	<ul style="list-style-type: none"> - Daily quantity and management of domestic and operation solid waste from the operation process
Monitoring and Survey	<ul style="list-style-type: none"> - Records of all monitoring carried out as per the finalized monitoring protocol.
Complaints from Nearest Residents	<ul style="list-style-type: none"> - Records of all complainants from the nearest villages
Employee Health and Safety Record	<ul style="list-style-type: none"> - Daily record for accidents at the project
Others	<ul style="list-style-type: none"> - Equipment inspection and calibration records, where applicable - Vehicle maintenance and inspection records

7.9. REPORTING MONITORING RESULTS

Results of monitoring will be recorded in files and audit monitoring will be carried out strictly as required by the related national regulations and the monitoring results of required parameters should be reported to Environmental Conservation Department every 6 months.

7.10. CORPORATE SOCIAL RESPONSIBILITY (CSR)

7.10.1. Purpose

To be the appropriate sector and provide the most benefits for the region in carrying out CSR activities. The goal is to achieve sustainable development.

7.10.2. Detail CSR Plan

The project proponent already has the portion about 2% from the annual profit in order to support all the staffs and workers of social occasional events and corporate social

responsibility programs. The following estimated budgets are for the social, education, and health sectors, respectively, for the CSR program of MCCM Co., Ltd. as shown in Table 7-17 below. In the project operation period from 2020 to 2023, the project proponent is implemented the CSR activities which are water donation and religious donation near villages. Other activities have not implemented yet however if it necessary, the project proponent will be completed. Donation to monastery and religious organization near villages record is shown in Table 7-17.

Table 7-17 Estimated Budget for CSR Program of MCCM Co., Ltd.

No	Item	Responsible Organization	Frequency	Estimated Budgets (MMK)
Social				
11	Road construction and make good water drainage system near villages	MCCM Co., Ltd.	Annually	2,000,000
Health				
2	Provide drinking water tank near villages and rural health department in the project area	MCCM Co., Ltd.	Annually	2,500,000
Religion				
3	Donation to monastery and religious organization near villages	MCCM Co., Ltd.	Annually	2,000,000
Education				
4	Support to Building construction for schools at near villages	MCCM Co., Ltd.	Annually	2,000,000
Total				8,500,000

7.11. GRIEVANCE REDRESS MECHANISMS (GRMS)

Grievance redress mechanisms (GRMs) are institutions, instruments, methods, and processes by which a resolution to a grievance is sought and provided. In this program, clarification how to submit grievance, appointing negotiator, publishing phone numbers and address where a person could contact and complaint are carried out.

A Negotiator will be appointed as a Central Grievance Collector to file complaints through the Company's Grievance Complaint Form. Arrangements will be made to register

grievances. Subsequently, grievances will be resolved from investigating those by contacting the most responsible person of the project or will be continued by forming grievances resolving team. The complaint form is shown in **Appendix (L)**. Negotiator will carry out the grievance redress mechanisms (GRMs) by collaborating with relevant governments and local communities. The team for grievance redress mechanisms is shown in Table 7-18.

Table 7-18 Team for Grievance Redress Mechanisms

No	Name	Position	Ph No.	Contact
1	U Myint Maung	Managaing Director	09773104888	MCCM Co., Ltd
2	U Ko Ko Oo	Director	09697997888	MCCM Co., Ltd

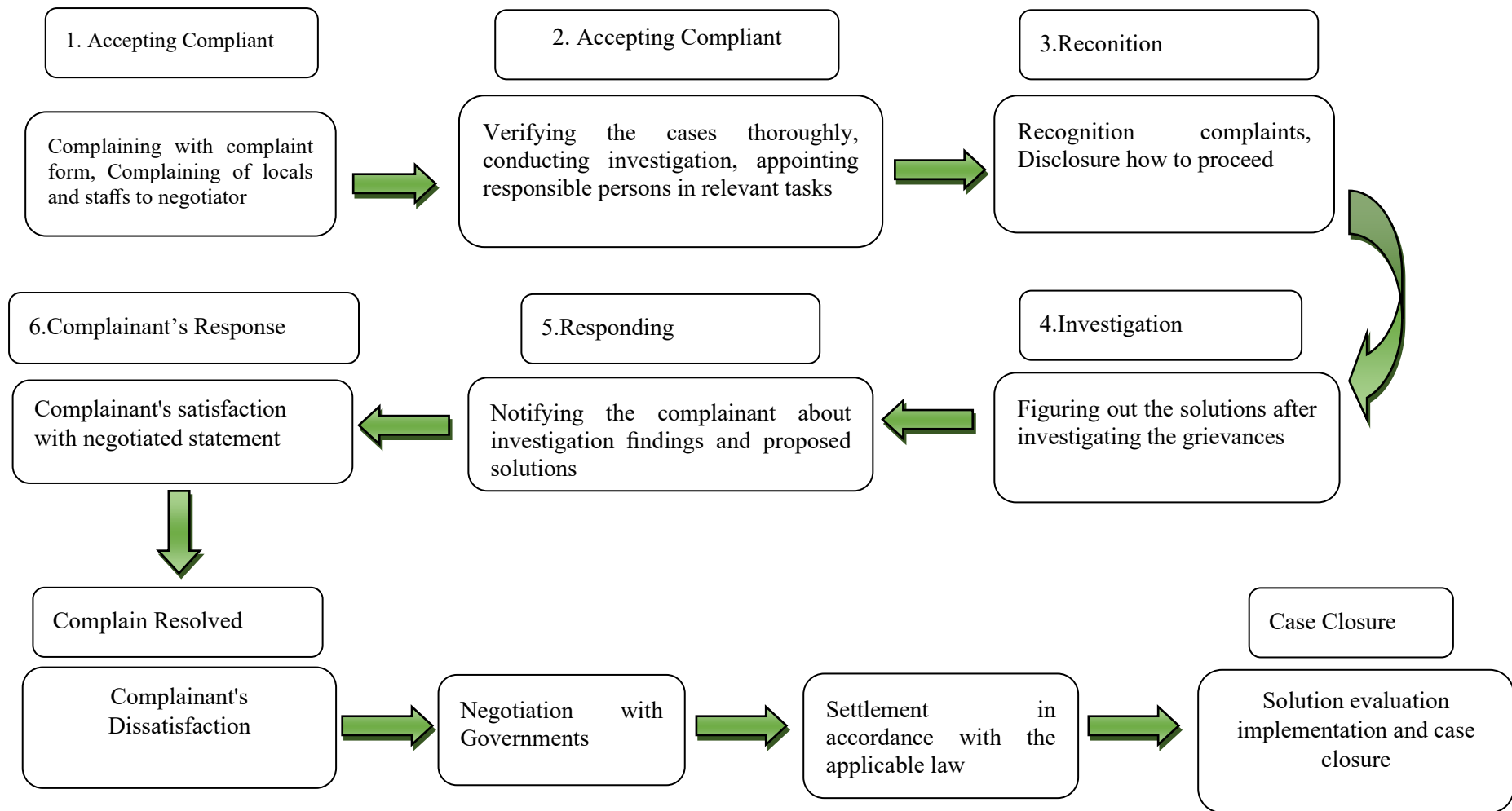


Figure 7-8 Grievance Redress Mechanism

CHAPTER 8

RECOMMENDATION AND CONCLUSION

The project proponent, MCCM Co., Ltd. is situated at Mandalay Region, Myingyan District, Taungtha Township. The project proponent requested Hexagonal Angle International Consultants Co., Ltd. to implement the Environmental Impact Assessment (EIA) of the project.

Assessment of potential environmental impacts, risk assessments and preparing of environmental management plan with recommended impact mitigation measures were prepared for construction/ decommission and operation stages according to the compliance with environmental impact assessment procedure (2015) and National Environmental (Emission) Guidelines (2015). The main objectives of the EIA are;

- a) To identify and assess potential impacts on the environment
- b) To implement environmental management and mitigation measure plan
- c) The environmental quality of the surrounding area will not be affected or decreased by the project activities.

In this EIA report study, baseline environmental data collection and site visit activities was conducted in two seasons which are wet and dry seasons. In wet season, the baseline quality and site visit were conducted in September, 2021 and also conducted on May, 2023 in dry season. The environmental baseline qualities and site visit activities included monitoring for air, water, noise, vibration, light, temperature, odor, soil and surveyed for biodiversity, socio-economic, traffic counting and project investigation.

According to the data interpretation for outdoor air monitoring results and other environmental baseline quality measurements were compared with National and Environmental Quality (emission) guideline (2015) and other international standards. The detailed description of monitoring activities and results are described in Chapter 4. According to the results, all results of the outdoor air quality are within the NEQEG (2015) expect ozone parameter in project area in wet season due to create by chemical reactions between oxides of nitrogen (NO₂) and volatile organic compound (VOC), and sunlight, especially in crude oil storage areas, refining area, waste disposal areas of silica gel, and raw and product storage areas.

As water quality monitoring, 2 points for surface water, 3 points for ground water, 1 point for domestic wastewater and 1 point of operation wastewater sampling were conducts in the study area. According to the results, all measurement parameters are within the guidelines except from biological oxygen demand (BOD) of operation wastewater quality in wet season due to the wastewater filtration pond capacity is insufficient for the filtering process from silica gel. Therefore, we recommend to constructed the sufficient filtration tank and now, No.3 (filtering tank) was constructed. The operation wastewater will be monitored twice a year, which is also written in the monitoring report. Another water parameter which exceed the guidelines are chlorine, phosphorous of Kyaw Zi village's ground water quality and temperature in dry season. All results of noise, vibration, light, odor and soil qualities were meeting with the guidelines but temperature results in dry season are over the guideline

because of the outside weather conditions and the air circulation equipment such as aircon and fans are closed since the factory is stopped and the electricity is break.

For the biodiversity survey, there are 2 seasons which are wet and dry season were conducted. According to the survey result, some flora and fauna species are in the IUCN red list and the detailed information is described in biological section, Chapter 4. As EIA procedure, the socio-economic survey was made in project near villages such as Kyaw Zi village and Malar village. Moreover, the traffic volume counting activities was done in wet season and dry season and the results are compared with standard from Thailand.

The assessments of each impact are based on the construction/ decommission and operation process of the project. Evaluation of environmental and social impact assessment and detail consideration can be seen in **Chapter 5**. The assessment of risk and cumulative impact of the project are also presented in this chapter.

In the potential environmental impact assessment during the construction/ decommission phase, there is no major and moderate impacts level. During operation phase, the moderate impact level is air pollution, solid waste and the remaining parameters such as water pollution, noise and vibration, soil pollution are low impact level.

8.1. RECOMMENDATIONS

The following recommendations have been made for efficient and effective implementation of environmental conservation, health and safety and social responsibilities through the lifespan of the proposed project.

- Follow the comments and suggestions made by ECD after reviewing this EIA report.
- Once EIA is approved by concerned authorities, strict implementation is essential.
- For full and proper implementation of environmental management plan in this EIA report, well understanding and supports by proponent and authority is deem necessity.
- Proposed emergency response plan should be implemented strictly both during construction and operation/maintenance phases of the project.
- Well experienced and knowledgeable HSE Manager and HSE Assistants shall be appointed.
- Daily, monthly and annual action plan shall be formulated based on environmental management plan in this EIA and practiced at operation level.
- Necessary care and environmentally sound practices should be taken for activities out of project site particularly on goods and materials transportation.
- Keep full records of environmental management activities and present to annual independent third-party environment audit.
- Follow the audit report and comments.
- Abide environmental policy, laws, rules and instructions of the Republic of the Union of Myanmar.

Finally, the proponent should follow the comments and suggestions made by ECD after reviewing this EIA report study. Once EIA is approved by concerned authorities,

effective implementation of EMP by the project proponent is essential. The proponent should abide environmental policy, laws, rules and instructions of the Republic of the Union of Myanmar.

8.2. CONCLUSION

The environmental and social impacts are caused by construction/ decommission and operation process of the project, which is generated by air quality, noise, solid waste, and wastewater. Employees and communities around the project area could suffer from the effects of pollution unless the major and moderate impacts are not mitigated. Hence, those impacts must be mitigated according to commitment table and mitigation measures plan mentioned in the report.

Therefore, dust and gas emissions and wastewater generated from the project must be properly cleaned and discharged. In addition, control of noise sources and waste storage and disposal must be done. In addition, providing health education to workers is regarding the handling of hazardous waste and occupational health and safety. It must be controlled by trained professionals with a system of rewards and punishments for proper disposal of waste by employees.

As a project proponent, it is necessary to systematically implement this environmental management plan to minimize environmental and social impact. Consequently, the physical and social environment of the proposed project will be completely acceptable and their socio-economic standard is expected to be improved and undertaking corporate social responsibilities (CSR) as recommended.

In conclusion, it has been figured out that, the proposed project is going to generate local employment opportunities and enhance capabilities and working skills of employees as well as improvement of living standard for local people. The study indicates that further positive impacts would be of immense benefit to the local community and national development as well.

CHAPTER 9

COMMENT RESPONSE TABLE

MCCM Co. Ltd မှ အကောင်အထည်ဖော်ဆောင်ရွက်မည့် အသေးစားရေနံချက်လုပ်ခြင်းလုပ်ငန်းနှင့် ပတ်သတ်၍ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ဦးစီးဌာန၊ ညွှန်ကြားရေးမှူးချုပ်ရုံးမှ ညွှန်ကြားလာသော သဘောထားမှတ်ချက်အား ပြန်လည်ပြင်ဆင်ခြင်း

စဉ်	စိစစ်တွေ့ရှိချက်များ	သုံးသပ်အကြံပြုချက်များ	ပြန်လည်ပြင်ဆင်ချက်များ
၃။	ကတိကဝတ်များ		
၃.၁		စီမံကိန်းအဆိုပြုသူမှ စီမံကိန်းနှင့်သက်ဆိုင်သည့် ဥပဒေ၊နည်းဥပဒေများ၊ လုပ်ထုံးလုပ်နည်းများနှင့် နိုင်ငံတကာစည်းကမ်းသတ်မှတ်ချက်များကို လိုက်နာမည်ဖြစ်ကြောင်းကတိကဝတ်အားဖော်ပြရန်။	စီမံကိန်းအဆိုပြုသူမှ လိုက်နာမည်ဖြစ်ကြောင်းအား အခန်း (၂)၊ စာပိုဒ်ခွဲ ၂.၁ တွင် ဖော်ပြထားပါသည်။
၃.၂		Commitment list အနေဖြင့် ဖော်ပြချက်တွင် စီမံကိန်းမှ အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးခြင်း အစီအစဉ်နှင့် ပတ်သတ်၍ ဆက်လက်ဆောင်ရွက်သွားမည့် လုပ်ငန်းစဉ်များနှင့် ပတ်သတ်၍ ဖော်ပြရန်။	စီမံကိန်းမှ အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးခြင်းအစီအစဉ်နှင့်ပတ်သတ်၍ ဆက်လက်ဆောင်ရွက်သွားမည့်လုပ်ငန်းစဉ်များနှင့် ပတ်သတ်၍ ကတိကဝတ်ပြု ဖော်ပြခြင်းအား အခန်း (၂)၊ စာပိုဒ်ခွဲ ၂.၉ တွင် ဖော်ပြထားပါသည်။
၄.	မူဝါဒ၊ ဥပဒေနှင့် အဖွဲ့အစည်းဆိုင်ရာမူဘောင်		
၄.၁		Commitment letter တွင် စီမံကိန်းအဆိုပြုသူမှ အမှန်တစ်ကယ်လိုက်နာဆောင်ရွက်နိုင်မည့် Parameters များနှင့် guideline values များအားဖော်ပြရန်။	အခန်း (၂) တွင် စာပိုဒ်ခွဲ ၂.၉ တွင် ထည့်သွင်းဖော်ပြထားပါသည်။

၄.၂		စီမံကိန်းနှင့်ပတ်သတ်၍ တာဝန်ရှိအဖွဲ့အစည်းများ၏ (institutional framework) နှင့် ပတ်သတ်၍ ဖော်ပြရန်။	အခန်း (၂)၊ စာပိုဒ်ခွဲ (၂.၂) တွင်ဖော်ပြထားပါသည်။
၅	စီမံကိန်းအကြောင်းအရာ ဖော်ပြချက်နှင့် အခြားနည်း ရွေးချယ်ခြင်း		
၅.၁		အနီးတွင်ရှိသော စမ်းချောင်းများနှင့် ပတ်သတ်၍ဖော်ပြရန်။	အနီးတွင်ရှိသော စမ်းချောင်းများနှင့် ပတ်သတ်၍ အခန်း (၃)၊ စာပိုဒ်ခွဲ (၃.၁) တွင် ဖော်ပြထားပါသည်။
၅.၂		Raw materials တွင် silica gel နှင့်ပတ်သတ်၍ သိုလှောင်သိမ်းဆည်းထားရှိသည့်အစီအစဉ်နှင့် ၎င်းတို့အားစွန့်ပစ်ပါက မည်ကဲ့သို့ဆောင်ရွက်ကြောင်းကိုဖော်ပြရန်။	Silica gel နှင့်ပတ်သတ်၍ သိုလှောင်သိမ်းဆည်းထားရှိသည့်အစီအစဉ်နှင့် စွန့်ပစ်သည့်အစီအစဉ်အား အခန်း (၃)၊ စာပိုဒ်ခွဲ ၃.၅.၁.၁ တွင် ဖော်ပြထားပါသည်။
၅.၃		Preliminary tank, Figure ၃-၄ Heating crude oil in preliminary tank နှင့်ပတ်သတ်၍ ဖော်ပြချက်တွင် ၅၀°C အပူပေး၍ ရေနှင့်အတူပါဝင်သော Oil များအားခွဲထုတ်ပါကြောင်းနှင့် ၎င်းတို့အားထားရှိမှုကို ပုံများဖြင့် ဖော်ပြထားရှိပြီး မူလအဆင့်အနေဖြင့် ပါဝင်သောရေများအား မည်ကဲ့သို့ပြုလုပ်ကြောင်းနှင့် စွန့်ပစ်မှုမလုပ်ဆောင်မီ ဆောင်ရွက်သည့်လုပ်ငန်းစဉ်များကို ဖော်ပြရန်။	ခွဲထုတ်လိုက်သောရေများနှင့်ပတ်သတ်၍ ဖော်ပြထားမှုများအား အခန်း (၃)၊ စာပိုဒ်ခွဲ ၃.၅.၁.၂ တွင် ဖော်ပြထားပါသည်။
၅.၄		Laboratory test နှင့်ပတ်သတ်၍ တည်ဆောက်ထားရှိသည့်နေရာ၊ အသုံးပြုသည့် ပစ္စည်းကိရိယာများအားဖော်ပြရန်။	Laboratory နှင့် ပတ်သတ်၍ အခန်း (၃)၊ စာပိုဒ်ခွဲ (၃.၇) တွင် ဖော်ပြထားပါသည်။

၅.၅	နေရာသီ ပူပြင်းခြောင်သွေ့သောအချိန်တွင် ပြင်ပအပူချိန်နှင့်ဓာတ်ပြု၍ ပေါက်ကွဲမှုမဖြစ်ပွားစေရန် ဆောင်ရွက်ထားရှိသည့် လုပ်ငန်းစဉ်အား ဖော်ပြရန်။	သိုလှောင်ကန်များတွင် ဆောင်ရွက်ထားရှိသည့် အစီအမံများအား အခန်း (၃)၊ စာပိုဒ်ခွဲ (၃.၅.၁.၅) တွင် ဖော်ပြထားပါသည်။
၅.၆	ထွက်ရှိလာသည့် ရေနံအခြားအနယ်အနှစ်များအား စွန့်ပစ်မည့်လုပ်ငန်းစဉ်တို့အားဖော်ပြရန်။	ထွက်ရှိလာသော ရေနံအခြားအနယ်အနှစ်များနှင့် ပတ်သတ်၍ ဆောင်ရွက်သည့် အစီအစဉ်များအား အခန်း (၃)၊ စာပိုဒ်ခွဲ (၃.၅.၁.၆) တွင် ဖော်ပြထားပါသည်။
၅.၇	Silica gel များအား စနစ်တကျ စွန့်ပစ်ရန်နှင့် မစွန့်ပစ်ခင်တွင် သိုလှောင်ထားရှိသည့် လုပ်ငန်းစဉ်များကို ဖော်ပြရန်။	Silica gel များနှင့်ပတ်သတ်၍ ဆောင်ရွက်သွားမည့်အစီအစဉ်များအား အခန်း (၃)၊ စာပိုဒ်ခွဲ ၃.၉.၄ တွင် ဖော်ပြထားပါသည်။
၅.၈	စက်ရုံမှ ထွက်ရှိလာမည့် စွန့်ပစ်ပစ္စည်းများအား တစ်လလျှင် သုံးကြိမ်ခန့် Disposal site တွင်စွန့်ပစ်၍ ဆောင်ရွက်မည်နှင့်ပတ်သတ်၍ ယာယီထားရှိမည့် နေရာအားဖော်ပြရန်နှင့် မိုးရာသီကာလ ၎င်းစွန့်ပစ်ပစ္စည်းများပြင်ပသို့ မရောက်ရှိစေရန် ဆောင်ရွက်မည့်လုပ်ငန်းစဉ်များကို ဖော်ပြရန်။	ယာယီစွန့်ပစ်မည့်နေရာနှင့် စွန့်ပစ်ပစ္စည်းများ ပြင်ပသို့ မရောက်ရှိစေရန် ဆောင်ရွက်သွားမည့်အစီအစဉ်များအား အခန်း (၃)၊ စာပိုဒ်ခွဲ ၃.၉.၄ နှင့် ပုံ ၃-၂၄ တွင် ဖော်ပြထားပါသည်။
၅.၉	Crude oil မှခွဲထွက်မည့် စွန့်ပစ်ရေများအား သီးသန့် tank ဆောက်လုပ်၍ စနစ်တကျစွန့်ပစ်မည့် လုပ်ငန်းစဉ်များအား ဖော်ပြရန်။	Crude oil မှ ခွဲထွက်မည့် စွန့်ပစ်ရေများနှင့် ပတ်သတ်၍ စီမံဆောင်ရွက်သည့် အစီအစဉ်များအား အခန်း (၃)၊ စာပိုဒ်ခွဲ (၃.၅.၁.၃) တွင် ဖော်ပြထားပါသည်။
၅.၁၀	Wastewater treatment tanks (၄) ခုအားတည်ဆောက်ထားရှိမှုအခြေအနေ filtered oil and water အားသိုလှောင်မည့်ပမာဏ လုံလောက်မှုရှိ၊ မရှိ၊ sand and charcoal, firefighting tank တို့ဖြင့်တည်ဆောက်ထားရှိသည့် Tanks များ၏ ဒီဇိုင်းနှင့်ပုံများနှင့်၎င်းတို့၏ တည်နေရာများအား မြေပုံပေါ်တွင် ထည့်သွင်းဖော်ပြရန်နှင့် ၎င်းတို့အား treatment ပြုလုပ်၍	Wastewater treatment tanks (၄) နှင့် ပတ်သတ်၍ ဖော်ပြထားမှုများအား အခန်း (၃)၊ စာပိုဒ်ခွဲ (၃.၉.၅) တွင် ဖော်ပြထားပါသည်။

		စွန့်ပစ်မှုမှာ ပတ်ဝန်းကျင်အပေါ် သက်ရောက်မှု ရှိ/မရှိ တို့အား ဖော်ပြပေးရန်။	
၅.၁၁		ကုန်ကြမ်းပစ္စည်းများနှင့် ပတ်သတ်၍ မည်ကဲ့သို့သယ်ဆောင်ကြောင်းနှင့် သယ်ဆောင်သည့်လမ်းကြောင်းတစ်လျှောက် ဒေသခံပြည်သူများ၏ ယဉ်ယန္တရားများနှင့် ယဉ်အန္တရာယ် မဖြစ်ပွားစေရန် ဆောင်ရွက်မည့်လုပ်ငန်းအစီအစဉ်အား ဖော်ပြရန်။	ကုန်ကြမ်းပစ္စည်းသယ်ဆောင်မှုများနှင့်ပတ်သတ်၍ ဖြစ်နိုင်သော အန္တရာယ်အဆင့်များ၊ လျှော့ချရမည့်နည်းလမ်းများနှင့်ပတ်သတ်၍ အခန်း (၅)၊ စာပိုဒ်ခွဲ (၅.၁၁.၂) တွင် ဖော်ပြထားပါသည်။
၅.၁၂		တစ်ရက်ချက်လုပ်စွမ်းရည် ပမာဏနှင့် ၎င်းတို့အားသိုလှောင်သိမ်းဆည်းထားသည့် လုပ်ငန်းစဉ်မှစ၍ နောက်ဆုံး ရောင်းချသည့်လုပ်ငန်းစဉ်အထိပါ ဖော်ပြရန်	တစ်ရက်ချက်လုပ်စွမ်းရည် ပမာဏနှင့် ၎င်းတို့အားသိုလှောင်သိမ်းဆည်းထားသည့် လုပ်ငန်းစဉ်မှစ၍ နောက်ဆုံး ရောင်းချသည့်လုပ်ငန်းစဉ်အထိ အခန်း (၃)၊ စာပိုဒ်ခွဲ (၃.၅.၁.၁၂) နှင့် စာပိုဒ်ခွဲ (၃.၅.၁.၁၃) တွင် ဖော်ပြထားပါသည်။
၅.၁၃		စီမံကိန်း၏ အနီးပတ်ဝန်းကျင်တွင် စိုက်ပျိုးမြေဧရိယာများ၊ ရာသီချောင်းများရှိသည့်အတွက် စီမံကိန်းမှစွန့်ပစ်ရေများ၊ စွန့်ပစ်အစိုင်အခဲများ ပြင်ပသို့မရောက်ရှိစေရန် ဆောင်ရွက်မည့် လုပ်ငန်းစဉ်အားဖော်ပြရန်။	စီမံကိန်းမှစွန့်ပစ်ရေများ၊ စွန့်ပစ်အစိုင်အခဲများ ပြင်ပသို့မရောက်ရှိစေရန် ဆောင်ရွက်မည့် အစီအစဉ်များအား အခန်း (၃)၊ စာပိုဒ်ခွဲ (၃.၉.၄) နှင့် စာပိုဒ်ခွဲ (၃.၉.၅) တွင် ဖော်ပြထားပါသည်။
၅.၁၄		စီမံကိန်းမှ ရေနံချက်လုပ်ရာတွင် ထွက်ရှိလာနိုင်သည့် အမှုန်အမွှားများ၊ အနံ့ထွက်ရှိမှုတို့နှင့်ပတ်သတ်၍ စီမံကိန်းမှ မည်သည့်ပမာဏအထိ ထွက်ရှိနိုင်ကြောင်းနှင့် ၎င်းတို့အား ပတ်ဝန်းကျင်လေအရည်အသွေးအား ညစ်ညမ်းမှုမဖြစ်စေရန် ဆောင်ရွက်မည့် လုပ်ငန်းစဉ်များနှင့် စက်ပစ္စည်းများတွင် တပ်ဆင်အသုံးပြုမည့် လုပ်ငန်းစဉ်များအားဖော်ပြရန်	စီမံကိန်းမှ ရေနံချက်လုပ်ရာတွင် ထွက်ရှိလာနိုင်သည့် အခိုးအငွေ့တို့နှင့်ပတ်သတ်၍ စီမံကိန်းမှ မည်သည့်ပမာဏအထိ ထွက်ရှိနိုင်ကြောင်းအား အခန်း (၅)၊ စာပိုဒ်ခွဲ (၅.၈.၂) တွင် တွက်ချက်ဖော်ပြထားပါသည်။

၅.၁၅	<p>စီမံကိန်းမှ နောက်ဆုံးထွက်ရှိသော ဓာတ်ဆီ၊ ဒီဇယ်ဆီနှင့် မီးထိုးဆီများအား ရောင်းချရာတွင် ဆောင်ရွက်ထားရှိသည့် အဆောက်အဦနှင့် နေ့စဉ်ရောင်းချရန် လျာထားရှိမှုပန် Design များ ဝယ်ယူရန် လာရောက်ကြသော ကားအဝင်အထွက်ရှိသဖြင့် ၎င်းတို့အား မည်ကဲ့သို့ဆောင်ရွက်ထားရှိကြောင်းကို ဖော်ပြရန်။</p>	<p>နောက်ဆုံးထွက်ရှိသော ထုတ်ကုန်များနှင့်ပတ်သတ်၍ ရောင်းချရန်စီစဉ်ထားရှိမှုများ၊ ကားအဝင်အထွက်များနှင့်ပတ်သတ်၍ စီစဉ်ထားရှိမှုများအား အခန်း (၃)၊ စာပိုဒ်ခွဲ (၃.၅.၁.၁၃) တွင် ဖော်ပြထားပါသည်။</p>
၅.၁၆	<p>စီမံကိန်းနှင့်ပတ်သတ်၍ စာမျက်နှာ (၅), ပုံ (၁) ထုတ်ကုန်ထုတ်လုပ်ပုံ အဆင့်ဆင့်အား ဖော်ပြထားကြောင်း စိစစ်တွေ့ရှိရသော်လည်း စီမံကိန်းအကြောင်းအရာဖော်ပြချက်တွင် ကုန်ကြမ်းအား ပမာဏမည်မျှ ကုန်ကြမ်းလက်ခံရန် တည်ဆောက်ထားရှိပါကြောင်းနှင့် တစ်ရက်ချက်လုပ်ရာတွင် ကုန်ကြမ်းမည်မျှ အသုံးပြု၍ ကုန်ကြမ်းများသိုလှောင်ထားရှိသည့် လုပ်ငန်းစဉ်တို့အား စီမံကိန်းအကြောင်းအရာအခန်းတွင် ဖော်ပြရန်။</p>	<p>ကုန်ကြမ်းပမာဏသိုလှောင်မှု၊ တစ်ရက်ချက်လုပ်ရာတွင်အသုံးပြုမှုများနှင့်ပတ်သတ်၍ အခန်း (၃)၊ စာပိုဒ်ခွဲ (၃.၅.၁.၅) တွင် ပြင်ဆင်ဖော်ပြထားပါသည်။</p>
၅.၁၇	<p>စီမံကိန်းအကြောင်းအရာဖော်ပြချက်အနေဖြင့် လုပ်ငန်းဆောင်ရွက်မည့်အဆင့်ဆင့်တိုင်းအတွက် စိစစ်သူနားလည်သဘောပေါက်စေရန် အဆင့်တိုင်းတွင်အသုံးပြုသည့် လုပ်ငန်းစဉ်တို့အား ရှင်းလင်းစွာဖော်ပြရန်။</p>	<p>လုပ်ငန်းဆောင်ရွက်မည့်အဆင့်ဆင့်အတွက် လုပ်ငန်းစဉ်တို့အား အခန်း (၃)၊ စာပိုဒ်ခွဲ (၃.၅) တွင် ဖော်ပြထားပါသည်။</p>
၅.၁၈	<p>စီမံကိန်းမှ ကုန်ကြမ်းများကို သယ်ဆောင်ခြင်းနှင့်ပတ်သတ်၍ ၎င်းကုန်ကြမ်းများအား သိုလှောင်သိမ်းဆည်းထားရှိသည့် လုပ်ငန်းစဉ်နှင့် ကုန်ကြမ်းများအားဝယ်ယူရာတွင် လိုင်စင်ရှိသော ဒေသန္တရ လုပ်ငန်းရှင်များဝယ်ယူရန် ၊ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနမှ ချမှတ်ထားရှိသော ဥပဒေ၊ နည်းဥပဒေ လုပ်ထုံးလုပ်နည်းများနှင့်အညီ ဆောင်ရွက်သည့် လုပ်ငန်းရှင်များမှ ဝယ်ယူမည်ဖြစ်ကြောင်းကတိကဝတ်ပြု</p>	<p>လိုက်နာလုပ်ဆောင်မည်ဖြစ်ကြောင်းအား အစီရင်ခံစာ၏ စာမျက်နှာ ၁ တွင် ကတိကဝတ်ပြု ဖော်ပြထားပါသည်။</p>

		ဖော်ပြရန်။ နောက်ဆုံးရရှိလာသည့် ဒီဇယ်ဆီနှင့် ဓာတ်ဆီများအား ရောင်းချသည့် လုပ်ငန်းစဉ်ကို အသေးစိတ် ထည့်သွင်းဖော်ပြရန်။	နောက်ဆုံးရရှိလာသည့် ထုတ်ကုန်များအား အခန်း (၃)၊ စာပိုဒ်ခွဲ (၃.၅.၁.၁၃) တွင် ဖော်ပြထားပါသည်။
၅.၁၉		မြေအောင်ရေထုတ်ယူသုံးစွဲမှုနှင့်ပတ်သတ်၍ လစဉ်ထုတ်ယူသုံးစွဲသည့် ပမာဏအားဖော်ပြရန်။	မြေအောက်ရေထုတ်ယူသုံးစွဲမှုနှင့်ပတ်သတ်၍ အခန်း (၃)၊ စာပိုဒ်ခွဲ ၃.၈.၂ တွင် ဖော်ပြထားပါသည်။
၅.၂၀		No.၄ waste water tank နှင့် ပတ်သတ်၍ မည်သည့်လုပ်ငန်းစဉ် နေရာတွင်အသုံးပြုကြောင်းနှင့် layout plan တွင် ယခုဆောင်ရွက်လျက်ရှိသော wastewater treatment process အားဖော်ပြရန်။ Discharge waste များအားနောက်ဆုံးအဆင့်တွင် မည်သည့်နေရာသို့ စွန့်ထုတ်ကြောင်းအား ဖော်ပြပေးရန်။	No 4 Waste water tank နှင့်ပတ်သတ်၍ Preliminary Tank အနားတွင် အသုံးပြုကြောင်းနှင့် ဆီအနည်အနှစ်များ (Discharge waste) အား စွန့်ပစ်ခြင်းမရှိဘဲ Preliminary tank တွင် ပြန်လည် ထည့်သွင်းအသုံးပြုကြောင်းအား အခန်း (၃)၊ စာပိုဒ်ခွဲ (၃.၅.၁.၃) တွင် ဖော်ပြထားပါသည်။ အခန်း (၃)၊ စာပိုဒ်ခွဲ (၃.၃)၊ Layout Plan တွင် ယခုဆောင်ရွက်လျက်ရှိသော Wastewater treatment process များ၊ တည်နေရာများအား ထည့်သွင်းဖော်ပြထားပါသည်။
၆	လက်ရှိပတ်ဝန်းကျင်အခြေအနေ		
၆.၁		စီမံကိန်းတည်နေရာမှာဧရာဝတီမြစ်နှင့် မည်မျှကွာဝေးကြောင်းအား ဖော်ပြရန်လိုအပ်ပြီး မိုးရာသီကာလများတွင် ရေလွှမ်းမှုအခြေအနေများအားဖော်ပြရန်။	စီမံကိန်းတည်နေရာနှင့် ဧရာဝတီမြစ်အကွာအဝေး၊ ရေလွှမ်းမှုအခြေအနေများအား သက်ဆိုင်ရာအပိုင်းဖြစ်သည့် အခန်း (၄)၊ စာပိုဒ်ခွဲ (၄.၃.၇) တွင် ဖော်ပြထားပါသည်။
၆.၂		Water sample collection points in wet season တွင် တိုင်းတာထားသည့် Operation wastewater နှင့်ပတ်သတ်၍ တိုင်းတာထားသည့် parameters များမှာ EQEG Guideline ၏ ၂.၁.၆ တွင် သတ်မှတ်ထားသည့် parameters များပါ အမျိုးအစားများအား တိုင်းတာ၍နှိုင်းယှဉ်ဖော်ပြရန်။	Operation Wastewater နှင့်ပတ်သတ်၍ EQEG Guideline ၏ ၂.၁.၆ တွင် သတ်မှတ်ထားသည့် parameters များ ကျန်ရှိနေသော အရည်အသွေးများအား တိုင်းတာထားသောရလဒ်များအား အခန်း (၄)၊ စာပိုဒ်ခွဲ (၄.၄.၄.၃)၊ ဇယား ၄-၃၂ တွင် ဖော်ပြထားပါသည်။ ထို့အပြင် ဓာတ်ခွဲခန်းစမ်းသပ်စစ်ဆေးမှုရလဒ်များအား Appendix (G) တွင် ဖော်ပြထားပါသည်။

၆.၃		Water sample collection points in dry season တွင် တိုင်းတာမည့် Parameter များမှာ ကျန်းမာရေးဦးစီးဌာနမှ ထုတ်ပြန်ထားရှိသော သောက်သုံးရေစံချိန်စံညွှန်း (drinking water Guideline ၂၀၁၉) ပါ သတ်မှတ်ချက် parameters များအားတိုင်းတာ၍ ဖော်ပြရန်	အခန်း (၄)၊ စာပိုဒ်ခွဲ (၄.၄.၄.၃)၊ ဇယား ၄-၃၁ တွင် ဖော်ပြထားပါသည်။
၆.၄		Figure ၄-၃၄ Map of Water Quality Monitoring in Wet Season ဖော်ပြချက်တွင် တိုင်းတာမည့်နေရာများအား ရှင်းလင်းစွာဖော်ပြပေးရန်။	အခန်း (၄)၊ စာပိုဒ်ခွဲ (၄.၄.၄.၁)၊ ဇယား ၄-၂၂ နှင့် ပုံ ၄-၃၇ တွင် ပြင်ဆင်ဖော်ပြထားပါသည်။
၆.၅		No.၃ filtration tank တည်ဆောက်ထားရှိမှုနှင့် စွန့်ပစ်ရေများအားစွန့်ပစ်သည့်လုပ်ငန်းစဉ်အဆင့်ဆင့်အားသိသာ မြင်သာစေရန်ပုံများကိုသီးခြားခွဲထုတ်၍ ဖော်ပြပေးရန်။	No.၃ Filtration Tank တည်ဆောက်ထားရှိမှုအား အခန်း (၃)၊ စာပိုဒ်ခွဲ (၃.၉.၅)၊ ပုံ ၃-၂၉ နှင့် စွန့်ပစ်ရေများ စွန့်ပစ်သည့်လုပ်ငန်းစဉ်အဆင့်ဆင့်အား ပုံ ၃-၂၇ တွင် ဖော်ပြထားပါသည်။
၆.၆		EQEG Guideline တွင် surface water နှင့်ပတ်သတ်၍ guideline ဖော်ပြထားမှု မရှိခြင်းအပြင် တိုင်းတာထားသည့် surface တွင်ဖော်ပြထားသော Parameters များအနက် Free Chlorine နှင့် Phosphorous ၊ True colour တို့မှ Myanmar National Drinking Water Quality Standards (၂၀၁၉) ထက်ကျော်လွန်နေကြောင်းစိစစ်တွေ့ရှိရပြီး ကျော်လွန်ရသည့်အကြောင်းအရင်းအားဖော်ပြရန်။	Surface Water နှင့်ပတ်သတ်၍ EQEG guideline နှင့် Myanmar National Drinking Water Quality Standards (၂၀၁၉) အစား Surface Water Quality Standard (Vietnam) အား ထည့်သွင်း၍ နှိုင်းယှဉ်ဖော်ပြထားပါသည်။ နှိုင်းယှဉ်ဖော်ပြမှုများအရ Oil & Grease သည်သာ ကျော်လွန်နေသည်ကို တွေ့ရပါသည်။ ကျော်လွန်နေရသည့် အကြောင်းအရင်းအား အခန်း (၄)၊ စာပိုဒ်ခွဲ ၄.၄.၄.၃ တွင် ဖော်ပြထားပါသည်။
၆.၇		<ul style="list-style-type: none"> • Results of Phytoplankton and Zooplankton Benthic Macroinvertebrates (snails and mussels), fish တို့နှင့်ပတ်သတ်၍ လက်တွေ့ကွင်းဆင်း၍ Sample ကောက်ယူခဲ့မှု အခြေအနေ၊ မှတ်တမ်းဓာတ်ပုံများအားဖော်ပြရန်၊ • ငါးများအား sample ကောက်ယူစဉ်တွင် ဒေသခံ ငါးဖမ်းလုပ်သားများ၏ ပုံစံမတူသော fishing gears (၂ 	Phytoplankton and Zooplankton Benthic Macroinvertebrates တို့နှင့် ပတ်သတ်၍ လက်တွေ့ကွင်းဆင်း၍ ကောက်ယူခဲ့မှုအခြေအနေများအား အခန်း (၄)၊ စာပိုဒ်ခွဲ (၄.၅.၄.၂.၈.၁.၁)၊ ပုံ ၄-၉၁ တွင် ဖော်ပြထားပါသည်။ ငါးများအား sample ကောက်ယူမှုများနှင့်ပတ်သတ်၍ အခန်း (၄)၊ စာပိုဒ်ခွဲ (၄.၅.၄.၂.၁၀.၁) တွင် ဖော်ပြထားပါသည်။

		<p>) ခုမှ ကောက်ယူခဲ့ကြောင်းဖော်ပြထားသဖြင့် ကောက်ယူခဲ့သည့် လုပ်ငန်းစဉ်များ၊ ငါးဖမ်းပိုက်အမျိုးအစား၊ ပိုက်ကွန်အရွယ်အစား၊ မှတ်တမ်းဓာတ်ပုံများ စသည်ဖြင့် ဖော်ပြပေးရန်။</p>	
၆.၈		<p>Field survey approach တွင် ကွင်းဆင်းကောက်ယူခဲ့သည့် social survey နှင့်ပတ်သတ်၍ ဖော်ပြထားရှိသော်လည်း မည်ကဲ့သို့ကောက်ယူခဲ့ကြောင်းနှင့် social survey ကောက်ယူခဲ့သည့် အရေအတွက်ပမာဏအား ဖော်ပြပေးရန်။</p>	<p>အခန်း (၄)၊ စာပိုဒ်ခွဲ (၄.၆) တွင် ပြင်ဆင်ဖော်ပြထားပါသည်။</p>
၆.၉		<p>စီမံကိန်း၏မီးခိုးခေါင်းတိုင်မှ ထွက်ရှိသော ထုတ်လွှတ်အခိုးအငွေ့အား တိုင်းတာဖော်ပြရန်။</p>	<p>စီမံကိန်း၏ မီးခိုးခေါင်းတိုင်မှ ထွက်ရှိသော ထုတ်လွှတ်အခိုးအငွေ့အား အခန်း (၄)၊ စာပိုဒ်ခွဲ (၄.၄.၃) တွင် ဖော်ပြထားပါသည်။</p>
၇	<p>ပတ်ဝန်းကျင်အပေါ်သက်ရောက်မှုနှင့် ဘေးအန္တရာယ်ရှိမှု ဆန်းစစ်ခြင်းနှင့် လျော့နည်းစေရေးလုပ်ငန်းများ</p>		
၇.၁		<p>Operation phase မှ cooling water tank မှထွက်ရှိနိုင်ကြောင်း ဖော်ပြထားရှိသော်လည်း စီမံကိန်းအကြောင်းအရာဖော်ပြချက် အခန်း (၃) တွင် ၎င်းလုပ်ငန်းစဉ်နှင့် ပတ်သတ်၍ ဖော်ပြထားခြင်းမရှိကြောင်း စိစစ်တွေ့ရှိရပါသဖြင့် မည်သည့်နေရာမှထွက်ရှိလာသောရေပူများ (သို့) အခြားရေများအား cooling water tank ပြုလုပ်၍ အအေးခံရသည့် လုပ်ငန်းစဉ်အတွက် တည်ဆောက်ထားရှိသည့် tank design၊ သိုလှောင်နိုင်မှုပမာဏ၊ စွန့်ပစ်မည့် လုပ်ငန်းစဉ်များကို အခန်း (၃) စီမံကိန်းအကြောင်းအရာ ဖော်ပြချက်အခန်းတွင် ထည့်သွင်းဖော်ပြရန်။</p>	<p>Operation Phase တွင် ဆီငွေ့များအား အအေးခံရာ (Condenser) တွင် အသုံးပြုသည့် ရေကန် (Water Tank) နှင့်ပတ်သတ်၍ အခန်း (၃)၊ စာပိုဒ်ခွဲ (၃.၅.၁.၉)၊ ပုံ ၃-၁၀ တွင် ဖော်ပြထားပါသည်။</p> <p>Condenser (Cooling Water Tank) ၏ အကျယ်အဝန်းနှင့် သိုလှောင်နိုင်မှု ပမာဏများအား အခန်း (၃)၊ စာပိုဒ်ခွဲ (၃.၅.၁.၉) တွင် ဖော်ပြထားပါသည်။</p>

၇.၂		<p>စီမံကိန်းအနီးရှိ ဒေသခံများ၏ စိုက်ပျိုးမြေများနှင့် လေထုအရည်အသွေးအား ညစ်ညမ်းမှုမှကာကွယ်နိုင်ရန် စီမံကိန်းဧရိယာ ခြံဝန်းပတ်လည်တစ်ဝိုက်တွင် ဒေသနှင့်ကိုက်ညီသော သစ်ပင်များ စိုက်ပျိုးပေးရန်။</p>	<p>စီမံကိန်းဧရိယာ ခြံဝန်းပတ်လည်တစ်ဝိုက်တွင် သစ်ပင်များစိုက်ပျိုးထားမှုများအား အခန်း (၅)၊ စာပိုဒ်ခွဲ (၅.၈.၁.၂.၂) တွင် ဖော်ပြထားပါသည်။</p>
၇.၃		<p>ရေနံချက်လုပ်ငန်းမှထွက်ရှိနိုင်သော BTEX compounds (benzene,toluene,thylbenzene and xylene) နှင့် hydrogen sulfide (H₂S) တို့အားတိုင်းတာဖော်ပြရန်နှင့် နိုင်ငံတကာစံနှုန်းတစ်ခုခုအား လိုက်နာ၍ နှိုင်းယှဉ်ဖော်ပြပေးရန်နှင့် ၎င်းတို့အား အခန်း(၄) လက်ရှိပတ်ဝန်းကျင် အခြေအနေအခန်းနှင့် monitoring အခန်းတို့တွင် စောင့်ကြပ်ကြည့်ရှုရမည့် အစီအစဉ်အနေဖြင့် Parameter များ ဖော်ပြပေးရန်။</p>	<p>ရေနံချက်လုပ်ငန်းမှထွက်ရှိနိုင်သော BTEX compounds (benzene,toluene,thylbenzene and xylene) နှင့် hydrogen sulfide (H₂S) များ အနက်မှ မြန်မာနိုင်ငံတွင် တိုင်းတာရရှိနိုင်သော hydrogen sulfide (H₂S) နှင့် Nitrogen Oxide (NO_x) တို့အား တိုင်းတာဖော်ပြထားခြင်းအား အခန်း (၄)၊ စာပိုဒ်ခွဲ (၄.၄.၂.၂) တွင် ဖော်ပြထားပါသည်။ စောင့်ကြပ်ကြည့်ရှုရမည့် အစီအစဉ်အနေဖြင့် Parameter များအား အခန်း (၇)၊ စာပိုဒ်ခွဲ (၇.၃.၂)၊ ဇယား ၇-၃ တွင် Stack Height emission တိုင်းတာမှုအဖြစ် ထည့်သွင်းဖော်ပြထားပါသည်။</p>
၇.၄		<p>Cooling water tank အတွင်းသို့ နေ့စဉ် ရောက်ရှိသည့် စွန့်ပစ်ရေပမာဏနှင့် ၎င်းတို့အားအအေးခံပြီးနောက် မည်သည့်နေရာတွင် စီမံဆောင်ရွက်ထားကြောင်းကို အခန်း(၃)တွင်ဖော်ပြရန်။</p>	<p>Cooling water tank အတွင်းသို့ ရောက်ရှိသောရေများသည် Condenser တွင် ပြန်လည်ဖြတ်သန်းစီးဆင်းရန်အတွက် အသုံးပြုကြောင်းအား အခန်း (၃)၊ စာပိုဒ်ခွဲ (၃.၅.၁.၉) တွင် ဖော်ပြထားပါသည်။</p>
၇.၅		<p>Water filtration system နှင့်ပတ်သတ်၍ ဆောင်ရွက်ထားရှိပြီးလုပ်ငန်းစဉ်အားဖော်ပြရန်။</p>	<p>Water filtration system နှင့်ပတ်သတ်၍ ဆောင်ရွက်ထားရှိပြီးလုပ်ငန်းများအား အခန်း (၃)၊ စာပိုဒ်ခွဲ (၃.၉.၅) တွင် ဖော်ပြထားပါသည်။</p>
၇.၆		<p>Oil sample bottle အသုံးပြုမှုနှင့် ထွက်ရှိမှုပမာဏအပြင် lab waste များနှင့်ပတ်သတ်၍ lab ခန်းထားရှိမှု လုပ်ငန်းစဉ်တို့အား အခန်း(၃) စီမံကိန်းအကြောင်းအရာဖော်ပြချက် အခန်းတွင်ဖော်ပြရန်။</p>	<p>Oil sample bottle အသုံးပြုမှုနှင့် ထွက်ရှိမှုပမာဏတို့အား အခန်း (၃)၊ စာပိုဒ်ခွဲ (၃.၉.၄) တွင် ဖော်ပြထားပါသည်။ Laboratory နှင့်ပတ်သတ်၍ အခန်း (၃)၊ စာပိုဒ်ခွဲ ၃.၇ တွင် ဖော်ပြထားပါသည်။</p>

၇.၇		<p>စီမံကိန်းမှအမှန်တစ်ကယ်အသုံးပြုရမည့် chemical ပစ္စည်းများအား အခန်း(၃)တွင်ဖော်ပြပေးရန်နှင့် ၎င်းတို့၏အကျိုးအပြစ်များနှင့် လျော့ချမည့် လုပ်ငန်းစဉ်များကို အခန်း(၅)တွင် ဖော်ပြရန်။</p>	<p>စီမံကိန်းမှအမှန်တစ်ကယ်အသုံးပြုရမည့် chemical ပစ္စည်းများအား အခန်း (၃)၊ စာပိုဒ်ခွဲ (၃.၉.၃) တွင် ဖော်ပြထားပါသည်။ ထို Solvent Green ၅ (Color Powder) သည် သိသာထင်ရှားသော Hazardous ပစ္စည်းမဟုတ်ကြောင်းအား Appendix (O) Material Safety Certificate တွင် ဖော်ပြထားပြီး အသုံးပြုခြင်းမှ ထွက်ရှိလာသောအမှိုက်များအား မည့်ကဲ့သို့စီမံမည် ဖြစ်ကြောင်း အခန်း (၅)၊ စာပိုဒ်ခွဲ (၅.၈.၄.၂.၂) တွင် ဖော်ပြထားပါသည်။</p>
၇.၈		<p>လုပ်ငန်းလည်ပတ်ဆောင်ရွက်နေသော စီမံကိန်းဖြစ်သဖြင့် settlement tank and waste disposal area အား တည်ဆောက်ခြင်းနှင့် နေရာအတိအကျ သတ်မှတ်၍ ပတ်ဝန်းကျင်အပေါ် သက်ရောက်မှုမရှိစေရန် ဆောင်ရွက်မည့် လုပ်ငန်းစဉ်များကိုဖော်ပြရန်။</p>	<p>settlement tank and waste disposal area အား တည်ဆောက်ခြင်းနှင့် နေရာအတိအကျအား အခန်း (၃)၊ စာပိုဒ်ခွဲ ၃.၉.၅၊ ပုံ ၃-၂၅ တွင် ဖော်ပြထားပြီး လုပ်ဆောင်မည့်လုပ်ငန်းစဉ်များမှာ အခန်း (၅)၊ စာပိုဒ်ခွဲ (၅.၈.၄.၂.၂) အတိုင်း လိုက်နာဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။</p>
၇.၉		<p>Occupational safety risk , Health Impact, Fire hazard ,Earthquake, Flood, Ground subsidence တို့အား ဖော်ပြထားရှိကြောင်းစိစစ်တွေ့ရှိရသော်လည်း အခန်းခွဲများမှာ(လက်ရှိပတ်ဝန်းကျင်အခြေအနေဖော်ပြချက်) အခန်းခေါင်းစဉ်ခွဲများဖြစ်နေပြီး အခန်း(၅)၊ ထိခိုက်မှုနှင့် လျော့ပါးစေရေးအခန်းတွင် ခေါင်းစဉ်ခွဲအနေဖြင့် ပြန်လည်ထည့်သွင်းဖော်ပြရန်။</p>	<p>အခန်း (၅) တွင် ပြင်ဆင်ဖော်ပြထားပါသည်။</p>
၇.၁၀		<p>ဒေသခံပြည်သူများ၏လိုလားချက်၊ စိုးရိမ်ပူပန်မှုများအား ထည့်သွင်းဖော်ပြရန်။</p>	<p>ဒေသခံပြည်သူများ၏ အကြံပေးချက်များ၊ လိုအပ်ချက်များအား အခန်း (၄)၊ စာပိုဒ်ခွဲ (၄.၅.၆) တွင် ဖော်ပြထားပါသည်။</p>
၇.၁၁		<p>Hazardous waste and hazardous materials များနှင့်ပတ်သတ်၍ အသုံးပြုမည့် နည်းစနစ်၊ ကိုင်တွယ်ခြင်း၊ လစဉ် (သို့) နှစ်စဉ် ထွက်ရှိနိုင်သော ပမာဏ ၎င်းတို့အား စီမံခန့်ခွဲမည့်အစီအစဉ်နှင့် နောက်ဆုံးစွန့်ပစ်သည့် လုပ်ငန်းစဉ်</p>	<p>Hazardous waste and hazardous materials များနှင့်ပတ်သတ်၍ အသုံးပြုမည့် နည်းစနစ်၊ ကိုင်တွယ်ခြင်း၊ လစဉ် (သို့) နှစ်စဉ် ထွက်ရှိနိုင်သော ပမာဏ၊ စွန့်ပစ်ပစ္စည်းတို့အား ဆောင်ရွက်မည့်အစီအစဉ်တို့အား အခန်း (၃)၊ စာပိုဒ်ခွဲ ၃.၉.၄ တွင် ဖော်ပြထားပါသည်။</p>

		အဆင့်အထိ ဖော်ပြရန်။	
၇.၁၂		Odor နှင့်ပတ်သတ်၍ စီမံကိန်းမှအဓိက ထွက်ရှိနိုင်သည့်နေရာနှင့် ပတ်ဝန်းကျင်အပေါ် သက်ရောက်မှု ၊ လျော့ချမည့် လုပ်ငန်းစဉ်တို့အားဖော်ပြရန်။	Odor နှင့်ပတ်သတ်၍ စီမံကိန်းမှ အဓိကထွက်ရှိနိုင်သောနေရာများအား အခန်း (၄)၊ စာပိုဒ်ခွဲ ၄.၄.၉ တွင် တိုင်းတာ ဖော်ပြထားပြီး တိုင်းတာမှုများအရ ရလဒ်များသည် မရှိသလောက်ဖြစ်သောကြောင့် ဖော်ပြခြင်းမပြုတော့ပါ။
၇.၁၃		Impact assessment methodology နှင့်ပတ်သတ်၍ NEMA အား references ပေးထားမှုအားပြင်ဆင်ဖော်ပြရန်။	အခန်း (၅)၊ စာပိုဒ်ခွဲ (၅.၄) တွင် ပြင်ဆင်ဖော်ပြထားပါသည်။
၈	ဆက်စပ်သက်ရောက်မှုဆန်းစစ်ခြင်း		
၈.၁		သဘောထားမှတ်ချက်ပေးရန်မရှိပါ။	
၉	ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်		
၉.၁		ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်တွင် ဖော်ပြထားရှိသော sub-plan များအား EIA Procedure ၆၃(ဇ) ပါ သတ်မှတ်ချက်များနှင့်အညီ ရေးသားရန်လိုအပ်ပြီး အစီအစဉ်ခွဲ များအလိုက် ပါဝင်ရမည့် အကြောင်းအရာများအားအောက်ပါ ခေါင်းစဉ် ခွဲများနှင့် လျော်ညီစွာ ရေးသားပြုစုဖော်ပြရန်။ (က) ရည်ရွယ်ချက်များ	Sub Plan များအား EIA Procedure ၆၃(ဇ) ပါ သတ်မှတ်ချက်များနှင့်အညီ အခန်း (၇)၊ စာပိုဒ်ခွဲ (၇.၄.၂ မှ ၇.၅.၄) အထိ ဖော်ပြထားပါသည်။

	<p>(ခ) ဥ ပဒေဆိုင်ရာ လိုအပ်ချက်များ</p> <p>(ဂ) လွှမ်းခြုံမြေပုံကြီးများ၊ လုပ်ငန်းခွင်အလိုက်မြေပုံများ၊ ဓာတ်ပုံများ၊ ကောင်းကင်ဓာတ်ပုံများ၊ ဂြိုဟ်တုဓာတ်ပုံများ</p> <p>(ဃ) အကောင်အထည်ဖော်ဆောင်ရွက်မည့် အစီအစဉ်</p> <p>(င) စီမံခန့်ခွဲမှုဆောင်ရွက်ချက်များ</p> <p>(စ) စောင့်ကြပ်ကြည့်ရှုမည့် အစီအစဉ်များ</p> <p>(ဆ) ရန်ပုံငွေလျာထားချက်နှင့်တာဝန်များ</p>	
၉.၂	နှစ်စဉ်စိုက်ပျိုးသွားမည့်လုပ်ငန်းစဉ်များအား ယခုအခန်းတွင် ခေါင်းစဉ်ခွဲဖြင့် ဖော်ပြပေးရန်	သစ်ပင်စိုက်ပျိုးမှုအခြေအနေများအား အခန်း (၇)၊ စာပိုဒ်ခွဲ (၇.၆) တွင် ဖော်ပြထားပါသည်။
၉.၃	<p>အရေးပေါ်တုံ့ပြန်မှုစီမံချက်တွင် အရေးပေါ်ဖြစ်ပွားလာပါက အသိပေးခြင်းနည်းစနစ်၊</p> <p>ဘေးကင်းရာသို့ကယ်ထုတ်မည့်အစီအစဉ်၊</p> <p>ပူးပေါင်းဆောင်ရွက်မည့် အဖွဲ့အစည်း၊ (နီးစပ်ရာ မီးသတ်၊ ကြက်ခြေနီ၊ ရဲ၊ ရပ်ကွက်/ကျေးရွာ၊ ဆေးရုံ) တို့ကို အကြောင်းကြားခြင်း ပို့ဆောင်ခြင်းလုပ်ငန်းစဉ်၊ အရေးပေါ် တုန့်ပြန်မည့် အဖွဲ့ဝင်များ၏ လုပ်ပိုင်ခွင့်နှင့် တာဝန်ဝတ္တရားများ၊ လိုက်နာဆောင်ရွက်မည့် ဥပဒေများ၊ လုပ်ထုံးလုပ်နည်းများ၊ ကြိုတင်လေ့ကျင့်သင်ကြားပေးမှုအစီအစဉ်၊ ဇာတ်တိုက်လေ့ကျင့် မှုအစီအစဉ်များ၊ ကြိုတင်ပြင်ဆင်ထားရှိမှုအခြေအနေနှင့် ဖြစ်ပွားပြီးနောက် အစီရင်ခံ တင်ပြမှုလုပ်ငန်းစဉ်များ၊ စောင့်ကြပ်ကြည့်ရှုမည့်လုပ်ငန်းစဉ်များ ပါဝင်ရန်၊</p>	ဤအကြောင်းအရာနှင့်ပတ်သက်၍ အခန်း (၇)၊ အပိုဒ်ခွဲ (၇.၇၊ ၇.၈) တွင် ဖော်ပြထားပါသည်။

၉.၄		စာမျက်နှာ (၃-၂)၊ အခန်း (၃) ၊ အခန်းခွဲ (၃.၂) project implementation schedule တွင် စီမံကိန်း၏ operation ကာလသည် ၂၀၂၀ march လမှ စတင်ခဲ့ကြောင်း ဖော်ပြထားရှိပါသဖြင့် ၂၀၂၀ ခုနှစ်မှ ၂၀၂၃ ခုနှစ်အထိ CSR လုပ်ငန်းနှင့်ပတ်သတ်၍ စီမံကိန်းမှတ်ချက်အတိုင်း ဆောင်ရွက်ပြီးစီးမှုကို ဖော်ပြရန်။	CSR လုပ်ငန်းနှင့်ပတ်သတ်၍ စီမံကိန်းမှတ်ချက်အတိုင်း ဆောင်ရွက်ပြီးစီးမှုကို အခန်း (၇)၊ အပိုဒ်ခွဲ (၇.၁၀.၂) တွင် ဖော်ပြထားပါသည်။
၁၀	စောင့်ကြပ်ကြည့်ရှုမည့်အစီအစဉ်		
၁၀.၁		စောင့်ကြပ်ကြည့်ရှုမည့် parameters များသည် မူဝါဒနှင့်ညီ ပဒေမူဘောင်အခန်းနှင့် စီမံကိန်းပိုင်ရှင်မှ လိုက်နာမည့် Parameters များနှင့် ပြန်လည်စိစစ်ဖော်ပြရန်	အခန်း (၂) တွင် ဖော်ပြထားသော Parameters များမှာ လိုက်နာမည့် Guideline များကို သာဖော်ပြထားခြင်းဖြစ်ပြီး အခန်း (၇)၊ စာပိုဒ်ခွဲ (၇.၃) တွင် ဖော်ပြထားသော စောင့်ကြပ်ကြည့်ရှုမည့် Parameter များသည် မြန်မာနိုင်ငံတွင် တိုင်းတာ၍ ရသော အရည်အသွေးအား တိုင်းတာ ဆောင်ရွက်သွားမည်ဖြစ်ပါသည်။
၁၀.၂		Summary of environmental monitoring program, တွင်ဖော်ပြထားသော စွန့်ပစ်အရည် တိုင်းတာမှုနှင့် ပတ်သတ်၍ EQEG Guideline ၏ ၂.၁.၆ ပါ သတ်မှတ်ချက်များနှင့်လျော်ညီစွာ တိုင်းတာဖော်ပြရန်။	Summary of environmental monitoring program, တွင်ဖော်ပြထားသော စွန့်ပစ်အရည် တိုင်းတာမှုနှင့် ပတ်သတ်၍ EQEG Guideline ၏ ၂.၁.၆ ပါ သတ်မှတ်ချက်များနှင့်လျော်ညီစွာ တိုင်းတာခြင်းအား မြန်မာနိုင်ငံတွင် တိုင်းတာ၍ ရသော အရည်အသွေးအား တိုင်းတာထားပါသည်။
၁၀.၃		Summary of environmental monitoring progeam တွင် ဖော်ပြထားသော stack height emission တိုင်းတာမည့် parameters များမှာ NEQEG guideline ၏ ၂.၁.၆ ပါ သတ်မှတ်ချက်များနှင့် လျော်ညီစွာတိုင်းတာဖော်ပြရန်။	Summary of environmental monitoring progeam တွင် ဖော်ပြထားသော stack height emission တိုင်းတာမည့် parameters များမှာ NEQEG guideline ၏ ၂.၁.၆ ပါ သတ်မှတ်ချက်များနှင့် လျော်ညီစွာတိုင်းတာခြင်းအား မြန်မာနိုင်ငံတွင် တိုင်းတာ၍ ရသော အရည်အသွေးအား တိုင်းတာထားပါသည်။
၁၁	အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးခြင်းနှင့် သတင်းအချက်အလက်များ ထုတ်ဖော်တင်ပြခြင်း		

၁၁.၁		အစည်းအဝေးပြုလုပ်ခဲ့သည့် ၁၇-၂-၂၀၂၂ ရက်နေ့ zoom meeting ၌ ဒေသခံကျေးရွာများမပါရှိကြောင်းနှင့် တက်ရောက်သည့် attendance list တို့တွင် လက်မှတ်ရေးထိုးထားခြင်း မရှိပါသဖြင့်ဖော်ပြရန်၊	အစည်းအဝေးပြုလုပ်ခဲ့သည့် ၁၇-၂-၂၀၂၂ ရက်နေ့ zoom meeting ၌ ဒေသခံကျေးရွာများမပါရှိကြောင်းမှာ ၎င်းအချိန်တွင် ဒေသခံများမှာ zoom meeting အသုံးပြုရန် ခက်ခဲခြင်း၊ စီမံကိန်းနေရာသို့ သွားလာ၍ မရခြင်း တို့ကြောင့် ဖြစ်ပြီး တက်ရောက်သည့် attendance list တို့တွင် လက်မှတ်ရေးထိုးထားခြင်းမရှိခြင်းမှာ zoom meeting ဖြင့် ပြုလုပ်ခြင်း ဖြစ်သောကြောင့် နာမည် စာရင်းအား ကောက်ယူ၍ သာ ရနိုင်သောကြောင့် ဖြစ်ပါသည်။
၁၁.၂		ဒေသခံများပါဝင်သော အစည်းအဝေးအား ပြုလုပ် ၍ မှတ်တမ်းဓာတ်ပုံများ၊တက်ရောက်သည့် attendance list၊ ၎င်းတို့၏သဘောထားအမြင်များ၊ အစည်းအဝေးမှတ်တမ်းများကိုဖော်ပြရန်။	အများပြည်သူတိုင်ပင်ဆွေးနွေးခြင်းနှင့် စပ်လျဉ်း၍ EIA Stage တွင် ကျောဇီကျေးရွာနှင့် မာလကျေးရွာများ တွင် ထပ်မံပြုလုပ်ပြီး အချက်အလက်များနှင့် အကြံပြုစာများအား အခန်း (၆)၊ အပိုဒ်ခွဲ (၆.၅.၄) တွင် ဖြည့်စွက်ဖော်ပြထားပါသည်။
၁၁.၃		အများပြည်သူနှင့်တိုင်ပင်ဆွေးနွေးခြင်းလုပ်ငန်းစဉ်တွင် တက်ရောက်ခဲ့သည့်လူစာရင်းအား (ဌာနဆိုင်ရာ () ဦး၊ ကျောဇီကျေးရွာ () ဦး၊ မာလာကျေးရွာ () ဦးစသည်ဖြင့်) ဖော်ပြရန်။	အများပြည်သူနှင့်တိုင်ပင်ဆွေးနွေးခြင်းလုပ်ငန်းစဉ်တွင် တက်ရောက်ခဲ့သည့်လူစာရင်းအား အခန်း (၆)၊ အပိုဒ်ခွဲ (၆.၂.၅)၊ ဇယား (၆-၃) နှင့် အပိုဒ်ခွဲ (၆.၅.၂)၊ ဇယား (၆-၁၀) တွင် ဖြည့်စွက်ဖော်ပြထားပါသည်။
၁၂	နိဂုံးနှင့် သုံးသပ်ချက်		
၁၂.၁		စာမျက်နှာ (၈-၁ မှ ၈-၃) အထိအား ဖော်ပြထားကြောင်း စိစစ်တွေ့ရှိရပါသည်။	
၁၃	အထွေထွေ		

၁.၃.၁	<p>စီမံကိန်းနှင့် ပတ်သတ်၍ ခေါင်းစဉ်ကြီးများ၏အောက်တွင် ဖော်ပြထားသော ခေါင်းစဉ်ခွဲများအား မှန်ကန်စွာ ရေးသားဖော်ပြရန်။</p>	<p>စီမံကိန်းနှင့် ပတ်သတ်၍ ခေါင်းစဉ်ကြီးများ၏အောက်တွင် ဖော်ပြထားသော ခေါင်းစဉ်ခွဲများအား မှန်ကန်စွာ ပြန်လည်ပြင်ဆင်ဖော်ပြထားပါသည်။</p>
၁၄	<p>RT members များ၏ သဘောထားမှတ်ချက်များ</p>	
၁၄.၁	<p>ရှေးဟောင်းသုတေသနနှင့် အမျိုးသားပြတိုက်ဦးစီးဌာန</p>	
	<p>-မန္တလေးတိုင်းဒေသကြီး၊ တောင်သာမြို့နယ်တွင် ၁၉၉၉-၂၀၀၀ ခုနှစ်တွင် တူးဖော်ခဲ့ပြီး၊မြေပြန်လည် ဖုံးအုပ်ထားသည့် အင်းတဲရွာတွင် ရှေးဟောင်းတူးဖော်မှုကုန်းမြေများ တည်ရှိပါသည်။ ၎င်းနေရာနှင့် စီမံကိန်းအကွာဝေးနှင့် စီမံကိန်းဆောင်ရွက်သည့်အခါ ထွက်ပေါ်လာသည့် တုန်ခါမှု (vibration) ဒဏ်ကြောင့် ရှေးဟောင်းယဉ်ကျေးမှုအမွေအနှစ်များအပေါ် ထိခိုက်မှုဒဏ်သက်ရောက်နိုင်မှု ရှိ/မရှိ တိုင်းတာစစ်ဆေးသင့်ပါသည်။</p> <p>- မြေအောက်မှတိမ်မြုပ်နေသည့် ရှေးဟောင်းဝတ္ထုပစ္စည်းများ၊ ရှေးဟောင်းအဆောင်အအုံများ တွေ့ရှိပါက နီးစပ်ရာကျေးရွာ၊ မြို့နယ် အုပ်ချုပ်ရေးမှူးမှတစ်ဆင့် ရှေးသောင်းသုတေသနနှင့် အမျိုးသားပြတိုက်၊ ပုဂံညောင်ဦးမြို့နယ်သို့ ဆက်သွယ်သတင်းပေးပို့သင့်ပါသည်။</p>	<p>မန္တလေးတိုင်းဒေသကြီး၊ တောင်သာမြို့နယ်တွင် ၁၉၉၉-၂၀၀၀ ခုနှစ်တွင် တူးဖော်ခဲ့ပြီး၊မြေပြန်လည် ဖုံးအုပ်ထားသည့် အင်းတဲရွာတွင် ရှေးဟောင်းတူးဖော်မှုကုန်းမြေများ တည်ရှိပါသည်။ ၎င်းနေရာနှင့် စီမံကိန်းအကွာဝေးနှင့် စီမံကိန်းဆောင်ရွက်သည့်အခါ ထွက်ပေါ်လာသည့် တုန်ခါမှု (vibration) ဒဏ်ကြောင့် ရှေးဟောင်းယဉ်ကျေးမှုအမွေအနှစ်များအပေါ် ထိခိုက်မှုဒဏ်သက်ရောက်နိုင်မှု မရှိနိုင်ပါ။ အဘယ်ကြောင့်ဆိုသော် စီမံကိန်းဧရိယာနှင့် ဝေးကွာခြင်းနှင့် စီမံကိန်းလုပ်ငန်းတွင် တုန်ခါမှုမြင့်မားစေသော လုပ်ဆောင်ချက်များမရှိသောကြောင့် ဖြစ်ပါသည်။</p> <p>မြေအောက်မှတိမ်မြုပ်နေသည့် ရှေးဟောင်းဝတ္ထုပစ္စည်းများ၊ ရှေးဟောင်းအဆောင်အအုံများ တွေ့ရှိပါက နီးစပ်ရာကျေးရွာ၊ မြို့နယ် အုပ်ချုပ်ရေးမှူးမှတစ်ဆင့် ရှေးသောင်းသုတေသနနှင့် အမျိုးသားပြတိုက်၊ ပုဂံညောင်ဦးမြို့နယ်သို့ ဆက်သွယ်သတင်းပေးပို့သွားမည် ဖြစ်ပါသည်။</p>
၁၄.၂	<p>မြန်မာ့ရေနံဓာတုဗေဒလုပ်ငန်း၊ စွမ်းအင်ဝန်ကြီးဌာန</p>	

	<p>Solvent green ၅ (colour powder) is used to change the colour of diesel to blue or green according to the demand of client ဟု ဖော်ပြထားသဖြင့် element of client အစား order No. ၂၁၁/၂၀၁၉ Local Refinery and Mini released by the Ministry of Electricity of Energy ဟုဖော်ပြရန်</p>	<p>Solvent green ၅ (colour powder) is used to change the colour of diesel to blue or green according to the demand of client ဟု ဖော်ပြထားသဖြင့် element of client အစား order No. ၂၁၁/၂၀၁၉ Local Refinery and Mini released by the Ministry of Electricity of Energy ဟု အခန်း (၃)၊ အပိုဒ်ခွဲ (၃.၉.၃) တွင် ဖော်ပြထားပါသည်။</p> <p>ရေနံထွက်ပစ္စည်းကြီးကြပ်စစ်ဆေးရေးဦးစီးဌာန နှင့် ညှိနှိုင်းဆောင်ရွက်ပါမည်။</p>
<p>၁၄.၃</p>	<p>စက်မှုကြီးကြပ်ရေးနှင့်စစ်ဆေးရေးဦးစီးဌာန</p>	
	<p>-ပုဂ္ဂလိကစက်မှုလုပ်ငန်းဥပဒေ (၁၉၉၀) နှင့် လျှပ်စစ်ဥပဒေ (၂၀၁၄) တို့ကို ထည့်သွင်းဖော်ပြရန်လိုအပ်ပါသည်။ လိုက်နာရမည့်အချက်များအား ဥပဒေရေးရာ ဝန်ကြီးဌာနမှ အကြံပြုချက်များအတိုင်းထည့်သွင်းဖော်ပြရန်။</p> <p>- စက်မှုမှတ်ပုံတင်၊ လျှပ်စစ်အန္တရာယ်ကင်းရှင်းရေးစစ်ဆေးမှု ထောက်ခံချက်၊ ဓာတုပစ္စည်းများကိုင်တွယ်သုံးစွဲထွင့် မှတ်ပုံတင်၊ လိုင်စင်များ လျှောက်ထားဆောင်ရွက်ရန်၊</p> <p>- ပြည်ပပညာရှင်များပါဝင်သဖြင့် ထုတ်ပြန်ထားသော အလုပ်သမားဥပဒေများအား ထည့်သွင်းဖော်ပြရန်၊</p> <p>မြေယာအသုံးချမှုနှင့် အမျိုးအစားထည့်သွင်းဖော်ပြရန်၊</p>	<p>အခန်း (၂)၊ စာပိုဒ်ခွဲ (၂.၆.၆.၅) နှင့် (၂.၆.၆.၈) တွင်ဖော်ပြထားပါသည်။</p> <p>စက်မှုမှတ်ပုံတင်၊ လျှပ်စစ်အန္တရာယ်ကင်းရှင်းရေးစစ်ဆေးမှု ထောက်ခံချက်ကို ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။</p> <p>ဓာတုပစ္စည်းများကိုင်တွယ်သုံးစွဲထွင့် မှတ်ပုံတင်၊ လိုင်စင်များ လျှောက်ထားဆောင်ရွက်ရန် Hazardous Chemical များအား သုံးစွဲမှုမရှိပါ။ အသုံးပြုသော အရောင်တင်မှုန်မှာလည်း သိသာထင်ရှားသော သက်ရောက်မှု မရှိကြောင်း နောက်ဆက်တွဲရှိ MSDS တွင် ဖော်ပြထားပါသည်။</p> <p>ပြည်ပပညာရှင်များပါဝင်သဖြင့် ထုတ်ပြန်ထားသော အလုပ်သမားဥပဒေများအား အခန်း (၂) ၏ သက်ဆိုင်ရာ အပိုင်းတွင် ဖော်ပြထားပါသည်။</p> <p>မြေယာအသုံးချမှုနှင့် အမျိုးအစားအား အခန်း(၃)၊ အပိုဒ်ခွဲ (၃.၁) တွင် ဖော်ပြ ထားပါသည်။</p>

<p>-သယ်ယူပို့ဆောင်သည့် နည်းလမ်းများ ထည့်သွင်းဖော်ပြရန်၊</p> <p>-အသုံးပြုသည့်ဓာတုပစ္စည်းများအားထည့်သွင်းဖော်ပြရန်၊</p> <p>-ကုန်ကြမ်း ဓာတုပစ္စည်းများအား chemical substance law ပါ သတ်မှတ်ချက်များအတိုင်းသိုလှောင်ထားရှိကြောင်းဖော်ပြရန်၊</p> <p>- Hazardous Chemical များအား သုံးစွဲမှုရှိသဖြင့် စနစ်တကျ သိုလှောင်ထားရှိရန်၊ သတိပေးဆိုင်းဘုတ်များ ထားရှိရန်</p> <p>ရေလိုအပ်ချက်နှင့်စွန့်ပစ်ရေထွက်ရှိသည့် ပမာဏ၊ မြေအောက်ရေ သုံးစွဲမှုကြောင့် ရေရှည်တွင်ထိခိုက်မှု ရှိ/မရှိ ဖော်ပြရန်။</p> <p>-မီးခိုးခေါင်းတိုင်နှင့်ပတ်သတ်၍ ဤအခန်းတွင်လည်းဖော်ပြရန်၊</p> <p>-Petroleum residue နှင့် silica gel များသည် soil contamination, ground water quality နှင့် climate change တို့အားဖြစ်ပေါ်စေနိုင်သဖြင့် ဟင်းလင်းပြင်၌ စွန့်ပစ်ခြင်းမပြုသင့်ပါ။ အမိုးအကာအောက်တွင် စနစ်တကျ စွန့်ပစ်ရပါမည်။</p> <p>- waste water treatment အား flowchart ဖြင့် ရှင်းလင်းစွာဖော်ပြရန်၊</p>	<p>သယ်ယူပို့ဆောင်သည့် နည်းလမ်းများအား အခန်း(၃)၊ အပိုဒ်ခွဲ (၃.၅.၁.၂) တွင် ဖော်ပြထားပါသည်။</p> <p>အသုံးပြုသည့်ဓာတုပစ္စည်းများအား အခန်း(၃)၊ အပိုဒ်ခွဲ (၃.၉.၃) တွင် ဖော်ပြ ထားပါသည်။</p> <p>ကုန်ကြမ်း ဓာတုပစ္စည်းများအား chemical substance law ပါ သတ်မှတ်ချက်များအတိုင်းသိုလှောင်ထားရှိကြောင်းကို အခန်း(၃)၊ အပိုဒ်ခွဲ (၃.၉.၃) တွင် ဖော်ပြ ထားပါသည်။</p> <p>Hazardous Chemical များအား သုံးစွဲမှုမရှိပါ။ အသုံးပြုသော အရောင်တင်မှုန်မှာလည်း သိသာထင်ရှားသော သက်ရောက်မှု မရှိကြောင်း နောက်ဆက်တွဲရှိ MSDS တွင် ဖော်ပြထားပါသည်။</p> <p>ရေလိုအပ်ချက်နှင့်စွန့်ပစ်ရေထွက်ရှိသည့် ပမာဏ၊ မြေအောက်ရေ သုံးစွဲမှုကြောင့် ရေရှည်တွင်ထိခိုက်မှုနည်းပါးကြောင်းကို အခန်း(၃)၊ အပိုဒ်ခွဲ (၃.၉.၁) တွင် ဖော်ပြ ထားပါသည်။</p> <p>မီးခိုးခေါင်းတိုင်နှင့်ပတ်သတ်၍ အခန်း(၃)၊ အပိုဒ်ခွဲ (၃.၅.၁.၇) တွင် ဖော်ပြ ထားပါသည်။</p> <p>Petroleum residue နှင့် silica gel များသည် soil contamination, ground water quality နှင့် climate change တို့အားဖြစ်ပေါ်စေနိုင်သဖြင့် ဟင်းလင်းပြင်၌ စွန့်ပစ်ခြင်းမပြုသင့်ပါ။ အမိုးအကာအောက်တွင် စနစ်တကျ စွန့်ပစ်ရန် ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။</p> <p>waste water treatment အား flowchart ဖြင့် အခန်း(၃)၊ အပိုဒ်ခွဲ (၃.၉.၅) တွင် ဖော်ပြထားပါသည်။</p>
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<p>- Mini Lab ရှိသဖြင့် ထွက်ရှိလာသော စွန့်ပစ်ပစ္စည်းများအား hazardous waste များ စွန့်ပစ်သည့် နည်းလမ်းများဖြင့် စွန့်ပစ်မည်ဖြစ်ကြောင်း ထည့်သွင်းဖော်ပြရန်၊</p> <p>_သဘာဝရေထုတွင်းသို့ စွန့်ပစ်သည့် final discharge အားဖော်ပြ၍ တိုင်းတာစစ်ဆေးရန်၊</p> <p>-အနည်ထိုင်ကန်များမှထွက်ရှိလာသော sludge များအား လဲလှယ်မည့်စနစ်၊စွန့်ပစ်မှု တို့အားဖော်ပြရန်၊</p> <p>-ECD မှထုတ်ပြန်ထားသည့် အသေးစားရေနံချက်လုပ်ငန်းများ လိုက်နာရမည့် လမ်းညွှန်ချက်များအတိုင်း လိုက်နာရန်၊ တိုင်းတာစစ်ဆေးရန်။</p>	<p>Mini Lab ရှိသဖြင့် ထွက်ရှိလာသော စွန့်ပစ်ပစ္စည်းများအား hazardous waste များ စွန့်ပစ်သည့် နည်းလမ်းများဖြင့် စွန့်ပစ်မည်ဖြစ်ကြောင်း အခန်း(၃)၊ အပိုဒ်ခွဲ (၃.၉.၄) တွင် ဖော်ပြထားပါသည်။</p> <p>သဘာဝရေထုတွင်းသို့ စွန့်ပစ်သည့် final discharge ဖြစ်သော operation wastewater အားဖော်ပြ၍ တိုင်းတာခြင်းကို အခန်း(၄)၊ အပိုဒ်ခွဲ (၄.၄.၄) တွင် ဖော်ပြထားပါသည်။</p> <p>အနည်ထိုင်ကန်များမှထွက်ရှိလာသော sludge များအား လဲလှယ်မည့်စနစ်၊စွန့်ပစ်မှု တို့အား အခန်း(၃)၊ အပိုဒ်ခွဲ (၃.၅.၁.၃) တွင် ဖော်ပြထားပါသည်။</p> <p>ECD မှထုတ်ပြန်ထားသည့် အသေးစားရေနံချက်လုပ်ငန်းများ လိုက်နာရမည့် လမ်းညွှန်ချက်များအတိုင်း လိုက်နာဆောင်ရွက်သွားပါမည်။</p>
<p>၁၄.၄ နိုင်ငံခြားစီးပွားဆက်သွယ်ရေးဦးစီးဌာန</p>	
<p>-အပိုဒ် ၂.၂ ခေါင်းစဉ်အောက်ရှိ စာမျက်နှာ ၁၆၁ တွင် decomposition phase ဟူသည့်အသုံးအနှုန်းများမှာ စီမံကိန်းပိတ်သိမ်းသည့် အဆင့်ကို ဆိုလိုခြင်းဖြစ်ပါက ယင်းအသုံးအနှုန်းအစား ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း အစီရင်ခံစာများတွင် ဖော်ပြလေ့ရှိသည့် “Decommissioning Phase” ဟုဖော်ပြရန်၊</p> <p>-Table ၅-၉၄ တွင် “Cumulative Impact Assessment of all three projects” ဟုလည်းကောင်း Table ၅-၉၅ တွင် “Final Environmental Significance Rating of all three projects” ဟုလည်းကောင်း ခေါင်းစဉ်များဖြင့်ဖော်ပြထားရာ အဆိုပါ “Three projects” ဟူသည့်ဖော်ပြချက်မှာ စီမံကိန်း၏ လုပ်ငန်းအဆင့်များကို ဆိုလိုခြင်းဖြစ်ပါက</p>	<p>အစီရင်ခံစာတွင် ပြင်ဆင်ဖော်ပြထားပါသည်။</p> <p>“Three projects” ဟူသည့်ဖော်ပြချက်မှာ စီမံကိန်း၏ လုပ်ငန်းအဆင့်များကို ဆိုလိုခြင်းမဟုတ်ပဲ Cumulative Impact ဖြစ်နိုင်ချေရှိသော စီမံကိန်းအမျိုးအစား (၃) မျိုးအား ဖော်ပြထားခြင်း ဖြစ်ပါသည်။</p>

	<p>ယင်းဖော်ပြချက်အစား “Three phase” ဟု ပြင်ဆင်ဖော်ပြရန်။</p> <p>-အပိုဒ် ၈.၂ conclusion ပါ environmental ဟူသည့် ဖော်ပြချက်တွင် အပိုဒ် ၄.၅ ရှိ Physical Environmental အဖြစ်ဖော်ပြထားသည့် “Air Quality, Stack emission, Water quality, Noise, Light ,.Temperature ,Odor, Soil, Vibration, Climate and Meteorology and Geology” များလည်းအကျုံးဝင်ပါဝင်ခြင်း ရှိ/မရှိ စိစစ်ရန်နှင့် အကျုံးဝင်ပါက ထည့်သွင်းဖော်ပြရန်။</p>	<p>အပိုဒ် ၈.၂ conclusion ပါ environmental ဟူသည့် ဖော်ပြချက်တွင် အပိုဒ် ၄.၅ ရှိ Physical Environmental အဖြစ်ဖော်ပြထားသည့် “Air Quality, Stack emission, Water quality, Noise, Light ,.Temperature ,Odor, Soil, Vibration, Climate and Meteorology and Geology” များမှာ အကျုံးဝင်ပြီး ထိုခေါင်းစဉ်များအား ခြုံငုံ၍ environmental ဟု ကိုယ်စားပြု သုံးစွဲထားခြင်း ဖြစ်ပါသည်။</p>
<p>၁၄.၅</p>	<p>မိုးလေဝသနှင့်ဇလဗေဒညွှန်ကြားမှုဦးစီးဌာန</p>	
	<p>စာမျက်နှာ ၇, ခေါင်းစဉ် ၄၊ အောက်ဆုံးစာကြောင်း၌ ဖော်ပြထားသည့် လေထုဖိအားအခြေအနေကို ပုံမှန်ရာသီများအဖြစ် (နွေရာသီ၊ မိုးရာသီ၊ဆောင်းရာသီ) ဟုဖော်ပြထားသည့်အတွက် လေထုဖိအားအခြေအနေကို ပုံမှန်ရာသီများအစား ရှင်းလင်းသည့်အသုံးအနှုန်းဖြင့် အစားထိုးရန်၊</p> <p>-ရာသီဥတုဆိုင်ရာအချက်အလက်များဖော်ပြမှုတွင် ၂၀၁၇ မှ ၂၀၂၂ ဩဂုတ်လအထိသာ ဖော်ပြထားသဖြင့် အနည်းဆုံး ၁၀ နှစ်စာမှတ်တမ်းအချက်အလက်များဖြင့် လေ့လာရန်။</p> <p>-လေအရည်အသွေးတိုင်းတာမှုဆောင်ရွက်ချက်တွင် dry season အတွက် ၂၀၂၃ ခုနှစ် မေလအတွင်း တိုင်းတာထားသည်ကို တွေ့ရှိရပြီး လေထုညစ်ညမ်းမှု ဖြစ်စဉ်များသည် ခြောင်သွေကာလဖြစ်သည့် မတ်၊ ဧပြီလများတွင် အများဆုံးဖြစ်သောကြောင့် base line data ယူသည့် တိုင်းတာချက်ကိုမေလအစား မတ်လတွင်ပြန်လည်တိုင်းတာရန်၊</p>	<p>လေထုဖိအားအခြေအနေကို ပုံမှန်ရာသီများအဖြစ် (နွေရာသီ၊ မိုးရာသီ၊ဆောင်းရာသီ) ဟုဖော်ပြထားသည့်အတွက် လေထုဖိအားအခြေအနေကို ပုံမှန်ရာသီများအစား ရှင်းလင်းသည့်အသုံးအနှုန်းဖြင့် အစားထိုး ရှိ ပြင်ဆင်ဖော်ပြထားပါသည်။</p> <p>ရာသီဥတုအချက်အလက်များအား အခန်း (၄)၊ စာပိုဒ်ခွဲ (၄.၃.၁) တွင် ဖော်ပြထားပါသည်။</p> <p>လေအရည်အသွေးတိုင်းတာမှုဆောင်ရွက်ချက်တွင် dry season အတွက် ၂၀၂၃ ခုနှစ် မေလအတွင်း တိုင်းတာထားသည်ကို တွေ့ရှိရပြီး လေထုညစ်ညမ်းမှု ဖြစ်စဉ်များသည် ခြောင်သွေကာလဖြစ်သည့် မတ်၊ ဧပြီလများတွင် အများဆုံးဖြစ်သောကြောင့် base line data ယူသည့် တိုင်းတာချက်ကိုမေလအစား မတ်လတွင်ပြန်လည်တိုင်းတာခြင်းနှင့် ပတ်သက်၍ report ပြန်လည်တင်ပြရမည့် deadline မှာ ဖေဖော်ဝါရီလ ၂၀၂၄ ခုနှစ် နောက်ဆုံးဖြစ်၍ မတ်လ အစား ဖေဖော်ဝါရီလ ၂၀၂၄ ခုနှစ်တွင် တိုင်းတာ၍ အခန်း (၄)၊ အပိုဒ်ခွဲ (၄.၄.၂) တွင် ဖော်ပြထားပါသည်။</p>

<p>-Siclica များကို လောင်စာတောင့်ပြုလုပ်၍ အကြွင်းအကျန်များကို လောင်စာဆီအဖြစ် ပြန်လည်အသုံးပြုမည်ဟုဖော်ပြထားပြီး အဆိုပါဖြစ်စဉ်မှ ထွက်ရှိလာမည့် စွန့်ပစ်ရေ/ပစ္စည်းစွန့်ထုတ်မည့်စနစ် မပါရှိသဖြင့် ထည့်သွင်းဖော်ပြရန်။</p> <p>-သဘာဝဘေးအန္တရာယ်ဆိုင်ရာ အကဲဖြတ်မှုအပိုင်းတွင် မြေငလျင်နှင့် ရေကြီးမှုဖြစ်စဉ်များကိုသာ ထည့်သွင်းဖော်ပြထားသည့်အတွက်စီမံကိန်းဧရိယာသည် ပူပြင်းခြောက်သွေ့သည့်ဒေသဖြစ်ပြီး လုပ်ငန်းလည်ပတ်ရာ၌ အပူချိန် ၅၀ ဒီဂရီ စင်တီဂရိတ် ပမာဏရှိသော အပူပေးခြင်းဖြစ်စဉ်များ ပါဝင်သောကြောင့် ဝန်ထမ်းများ /လုပ်သားများ အပူလွန်ကဲမှုဖြစ်စဉ်များ ကြုံတွေ့ရနိုင်ပြီး ကျန်းမာရေးထိခိုက်မှု အခွေအနေများရှိနိုင်ပါသောကြောင့် Extreme Temperature အပေါ်သက်ရောက်နိုင်သည့် impact ကို ထည့်သွင်းဖော်ပြရန်။</p> <p>-အစီရင်ခံစာ၌ စာလုံးပေါင်းသတ်ပုံအမှားများနှင့် format မတူညီမှုများ တွေ့ရှိရပါသဖြင့် ပြန်လည်စိစစ်ဖော်ပြရန်၊ (ဥပမာ- အရောင်ဆိုးဆေးမှုန့်ခေါင်းစဉ်အချို့အား Italic ပေးထားခြင်း)</p>	<p>Siclica များကို လောင်စာတောင့်ပြုလုပ်၍ အကြွင်းအကျန်များကို လောင်စာဆီအဖြစ် ပြန်လည်အသုံးပြုမည်ဟု ဖော်ပြထားခြင်းမဟုတ်ပါ။ ပြင်ပရှိ လောင်စာတောင့်ပြုလုပ်မည့် လုပ်ငန်းကို ပြန်လည်ရောင်းချခြင်းဖြစ်သဖြင့် ထိုလုပ်ငန်းနှင့် ပတ်သက်သော စွန့်ပစ်နည်းစနစ်များ မပါရှိပါ။ ထိုအကြောင်းအရာအား အခန်း (၃)၊ အပိုဒ်ခွဲ (၃.၉.၄) တွင် ဖော်ပြထားပြီး ဖြစ်ပါသည်။</p> <p>Extreme Temperature အပေါ်သက်ရောက်နိုင်သည့် impact ကို အခန်း (၅)၊ အပိုဒ်ခွဲ (၅.၁၁.၃.၃) တွင် ဖော်ပြထားပါသည်။</p> <p>အစီရင်ခံစာတွင် ပြင်ဆင်ဖော်ပြထားပါသည်။</p>
<p>၁၄.၆ ငါးလုပ်ငန်းဦးစီးဌာန၊ ဖွံ့ဖြိုးရေး နှင့် သုတေသနဌာနစိတ်</p>	
<p>-Water treatment layout plan အား ရှင်းလင်းပြတ်သားစွာရေးဆွဲ၍ စွန့်ပစ်ရေများနောက်ဆုံးရောက်ရှိ စီးဆင်းသွားမည့်နေရာကို မြေပုံတွင်ဖော်ပြရန်၊အဆိုပါနေရာတွင် ကနဦး လေ့လာသုတေသနပြု ဆောင်ရွက်ထားသည့်နေရာနှင့် ထပ်တူကျမကျ ပြန်လည်စိစစ်သုံးသပ်ပေးသွားရန် ၊ စွန့်ပစ်ရေကြောင့်သက်ရောက်မှုရှိနိုင်သည့် နေရာအား buffer zone ဖြင့်ဖော်ပြပေး၍</p>	<p>- Water treatment layout plan နှင့် စွန့်ပစ်ရေများနောက်ဆုံးရောက်ရှိ စီးဆင်းသွားမည့်နေရာ၊ Buffer Zone များအား အခန်း (၃)၊ စာပိုဒ်ခွဲ (၃.၉.၅) တွင် ထည့်သွင်းဖော်ပြထားပါသည်။ သက်ရောက်မှုများအား လေ့လာရာတွင် စီမံကိန်းဧရိယာ၏ ပတ်လည် ၃ ကီလိုမီတာအား လေ့လာခြင်းဖြစ်သဖြင့် ထပ်တူကျပါသည်။ စီမံခန့်ခွဲမှုအစီအစဉ်အသေးစိတ်အား အခန်း (၇)၊ စာပိုဒ်ခွဲ (၇.၄.၃)</p>

	<p>စီမံခန့်ခွဲမှုအစီအစဉ်အသေးစိတ်အားရေးဆွဲဖော်ပြပေးရန်။</p> <p>-ရေနံယိုစိမ့်ခြင်းကြောင့် အနီးအနားပတ်ဝန်းကျင်ရှိ ချောင်း/မြောင်းငယ်မှ ရော့ဝတီမြစ်မကြီးအတွင်း ရောက်ရှိသွားပါက ရေနေဂေဟစနစ်ကို ထိခိုက်နိုင်ပါသဖြင့် အဆိုပါ ကိစ္စရပ်များမဖြစ်ပေါ်အောင်</p> <p>အထူးဂရုစိုက်ရန်လိုအပ်ပြီးကြိုတင်ကာကွယ်ဆောင်ရွက်မည့် အစီအမံများတွင် အပင်၊ ငှက်သတ္တဝါများနည်းတူ ရေနေသတ္တဝါ ငါးများအတွက်လည်း ဖြည့်စွက်ရေးသားဖော်ပြရန်၊</p> <p>-Land Use Map တွင် အနီးအနားရှိ ချောင်းငယ်၊ မြစ်ငယ်များ မှာ ခြောက်သွေ့ရာသီတွင် ရိုက်ကူးထားခြင်းဖြစ်၍ မိုးရာသီတွင် ရိုက်ကူးထားသော Remote Sensing ပုံများကို အသုံးပြု၍ ရာသီချိန်(၃)ချိန် ထုတ်ယူဖော်ပြရန်၊</p>	<p>တွင် ဖော်ပြထားပါသည်။</p> <p>-ရေနေဂေဟစနစ်များ (ရေနေသတ္တဝါငါးများ) ထိခိုက်မှုမရှိစေရန်အတွက် စက်ရုံမှ ထွက်ရှိသော စွန့်ပစ်ပစ္စည်း၊ စွန့်ပစ်အရည်များအား စနစ်တကျစီမံခန့်ခွဲမည့် အစီအစဉ်များအား အခန်း (၇)၊ စာပိုဒ်ခွဲ (၇.၄.၇.၃) တွင် ဖော်ပြထားပါသည်။</p>
<p>၁၄.၇</p>	<p>တိုင်းရင်းသားအခွင့်အရေးများကာကွယ်စောင့်ရှောက်ရေးဦးစီးဌာန</p>	
	<p>-တိုင်းရင်းသားလူမျိုးများ၏အခွင့်အရေး ကာကွယ်စောင့်ရှောက်သည့် နည်းဥပဒေများ (၂၀၁၉) The Ethnic Rights Protection Rules (၂၀၁၉) ကိုထည့်သွင်းဖော်ပြရန်၊</p> <p>-ဥပဒေပါပုဒ်မများကိုရေးသားဖော်ပြရာတွင် Articles ဟု မသုံးဘဲ Section ဟုသာ ရေးသားဖော်ပြရန်၊ Articles ၂၂ အား ထည့်သွင်းဖော်ပြရန်မလိုအပ်ပါ။</p> <p>-စီမံကိန်းအဆိုပြုသူသည် တိုင်းရင်းသားလူမျိုးများ၏အခွင့်အရေး ကာကွယ်စောင့်ရှောက်သည့် ဥပဒေ ပုဒ်မ ၅ (The Ethnic Rights Protection Rules (၂၀၁၉) Rules ၂၀ and ၂၁) တို့နှင့်အညီ လိုက်နာဆောင်ရွက်ရန်၊</p> <p>-တိုင်းရင်းသားလူမျိုးများ၏ အခွင့်အရေးကာကွယ်စောင့်ရှောက်သည့် ဥပဒေ၊ နည်းဥပဒေများပါ ပြဋ္ဌာန်းချက်များအား လေးစားလိုက်နာမည်ဖြစ်ကြောင်း ကတိကဝတ်ကို ဥပဒေရေးရာဝန်ကြီးဌာန၏အကြံပြုချက်နှင့်အတူရေးသားဖော်ပြရန်၊</p> <p>-စီမံကိန်းဆောင်ရွက်မည့်မြေနေရာနှင့် စပ်လျဉ်း၍</p>	<p>အခန်း (၂)၊ စာပိုဒ်ခွဲ (၂.၆.၃.၂) တွင်ဖော်ပြထားပါသည်။</p> <p>-စီမံကိန်းဆောင်ရွက်မည့်မြေနေရာနှင့် ပတ်သက်သော အချက်အလက်များကို အခန်း</p>

	<p>မည်သည့်မြေအမျိုးအစား၊မည်သို့ရယူထားရှိသည်၊ ဒေသခံများခံမှ ဝယ်ယူထားရှိခြင်းဖြစ်ပါက လျော်ကြေးမည်သို့ပေးဆောင်သည်နှင့် ပေးချေထားရှိမှုအခြေအနေတို့ကို ထည့်သွင်းဖော်ပြရန်။</p> <p>-GRM နှင့်စပ်လျဉ်းသည့် လုပ်ငန်းများဆောင်ရွက်ရန် ကော်မတီ/အဖွဲ့ ဖွဲ့စည်းထားရှိမှုအခြေအနေတို့ကို ပြည့်စုံစွာထည့်သွင်းဖော်ပြရန်။</p> <p>အများပြည်သူတိုင်ပင်ဆွေးနွေးခြင်းနှင့် စပ်လျဉ်း၍ EIA Stage တွင် အစည်းအဝေးတက်ရောက်သူ ကျောဇီကျေးရွာနှင့် မာလကျေးရွာဟုဖော်ပြထားသော်လည်း တက်ရောက်သူလက်မှတ်ရေးထိုးစာရင်းတွင် ဒေသခံ ၆ ဦး (ကျောဇီကျေးရွာမှ ၄ဦး၊ မြင်းခြံမှ ၂ဦး) သာတက်ရောက်သည့်အတွက် သက်ရောက်ခံကျေးရွာများမှ ဒေသခံများ၌ပင်ဆွေးနွေးသည့် အစည်းအဝေးပွဲ ဖြစ်ရန်။</p> <p>-စီမံကိန်းနှင့် ပတ်သတ်၍ “ဝေဖန်အကြံပြုလွှာ များတွင် ဌာနဆိုင်ရာများမှ အကြံပြုချက်များကိုသာ တွေ့ရှိရသည့်အတွက် စီမံကိန်းကြောင့် သက်ရောက်မှုရှိသည့် / စီမံကိန်းအနီးရှိ ဒေသခံများ၏ အကြံပြုချက်များရယူရန်နှင့် အဆိုပါအကြံပြုချက်များအပေါ် မည်သို့ဖြေရှင်းဆောင်ရွက်ပေးမည်နှင့် ဆောင်ရွက်ပြီးစီးမှုအခြေအနေတို့ကို ထည့်သွင်းရေးသားဖော်ပြရန်။</p>	<p>(၃)၊ အပိုဒ်ခွဲ (၃.၁) တွင် ဖော်ပြထားပါသည်။</p> <p>GRM နှင့်စပ်လျဉ်းသည့် လုပ်ငန်းများဆောင်ရွက်ရန် ကော်မတီ/အဖွဲ့ ဖွဲ့စည်းထားရှိမှုအခြေအနေတို့ကို အခန်း (၇)၊ အပိုဒ်ခွဲ (၇.၁၁) တွင် ဖော်ပြထားပါသည်။</p> <p>အများပြည်သူတိုင်ပင်ဆွေးနွေးခြင်းနှင့် စပ်လျဉ်း၍ EIA Stage တွင် ကျောဇီကျေးရွာနှင့် မာလကျေးရွာများ တွင် ထပ်မံပြုလုပ်ပြီး အချက်အလက်များနှင့် အကြံပြုစာများအား အခန်း (၆)၊ အပိုဒ်ခွဲ (၆.၅.၄) တွင် ဖြည့်စွက်ဖော်ပြထားပါသည်။</p> <p>စီမံကိန်းကြောင့် သက်ရောက်မှုရှိသည့် / စီမံကိန်းအနီးရှိ ဒေသခံများ၏ အကြံပြုချက်များရယူထားခြင်းအား အခန်း (၆)၊ အပိုဒ်ခွဲ (၆.၅.၄) တွင် ဖြည့်စွက်ဖော်ပြထားပါသည်။ အကြံပြုချက်များအပေါ် ဆောင်ရွက်ပြီးစီးမှုအခြေအနေများကို အခန်း (၆)၊ အပိုဒ်ခွဲ (၆.၈) တွင် ဖြည့်စွက်ဖော်ပြထားပါသည်။</p>
၁၄.၈	ရင်းနှီးမြှုပ်နှံမှု နှင့်ကုမ္ပဏီများညွှန်ကြားမှုဦးစီးဌာန	
	<p>-MIC Permit ရယူရန်</p> <p>-မြန်မာနိုင်ငံကုမ္ပဏီများ ၂ ပဒေ (၂၀၁၇) ကိုလိုက်နာဆောင်ရွက်မည်ဖြစ်ကြောင်း ထည့်သွင်းရေးသားဖော်ပြရန်</p> <p>ကုမ္ပဏီအနေဖြင့်ကော်မရှင်ခွင့်ပြုမိန့် ရယူဆောင်ရွက်မည်ဆိုပါက</p>	<p>MIC Permit ရယူရန် ဆောင်ရွက်သွားပါမည်။</p> <p>မြန်မာနိုင်ငံကုမ္ပဏီများ ၂ ပဒေ (၂၀၁၇) ကိုလိုက်နာဆောင်ရွက်မည်ဖြစ်ကြောင်း အခန်း (၂)၊ အပိုဒ်ခွဲ (၂.၆.၇) တွင် ထည့်သွင်းဖော်ပြထားပါသည်။</p> <p>ကုမ္ပဏီအနေဖြင့်ကော်မရှင်ခွင့်ပြုမိန့် ရယူဆောင်ရွက်မည်ဆိုပါက</p>

	မြန်မာနိုင်ငံရင်းနှီးမြှုပ်နှံမှု ဥပဒေ ပုဒ်မ ၃၆(ဂ) ၊နည်းဥပဒေများအပိုဒ် ၅ အရ မြန်မာနိုင်ငံရင်းနှီးမြှုပ်နှံမှုကော်မရှင် (MIC) သို့ အဆိုပြုချက်တင်ပြပြီး ခွင့်ပြုမိန့်ရယူရန်။	မြန်မာနိုင်ငံရင်းနှီးမြှုပ်နှံမှု ဥပဒေ ပုဒ်မ ၃၆(ဂ) ၊နည်းဥပဒေများအပိုဒ် ၅ အရ မြန်မာနိုင်ငံရင်းနှီးမြှုပ်နှံမှုကော်မရှင် (MIC) သို့ အဆိုပြုချက်တင်ပြပြီး ခွင့်ပြုမိန့် ရယူရန် စီစဉ် ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။
၁၄.၉	ဘေးအန္တရာယ်ဆိုင်ရာစီမံခန့်ခွဲမှုဦးစီးဌာန	
	ဘေးအန္တရာယ်ဆိုင်ရာစီမံခန့်ခွဲမှု ဥပဒေ(၂၀၁၃) ကို ထည့်သွင်းဖော်ပြရန်နှင့် ဥပဒေတွင်ပါရှိသည့်စီမံကိန်းဆောင်ရွက်မှုများနှင့်ပတ်သတ်၍ ဥပဒေပုဒ်မများကို လိုက်နာမည်ဖြစ်ကြောင်း ဖော်ပြရန်။	အခန်း (၂)၊ စာပိုဒ်ခွဲ (၂.၆.၁၀.၂) တွင် ဖော်ပြထားပါသည်။
၁၄.၁၀	အထွေထွေအုပ်ချုပ်ရေးဦးစီးဌာန	
	စီမံကိန်းတည်နေရာ မြေဧရိယာ (၃.၉၈)ဧကနှင့် ပတ်သတ်၍ နောက်ဆက်တွဲဖော်ပြချက်တွင် တိုင်းဒေသကြီးအစိုးရအဖွဲ့၏ လယ (၃၀-ခ) ခွင့်ပြုမိန့်အား ပူးတွဲဖော်ပြထားသဖြင့် EIA အစီရင်ခံစာ အခန်း (၃) တွင်လည်းမြေနေရာအား လယ (၃၀-ခ) ခွင့်ပြုမိန့် ရရှိထားကြောင်းဖော်ပြရန်။	အခန်း (၃)၊ အပိုဒ်ခွဲ (၃.၁) တွင် ဖော်ပြထားပါသည်။
၁၄.၁၀	သစ်တောဦးစီးဌာန	
	စီမံကိန်းဆောင်ရွက်မည့်ဧရိယာသည် သစ်တောကြိုးဝိုင်း/ကြိုးပြင်ကာကွယ်တော (သစ်တောနယ်မြေ) များနှင့်လွတ်ကင်းပြီး ဧရိယာဧက (၃.၉၈) ဧကသာရှိ၍ သစ်တောများအပေါ် တိုက်ရိုက်သက်ရောက်မှုမရှိသော်လည်း မြင့်မားသောအပူချိန်ဖြင့် ခါတ်ဆီနှင့်ဒီဇယ်များကိုချက်လုပ်ခြင်း/ သိုလှောင်ခြင်းတို့ကြောင့် ပတ်ဝန်းကျင်အပေါ် မီးဘေးအန္တရာယ်ကျရောက်နိုင်မှု အလားအလာရှိခြင်းကြောင့်လည်းကောင်း	စီမံကိန်း စက်ရုံ ပတ်လည်တွင် သစ်ကြီး ဝါးကြီး အပင်များ မရှိသည့်အပြင် စက်ရုံအနီးပတ်ဝန်းကျင်ရှိ မြေယာများသည် စိုက်ပျိုးမြေများ ဖြစ်သည့်အတွက် တောမီးလောင်ကျွမ်းမှု အန္တရာယ် ကျရောက်နိုင်ခြင်း မရှိနိုင်ပါသဖြင့် လျော့ပါးစေရေးနည်းလမ်းများအား မဖော်ပြတော့ပါ။

	<p>စီမံကိန်းဧရိယာအတွင်း ကွင်းဆင်းစစ်တမ်းကောက်ယူမှုအရ အပူပိုင်းတောခြောက်သစ်တော ဂေဟစနစ်တွင်ပေါက်ရောက်သော သစ်မျိုးများအများဆုံးတွေ့ရှိရသော ကြောင့်လည်းကောင်း၊ တောမီးလောင်ကျွမ်းမှုအန္တရာယ်ကျရောက်လာပါက ထိခိုက်မှုနည်းပါးစေရေးအတွက် ထိန်းချုပ်ကာကွယ်နိုင်မည့်အစီအမံတစ်ရပ် ရေးဆွဲထည့်သွင်းဖော်ပြပေးရန်</p>	
<p>၁၄.၁ ၂</p>	<p>ပြည်သူ့ကျန်းမာရေးဦးစီးဌာန</p>	
	<p>-Occupational Health and Safety Plan အားဖော်ပြရာတွင် စက်ရုံလည်ပတ်သည့်ကာလတွင်ခန့်ထားမည့် ဝန်ထမ်းဦးရေစုစုပေါင်းအားဖော်ပြရန်၊</p> <p>- အပူဒဏ် (heat exposure) နှင့် ထိတွေ့နေရသော လုပ်ငန်းခွင်အတွင်း လုပ်ငန်းခွင်အပူချိန်အား နှစ်စဉ်တိုင်းတာပေးနိုင်ပါရန်နှင့် သတ်မှတ်ထားသောပမာဏထက် ကျော်လွန်ခြင်းမရှိစေရန် အစီအမံများပြုလုပ်ပေးခြင်းနှင့် အလုပ်သမားများအား တစ်ကိုယ်ရည်သုံးအကာအကွယ်ပစ္စည်းများဖြစ်သော (Heat-protective clothing ,Insulated gloves and shoes)စသည်တို့ကို လုံလောက်အောင်ထောက်ပံ့ပေးခြင်းများ ပြုလုပ်ပေးရန်၊</p> <p>လုပ်ငန်းခွင်ရှိ အလုပ်သမားများ၏ ကျန်းမာရေးနှင့် ထိခိုက်ဒဏ်ရာရရှိမှုများအား အရေးပေါ်ကုသမှုပေးနိုင်ရေးအတွက် အရေးပေါ် first aid kit များ အလုံအလောက်ထားရှိရန်၊</p>	<p>စက်ရုံလည်ပတ်သည့်ကာလတွင်ခန့်ထားမည့် ဝန်ထမ်းဦးရေစုစုပေါင်းအား အခန်း (၃)၊ အပိုဒ်ခွဲ (၃.၄) တွင် ဖော်ပြထားပါသည်။</p> <p>အပူဒဏ် (heat exposure) နှင့် ထိတွေ့နေရသော လုပ်ငန်းခွင်အတွင်း လုပ်ငန်းခွင်အပူချိန်အား နှစ်စဉ်တိုင်းတာခြင်းအား အခန်း (၇)၊ ဇယား (၇-၃) တွင် ဖော်ပြထားပါသည်။</p> <p>သတ်မှတ်ထားသောပမာဏထက် ကျော်လွန်ခြင်းမရှိစေရန် အစီအမံများပြုလုပ်ပေးခြင်းအား အခန်း (၅)၊ အပိုဒ်ခွဲ (၅.၁၁.၃.၃) တွင် ဖော်ပြထားပါသည်။</p> <p>အလုပ်သမားများအား တစ်ကိုယ်ရည်သုံးအကာအကွယ်ပစ္စည်းများဖြစ်သော (Heat-protective clothing ,Insulated gloves and shoes)စသည်တို့ကို လုံလောက်အောင်ထောက်ပံ့ပေးခြင်းများ ပြုလုပ်ပေးရန် အခန်း (၅)၊ အပိုဒ်ခွဲ (၅.၁၁.၃.၃) တွင် ဖော်ပြထားပါသည်။</p> <p>လုပ်ငန်းခွင်ရှိ အလုပ်သမားများ၏ ကျန်းမာရေးနှင့် ထိခိုက်ဒဏ်ရာရရှိမှုများအား အရေးပေါ်ကုသမှုပေးနိုင်ရေးအတွက် အရေးပေါ် first aid kit များ အလုံအလောက်ထားရှိရန် အခန်း (၇)၊ အပိုဒ်ခွဲ (၇.၇) တွင် ဖော်ပြထားပါသည်။</p>

<p>-Table ၄.၁၀ Air quality location point နှင့်ပတ်သတ်၍ Baseline data တွင် air quality အားတိုင်းတာရာတွင် MCCM Projectကျော်စီကျေးရွာနှင့်မာလာကျေးရွာအတွင်း တိုင်းတာထားသည်ကိုတွေ့ရပါသည်။ Air quality အား Regular Monitor လုပ်ရာတွင် မာလာကျေးရွာရှိ အထက်တန်းကျောင်းအားလည်း ထည့်သွင်းတိုင်းတာပေးရန်နှင့် Community အတွင်း တိုင်းတာရရှိသော Air Quality Monitoring အဖြေအား WHO Guideline နှင့်နှိုင်းယှဉ်ဖော်ပြရန်</p> <p>-Data Missing During Field Visit ဟုဖော်ပြထားရာ Data ထည့်သွင်းမဖော်ပြနိုင်လျှင် ဇယားအားဖြုတ်ထားခဲ့ပါရန်နှင့် ဖော်ပြလိုပါက သက်ဆိုင်ရာမြို့နယ်၏ “ Township HealthProfile” မှရယူဖော်ပြရန်</p> <p>-Emergency response plan နှင့်ပတ်သတ်၍ Operation phase တွင် လုပ်ငန်းခွင်ရှိ အလုပ်သမားများ၏ ကျန်းမာရေးနှင့်ထိခိုက်ဒဏ်ရာရရှိမှုများအား နီးစပ်ရာဆေးရုံသို့ မည်သို့ချိတ်ဆက်ပို့ဆောင်ကုသရန် စီမံထားရှိမှု (နီးစပ်ရာ ကျန်းမာရေးဌာနများ၊တောင်သာမြို့နယ်ဆေးရုံ၊ မြင်းခြံမြို့နယ်ဆေးရုံများနှင့် ချိတ်ဆက်ဆောင်ရွက်ထားရှိမှု)အားဖော်ပြပေးပါရန်။</p> <p>-လုပ်ငန်းသဘာဝအရ မီးလောင်ပေါက်ကွဲနိုင်သည့် လုပ်ငန်းဖြစ်သောကြောင့် အရေးပေါ်တုံ့ပြန်မှုအစီအစဉ်များနှင့် ပတ်သတ်၍ ပုံမှန်လေ့ကျင့်မှုများ (Regular Drills) ပြုလုပ်ရန်နှင့် သဘာဝဘေးအရေးပေါ် အခြေအနေများတွင် အလျင်အမြန် တုံ့ပြန်ဆောင်ရွက်နိုင်ရေးအတွက် စီမံကိန်းဧရိယာအတွင်း အမှန်တစ်ကယ် ဆောင်ရွက်ရရှိနိုင်မည့် အခြေအနေများနှင့်သက်ဆိုင်ရာ တိုင်းဒေသကြီး/မြို့နယ် အစိုးရအဖွဲ့များအား အချိန်မီအကြောင်းကြား၍ ညွှန်ကြားချက်များနှင့်အညီ ပူးပေါင်းဆောင်ရွက်ရန်။</p>	<p>Air quality အား Regular Monitor လုပ်ရာတွင် မာလာကျေးရွာအားတိုင်းတာမည်ဖြစ်ပြီး တိုင်းတာသည့်နေရာသည် အထက်တန်းကျောင်းအားလည်း ခြုံငုံသည့် နေရာ ဖြစ်ပါသည်။</p> <p>Community အတွင်း တိုင်းတာရရှိသော Air Quality Monitoring အဖြေအား WHO Guideline နှင့်နှိုင်းယှဉ် ၍ အခန်း (၄)၊ အပိုဒ်ခွဲ (၄.၄.၁ နှင့် ၄.၄.၂) တွင် ဖော်ပြထားပါသည်။</p> <p>Data Missing During Field Visit ဟုဖော်ပြထားခြင်းအား အခန်း (၄)၊ အပိုဒ်ခွဲ (၄.၆.၅) တွင် ပြင်ဆင်ဖော်ပြထားပါသည်။</p> <p>Emergency response plan နှင့်ပတ်သတ်၍ Operation phase တွင် လုပ်ငန်းခွင်ရှိ အလုပ်သမားများ၏ ကျန်းမာရေးနှင့်ထိခိုက်ဒဏ်ရာရရှိမှုများအား နီးစပ်ရာဆေးရုံသို့ မည်သို့ချိတ်ဆက်ပို့ဆောင်ကုသရန် စီမံထားရှိမှုအား အခန်း (၄)၊ အပိုဒ်ခွဲ (၇.၇) တွင် ဖော်ပြထားပါသည်။</p> <p>လုပ်ငန်းသဘာဝအရ မီးလောင်ပေါက်ကွဲနိုင်သည့် လုပ်ငန်းဖြစ်သောကြောင့် အရေးပေါ်တုံ့ပြန်မှုအစီအစဉ်များနှင့် ပတ်သတ်၍ ပုံမှန်လေ့ကျင့်မှုများ (Regular Drills) ပြုလုပ်ရန်နှင့် သဘာဝဘေးအရေးပေါ် အခြေအနေများတွင် အလျင်အမြန် တုံ့ပြန်ဆောင်ရွက်နိုင်ရေးအတွက် စီမံကိန်းဧရိယာအတွင်း အမှန်တစ်ကယ် ဆောင်ရွက်ရရှိနိုင်မည့် အခြေအနေများနှင့်သက်ဆိုင်ရာ တိုင်းဒေသကြီး/မြို့နယ် အစိုးရအဖွဲ့များအား အချိန်မီအကြောင်းကြား၍ ညွှန်ကြားချက်များနှင့်အညီ</p>
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		ပူးပေါင်းဆောင်ရွက်ရန် အခန်း (၄)၊ အပိုဒ်ခွဲ (၇.၇) တွင် ဖော်ပြထားပါသည်။
၁၄.၁ ၃	ဥပဒေရေးရာဝန်ကြီးဌာန	
	<p>(က) စီမံကိန်းပိုင်ရှင်သည် လိုက်နာမည့် ကတိကဝတ်များကို ဖော်ပြရာတွင် စီမံကိန်းနှင့်သက်ဆိုင်သော ဥပဒေ၊နည်းဥပဒေများနှင့် လုပ်ထုံးလုပ်နည်းများ၏ပြဋ္ဌာန်းချက်များကိုသာ ကူးယူဖော်ပြထားပြီး စီမံကိန်းပိုင်ရှင်ကလိုက်နာရမည့် ကတိကဝတ်များအဖြစ် ထည့်သွင်းဖော်ပြထားခြင်းမရှိသဖြင့် စီမံကိန်းပိုင်ရှင်က စီမံကိန်းနှင့်သက်ဆိုင်သည့် ဥပဒေ၏ ပုဒ်မ၊ နည်းဥပဒေများ၏ နည်းဥပဒေ၊ လုပ်ထုံးလုပ်နည်းများ၏အပိုဒ်တို့ကိုညွှန်း၍ အကြောင်းအရာတစ်ခုချင်းအလိုက် လိုက်နာမည့်ကတိကဝတ်များအဖြစ် ပြည့်ပြည့်စုံစုံဖြင့်ဖော်ပြရန်လိုအပ်ပါသည်။ (ဥပမာ-စီမံကိန်းပိုင်ရှင်သည် စီမံကိန်းဆောင်ရွက်ရာတွင် ရှေးဟောင်းဝတ္ထုပစ္စည်းများ တွေ့ရှိရလျှင် ရှေးဟောင်းဝတ္ထုများ ကာကွယ်ထိန်းသိမ်းရေးဥပဒေ ပုဒ်မ ၁၂ အရ သက်ဆိုင်ရာရပ်ကွက်နှင့်ကျေးရွာအုပ်စု အုပ်ချုပ်ရေးမှူးထံ သတင်းပို့မည်ဖြစ်ကြောင်း ဝန်ခံကတိပြုပါသည်ဟု ဖော်ပြရန်ဖြစ်ပါသည်။)</p> <p>(ခ) ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဥပဒေ ပုဒ်မ ၇ (ဏ) နှင့် စပ်လျဉ်း၍ လိုက်နာရမည့် အချက် သုံးချက် အနက် သဘာဝသယံဇာတကို ထုတ်ယူသုံးစွဲခြင်းရှိပါက ပေးသွင်းရမည့်ငွေ၊ ပတ်ဝန်းကျင်ကို ထိခိုက်စေပါက ပေးရမည့်လျော်ကြေးငွေတို့ကို ဝန်ကြီးဌာနက သတ်မှတ်သည့်အတိုင်း ပေးသွင်းမည် ဖြစ်ကြောင်း ဖော်ပြရမည်ဖြစ်ပါသည်။</p> <p>(ဂ) The Protection of Wildlife and Conservation of Natural Areas Law (၁၉၉၄)</p>	အခန်း (၂) ရှိ သက်ဆိုင်ရာ အပိုင်းများတွင် ပြင်ဆင်ဖော်ပြထားပါသည်။

<p>သည်ရှုတ်သိမ်းပြီးဖြစ်သဖြင့် ဖော်ပြရန်မလိုအပ်ဘဲ တည်ဆဲဥပဒေဖြစ်သည့် ဇီဝမျိုးစုံမျိုးကွဲနှင့် သဘာဝထိန်းသိမ်းရေးနယ်မြေများ ကာကွယ်စောင့်ရှောက်ခြင်းဆိုင်ရာ ဥပဒေ၊ ၂၀၁၈ ပါ သက်ဆိုင်သည့်ပြဋ္ဌာန်းချက်များကို လိုက်နာမည့် ကတိကဝတ်အဖြစ်ဖော်ပြရမည်။</p> <p>(ဃ) အစီရင်ခံစာပါ အောက်ဖော်ပြပါ ဥပဒေများသည် အစီရင်ခံစာပါ အကြောင်းအရာနှင့် တိုက်ရိုက်သက်ဆိုင်ခြင်းမရှိသဖြင့် ပယ်ဖျက် သင့်ပါသည်</p> <p>(D) Income Tax Law (၁၉၇၄)</p> <p>() The Union Taxation Law (၂၀၁၈-၂၀၁၉)</p> <p>(c) စီမံကိန်းပိုင်ရှင်သည် တိုင်းရင်းသားလူမျိုးများ၏ အခွင့်အရေးနှင့် ရပိုင်ခွင့်များကို ခိုင်လုံသော အကြောင်းပြချက်မရှိဘဲ ပိတ်ပင်တားဆီးခြင်းမပြုရပါဘူး။ ယင်းတို့၏ အခွင့်အရေးများကို ကာကွယ်စောင့်ရှောက်ပါမယ်ဆိုသည့် ကတိကဝတ်ကို တိုင်းရင်းသားလူမျိုးများ၏ အခွင့်အရေးကာကွယ်စောင့်ရှောက်သည့်ဥပဒေ ၂၀၁၅ ပုဒ်မ ၂၅ သာမက တိုင်းရင်းသားလူမျိုးများ၏ အခွင့်အရေးကာကွယ် စောင့်ရှောက်သည့်နည်းဥပဒေများ နည်းဥပဒေ ၂၀ နှင့် ၂၁ တို့အရ တိုင်းရင်းသား လူမျိုးများ နေထိုင်ရာဒေသအတွင်း ဖော်ဆောင်မည့် စီမံကိန်းနှင့်စပ်လျဉ်း၍ စီမံကိန်းအဆိုပြုသူသည်လိုက်နာရမည့်တာဝန်များကို ကတိကဝတ် များအဖြစ် ဖော်ပြရမည်။</p> <p>(စ) - စီမံကိန်းအဆိုသူအနေဖြင့် ပတ်ဝန်းကျင်ညစ်ညမ်းမှု ဖြစ်စေနိုင်သော လုပ်ငန်းတစ်ရပ်ရပ်ကို လုပ်ကိုင်ရာတွင် မြန်မာ့အာမခံ၌ အထွေထွေနစ်နာ ဆုံးရှုံးမှု ပေးလျော်ရန် အာမခံကို မဖြစ်အနေထားရှိရမည့်အချက်နှင့်စပ်လျဉ်း၍ မြန်မာ့အာမခံလုပ်ငန်းဥပဒေ၊ ၁၉၉၃ ကို ထည့်သွင်း ကတိကဝတ်ပြုရမည်။</p>	
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<p>(ဆ) စီမံကိန်းတွင်အသုံးပြုမည့် မော်တော်ယာဉ်များနှင့်စပ်လျဉ်း၍ “ယာဉ်အန္တရာယ် ကင်းရှင်းရေးနှင့် မော်တော်ယာဉ်စီမံခန့်ခွဲမှုဥပဒေ၊ ၂၀၂၀ ပုဒ်မ ၉(က)၊ ၁၂ (ဂ)၊ ၁၄ (၁)၊ ၁၈ (က)၊ ၈၁ (ဆ) တို့ပါ ပြဋ္ဌာန်းချက်ပါ အချက်များ ကို စီမံကိန်းပိုင်ရှင်က လိုက်နာမည့် အကြောင်း ကတိကဝတ်ပြုရမည့်အပြင် ယာဉ်အန္တရာယ်ကင်းရှင်း ရေးနှင့် မော်တော်ယာဉ်စီမံခန့်ခွဲမှုနည်းဥပဒေ ၂၀၂၂ ပါ စီးပွားရေးလုပ်ငန်း သုံးမော်တော် ပြဋ္ဌာန်းချက်များကို လိုက်နာမည့် အကြောင်း ကတိကဝတ်ပြုရ မည်ဖြစ်ပါသည်။</p> <p>(ဇ) စီမံကိန်းတွင် စက်သုံးဆီများသိုလှောင်ထိန်းသိမ်းခြင်းနှင့်စပ်လျဉ်း၍ ရေနံနှင့် ရေနံထွက်ပစ္စည်း ဆိုင်ရာဥပဒေ ၂၀၁၇ သာမက Petroleum Rules ၁၉၃၇ ပါ အခန်း ၃ နှင့် ၄ တို့ပါ ပြဋ္ဌာန်း ချက်များကိုလည်း လိုက်နာမည့် ကတိကဝတ်ပြုရန်လိုအပ်ပါသည်။</p> <p>(ဈ) စီမံကိန်းတွင်အသုံးပြုမည့် ပေါက်ကွဲစေတတ်သော ဝတ္ထုပစ္စည်းများကို သုံးစွဲခြင်း ရှိပါက Explosive Substances Act, ၁၉၀၈ (ပုဒ်မ ၃၊ ၄၊ ၅) နှင့်လုပ်ငန်းခွင်သုံး ပေါက်ကွဲစေတတ်သော ဝတ္ထုပစ္စည်းများဆိုင်ရာဥပဒေ၊ ၂၀၁၈ (ပုဒ်မ ၆ (ဂ)၊ (ဂ)၊ ၁၁ (၁)၊ ၁၃၊ ၁၄ (ခ)၊ ၁၅၊ ၁၆၊ ၁၈၊ ၂၀၊ ၂၁) တို့ပါ အချက်များကို လိုက်နာ မည်ဖြစ်ကြောင်း ကတိကဝတ်ပြုရမည်။</p> <p>(ည) စီမံကိန်းဆောက်လုပ်ရာတွင် အသုံးပြုမည့် ရေ အတွက် Underground Water Act ကို ဖော်ပြထားခြင်းမရှိပါဘူး။ အစီစီတွင်း တူးဖော်လိုပါက သက်ဆိုင်ရာအရာရှိ ခွင့်ပြုချက်ဖြင့် ဆောင်ရွက်ရမည့် ယင်းအက်ဥပဒေပုဒ်မ ၃ နှင့် ၅ တို့ကို လိုက်နာမည်ဖြစ်ကြောင်း အကြောင်းအရာများကို ဖော်ပြရ၍ ကတိကဝတ်ပြုရမည်။ ထို့ပြင် ရက်ရမည့် ယား များများ ဖွံ့ဖြိုးတိုးတက်ရေးနှင့် မြစ်ချောင်းများညစ်ညမ်းမှုမရှိစေရေးအတွက် ရေအရင်းအမြစ်နှင့်မြစ်ချောင်းများ ဖွံ့ဖြိုးတိုးတက်ရေးဥပဒေသာမက ရေအရင်းအမြစ် နှင့်မြစ်ချောင်းများ ဖွံ့ဖြိုးတိုးတက်ရေးနည်းဥပဒေတို့ပါ သက်ဆိုင်သည့် ပြဋ္ဌာန်းချက်များကို တစ်ချက်ချင်း လိုက်နာမည်ဖြစ်ကြောင်း ကတိကဝတ်ပြုရ မည်ဖြစ်ပါသည်။</p>	
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(င) စီမံကိန်းတွင် အလုပ်လုပ်ကိုင်ကြမည့် အလုပ်သမားများနှင့်စပ်လျဉ်း၍ ၁၉၇၂ ခုနှစ်၊ ပြည်ထောင်စုမြန်မာနိုင်ငံပြည်သူ့ကျန်းမာရေးဥပဒေ (ပုဒ်မ ၃၊ ၅)နှင့် ကူးစက်ရောဂါများကာကွယ်ထိန်းချုပ်ရေးဥပဒေ၊ ၁၉၉၅ (ပုဒ်မ ၃ (က) (၉)၊ ၄၊ ၁၁) တို့သာမက ဆေးလိပ်နှင့်ဆေးရွက်ကြီးထွက်ပစ္စည်း သောက်သုံးမှုထိန်းချုပ်ရေးဥပဒေ၊ ၂၀၀၆ (ပုဒ်မ ၉) ပါ ပြဋ္ဌာန်းချက်များကို လိုက်နာမည့် ကတိကဝတ်အဖြစ်ဖော်ပြရမည်။

(၅) Prevention of Hazard from Chemical and Related Substance Law (၂၀၁၃) $\text{oupm } \text{o}\delta\text{b}\omega\text{p}\iota\text{o}\mu\text{o}\rho\text{u}\delta\alpha$ တားဆီးကာကွယ်ရေးဥပဒေ၊ ၂၀၁၃ တွင် လိုက်နာမည့် အချက်ကို ဖော်ပြထားခြင်းမရှိသဖြင့် ယင်းဥပဒေပုဒ်မ (ပုဒ်မ ၁၅ (က)၊ (ခ)၊ ၁၆ (ခ)မှ (ည)အထိ၊ ၁၇၊ ၂၂၊ ၂၇ (က) မှ (ဃ) အထိ) တို့ကို လိုက်နာမည်ဖြစ်ကြောင်း ဖော်ပြရမည်။

(ဃ) စီမံကိန်းတွင် အသုံးပြုမည့် လျှပ်စစ်ဓာတ်အား သုံးစွဲမှုနှင့်စပ်လျဉ်း၍ လျှပ်စစ်ဥပဒေ၊ ၂၀၁၄ (ပုဒ်မ ၂၀၊ ၂၁ (က)၊ ၂၄၊ ၂၇၊ ၂၉+၃၃+၄၀၊ ၆၈) တို့ကို လိုက်နာမည့် ကတိကဝတ် အဖြစ် ဖော်ပြရမည်။

(ဏ) အစီရင်ခံစာတွင် မြန်မာနိုင်ငံမီးသတ်တပ်ဖွဲ့ဥပဒေကို ဖော်ပြထားသော်လည်း ယင်းဥပဒေပုဒ်မ ၂၅ နှင့်အညီ စက်ရုံစီမံခန့်ခွဲသူ မမီးသတ်ဦးစီးဌာန၏ ညွှန်ကြားချက်နှင့်အညီ သီးသန့်မီးသတ်တပ်ဖွဲ့ဖွဲ့စည်းမည်၊မီးဘေးလုံခြုံရေးဆိုင်ရာ ပစ္စည်းကိရိယာများကို ထားရှိမည် ဖြစ်ကြောင်းကတိကဝတ်ပြုဖော်ပြရမည်။

(တ) သဘာဝဘေးအန္တရာယ်ဆိုင်ရာ စီမံခန့်ခွဲမှုဥပဒေ ပုဒ် ၁၄ မှ ၁၈ ပြဋ္ဌာန်းချက်များကို လိုက်နာမည့် ကတိကဝတ်အဖြစ် ဖော်ပြရမည်။

(ထ) စီမံကိန်းပိုင်ရှင်သည် စီမံကိန်းအတွက် အသုံးပြုမည့်ကို ငှားရမ်းခြင်းဖြစ်ပါက မြန်မာနိုင်ငံရင်းနှီးမြှုပ်နှံမှုဥပဒေ ပုဒ်မ ၅၀ (ဃ) အရ မြေငှားရမ်းခြင်းစာချုပ်အား စာချုပ်စာတမ်းမှတ်ပုံတင်ခြင်းအက်ဥပဒေနှင့်အညီ စာချုပ်စာတမ်းမှတ်ပုံတင်ရုံးတွင်

<p>မှတ်ပုံတင်ရ မည်ဖြစ်ကြောင်း ကတိကဝတ်ပြုရမည်။ မြန်မာနိုင်ငံရင်းနှီးမြှုပ်နှံမှု နည်းဥပဒေ ၂၀၁၇ ပါ သက်ဆိုင်သည့် အချက်များကို လိုက်နာမည့် ကတိကဝတ်ပြုဖော်ပြရမည်။</p> <p>(ဒ) စီမံကိန်းမြေနေရာတွင် ယဉ်ကျေးမှုအမွေအနှစ်များနှင့်စပ်လျဉ်း၍ ရှေးဟောင်းဝတ္ထု ပစ္စည်းများတွေ့ရှိပါက မည်သို့ဆောင်ရွက်ဖြစ်ကြောင်း ဖော်ပြထားခြင်း မရှိသဖြင့် ရှေးဟောင်းဝတ္ထုပစ္စည်းကာကွယ်စောင့်ရှောက်ရေးဥပဒေ၊ ၂၀၁၅ ပါ လိုက်နာမည်ဖြစ်ကြောင်း ကတိကဝတ်ပြုရမည် ဖြစ်ပါသည်။ ထို့ပြင် ယဉ်ကျေးမှုအမွေ အနှစ်ဒေသများ ကာကွယ်စောင့်ရှောက်ရေးဥပဒေ ၂၀၁၉ နှင့် သက်ဆိုင် သည့် ပြဋ္ဌာန်းချက်များကို ရှေးဟောင်းအဆောက်အအုံများ ကာကွယ်စောင့်ရှောက်ရေးဥပဒေ ၂၀၁၅ တို့ပါ စီမံကိန်းနှင့်သက်ဆိုင်သည့် ပြဋ္ဌာန်းချက် များကိုလည်း လိုက်နာမည့်ကတိကဝတ် အဖြစ်ဖော်ပြရမည်။</p> <p>(ခ) စီမံကိန်းတွက်လိုအပ်သော စက်ပစ္စည်းများတင်ပို့ခြင်းရှိပါက ပို့ကုန်သွင်းကုန်ဥပဒေ၊ ၂၀၁၂ ပုဒ်မ ၅ နှင့် ၆ တို့အပြင် ပုဒ်မ ၇ အရ (ပြည်ပမှ ပစ္စည်းတစ်စုံတစ်ရာ တင်သွင်းခြင်းရှိပါက ထည့်သွင်း ဖော်ပြရန်)</p> <p>(န) စီမံကိန်းတွင် အသုံးပြုသည့် မြေတွင် လယ်ယာမြေပါရှိပါက မြေအမျိုးအစားကို “လယ်မြေ” သို့မဟုတ် “လယ်မြေ မဟုတ်သည့် လယ်ယာ မြေ” အတိအကျ ဖော်ညွှန်းပြီး မြေအမျိုးအစားအလိုက် အခြားနည်းအသုံးပြုခွင့် ပေးနိုင်ခွင့်ရှိသူထံမှ ခွင့်ပြုချက်ရယူ မည်ဖြစ်ကြောင်း တိကျစွာဖော်ပြသင့်ပါသည်။</p> <p>(ပ) အလုပ်သမားဥပဒေများနှင့် အကျဉ်းမျှသာဖော်ပြထား ဥပဒေတစ်ခုချင်း၊ ပုဒ်မတစ်ခုချင်း လိုက်နာမည့်ကတိကဝတ်ဖော်ပြရမည်။</p> <p>(ဖ) စီမံကိန်းနှင့် သက်ဆိုင်သော အောက်ဖော်ပြပါ ဥပဒေများ၊ နည်းဥပဒေများ၊ EIA</p>	
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<p>Procedure တို့ကို စာရင်းဖော်ပြ၍ သေချာစွာ ဖတ်ရှုပြီးစီမံကိန်းပိုင်ရှင်က လိုက်နာရမည့် ကတိကဝတ်များကို သက်ဆိုင်ရာ ဥပဒေ၏ ပုဒ်မ၊ နည်းဥပဒေများ၏ နည်းဥပဒေ၊ လုပ်ထုံးလုပ်နည်း၏ အပိုဒ်ကို ညွှန်း၍ တိကျရှင်းလင်းစွာ ဖော်ပြပါရန် အကြံပြုအပ်ပါသည် -</p> <p>(၁) ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဥပဒေ၊ ၂၀၁၂ (ပုဒ်မ ၇ (ဏ)၊ ၁၄၊ ၁၅၊ ၂၄၊ ၂၉)</p> <p>(၂) ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးနည်းဥပဒေများ၊ ၂၀၁၄ (နည်းဥပဒေ ၆၉ (က)၊ (ခ))</p> <p>(၃) ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း၊ ၂၀၁၅ (အပိုဒ် ၁၀၂ မှ ၁၁၀ အထိ၊ ၁၁၃၊ ၁၁၅၊ ၁၁၇)</p> <p>(၄) EQSG, ၂၀၁၅</p> <p>(၅) မြန်မာနိုင်ငံရင်းနှီးမြှုပ်နှံမှုဥပဒေ၊ ၂၀၁၆ (ပုဒ်မ ၅၀၊ ၅၁၊ ၆၅၊ ၇၃)</p> <p>(၆) မြန်မာနိုင်ငံရင်းနှီးမြှုပ်နှံမှုနည်းဥပဒေများ၊ ၂၀၁၇ (နည်းဥပဒေ ၂၀၂၊ ၂၀၃၊ ၂၀၆၊ ၂၁၂)</p> <p>(၇) ပုဂ္ဂလိက စက်မှုလုပ်ငန်းဥပဒေ၊ ၁၉၉၀ (ပုဒ်မ ၂၇)</p> <p>(၈) လုပ်ငန်းခွင်သုံးပေါက်ကွဲစေတတ်သော ဝတ္ထုပစ္စည်းများဆိုင်ရာဥပဒေ၊ ၂၀၁၈ (ပုဒ်မ ၆ (ဂ)၊ ၇ (ဂ)၊ ၁၁ (ခ)၊ ၁၃+၁၄ (ခ)၊ ၁၅၊ ၁၆၊ ၁၈၊ ၁၉၊ ၂၀၊ ၂၁)</p> <p>(၉) The Explosive Substances Act, ၁၉၀၈ (၂)</p> <p>(၁၀) အလုပ်သမားအဖွဲ့အစည်းဥပဒေ၊ ၂၀၁၁ (ပုဒ်မ ၁၈ မှ ၂၂ အထိ)</p>	
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<p>(၁၁) အလုပ်သမားရေးရာအငြင်းပွားမှုဖြေရှင်းရေးဥပဒေ၊ ၂၀၁၂ (ပုဒ်မ ၃၈၊ ၃၈-က၊ ၃၉၊ ၄၀၊ ၅၁)</p> <p>(၁၂) အလုပ်အကိုင်နှင့် ကျွမ်းကျင်မှုဖွံ့ဖြိုးတိုးတက်ရေးဥပဒေ၊ ၂၀၁၃ (ပုဒ်မ ၅၊ ၁၄၊ ၃၀)</p> <p>(၁၃) ၂၀၁၃ ခုနှစ်၊ အနည်းဆုံးအခကြေးငွေဥပဒေ (ပုဒ်မ ၁၂၊ ၁၃)</p> <p>(၁၄) ၂၀၁၆ ခုနှစ်၊ အခကြေးငွေပေးချေရေးဥပဒေ (ပုဒ်မ ၃၄၊ ၅၁၄ နှင့် အခန်း (၃))</p> <p>(၁၅) ခွင့်နှင့်အလုပ်ပိတ်ရက်များဥပဒေ၊ ၁၉၅၁ (ခြံရေး)</p> <p>(၁၆) အလုပ်သမားလျော်ကြေးအက်ဥပဒေ၊ ၁၉၂၃ (ခြံရေး)</p> <p>(၁၇) လူမှုဖူလုံရေးဥပဒေ၊ ၂၀၁၂ (ပုဒ်မ ၁၁ (က)၊ ၁၅ (က)၊ (ခ)၊ ၁၈ (ခ)၊ ၄၀ (ခ)၊ ၇၅)</p> <p>(၁၈) လုပ်ငန်းခွင်ဘေးအန္တရာယ်ကင်းရှင်းရေးနှင့် ကျန်းမာရေးဆိုင်ရာ ဥပဒေ၊ ၂၀၁၉ (ပုဒ်မ ၁၂၊ ၁၄၊ ၁၆၊ ၁၇၊ ၁၈၊ ၂၆၊ ၂၇၊ ၃၄၊ ၃၆)</p> <p>(၁၉) ယဉ်ကျေးမှုအမွေအနှစ်ဒေသများ ကာကွယ်စောင့်ရှောက်ရေးဥပဒေ၊ ၂၀၁၉ (ပုဒ်မ ၂၁ (ခ))</p> <p>(၂၀) ရှေးဟောင်းဝတ္ထုပစ္စည်းကာကွယ်စောင့်ရှောက်ရေးဥပဒေ၊ ၂၀၁၅ (ပုဒ်မ ၁၂)</p> <p>(၂၁) ရှေးဟောင်းအဆောက်အအုံများ ကာကွယ်စောင့်ရှောက်ရေးဥပဒေ၊ ၂၀၁၅ (ပုဒ်မ ၁၂၊ ၁၅၊ ၂၀ (စ))</p>	
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<p>(၂၂) ၁၉၇၂ ခုနှစ်၊ ပြည်ထောင်စုမြန်မာနိုင်ငံပြည်သူ့ကျန်းမာရေးဥပဒေ (ပုဒ်မ ၃၅)</p> <p>(၂၃) ကူးစက်ရောဂါများကာကွယ်ထိန်းချုပ်ရေးဥပဒေ၊ ၁၉၉၅ (ပုဒ်မ ၃ (က) (၉)၊ ၄၊ ၁၁)</p> <p>(၂၄) ဆေးလိပ်နှင့်ဆေးရွက်ကြီးထွက်ပစ္စည်း သောက်သုံးမှုထိန်းချုပ်ရေးဥပဒေ၊ ၂၀၀၆ (ပုဒ်မ ၉)</p> <p>(၂၅) ရေအရင်းအမြစ်နှင့် မြစ်ချောင်းများထိန်းသိမ်းရေးဥပဒေ၊ ၂၀၀၆ (ပုဒ်မ ၈ (က)၊ ၁၁၊ ၁၉၊ ၂၁ (ခ)၊ ၂၂၊ ၂၄ (ခ)) (ရေကိုစုပ်တင်ခြင်းရှိ၍ ယင်းအတွက် ပုဒ်မ ၆ နှင့် ၃၀ ကို ပေါင်း၍ ထည့်သွင်းဖော်ပြရန်)</p> <p>(၂၆) ရေအရင်းအမြစ်နှင့် မြစ်ချောင်းများထိန်းသိမ်းရေးနည်းဥပဒေများ၊ ၂၀၁၃ (ရေကိုစုပ်တင်ခြင်းအတွက် ထည့်သွင်းဖော်ပြရန်)</p> <p>(၂၇) ရေနံနှင့် ရေနံထွက်ပစ္စည်းဆိုင်ရာဥပဒေ၊ ၂၀၁၇ (ပုဒ်မ ၈ (က)၊ (ဂ)၊ ၉ (က)၊ (င)၊ ၁၀ (က)၊ (ခ)၊ (ဃ)၊ (င)၊ ၁၁) (သက်ဆိုင်သလို ထည့်သွင်းဖော်ပြရန်)</p> <p>(၂၈) The Petroleum Rules, ၁၉၃၇ (Chapter III and IV)</p> <p>(၂၉) အင်ဂျင်နီယာကောင်စီဥပဒေ၊ ၂၀၁၃ (ပုဒ်မ ၃၄)</p> <p>(၃၀) ဓာတုပစ္စည်းနှင့် ဆက်စပ်ပစ္စည်းများအန္တရာယ်မှ တားဆီးကာကွယ်ရေး ဥပဒေ၊ ၂၀၁၃ (ပုဒ်မ ၁၅ (က)၊ (ခ)၊ ၁၆ (ခ) မှ (ည) အထိ၊ ၁၇၊ ၂၂ (က) မှ (ဃ)အထိ)</p> <p>(၃၁) မြန်မာနိုင်ငံမီးသတ်တပ်ဖွဲ့ဥပဒေ၊ (ပုဒ်မ ၂၅)</p>	
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<p>(၃၂) ပို့ကုန်သွင်းကုန်ဥပဒေ ၂၀၁၈ (ပုဒ်မ ၇)</p> <p>(၃၃) သစ်တောဥပဒေ၊ ၂၀၁၈ (ပုဒ်မ ၁၂ (က)) (သစ်တောကြီးဝိုင်းအတွင်းဖြစ်၍)</p> <p>(၃၄) ဇီဝမျိုးစုံမျိုးကွဲနှင့် သဘာဝထိန်းသိမ်းရေးနယ်မြေများ ကာကွယ်စောင့် ရှောက်ခြင်းဆိုင်ရာ ဥပဒေ၊ ၂၀၁၈ (ပုဒ်မ ၃၅ (က)၊ (ဂ)၊ (ဃ)၊ ၂၉ (င)၊ ၃၉ (ဃ))</p> <p>(၃၅) ဘွဲ့လွှာဥပဒေ၊ ၂၀၁၅ (ပုဒ်မ ၁၂၊ ၁၄၊ ၁၈၊ ၁၉၊ ၂၀၊ ၂၁၊ ၂၄၊ ၂၉(ခ)၊ ၃၁၊ ၄၀) (အသုံးပြုပါက)။</p> <p>(၃၆) မြန်မာ့အာမခံလုပ်ငန်းဥပဒေ၊ ၁၉၉၃ (ပုဒ်မ ၁၅၊ ၁၆)</p> <p>(၃၇) မန္တလေးတိုင်းဒေသကြီးအတွင်း ပြဋ္ဌာန်းထားသည့် စီမံကိန်း နှင့်သက်ဆိုင် သည့် ဥပဒေများ</p> <p>(၃၈) လျှပ်စစ်ဥပဒေ၊ ၂၀၁၄ (ပုဒ်မ ၂၀၊ ၂၁ (က)၊ ၂၄၊ ၂၇၊ ၂၉၊ ၃၃၊ ၄၀၊ ၆၈)၊ (လျှပ်စစ်ဓာတ်အား ထုတ်လုပ်ခြင်းမဟုတ်ဘဲ ရယူသုံးစွဲခြင်းအတွက် မိမိနှင့်သက်ဆိုင်သလို ကတိကဝတ်ဖော် ရေးရန်)</p> <p>(၃၉) စီမံကိန်းတွင် အသုံးပြုမည့်မြေတွင် လယ်ယာမြေပါဝင်ပါက လယ်ယာမြေဥပဒေပုဒ်မ ၃၀ ထည့်သွင်း ဖော်ပြရန်၊ မြေလွတ်၊ မြေလပ်နှင့် မြေရိုင်းများပါဝင်ပါက မြေလွတ်၊ မြေလပ်နှင့် မြေရိုင်းများစီမံခန့်ခွဲရေး ဥပဒေပုဒ်မ ၁၀ (က)၊ ၁၉ (က)နှင့် ၁၉ (ဃ) တို့ ထည့်သွင်းဖော်ပြရန်။</p> <p>(၄၀) အမြန်လမ်းမကြီးများဥပဒေ (၂၀၀၀) ပုဒ်မ ၈</p>	
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	<p>(၄၁) ယာဉ်အန္တရာယ်ကင်းရှင်းရေးနှင့် မော်တော်ယာဉ်စီမံခန့်ခွဲမှုဥပဒေ၊ ၂၀၂၀ (ပုဒ်မ ၉ (က)၊ ၁၂ (ဂ)၊ ၁၄ (ခ)၊ ၁၈ (က)၊ ၈၁ (ဆ))</p> <p>(၄၂) "ယာဉ်အန္တရာယ်ကင်းရှင်းရေးနှင့် မော်တော်ယာဉ်စီမံခန့်ခွဲမှုနည်းဥပဒေ၊ ၂၀၂၂ နည်းဥပဒေ ၂၅၂/၂၅၃၊ ၂၅၄၊ ၂၅၆၊ - ၂၆၃ ၂၆၉ ၂၇၀</p> <p>(၄၃) တိုင်းရင်းသားလူမျိုးများ၏ အခွင့်အရေးကာကွယ်စောင့်ရှောက်သည့် ဥပဒေ ၂၀၁၅ ပုဒ်မ ၅</p> <p>(၄၄) တိုင်းရင်းသားလူမျိုးများ၏ အခွင့်အရေးကာကွယ် စောင့်ရှောက်သည့် နည်းဥပဒေများ နည်းဥပဒေ ၂၀ နှင့် ၂၁</p> <p>(၄၆) Underground Water Act ပုဒ်မ ၃ နှင့် ၅</p> <p>(၄၇) သဘာဝစားအန္တရာယ်ဆိုင်ရာ စီမံခန့်ခွဲမှုဥပဒေ ပုဒ် ၁၄ မှ ၁၈</p> <p>(၄၈) The Standardization Law (၂၀၁၄) သက်ဆိုင်သည့်ပြဋ္ဌာန်းချက်</p>	
၁၄.၁ ၄	မူဝါဒနှင့် ဥပဒေရေးရာဌာန၊ ECD	
	<p>-မူဝါဒ၊ ဥပဒေနှင့် အဖွဲ့အစည်းဆိုင်ရာမူဘောင်အခန်းတွင် အောက်ပါတို့ကို ပြင်ဆင်ဖြည့်စွက် ရေးသားပေးရန်</p> <p>- “သစ်တောနည်းဥပဒေ၊ ၁၉၉၅” ဟု ဖော်ပြထားသဖြင့် “သစ်တောနည်းဥပဒေများ၊ ၁၉၉၅ (ပြင်ဆင် ၁၉၉၈) ဟု ပြင်ဆင်ဖော်ပြရန်၊ တောရိုင်းတိရစ္ဆာန်နှင့်</p>	အခန်း (၂) ရှိ သက်ဆိုင်ရာ အပိုင်းများတွင် ပြင်ဆင်ဖော်ပြထားပါသည်။

<p>သဘာဝနယ်မြေများကာကွယ်ထိန်းသိမ်းရေးဥပဒေ၊ ၁၉၉၄” ဟု မှားယွင်းစွာ ဖော်ပြထားပါသဖြင့် “တောရိုင်းတိရစ္ဆာန်နှင့် တောရိုင်းပင်များကာကွယ်ရေးနှင့် သဘာဝနယ်မြေများ ထိန်းသိမ်းရေးဥပဒေ၊ ၁၉၉၄ (ပြင်ဆင် ၂၀၁၉)”</p> <p>"ရေအရင်းအမြစ်နှင့် မြစ်ချောင်းများထိန်းသိမ်းရေးဥပဒေ၊ ၂၀၀၆” ဟု ဖော်ပြထားပါသဖြင့် (ပြင်ဆင် ၂၀၁၇)' ဟု ပြင်ဆင်ဖော်ပြရန်၊ ” ဟု ပြန်လည်ပြင်ဆင်ဖော်ပြရန်၊ “ရေအရင်းအမြစ်နှင့် မြစ်ချောင်းများထိန်းသိမ်းရေးဥပဒေ၊ ၂၀၀၆ “ကူးစက်ရောဂါများ ကာကွယ်နှိမ်နင်းရေးဥပဒေ၊ ၁၉၉၅” ဟု ဖော်ပြထားပါသဖြင့် “ ကူးစက်ရောဂါကာကွယ်နှိမ်နင်းရေးဥပဒေ၊ ၁၉၉၅ (ပြင်ဆင် ၂၀၁၁)” ဟု ပြန်လည်ပြင်ဆင် ဖော်ပြရန်၊ “အလုပ်ရုံများဥပဒေ၊ ၁၉၅၁” ဟု ဖော်ပြထားပါသဖြင့် “အလုပ်ရုံများအက်ဥပဒေ၊ ၁၉၅၁ (ပြင်ဆင် ၂၀၁၆)” ဟု ဓာတုပစ္စည်းနှင့် ဆက်စပ်ပစ္စည်းများ အန္တရာယ်မှ တားဆီးကာကွယ်ရေးနည်းဥပဒေ၊ ၂၀၁၆” ပြန်လည်ပြင်ဆင် ဖော်ပြရန်၊ ဟု ဖော်ပြထားပါသဖြင့် “ဓာတ်တုပစ္စည်းနှင့် ဆက်စပ်ပစ္စည်းများအန္တရာယ်မှ တားဆီးကာကွယ်ရေးနည်းဥပဒေများ၊ ၂၀၁၆ (ပြင်ဆင် ၂၀၁၈)” ဟု ပြန်လည်ပြင်ဆင်ဖော်ပြရန် ဘက်စုံပို့ဆောင်ရေးဥပဒေ၊ ၂၀၁၄” ဟု ဖော်ပြထားပါသဖြင့် “ဘက်စုံပို့ဆောင်ရေးဥပဒေ၊ ၂၀၀၄ (ပြင်ဆင် ၂၀၂၂) ဟု ဖော်ပြရန်၊ “ဝင်ငွေခွန်ဥပဒေ၊ ၁၉၇၄” ဟု ဖော်ပြထားပါသဖြင့် “ဝင်ငွေခွန်ဥပဒေ၊ ၁၉၇၄ (ပြင်ဆင် ၂၀၁၆)” ဟု ဖော်ပြရန်</p> <p>-“ပြည်ထောင်စု၏ အခွန်အကောက်ဥပဒေ၊ ၂၀၁၈” ဟု ဖော်ပြထားပါသဖြင့် “ပြည်ထောင်စု၏ အခွန်အကောက်ဥပဒေ၊ ၂၀၁၈ (ပြင်ဆင် ၂၀၂၃)” ဟု ဖော်ပြရန်၊</p> <p>-“မြန်မာနိုင်ငံရင်းနှီးမြှုပ်နှံမှုဥပဒေ၊ ၂၀၁၆” ဟု ဖော်ပြထားပါသဖြင့် “မြန်မာနိုင်ငံ ရင်းနှီးမြှုပ်နှံမှုဥပဒေ၊ ၂၀၁၆ (ပြင်ဆင် ၂၀၁၉)” ဟု ဖော်ပြရန်၊</p> <p>-“ခွင့်နှင့် အလုပ်ပိတ်ရက်များအက်ဥပဒေ၊ ၁၉၅၁” ဟု ဖော်ပြထားပါသဖြင့် “ခွင့်နှင့် အလုပ်ပိတ်ရက်များ အက်ဥပဒေ၊ ၁၉၅၁ (ပြင်ဆင် ၂၀၁၄)” ဟု ဖော်ပြရန်</p>	
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	<p>-“ အလုပ်သမားရေးရာ အငြင်းပွားမှုဖြေရှင်းရေးဥပဒေ၊ ၂၀၁၂” ဟု ဖော်ပြထားပါသဖြင့် “အလုပ်သမားရေးရာ အငြင်းပွားမှုဖြေရှင်းရေးဥပဒေ၊ ၂၀၁၂ (ပြင်ဆင် ၂၀၁၉)” ဟု ဖော်ပြရန်၊</p> <p>-အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များ” ဟု ဖော်ပြထားပါသဖြင့် အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာအရည်အသွေး(ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များ၊ ၂၀၁၅” ဟု ဖော်ပြရန်</p>	
<p>၁၄.၁ ၅</p>	<p>EIA (Sector)</p>	
	<p>-Page ၃-၀၉ တွင် Solid Waste ထွက်ရှိမှု၌ Reduce of Petroleum နှင့် Silica Gel အသုံးပြုမှုတို့ကို ဖော်ပြထားရှိပြီး ထွက်ရှိမှု ပမာဏ၊ သိုလှောင်မှု၊ သန့်စင်မှု၊ စွန့်ပစ်မှု ဖော်ပြရန်၊</p> <p>-စာမျက်နှာ (၃-၂၀) တွင် Operation Waste Water ထွက်ရှိမှု ၂၀ ဂါလန် During ၂-၃ days ဖော်ပြထားရှိပြီး အသုံးပြုမှု၊ ထွက်ရှိနိုင်မှု သေချာစိစစ်ဖော်ပြရန်၊ ဘက်နေရာမှ ထွက်ရှိကြောင်း၊ ဘယ်လိုသန့်စင်၍ စွန့်ပစ်မည်တို့ကို ဖော်ပြရန်၊</p> <p>စီမံကိန်းဆောင်ရွက်သည့် လုပ်ငန်းစဉ်မှ H₂S နှင့် NH₃ ပါဝင်သော Raw Waste ထွက်ရှိမှု၊ သန့်စင်မှုတို့ကို ဖော်ပြရန်</p> <p>-စာမျက်နှာ (၃-၂၂) Waste Water Treatment Plant ဖော်ပြထားပြီး အလုပ်လုပ်ပုံ၊ သန့်စင်မှု အသေးစိတ်ဖော်ပြရန်၊ Flow Chart/ Layputဖြင့် ဖော်ပြရန်၊</p> <p>-စာမျက်နှာ (၃-၂၄) Alternative တွင် Location နှင့် Technology များ ဖော်ပြထားပြီး</p>	<p>Solid Waste နှင့်ပတ်သက်သောအချက်အလက်များအား အခန်း (၃)၊ စာပိုဒ်ခွဲ (၃.၉.၄) တွင် ဖော်ပြထားပါသည်။</p> <p>Operation Waste Water ထွက်ရှိမှုနှင့်ပတ်သတ်ပြီး အခန်း (၃)၊ စာပိုဒ်ခွဲ (၃.၉.၅) တွင် ဖော်ပြထားပါသည်။</p> <p>စီမံကိန်းဆောင်ရွက်သည့် လုပ်ငန်းစဉ်မှ H₂S နှင့် NH₃ ထွက်ရှိမှုအား အခန်း(၄)၊ ဇယား (၄-၂၁) ရှိ မီးခိုးခေါင်းတိုင်မှ ထွက်ရှိမှုအတွက် တိုင်းတာရာတွင် ဖော်ပြထားပါသည်။ ရလဒ်အရ H₂S နှင့် NH₃ ထွက်ရှိမှု မှာ NEQEG စံချိန်စံညွှန်းအောက်တွင် ရှိနေသည်ကို တွေ့ရပါသည်။</p> <p>Waste Water Treatment Plant ဖော်ပြထားပြီး အလုပ်လုပ်ပုံ၊ သန့်စင်မှု အသေးစိတ် နှင့် Flow Chart များကို အခန်း (၃)၊ အပိုဒ်ခွဲ (၃.၉.၅) တွင် ဖော်ပြထားပါသည်။</p> <p>Alternative တွင် Location နှင့် Technology များ ဖော်ပြထားပြီး Best Operation</p>

<p>Best Operation ဖြစ်ကြောင်း အထောက်အထားနှင့် တကွ ဖော်ပြရန်၊</p> <p>-စာမျက်နှာ (၄-၃) Temperature နှင့် ပတ်သက်၍ ပြန်လည်စိစစ်ဖော်ပြရန်၊ အလားတူ Rainfall Data များ စိစစ်ရန်၊</p> <p>-စာမျက်နှာ (၄-၁) Stack Height Emission of Operation ကာလတွင် တိုင်းတာခြင်း ဟုတ်/မဟုတ် ဖော်ပြရန်၊ Operation ကာလတွင် တိုင်းတာရန်၊</p> <p>-စာမျက်နှာ (၁၀၄) Discharge Point နှင့် Operation waste Sample ယူသော နေရာတူနေပါသည်။ ပြန်လည်စိစစ်ဖော်ပြရန်၊</p> <p>-EMP အခန်းတွင် မည်ကဲ့သို့ လျော့ချမည်မည်ကဲ့သို့ ဆောင်ရွက်မည်ကို ဖော်ပြထားခြင်း ရှိ/မရှိနှင့် စွန့်ပစ်အစိုင်အခဲ၊ အငွေ့၊ အရည်၊ အသံ/အနံ့တို့အတွက် ဖော်ပြရန်၊ GHG ထွက်ရှိမှုတွက်ချက်ဖော်ပြရန်၊ ထွက်ရှိမှုနှုန်း၊ သန့်စင်ခြင်း၊ စွန့်ပစ်ခြင်းများ ဖော်ပြရန်။</p>	<p>ဖြစ်ကြောင်း အထောက်အထားများကို အခန်း (၃)၊ အပိုဒ်ခွဲ (၃.၁၂.၁) တွင် ဖော်ပြထားပါသည်။</p> <p>Stack height emission ကို operation ကာလတွင် တိုင်းတာ ထားခြင်း ဖြစ်ပါသည်။</p> <p>Operation Waste Sample သည် စက်ရုံမှရေနေောက်ဆုံးစွန့်ထုတ်သည့်နေရာဖြစ်သည့် Discharge Point တွင် ကောက်ယူခြင်းဖြစ်သဖြင့် တူနေခြင်းဖြစ်ပါသည်။</p> <p>EMP အခန်းတွင် စွန့်ပစ်အစိုင်အခဲ၊ အငွေ့၊ အရည်၊ အသံတို့အတွက်အတွက် မည်ကဲ့သို့ လျော့ချမည်မည်ကဲ့သို့ ဆောင်ရွက်မည်ကို ဖော်ပြထားပါသည်။ အနံ့အရည်အသွေး၏ တိုင်းတာမှုအရ အနံ့သက်ရောက်မှုမရှိသဖြင့် လျော့ချရမည့်နည်းလမ်းများအား မဖော်ပြတော့ပါ။</p>
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MCCM Co. Ltd မှ အကောင်အထည်ဖော်ဆောင်ရွက်မည့် အသေးစားရေနံချက်လုပ်ခြင်းလုပ်ငန်းနှင့် ပတ်သတ်၍ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ဦးစီးဌာန၊ ညွှန်ကြားရေးမှူးချုပ်ရုံးမှ ညွှန်ကြားလာသော သဘောထားမှတ်ချက်အား ပြန်လည်ပြင်ဆင်ခြင်း

စဉ်	အကြောင်းအရာ	ပြင်ဆင်ချက်
၁။	ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း အစီရင်ခံစာနှင့် ပတ်သက်၍ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနမှ တတိယ အဖွဲ့အစည်း အတည်ပြုချက်ရယူထားသော အစီရင်ခံစာရေးသားမည့် ကျွမ်းကျင်ပညာရှင်စာရင်းအတိုင်း ပြန်လည်တင်ပြရန်	တတိယ အဖွဲ့အစည်း အတည်ပြုချက်ရယူထားသော အစီရင်ခံစာရေးသားမည့် ကျွမ်းကျင်ပညာရှင်စာရင်းအတိုင်း အခန်း (၁)၊ အပိုဒ်ခွဲ (၁.၆.၂)၊ ဇယား (၁-၃) တွင် ပြင်ဆင်ဖော်ပြထားပါသည်။

MCCM Co. Ltd မှ အကောင်အထည်ဖော်ဆောင်ရွက်မည့် အသေးစားရေနံချက်လုပ်ခြင်းလုပ်ငန်းနှင့် ပတ်သတ်၍ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ဦးစီးဌာန၊ ညွှန်ကြားရေးမှူးချုပ်ရုံးမှ ညွှန်ကြားလာသော သဘောထားမှတ်ချက်အား ပြန်လည်ပြင်ဆင်ခြင်း

စဉ်	အကြောင်းအရာ	ပြင်ဆင်ချက်
(က)	အစီရင်ခံစာ အခန်း(၇) Summary OF environmental Monitoring Program တွင် ဖော်ပြချက်အရ အနံ့အရည်သွေးနှင့်စွန့်ပစ်ရေအရည်သွေးတို့ကို တစ်နှစ်တစ်ကြိမ် တိုင်းတာသွားမည်ဖြစ်ကြောင်း ဖော်ပြထားသဖြင့် EIA Procedure အပိုဒ် ၁၀၈ အရ (၆) လတစ်ကြိမ်ဆောင်ရွက်သွားရန်လိုကြောင်း၊	အစီရင်ခံစာ အခန်း(၇)၊ အပိုဒ်ခွဲ (၇.၃.၂)၊ Summary OF environmental Monitoring Program နှင့် ဇယား ၇-၃ တွင် အနံ့အရည်သွေးနှင့်စွန့်ပစ်ရေအရည်သွေးတို့ကို EIA Procedure အပိုဒ် ၁၀၈ အရ (၆) လတစ်ကြိမ်ဆောင်ရွက်သွားမည် ဖြစ်ကြောင်း ဖော်ပြထားပါသည်။
(ခ)	မြေပေါ်ရေအရည်အသွေးအား တိုင်းတာဖော်ပြရာတွင် အစီရင်ခံစာ၌ နိုင်းယုဉ်ဖော်ပြထားသည့် စံချိန်စံညွှန်းများအပြင် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနမှ ထုတ်ပြန်ထားသည့် National Surface water Quality standard ဖြင့်လည်း နိုင်းယုဉ်ဖော်ပြရန် လိုအပ်ကြောင်း၊	နိုင်းယုဉ်ဖော်ပြထားပုံအား အခန်း (၄)၊ စာပိုဒ်ခွဲ (၄.၄.၄.၃)၊ ဇယား ၄-၃၁ တွင် ထည့်သွင်းဖော်ပြထားပါသည်။

(ဂ)	<p>အဆိုပါ စီမံကိန်းလုပ်ငန်းကို ဆောင်ရွက်သည့်အခါ မြေပေါ်မြေအောက်ရှိ ရှေးဟောင်းဝတ္ထုပစ္စည်းများ၊ ရှေးဟောင်းအထောက်အထားတစ်စုံတစ်ရာတွေ့ရှိပါက နီးစပ်ရာ အုပ်ချုပ်ရေးမှူးရုံးနှင့် ရှေးဟောင်းသုတေသနနှင့်အမျိုးသားပြတိုက်ဦးစီးဌာန၊မန္တလေး ဌာနခွဲသို့ အမြန်ဆုံးဆက်သွယ် အကြောင်းကြားပေးရန် လိုအပ်ကြောင်း။</p>	<p>စီမံကိန်းလုပ်ငန်းကို ဆောင်ရွက်သည့်အခါ မြေပေါ်မြေအောက်ရှိ ရှေးဟောင်းဝတ္ထုပစ္စည်းများ၊ ရှေးဟောင်းအထောက်အထားတစ်စုံတစ်ရာတွေ့ရှိပါက နီးစပ်ရာ အုပ်ချုပ်ရေးမှူးရုံးနှင့် ရှေးဟောင်းသုတေသနနှင့်အမျိုးသားပြတိုက်ဦးစီးဌာန၊မန္တလေး ဌာနခွဲသို့ အမြန်ဆုံးဆက်သွယ် အကြောင်းကြားပေးမည် ဖြစ်ကြောင်းကို အခန်း (၂)၊ အပိုဒ်ခွဲ (၂.၉) နှင့် အခန်း (၄)၊ အပိုဒ်ခွဲ (၄.၆.၂.၁) တွင် ထည့်သွင်းဖော်ပြထားပါသည်။</p>
(ဃ)	<p>စီမံကိန်းဧရိယာအတွင်း မြင့်မားသောအပူချိန်ဖြင့် ဓါတ်ဆီနှင့်ဒီဇယ်ဆီများကို ချက်လုပ်ခြင်း/ သိုလှောင်ခြင်းတို့ကြောင့် ပတ်ဝန်းကျင်အပေါ် မီးဘေးအန္တရာယ်ကျရောက်နိုင်မှု အလားအလာရှိခြင်းကြောင့်လည်းကောင်း၊ စီမံကိန်းဧရိယာအတွင်း ကွင်းဆင်းစစ်တမ်း ကောက်ယူမှုအရ အပူပိုင်းတောခြောက် သစ်တောဂေဟစနစ်တွင် ပေါက်ရောက်သော သစ်မျိုးအများဆုံးတွေ့ရှိရသောကြောင့် လည်းကောင်း၊ တောမီးလောင်ကျွမ်းမှု အန္တရာယ် ကျရောက်လာပါက ထိခိုက်မှုနည်းပါးစေရေးအတွက် ထိန်းချုပ်ကာကွယ်နိုင်မည့် အစီအမံ တစ်ရပ် ရေးဆွဲထည့်သွင်းဖော်ပြရန်။</p>	<p>စီမံကိန်းဧရိယာအတွင်း မြင့်မားသောအပူချိန်ဖြင့် ဓါတ်ဆီနှင့်ဒီဇယ်ဆီများကို ချက်လုပ်ခြင်း/ သိုလှောင်ခြင်းတို့ကြောင့် ပတ်ဝန်းကျင်အပေါ် မီးဘေးအန္တရာယ်ကျရောက်နိုင်မှု အလားအလာရှိခြင်းကြောင့်လည်းကောင်း၊ အပူပိုင်းတောခြောက် သစ်တောဂေဟစနစ်တွင် ပေါက်ရောက်သော သစ်မျိုးအများဆုံးတွေ့ရှိရသောကြောင့် လည်းကောင်း၊ တောမီးလောင်ကျွမ်းမှု အန္တရာယ် ကျရောက်လာပါက ထိခိုက်မှုနည်းပါးစေရေးအတွက် ထိန်းချုပ်ကာကွယ်နိုင်မည့် အစီအမံ တစ်ရပ်ကိုရေးဆွဲပြီး ပြင်ဆင်ထားသည်များအား အခန်း (၅)၊ အပိုဒ်ခွဲ (၅.၁၃.၄) နှင့် အခန်း (၇)၊ စာပိုဒ်ခွဲ (၇.၅.၄.၁) နှင့် (၇.၅.၄.၂) တို့တွင် ဖော်ပြထားပါသည်။</p>

Reference

- A Guide to Air Quality Index by U.S Environmental Protection Agency (EPA)
- Addo-Bediako A, Matlou K, Makushu E. 2018. Heavy metal concentrations in water and sediment of the Steelpoort River, Olifants River System, South Africa. *Afr J Aquat Sci.* 43(4):413–416.
- Amin, M.H.A., Akter, M.M., Jutidamrongphan, W. and Techato, K.A., 2022. Okra tree crop agroforestry model: economic and environmental impact. *Environment, Development and Sustainability*, pp.1-16.
- DeFilipps, R.A. and Krupnick, G.A., 2018. The medicinal plants of Myanmar. *PhytoKeys*, (102), p.1.
- Anon., 2015. UK essays. [Online] Available at: <https://www.ukessays.com> [Accessed 28 August 2017].
- Arunachalam, K., Saravanan, S. and Parimelazhagan, T., 2011. Nutritional analysis and antioxidant activity of Palmyrah (*Borassus flabellifer* L.) seed embryo for potential use as food source. *Food Science and Biotechnology*, 20, pp.143-149.
- Assessing Vibration: a technical guideline, 2006, Department of Environment and Conservation, NSW (New South Wales), Australia guideline
- Badoni, R., Kumar Semwal, D., Rawat, U. and Singh Maniyari Rawat, M., 2011. Chemical constituents from fruits and stem bark of *Celtis australis* L. *Helvetica Chimica Acta*, 94(3), pp.464-473.
- Bakalial, B., Biswas, S.P., Borah, S. and Baruah, D., 2014. Checklist of fishes of Lower Subansiri River drainage, northeast India. *Annals of Biological Research*, 5(2), pp.55-67.
- Bellinger, E.G. and Sigeo, D.C. 2010. *Freshwater algae: Identification and use as bioindicators*. John Wiley & Sons, Ltd, United States of America.
- BirdLife International. (2020). Species factsheet: *Mirafra microptera*. Retrieved from <https://www.birdlife.org/>
- Blaauw, F., Eames, J. C., Leven, M. R., Steinheimer, F. D., & Boesman, P. (2018). *Birds of Myanmar - An Annotated Checklist*. Oriental Bird Club.
- Buss DF, Baptista DF, Silveira MP, Nessimian JL, Dorvillé LFM. 2002. Influence of water chemistry and environmental degradation on macroinvertebrate assemblages in a river basin in South-East Brazil.
- Carbon Dioxide Detection and Indoor Air Quality Control by OHS/ Modified by HA Team
- Debashri, M. and Tamal, M., 2012. A Review on efficacy of *Azadirachta indica* A. Juss based biopesticides: An Indian perspective. *Res. J. Recent Sci*, 2277, p.2502.
- DeFilipps, R.A. and Krupnick, G.A., 2018. The medicinal plants of Myanmar. *PhytoKeys*, (102), p.1.
- DOF, Feb,2003. *Ranger's Handbook*. Department of Forestry, Ministry of Forestry3. FAO, 1985. Nature Conservation and National Park Project.

- Drury, L.W., 2017. Hydrogeology of the Dry Zone—Central Myanmar. Australian Water Partnership: Canberra, Australia..
- Dr. Ir. Subagyo Pramumijoyo, Zaw. K. L and Lat. K.Z, 2010. Regional Geology of Myanmar. Gadjah Mada University.
- Duckworth, J.W. (2016). "*Callosciurus pygerythrus*". IUCN Red List of Threatened Species
- Eames, J. C., Leven, M. R., & Tun, T. H. (2019). The rediscovery of the Jerdon's Babbler *Chrysomma altirostre* in Myanmar and an estimate of its population size based on sound recordings. *BirdingASIA*, 31, 41-47.
- Earthquake data: NEIC for the period 1964 – 2004; from other sources for 1912 – 1963. Tectonic boundaries and fault locations are mainly based on GIAC reports (1997, 2000)
- Evans, E.A. and Mendoza, O.J., 2009. World mango trade and the economics of mango production. In *The mango: botany, production and uses* (pp. 606-627). Wallingford UK: CABI."
- FAO, 1985. Nature Conservation and National Park Project
- FAO= Food and Agriculture Organization of the United States
- Fatima, M., Ahmed, S., Siddiqui, M.U.A. and ul Hasan, M.M., 2021. Medicinal uses, phytochemistry and pharmacology of *Bauhinia racemosa* lam. *Journal of Pharmacognosy and Phytochemistry*, 10(2), pp.121-124.
- Feldhamer, G. A., Drickamer, L. C., Vessey, S. H., Merritt, J. F., & Krajewski, C. (2014). *Mammalogy: Adaptation, Diversity, Ecology* (4th ed.). Johns Hopkins University Press.
- Fish Base, 2022. A Global Information System on Fishes, Fish Base mirror: Kiel, Germany.
- Gargominy O., Ponder W. F. & Bouchet P. (2008). "Global Diversity of Gastropods (*Gastropoda; Mollusca*) in Freshwater". *Hydrobiologia* 595: 149–166. hdl.handle.net doi:10.1007/s10750-007-9012-6
- General EHS Guidelines by International Finance Corporation (World Bank Group) on 30th April 2007
- Hans, W. P. 1998: in: Sandgren, Craig D (Ed.) *Growth and Reproductive Strategies of Freshwater Phytoplankton. Growth and Reproductive Strategies of Freshwater Blue-Green Algae (Cyanobacteria)*. Cambridge University Press, Cambridge.
- Herzig, A., 1987. The analysis of planktonic rotifer populations: A plea for long-term investigations. In *Rotifer Symposium IV: Proceedings of the Fourth Rotifer Symposium, held in Edinburgh, Scotland, August 18–25, 1985* (pp. 163-180). Springer Netherlands.
- Heuzé V., Thiollot H., Tran G., Hassoun P., Lebas F., 2018. Ahuhu (*Tephrosia purpurea*). Feedipedia, a programme by INRAE, CIRAD, AFZ and FAO. <https://www.feedipedia.org/node/654> Last updated on January 25, 2018, 14:36
- <https://ghgprotocol.org/calculation-tools>
- <https://www.myanmarstandards.org.mm>, National Surface Water Quality Standard (2024)

- Huber, Markus, 2010. Compendium of Bivalves 2. A full-color guide to the remaining seven families. A systematic listing of 8'500 bivalve species and 10'500 synonyms
- International Finance Corporation (IFC) General EHS Guideline, 2007
- Islam, M.T. and Uddin, M.A., 2017. A revision on *Urena lobata* L. International Journal of Medicine, 5(1), pp.126-131."
- IUCN 2023. The IUCN Red List of Threatened Species. Version 2022-2.
<https://www.iucnredlist.org>
- Jalil, J., Attiq, A., Hui, C.C., Yao, L.J. and Zakaria, N.A., 2020. Modulation of inflammatory pathways, medicinal uses and toxicities of *Uvaria* species: potential role in the prevention and treatment of inflammation. *Inflammopharmacology*, 28, pp.1195-1218.
- Jayaram, K.C., 2013. The Freshwater Fish of the Indian Region. Narendra Publishing House, Delhi, India, 515pp.
- Jose De Paggi, S. 1976. Distribution espacially temporal del zooplancton de un cuerpo de agua eutrofico (Lago del Parque Gral. Belgrano, Santa Fe). *Physics*, Buenos Aires. 35: 171-183.
- Kanowski, P.J., n.d. Australian National University. [Online] Available at: <http://www.fao.org> [Accessed 28 August 2017].
- Kottelat, M. (2013) The Fishes of the Inland Waters of Southeast Asia: A Catalogue and Core Bibliography of the Fishes Known to Occur in Freshwaters, Mangroves and Estuaries. *Raffles Bulletin of Zoology*, 27, 1-663.
- Lansky, E.P., Paavilainen, H.M. and Lansky, S., 2013. *Caper: the genus Capparis*. CRC Press.
- List of Protected Animals. The Forest Department Issued by the Decree No. 690/2020 dated on Mar 4th, 2020. Ministry of Natural Resources and Environmental Conservation.
- Makaza, W., Gasura, E., Nyakurwa, C.S. and Masekesa, R.T., 2022. Prospects in cultivation and utilization of spiderplant (*Cleome gynandra* L.) in Sub-Saharan Africa: A review. *African Journal of Food, Agriculture, Nutrition and Development*, 22(1), pp.19370-19385.
- Maung, A. N., Aung, T. N., & Nyunt, M. M. (2017). Avifauna of the Mandalay Division, Central Myanmar. *Journal of Threatened Taxa*, 9(2), 9809-9832.
- Myint, Y., 2013, March. Talk out of one of Myanmar forester. Yangon: Sein young So.
- National Environmental Quality (Emission) Guidelines (2015) (General)
- National Environmental Quality (Emission) Guidelines (2015) (Petroleum Refining)
- National Environmental Quality (Emission) Guideline-Wastewater, Storm Water Runoff, Effluent and Sanitary Discharges - 2015(Petroleum Refining)
- Nowak, R. M. (1999). *Walker's Mammals of the World* (Vol. 1). JHU Press.
- Occupational Safety and Health Administration; PEL=Permissible Exposure Limit

- Perdebaeva, G.A. and Azhiev, A.B., 2023. Economic Significance of Creeping Anchors *Tribulus Terrestris* L. Texas Journal of Agriculture and Biological Sciences, 14, pp.63-65.
- Phyu, A.S., 2017. Myanmar third-worst for deforestation rate, says UN. Myanmar Times, 28 August.
- Prabhu, S., Vijayakumar, S., Ramasubbu, R., Praseetha, P.K., Karthikeyan, K., Thiyagarajan, G., Sureshkumar, J. and Prakash, N., 2021. Traditional uses, phytochemistry and pharmacology of *Bauhinia racemosa* Lam.: a comprehensive review. Future Journal of Pharmaceutical Sciences, 7(1), pp.1-18.
- Rainboth, W.J. 1996. Fishes of the Cambodian Mekong. FAO Species Identification Field Guide for Fishery Purposes. FAO, Rome.
- Ranaivoson, T., Brinkmann, K., Rakouth, B. and Buerkert, A., 2015. Distribution, biomass and local importance of tamarind trees in south-western Madagascar. Global Ecology and Conservation, 4, pp.14-25.
- Rasifudi L, Addo-Bediako A, Swemmer A, Bal K. 2018. Distribution and diversity of benthic macroinvertebrates in the Selati River of Olifants River System, South Africa. Afr Entomol. 26(2):398–406.
- Regional Data, Administrative Department, Taungtha Township, Mandalay Region, September 30, 2019
- Reynolds, Colin (1984). The ecology of freshwater phytoplankton. Cambridge: Cambridge University Press. ISBN 978-0521237826. OCLC 9442481
- Roberts, T. J. 1992. The birds of Pakistan, vol. II. Oxford University Press, Karachi. p. 4-29
- Rout, S., Sahoo, G., Mishra, U.N., Sheera, A. and Prusty, A.K., 2021. An Overview of Acacia. Research Today, 3(8), pp.691-693.
- Sabo, V.A. and Knezevic, P., 2019. Antimicrobial activity of Eucalyptus camaldulensis Dehn. plant extracts and essential oils: A review. Industrial crops and products, 132, pp.413-429.
- Saha, S., Shilpi, J.A., Mondal, H., Hossain, F., Anisuzzman, M., Hasan, M.M. and Cordell, G.A., 2013. Ethnomedicinal, phytochemical, and pharmacological profile of the genus *Dalbergia* L.(Fabaceae). Phytopharmacology, 4(2), pp.291-346.
- Shapiro, 2006. Mississippi River Water Quality and the clean water. Water Science and Technology Board, Division on Earth and life studies, National Research Council.
- Singh, A., Sharma, S. K., Mishra, V. and Singh, E. 2014. Freshwater zooplankton: An introduction & Their Role in Aquaculture. Research Scholar, College of Fisheries Guru Govind Singh Marg, MPUAT, Udaipur 313001 (India), M: 91-9782241997.
- Singh, K.N. and Lal, B., 2006. Notes on traditional uses of khair (*Acacia catechu* Willd.) by inhabitants of shivalik range in Western Himalaya. Ethnobotanical Leaflets, 2006(1), p.12.
- Sivamaruthi, B.S., Prasanth, M.I., Kesika, P., Tencomnao, T. and Chaiyasut, C., 2022. Functional properties of *Streblus asper* Lour.: a review. Food Science and

Technology, 42. DeFilipps, R.A. and Krupnick, G.A., 2018. The medicinal plants of Myanmar. *PhytoKeys*, (102), p.1.

Soil Types and Characteristics of Myanmar, Ministry of Agriculture and Irrigation

Srivastava, A., Bishnoi, S.K., Sarkar, P.K. and Anuradha Srivastava, S.B., 2017. Value addition in palmyra palm (*Borassus flabellifer* L.): A potential strategy for livelihood security and poverty alleviation. *Rashtriya krishi*, 12(1), pp.110-112

Standard Guideline of International Labor Organization (ILO)

Tawlar, P.K. and Jhingran. A.G., 1991. Inland Fishes of India and Adjacent countries. Vol. I and II. Oxford and IBH publishing Co. PVT. Ltd. New Delhi, Bombay, Calcutia. 1158 pp.

The 2014 Myanmar Population and Housing Census Mandalay Region, Myingyan District Taungtha Township Report

The Yangon City solid waste generation rate as of 2012 is 0.39 kg per personal day (Pollution Control and Cleaning Department, Yangon City Development Committee, 2014).

The, N.s., Sept, 2011. The Two Spots. Yangon: Pan myo tayar.

Tun, T., Jan, 2000. Greening the Dry Zone of Myanmar. *Myanmar Forestry Journal*, pp.8-14.

Vaughan, T. A., Ryan, J. M., & Czaplewski, N. J. (2013). *Mammalogy* (6th ed.). Jones & Bartlett Publishers.

White, 2005. Water quality monitoring F. E water reservoir. Environmental Resources Branch.

Win, T. & Kaung, B., Jan, 2005. Some Prominent Tree Species of Central Dry zone of Myanmar Characteristics and Planting Practices. Yangon, Myanmar: Myanmar Academy of Agricultural, Forestry, Livestock, and Fishery Sciences.

World Bank Group and IFC (April 30, 2007)

World Health Organization (WHO) Guidelines 2018

World Health Organization Guideline, 2021,

www.volcanodiscovery.com

Sahris. (n.d.). The Impact Assessment Methodology. <https://sahris.sahra.org.za/sites/default/files/additionaldocs/Appendix F1 - Impact Assessment Methodology.pdf>

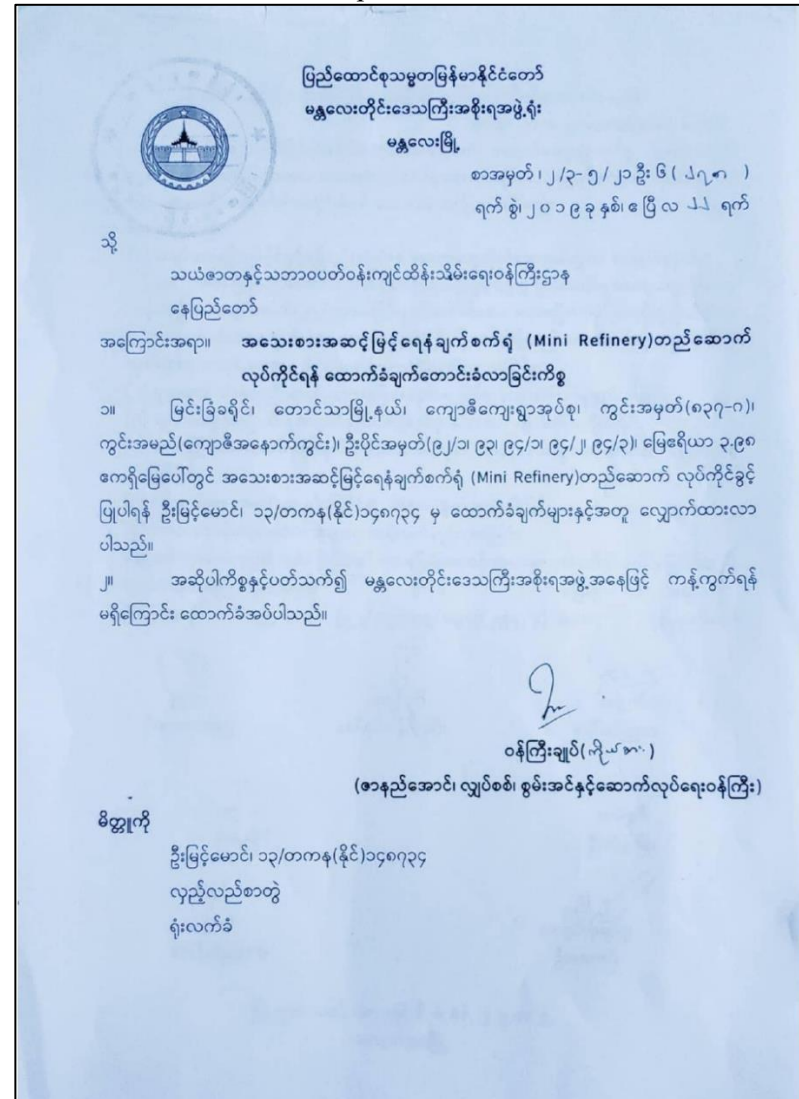
Appendix (A)

Company Documents and Land Related Documents

Company Registration



Permit From Government Department



Permit and Recommendation for Landuse

ပုံစံ-၁၅(က)

မန္တလေးတိုင်းဒေသကြီးအစိုးရအဖွဲ့

လယ်မြေမှတစ်ပါး လယ်ယာမြေအား အခြားနည်းအသုံးပြုရန် ခွင့်ပြုခြင်း

မန္တလေးတိုင်းဒေသကြီး၊ မန္တလေးခရိုင်၊ ချမ်းမြသာစည်မြို့နယ်၊ ၀၀-၃/၁၃ နေ ဦးရွှေပိုင်၏ သား ဦးမြင့်မောင်၊ ၁၃/တကန(နိုင်)၁၄၈၇၃၄ အား လယ်ယာမြေ ဥပဒေပုဒ်မ ၂၉ နှင့် ၃၀ တို့အရ အောက်ဖော်ပြပါ လယ်မြေမှတစ်ပါး လယ်ယာမြေကို သတ်မှတ်ထားသည့် စည်းကမ်းချက်များနှင့်အညီ အခြားနည်း အသုံးပြုခွင့်ပြုလိုက်သည်။

အခြားနည်းအသုံးပြုခွင့်ပြုသည့် လယ်မြေမှတစ်ပါး လယ်ယာမြေအကြောင်းအရာ

မန္တလေးတိုင်းဒေသကြီး၊ မြင်းခြံခရိုင်၊ တောင်သာမြို့နယ်

စဉ်	ရပ်ကွက်/ ကျေးရွာ အုပ်စု	ကွင်း/ အကွက် အမှတ်နှင့် အမည်	ဦးပိုင် အမှတ်	မြေမျိုး	ခွင့်ပြုသည့် ဧရိယာ		ခွင့်ပြုသည့်နည်းလမ်း	မှတ်ချက်
					ဧ က	ဒသမ		
၁	၂	၃	၄	၅	၆	၇	၈	၉
၁	ကျောက် ကျေးရွာ အမှတ်	၈၃၇-၁၊ ၈၃၇-၂၊ ၈၃၇-၃	၉၂/၁ ၉၃ ၉၄/၁	ယာ ယာ ယာ	၀ ၀ ၀	၃၄ ၇၂ ၉၇	အဆင့်မြင့်အသေးစား ရေန်ချက်စက်ရုံ မြေနေရာအဖြစ်	ခွင့်ပြုသည့် နေ့မှ(၆)လ အတွင်း အသုံးမပြု လျှင် ဖြန် လှောင်သိမ်း ယူနိုင်သည်။
				ပေါင်း	၃	၉၈		

သက်သေခံမြေပုံပူးတွဲထားပါသည်။

မန္တလေးတိုင်းဒေသကြီးအစိုးရအဖွဲ့၏ (၁၇ - ၁၀ - ၂၀၁၈)ရက်နေ့ အစည်းအဝေး အမှတ်စဉ် (၁၉ / ၂၀၁၈) ဆုံးဖြတ်ချက်အပိုဒ် - ၁၂၅ အရ လက်မှတ်ရေးထိုး ထုတ်ပေးခြင်း ဖြစ်သည်။



စာအမှတ်၊ ၂ / ၃ - ၃ / ၇ ဦး (၂ ၉၅)
ရက်စွဲ၊ ၂၀၁၈ ခုနှစ်၊ နိုဝင်ဘာလ ၂ ရက်

(ကြည်ဝင်း)
အတွင်းရေးမှူး
မန္တလေးတိုင်းဒေသကြီးအစိုးရအဖွဲ့
မန္တလေးမြို့

မြို့နယ်လယ်ယာမြေစီမံခန့်ခွဲမှုအဖွဲ့၏ ကွင်းဆင်းစိစစ်ထောက်ခံချက်

ရက်စွဲ၊ ၂၀၁၈ ခုနှစ်၊ ဇူလိုင်လ (၆) ရက်


မန္တလေးတိုင်းဒေသကြီး၊ မြင်းခြံခရိုင်၊ တောင်သာမြို့နယ်၊ ကျောက်ကျေးရွာအုပ်စု လယ်ယာမြေ စီမံခန့်ခွဲမှုအဖွဲ့၏ အဆင့်မြင့်အသေးစားရေန်ချက်စက်ရုံဆောက်လုပ်အသုံးပြုရန်အတွက် လယ(၃၀-ခ) လျှောက်ထားမှုအပေါ် အောက်ပါအတိုင်းစိစစ် ထောက်ခံတင်ပြအပ်ပါသည်။ လျှောက်ထားခြင်းသည်-

- (၁) လယ်ယာမြေလုပ်ပိုင်ခွင့်ရရှိသူဦးသဲလုံးမှ အထွေထွေကိုယ်စားလှယ်လွှဲစာ စာချုပ်အမှတ် (၂၄/၂၀၁၈) ဖြင့်လည်းကောင်း၊ လယ်ယာမြေလုပ်ပိုင်ခွင့်ရရှိသူ ဦးဖိုးဆယ်မှ အထွေထွေကိုယ်စား လှယ်လွှဲစာ စာချုပ်အမှတ်(၂၅/၂၀၁၈)ဖြင့်လည်းကောင်း၊ လယ်ယာမြေလုပ်ပိုင်ခွင့်ရရှိသူ ဦးသိန်းဝင်း မှ အထွေထွေကိုယ်စားလှယ်လွှဲစာ စာချုပ်အမှတ်(၂၆/၂၀၁၈)ဖြင့်လည်းကောင်းအထွေထွေ ကိုယ်စား လှယ်လွှဲစာ စာချုပ်များအရ ဦးမြင့်မောင်အားလွှဲပြောင်းထားရှိခြင်း၊
- (၂) မူလရာသီသီးနှံသည် ရာသီဥတုအခြေအနေအရ ဖြစ်ထွန်းအောင်မြင်မှုနည်းပါးခြင်း
- (၃) ရာသီသီးနှံသည် သီးနှံအထွက်နှုန်းပေးပြီး စီးပွားရေးအရ ထွက်မြေမကုန်ခြင်း
- (၄) အဆင့်မြင့်အသေးစားရေန်ချက်စက်ရုံဆောက်လုပ်အသုံးပြုရန်အတွက်လိုအပ်သော မြေပမာဏ ဖြစ်ခြင်း
- (၅) မြေအမျိုးအစားမှာ(ယာ-၄)မြေဖြစ်၍ သီးနှံအထွက် နည်းပါးခြင်း
- (၆) ဘေးပတ်ဝန်းကျင်ထောင်သူများမှ ကန့်ကွက်မည့်သူမရှိခြင်း


လျှောက်ထားသောမြေ၏ ကွင်း၊ ဦးပိုင်၊ ဧရိယာ၊ မြေမျိုးအတန်းအစားမှာ အောက်ပါအတိုင်း ဖြစ်ပါသည်။

စဉ် တောင်သူအမည် ကွင်းအမှတ် ဦးပိုင် မြေမျိုး ဧရိယာ


၁။ ဦးမြင့်မောင် ၈၃၇-၀ (၉၂/၁၉၃၄/၁၉၄/၂၉၄/၃) ယာ-၄ (၃- ၉၈)ဧက




ဦးဝင်းထွန်း




အဖွဲ့ဝင်
ဒေါ်နှင်းလှလှဝင်း




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ဒေါ်ခင်ဖြူမာ




အဖွဲ့ဝင်
ဦးရွှေနိုင်



အဖွဲ့ဝင်
ဦးသိန်းမြိုး



အဖွဲ့ဝင်
ဒေါ်မြင့်မြင့်စန်း



အထွေထွေရေးမှူး
ဦးအေးကို

မြို့နယ် လယ် ယာ မြေ စီ မံ ခန့် ခွဲ မှ အ ဖွဲ့
တောင်သာမြို့

တောင်သာမြို့နယ်၊ ကျောဇီကျေးရွာအုပ်စု အုပ်ချုပ်ရေးမှူး၏ စိစစ်ထောက်ခံချက်


ရက်စွဲ၊ ၂၀၁၈ ခုနှစ်၊ ဇူလိုင်လ (၄)ရက်

မန္တလေးတိုင်းဒေသကြီး၊ ချမ်းမြသာစည်မြို့နယ်၊ ၁၀-၃၊ ၁၃/၅၈ လမ်းနေ ဦးမြင့်မောင် အဆင့်မြင့်အသေးစား ရေနံချက်စက်ရုံဆောက်လုပ်အသုံးပြုရန်အတွက်လျှောက်ထားမှုကို အောက်ပါအတိုင်း စိစစ် ထောက်ခံတင်ပြအပ်ပါသည်။

လျှောက်ထားခြင်းသည်-

- ၁။ ရာသီသီးနှံများ စိုက်ပျိုးသော်လည်း အောင်မြင်ဖြစ်ထွန်းမှု မရှိခြင်း။
- ၂။ သီးနှံစိုက်ပျိုးမှုအတွက် ရေသွင်းရေထုတ်ခက်ခဲခြင်း။
- ၃။ ပတ်ဝန်းကျင်တွင် လက်ရှိလုပ်ကိုင်နေသော တောင်သူလယ်သမားများ၏ စိုက်ပျိုးရေး လုပ်ငန်းများအား ထိခိုက်နိုင်မှုမရှိခြင်း။
- ၄။ အများပြည်သူအသုံးပြုလျှက်ရှိသည့် လမ်းများ၊ လယ်ယာကုန်ထုတ်လမ်းများအား ထိခိုက်နိုင်မှုမရှိခြင်း။ တို့ကြောင့် လျှောက်ထားမှုအပေါ် စိစစ်ထောက်ခံအပ်ပါသည်။

စဉ် တောင်သူအမည် ကွင်းအမှတ် ဦးပိုင် မြေမျိုး ဧရိယာ
 ၁။ ဦးမြင့်မောင် ၈၃၇-၀ (၉၂/၁၉၃၉၄/၁၉၄/၂၉၄/၃) ယာ-၄ (၃.၉၈)ဧက


 (အုပ်ချုပ်ရေးမှူး)
 ကျောဇီကျေးရွာအုပ်စု၊ တောင်သာမြို့နယ်။

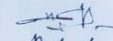
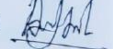

သို့

သက်ဆိုင်ရာ


ရက်စွဲ၊ ၂၀၁၉ခုနှစ်၊ ဇူလိုင်လ၊ ရက်

အကြောင်းအရာ။ ပတ်ဝန်းကျင်တောင်သူများ၏ ထောက်ခံချက်နှင့်အုပ်ချုပ်ရေးမှူး၏ထပ်ဆင့်ထောက်ခံချက်။

မန္တလေးတိုင်းဒေသကြီး၊ မြင်းခြံခရိုင်၊ တောင်သာမြို့နယ်၊ ကျောဇီကျေးရွာအုပ်စု၊ ကွင်းအမှတ် (၈၃၇-၀) ကွင်းအမည် (ကျောဇီအနောက်ကွင်း)၊ ဦးပိုင်အမှတ် (၉၂/၁၂၉၃၂၉၄/၁၂၉၄/၃)၊ မြေဧရိယာ (၄)ဧကရှိ ယာမြေတွင် ဦးမြင့်မောင် (၁၃/တကန (နိုင်) ၁၄၈၇၃၄)(MCCM Co.Ltd)မှ အသေးစားအဆင့်မြင့်ရေနံချက် စက်ရုံဆောက်လုပ်ခြင်းနှင့် စက်ရုံဝန်းအတွင်း စက်သုံးဆီသိုလှောင်ကန်ဆောက်လုပ်ခြင်းတို့အား ကန့်ကွက်ရန် မရှိပါကြောင်းထောက်ခံအပ်ပါသည်။

- | | | | |
|------------|---------------------------------|---------------------|---|
| အရှေ့အရပ် | - ဦးမောင်မောင်တိုး | ၉/တသန(နိုင်) ၀၄၂၁၉၀ |  |
| အနောက်အရပ် | - ဦးအောင်စန်းလင်း | ၉/တသန(နိုင်) ၀၉၉၁၅၅ |  |
| တောင်အရပ် | - မြင်းခြံ - ပုဂံညောင်ဦးကားလမ်း | | |
| မြောက်အရပ် | - ဒေါ်မြည့် | ၉/တသန(နိုင်) ၀၄၁၉၇၆ |  |

ထပ်ဆင့်ထောက်ခံအပ်ပါသည်။


 (အုပ်ချုပ်ရေးမှူး)
 ကျောဇီကျေးရွာအုပ်စု၊ တောင်သာမြို့နယ်။

Performance Reward from Government



Appendix(B)

Certificate for Transitional Consultants Registration

Certificate for Transitional Consultants Registration for Organization



THE REPUBLIC OF THE UNION OF MYANMAR
Ministry of Natural Resources and Environmental Conservation



CERTIFICATE FOR TRANSITIONAL CONSULTANT REGISTRATION
 (ကြားကာလအကြံပေးလုပ်ကိုင်သူမှတ်ပုံတင်ခြင်းအထောက်အထားလက်မှတ်)

No. 00079 Date 14 FEB 2023

The Ministry of Natural Resources and Environmental Conservation, hereby, issues this certificate to the organization under Environmental Impact Assessment Procedure, Notification No. 616/2015. (ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း၊ အမိန့်ကြော်ငြာစာအမှတ်၊ ၆၁၆/၂၀၁၅ အရ သယ်စာတစ်ခု သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာနသည် ဤအထောက်အထားလက်မှတ်ကို ထုတ်ပေးလိုက်သည်။)

(a) Name of Organization (အဖွဲ့အစည်းအမည်)	Hexagonal Angle International Consultants Co., Ltd
(b) Name of the representative in the organization (အဖွဲ့အစည်းကိုယ်စားလှယ်၏အမည်)	Ms. Thu Thu Aung
(c) Citizenship of the representative in the organization (အဖွဲ့အစည်းကိုယ်စားလှယ်၏နိုင်ငံသား)	Myanmar
(d) Identity Card /Passport Number of the representative person in the organization (အဖွဲ့အစည်းကိုယ်စားလှယ်၏ မှတ်ပုံတင်/ နိုင်ငံကူးလက်မှတ် အမှတ်)	12/OuKaTa (N) 161670
(e) Address of organization (ဆက်သွယ်ရန်လိပ်စာ)	No. (888), 7 th floor/B, Myittar Road, 10 Quarter, South Okkalapa Township, Yangon. Telephone (office): +959 898333722 Mobile phone: 09-43030922, 09-898333722 E mail: info@hexagonalangle.com thuthuaung@hexagonalangle.com
(f) Type of Consultancy (အကြံပေးလုပ်ကိုင်မှုအမျိုးအစား)	Organization
(g) Duration of validity (သက်တမ်းကုန်ဆုံးရက်)	30 th June, 2023

EXTENSION
 သက်တမ်းတိုးခြင်း
 The VALIDITY of this certificate is extended for two months from (1.7.2023) to (31.8.2023)
 ဤသက်တမ်းအား (၁-၇-၂၀၂၃) ရက်နေ့မှ (၃၁-၈-၂၀၂၃) ရက်နေ့အထိ (၂)လ သက်တမ်းတိုးပေးခြင်း
 For Director General
 (Sa Aung Thu, Director)
 Environmental Conservation Department



Director General
 Environmental Conservation Department
 Ministry of Natural Resources and Environmental Conservation

ဤအထောက်အထားလက်မှတ်သည် ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်းနှင့် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဖြင့် လုပ်ထုံးလုပ်နည်း၊ သို့မဟုတ် အဖွဲ့အစည်းများလုပ်ငန်းလိုင်စင်ဆိုင်ရာ လုပ်ထုံးလုပ်နည်း ထုတ်ပြန်ချက်များနှင့် (B) လ ဖြည့်ဖြောက်သည်အထိ ဖြစ်ပေါ်နိုင်ပါသည်။

Areas of Expertise Permitted (ခွင့်ပြုသည့် ကျွမ်းကျင်မှုနယ်ပယ်များ)

1. Geology and Soil;	2. Facilitation of meeting;
3. Risk Assessment and Hazard Management;	4. O (General Environmental Management);
5. O (Landslide Prediction and Management);	6. O (Geotechnical Engineering);
7. Ground water and Hydrology and Modeling;	8. O (Social Study and Analysis);
9. O (Legal Study and Analysis);	10. O (Public Consultation);
11. O (Traffic Impact Assessment);	12. Ecology and Biodiversity.
13.	14.

စည်းကမ်းချက်များ

၁။ ကြားကာလအကြံပေးလုပ်ကိုင်သူမှတ်ပုံတင်ခြင်းအထောက်အထားလက်မှတ်ရရှိသူသည်-

(က) ဤအထောက်အထားလက်မှတ်ကို ဖျက်သိမ်းခြင်း၊ ပြင်ဆင်ခြင်း၊ မသက်ဆိုင်သူတစ်ဦးဦးသို့ ငှားရမ်းခြင်း၊ အမည်ခံ အသုံးပြုခြင်းနှင့် တစ်ဆင့်လွှဲပြောင်းပေးခြင်းမပြုရ။

(ခ) ဤအထောက်အထားလက်မှတ်ကို သတ်မှတ်သည့် စည်းကမ်းချက်အတွင်း လုပ်ငန်းလုပ်ကိုင်ခွင့် အငြင်းပွားမှုများ၊ စောင့်ကြည့်မှုများနှင့်စပ်လျဉ်း၍ တာဝန်ယူဖြေရှင်းရမည်။ ယင်းသို့ ဖြေရှင်းနိုင်ခြင်း မရှိပါက အထောက်အထားလက်မှတ် ရုပ်ဆိုင်းခြင်း သို့မဟုတ် ပယ်ဖျက်ခြင်း ခံရမည်။

(ဂ) ဤအထောက်အထားလက်မှတ်တွင် ခွင့်ပြုထားသည့် ကျွမ်းကျင်မှုနယ်ပယ်များအတွက်သာ တာဝန်ယူ လေ့လာဆန်းစစ်ရေးဆွဲခွင့်ရှိသည်။

(ဃ) မိမိအဖွဲ့အစည်းတွင် ပါဝင်သည့် အကြံပေးပုဂ္ဂိုလ်များ ပြောင်းလဲမှု တစ်စုံတစ်ရာရှိပါက ကြားကာလ အကြံပေးလုပ်ကိုင်သူမှတ်ပုံတင်ခြင်း အထောက်အထားလက်မှတ် ရရှိထားသူဖြစ်သူ အစားထိုး ပြောင်းလဲရမည်။

(င) အဖွဲ့အစည်းဖြစ်ပါက အဖွဲ့အစည်းတွင် ဒါရိုက်တာဘုတ်အဖွဲ့ (Board of Director) အကြံပေးပုဂ္ဂိုလ် (Consultant) များ ပြောင်းလဲလိုလျှင် တည်ဆဲပဒေများနှင့်အညီ ဆောင်ရွက်ပြီး ရက်ပေါင်း ၃၀ အတွင်း ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနသို့ မပျက်မကွက် အကြောင်းကြားရမည်။

(စ) ဝန်ကြီးဌာနက အခါအလျော်စွာ သတ်မှတ်သည့် စည်းကမ်းချက်များကိုလိုက်နာရမည်။

(ဆ) ဖော်ပြပါ စည်းကမ်းချက်တစ်ရပ်ရပ်ကို ဖောက်ဖျက်ခြင်း၊ လိုက်နာရန်ပျက်ကွက်ခြင်း တစ်စုံတစ်ရာ ပေါ်ပေါက်ပါက အထောက်အထားလက်မှတ် ရုပ်ဆိုင်းခြင်း သို့မဟုတ် ပယ်ဖျက်ခြင်း ခံရမည်။

၂။ အထောက်အထားလက်မှတ်ရရှိသူသည် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနက ခွင့်ပြုထားသော ပတ်ဝန်းကျင် ဆန်းစစ်ခြင်းအမျိုးအစားကိုသာ ဆောင်ရွက်ရမည်။

၃။ အထောက်အထားလက်မှတ်ရရှိသူသည် မြန်မာနိုင်ငံ၏ တည်ဆဲပဒေစနစ်ရပ်ရပ်ကို ဖောက်ဖျက်ကြောင်း သို့မဟုတ် ဆန်းစစ်ခြင်းလုပ်ငန်းများ ဆောင်ရွက်ရာတွင် သိသာထင်ရှားသော မှားယွင်းမှုများ ပါရှိနေပြီး သတ်မှတ် စံချိန်စံညွှန်း သို့မဟုတ် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဥပဒေ၊ နည်းဥပဒေများ၊ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း ဆိုင်ရာ လုပ်ထုံးလုပ်နည်းတို့အရ စီစဉ်သုံးသပ်ပြီး ကနဦးသဘောထားမှတ်ချက်နှင့်အညီ ပြန်လည်ပြင်ဆင်ခြင်း မရှိကြောင်း ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန၏ သတ်မှတ်ဆုံးဖြတ်ခြင်းခံရလျှင် အထောက်အထားလက်မှတ် ရုပ်ဆိုင်းခြင်း သို့မဟုတ် ပယ်ဖျက်ခြင်း ခံရမည်။

၄။ အထောက်အထားလက်မှတ်ရရှိသော အဖွဲ့အစည်းသည် သက်ဆိုင်ရာစီမံကိန်းအတွက် လေ့လာဆန်းစစ်ရေးဆွဲ ဆောင်ရွက်ရန် တာဝန်ယူအဖွဲ့အစည်းအတည်ပြုချက်ရယူရာ၌ မိမိအဖွဲ့အစည်းတွင် မှတ်ပုံတင်ထားသည့် အကြံပေး ပုဂ္ဂိုလ်များ၏ အမည်စာရင်းကိုသာ တင်ပြရမည်။

၅။ အထောက်အထားလက်မှတ်ရရှိသော အဖွဲ့အစည်းသည် မိမိအဖွဲ့အစည်းက လက်လှမ်းမီသော ကျွမ်းကျင်မှု နယ်ပယ်များအတွက် လေ့လာဆန်းစစ်ရေးဆွဲ ဆောင်ရွက်နိုင်ရန် ကြားကာလအကြံပေးလုပ်ကိုင်သူ မှတ်ပုံတင်ခြင်း အထောက်အထားလက်မှတ် ရရှိပြီးဖြစ်သည့် တစ်ဦးပုဂ္ဂလလုပ်ကိုင်သူ (Freelancer) ကို သက်ဆိုင်ရာစီမံကိန်း အတွက်သာ ငှားရမ်းဆောင်ရွက်ရမည်။

Certificate for Transitional Consultants Registration



THE REPUBLIC OF THE UNION OF MYANMAR
Ministry of Natural Resources and Environmental Conservation



CERTIFICATE FOR TRANSITIONAL CONSULTANT REGISTRATION
 (ကြားကာလအကြံပေးလုပ်ကိုင်သူမှတ်ပုံတင်ခြင်းအထောက်အထားလက်မှတ်)

No. 00309 Date 13 FEB 2023

The Ministry of Natural Resources and Environmental Conservation, hereby, issues this certificate to the organization under Environmental Impact Assessment Procedure, Notification No. 616/2015. (ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း၊ အမိန့်ကြော်ငြာစာအမှတ်၊ ၆၁၆/၂၀၁၅ အရ သယ်စာတစ်ခု သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာနသည် ဤအထောက်အထားလက်မှတ်ကို ထုတ်ပေးလိုက်သည်။)

- (a) Name of Consultant (အကြံပေးပုဂ္ဂိုလ်အမည်) Ms. Ei Ei Zaw
- (b) Citizenship (နိုင်ငံသား) Myanmar
- (c) Identity Card / Passport Number (မှတ်ပုံတင်/ နိုင်ငံကူးလက်မှတ် အမှတ်) 12/THAKAGA (N) 182040
- (d) Address (ဆက်သွယ်ရန်လိပ်စာ) No (42), U San Phay Road, Thingangyun Tsp, Yangon.
 Mobile phone: 09444491125
 E mail: eiiezaw@hexagonalangle.com
- (e) Organization (အဖွဲ့အစည်း) Hexagonal Angle International Consultants Co.,Ltd.
- (f) Type of Consultancy (အကြံပေးလုပ်ကိုင်မှုအမျိုးအစား) Person
- (g) Duration of validity (သက်တမ်းကုန်ဆုံးရက်) 30th June, 2023.

EXTENSION
 သတ်တစ်လအတွက်
 The VALIDITY of this certificate is extended for two months from (1.7.2023) to (31.8.2023)
 ဤလက်မှတ်အား (၁-၇-၂၀၂၃) ရက်နေ့မှ (၃၁-၈-၂၀၂၃) ရက်နေ့အထိ (၂)လသက်တမ်းတိုးပေးသည်။
 For Director General (Sa Aung Thu, Director) Environmental Conservation Department



Director General,
 Environmental Conservation Department
 Ministry of Natural Resources and Environmental Conservation

ဤအထောက်အထားလက်မှတ်သည် ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်းနှင့် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဖြင့်လုပ်ဆောင် တတ်သူပုဂ္ဂိုလ် သို့မဟုတ် အဖွဲ့အစည်းများလုပ်ငန်းဆောင်ရွက်ရန်အတွက် လုပ်ထုံးလုပ်နည်း ထုတ်ပြန်ချက်အရ (၆) လ ပြည့်မြောက်သည့်နေ့တွင် ဖျက်ပြတ်မည် ဖြစ်သည်။

Areas of Expertise Permitted (ခွင့်ပြုသည့် ကျွမ်းကျင်မှုနယ်ပယ်များ)

- | | |
|---|-----|
| 1. Risk Assessment and Hazard Management. | 2. |
| 3. | 4. |
| 5. | 6. |
| 7. | 8. |
| 9. | 10. |
| 11. | 12. |
| 13. | 14. |

စည်းကမ်းချက်များ

- ၁။ ကြားကာလအကြံပေးလုပ်ကိုင်သူမှတ်ပုံတင်ခြင်းအထောက်အထားလက်မှတ်ရရှိသူသည်-
 - (က) ဤအထောက်အထားလက်မှတ်ကို ဖျက်သိမ်းခြင်း၊ ပြင်ဆင်ခြင်း၊ မသက်ဆိုင်သူတစ်ဦးဦးသို့ ငှားရမ်းခြင်း၊ အမည်ခံ အသုံးပြုခြင်းနှင့် တစ်ဆင့်လွှဲပြောင်းကိုင်ဆောင်ခြင်းမပြုရ။
 - (ခ) ဤအထောက်အထားလက်မှတ်ကို သတ်မှတ်သည့် စည်းကမ်းချက်အရ လုပ်ငန်းလုပ်ကိုင်ခွင့် အငြင်းပွားမှုများ၊ စောဒကတက်မှုများနှင့်စပ်လျဉ်း၍ တာဝန်ယူဖြေရှင်းရမည်။ ယင်းသို့ ဖြေရှင်းနိုင်ခြင်း မရှိပါက အထောက်အထားလက်မှတ် ရုပ်ဆိုင်ခြင်း သို့မဟုတ် ပယ်ဖျက်ခြင်း ခံရမည်။
 - (ဂ) ဤအထောက်အထားလက်မှတ်တွင် ခွင့်ပြုထားသည့် ကျွမ်းကျင်မှုနယ်ပယ်များအတွက်သာ တာဝန်ယူ လေ့လာဆန်းစစ်ရေးဆွဲခွင့်ရှိသည်။
 - (ဃ) မိမိအဖွဲ့အစည်းတွင် ပါဝင်သည့် အကြံပေးပုဂ္ဂိုလ်များ ပြောင်းလဲမှု တစ်စုံတစ်ရာရှိပါက ကြားကာလ အကြံပေးလုပ်ကိုင်သူမှတ်ပုံတင်ခြင်း အထောက်အထားလက်မှတ် ရရှိထားသူဖြစ်သော စာစားထိုး ပြောင်းလဲရမည်။
 - (င) အဖွဲ့အစည်းဖြစ်ပါက အဖွဲ့အစည်းတွင် ဒါရိုက်တာဘုတ်အဖွဲ့ (Board of Director)၊ အကြံပေးပုဂ္ဂိုလ် (Consultant) များ ပြောင်းလဲလိုလျှင် တည်ဆဲဥပဒေများနှင့်အညီ ဆောင်ရွက်ပြီး ရက်ပေါင်း ၃၀ အတွင်း ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနသို့ မပျက်မကွက် အကြောင်းကြားရမည်။
 - (စ) ဝန်ကြီးဌာနက အခါအားလျော်စွာ သတ်မှတ်သည့် စည်းကမ်းချက်များကိုလိုက်နာရမည်။
 - (ဆ) ဖော်ပြပါ စည်းကမ်းချက်တစ်ရပ်ရပ်ကို ဖောက်ဖျက်ခြင်း၊ လိုက်နာရန်ပျက်ကွက်ခြင်း တစ်စုံတစ်ရာ ပေါ်ပေါက်ပါက အထောက်အထားလက်မှတ် ရုပ်ဆိုင်ခြင်း သို့မဟုတ် ပယ်ဖျက်ခြင်း ခံရမည်။
- ၂။ အထောက်အထားလက်မှတ်ရရှိသူသည် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနက ခွင့်ပြုထားသော ပတ်ဝန်းကျင် ဆန်းစစ်ခြင်းအမျိုးအစားကိုသာ ဆောင်ရွက်ရမည်။
- ၃။ အထောက်အထားလက်မှတ်ရရှိသူသည် မြန်မာနိုင်ငံ၏ တည်ဆဲဥပဒေတစ်ရပ်ရပ်ကို ဖောက်ဖျက်ကြောင်း သို့မဟုတ် ဆန်းစစ်ခြင်းလုပ်ငန်းများ ဆောင်ရွက်ရာတွင် သိသာထင်ရှားသော မှားယွင်းမှုများ ပါရှိနေပြီး သတ်မှတ် စံချိန်စံညွှန်း သို့မဟုတ် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဥပဒေ၊ နည်းဥပဒေများ၊ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း ဆိုင်ရာ လုပ်ထုံးလုပ်နည်းတို့အရ စိစစ်သုံးသပ်ပြီး ကနဦးသဘောထားမှတ်ချက်နှင့်အညီ ပြန်လည်ပြင်ဆင်ခြင်း မရှိကြောင်း ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန၏ သတ်မှတ်ဆုံးဖြတ်ခြင်းခံရလျှင် အထောက်အထားလက်မှတ် ရုပ်ဆိုင်ခြင်း သို့မဟုတ် ပယ်ဖျက်ခြင်း ခံရမည်။
- ၄။ အထောက်အထားလက်မှတ်ရရှိသော အဖွဲ့အစည်းသည် သက်ဆိုင်ရာစီမံကိန်းအတွက် လေ့လာဆန်းစစ်ရေးဆွဲ ဆောင်ရွက်ရန် တတ်ယအဖွဲ့အစည်းအတည်ပြုချက်ရယူရာ၌ မိမိအဖွဲ့အစည်းတွင် မှတ်ပုံတင်ထားသည့် အကြံပေး ပုဂ္ဂိုလ်များ၏ အမည်စာရင်းကိုသာ တင်ပြရမည်။
- ၅။ အထောက်အထားလက်မှတ်ရရှိသော အဖွဲ့အစည်းသည် မိမိအဖွဲ့အစည်းက လက်လှမ်းမမီသော ကျွမ်းကျင်မှု နယ်ပယ်များအတွက် လေ့လာဆန်းစစ်ရေးဆွဲ ဆောင်ရွက်နိုင်ရန် ကြားကာလအကြံပေးလုပ်ကိုင်သူ မှတ်ပုံတင်ခြင်း အထောက်အထားလက်မှတ် ရရှိပြီးဖြစ်သည့် တစ်သီးပုဂ္ဂလ်လုပ်ကိုင်သူ (Freelancer) ကို သက်ဆိုင်ရာစီမံကိန်း အတွက်သာ ငှားရမ်းဆောင်ရွက်ရမည်။

Appendix(C)
Third-Party Confirmation Letter



ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော်အစိုးရ
 သယံဇာတနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာန
 ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန
 ညွှန်ကြားရေးမှူးချုပ်ရုံး

သို့



Director (Technical)
 MCCM Co., Ltd
 No. (EE-3/13), 58 St, Between 104 & 105 Sts,
 Kantharyar Quarter, Chanmyatharzi Tsp, Mandalay

အကြောင်းအရာ။ အသေးစားရေနံချက်စက်ရုံ (Mini Refinery) တည်ဆောက်၍ စက်သုံးဆီ ထုတ်လုပ်မည့် လုပ်ငန်းအတွက် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း ဆောင်ရွက်မည့် တတိယအဖွဲ့အစည်းအပေါ် သဘောထားမှတ်ချက် ပြန်ကြားခြင်း

ရည်ညွှန်းချက်။ (၁) MCCM Co., Ltd ၏ ၁၄-၇-၂၀၂၁ ရက်စွဲပါစာ
 (၂) ဤဝန်ကြီးဌာန၊ ပြည်ထောင်စုဝန်ကြီးရုံး၏ ၂၂-၄-၂၀၂၁ ရက်စွဲပါ စာအမှတ်၊ (သစ်တော) ၃ (၂) /၀၃ (EC)/၁၀၉၄ / ၂၀၂၁

၁။ အကြောင်းအရာပါကိစ္စနှင့်ပတ်သက်၍ MCCM Co., Ltd မှ မန္တလေးတိုင်းဒေသကြီး၊ မြင်းခြံခရိုင်၊ တောင်သာမြို့နယ် ကျောစီကျေးရွာအနောက်ဘက် ကွင်း/အကွက် အမှတ် (၈၃၇-၈) ဦးပိုင်အမှတ် (၉၂/၁၊ ၉၃/၉၄/၁၊ ၉၄/၂/၉၄/၃) တို့ရှိ မြေဧရိယာ (၄)ဧကတွင် တည်ဆောက်ပြီး အကောင်အထည်ဖော်ဆောင်ရွက်မည့် အသေးစားရေနံချက်လုပ်ငန်းလုပ်ငန်းအတွက် ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်း (Environmental Impact Assessment - EIA) ဆောင်ရွက်ရန် တတိယ အဖွဲ့အစည်း ဖြစ်သော Hexagonal Angle International Consultants Co., Ltd အား လုပ်ငန်းအပ်နှံ ဆောင်ရွက်ခွင့်ပြုနိုင်ပါရန် ရည်ညွှန်း(၁)ပါ စာဖြင့် တင်ပြလာပါသည်။

၂။ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း (Environmental Impact Assessment - EIA) အစီရင်ခံစာ ရေးသားပြုစုရန် Hexagonal Angle International Consultants Co., Ltd သည် ကြားကာလ အကြံပေးလုပ်ကိုင်သူ မှတ်ပုံတင်ခြင်း အထောက်အထားလက်မှတ် ရရှိရေး လျှောက်ထားဆဲ ကုမ္ပဏီတစ်ခုဖြစ်ပြီး အဆိုပါလုပ်ငန်းအတွက် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း ဆောင်ရွက်မည့် အဖွဲ့တွင် အဖွဲ့ဝင် (၁၆)ဦး ပါဝင်ကြောင်း၊ အဖွဲ့ဝင် (၁)ဦးမှာ ကြားကာလအကြံပေး လုပ်ကိုင်သူ မှတ်ပုံ တင်ခြင်း အထောက်အထားလက်မှတ် ရရှိထားပြီးဖြစ်ပြီး ကျန် (၁၅)ဦးမှာ လျှောက်ထားဆဲ ဖြစ်ကြောင်း၊ အဖွဲ့ဝင်များ၏ ဘာသာရပ်ဆိုင်ရာ ကျွမ်းကျင်မှု နယ်ပယ်များမှာ Geology and Soil ၊

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Impact Assessment ၊ Social Survey ၊ Air Pollution ၊ Water Pollution ၊ Risk and Hazard Assessment ၊ Land Use Survey ၊ Waste Water Management ၊ Solid Waste Management ၊ Ecological Impact Assessment ၊ Noise and Vibration ၊ Environmental Management Plans ၊ Occupational Health and Safety ၊ Air Quality Monitoring and Analysis ၊ Ecology and Biodiversity Survey ၊ Biodiversity Survey ၊ Flora and Fauna Analysis ၊ Air Pollution Management ၊ Energy Management Plan and Action ၊ Environmental Management Plan ၊ Traffic Survey Research and Methodology ၊ Environmental Quality Monitoring ၊ Legal Analysis စသည်တို့ဖြစ်သဖြင့် စီမံကိန်းနှင့်စပ်လျဉ်းသည့် လိုအပ်သော ပညာရှင်များ ပါဝင်ကြောင်း စိစစ် တွေ့ရှိရပါသည်။

၃။ သို့ဖြစ်ပါ၍ MCCM Co., Ltd မှ မန္တလေးတိုင်းဒေသကြီး၊ မြင်းခြံခရိုင်၊ တောင်သာမြို့နယ် ကျောစီကျေးရွာအနောက်ဘက် ကွင်း/အကွက် အမှတ် (၈၃၇-၈) ဦးပိုင်အမှတ် (၉၂/၁၊ ၉၃/၉၄/၁၊ ၉၄/၂/၉၄/၃) တို့ရှိ မြေဧရိယာ (၄)ဧကတွင် ဆောင်ရွက်မည့် ရေနံချက်လုပ်ငန်းလုပ်ငန်း (Mini Refinery) အတွက် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း (Environmental Impact Assessment - EIA) အစီရင်ခံစာ ရေးသားပြုစုရန် တတိယအဖွဲ့အစည်းဖြစ်သော Hexagonal Angle International Consultants Co., Ltd အား လုပ်ငန်းအပ်နှံ ဆောင်ရွက်ခွင့်ပြုပါရန် တင်ပြလာခြင်းအပေါ် ကန့်ကွက်ရန်မရှိပါကြောင်းနှင့် ပြည်ထောင်စုဝန်ကြီးရုံး၏ ရည်ညွှန်း(၂)ပါ ခွင့်ပြုချက်အရ အောက်ဖော်ပြပါအတိုင်း သဘောထား မှတ်ချက် ပြန်ကြားအပ်ပါသည်-

- (က) ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း အပိုဒ် (၅၃)အရ နယ်ပယ်အတိုင်းအတာသတ်မှတ်ခြင်း အစီရင်ခံစာ (Scoping Report) နှင့် ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်းဆောင်ရွက်မည့် လုပ်ငန်းတာဝန်များ (Terms of Reference for EIA Study) ကို တင်ပြအတည်ပြုချက်ရယူရန်၊
- (ခ) ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း အပိုဒ် (၆၃)နှင့်အညီ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းအစီရင်ခံစာ (Environmental Impact Assessment - EIA) ကို ရေးဆွဲပြုစု၍ သယံဇာတနှင့်သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ဝန်ကြီး ဌာနသို့ တင်ပြအတည်ပြုချက်ရယူရန်၊

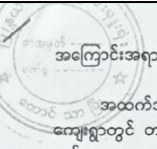
(လှမောင်သိန်း)
 ညွှန်ကြားရေးမှူးချုပ်

၃

မိတ္တူကို ပြည်ထောင်စုဝန်ကြီးရုံး၊ သယံဇာတနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာန၊ ရုံးအမှတ် (၂၈) ညွှန်ကြားရေးမှူးရုံး၊ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန၊ မန္တလေးတိုင်းဒေသကြီး ရုံးလက်ခံ၊ မျှောစာတွဲ

Appendix(D)

Fire Safety Documents



အကြောင်းအရာ။ ။တောင်သာမြို့နယ်မီးသတ်ဦးစီးမှူးရုံး၏သဘောထားမှတ်ချက်ပေးခြင်း

အထက်အကြောင်းအရာပါ ကိစ္စနှင့်ပတ်သက်၍ မြင်းခြံခရိုင် ၊ တောင်သာမြို့နယ် ၊ ကျောစီကျေးရွာတွင် တည်ရှိသော MCCM အသေးစားရေနံချက်စက်ရုံအား မီးသတ်ဦးစီးဌာန၏ ဥပဒေ၊ နည်းဥပဒေအရ မန္တလေးတိုင်းဒေသကြီး တိုင်းမီးသတ်ဦးစီးမှူး၏ ညွှန်ကြားထားသည့် အတိုင်း မီးဘေးကြိုတင်ကာကွယ်တားဆီးရေး လုပ်ငန်းများကို စနစ်တကျ ဆောင်ရွက်ထားသည့် အတွက် ကြောင့် တောင်သာမြို့နယ်မီးသတ်ဦးစီးမှူးရုံးမှ ကန့်ကွက်ရန်မရှိပါကြောင်း သဘောထားမှတ်ချက် ပေးပို့ပါသည်။



မြို့နယ်မီးသတ်ဦးစီးမှူး
ကျော်စွာ(ဦးစီးအရာရှိ)

မိတ္တူ-
ရုံးလက်ခံ

ကန့်သတ်

စက်ရုံ/အလုပ်ရုံစစ်ဆေးချက်ပုံစံ

- | | |
|---|-------------------------------|
| ၁။ ကုမ္ပဏီပိုင်ရှင်အမည် | MD-ဦးမြင့်မောင် |
| ၂။ တည်နေရာ | တောင်သာမြို့နယ်၊ကျောစီကျေးရွာ |
| ၃။ ရေအကျယ်အဝန်း | ၄ ဧက |
| ၄။ လက်ရှိအဆောက်အဦများ(အမျိုးအစား၊အကျယ်အဝန်း၊အသုံးပြုပုံ) | |
| (က) သံထည်ပစ္စည်းများ | |
| ၅။ ပတ်ဝန်းကျင်(အဆောက်အဦနှင့်လုပ်ငန်းများ) | |
| (က) မရှိပါ | |
| ၆။ သို့လျှင်/ဖြန့်ဖြူးသည့် စက်သုံးဆီအမျိုးအစား/သိုလှောင်မှုစနစ် | |
| (က) ဓါတ်ဆီ(ဂါလန်) | ၅၆၀၀၀/- (၂ကန့်) |
| (ခ) ရေနံစိမ်း(ဂါလန်) | ၅၆၀၀၀/- (၄ကန့်) |
| (ဂ) ဒီဇယ်(ဂါလန်) | ၅၆၀၀၀/- (၂ကန့်) |
| (ဃ) မီးထိုးဆီ(ဂါလန်) | ၅၆၀၀၀/- (၁ကန့်) |
| (င) ဆီချော(ဂါလန်) | ၅၆၀၀၀/- (၄ကန့်) |
| ၇။ မီးသတ်ပစ္စည်းကိရိယာများထားရှိမှု | |
| (က) စနစ်တကျထားရှိပါသည် | |
| ၈။ ဝန်ထမ်းအင်အား | |
| (က) မန်နေဂျာ | (၁)ဦး |
| (ခ) ဝန်ထမ်းအင်အား | (၃၀)ဦး |
| ၉။ သီးသန့်မီးသတ်တပ်ဖွဲ့(ရှိ/မရှိ)အင်အား | (ရှိ) / ၅ဦး |
| ၁၀။ သင်တန်းတတ်ရောက်ပြီး/မပြီး | |
| (က) အကြိုအခြေခံမီးသတ်ပညာသင်တန်း | (၅)ဦး |
| (ခ) မီးဘေးလုံခြုံရေးတာဝန်ခံသင်တန်း | (-)ဦး |

စီမံခန့်ခွဲသူ တည်နေရာ စကားပြောကြေးနန်းအမှတ် စစ်ဆေးရေးအဖွဲ့		မီးဘေးကြိုတင်ကာကွယ်ရေးပုံစံ ပိုင်ရှင်အမည် လုပ်ငန်းအမည် တည်နေရာ	MD-ဦးမြင့်မောင် MCCM ရေနံချက်စက်ရုံ ကျောစီကျေးရွာ
စဉ်	အမည်	ရာထူး	
၁။	ဦးကျော်စွာ	ဦးစီးအရာရှိ	
၂။	ဦးကျော်လင်းထိုက်	လ/ထဦးစီးမှူး	
၃။	ဥာဏ်ထွန်းအောင်	တပ်ကြပ်ကြီး	
၄။	သက်မင်းလှိုင်	တပ်ကြပ်	
၅။	ဇေယျာထက်	ဒုတပ်ကြပ်	
၆။	အောင်မင်းပိုင်	တပ်သား	
၁။	မီးဘေးကြိုတင်ကာကွယ်ရေးစီမံချက် ရေးဆွဲထားခြင်းရှိ/မရှိ	ရှိ	
	(က) မီးဘေးလုံခြုံရေးတာဝန်ခံ၏ အဆင့်/အမည်	-	
	(ခ) နှိုးဆော်စာ(Notice)	ရှိ	
၂။	စီမံချက်အား အကောင်အထည်ဖော်ခြင်းရှိ/မရှိ	ရှိ	
	(က) လေ့ကျင့်ခန်းပြုလုပ်ပြီး/မပြီး	ပြီး	
	(ခ) မီးသတ်သင်တန်းတတ်ရောက်ပြီး/မပြီး	ပြီး	
	(ဂ) Fire Safety Manager သင်တန်းတတ်ရောက်ပြီး/မပြီး	မပြီး	
၃။	လုပ်ငန်းလိုင်စင်		
	(က) လုပ်ငန်းလိုင်စင်အမှတ်	၂၂၁/၃/၁၃၂၇	
	(ခ) လိုင်စင်ထုတ်ပေးသည့် ရက်စွဲ	၈-၄-၂၀၂၀	
	(ဂ) လိုင်စင်သက်တမ်းကုန်ဆုံးသည့်ရက်စွဲ		
	(ဃ) မြန်မာနိုင်ငံရင်းနှီးမြှုပ်နှံမှုကော်မရှင် ခွင့်ပြုမိန့်အမှတ်		
၄။	အသုံးပြုသည့် စက်အမျိုးအစား		
	(က) အရေအတွက်	(၂)လုံး	
	(ခ) မြင်းကောင်ရေအား		
	(ဂ) ဗို့အား	41.5 Kg	
	(ဃ) မော်တာအရေအတွက် ကြီး/သေး	ကြီး(၂)လုံး	
	(င) ဘေးအန္တရာယ်ကာကွယ်ထားရှိမှု	ရှိ	
	(စ) စက်ပစ္စည်းထုတ်လုပ်သည့်နိုင်ငံ	တရုတ်	

၅။	ဘိုလ်လာအသုံးပြုခြင်း	မရှိ
	(က) အရွယ်အစား	
	(ခ) လောင်စာအမျိုးအစား	
၆။	လျှပ်စစ်သွယ်တန်းမှု	
	(က) သုံးစွဲသည့်ဗို့အား	325KVA
	(ခ) ဝါယာကြိုးသွယ်တန်းမှု ကောင်း/မကောင်း	ကောင်း
	(ဂ) မီးခလုတ်များ တပ်ဆင်အသုံးပြုခြင်း စနစ်ကျမှုရှိ/မရှိ	ရှိ
	(ဃ) ယာယီမီးကြိုးသွယ်တန်းထားရှိမှုရှိ/မရှိ	မရှိ
၇။	မီးသတ်ပစ္စည်းကိရိယာများ	
	(က) မီးသတ်စင်အရေအတွက်	၃စင်
	(ခ) မီးသတ်ဆေးဘူးအမျိုးအစား/အရေအတွက်	
	(ဂ) အရေးပေါ်မီးသတ်ပိုက်	ရှိ
	(ဃ) မီးသတ်စက် (အပေါ်စားနောက်ဆက်တွဲယာဉ်	အပေါ်စား
	(င) မီးလှန့်အချက်ပေးကိရိယာ(Smoke/Heat Dectator)	ရှိ
၈။	ဝန်ထမ်းများ မီးငြိမ်းသတ်ရေးပစ္စည်းကိရိယာများ	
	ကိုင်တွယ်အသုံးပြုနားလည်ခြင်းရှိ/မရှိ	ရှိ
	(က) လုံခြုံရေးဝန်ထမ်းထားရှိခြင်းရှိ/မရှိ	ရှိ
	(ခ) လုံခြုံရေးဝန်ထမ်း(မီးသတ်)	ရှိ
	(ဂ) အခြားလုံခြုံရေးအဖွဲ့ရှိ/မရှိ	မရှိ
၉။	ရေရရှိရေး	
	(က) အဝီစိတွင်းရှိ/မရှိ	ရှိ
	(ခ) ရေစင်	ရှိ
	(ဂ) ရေတွင်းရေကန်မြေတွင်းရေပိုက်ခေါင်း	ရှိ
	(ဃ) မီးသတ်စက်(အပေါ်စား)	ရှိ
၁၀။	ဆက်သွယ်ရေး	
	(က) စကားပြောကြေးနန်း(အတွင်း/အပြင်)	အပြင်
	(ခ) မီးလှန့်အချက်ပေးခြင်း	ရှိ
	(ဂ) ဆက်သွယ်ရေး	ရှိ
	(ဃ) သယ်ယူပို့ဆောင်ရေး	ရှိ
	(င) အနီးဆုံးဆက်သွယ်နိုင်သောမီးသတ်စခန်း	ကျောစီနယ်မြေမီးသတ်စခန်း
၁၁။	ပစ္စည်းများကာကွယ်ထိန်းသိမ်းနိုင်ခြင်း	
	(က) မီးမလောင်ခိုက ကာကွယ်ထိန်းသိမ်းနိုင်ခြင်း	
၁၂။	မီးလောင်မှုမှတ်တမ်းရှိ/မရှိ	မရှိ

Appendix(E)

Baseline Measurement Results in Wet Season

Outdoor Air Result



HEXAGONAL ANGLE
INTERNATIONAL CONSULTANTS CO.,LTD.

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Email: info@hexagonalangle.com
Website: www.hexagonalangle.com

Project Name	MCCM Company Limited	
Air Sampling Location	Project Area	
	Latitude	21°17'54.24"N
	Longitude	95°10'24.26"E
Date	15th to 16th September, 2021	
Logging Duration (Hours)	24 Hour	
	Log on Time (Date)	15.09.2021
	Log off Time (Date)	16.09.2021
Air Quality Measuring Equipment	OCEANUS - AQM - 09	

Table of Air Quality Monitoring Result

No.	Parameter	Analyzed Period	Result	Unit	Average Period	NEQ(E) Guidelines Value
1	Particulate Matter PM _{2.5}	24 Hour	10.45	µg/m ³	1 Year 24 Hour	* 20 µg/m ³ * 25 µg/m ³
2	Particulate Matter PM ₁₀	24 Hour	15.73	µg/m ³	1 Year 24 Hour	* 40 µg/m ³ * 50 µg/m ³
3	Total Suspended Particulate (TSP)	24 Hour	18.72	µg/m ³	24 Hours	NG
4	Sulphur Dioxide (SO ₂)	24 Hour	7.86	µg/m ³	10 Mins 24 Hours	* 500 µg/m ³ * 20 µg/m ³
5	Nitrogen Dioxide (NO ₂)	24 Hour	82.26	µg/m ³	1 Year 1 Hour	* 40 µg/m ³ * 200 µg/m ³
6	Carbon Monoxide (CO)	24 Hour	0.33	mg/m ³	-	NG
7	Ozone (O ₃)	24 Hour	104.83	µg/m ³	8 Hour Daily Maximum	100 µg/m ³
10	Relative Humidity	24 Hour	82.86	%	-	NG
11	Temperature	24 Hour	30	Celsius	-	NG
12	Air Pressure	24 Hours	996.04	hPa	24-Hour	NG
13	Wind Direction	24 Hour	0.17	Degree	-	NG
14	Wind Speed	24 Hour	156	m/s	-	NG

NG = No Guideline
NEQ(E) Guideline= National Environmental Quality (Emission) Guidelines

Analyzed by

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Checked by

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Noise Quality Result



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Project Name	MCCM Company Limited		
Project Location	Project Area		
	Latitude	21°17'54.24"N	
	Longitude	95°10'24.26"E	
Date	16.09.2021		
Logging Duration	24 Hour		
	Log on Time (Date)	15.09.2021	
	Log off Time (Date)	16.09.2021	
Noise Quality Measuring Equipment	GM-1356 Digital Sound Level Meter		

Table of Noise Quality Monitoring Result

No	Location	Duration	Noise Level (dBA)		NEQ(E) Guideline Value	
			Day Time (07:00 – 22:00)	Night Time (22:00 – 07:00)	Residential, Institutional, educational	Industrial, commercial
			*Average Result (dBA)	*Average Result (dBA)		
1	MCCM Project Area 21°17'54.24"N 95°10'24.26"E	24 hr	62.6	63.4	55	70

NEQ(E) Guidelines- National Environmental Quality (Emission) Guidelines

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Light Quality Result



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Project Name	MCCM Company Limited
Project Location	Project Compound
Date	16.9.2021
Logging Duration	Measured 5-minute interval for 5 times
Light Quality Measuring Equipment	AS-823 Lux Meter

Table of Light Quality Monitoring Result

No	Location	Duration	Unit	Measure Value (Lux)	*IFC Value (Lux)
1	Office 21°17'54.36"N, 95°10'25.94"E	Measured 5-minute interval for 5 times	Lux	296.2	500
2	Kitchen 21°17'54.43"N, 95°10'26.25"E			164.2	200
3	Control Room 21°17'54.51"N, 95°10'26.57"E			298.3	500
4	Silica Gel Room 21°17'51.59"N, 95°10'23.37"E			133	100
5	Machinery Store 21°17'51.77"N, 95°10'23.98"E			124.5	100

*General EHS Guidelines by International Finance Corporation (World Bank Group), 30th April 2007

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Temperature Result



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Project Name	MCCM Company Limited
Project Location	Project Area
Date	16.09.2021
Logging Duration	Measured 5-minute interval for 5 times
Temperature Measuring Equipment	OHS-Infrared Thermometer

Table of Temperature Monitoring Result

No	Location	Duration	Unit	Measure Value	Standard Guideline* (°C)
1	Office 21°17'54.36"N, 95°10'25.94"E	Measured 5-minute interval for 5 times	°C	26.56	32
2	Kitchen 21°17'54.43"N, 95°10'26.25"E			26.37	
3	Control Room 21°17'54.51"N, 95°10'26.57"E			26.09	
4	Machinery Store 21°17'51.77"N, 95°10'23.98"E			26.10	
5	Store Room 21°17'51.59"N, 95°10'23.37"E			25.04	

* Standard Guideline of International Labor Organization (ILO)

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Appendix(F)
Baseline Measurement Results in Dry Season

Outdoor Air Result of Project Area



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Project Name	MCCM Company Limited		
Air Sampling Location	Project Area		
	Latitude	21°17'54.24"N	
	Longitude	95°10'24.26"E	
Date	10 th - 11 th May, 2023		
Logging Duration (Hours)	24 Hour		
	Log on Time (Date, Time)	10 th May, 2023	7:30AM
	Log off Time (Date, Time)	11 th May, 2023	7:30AM
Air Quality Measuring Equipment	AQM-09 Air Quality Monitoring Station		

Table of Air Quality Monitoring Result

No.	Parameter	Analyzed Period	Result	Unit	Average Period	WHO Global Air Quality Guidelines 2021 ¹	OSHA (PEL) Guidelines ²	NEQ(EG) Guideline Value (Petroleum Refining) ³
1	Particular Matter PM _{2.5}	24 Hour	11.17	µg/m ³	1 Year 24 Hour	*15 µg/m ³ *45 µg/m ³	NG	50 µg/m ³
2	Particular Matter PM ₁₀	24 Hour	20.98	µg/m ³	1 Year 24 Hour	*5 µg/m ³ *15 µg/m ³	NG	* 20 µg/m ³ * 50 µg/m ³
3	Total Suspended Particulate (TSP)	24 Hour	28.89	µg/m ³	24 Hours	NG	NG	NG
4	Sulphur Dioxide (SO ₂)	24 Hour	19.86	µg/m ³	10 Mins 24 Hours	*500 µg/m ³ *40 µg/m ³	NG	NG
5	Nitrogen Dioxide (NO ₂)	1 Hour	5.35	µg/m ³	1 Year 1 Hour 24 Hour	*10 µg/m ³ *200 µg/m ³ *25 µg/m ³	NG	NG
6	Carbon Monoxide (CO)	24 Hour	0.32	ppm	15 Min 1 Year 8 Hour 24 Hour	*100 µg/m ³ *35 µg/m ³ *10 µg/m ³ *4 µg/m ³	50 ppm	NG
7	Carbon dioxide (CO ₂)	24 Hour	279.69	ppm	-	NG	5000 ppm	NG
8	Ozone (O ₃)	8- Hour	42.95	µg/m ³	8 Hour Daily Maximum	NG	NG	100 µg/m ³
9	Relative Humidity	24 Hour	33.28	%	-	NG	NG	NG
10	Temperature	24 Hour	33.31	Celsius	-	NG	NG	NG
11	Wind Direction	24 Hour	221.43	Degree	-	NG	NG	NG
12	Wind Speed	24 Hour	1.09	m/s	-	NG	NG	NG
13	Volatile Organic Compounds (VOC)	24 Hour	0.46	ppm	-	NG	NG	NG

¹World Health Organization Guideline, 2021

²Occupational Safety and Health Administration; PEL=Permissible Exposure Limit

³National Environmental Quality (Emission) Guidelines (2015)(Petroleum Refining). NG=No Guideline

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Outdoor Air Result of Kyaw Zi Village



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Project Name	MCCM Company Limited		
Air Sampling Location	Kyaw Zi Village		
	Latitude	21°18'56.10"N	
	Longitude	95°10'41.46"E	
Date	11 th - 12 th May, 2023		
Logging Duration (Hours)	24 Hour		
	Log on Time (Date, Time)	11 th May, 2023	7:00AM
	Log off Time (Date, Time)	12 th May, 2023	7:00AM
Air Quality Measuring Equipment	AQM-09 Air Quality Monitoring Station		

Table of Air Quality Monitoring Result

No.	Parameter	Analyzed Period	Result	Unit	Average Period	WHO Global Air Quality Guidelines 2021 ¹	OSHA (PEL) Guidelines ²	NEQ(EG) Guideline Value (Petroleum Refining) ³
1	Particular Matter PM _{2.5}	24 Hour	7.51	µg/m ³	1 Year 24 Hour	*15 µg/m ³ *45 µg/m ³	NG	50 µg/m ³
2	Particular Matter PM ₁₀	24 Hour	30.98	µg/m ³	1 Year 24 Hour	*5 µg/m ³ *15 µg/m ³	NG	* 20 µg/m ³ * 50 µg/m ³
3	Total Suspended Particulate (TSP)	24 Hour	45.56	µg/m ³	24 Hours	NG	NG	NG
4	Sulphur Dioxide (SO ₂)	24 Hour	10.99	µg/m ³	10 Mins 24 Hours	*500 µg/m ³ *40 µg/m ³	NG	NG
5	Nitrogen Dioxide (NO ₂)	24 Hour	19.17	µg/m ³	1 Year 1 Hour 24 Hour	*10 µg/m ³ *200 µg/m ³ *25 µg/m ³	NG	NG
6	Carbon Monoxide (CO)	24 Hour	0.06	ppm	15 Min 1 Year 8 Hour 24 Hour	*100 µg/m ³ *35 µg/m ³ *10 µg/m ³ *4 µg/m ³	50 ppm	NG
7	Carbon dioxide (CO ₂)	24 Hour	267.02	ppm	-	NG	5000 ppm	NG
8	Ozone (O ₃)	24 Hour	53.38	µg/m ³	8 Hour Daily Maximum	NG	NG	100 µg/m ³
9	Relative Humidity	24 Hour	58.94	%	-	NG	NG	NG
10	Temperature	24 Hour	32.98	Celsius	-	NG	NG	NG
11	Wind Direction	24 Hour	254.62	Degree	-	NG	NG	NG
12	Wind Speed	24 Hour	0.61	m/s	-	NG	NG	NG
13	Volatile Organic Compounds (VOC)	24 Hour	0.27	ppm	-	NG	NG	NG

¹World Health Organization Guideline, 2021

²Occupational Safety and Health Administration; PEL=Permissible Exposure Limit

³National Environmental Quality (Emission) Guidelines (2015)(Petroleum Refining). NG=No Guidelines

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Outdoor Air Result of Malar Village



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Project Name	MCCM Company Limited		
Air Sampling Location	MaLar Village		
	Latitude	21°17'59.87"N	
	Longitude	95°8'41.19"E	
Date	12 th - 13 th May, 2023		
Logging Duration (Hours)	24 Hour		
	Log on Time (Date, Time)	12 th May, 2023	10:30AM
	Log off Time (Date, Time)	13 th May, 2023	10:30AM
Air Quality Measuring Equipment	AQM-09 Air Quality Monitoring Station		

Table of Air Quality Monitoring Result

No.	Parameter	Analyzed Period	Result	Unit	Average Period	WHO Global Air Quality Guidelines 2021 ¹	OSHA (PEL) Guidelines ²	NEQ(E)G Guideline Value (Petroleum Refining) 3	
									Year
1	Particulate Matter PM _{2.5}	24 Hour	7.07	µg/m ³	1 24	Year Hour	*15 µg/m ³ *45 µg/m ³	NG	50 µg/m ³
2	Particulate Matter PM ₁₀	24 Hour	23.47	µg/m ³	1 24	Year Hour	*5 µg/m ³ *15 µg/m ³	NG	* 20 µg/m ³ * 50 µg/m ³
3	Total Suspended Particulate (TSP)	24 Hour	34.22	µg/m ³	24 Hours		NG	NG	NG
4	Sulphur Dioxide (SO ₂)	24 Hour	4.29	µg/m ³	10 24	Mins Hours	*500 µg/m ³ *40 µg/m ³	NG	NG
5	Nitrogen Dioxide (NO ₂)	1 Hour	4.24	µg/m ³	1 24	Year Hour	*200 µg/m ³ *25 µg/m ³	NG	NG
6	Carbon Monoxide (CO)	24 Hour	0.38	ppm	15 1	Min Year	*100 µg/m ³ *35 µg/m ³	50 ppm	NG
7	Carbon dioxide (CO ₂)	24 Hour	277.29	ppm	-		NG	5000 ppm	NG
8	Ozone (O ₃)	8- Hour	27.15	µg/m ³	8 Hour Daily Maximum		NG	NG	100 µg/m ³
9	Relative Humidity	24 Hour	34.83	%	-		NG	NG	NG
10	Temperature	24 Hour	39.62	Celsius	-		NG	NG	NG
11	Wind Direction	24 Hour	290.36	Degree	-		NG	NG	NG
12	Wind Speed	24 Hour	0.87	m/s	-		NG	NG	NG
13	Volatile Organic Compounds (VOC)	24 Hour	0.41	ppm	-		NG	NG	NG

¹World Health Organization Guideline, 2021

²Occupational Safety and Health Administration, PEL - Permissible Exposure Limit

³National Environmental Quality (Emission) Guidelines (2015) (Petroleum Refining), NG=No Guidelines

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Indoor Air Results



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Project Name	MCCM Company Limited		
Indoor Air Sampling Location	Project Area		
Date	10 th May, 2023		
Logging Duration (Hours)	Measured 5-minute interval for 7 times		
	Log on Time (Date, Time)	10 th May, 2023	7:30AM
Indoor Air Quality Measuring Equipment	Multifunctional Air Quality Detector and Smart sensor AR8200 Carbon Dioxide Detector		

Table of Indoor Air Quality Monitoring Result

No	Location	Parameter	Results	*EPA (Air Quality Index, AQI)	*OHS Guideline for CO ₂
1	Office 21°17'54.36"N, 95°10'25.94"E	Carbon dioxide (CO ₂)	1293.00 ppm	NG	Fair
		Particulate Matter (PM ₁)	15.50 µg/m ³	NG	NG
		Particulate Matter (PM ₁₀)	34.50 µg/m ³	Good	NG
		Particulate Matter (PM _{2.5})	26.50 µg/m ³	Moderate	NG
		Total Volatile Organic Compound (TVOC)	0.05 mg/m ³	Safe	NG
		Formaldehyde (HCHO)	0.04 mg/m ³	Low	NG
		Humidity	32.25	NG	NG
2	Kitchen 21°17'54.43"N, 95°10'26.25"E	Carbon dioxide (CO ₂)	1290.25 ppm	NG	Fair
		Particulate Matter (PM ₁)	17.50 µg/m ³	NG	NG
		Particulate Matter (PM ₁₀)	37.75 µg/m ³	Good	NG
		Particulate Matter (PM _{2.5})	29.75 µg/m ³	Moderate	NG
		Total Volatile Organic Compound (TVOC)	0.01 mg/m ³	Safe	NG
		Formaldehyde (HCHO)	0.00 mg/m ³	Low	NG
		Humidity	34.50	NG	NG
3	Control Room 21°17'54.51"N, 95°10'26.57"E	Carbon dioxide (CO ₂)	1262.50 ppm	NG	Fair
		Particulate Matter (PM ₁)	16.75 µg/m ³	NG	NG
		Particulate Matter (PM ₁₀)	36.25 µg/m ³	Good	NG
		Particulate Matter (PM _{2.5})	28.75 µg/m ³	Moderate	NG
		Total Volatile Organic Compound (TVOC)	0.04 mg/m ³	Safe	NG
		Formaldehyde (HCHO)	0.00 mg/m ³	Low	NG
		Humidity	33.25	NG	NG
4	Silica Gel Room 21°17'51.59"N, 95°10'23.37"E	Carbon dioxide (CO ₂)	1261.25 ppm	NG	Fair
		Particulate Matter (PM ₁)	18.00 µg/m ³	NG	NG
		Particulate Matter (PM ₁₀)	37.00 µg/m ³	Good	NG
		Particulate Matter (PM _{2.5})	28.75 µg/m ³	Moderate	NG
		Total Volatile Organic Compound (TVOC)	0.11 mg/m ³	Safe	NG
		Formaldehyde (HCHO)	0.02 mg/m ³	Low	NG
		Humidity	40.25	NG	NG
5	Machinery Store 21°17'51.77"N, 95°10'23.98"E	Carbon dioxide (CO ₂)	1155.25 ppm	NG	Fair
		Particulate Matter (PM ₁)	13.25 µg/m ³	NG	NG
		Particulate Matter (PM ₁₀)	26.50 µg/m ³	Good	NG
		Particulate Matter (PM _{2.5})	19.50 µg/m ³	Moderate	NG
		Total Volatile Organic Compound (TVOC)	0.09 mg/m ³	Safe	NG
		Formaldehyde (HCHO)	0.01 mg/m ³	Low	NG
		Humidity	41.00	NG	NG

NG = No Guideline

*A Guide to Air Quality Index by U.S Environmental Protection Agency (EPA)

*Carbon Dioxide Detection and Indoor Air Quality Control by OHS

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Stack Heigh Emission Result



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Project Name	MCCM Company Limited		
Location	Project Area		
Date	10 th May, 2023		
Sample Location	Furnace Stack	21°17'54.96"N, 95°10'25.37"E	
	Generator Stack	21°17'55.72"N, 95°10'27.53"E	
Logging Duration (Hours)	Measured 5-minute interval for 7 times		
Stack Emission Measuring Equipment	Oceanus OC-1000 and Oceanus OC-2000		

Table of Stack Emission Result

No	Parameter	Units	Diesel Furnace Stack	Generator Stack	IFC Standards	NEQEG (2015) *
1	CH ₄	% LEL	0	0	NA	NA
2	Hydrogen Sulphide (H ₂ S)	mg/Nm ³	2.1	4.03	NA	10 mg/ Nm ³
3	Nitrogen Oxide (NO _x)	mg/Nm ³	0.01	0	320 mg/ Nm ³	450 mg/ Nm ³
4	Ammonia (NH ₃)	mg/Nm ³	0	0	NA	30 mg/ Nm ³
5	Oxygen (O ₂)	% Vol	22.8	21.33	At least 3 %	NA
6	Carbon monoxide (CO)	ppm	0.5	0.32	NA	NA
7	Sulphur dioxide (SO ₂)	ppm	0.3	0.7	NA	NA

NA – Not Applicable

*National Environmental Quality (Emission) Guidelines; 2015 (Petroleum Refining)

*General EHS Guidelines by International Finance Corporation (World Bank Group), 30th April 2007

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Outdoor Air Measurement Results According ECD RT Meeting Comments



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Project Name	MCCM Company Limited		
Air Sampling Location	Kyaw Zi Village		
	Latitude	21° 18' 56.10" N	
	Longitude	95° 10' 41.46" E	
Date	16.2.2024 – 17.2.2024		
Logging Duration (Hours)	24 Hour		
	Log on Time (Date, Time)	16 th February 2024	08:05 AM
	Log off Time (Date, Time)	17 th February 2024	08:05 AM
Air Quality Measuring Equipment	OCEANUS - AQM - 09		

Table of Air Quality Monitoring Results

No	Parameter	Analyzed Period	Results	Unit	Average Period	WHO Guideline Value	NEQG Guideline Value	OHSA (PEL) Standard	Remark
1	Particulate Matter PM _{2.5}	24-hr	8.36	µg/m ³	1 Year	5 µg/m ³	10 µg/m ³	NG	Within the Guideline
					24 Hour	15 µg/m ³	25 µg/m ³	NG	
2	Particulate Matter PM ₁₀	24-hr	23.68	µg/m ³	1 Year	15 µg/m ³	20 µg/m ³	NG	Within the Guideline
					24 Hour	45 µg/m ³	50 µg/m ³	NG	
3	Total Suspended Particulate (TSP)	24-hr	41.25	µg/m ³	24 Hours	NG	NG	NG	-
4	Sulphur Dioxide (SO ₂)	24-hr	8.45	µg/m ³	10 Mins	500 µg/m ³	500 µg/m ³	NG	Within the Guideline
					24 Hours	40 µg/m ³	20 µg/m ³		
5	Nitrogen Dioxide (NO ₂)	1-hr	5.36	µg/m ³	1 Year	10 µg/m ³	40 µg/m ³	NG	Within the guideline
					1 Hour	200 µg/m ³	200 µg/m ³		
					24 Hours	25 µg/m ³	NG		
6	Ozone (O ₃)	8-hr	36.4	µg/m ³	8 Hours Daily Maximum	100 µg/m ³	100 µg/m ³	NG	Within the guideline
7	Carbon Monoxide (CO)	24-hr	0.7	mg/m ³	15 Mins	100 mg/m ³	NG	50 ppm	Within the guideline
					1 Hour	35 mg/m ³			
					8 Hour	10 mg/m ³			
					24 Hours	4 mg/m ³			
8	VOC	24-hr	0.16	-	NG	NG	NG	NG	-
9	Carbon Dioxide (CO ₂)	8-hr	201.9	ppm	8 Hours Daily Maximum	NG	NG	5000 ppm	Within the guideline
10	Temperature	24-hr	31.45	°C	-	NG	NG	NG	-

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No	Parameter	Analyzed Period	Results	Unit	Average Period	WHO Guideline Value	NEQG Guideline Value	OHSA (PEL) Standard	Remark
11	Relative Humidity	24-hr	41.87	Rh%	-	NG	NG	NG	-
12	Wind Speed	24-hr	1.75	m/s	-	NG	NG	NG	-
13	Wind Direction	24-hr	268.41	Degree	-	NG	NG	NG	-

* WHO Air Quality Guidelines: Global Update 22 Sep, 2021

* National Environmental Quality (Emission) Guidelines (2015) - (General Guidelines for Air Emissions)

* OSHA= Occupational Safety and Health Administration; PEL= Permissible Exposure Limit

NG = No Guideline

Analyzed by

Sit Thway Aung

Sit Thway Aung
Junior Environmentalist
Hexagonal Angle International Consultants Co., Ltd.

Checked by

Ain Naing Oo

Deputy Team Leader
Operation Department
Hexagonal Angle International Consultants Co., Ltd.

DEVELOPING ALLIANCE, DELIVERING SUCCESS!



HEXAGONAL ANGLE
INTERNATIONAL CONSULTANTS CO.,LTD.

Office: No. 99/1, Nant Thar Phyu St,
14/3 Quarter, South Okkalapa Township,
Yangon, Myanmar.
Tel: 09 898333722, 09 898333711
Email: info@hexagonalangle.com
Website: www.hexagonalangle.com

Project Name	MCCM Company Limited		
Air Sampling Location	Project Area		
	Latitude	21° 17' 54.24" N	
	Longitude	95° 10' 24.26" E	
Date	15.2.2024 - 16.2.2024		
Logging Duration (Hours)	24 Hour		
	Log on Time (Date, Time)	15 th February 2024	08:00 AM
	Log off Time (Date, Time)	16 th February 2024	08:00 AM
Air Quality Measuring Equipment	OCEANUS - AQM - 09		

Table of Air Quality Monitoring Results

No	Parameter	Analyzed Period	Results	Unit	Average Period	WHO Guideline Value	NEQG Guideline Value	OHSA (PEL) Standard	Remark
1	Particulate Matter PM _{2.5}	24-hr	10.1	µg/m ³	1 Year	5 µg/m ³	10 µg/m ³	NG	Within the Guideline
					24 Hour	15 µg/m ³	25 µg/m ³	NG	
2	Particulate Matter PM ₁₀	24-hr	25.65	µg/m ³	1 Year	15 µg/m ³	20 µg/m ³	NG	Within the Guideline
					24 Hour	45 µg/m ³	50 µg/m ³	NG	
3	Total Suspended Particulate (TSP)	24-hr	35.69	µg/m ³	24 Hours	NG	NG	NG	-
4	Sulphur Dioxide (SO ₂)	24-hr	30.12	µg/m ³	10 Mins	500 µg/m ³	500 µg/m ³	NG	Slightly Above the Guideline
					24 Hours	40 µg/m ³	20 µg/m ³		
5	Nitrogen Dioxide (NO ₂)	1-hr	10.25	µg/m ³	1 Year	10 µg/m ³	40 µg/m ³	NG	Within the guideline
					1 Hour	200 µg/m ³	200 µg/m ³		
					24 Hours	25 µg/m ³	NG		
6	Ozone (O ₃)	8-hr	40.9	µg/m ³	8 Hours Daily Maximum	100 µg/m ³	100 µg/m ³	NG	Within the guideline
					15 Mins	100 mg/m ³	NG		
7	Carbon Monoxide (CO)	24-hr	2.3	mg/m ³	1 Hour	35 mg/m ³	NG	50 ppm	Within the guideline
					8 Hour	10 mg/m ³			
					8 Hours	10 mg/m ³			
					24 Hours	4 mg/m ³			
8	VOC	24-hr	0.3	-	NG	NG	NG	NG	-
9	Carbon Dioxide (CO ₂)	8-hr	346.12	ppm	8 Hours Daily Maximum	NG	NG	5000 ppm	Within the guideline

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No	Parameter	Analyzed Period	Results	Unit	Average Period	WHO Guideline Value	NEQG Guideline Value	OHSa (PEL) Standard	Remark
10	Temperature	24-hr	33.11	°C	-	NG	NG	NG	-
11	Relative Humidity	24-hr	31.56	Rh%	-	NG	NG	NG	-
12	Wind Speed	24-hr	2.69	m/s	-	NG	NG	NG	-
13	Wind Direction	24-hr	254.63	Degree	-	NG	NG	NG	-

*WHO Air Quality Guidelines: Global Update 22 Sep, 2021

† National Environmental Quality (Emission) Guidelines (2015) - (General Guidelines for Air Emissions)

* OSHA= Occupational Safety and Health Administration; PEL= Permissible Exposure Limit

NG = No Guideline

Analyzed by



Sit Thway Aung
Junior Environmentalist
Hexagonal Angle International Consultants Co., Ltd.

Checked by



Deputy Team Leader
Operation Department
Hexagonal Angle International Consultants Co., Ltd.

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Project Name	MCCM Company Limited		
Air Sampling Location	MaLar Village		
	Latitude	21° 17' 59.87" N	
	Longitude	95° 8' 41.19" E	
Date	17.2.2024 – 18.2.2024		
Logging Duration (Hours)	24 Hour		
	Log on Time (Date, Time)	17 th February 2024	08:15 AM
	Log off Time (Date, Time)	18 th February 2024	08:15 AM
Air Quality Measuring Equipment	OCEANUS - AQM - 09		

Table of Air Quality Monitoring Results

No	Parameter	Analyzed Period	Results	Unit	Average Period	WHO Guideline Value	NEQG Guideline Value	OHSa (PEL) Standard	Remark
1	Particulate Matter PM _{2.5}	24-hr	9.25	µg/m ³	1 Year	5 µg/m ³	10 µg/m ³	NG	Within the Guideline
					24 Hour	15 µg/m ³	25 µg/m ³	NG	
2	Particulate Matter PM ₁₀	24-hr	27.47	µg/m ³	1 Year	15 µg/m ³	20 µg/m ³	NG	Within the Guideline
					24 Hour	45 µg/m ³	50 µg/m ³	NG	
3	Total Suspended Particulate (TSP)	24-hr	37.89	µg/m ³	24 Hours	NG	NG	NG	-
4	Sulphur Dioxide (SO ₂)	24-hr	5.64	µg/m ³	10 Mins	500 µg/m ³	500 µg/m ³	NG	Within the Guideline
					24 Hours	40 µg/m ³	20 µg/m ³		
5	Nitrogen Dioxide (NO ₂)	1-hr	6.25	µg/m ³	1 Year	10 µg/m ³	40 µg/m ³	NG	Within the guideline
					1 Hour	200 µg/m ³	200 µg/m ³		
					24 Hours	25 µg/m ³	NG		
6	Ozone (O ₃)	8-hr	31.2	µg/m ³	8 Hours Daily Maximum	100 µg/m ³	100 µg/m ³	NG	Within the guideline
					15 Mins	100 mg/m ³	NG		
7	Carbon Monoxide (CO)	24-hr	0.53	mg/m ³	1 Hour	35 mg/m ³	NG	NG	Within the guideline
					8 Hour	10 mg/m ³		50 ppm	
					24 Hours	4 mg/m ³		NG	
					8 Hours Daily Maximum	NG		5000 ppm	
8	VOC	24-hr	0.38	-	NG	NG	NG	NG	-
9	Carbon Dioxide (CO ₂)	8-hr	246.78	ppm	8 Hours Daily Maximum	NG	NG	5000 ppm	Within the guideline
10	Temperature	24-hr	32.1	°C	-	NG	NG	NG	-

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HEXAGONAL ANGLE
INTERNATIONAL CONSULTANTS CO.,LTD.

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Email: info@hexagonalangle.com
Website: www.hexagonalangle.com

No	Parameter	Analyzed Period	Results	Unit	Average Period	WHO Guideline Value	NEQG Guideline Value	OHSA (PEL) Standard	Remark
11	Relative Humidity	24-hr	32.64	Rh%	-	NG	NG	NG	-
12	Wind Speed	24-hr	0.71	m/s	-	NG	NG	NG	-
13	Wind Direction	24-hr	354.01	Degree	-	NG	NG	NG	-

*WHO Air Quality Guidelines: Global Update 22 Sep, 2021

*National Environmental Quality (Emission) Guidelines (2015) - (General Guidelines for Air Emissions)

*OSHA- Occupational Safety and Health Administration; PEL= Permissible Exposure Limit

NG = No Guideline

Analyzed by

Sit Thway Aung
Junior Environmentalist
Hexagonal Angle International Consultants Co., Ltd.

Checked by

Deputy Team Leader
Operation Department
Hexagonal Angle International Consultants Co., Ltd.

On-Site Water Quality Result



HEXAGONAL ANGLE
INTERNATIONAL CONSULTANTS CO.,LTD.

Project Name	MCCM Company Limited	
Sample Location	Surface Water-1 Downstream of Ayeyarwady River	21°18'6.602"N 95°08'42.998"E
	Surface Water-2 Upstream of Ayeyarwady River	21°18'51.20"N 95°10'4.68"E
	Groundwater (1) Groundwater at Kyaw Zi Village	21°18'54.03"N 95°10'42.84"E
	Groundwater (2) Groundwater at Malar Village	21°17'51.934"N 95°08'39.595"E
	Groundwater (3) Groundwater at Project Area	21°17'51.94"N 95°10'23.10"E
Date	11 th May, 2023	
On-Site Water Quality Measuring Equipment	Hanna Instrument (H98129)	

Table of On-Site Water Quality Result

No	Parameter	Surface Water-1	Surface Water-2	Ground-water (1)	Ground-water (2)	Ground-water (3)	Unit	WHO Guidelines (2018) *
1	pH	7.83	8.24	8.24	7.83	7.54	-	6.5-8.5
2	TDS	63	147	147	63	461	ppm	1000 mg/l
3	Electric conductivity	127	295	295	127	853	µS/cm	2500 µS/cm
4	Temperature	30.8	33.2	33.2	30.8	30.5	°C	25°C

*World Health Organization (2018)

Analyzed by

Aung Kyaw Phyo
Environmental Field Technician
Hexagonal Angle International Consultants Co., Ltd.

Checked by

Win Naing Oo
Environmental Monitoring Team Leader
Hexagonal Angle International Consultants Co., Ltd.

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Surface Water Quality of Upstream Result

ALARM Ecological Laboratory

Water Testing Result Report



Report Number: EL-WR-23-01568

Date : May 22, 2023

Client Information

Client Name : MCCM Co., Ltd
Organization :
Client ID : -
Registration Date & Time : 12.5.2023; 11:50 AM
Contact : 09-898333711
Email : thandarkyaw@hexagonalangle.com
Testing Purpose : -

Sample Information

Sample ID : 9693
Sample Name : Surface Water Quality (Upstream)
Sample Type / Source : Raw
Sampling Date & Time : 11.5.2023; 3:15 PM
Sample Location : Ayeyawaddy River, Kyaw Zi village , Taungthar Tsp, Mandalay Region
Latitude : 21° 18' 51.2" N
Longitude : 95° 10' 4.68" E

Testing Results

*This laboratory analysis report is based solely on the sample submitted by the client unless client took our sampling service.
This report shall not be reproduced except in full, without written approval of the laboratory*

Sr.	Quality Parameters	Results	Units	Drinking Standards	Remarks
1	pH ¹	7.9	S.U	6.5 - 8.5 ²	Normal
2	Temperature ²	25.8	°C	-	-
3	True Colour ³	0	HU	≤15 ⁴	Normal
4	Turbidity ³	< 5	FAU	≤5 ⁴	Clear
5	TDS ⁵	295	mg/L	≤1000 ⁶	Normal
6	TSS ⁵	2	mg/L	-	-
7	Conductivity ⁵	0.82	mS/cm	≤2.5 ^b	Normal
8	Hardness ⁵	180	mg/L	≤500 ^c	Normal
9	Dissolved Oxygen ⁷	6.22	mg/L	-	-
10	Free Chlorine ³	0.15	mg/L	≤0.2 ⁸	Normal
11	Phosphorous ³	2.9	mg/L	-	-
12	Arsenic ⁴	0.005	mg/L	≤0.05 ⁹	Normal
13	Iron ⁷	< 0.1	mg/L	≤1 ⁸	Normal
14	Lead ⁷	ND	mg/L	≤0.01 ⁶	LOD = 0.1 mg/L
15	Oil & Grease ⁹	4	mg/L	-	-
16	Total Nitrogen ³	2.3	mg/L	-	-

²ND¹ = Not Detected

¹LOD¹ = Lower limit of detection

¹ - ¹ = No Reference Standard

Tested by

Checked by

Approved by

Daw Lin Myat Aung
Lab. Technician II
Ecological Laboratory
ALARM

Daw Lin Myat Aung
Lab. Technician I
Ecological Laboratory
ALARM

Dr. Aye Win
Laboratory in Charge
Ecological Laboratory
(ALARM)

No.237, Corner of Shu Khin Thar Street & 7 Street, (3) Block, South Oakkalapa Township, Yangon.
Tel: 09-407496078, Email: aelab.2022@gmail.com

Surface Water Quality of Downstream Result

ALARM Ecological Laboratory

Water Testing Result Report



Report Number: EL-WR-23-01569 Date : May 22, 2023

Client Information	Sample Information
Client Name : MCCM Co., Ltd	Sample ID : 9694
Organization :	Sample Name : Surface Water Quality (Downstream)
Client ID : -	Sample Type / Source : Raw
Registration Date & Time : 12.5.2023; 11:50 AM	Sampling Date & Time : 11.5.2023; 3:40 PM
Contact : -	Sample Location : Ayeawaddy River, Kyaw Zi village, Taungthar Tsp, Mandalay Region
Email : thandarkyaw@hexagonalangle.com	Latitude : 21° 18' 6.602" N
Testing Purpose : -	Longitude : 95° 08' 42.998" E

Testing Results

This laboratory analysis report is based solely on the sample submitted by the client unless client took our sampling service. This report shall not be reproduced except in full, without written approval of the laboratory.

Sr.	Quality Parameters	Results	Units	Drinking Standards	Remarks
1	pH ^a	8	S.U	6.5 - 8.5 ^c	Normal
2	Temperature ^b	25.5	°C	-	-
3	True Colour ^b	18	HU	≤15 ^c	Above the limit
4	Turbidity ^b	< 5	FAU	≤5 ^c	Clear
5	TDS ^b	131	mg/L	≤1000 ^c	Normal
6	TSS ^b	3	mg/L	-	-
7	Conductivity ^b	0.32	mS/cm	≤2.5 ^b	Normal
8	Hardness ^b	200	mg/L	≤500 ^c	Normal
9	Dissolved Oxygen ^b	6.42	mg/L	-	-
10	Free Chlorine ^b	0.98	mg/L	≤0.2 ^a	Above the limit
11	Phosphorous ^b	2.3	mg/L	-	-
12	Arsenic ^d	0.005	mg/L	≤0.05 ^a	Normal
13	Iron ^d	< 0.1	mg/L	≤1 ^a	Normal
14	Lead ^d	0.1	mg/L	≤0.01 ^c	Above the limit
15	Oil & Grease ^b	6	mg/L	-	-
16	Total Nitrogen ^b	1.5	mg/L	-	-

^aND = Not Detected ^bLOD = Lower limit of detection ^c- = No Reference Standard

Tested by	Checked by	Approved by
 Daw Mya Myat Khine Lab. Technician II Ecological Laboratory ALARM	 Daw Lin Myat Aung Lab. Technician I Ecological Laboratory ALARM	 Dr. Aye Aye Win Laboratory In-Charge Ecological Laboratory (ALARM)

No.237, Corner of Shu Khin Thar Street & 7 Street, (3) Block, South Oakkalapa Township, Yangon.
Tel: 09-407496078, Email: aelab.2022@gmail.com

Groundwater of Kyaw Zi Village Result

ALARM Ecological Laboratory

Water Testing Result Report



Report Number: EL-WR-23-01570 Date : May 22, 2023

Client Information	Sample Information
Client Name : MCCM Co., Ltd	Sample ID : 9695
Organization :	Sample Name : Ground Water (Kyaw Zi)
Client ID : -	Sample Type / Source : Ground
Registration Date & Time : 12.5.2023; 11:50 AM	Sampling Date & Time : 11.5.2023; 3:30 PM
Contact : 09-898333711	Sample Location : Kyaw Zi village, Taungthar Tsp, Mandalay Region
Email : thandarkyaw@hexagonalangle.com	Latitude : 21° 18' 54.03" N
Testing Purpose : -	Longitude : 95° 10' 42.84" E

Testing Results

This laboratory analysis report is based solely on the sample submitted by the client unless client took our sampling service. This report shall not be reproduced except in full, without written approval of the laboratory.

Sr.	Quality Parameters	Results	Units	Drinking Standards	Remarks
1	pH ^a	8	S.U	6.5 - 8.5 ^c	Normal
2	TDS ^b	1128	mg/L	≤1000 ^c	Above the limit
3	TSS ^b	0	mg/L	-	-
4	Conductivity ^b	3.26	mS/cm	≤2.5 ^b	Above the limit
5	Hardness ^b	360	mg/L	≤500 ^c	Normal
6	Ammonia ^b	0.2	mg/L	-	-
7	Dissolved Oxygen ^b	6.12	mg/L	-	-
8	Free Chlorine ^b	0.25	mg/L	≤0.2 ^a	Above the limit
9	Phosphorous ^b	0.2	mg/L	-	-
10	Arsenic ^d	0.01	mg/L	≤0.05 ^a	Normal
11	Iron ^d	< 0.1	mg/L	≤1 ^a	Normal

^aND = Not Detected ^bLOD = Lower limit of detection ^c- = No Reference Standard

Tested by	Checked by	Approved by
 Daw Mya Myat Khine Lab. Technician II Ecological Laboratory ALARM	 Daw Lin Myat Aung Lab. Technician I Ecological Laboratory ALARM	 Dr. Aye Aye Win Laboratory In-Charge Ecological Laboratory (ALARM)

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ပတ်ဝန်းကျင်ရေးရာဓာတ်ခွဲခန်း
Ecological Laboratory



စီမံကိန်းအစီအစဉ် ဖြန့်ဖြူးတိုးတက်ရေးအသင်း (Advancing Life and Regenerating Motherland, ALARM)

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စာအမှတ်/Reference Number: EL (M)-R / 1060

နေ့ရက်/Date: 19th, May, 2023

ဓာတ်ခွဲခန်းစမ်းသပ်အစီအစဉ်/Laboratory Analysis Report

နမူနာအသွင် /Sample Profile

နမူနာအသွင် /Sample Name	Ground Water (Kyaw Zi)	နမူနာအမှတ် / Sample ID	1060	
နေရာ (မြို့နယ်) Location (Township)	Kyaw Zi village, Taungthar Tsp.	လတ္တီတွဒ် Latitude	21° 18' 54.03" N	
နေရာ (တိုင်း/ပြည်နယ်) Location (Region/State)	Mandalay	လောင်ဂျီတွဒ် Longitude	95° 10' 42.84" E	
ပေးသူအသွင် /Sender Name	MCCM Co., Ltd	နမူနာပေးပို့ချိန် (နေ့၊ နာရီ) Sampling Time (Date, Time)	11.5.2023	3:30 PM
အဖွဲ့အစည်း /Organisation	MCCM Co., Ltd	နမူနာရောက်ရှိချိန် (နေ့၊ နာရီ) Arriving Time (Date, Time)	12.5.2023	11:50 AM
ဆက်သွယ်ရေး /Contact	09-89833711			

(This laboratory analysis report is based solely on the sample submitted by the customer)

(ဤဓာတ်ခွဲခန်းစမ်းသပ်အစီအစဉ်သည် ပေးပို့သူမှပေးပို့သော နမူနာကိုသာ အခြေခံထားပါသည်။)

Analysis Results/စမ်းသပ်ချက်အဖြေ

စဉ် Sr.	စမ်းသပ်ရန်အတွက် Quality Parameter	ရလဒ် Results	နည်းစဉ် Method	စံသတ်မှတ်ချက် Drinking Standard	မှတ်ချက် Remarks
1	Total plate count (CFU/ml)		Total plate count method	0	
2	Total coliform count (MPN/100 ml) (Presumption test)	>1100	Most Probable Number method	0	
3	Total faecal coliform count (MPN/100ml) (Presumption test)		Most Probable Number method	0	
4	Total coliform count (CFU/ml) (Confirm test)		Eosin Methyl blue agar plate test	0	
5	Complete test for coliform bacteria		Gram staining test	-	
6	Total coliform count (CFU/ml)		3M Pate count method	0	
7	Total E.coli count (CFU/ml)		3M Pate count method	0	

Note: The target sample needs to test some additional tests to confirm total coliform and total faecal coliform.

စမ်းသပ်ပြီး

Tested by

May Zaw
Research Assistant
ALARM

စစ်ဆေးပြီး

Checked by

May Myat Nyein
Research Assistant
ALARM

တာဝန်ခံ

Approved by

Ni Tar Nwe
Research Scientist
ALARM

ALARM Ecological Laboratory

Water Testing Result Report



Report Number: EL-WR-23-01571

Date : May 22, 2023

Client Information

Client Name : MCCM Co., Ltd
Organization :
Client ID : -
Registration Date & Time : 12.5.2023; 11:50 AM
Contact : 09-89833711
Email : thandarkyaw@hexagonalangle.com
Testing Purpose : -

Sample Information

Sample ID : 9696
Sample Name : Ground Water (Marlar)
Sample Type / Source : Ground
Sampling Date & Time : 11.5.2023 ; 4:00 PM
Sample Location : Mar Lar village, Taungthar Tsp, Mandalay Region
Latitude : 21° 17' 51.934" N
Longitude : 95° 08' 39.595" E

Testing Results

This laboratory analysis report is based solely on the sample submitted by the client unless client took our sampling service.

This report shall not be reproduced except in full, without written approval of the laboratory

Sr.	Quality Parameters	Results	Units	Drinking Standards	Remarks
1	pH ¹	7.7	S.U	6.5 - 8.5 ²	Normal
2	TDS ¹	718	mg/L	≤1000 ⁴	Normal
3	TSS ¹	0	mg/L	-	-
4	Conductivity ³	1.8	mS/cm	≤2.5 ³	Normal
5	Hardness ¹	250	mg/L	≤500 ⁶	Normal
6	Ammonia ³	2.3	mg/L	-	-
7	Dissolved Oxygen ¹	6.34	mg/L	-	-
8	Free Chlorine ³	0.07	mg/L	≤0.2 ³	Normal
9	Phosphorous ³	1.9	mg/L	-	-
10	Arsenic ²	0.005	mg/L	≤0.05 ²	Normal
11	Iron ¹	< 0.1	mg/L	≤1 ⁵	Normal

2 "ND" = Not Detected

"LOD" = Lower limit of detection

* - * = No Reference Standard

Tested by

Daw May Myat Khine
Lab. Technician II
Ecological Laboratory
ALARM

Checked by

Daw Lin Myat Aung
Lab. Technician I
Ecological Laboratory
ALARM

Approved by

Dr. Aye Aye Nwin
Laboratory In-charge
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Groundwater of Malar Village Result



ပတ်ဝန်းကျင်ရေးရာဓာတ်ခွဲခန်း
Ecological Laboratory



စိမ်းလန်းအသိမြင့်စွာဖြူတိုးတက်ရေးအသင်း (Advancing Life and Regenerating Motherland, ALARM)

No.121, Corner of Shu Khin Thar Street & 7 Street, (3) Block, South Oakkalapa Township, Yangon. Tel : 09-407496078

စာအမှတ်/Reference Number: EL (M)-R / 1061

နေ့စွဲ/Date: 19th, May, 2023

ဓာတ်ခွဲခန်းစမ်းသပ်မှုအစီအစဉ်/Laboratory Analysis Report

နမူနာအမည် /Sample Profile

နမူနာအမည် /Sample Name	Ground Water (Mar Lar)	နမူနာအမှတ် / Sample ID	1061	
နေရာ (မြို့နယ်) Location (Township)	Mar Lar village, Taungthar Tsp.	လတ္တီတွဒ် Latitude	21°17' 51.934" N	
နေရာ (တိုင်း/ပြည်နယ်) Location (Region/State)	Mandalay	လောင်ဂျီတွဒ် Longitude	95°08' 39.593" E	
ပေးပို့သူအမည် /Sender Name	MCCM Co., Ltd	နမူနာတက်သွင်းရက် (ခန့်မှန်း) Sampling Time (Date, Time)	11.5.2023	4:00 PM
အဖွဲ့အစည်း /Organisation	MCCM Co., Ltd	နမူနာရောက်ရှိရက် (ခန့်မှန်း) Arriving Time (Date, Time)	12.5.2023	11:50 AM
ဆက်သွယ်ရန် /Contact	09-898333711			

(This laboratory analysis report is based solely on the sample submitted by the customer)

(ဤဓာတ်ခွဲခန်းစမ်းသပ်မှုအစီအစဉ်သည် အပူချိန်အတိုင်းပေးပို့သည့်နမူနာကိုသာအခြေခံထားပါသည်။)

Analysis Results/စမ်းသပ်ရလဒ်အကျဉ်းချုပ်

စဉ် Sr.	အရည်အသွေးညွှန်းကိန်း Quality Parameter	ရလဒ် Results	နည်းလမ်း Method	စံသတ်မှတ်ချက် Drinking Standard	မှတ်ချက် Remarks
1	Total plate count (CFU/ml)		Total plate count method	0	
2	Total coliform count (MPN/100 ml) (Presumption test)	150	Most Probable Number method	0	
3	Total faecal coliform count (MPN/100ml) (Presumption test)		Most Probable Number method	0	
4	Total coliform count (CFU/ml) (Confirm test)		Eosin Methyl blue agar plate test	0	
5	Complete test for coliform bacteria		Gram staining test	-	
6	Total coliform count (CFU/ml)		3M Pate count method	0	
7	Total E.coli count (CFU/ml)		3M Pate count method	0	

Note: The target sample needs to test some additional tests to confirm total coliform and total faecal coliform.

စမ်းသပ်ပြီး
Tested by

May

May Zaw
Research Assistant
ALARM

စစ်ဆေးပြီး
Checked by

Myat

May Myat Nyein
Research Assistant
ALARM

တာဝန်ခံ
Approved by

Ni Tar Nwe

Ni Tar Nwe
Research Scientist
ALARM

Groundwater of Project Area Result

ALARM Ecological Laboratory

Water Testing Result Report



Report Number: EL-WR-23-01572

Date : May 22, 2023

Client Information

Client Name : MCCM Co., Ltd
Organization :
Client ID : -
Registration Date & Time : 12.5.2023; 11:50 AM
Contact : 09-898333711
Email : thandaryaw@hexagonalangle.com
Testing Purpose : -

Sample Information

Sample ID : 9697
Sample Name : Ground Water (Project Area)
Sample Type / Source : Ground
Sampling Date & Time : 11.5.2023 ; 4:25 PM
Sample Location : MCCM Mini Refinery Project Area, Taungthar Tsp, Mandalay Region
Latitude : 21° 17' 52.03" N
Longitude : 95° 10' 22.95" E

Testing Results

This laboratory analysis report is based solely on the sample submitted by the client unless client took our sampling service. This report shall not be reproduced except in full, without written approval of the laboratory.

Sr.	Quality Parameters	Results	Units	Drinking Standards	Remarks
1	pH ¹	7.5	S.U	6.5 - 8.5 ^c	Normal
2	TDS ⁴	891	mg/L	≤1000 ^c	Normal
3	TSS ³	0	mg/L	-	-
4	Conductivity ⁵	2.1	mS/cm	≤2.5 ^b	Normal
5	Hardness ³	220	mg/L	≤500 ^c	Normal
6	Ammonia ³	0.6	mg/L	-	-
7	Dissolved Oxygen ³	6.58	mg/L	-	-
8	Free Chlorine ³	0.09	mg/L	≤0.2 ^a	Normal
9	Phosphorous ³	1.3	mg/L	-	-
10	Arsenic ⁴	0.005	mg/L	≤0.05 ^a	Normal
11	Iron ¹	< 0.1	mg/L	≤1 ^c	Normal

² "ND" = Not Detected

³ "LOD" = Lower limit of detection

^{a, b, c} = No Reference Standard

Tested by	Checked by	Approved by
<i>May</i> Daw May Myat Khine Lab. Technician II Ecological Laboratory ALARM	<i>Myat</i> Daw Lin Myat Myat Aung Lab. Technician I Ecological Laboratory ALARM	<i>Myat</i> Dr. Aye Aye Win Laboratory Incharge Ecological Laboratory (ALARM)

No.237, Corner of Shu Khin Thar Street & 7 Street, (3) Block, South Oakkalapa Township, Yangon.

Tel: 09-407496078, Email: aelab.2022@gmail.com



ပတ်ဝန်းကျင်ရေးရာဓာတ်ခွဲခန်း
Ecological Laboratory



စိမ်းလန်းအိမ်ခြေခွဲ ဖြူတိုးတက်ရေးအသင်း (Advancing Life and Regenerating Motherland, ALARM)

No.121, Corner of Shu Khin Thar Street & 7 Street, (3) Block, South Oakkalapa Township, Yangon.Tel - 09-407496078

စာအမှတ်/Reference Number: EL (M)-R / 1062

နေ့စွဲ/Date: 19th, May, 2023

ဓာတ်ခွဲခန်းစစ်ဆေးမှုအစီအစဉ်/ Laboratory Analysis Report

နမူနာအမည် / Sample Profile

နမူနာအမည် / Sample Name	Ground Water (Project Area)	နမူနာအမှတ် / Sample ID	1062	
နေရာ (မြို့နယ်) / Location (Township)	MCCM Mini Refinery Project Area, Taungthar Tsp.	လတ္တီတွဒ် / Latitude	21°17' 52.03" N	
နေရာ (တိုင်း/ပြည်နယ်) / Location (Region/State)	Mandalay	လောင်ဂျီတွဒ် / Longitude	95°10' 22.95" E	
ပေးပို့သူအမည် / Sender Name	MCCM Co., Ltd	နမူနာကောက်ယူချိန် (နေ့၊ နာရီ) / Sampling Time (Date, Time)	11.5.2023	4:25 PM
အဖွဲ့အစည်း / Organisation	MCCM Co., Ltd	နမူနာရောက်ရှိချိန် (နေ့၊ နာရီ) / Arriving Time (Date, Time)	12.5.2023	11:50 AM
ဆက်သွယ်ရန် / Contact	09-898333711			

(This laboratory analysis report is based solely on the sample submitted by the customer)

(ဤဓာတ်ခွဲခန်းစစ်ဆေးမှုအစီအစဉ်သည် ပေးပို့သူမှပေးပို့သည့်နမူနာကိုသာအခြေခံထားပါသည်။)

Analysis Results/စစ်ဆေးရက်အဖြေ

စဉ် / Sr.	အရည်အသွေးညွှန်းကိန်း / Quality Parameter	ရလဒ် အဖြေ / Results	နည်းလမ်း / Method	စံသတ်မှတ်ချက် / Drinking Standard	မှတ်ချက် / Remarks
1	Total plate count (CFU/ml)		Total plate count method	0	
2	Total coliform count (MPN/100 ml) (Presumption test)	0	Most Probable Number method	0	
3	Total faecal coliform count (MPN/100ml) (Presumption test)		Most Probable Number method	0	
4	Total coliform count (CFU/ml) (Confirm test)		Eosin Methyl blue agar plate test	0	
5	Complete test for coliform bacteria		Gram staining test	-	
6	Total coliform count (CFU/ml)		3M Pate count method	0	
7	Total E.coli count (CFU/ml)		3M Pate count method	0	

Note: The target sample needs to test some additional tests to confirm total coliform and total faecal coliform.

စစ်ဆေးပြီး / Tested by

May Zaw

Research Assistant
ALARM

စစ်ဆေးပြီး / Checked by

May Myat Nyein

Research Assistant
ALARM

တာဝန်ခံ / Approved by

Ni Tar Nwe

Research Scientist
ALARM

Noise Measurement Result



HEXAGONAL ANGLE
INTERNATIONAL CONSULTANTS CO.,LTD.

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Tel: +959 898333711
Email: info@hexagonalangle.com
Website: www.hexagonalangle.com

Project Name	MCCM Company Limited		
Noise Sampling Location	Project Area - 21°17'54.24"N 95°10'24.26"E		
	Kyaw Zi Village - 21°18'56.10"N 95°10'41.46"E		
	Malar Village - 21°17'59.87"N 95°8'41.19"E		
	Office - 21°17'54.36"N 95°10'25.94"E		
	Kitchen - 21°17'54.43"N 95°10'26.25"E		
	Control Room - 21°17'54.51"N 95°10'23.57"E		
	Silica Gel Room - 21°17'51.59"N 95°10'23.37"E		
	Machinery Store - 21°17'51.77"N 95°10'23.98"E		
Date	10 th to 11 th May, 2023		
Logging Duration (Hours)	24 Hour		
	Log on Time (Date, Time)	10 th May, 2023	07:30 AM
	Log off Time (Date, Time)	11 th May, 2023	07:30 AM
Noise Quality Measuring Equipment	GM-1356 Digital Sound Level Meter		

Table of Noise Quality Monitoring Result

No	Location	Duration	Unit	Result	NEQ(E) Guideline Value
24-hr Outdoor Noise Monitoring					
1	Project Area	24-hour Monitoring	dBA	Day Time	70
				Night Time	
				48.04 51.81	
2	Kyaw Zi Village			45.17 34.11	
3	Malar Village			49.53 31.25	
Indoor Manual Noise Monitoring					
1	Office	Measured 5-minute interval for 7 times	dBA	Min	Max
				41.66	61.24
2	Kitchen			52.13	58.29
3	Control Room			36.86	61.64
4	Silica Gel Room			51.59	61.40
5	Machinery Store	47.14	51.00		

NG = No Guideline
NEQ(E) Guideline = National Environmental Quality (Emission) Guidelines

Analyzed by

Aung Kyaw Phyo
Environmental Field Technician
Hexagonal Angle International Consultants Co., Ltd.

Checked by

Win Naing Oo
Environmental Monitoring Team Leader
Hexagonal Angle International Consultants Co., Ltd.

DEVELOPING ALLIANCE, DELIVERING SUCCESS!

Vibration Measurement Result



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Website: www.hexagonalangle.com

Project Name	MCCM Company Limited
Location	Project Area
Date	10 th May, 2023
Logging Duration (Hours)	Measured 5-minute interval for 7 times
Stack Emission Measuring Equipment	BENETECH Vibration Meter

Table of Vibration Result

No	Location	Acceleration (m/s ²)	Velocity (mm/s ²)	Criteria for Workshop			
				Acceleration (m/s ²)		Velocity (mm/s)	
				Preferred	Maximum	Preferred	Maximum
1	Vibration - 1 21°17'54.28"N 95°10'24.68"E	0.03	0.3				
2	Vibration - 2 21°17'54.45"N 95°10'24.60"E	0.02	0.5	0.040 (92 dB)	0.080 (98 dB)	0.80 (118 dB)	1.6 (124 dB)
3	Vibration - 3 21°17'54.84"N 95°10'24.71"E	0.005	0.2				

Assessing Vibration: a technical guideline, 2006, Department of Environment and Conservation, NSW (New South Wales), Australia

Analyzed by

Aung Kyaw Phyo
Environmental Field Technician
Hexagonal Angle International Consultants Co., Ltd.

Checked by

Win Naing Oo
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Hexagonal Angle International Consultants Co., Ltd.

DEVELOPING ALLIANCE, DELIVERING SUCCESS!

Light Measurement Result



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Project Name	MCCM Company Limited
Light Sampling Location	Project Compound
Date	10 th May, 2023
Logging Duration (Hours)	Measured 5-minute interval for 7 times
Light Quality Measuring Equipment	AS-823 Lux Meter

Table of Light Quality Monitoring Result

No	Location	Duration	Unit	Measure Value (Lux)	*Standard Value (Lux)
1	Office	Measured 5-minute interval for 7 times	Lux	421.33	500
2	Kitchen			295.33	200
3	Control Room			956.00	500
4	Silica Gel Room			335.67	100
5	Machinery Store			157.67	100

*General EHS Guidelines by International Finance Corporation (World Bank Group), 30th April 2007

Analyzed by

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Win Naing Oo
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Temperature Measurement Result



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Project Name	MCCM Company Limited
Temperature Sampling Location	Project Area
Date	10 th May, 2023
Logging Duration (Hours)	Measured 5-minute interval for 7 times
Temperature Measuring Equipment	OHS-Infrared Thermometer

Table of Temperature Monitoring Result

No	Location	Duration	Unit	Measure Value	Standard Guideline*
1	Office 21°17'54.36"N, 95°10'25.94"E	Measured 5-minute interval for 7 times	°C	35.5	32
2	Kitchen 21°17'54.43"N, 95°10'26.25"E			35.25	
3	Control Room 21°17'54.51"N, 95°10'26.57"E			36	
4	Silica Gel Room 21°17'51.59"N, 95°10'23.37"E			35	
5	Machinery Store 21°17'51.77"N, 95°10'23.98"E			33	

* Standard Guideline of International Labor Organization (ILO)

Analyzed by

Aung Kyaw Phyo
Environmental Field Technician
Hexagonal Angle International Consultants Co., Ltd.

Checked by

Win Naing Oo
Environmental Monitoring Team Leader
Hexagonal Angle International Consultants Co., Ltd.

DEVELOPING ALLIANCE, DELIVERING SUCCESS!

Odor Measurement Result



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Website: www.hexagonalangle.com

Project Name	MCCM Company Limited
Odor Sampling Location	Project Compound
Date	10 th May, 2023
Logging Duration (Hours)	Measured 5-minute interval for 7 times
Odor Measuring Equipment	Intelligent Gas Detector OC-903

Table of Odor Monitoring Result

No	Location	Duration	Unit	Measure Value (ppm)	NEQEG (2015) *
1	Furnace Stack 21°17'54.96"N, 95°10'25.37"E	Measured 5-minute interval for 7 times	ppm	0.01	5-10
2	Furnace 21°17'54.73"N, 95°10'25.36"E			0.02	
3	Condenser 21°17'54.50"N, 95°10'24.87"E			0	
4	Control Room 21°17'54.39"N, 95°10'25.92"E			0	
5	Outside Factory 21°17'57.34"N, 95°10'25.50"E			0	
6	Outside Factory Plantation Area 21°17'51.14"N, 95°10'25.01"E			0	
7	Outside factory next to the road 21°17'49.45"N, 95°10'18.31"E			0	

NG = No Guideline

*National Environmental Quality (Emission) Guidelines; 2015

Analyzed by

Aung Kyaw Phyo
Environmental Field Technician
Hexagonal Angle International Consultants Co., Ltd.

Checked by

Win Naing Oo
Environmental Monitoring Team Leader
Hexagonal Angle International Consultants Co., Ltd.

DEVELOPING ALLIANCE, DELIVERING SUCCESS!

On-site Soil Quality Measurement Result



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Website: www.hexagonalangle.com

Project Name	MCCM Company Limited
Location	Project Area
Date	10 th May, 2023
Logging Duration (Hours)	Measured 5-minute interval for 7 times
Stack Emission Measuring Equipment	4 in 1 Soil Survey Instrument

Table of Soil Result

No	Site Description	pH	Temperature	Moisture	FAO Standards*
1	Water Final Discharge Point 21°17'55.74"N 95°10'28.29"E	6.65	37 °C	Dry	Slightly Acid
2	Discharge Point, Near Preliminary Tank 21°17'53.52"N 95°10'26.99"E	6.4	36 °C	Dry	Slightly Acid

NA = Not Applicable

*FAO= Food and Agriculture Organization

Analyzed by

Aung Kyaw Phyo
Environmental Field Technician
Hexagonal Angle International Consultants Co., Ltd.

Checked by

Win Naing Oo
Environmental Monitoring Team Leader
Hexagonal Angle International Consultants Co., Ltd.

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Soil Quality Measurement Lab Result

ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော်အစိုးရ
စိုက်ပျိုးရေး၊ မွေးမြူရေးနှင့် ဆည်မြောင်းဝန်ကြီးဌာန
စိုက်ပျိုးရေးဦးစီးဌာန
(မြေအသုံးချရေးဌာနခွဲ)
ရန်ကင်းမြို့



စာအမှတ်- ၈၁- ၂(၁) / ၂၀၂၃-၂၀၂၄ (၀၅၄)
နေ့စွဲ ၂၀၂၃ ခုနှစ်၊ မေလ (၃၁) ရက်

အကြောင်းအရာ။ မြေနမူနာ ဓာတ်ခွဲအဖြေများပေးပို့ခြင်း။
ရည် ညွှန်း ချက် ။ MCCM Company Limitedမှ (15.5.2023)နေ့တွင် ပေးပို့သော နမူနာ။
အထက်အကြောင်းအရာပါ ကိစ္စနှင့်ပတ်သက်၍ ရည်ညွှန်းစာဖြင့် ပေးပို့လာ
သော မြေနမူနာ (၂ - မျိုး)အား ဓာတ်ခွဲစစ်ဆေးပြီးဖြစ်၍ ဓာတ်ခွဲတွေ့ရှိချက် အဖြေများကို
ဤစာနှင့် အတူ ပူးတွဲပေးပို့ပါသည်။

(ဒေါက်တာသန္တာညီ)
ဒုတိယညွှန်ကြားရေးမှူး
ဓာတ်ခွဲခန်းတာဝန်ခံ
မြေအသုံးချရေးဌာနခွဲ

မိတ္တူကို-
ရုံးလက်ခံ။

DEPARTMENT OF AGRICULTURE (LAND USE)

SOIL ANALYTICAL DATA SHEET

MCCM Company Limited (15.5.2023)

Region - Mandalay Region.

Sheet No. 1

Township - MCCM Petroleum Mini Refinery Factory, Taungthar Township.

Sr No. S 1-2 / 2023

Sr No.	Sample	Moisture %	pH Soil:Water 1:2.5	Organic Carbon %	Humus %	Total N %	CEC (meq/100gm)	Exchangeable Cations (meq/100gm)					
								Ca ⁺⁺	Mg ⁺⁺	K ⁺	Na ⁺	H ⁺	Al ⁺⁺⁺
1	Waste Water Final Discharge Point 21°17'53.52"N 95°10'26.99"E	0.63	7.20	0.25	0.42	0.108	14.42	6.85	6.85	0.20	0.51	-	-
2	Discharge Point (Near Preliminary Tank) 21°17'55.74"N 95°10'28.29"E	1.59	8.92	0.28	0.48	0.087	14.26	10.72	2.68	0.09	0.77	-	-

(ဒေါက်တာသန္တာညီ)
ဒုတိယညွှန်ကြားရေးမှူး
ဓာတ်ခွဲခန်းတာဝန်ခံ
မြေအသုံးချရေးဌာနခွဲ

DEPARTMENT OF AGRICULTURE (LAND USE)

SOIL INTERPRETATION OF RESULTS

MCCM Company Limited (15.5.2023)

Region - Mandalay Region.

Sheet No. 1

Township - MCCM Petroleum Mini Refinery Factory, Taungthar Township.

Sr No. S 1-2 / 2023

Sr No.	Sample	pH Soil:Water 1:2.5	Organic Carbon	Total N	CEC
1	Waste Water Final Discharge Point 21°17'53.52"N 95°10'26.99"E	Slightly Alkaline	Very Low	Low	Medium
2	Discharge Point (Near Preliminary Tank) 21°17'55.74"N 95°10'28.29"E	Strongly Alkaline	Very Low	Very Low	Medium

(ဒေါက်တာသန္တာညီ)
ဒုတိယညွှန်ကြားရေးမှူး
ဓာတ်ခွဲခန်းတာဝန်ခံ
မြေအသုံးချရေးဌာနခွဲ

Appendix (G)
Water Sampling Results According ECD comments

ALARM Ecological Laboratory

Water Testing Result Report



Report Number: EL-WR-23-01572

Date : February 13, 2024

Client Information

Client Name : MCCM Co., Ltd
Organization :
Client ID : -
Registration Date & Time : 5.2.2024 ; 10:00 AM
Contact : 09-898333711
Email : thandarkyaw@hexagonalangle.com
Testing Purpose : -

Sample Information

Sample ID : 9697
Sample Name : Operation Wastewater
Sample Type / Source : Wastewater
Sampling Date & Time : 4.2.2024; 12:00 PM
Sample Location : MCCM Mini Refinery Project Area,
Taungthar Tsp, Mandalay Region
Latitude : 21°17'55.83"N
Longitude : 95°10'27.82"E

Testing Results

This laboratory analysis report is based solely on the sample submitted by the client unless client took our sampling service.

This report shall not be reproduced except in full, without written approval of the laboratory

Sr.	Quality Parameters	Results	Units	Drinking Standards	Remarks
1	Mercury	0	mg/L	0.02	LOD = 0.1 mg/l
2	Iron	2.1	mg/L	3	Normal
3	Phenol	0	mg/L	0.2	LOD = 0.1 mg/l
4	Temperature increase	27	°C	<3	Above the limit
5	Nickel	0.112	mg/L	0.5	Normal
6	Chromium(total)	0	mg/L	0.5	LOD = 0.1 mg/l

2"ND" = Not Detected

"LOD" = Lower limit of detection

" - " = No Reference Standard

Tested by

Checked by

Approved by

Daw May Myat Khine
Lab. Technician II
Ecological Laboratory
ALARM

Daw Lin Myat Aung
Lab. Technician I
Ecological Laboratory
ALARM

Dr. Aye Aye Win
Laboratory In-charge
Ecological Laboratory
(ALARM)

No.237, Corner of Shu Khin Thar Street & 7 Street, (3) Block, South Oakkalapa Township, Yangon.

Tel: 09-407496078, Email: aelab.2022@gmail.com

ALARM Ecological Laboratory

Water Testing Result Report



Report Number: EL-WR-23-01570

Date : February 13, 2024

Client Information

Client Name : MCCM Co., Ltd
Organization :
Client ID : -
Registration Date & Time : 5.2.2024 ; 10:00 AM
Contact : 09-898333711
Email : thandarkyaw@hexagonalangle.com
Testing Purpose : -

Sample Information

Sample ID : 9695
Sample Name : Ground Water (Kyaw Zi)
Sample Type / Source : Ground
Sampling Date & Time : 4.2.2024; 11:00 AM
Sample Location : KyawZi village ,Taungthar Tsp,
Mandalay Region
Latitude :
Longitude :

Testing Results

*This laboratory analysis report is based solely on the sample submitted by the client unless client took our sampling service.
This report shall not be reproduced except in full, without written approval of the laboratory*

Sr.	Quality Parameters	Results	Units	Drinking Standards	Remarks
1	Turbidity	2.3	NTU	5	Normal
2	Color	13	TCU	15	Normal
3	Lead	0	mg/L	0.01	LOD = 0.1 mg/l
4	Fecal coliform	0	MPN/100 ml	0	LOD = 0.1 mg/l
5	Manganese	0	mg/L	0.4	LOD = 0.1 mg/l
6	Chloride	56.2	mg/L	250	Normal
7	Sulphate	29.1	mg/L	250	Normal
8	Nitrate	12	mg/L	50	Normal

2"ND" = Not Detected

"LOD" = Lower limit of detection

" - " = No Reference Standard

Tested by

Checked by

Approved by

Daw May Myat Khine
Lab. Technician II
Ecological Laboratory
ALARM

Daw Lin Myat Aung
Lab. Technician I
Ecological Laboratory
ALARM

Dr. Aye Aye Win
Laboratory In-Charge
Ecological Laboratory
(ALARM)

No.237, Corner of Shu Khin Thar Street & 7 Street, (3) Block, South Oakkalapa Township, Yangon.

Tel: 09-407496078, Email: aelab.2022@gmail.com

ALARM Ecological Laboratory

Water Testing Result Report



Report Number: EL-WR-23-01571

Date : February 13, 2024

Client Information

Client Name : MCCM Co., Ltd
Organization :
Client ID : -
Registration Date & Time : 5.2.2024 ; 10:00 AM
Contact : 09-898333711
Email : thandarkyaw@hexagonalangle.com
Testing Purpose : -

Sample Information

Sample ID : 9696
Sample Name : Ground Water (Marlar)
Sample Type / Source : Ground
Sampling Date & Time : 4.2.2024; 10:00 AM
Sample Location : Mar Lar village, Taungthar Tsp,
Mandalay Region
Latitude : 21°17'51.934"N
Longitude : 95°08'39.595"E

Testing Results

*This laboratory analysis report is based solely on the sample submitted by the client unless client took our sampling service.
This report shall not be reproduced except in full, without written approval of the laboratory*

Sr.	Quality Parameters	Results	Units	Drinking Standards	Remarks
1	Turbidity	1.7	NTU	5	Normal
2	Color	11	TCU	15	Normal
3	Lead	0	mg/L	0.01	LOD = 0.1 mg/l
4	Fecal coliform	0	MPN/100 ml	0	LOD = 0.1 mg/l
5	Manganese	0	mg/L	0.4	LOD = 0.1 mg/l
6	Chloride	47.6	mg/L	250	Normal
7	Sulphate	23.4	mg/L	250	Normal
8	Nitrate	8.7	mg/L	50	Normal

2"ND" = Not Detected

"LOD" = Lower limit of detection

" - " = No Reference Standard

Tested by

Checked by

Approved by

Daw May Myat Khine
Lab. Technician II
Ecological Laboratory
ALARM

Daw Lin Myat Aung
Lab. Technician I
Ecological Laboratory
ALARM

Dr. Aye Aye Win
Laboratory In Charge
Ecological Laboratory
(ALARM)

No.237, Corner of Shu Khin Thar Street & 7 Street, (3) Block, South Oakkalapa Township, Yangon.

Tel: 09-407496078, Email: aelab.2022@gmail.com

Appendix (H)
Attendance List and Acceptance Invitation Letter
of Public Consultation Meeting in Scoping Stage

MCCM Co., Ltd. ၏ အသေးစားရေနံချက်လုပ်ငြင်းလုပ်ငန်းအား နယ်ပယ်အတိုင်းအတာသတ်မှတ်ခြင်း
အဆင့်တွင်အများပြည်သူတွေ့ဆုံဆွေးနွေးပွဲသို့ တက်ရောက်သူများစာရင်း

နေ့စွဲ : ၁၇ ရက်၊ ဖေဖော်ဝါရီလ၊ ၂၀၂၂ ခုနှစ်။

အချိန် : နံနက် ၁၀ နာရီမှ ၁၂ နာရီ အထိ။

စဉ်	အမည်	ရာထူး	ဌာန/အဖွဲ့အစည်း	နေရပ်လိပ်စာ
၁	ဦးဖြူမောင်	မန်နေဂျာ/ဒါရိုက်တာ	MCCM Co, Ltd.	တောင်သာ၊ မြို့နယ်၊ ဗဟန်းတိုင်း
၂	ဦးသန့်ခင်	ဒုတိယအမှုဆောင်	MCCM Co, Ltd.	ကျောက်တန်း၊ တောင်သာ၊ မြို့နယ်
၃	ဦးကျော်စွာ	ဦးစီးကျော်စွာ	ဖီ.သတ်ဌာန	တောင်သာ၊ မြို့နယ်
၄	ဦးကျော်စွာ	အမှုဆောင်ကျော်စွာ	စည်ပင်သာယာ	တောင်သာ၊ မြို့နယ်
၅	ဒေါ်အောင်နုစာ	ဦးစီးကျော်စွာ	ECD	ညောင်ဦးခရိုင်
၆	ဦးမောင်ထွဋ်	ဦးစီးကျော်စွာ	အထွေထွေဒုတိယအမှုဆောင်	တောင်သာ၊ မြို့နယ်
၇	ကိုစောသန့်	အမှုဆောင်	MCCM Co, Ltd.	ကျောက်တန်း၊ တောင်သာ၊ မြို့နယ်

DEVELOPING ALLIANCE DELIVERING SUCCESS




စဉ်	အမည်	ရာထူး	ဌာန/အဖွဲ့အစည်း	နေရပ်လိပ်စာ
၈	ဦးကျော်စွာ	ဒါရိုက်တာ	MCCM Co, Ltd.	ကျောက်တန်း၊ တောင်သာ
၉	ဒေါ်ညွှန်းညွှန်းစာ	ဦးစီးကျော်စွာ	ကျန်းမာရေးဌာန	တောင်သာ၊ မြို့နယ်
၁၀	ဒေါ်အိမ်စော	GM, Social Specialist	Hexagonal Angle	တောင်ညွှန်း၊ ဗဟန်း
၁၁	ဦးထက်စော	Senior Environmentalist	Hexagonal Angle	တောင်ညွှန်း၊ ဗဟန်း
၁၂	ဦးဝင်းသိန်း	Environmental & Transport Engineer	Hexagonal Angle	တောင်ညွှန်း၊ ဗဟန်း
၁၃	ဦးသန်းထွဋ်စော	Environmental Engineer	Hexagonal Angle	တောင်ညွှန်း၊ ဗဟန်း
၁၄				
၁၅				

DEVELOPING ALLIANCE DELIVERING SUCCESS

MCCM Co., Ltd. ၏ အသေးစားရေနံချက်လုပ်ခြင်းလုပ်ငန်းအား နယ်ပယ်အတိုင်းအတာသတ်မှတ်ခြင်း
အဆင့်တွင်အများပြည်သူတွေ့ဆုံဆွေးနွေးပွဲသို့ တက်ရောက်သူများစာရင်း

နေ့စွဲ : ၁၇ ရက်၊ ဇေပြီလ၊ ၂၀၂၂ ခုနှစ်။

အချိန် : နံနက် ၁၀ နာရီမှ ၁၂ နာရီ အထိ။

စဉ်	အမည်	ရာထူး	ဌာန/အဖွဲ့အစည်း	နေရပ်လိပ်စာ	ဖုန်းနံပါတ်	လက်မှတ်
၁	ဦးတင်အောင်	မြို့မအုပ်ချုပ်ရေး	အွယ်/အုပ်	အောင်အောင်/အွယ်/အုပ်	၀၉၅၅၇၇၅၅၆၈	
၂	ဦးကျော်စွာ	မြို့မအုပ်ချုပ်ရေး	ရေသောက်	ရေသောက် (၁)	၀၉၄၀၇၅၅၆၅၆၇	
၃	ဦးကျော်စွာ	ရေသောက်	ရေသောက်	ရေသောက် (၂)	၄၅၆၇၈၉၀၁၂	
၄						
၅						
၆						
၇						

APPENDIX (I)

Recommendations and Suggestions for Public Disclosure in Scoping Stage



HEXAGONAL ANGLE
INTERNATIONAL CONSULTANTS CO.,LTD.

Office: No. 23/2, 1st Floor, Laung Min Street, 14/3 Quarter, South Okkalapa Township, Yangon, Myanmar.
Tel: +959 898333711
Email: info@hexagonalangle.com
Website: www.hexagonalangle.com

မည် ဝိဇ္ဇာ
ရာထူး ဝေဖန်ရေးဦးစီးဌာန
ဌာန/အဖွဲ့အစည်း ပို့ဆောင်ရေး/သတင်းအချက်အလက်
လိပ်စာ ပြည်သူ့ဆေးရေးဦးစီးဌာန
..... တောင်သာမြို့
..... ၀၂၊ ၀၄ ၂၀ ၂၅၀၇၀၅၀

ရက်စွဲ။

ဝေဖန်အကြံပြုချက်

- လေ့လာရေး ခုခမ်း မှု → သက်တောင့်တတ်မှု၊ ဗဟုသုတများ မရှိခြင်း၊ ဖွဲ့စည်းပုံအားဖြင့် မှားယွင်းနေခြင်းကြောင့် လေ့လာမှု ဖြည့်စွက်ရန် လိုအပ်ပါသည်။
- ခွဲစိတ်ပေးခြင်း → ပုံပြင်ပေးခြင်း၊ ခွဲစိတ်ပေးခြင်း၊ အားရှိရာ ပါ စား၊ သတိပေးခြင်း။
- ဝါသနာရှိ ဆန်းသစ်ခြင်း → စာမျက်နှာများ မှားယွင်းနေခြင်းကို ခွဲစိတ်ပေးခြင်း၊ ပြင်ဆင်ပေးခြင်း ပါသည်။
- အချက်အလက် → ဝန်ထမ်း အားလုံး နားထောင်မှု မရှိခြင်း၊ တာဝန်ခံခြင်း မရှိခြင်းကြောင့် သတိပေးချက် ပေးရခြင်းဖြစ်ပါသည်။
- ပျက်စီးခြင်း → စက်ကိရိယာများ မှားယွင်းနေခြင်း၊ ပြင်ဆင်မှု ပေးရခြင်း၊ အားရှိရာ ပါ စား၊ သတိပေးခြင်း ပါသည်။



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မည် ဝေဖန်ရေးဦးစီးဌာန
ရာထူး ဝေဖန်ရေးဦးစီးဌာန
ဌာန/အဖွဲ့အစည်း ပို့ဆောင်ရေး/သတင်းအချက်အလက်
လိပ်စာ တောင်သာမြို့

ရက်စွဲ။ ၂၂.၂.၂၀၂၂

ဝေဖန်အကြံပြုချက်

စာတမ်းအကျဉ်းချုပ်

- ၁- စက်ကိရိယာများ မှားယွင်းနေခြင်းကြောင့် စက်ကိရိယာများ ပြင်ဆင်ပေးရန် လိုအပ်ပါသည်။
- ၂- စက်ကိရိယာများ မှားယွင်းနေခြင်းကြောင့် စက်ကိရိယာများ ပြင်ဆင်ပေးရန် လိုအပ်ပါသည်။
- ၃- စက်ကိရိယာများ မှားယွင်းနေခြင်းကြောင့် စက်ကိရိယာများ ပြင်ဆင်ပေးရန် လိုအပ်ပါသည်။

(Signature)

အမှုဆောင်အရာရှိ
ပြည်သူ့ဆေးရေးဦးစီးဌာန
တောင်သာမြို့



Appendix (J)

PowerPoint Slides of Public Consultation Meeting in EIA Stage



**“MCCM Co., Ltd. ၏ အသေးစား ရေနံချက်လုပ်ငန်း”
ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်းအစီရင်ခံစာ**

အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးပွဲ
၂၈ ရက်၊ ဇူလိုင်လ၊ ၂၀၂၃ ခုနှစ်။

ဦးဝင်းသိန်း
(Environmental Deputy Team Leader)

၂၈ ရက်၊ ဇူလိုင်လ၊ ၂၀၂၃ ခုနှစ် ဇင်ယော်ဟိုတယ်

ဆွေးနွေးတင်ပြမည့်အကြောင်းအရာ

၁. ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း အစီရင်ခံစာ ပြုလုပ်ရခြင်း ရည်ရွယ်ချက်။
၂. MCCM ကုမ္ပဏီ၏ နောက်ခံအကြောင်းအရာများကို တင်ပြခြင်း။
၃. ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းစီစဉ်မှုမှ သဘောထားမှတ်ချက်နှင့် တတိယအဖွဲ့အစည်းအား အတည်ပြုအကြောင်းကြားစာအား တင်ပြခြင်း။
၄. ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်းအစီရင်ခံစာ လေ့လာသည့် အချိန်ကာလအား တင်ပြခြင်း။
၅. MCCM Co., Ltd. ၏ အသေးစားရေနံချက် လုပ်ငန်းအကြောင်းအရာများ တင်ပြခြင်း။
၆. ကွင်းဆင်းလေ့လာခြင်းနှင့် တွေ့ရှိချက်များတင်ပြခြင်း။
၇. ပတ်ဝန်းကျင်အပေါ်သက်ရောက်မှု လျှော့ချရေးအစီအစဉ်များနှင့် အန္တရာယ်မြစ်ဖိုင်ချေ ဆန်းစစ်ခြင်းအစီအစဉ်များတင်ပြခြင်း။
၈. ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် နှင့် စောင့်ကြပ်ကြည့်ရှုခြင်း အစီအစဉ်အား တင်ပြခြင်း။
၉. ဆွေးနွေးအကြံပြုချက်များ ဆွေးနွေးခြင်း။

**ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း အစီရင်ခံစာ
ပြုလုပ်ရခြင်းရည်ရွယ်ချက်**

ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းအစီရင်ခံစာ ရေးဆွဲရခြင်း၏ ရည်ရွယ်ချက်

၁. သယံဇာတနှင့်သဘာဝပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းစီစဉ်မှု ထုတ်ပြန်ထားသော ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ဆောင်ရမည့်အစီအစဉ် ၆၃ ပါ သတ်မှတ်ချက်နှင့်အညီ လိုက်နာဆောင်ရွက်ခြင်း။
၂. စီမံကိန်း မဆောင်ရွက်မီ ထိုစီမံကိန်း၏ လွှမ်းမိုးမှုနှင့် ပတ်ဝန်းကျင်ဆိုင်ရာ ထိခိုက်မှုများကို နားလည်သဘောပေါက်ပြီး ထိခိုက်မှုများနှင့် ပတ်သက်သော သတင်းအချက်အလက်များကို စုစည်းတင်ပြခြင်း။
၃. စီမံကိန်းလုပ်ငန်းဆောင်ရွက်ခြင်းကြောင့် ဖြစ်ပေါ်လာနိုင်သော ပတ်ဝန်းကျင်အပေါ် အကျိုးသက်ရောက်မှုများ အားလုံးကို လေ့လာခြင်း။
၄. တောင်ကြီးနှင့် မိုင်းတီး သက်ရောက်မှုများကို ခြုံငုံခြင်း။
၅. မိုင်းတီးသက်ရောက်မှု တစ်ခုချင်းစီအလိုက် အတိုင်အတာနှင့် ပမာဏကို စနစ်တကျ ဆန်းစစ်ဖော်ထုတ် လေ့လာခြင်း။
၆. မိုင်းတီးသက်ရောက်မှုများအတွက် လျှော့ချရန် သင့်လျော်သည့် ဆောင်ရွက်မှုများ သတ်မှတ်ခြင်း။
၇. အများပြည်သူနှင့် တွေ့ဆုံဆွေးနွေးပွဲ ပြုလုပ်ခြင်းနှင့် သဘောထားများကိုရယူခြင်း။
၈. ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်များ ဖြေဆိုခြင်း။




MCCM Co., Ltd. ၏ နောက်ခံအကြောင်းအရာများကို တင်ပြခြင်း။

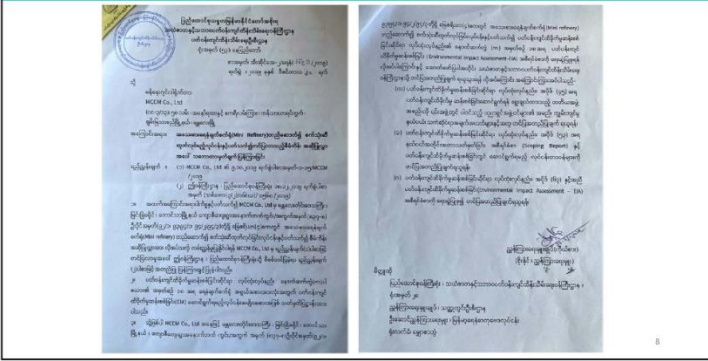
MCCM ကုမ္ပဏီ၏ နောက်ခံအကြောင်းအရာများ

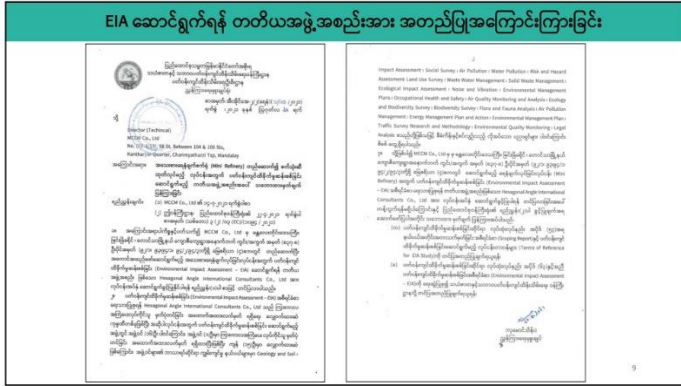
- MCCM Co., Ltd. သည် မြန်မာနိုင်ငံသာယာဝတီ ရင်းနှီးမြှုပ်နှံမှုဖြစ်ပြီး ပြည်တွင်းရရှိရေးစီမံများကို ဝယ်ယူပြီး စတင်ထိန်းသိမ်းမှုနှင့် ဖယ်ယားခြင်း အဖြစ် သန့်စင်၍ အသေးစား ရေနံချက်လုပ်ငန်း လုပ်ကိုင်ဆောင်ရွက်လျက်ရှိပါသည်။
- စီမံကိန်းသည် မန္တလေးတိုင်း၊ သေသံကြီး မြင်ငယ်ရေ၊ တောင်သာမြို့နယ်၊ ကျော့စီကျော့ရွာ အနီးတွင် တည်ရှိပါသည်။
- စီမံကိန်းသည် ၂၀၁၈ ခုနှစ် ဇွန်လ (၄) ရက်နေ့တွင် မြန်မာနိုင်ငံ ကုမ္ပဏီများအက်ဥပဒေ (၁၉၄၄) အရ ကုမ္ပဏီဖွဲ့စည်းတင်အမှတ် (၁၀၃၉၅၅၉၂) ဖြင့် အများနှင့် မသက်ဆိုင်သော ကုမ္ပဏီအဖြစ် တည်ထောင်ခဲ့ပါသည်။
- စီမံကိန်းသည် အသေးစားရေနံချက်လုပ်ငန်းအတွက် လိုအပ်သော ပြေအားပေးမှုဆိုင်ရာ ခွင့်ပြုချက်များ သက်ဆိုင်ရာ ဌာနဆိုင်ရာများ၏ ထောက်ခံချက်များ သေသံ ပြည်သူများ၏ ကန့်ကွက်ရန်မရှိကြောင်း ထောက်ခံချက်များ ရရှိထားပြီး လုပ်ငန်းလည်ပတ်လျက်ရှိပါသည်။
- သို့သော်လည်း ယခုကာလတွင် နိုင်ငံရေးအခြေအနေများ ကိုစစ်-၁၉ ရောက်အခြေအနေများနှင့် ကန့်ကြက်ရရှိမှုခက်ခဲခြင်း၊ လျှပ်စစ်ရရှိမှု ခက်ခဲခြင်း သည့်အခြေအနေများကြောင့် လုပ်ငန်းရပ်နားထားလျက်ရှိပါသည်။



ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနမှ
သဘောထားမှတ်ချက် နှင့် တတိယအဖွဲ့အစည်းအား
အတည်ပြုအကြောင်းကြားစာအား တင်ပြခြင်း။

ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနမှ သဘောထားမှတ်ချက်





ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း အစီရင်ခံစာ
လေ့လာသည့်အချိန်ကာလ

ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း အစီရင်ခံစာ လေ့လာသည့် အချိန်ကာလ

စဉ်	လုပ်ငန်းစဉ်	၂၀၂၁-၂၀၂၃		
		၂၀၂၁	၂၀၂၂	၂၀၂၃
၁.	တတိယအဖွဲ့အစည်း အတည်ပြုချက်ရယူခြင်း			
၂.	၂၀၀၆အကြိမ်တွင်ဆင်းလေ့လာခြင်း (ပတ်ဝန်းကျင်ဆိုင်ရာ နှင့် စီမံချက်ဆိုင်ရာများ လေ့လာခြင်း)			
၃.	၂၀၀၆အကြိမ်ရှိလာသောအချက်အလက်များ ခြုံငုံစစ်တိုင်ခြင်း			
၄.	အမျိုးသက်စရက်များအား အကဲဖြတ်ခြင်း			
၅.	နယ်ပယ်အတိုင်းအတာ သတ်မှတ်ခြင်းအစီရင်ခံစာရေးဆွဲခြင်း			
၆.	၃တိယအကြိမ်တွင်ဆင်းလေ့လာခြင်း (စီမံချက်ဆိုင်ရာများ နှင့် လူမှုစီးပွားအစီရင်ခံစာအကဲဖြတ်ခြင်း နှင့် အများပြည်သူ သဘောတော်ပြခြင်း)			
၇.	၃တိယအကြိမ်ရှိလာသောအချက်အလက်များ ခြုံငုံစစ်တိုင်ခြင်း			
၈.	စီမံခန့်ခွဲမှုအစီရင်ခံစာအကဲဖြတ်ခြင်း နှင့် လျော့ချရေးဆွဲလမ်းပန်း ဖြစ်ဆင်းခြင်း			
၉.	ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီရင်ခံစာ ပြင်ဆင်ခြင်း			
၁၀.	အချစ်အမြတ်နှင့် တွေ့ဆုံဆွေးနွေးခြင်း			
၁၁.	ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း အစီရင်ခံစာ ရေးဆွဲခြင်း			
၁၂.	ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း အစီရင်ခံစာအား လုပ်ငန်းရင်းသို့ ပေးအပ်ခြင်း			
၁၃.	ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း အစီရင်ခံစာအား ပတ်ဝန်းကျင်ထိခိုက်မှုလျှော့ချရေးစီမံချက် တင်ပြခြင်း			
၁၄.	ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း အစီရင်ခံစာအား ပတ်ဝန်းကျင်ထိခိုက်မှုလျှော့ချရေးစီမံချက် တင်ပြခြင်း			

MCCM Co., Ltd. ၏ အသေးစားရေနံချက်
လုပ်ငန်းအကြောင်းအရာများ တင်ပြခြင်း။

MCCM Co., Ltd. ၏ အသေးစားရေနံချက်စက်ရုံ အကြောင်းအရာ

❖ ကုန်ချော - ဓာတ်ဆီ၊ ဒီဇယ်ဆီ (အထူး အပါး)၊ မီးလုံးဆီ။

❖ ကုန်ချောရောင်းချသည့်နေရာ - မြစ်ကြီးနား၊ ထားဝယ်၊ ဟားကနဲ။

၁ လအတွင်း ကုန်ချောထွက်နှုန်း	
ဓာတ်ဆီ	၂,၇၅၄ ဂါလ
ဒီဇယ်ဆီ	၁၇,၀၇၂ ဂါလ
မီးလုံးဆီ	၅,၆၄၈ ဂါလ
ဖယောင်း	၁၀,၆၇၀ ဂါလ
ရေ/နို့	၁,၅၀၆ ဂါလ
စုစုပေါင်း (အရော)	၃၇,၆၅၀ ဂါလ

ကုန်ချော (ဓာတ်ဆီ၊ ဒီဇယ်ဆီ၊ မီးလုံးဆီ)

ကုန်ကြမ်းနှင့် ကုန်ချောလုပ်လှောင်ခြင်း

MCCM Co., Ltd. ၏ အသေးစားရေနံချက်စက်ရုံ အကြောင်းအရာ

စဉ်	အရင်းအမြစ်အမျိုးအစား	အမျိုးအစား	အရေအတွက်	အခြေအနေ
၁။	လျှပ်စစ်အရင်းအမြစ်	၃၁၅ ဧကစွဲအေး (၁၀ရပ်စတော်ဟာ)	၁	၃၁၅ ဧကစွဲအေး ဝါယာမလောင်စာသုံး စီစဉ် (၂၅၅ နှင့် ၁၅၀ ဧကစွဲအေး)
		၂၅၀ ဧကစွဲအေး (မီးစက်)	၁	
		၁၅၀ ဧကစွဲအေး (မီးစက်)	၁	
၂။	ရေအရင်းအမြစ်	၄ လက်မ အစိစိရေတွင်း	၁	၈၀၀၀၀ ဂါလဆန်သောရေကန် (လုပ်နံ့လည်တံကန်)
		၂ လက်မ အစိစိရေတွင်း	၁	
၃။	သောက်သုံးရေ	၂၀ လီတာ ရေဘူး (နေရာသီ)	၁၀၀	၁၀၀၀၀၀ ဂါလဆန်သောရေကန် (လုပ်နံ့လည်တံကန်)
		၂၀ လီတာ ရေဘူး (ဆောင်းရာသီ)	၆၀	
၄။	ရေသိုလှောင်စွ	၈၀၀၀၀ ဂါလဆန်သောရေကန်	၁	၁၀၀၀၀၀ ဂါလဆန်သောရေကန် (လုပ်နံ့လည်တံကန်)
		၁၀၀ ဂါလဆန်သောရေကန်	၁	
		၁၀၀၀၀၀ ဂါလဆန်သောရေကန်	၁	
		၅၀၀၀ ဂါလဆန်သောရေကန်	၁	

ရေနံချက်လုပ်ပုံအဆင့်ဆင့်

- (၁) ကုန်ကြမ်းလောင်စာနှင့် အလေးချိန် စိုနံ့ခြင်း
- (၂) ပထမသိုလှောင်ကန်တွင် အပူပေးခြင်းနှင့် အပူပေးပုံစံပြောင်းခြင်း
- (၃) ဂွက်လိပ်စာတစ်ဆင့် သိုလှောင်ကန်သို့ ပို့ဆောင်ခြင်း
- (၄) သိုလှောင်ကန်တွင် အပူပေးပုံစံပြောင်းခြင်းနှင့် ၅၀°C ပြုတ်စိုနံ့ထောင်ခြင်း
- (၅) သိုလှောင်ကန်မှတစ်ဆင့် အပူပေးပုံစံပြောင်းခြင်းနှင့် CCOD သိုလှောင်ခြင်း
- (၆) CCOD မှ ရေနံစိမ်းများကို စိုနံ့သို့ ပြောင်းလဲပေးခြင်း
- (၇) စိုနံ့မထုတ်လာသော ရေနံစိမ်းများကို CCOD တွင် ပြုလုပ်သည့်ကန်သို့ ပို့ဆောင်ခြင်း
- (၈) ရေနံစိမ်းများကို Distillation Column တွင် ဆင်းခြင်း

ရေနံချက်လုပ်ပုံအဆင့်ဆင့်

- (၉) Condenser တွင် ရေလှည့်ပေးခြင်း
- (၁၀) ဓာတ်ဆီ၊ ဒီဇယ်ဆီ၏ အရောင်အေး သို့သော် စိမ်းဆင်းခြင်းနှင့် ပြန်လည်ကွဲချက်ခြင်း
- (၁၁) Overhead Receiving Tank တွင် သိုလှောင်ခြင်း
- (၁၂) ဓာတ်ဆီများအား မီးလီတာကွယ်သံများဖြင့် သန့်စင်ခြင်း
- (၁၃) ဓာတ်ဆီ၊ ဒီဇယ်ဆီ၊ မီးလုံးဆီများအား ယာယီသိုလှောင်ခြင်းနှင့် အရောင်အေးပေးခြင်း
- (၁၄) ဓာတ်ဆီ၊ ဒီဇယ်ဆီ၊ မီးလုံးဆီများအား ရောင်းချခြင်း
- (၁၅) ဓာတ်ဆီ၊ ဒီဇယ်ဆီ၊ မီးလုံးဆီများအား သိုလှောင်ခြင်း
- (၁၆) ဓာတ်ဆီ၊ ဒီဇယ်ဆီ၊ မီးလုံးဆီများအား ရောင်းချခြင်း

MCCM Co., Ltd. ၏ အသေးစားဓာတ်ခွဲခန်း

- ❑ စီမံကိန်းလုပ်ငန်းအတွက် ကုန်ကြမ်းများအား ဝယ်ယူရာတွင် ရေနံစိမ်းအား ခေါင်းမာသန့်စင်ရာ၌ ကုန်ချောထွက်ရှိမှု ရာခိုင်နှုန်းနှင့် စေးပျက်မှုအား သိရှိနိုင်ရန် ဓာတ်ခွဲခြင်း လုပ်ငန်းအား လုပ်ဆောင်ပါသည်။
- ❑ ထိုသို့ဓာတ်ခွဲပြီးနောက်လျှင် ကုန်ချောထွက်နိုင်မည့် ရာခိုင်နှုန်းပေါ် မူတည်၍ ကုန်ကြမ်းဝယ်ယူခြင်း လုပ်ငန်းကို ဆောင်ရွက်ပါသည်။
- ❑ ဓာတ်ခွဲခန်းအတွင်း ခေါင်းမာထုပစ္စည်းများ သုံးစွဲမှုမရှိပါ။



ရေနံစိမ်းအား စာတိုခွဲစမ်းသပ်မှုပုံ



ဓာတ်ခွဲခန်းအတွင်းရှိ ရေနံစိမ်းအစုစည်းအား စောင့်ကြည့်ခြင်း



MCCM Co., Ltd. ၏အသေးစားဓာတ်ခွဲခန်းပုံ



ဓာတ်ခွဲခန်းအတွင်း အသုံးပြုမသော ပစ္စည်းများ

မီးဘေးအန္တရာယ်အတွက်ပြင်ဆင်ထားရှိမှု



မီးသတ်ဆေးဘူးများ



မီးသတ်ဆေးဘူးများနှင့် မီးသတ်ရန် အသုံးပြုဆောင်ရွက်မှုများ



အရေးပေါ်စက်သွယ်ပုံစံနှင့်မူဝါဒများ



မီးငြိမ်းသတ်ရေး သင်တန်းပို့ချခြင်း



မီးသတ်ဦးစီးဌာနမှ လာရောက်စစ်ဆေးခြင်း

ဝန်ထမ်းများအတွက်ပြင်ဆင်ထားရှိမှု



ဝန်ထမ်းဆောင်



ဆည်သည်များနှင့် တရားဝင်အသုံးပြုအတွက် နားရံဆောင်



ကန်တင်



အိမ်သာ



ရေပိုက်ကန် ရေကန်စီစဉ်ထားခြင်း



လုပ်ငန်းသုံးရေပိုလှောင်ထားခြင်း



ဝန်ထမ်းများအတွက် သုံးရေ



လျှပ်စစ်စီမံခန့်ခွဲရေး စီစဉ်မှုများ

ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းအဆင့်တွင် ကွင်းဆင်းလေ့လာခြင်းနှင့် တွေ့ရှိချက်များတင်ပြခြင်း။

ပတ်ဝန်းကျင်အခြေအနေအားလေ့လာခြင်း

- ❑ စီမံကိန်းကြောင့် ပတ်ဝန်းကျင်နှင့်လူမှုအပေါ်သက်ရောက်မှုများအား သိရှိနိုင်ရန် တိုင်းတာမှုများအား Hexagonal Angle International Consultants Co., Ltd. ၏ Environmental Team မှ သွားရောက်တိုင်းတာခဲ့ပါသည်။
- ❑ စီမံကိန်းမျိုးကြီးများ လေ့လာခြင်း အခြေခံပတ်ဝန်းကျင်အရည်အသွေးသိရှိရန်အတွက် ကွင်းဆင်းလေ့လာမှုကို ခုနှစ်သော ရာသီ (Wet Season) နှင့် မြောက်ဆွေသော ရာသီ (Dry Season) ဟူ၍ ရာသီ (၂) ချိန် ပြုလုပ်ခဲ့ပါသည်။
- ❑ စီမံကိန်း ဧရိယာ၏ အနီးပတ်ဝန်းကျင် ၃ ကီလိုမီတာ ပတ်လည် လေ့လာခြင်းများနှင့် စီမံကိန်းကိုလေ့လာခြင်း မေမြေမြင်၊ မှတ်တမ်းယူခြင်း

❖ **Wet Season ကွင်းဆင်းလေ့လာမှု**

- ကွင်းဆင်းလေ့လာမှုကို ၂၀၂၁ ခုနှစ်တွင် ပြုလုပ်ခဲ့ပါသည်။
- မြေအသုံးမျိုး လေ့လာခြင်း
- လေထုအရည်အသွေး အလင်း အပူချိန်၊ ဆူညံသံ အရည်အသွေးတိုင်းတာခြင်း
- မြေပေါ်ရေ နှင့် မြေအောက်ရေ အရည်အသွေးများ လက်တွေ့ တိုင်းတာခြင်း နှင့် ရေစုစုမှာ ဖောက်ယူခြင်း
- စီမံကိန်းမျိုးကြီးများ လေ့လာခြင်း
- ယာဉ်သွားလာမှု စစ်တမ်းကောက်ယူခြင်း

❖ **Dry Season ကွင်းဆင်းလေ့လာမှု**

- ကွင်းဆင်းလေ့လာမှုကို ၂၀၂၃ ခုနှစ်တွင် ပြုလုပ်ခဲ့ပါသည်။
- မြေအသုံးမျိုး လေ့လာခြင်း
- လေထုအရည်အသွေး အလင်း အပူချိန်၊ ဆူညံသံနှင့် တုန်ခါမှု အနံ့ အရည်အသွေးတိုင်းတာခြင်း
- မြေပေါ်ရေ နှင့် မြေအောက်ရေ အရည်အသွေးများ လက်တွေ့ တိုင်းတာခြင်း နှင့် ရေစုစုမှာ ဖောက်ယူခြင်း
- စီမံကိန်းမျိုးကြီးများ လေ့လာခြင်း
- လူမှုစီးပွားစစ်တမ်းကောက်ယူခြင်း
- ယာဉ်သွားလာမှု စစ်တမ်းကောက်ယူခြင်း
- မြေစုစုမှာ ဖောက်ယူစစ်ဆေးခြင်း

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ကွင်းဆင်းမှတ်တမ်းများ

စီမံကိန်းရုံပစ္စည်းလှောင်ခြင်း

လေ့လာရည်အသွေး တိုင်းတာခြင်း

မြေအောက်ရေစုစုနမူနာကောက်ယူခြင်း

မြေပေါ်ရေအရည်အသွေး ဖောက်ယူခြင်း

ဆူညံသံတိုင်းတာခြင်း

အလင်းတိုင်းတာခြင်း

အပူချိန်တိုင်းတာခြင်း

စီမံကိန်းမျိုးကြီးများ လေ့လာခြင်း

လူမှုစီးပွားစစ်တမ်းကောက်ယူခြင်း

ယာဉ်သွားလာမှု စစ်တမ်းကောက်ယူခြင်း

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ပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေးများတိုင်းတာရန် အသုံးပြုသော စက်ပစ္စည်းများ

လေ့လာရည်အသွေး တိုင်းတာသည့်စက်

အခြေကြည့်နံ့မြေခြင်း

GPS စက်

ဆူညံသံတိုင်းတာခြင်း

လက်တွေ့အရည်အသွေး တိုင်းတာစက်

မြေအရည်အသွေးတိုင်းတာစက်

တုန်ခါမှုတိုင်းတာစက်

အခြေအသေးစိတ်စက်

အလင်းတိုင်းတာစက်

အပူချိန်တိုင်းတာစက်

အနံ့တိုင်းတာစက်

ဖောက်ယူစစ်ဆေးသည့် တိုင်းတာစက်

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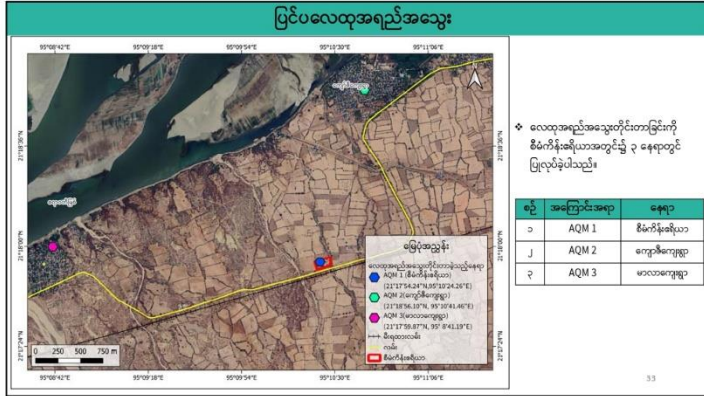
မြေအသုံးချမှုအခြေအနေအားလေ့လာခြင်း

မြေပုံအသွန်း

- လေ့လာသည့်နယ်ပယ် = ၃ ကီလိုမီတာပတ်လည်
- အနီးဆုံးအဆောက်အအုံ = ကော့စီရေစုရွာစက်ရုံ
- ကားလမ်း = ဆူညံနီး - မြင်းပြိုင်လမ်း
- အနီးဆုံးရေအရင်းအမြစ် = သဲမျောင်းနှင့် စုရာတီမြစ်

အမျိုးအစား	ဧရိယာ (ဧက)	ရာခိုင်နှုန်း (၁၀၀%)
စီမံကိန်းဧရိယာ	၃.၉၈	၀.၀၆
နီးကပ်မြေဧရိယာ	၃၇၁၃.၀၈	၅၅.၅၂
မြေလွတ်မြေဧရိယာ	၂၂၃၄.၇၃	၃၃.၄၂
စက်နံ့ဧရိယာ	၂၂.၇၇	၀.၃၉
လူနေဧရိယာ	၂၆၉.၃၉	၄.၀၃
ဆောင်းမြေဧက	၂၈.၉၉	၀.၄၃
ရေကန်ဧရိယာ	၄၂၄.၆၁	၆.၃၇
စုစုပေါင်း	၆၆၈၇.၆၇	၁၀၀%

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ပြင်ပလေထုအရည်အသွေးတိုင်းတာသည့်ရလဒ်

စဉ်	လေထုအရည်အသွေးအမျိုးအစား	မေးမြန်းသည့်အချိန်ကာလ	Wet Season	Dry Season	ယူနစ်	တိုင်းတာသည့်ကာလ	WHO စံနှုန်း	NEQC စံနှုန်း	OSHA (PEL) Standards
			တိုင်းတာမှု ရလဒ်	တိုင်းတာမှု ရလဒ်					
၁	အမှုန်အမွှား (PM10)	၂၄ နာရီ	၁၅.၇၃	၂၀.၉၈	μg/m ³	၁၂ နာရီ	-	၂၅၀ μg/m ³	NG
၂	အမှုန်အမွှား (PM2.5)	၂၄ နာရီ	၁၀.၄၅	၁၀.၁၇	μg/m ³	၂၄ နာရီ	၂၅	၂၅ μg/m ³	NG
၃	ဆိုင်ပြိုင်အမှုန် (TSP)	၂၄ နာရီ	၁၈.၇၂	၂၀.၈၉	μg/m ³	၂၄ နာရီ	NG	NG	NG
၄	ဆာလဖတ်ဒိုင်အောက်ဆိုက်	၂၄ နာရီ	၇.၆၆	၁၅.၈၆	μg/m ³	၁၀ နာရီ	၈ ppb	၂၅၀ μg/m ³	NG
၅	နိုက်ထရိုဂျင်ဒိုင်အောက်ဆိုက်	၂၄ နာရီ	၈၂.၂၆	၅.၃၅	μg/m ³	၁၀ နာရီ	၂၀ ppb	၂၅၀ μg/m ³	NG
၆	ကာဗွန်မိုနိုအောက်ဆိုက်	၂၄ နာရီ	၀.၃၃	၀.၃၂	ppm	၁၅ မိနစ်	၁၀၀ ppb/m ³	၃၅ ppb/m ³	50 ppm
၇	အိုဇွန်	၂၄ နာရီ	၁၀၀.၈၃	၄၂.၉၅	μg/m ³	၈ နာရီ	NG	၁၀၀ μg/m ³	NG
၈	ပျက်စီးမှု စွဲလျှင်ဆာ	၂၄ နာရီ	၈၂.၈၆	၃၃.၂၈	%RH	၂၄ နာရီ	NG	NG	NG
၉	အပူချိန်	၂၄ နာရီ	၃၀	၃၃.၃၁	°C	၂၄ နာရီ	NG	NG	NG
၁၀	လေတိုင်းဖျန်း	၂၄ နာရီ	၉၉.၀၄	-	hPa	၂၄ နာရီ	NG	NG	NG

Dry Season တွင် ပြင်ပလေထုအရည်အသွေးတိုင်းတာသည့်ရလဒ်

စဉ်	လေထုအရည်အသွေးအမျိုးအစား	မေးမြန်းသည့်အချိန်ကာလ	ကျေးရွာအနီး	မာလာကျေးရွာ	ယူနစ်	တိုင်းတာသည့်ကာလ	WHO စံနှုန်း	NEQC စံနှုန်း	OSHA (PEL) Standards
၁	အမှုန်အမွှား (PM10)	၂၄ နာရီ	၃၀.၉၈	၂၄.၄၅	μg/m ³	၁၂ နာရီ	-	၂၅၀ μg/m ³	NG
၂	အမှုန်အမွှား (PM2.5)	၂၄ နာရီ	၇.၄၅	၇.၀၇	μg/m ³	၁၂ နာရီ	၂၅	၂၅ μg/m ³	NG
၃	Total Suspended Particulate (TSP)	၂၄ နာရီ	၅၅.၆၆	၃၄.၂၂	μg/m ³	၂၄ နာရီ	NG	NG	NG
၄	ဆာလဖတ်ဒိုင်အောက်ဆိုက်	၂၄ နာရီ	၁၀.၉၉	၄.၂၉	μg/m ³	၁၀ နာရီ	၈ ppb	၂၅၀ μg/m ³	NG
၅	နိုက်ထရိုဂျင်ဒိုင်အောက်ဆိုက်	၂၄ နာရီ	၁၉.၁၇	၄.၂၄	μg/m ³	၁၀ နာရီ	၂၀ ppb	၂၅၀ μg/m ³	NG
၆	အိုဇွန်	၂၄ နာရီ	၅၃.၃၀	၂၅.၁၅	μg/m ³	၈ နာရီ	၉ ppb	၁၀၀ μg/m ³	၅၀ ppm
၇	ကာဗွန်မိုနိုအောက်ဆိုက်	၂၄ နာရီ	၀.၆၆	၀.၃၈	ppm	-	NG	NG	NG
၈	ကာဗွန်ဒိုင်အောက်ဆိုက်	၂၄ နာရီ	၂၆၇.၀၂	၂၇၂.၅၉	ppm	-	NG	NG	NG
၉	ပျက်စီးမှု စွဲလျှင်ဆာ	၂၄ နာရီ	၀.၂၅	၀.၄၁	ppm	-	NG	NG	NG
၁၀	ပျက်စီးမှု စွဲလျှင်ဆာ	၂၄ နာရီ	၅၈.၉၄	၃၄.၈၁	%RH	-	NG	NG	NG
၁၁	အပူချိန်	၂၄ နာရီ	၃၂.၉၈	၃၅.၆၂	°C	-	NG	NG	NG
၁၂	လေတိုင်းဖျန်း	၂၄ နာရီ	၀.၆၁	၀.၈၅	hPa	-	NG	NG	NG
၁၃	လေတိုင်းဖျန်း	၂၄ နာရီ	၂၅၄.၆၂	၂၅၀.၃၆	Degree	-	NG	NG	NG



အခန်းတွင်းလေထုအရည်အသွေးများအတွက် စံချိန်စံညွှန်းများ

အခန်းတွင်းလေထုအရည်အသွေးတိုင်းတာခြင်း (PM1.0, PM10, PM2.5, TVOC) အတွက် AQI စံချိန်စံညွှန်း				အခန်းတွင်းလေထုအရည်အသွေး (CO2) တိုင်းတာခြင်းအတွက် OHS စံချိန်စံညွှန်း			
သတ်မှတ်ဖျက်အညွှန်း	အဆင့်သတ်မှတ်ဖျက်	ရလဒ်တန်ဖိုး (mg/m ³ , 24-hour average)	သတ်မှတ်ပေးပြီးဖျက်	မှန်	လွန်	ကျန်းမာရေးဆိုင်ရာသက်ရောက်မှု	အဆင့်သတ်မှတ်မှု
၀ - ၅၀	ကောင်း	၀.၀ - ၁၂	-	၅၅၀ - ၅၅၀	ပိုမို	မလေ့လာဘဲကောင်းသော နေရာများတွင် ရှိတတ်သော ပြန့်နှံ့မှု	မကောင်း
၅၀ - ၁၀၀	အဆင့်အတင့်	၁၂.၁ - ၃၅.၄	မိမိတို့လုပ်ငန်းအတွက် အန္တရာယ်ရှိ	၅၅၀၀ - ၂၅၀၀	ပိုမို	မလေ့လာဘဲကောင်းသော နေရာများတွင် ရှိတတ်သော ပြန့်နှံ့မှု	အဆင့်
၁၀၀ - ၁၅၀	ကျန်းမာရေးဆိုင်ရာ ထိခိုက်လွယ်သော အခြေအနေ	၃၅.၅ - ၅၅.၄	အသက်ရှူလမ်းကြောင်းဆိုင်ရာ ရောဂါများကလေးကလေးများနှင့် လူကြီးများအတွက် မလေ့လာဘဲကောင်းသော အခြေအနေ	၂၅၀၀ - ၅၅၀၀	ပိုမို	မလေ့လာဘဲကောင်းသော နေရာများတွင် ရှိတတ်သော ပြန့်နှံ့မှု	မကောင်း
၁၅၀ - ၂၅၀	ကျန်းမာရေးနှင့် မညီညွတ်	၅၅.၅ - ၁၅၀.၄	ကလေးနှင့် လူကြီးများအတွက် ထိတွေ့မှုမလေ့လာဘဲကောင်းသော အခြေအနေ	၅၅၀၀	ပိုမို	မလေ့လာဘဲကောင်းသော နေရာများတွင် ရှိတတ်သော ပြန့်နှံ့မှု	အဆင့်
၂၅၀ - ၃၅၀	လုံခြုံရေးအန္တရာယ်ရှိ မညီညွတ်	၁၅၀.၅ - ၂၅၀.၄	အသက်ရှူလမ်းကြောင်းဆိုင်ရာ ရောဂါရှိလူများအားဖြင့် ရောဂါကြွယ်ဝသင့်	၅၅၀၀	ပိုမို	မလေ့လာဘဲကောင်းသော နေရာများတွင် ရှိတတ်သော ပြန့်နှံ့မှု	အဆင့်
၃၅၀ - ၅၀၀	အန္တရာယ်ရှိ	၂၅၀.၅ - ၃၅၀.၄	လူတိုင်းဆိုင်ရာ ကျန်းမာရေးဆိုင်ရာ အန္တရာယ်ရှိ	၅၅၀၀	ပိုမို	မလေ့လာဘဲကောင်းသော နေရာများတွင် ရှိတတ်သော ပြန့်နှံ့မှု	အဆင့်
၅၀၀ - ၅၅၀	အန္တရာယ်ရှိ	၃၅၀.၅ - ၅၅၀.၄	ကျန်းမာရေးဆိုင်ရာ အန္တရာယ်ရှိ	၅၅၀၀	ပိုမို	မလေ့လာဘဲကောင်းသော နေရာများတွင် ရှိတတ်သော ပြန့်နှံ့မှု	အဆင့်

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အခန်းတွင်းလေထုအရည်အသွေးတိုင်းတာခြင်း

အခန်းတွင်းလေထုအရည်အသွေးတိုင်းတာခြင်းအရ စံချိန်စံညွှန်းများ

စဉ်	တိုင်းတာခြင်းအရ စံချိန်စံညွှန်းများ	တိုင်းတာခြင်း Parameter များ
၀	ရိုင်းခန်း	<ul style="list-style-type: none"> အမှုန်အမွှား (PM1.0) အမှုန်အမွှား (PM10)
၂	မီးဖို	<ul style="list-style-type: none"> အမှုန်အမွှား (PM2.5) ငွေ့ရည်ပြန့်လွယ်သော ဓါတ်ငွေ့ပေါင်း (TVOC) ကာဗွန်ဒိုင်အောက်ဆိုက် (CO2)
၃	ထိန်းချုပ်ခန်း	
၄	ဆီလီကာဂျယ် သို့မဟုတ် သံလွှာပေါင်း	
၅	ကော်ဗား	




Wet Season တွင် အခန်းတွင်း လေထုအရည်အသွေးတိုင်းတာခြင်းအရ စံချိန်စံညွှန်းများ



Dry Season တွင် အခန်းတွင်း လေထုအရည်အသွေးတိုင်းတာခြင်းအရ စံချိန်စံညွှန်းများ

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ထုတ်လွှတ်အခန်းအငွေ့အရည်အသွေးတိုင်းတာခြင်း





ထုတ်လွှတ်အခန်းအငွေ့ အရည်အသွေး တိုင်းတာခြင်းကို စီမံကိန်း ဧရိယာအတွင်း၌ ၂ နေရာတွင် ပြုလုပ်ခဲ့ပါသည်။

စဉ်	အကြောင်းအရာ	နေရာ
၁	တိုင်းတာသည့် နေရာ (၁)	မီးဖိုခေါင်းတိုင်
၂	တိုင်းတာသည့် နေရာ (၂)	မီးခွက်စီးဆုံး ခေါင်းတိုင်

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ထုတ်လွှတ်အခန်းအငွေ့အရည်အသွေးတိုင်းတာသည့်ရလဒ်

စဉ်	အရည်အသွေးအမျိုးအစား	မီတီခေါင်းတိုင်	မီစက်မီခေါင်းတိုင်	နိုင်ငံတကာတာဝန်များ ဘေးကင်းရေးရလဒ်၏ စံနှုန်း	အဖျိုးသားအတွင်း တွင် သိပ်ရာ အရည်အသွေး ထုတ်လွှတ်မှု လမ်းညွှန်ချက်
၁	မီးဖိုခန်း	၀	၀	-	-
၂	တိုက်ထရိုဂျင်ဆောက်ဆိုင်	၂.၁	၄.၀၃	NA	၁၀ mg/ Nm3
၃	တိုက်ထရိုဂျင်ဆောက်ဆိုင်	၀.၀၁	၀	၃၂၀ mg/ Nm3	၄၅၀ mg/ Nm3
၄	အဖျိုးခန်း	၀	၀	NA	၃၀ mg/ Nm3
၅	အောက်ဆီဂျင်	၂၂.၈	၂၁.၃၃	အနည်းဆုံး ၃ %	NA
၆	ကာဗွန်ဒိုင်အောက်ဆိုက်	၀.၅	၀.၃၂	NA	NA
၇	ဆာလာဗိုင်အောက်ဆိုက်	၀.၃	၀.၇	NA	NA

ထုတ်လွှတ်အခန်းအငွေ့တိုင်းတာသည့်ရလဒ်များ

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လေထုညစ်ညမ်းမှု သက်ရောက်မှုနှင့် လျော့ချရမည့် အစီအစဉ်များ

□ တည်ဆောက်ခြင်း/ ဝိတ်သိမ်းခြင်းကာလ

သက်ရောက်မှု

အရင်းအမြစ်	ပမာဏ (M = T + E + D + I + R)						အရေကြီးဆော အဆင့် (Imp)	သိသာထင်ရှားမှု အဆင့် (M x Imp)	သက်ရောက်မှု အဆင့်
	T	E	D	I	R	M			
တည်ဆောက်ရေး/ ဖြိုဖျက်ရေးလုပ်ငန်းများမှ ထွက်ရှိလာသော ပျံ့နှံ့မှုများ နှင့် မိတ်သွေများ	၃	၁	၁	၁	၂	၈ (အလယ် အလတ်)	အဆင့်အတင့်	အလယ်အလတ် x အဆင့်အတင့်	အလယ် အလတ်

ဩဇာကျန်သက်ရောက်မှု

အရင်းအမြစ်	ပမာဏ (M = T + E + D + I + R)						အရေကြီးဆော အဆင့် (Imp)	သိသာထင်ရှားမှု အဆင့် (M x Imp)	သက်ရောက်မှု အဆင့်
	T	E	D	I	R	M			
တည်ဆောက်ရေး/ ဖြိုဖျက်ရေးလုပ်ငန်းများမှ ထွက်ရှိလာသော ပျံ့နှံ့မှုများ နှင့် မိတ်သွေများ	၃	၁	၁	၁	၁	၇ (အလယ် အလတ် သက်ရောက် မှု)	နိမ့်	အလယ်အလတ် သက်ရောက်မှု နိမ့်	လွန်အားမရှိဘဲ နိမ့်

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လေထုညစ်ညမ်းမှု သက်ရောက်မှုနှင့် လျော့ချရမည့် အစီအစဉ်များ

□ လုပ်ငန်းလည်ပတ်ခြင်း

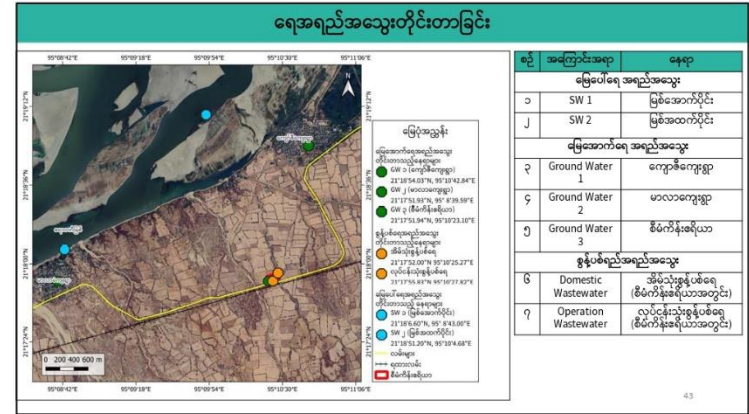
သက်ရောက်မှု

အရင်းအမြစ်	ပမာဏ (M = T + E + D + I + R)						အရေကြီးဆော အဆင့် (Imp)	သိသာထင်ရှားမှု အဆင့် (M x Imp)	သက်ရောက်မှု အဆင့်
	T	E	D	I	R	M			
လုပ်ငန်းဆောင်ရွက်ခြင်းမှ ထွက်ရှိလာသော ပျံ့နှံ့မှုများ နှင့် မိတ်သွေများ	၃	၂	၂	၂	၂	၁၂ (မြင့်)	အဆင့်အတင့်	မြင့် x အဆင့်အတင့်	မြင့်

ဩဇာကျန်သက်ရောက်မှု

အရင်းအမြစ်	ပမာဏ (M = T + E + D + I + R)						အရေကြီးဆော အဆင့် (Imp)	သိသာထင်ရှားမှု အဆင့် (M x Imp)	သက်ရောက်မှု အဆင့်
	T	E	D	I	R	M			
လုပ်ငန်းဆောင်ရွက်ခြင်းမှ ထွက်ရှိလာသော ပျံ့နှံ့မှုများ နှင့် မိတ်သွေများ	၃	၁	၁	၁	၁	၉ (အလယ် အလတ်)	အဆင့်အတင့်	အလယ်အလတ် x အဆင့်အတင့်	အလယ် အလတ်

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ရေအရည်အသွေးတိုင်းတာသည့်ရလဒ်

□ စီမံကိန်းရေလှည့်စနစ် အစီအစဉ်များ ရရှိမှုအခြေအနေ ၂၀၂၃ ခုနှစ် စက်တင်ဘာလ ၁၉ ရက် တွင်စတင်တာဝန်ယူပြီး စတင်ရေစမ်းသပ်ရမည့် စစ်ဆေးခံပါသည်။ တိုင်းတာမှုရလဒ်များအရ ရေအရည်အသွေးများသည် စံနှုန်းများအရင်း ဖြစ်ပါသည်။

မြေအောက်ရေအရည်အသွေးတိုင်းတာခြင်းရလဒ်

စဉ်	ရေအရည်အသွေး	ရလဒ်	ယူနစ်	စံနှုန်း
၁	ရေပူဖောင်း	၇.၂	S.U	၆.၅ - ၈.၅
၂	ပိုင်ငံကြွယ်မှု	၀	mg/L	၀
၃	လူပိုင်စိမ်း	၀.၈	mg/cm	၁.၂၅
၄	အနီရောင်	<၀.၂	mg/L	၀
၅	ကလိုရိုဖီရပ်စ်	<၀.၂	mg/L	၀
၆	သံသတ္တု	၀.၀၃	mg/L	၁၀
၇	မိုက်အက်စ်	၀	mg/L	၁၀

လုပ်ငန်းရုံအမှတ်ရေတိုင်းတာခြင်းရလဒ်

စဉ်	ရေအရည်အသွေး	ရလဒ်	ယူနစ်	စံနှုန်း
၁	ရေပူဖောင်း	၈	S.U	6.0 - 9.0
၂	ပိုင်ငံကြွယ်မှု	၂၄	mg/L	၁၅၀
၃	စီမံကိန်းရေ အောက်ရေရေလှည့်စနစ်	၇၀	mg/L	၁၅၀
၄	စာအုပ်ရေ	<၁.၅	mg/L	၁၅
၅	မိတ်သွေ	ND	mg/L	၁၀.၁
၆	ကလိုရိုဖီရပ်စ်	<၀.၀၄	mg/L	၁.၅
၇	သံသတ္တု	၄	mg/L	၁၀
၈	မိုက်အက်စ်	<၀.၀၅	mg/L	၀
၉	မိုက်အက်စ်	၁၀	mg/L	၁၀.၁

လုပ်ငန်းရုံအမှတ်ရေ စုစုပေါင်းစမ်းသပ်ခြင်း

မြေအောက်ရေ စုစုပေါင်းစမ်းသပ်ခြင်း

စီမံကိန်းရေ စုစုပေါင်းစမ်းသပ်ခြင်း

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ဆူညံသံတိုင်းတာခြင်းရလဒ်

စဉ်	တိုင်းတာသည့် နေရာ	အမျိုးအစား	တိုင်းတာခဲ့သည့် အချိန်	ဆူညံသံ (dBA)		လူနေမှုဇုန် ယာ	စက်မှု အလုပ်ရုံဇုန် ယာ
				နေ့အချိန် ပျမ်းမျှဆူညံသံ dBA	ညအချိန် ပျမ်းမျှဆူညံသံ dBA		
၁	စီမံကိန်း ခရီးယားအတွင်း	တိုင်းတာမှု တိုင်းတာရာ	Dry Season	၆၂.၆	၆၃.၄	၅၀	၇၀
၂	ခရီးယားအတွင်း			၄၈.၀၄	၅၁.၈၁		
၃	ကော့စီကော့စရာ			၄၅.၁၇	၃၄.၁၁		
၄	မလားကော့စရာ			၅၉.၀၃	၃၁.၂၅		
၅	နွဲခန်း			၄၁.၆၆	-		
၆	စီမံကိန်းအတွင်း	အခန်းအတွင်း တိုင်းတာခြင်း	Wet Season	၅၂.၁၃	-	၅၀	၇၀
၇	ထိန်းချုပ်ခန်း			၃၆.၆၆	-		
၈	သို့လှောင်ခန်း			၅၁.၅၉	-		



Dry Season တွင် ဆူညံသံတိုင်းတာခြင်း



Wet Season တွင် ဆူညံသံတိုင်းတာခြင်း

တုန်ခါမှုအရည်အသွေးရလဒ်များ

စဉ်	တိုင်းတာသည့်နေရာ	အမျိုးအစား	မှတ်ချက်		အညွှန်းတမ်း (Assessing Vibration Technical Guidelines - ၂၀၁၆)			
			Acceleration (m/s ²)	Velocity (mm/s)	အရှိန်အား		အရှိန်အား	
					အရှိန်အား	အရှိန်အား	အရှိန်အား	အရှိန်အား
၁	V1	Steel Column တွင် တိုင်းတာခြင်း	၀.၀၃	၀.၃	၀.၀၄၀ (၉.၂ dBS)	၀.၀၈၀ (၁၀၆ dBS)	၀.၈၀ (၁၁၆ dBS)	၁.၆ (၁၂၄ dBS)
၂	V2	Distillation Column တွင် တိုင်းတာခြင်း	၀.၀၂	၀.၅	၀.၀၄၀ (၉.၂ dBS)	၀.၀၈၀ (၁၀၆ dBS)	၀.၈၀ (၁၀၆ dBS)	၁.၆ (၁၂၄ dBS)
၃	V3	Steel Column တွင် တိုင်းတာခြင်း	၀.၀၀၅	၀.၂	၀.၀၄၀ (၉.၂ dBS)	၀.၀၈၀ (၁၀၆ dBS)	၀.၈၀ (၁၀၆ dBS)	၁.၆ (၁၂၄ dBS)



Steel Column တွင် တိုင်းတာခြင်း

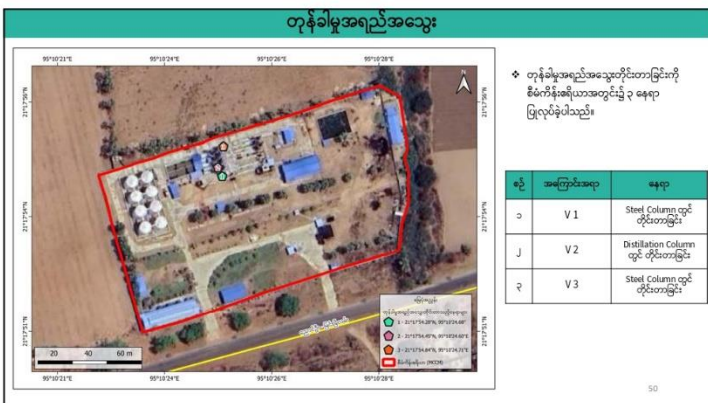


Steel Column တွင် တိုင်းတာခြင်း



Distillation Column တွင် တိုင်းတာခြင်း

တုန်ခါမှုအရည်အသွေး



ဆူညံသံ နှင့် တုန်ခါမှု သက်ရောက်မှုနှင့် လျှော့ချရမည့် အစီအစဉ်များ

□ တည်ဆောက်ခြင်းကာလ/ ဝိတ်သိမ်းခြင်းကာလ

သက်ရောက်မှု

အရည်အချင်း	ဝဘဝ (M = T + E + D + I + R)						အမျိုးအစား အသံ (Imp)	သီးသန့်ထုတ် အသံ (M x Imp)	သက်ရောက်မှု အသံ
	T	E	D	I	R	M			
တည်ဆောက်ခြင်း ဝိတ်သိမ်းခြင်း အခြေဆောက်လုပ်ရေးလုပ်ငန်းများ	၃	၂	၁	၂	၁	၉ (အလယ် အလတ်)	အသံအတိုင်း	(အလယ် အလတ် x အသံအတိုင်း)	အလယ် အလတ်

ပြင်းကျန်သက်ရောက်မှု

အရည်အချင်း	ဝဘဝ (M = T + E + D + I + R)						အမျိုးအစား အသံ (Imp)	သီးသန့်ထုတ် အသံ (M x Imp)	သက်ရောက်မှု အသံ
	T	E	D	I	R	M			
တည်ဆောက်ခြင်း ဝိတ်သိမ်းခြင်း အခြေဆောက်လုပ်ရေးလုပ်ငန်းများ	၃	၁	၁	၁	၁	၇ (အလယ် အလတ်)	၇၅၅	(အလယ်အလတ် သက်ရောက်မှု x ၇၅၅)	လွန်လွန်းစွာ သက်ရောက်မှု ရှိသည်

လျှော့ချရမည့်အချက်များ

- ကုန်ထုတ်ကုန်ကုန်များကို ဆောက်လုပ်ရေးလုပ်ငန်းများကို အချိန်အညီ လုပ်ဆောင်ရမည်။
- အချိန်အညီ ဆောက်လုပ်ရေးလုပ်ငန်းများကို ဆောင်ရွက်ရမည်။
- ဝိတ်သိမ်းခြင်း ဆောက်လုပ်ရေးလုပ်ငန်းများကို တာဝန်ရှိသူများ ဆောင်ရွက်ရမည်။
- ဝိတ်သိမ်းခြင်း ဆောက်လုပ်ရေးလုပ်ငန်းများကို တာဝန်ရှိသူများ ဆောင်ရွက်ရမည်။
- လက်ထောက်များနှင့် ဆောက်လုပ်ရေးလုပ်ငန်းများကို ဆောင်ရွက်ရမည်။
- ဆောက်လုပ်ရေးလုပ်ငန်းများကို ဆောင်ရွက်ရမည်။
- လက်ထောက်များနှင့် ဆောက်လုပ်ရေးလုပ်ငန်းများကို ဆောင်ရွက်ရမည်။
- ဆောက်လုပ်ရေးလုပ်ငန်းများကို ဆောင်ရွက်ရမည်။

ဆည်သံနှင့် တွန်ခါမှ သက်ရောက်မှုနှင့် လျော့ချရမည့် အစီအစဉ်များ

□ လုပ်ငန်းလည်ပတ်ခြင်း/ထိန်းသိမ်းခြင်းကာလ သက်ရောက်မှု

အရင်းအမြစ်	ပမာဏ						အရေကြီးသော အဆင့် (Imp)	သိသာထင်ရှားမှု အဆင့် (M x Imp)	သက်ရောက်မှု အဆင့်
	T	E	D	I	R	M			
လုပ်ငန်းဆောင်ရွက်ခြင်းများ	၃	၃	၁	၁	၁	၁	၉	(အလယ် အဆင့်) x (အသင့်အတင့်)	အလယ် အလတ်

လျော့ချရမည့်အချက်များ


- ဆည်သံနှင့် တွန်ခါမှဖြစ်သော စက်မှုပစ္စည်း ကိရိယာများကို အသုံးပြုခြင်း
- လုပ်ငန်းဆောင်ရွက်ရာတွင် အသုံးမပြုသော စက်ယန္တရားများကို ဝယ်ယူခြင်း၊ အသုံးမပြုသော စက်ယန္တရားများကို ပုံမှန်ပြုပြင်ထိန်းသိမ်းခြင်း
- ဆည်သံနှင့် တွန်ခါမှဖြစ်သော အလုပ်လုပ်သော အလုပ်သမား များအား နားအားအားပေးပေးခြင်းများ နှစ်ဖွဲ့ (၁၅) နားကြီးများ ကို လုံလောက်စွာ ထောက်ပံ့ခြင်း
- အလုပ်သမားများကို အသံဆူညံမှု စု စီ(B)(A) တွင်ဖြင့်သော ချော့များတွင် နားအားအားပေးပေးပေး တာဝန်ပေးခြင်း (၆) နားထုတ် ချော့ပုံစံရှိ ထိတွေ့မှုမရှိစေရန် ထိထိပ် နားအားအားပေးပေးပေး ပေးပေး ပေးပေး (၁၅) နားကြီးများ အသုံးကို (ဆက်တိုက်) နားအားပေးပေးခြင်း
- ဆည်သံနှင့် တွန်ခါမှဖြစ်သော ချော့များတွင် အလုပ်သမားများ ကို အလုပ်လုပ် တာဝန်ပေးခြင်း

ကြွင်းကျန်သက်ရောက်မှု

အရင်းအမြစ်	ပမာဏ						အရေကြီးသော အဆင့် (Imp)	သိသာထင်ရှားမှု အဆင့် (M x Imp)	သက်ရောက်မှု အဆင့်
	T	E	D	I	R	M			
လုပ်ငန်းဆောင်ရွက်ခြင်းများ	၃	၃	၁	၁	၁	၁	၆	(အလယ် အဆင့်) x (အသင့်အတင့်)	နိမ့်

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အလင်းအရည်အသွေးတိုင်းတာခြင်း



□ အလင်းအရည်အသွေးတိုင်းတာခြင်းကို စီမံကိန်းရေးရာအတွင်း၌ ဂ နေရာ ပြုလုပ်ပါသည်။

စဉ်	အရေကြင်းအရာ	နေရာ
၁	အလင်းတိုင်းတာ သည့်နေရာ (၁)	ရုံးခန်း
၂	အလင်းတိုင်းတာ သည့်နေရာ (၂)	မီးဖိုချောင်
၃	အလင်းတိုင်းတာ သည့်နေရာ (၃)	ထိန်းချုပ်ခန်း
၄	အလင်းတိုင်းတာ သည့်နေရာ (၄)	ဆီလီကွက်သံ သို့မဟုတ် သို့မဟုတ်ခန်း
၅	အလင်းတိုင်းတာ သည့်နေရာ (၅)	စက်ခန်း

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အလင်းရောင်တိုင်းတာခြင်း

အလင်းရောင်တိုင်းတာမှု ရလဒ်များနှင့် တိုင်းတာသည့်နေရာများ


စဉ်	တိုင်းတာသည့်နေရာ	Wet Season တွင်တိုင်းတာရလဒ် ရလဒ် (Lux)	Dry Season တွင်တိုင်းတာရလဒ် ရလဒ် (Lux)	*Standard Value နိမ့်နိမ့်နိမ့် (Lux)
၁	ရုံးခန်း	၂၉၆.၂	၄၂၁.၃၇	၅၀၀
၂	ထိန်းချုပ်ခန်း	၂၉၀.၃	၉၅၆	၅၀၀
၃	စက်ခန်း	၁၃၃	၃၃၅.၆၇	၁၀၀
၄	မီးဖိုချောင်	၁၆၄.၂	၂၉၅.၃၇	၂၀၀
၅	စက်ခန်း	၁၂၄.၅	၁၀၅.၆၇	၁၀၀

သက်ရောက်မှု

- အပြင်အုံ့ ထိန်းခြင်း
- အလုပ်လုပ်သောနေရာများတွင် အလုပ်သမားများ၏ အသံဆူညံမှုကို ထိန်းချုပ်ပေးခြင်း
- မြင်ကွင်းထိန်းသိမ်းမှု မရှိခြင်း
- ဖျက်စီးခြင်းဖြစ်ခြင်း
- အလုပ်လုပ်သောနေရာများ ထိခိုက်ပျက်စီးခြင်း

အကြံပြုချက်များ


- လုပ်ငန်းလည်ပတ်သည့် နေရာများတွင် လုံလောက်သော အလင်းရောင်ရှိစေရန် စီမံခန့်ခွဲခြင်း
- မြင်ကွင်းထိန်းသိမ်းမှု ထိန်းချုပ်ပေးခြင်း
- စက်ခန်းတွင် အစီအစဉ်ရှိသော သံစက်များ ဖြိုခွဲစေခြင်း
- သက်တောင့်တော်သော အလင်းရောင်ရှိရမည့် ဖိနပ်နီများကို ပြုပြင်ဆင်ဆင် ဆောင်ရွက်ခြင်း
- အစီအစဉ်ရှိသော ကွန်ကရစ်အစိတ်အပိုင်းများကို ပြုပြင်ဆင်ဆင် ဆောင်ရွက်ခြင်း
- အလင်းရောင် ထိန်းချုပ်ပေးခြင်း
- အလင်းရောင် ထိန်းချုပ်ပေးခြင်း





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အပူချိန်အရည်အသွေးတိုင်းတာခြင်း



□ အပူချိန်အရည်အသွေးတိုင်းတာခြင်းကို စီမံကိန်းရေးရာအတွင်း၌ ဂ နေရာ ပြုလုပ်ပါသည်။

စဉ်	အရေကြင်းအရာ	နေရာ
၁	အပူချိန်တိုင်းတာ သည့်နေရာ (၁)	ရုံးခန်း
၂	အပူချိန်တိုင်းတာ သည့်နေရာ (၂)	မီးဖိုချောင်
၃	အပူချိန်တိုင်းတာ သည့်နေရာ (၃)	ထိန်းချုပ်ခန်း
၄	အပူချိန်တိုင်းတာ သည့်နေရာ (၄)	ဆီလီကွက်သံ သို့မဟုတ် သို့မဟုတ်ခန်း
၅	အပူချိန်တိုင်းတာ သည့်နေရာ (၅)	စက်ခန်း

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အပူချိန်တိုင်းတာခြင်း

အပူချိန်တိုင်းတာမှု ရလဒ်များနှင့် တိုင်းတာသည့်နေရာများ

စဉ်	တိုင်းတာသည့်နေရာ	Wet Season တိုင်းတာရာရလဒ် ရလဒ် °C	Dry Season တိုင်းတာရာရလဒ် ရလဒ် °C	*Standard Value စံချိန်ညှိမှု
၁	ရုံးခန်း	၂၆.၅၆	၃၅.၀	၃၂ °C
၂	ထိန်းချုပ်ခန်း	၂၆.၀၉	၃၆	
၃	စက်ခန်း	၂၅.၀၄	၃၅	
၄	စီမံခန့်ခွဲရေး	၂၆.၃၇	၃၅.၂၀	
၅	စက်ခန်း	၂၆.၁၀	၃၃	

သက်ရောက်မှု




လှုပ်နှံလည်ပတ်သည့်ကာလ

- မေ့ရသွားလျှင်ဖြစ်
- အမှားပြင်ဆင်ရာ ရောက်ရမည်ဖြစ်
- တိုင်းတာမှုရလဒ်မှားယွင်းနိုင်ခြင်း
- ကြောက်ရွံ့ခြင်း
- ဖျားရင်နာခြင်း
- ဖျားရင်နာခြင်း

လျှော့ချရမည့်အစီအစဉ်

လှုပ်နှံလည်ပတ်သည့်ကာလ

- လှုပ်နှံလည်ပတ်သည့် နေရာများတွင် လေလင်းလေထွက်စေရန် စကားပြော ထားရှိစေခြင်း
- ပန်းကန် လေအေးစနစ်များ ထားရှိစေခြင်း (မပူ ပြုပြင်ထိန်းသိမ်းခြင်း)
- အပူပေးစနစ်များ ပိတ်ဆို့ပေးခြင်း
- အပူပေးစနစ်များ ထားရှိခြင်း
- အပူပေးစနစ်များ ထားရှိခြင်း
- အပူပေးစနစ်များ ထားရှိခြင်း
- အပူပေးစနစ်များ ထားရှိခြင်း
- အပူပေးစနစ်များ ထားရှိခြင်း

စွန့်ပစ်အမှိုက် သက်ရောက်မှုနှင့် လျှော့ချရမည့် အစီအစဉ်များ

□ လုပ်ငန်းလည်ပတ်ခြင်း

သက်ရောက်မှု

အမှိုက်အမျိုးအစား	ပမာဏ (M = T + E + D + I + R)					အမှေ့ကြီးသော အဆင့် (Imp)	သို့သော်လျှော့ချ အဆင့် (M x Imp)	သက်ရောက်မှု အဆင့်
	T	E	D	I	R			
စွန့်ပစ်အမှိုက်အစုံနှင့် အပူချိန်များ ထွက်ရှိခြင်း	၃	၁	၁	၁	၁	၅ (အလယ် အလတ်)	၁၅ (အလယ်အလတ် x အဆင့်အဆင့်)	အလယ်အလတ်

ကြိုတင်ကာနီသက်ရောက်မှု

အမှိုက်အမျိုးအစား	ပမာဏ (M = T + E + D + I + R)					အမှေ့ကြီးသော အဆင့် (Imp)	သို့သော်လျှော့ချ အဆင့် (M x Imp)	သက်ရောက်မှု အဆင့်
	T	E	D	I	R			
စွန့်ပစ်အမှိုက်အစုံနှင့် အပူချိန်များ ထွက်ရှိခြင်း	၃	၁	၁	၁	၁	၅ (အလယ် အလတ်)	၁၅ (အလယ်အလတ် x အဆင့်အဆင့်)	လွန်လွန်းစွာ မြင့်မား

လျှော့ချရမည့်အချက်များ

- အမှိုက်များကို မြေသားအောက်တွင် မရေစိုစွန်းစေဘဲ သီးခြားစွာ အမှိုက်ကို သီးသန့်နေရာတစ်ခု ဖွဲ့စည်းခြင်း
- စွန့်ပစ်အမှိုက်များ ပိတ်ဆို့မှုစနစ် ခိုင်ခံ့သောနေရာ (သို့) အမှိုက်ပုံစံများ ဖွဲ့စည်းမှုများကို တွေ့ရှိရပါက စွန့်ပစ်အမှိုက်များ ပုံစံ ပြင်ဆင်မှု သတ်မှတ်ထားသော နည်းလမ်းကို အသုံးပြုခြင်း
- စွန့်ပစ်အမှိုက်များကို အမှိုက်အစုံအလင် ဖြစ်ပေါ်စေရန် အမှိုက်ကန်များ အတွင်း၌ နေရာချ စွန့်ပစ်ရမည်
- အမှိုက်ပုံစံများ ဖွဲ့စည်းမှုများကို မြေပြင်အောက်တွင် ဖွဲ့စည်းခြင်းဖြစ်
- မြေပြင်အောက်တွင် မြေသား အမှိုက်များကို ထားရှိမှု လိုအပ်ပြီး ပြုလုပ်သည့်အခါတွင် အမှိုက်များကို ထားရှိရန် စနစ်တကျ အမှိုက်အစုံဖွဲ့စည်းရမည်
- မြေပြင် မြေပြင်အောက်တွင် လေထုဖွဲ့စည်းမှု ပြုလုပ်ခြင်း (3 R) ကို ထောက်ပံ့ရမည်ဖြစ်သည့် အမှိုက်များကို ထားရှိရန် စနစ်တကျ အမှိုက်အစုံဖွဲ့စည်းရမည် ဖြစ်ပါသည်
- စတုရန်းပုံစံအမှိုက်များကို သီးခြားစွာ (စတုရန်းပုံစံ အမှိုက်အစုံအလင်) မှုး၊ ဂရုစိုက်မှုများ သည် တွင် စနစ်တကျ စွန့်ပစ်ရမည်
- အမှိုက်ပုံစံများကို စတုရန်းပုံစံအမှိုက်များကို စွန့်ပစ်ရမည် ဖြစ်ပါသည်
- အမှိုက်ပုံစံများကို အပူပေးစနစ်များ ထားရှိသည့် မြေပြင် အမှိုက်အစုံဖွဲ့စည်းရမည်
- စီမံကိန်းဆိုင်ရာအတွက် အမှိုက်ပုံစံဖွဲ့စည်းမှု တာဝန်ရှိခြင်း

စွန့်ပစ်အမှိုက်သက်ရောက်မှုနှင့် လျှော့ချရမည့် အစီအစဉ်များ

□ တည်ဆောက်ခြင်းကာလ/ ပိတ်သိမ်းခြင်းကာလ

သက်ရောက်မှု

အမှိုက်အမျိုးအစား	ပမာဏ (M = T + E + D + I + R)					အမှေ့ကြီးသော အဆင့် (Imp)	သို့သော်လျှော့ချ အဆင့် (M x Imp)	သက်ရောက်မှု အဆင့်
	T	E	D	I	R			
စွန့်ပစ်အမှိုက်အစုံနှင့် အပူချိန်များ ထွက်ရှိခြင်း	၃	၁	၁	၁	၁	၅ (အလယ် အလတ်)	၁၅ (အလယ်အလတ် x အဆင့်အဆင့်)	အလယ်အလတ်


ကြိုတင်ကာနီသက်ရောက်မှု

အမှိုက်အမျိုးအစား	ပမာဏ (M = T + E + D + I + R)					အမှေ့ကြီးသော အဆင့် (Imp)	သို့သော်လျှော့ချ အဆင့် (M x Imp)	သက်ရောက်မှု အဆင့်
	T	E	D	I	R			
စွန့်ပစ်အမှိုက်အစုံနှင့် အပူချိန်များ ထွက်ရှိခြင်း	၃	၁	၁	၁	၁	၅ (အလယ် အလတ်)	၁၅ (အလယ်အလတ် x အဆင့်အဆင့်)	လွန်လွန်းစွာ မြင့်မား



လျှော့ချရမည့်အချက်များ

- တည်ဆောက်ရေး/ ပိတ်သိမ်းရေးကာလမှ စွန့်ပစ်အမှိုက်များကို အမှိုက်ကန် အမှိုက်ကန်နှင့် အမှိုက်ပုံစံ ဖွဲ့စည်းမှုများကို အမှိုက်အစုံအလင် ဖြစ်ပေါ်စေရန် အမှိုက်ကန် ဖွဲ့စည်းမှုများကို စနစ်တကျ စွန့်ပစ်ရမည်
- အမှိုက်ပုံစံများကို အမှိုက်အစုံအလင် ဖြစ်ပေါ်စေရန် အမှိုက်ကန် ဖွဲ့စည်းမှုများကို စနစ်တကျ စွန့်ပစ်ရမည်
- မြေပြင်အောက်တွင် မြေသား အမှိုက်များကို ထားရှိမှု လိုအပ်ပြီး ပြုလုပ်သည့်အခါတွင် အမှိုက်များကို ထားရှိရန် စနစ်တကျ အမှိုက်အစုံဖွဲ့စည်းရမည် ဖြစ်ပါသည်
- စတုရန်းပုံစံအမှိုက်များကို သီးခြားစွာ (စတုရန်းပုံစံ အမှိုက်အစုံအလင်) မှုး၊ ဂရုစိုက်မှုများ သည် တွင် စနစ်တကျ စွန့်ပစ်ရမည်
- အမှိုက်ပုံစံများကို စတုရန်းပုံစံအမှိုက်များကို စွန့်ပစ်ရမည် ဖြစ်ပါသည်
- အမှိုက်ပုံစံများကို အပူပေးစနစ်များ ထားရှိသည့် မြေပြင် အမှိုက်အစုံဖွဲ့စည်းရမည်
- စီမံကိန်းဆိုင်ရာအတွက် အမှိုက်ပုံစံဖွဲ့စည်းမှု တာဝန်ရှိခြင်း

မြေထုအရည်အသွေး



စဉ်	အမြေထုအရာ	နေရာ
၁	Soil 1	စီမံကိန်းဇုန် (အမှိုက်အစုံအလင် ဖြစ်ပေါ်စေရန် ဖွဲ့စည်းမှုများ)
၂	Soil 2	စီမံကိန်းဇုန် (အပူပေးစနစ်များ ထားရှိသည့်နေရာ)

မြေထုအရည်အသွေး

မြေအရည်အသွေးရလဒ်များ								
မူ	အမည်	အညွှန်းအမှတ်	ရလဒ်	မူရင်းအမှတ် (AOI)	မြေအမျိုးအစား	ရရှိသည့်နေ့ရက်	CEC ပြန်လည်	
၁	Sample ၁	Moisture (%)	၁၆.၃	-	-	-	-	
		pH (Soil Water - ၁:၅)	၅.၂	Slightly Acidic	-	-	-	
		Texture	Sand (%)	၁၂.၅	-	-	Sandy Loam	-
			Silt (%)	၁၅.၂	-	-		-
			Clay (%)	၁၀.၀	-	-		-
			Total (%)	၂၇.၇	-	-		Very Low
		CEC (meq/100g)	Ca	၀.၀၀	-	-	-	Medium
			Mg	၀.၀၀	-	-	-	
			Na	၀.၀၀	-	-	-	
			K	၀.၀၀	-	-	-	
			Sum	၀.၀၀	-	-	-	
		pH (Soil Water - ၁:၅)	Sand	၁၅.၅	Slightly Acidic	-	-	-
Silt	၁၅.၂		-	-	-	-		
Clay	၁၀.၀		-	-	-	-		
Total (%)	၂၇.၇		-	-	-	Very Low		
CEC (meq/100g)	Ca		၀.၀၀	-	-	-	Low	
Mg	၀.၀၀	-	-	-				
Na	၀.၀၀	-	-	-				
K	၀.၀၀	-	-	-				
Sum	၀.၀၀	-	-	-				

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မြေအရည်အသွေး သက်ရောက်မှုနှင့် လျှော့ချရမည့် အစီအစဉ်များ

□ လုပ်ငန်းလည်ပတ်ခြင်း

သက်ရောက်မှု

အရည်အမျိုးအစား	ပမာဏ (M = T + E + D + I + R)					အရေကြီးအသားအဆင့် (Imp)	သီးသော်လျှောက်မှုအဆင့် (M x Imp)	သက်ရောက်မှုအဆင့်
	T	E	D	I	R			
လုပ်ငန်းဆောင်ရွက်ခြင်းနှင့် ပြုပြင်ထိန်းသိမ်းခြင်း၊ ဆေးသုံးစွဲခြင်းများ	၃	၂	၃	၁	၁	၁၀ (အလယ်အလတ်)	၁၀ (အလယ်အလတ် x အဆင့်အဆင့်)	အလယ်အလတ်

လျှော့ချရမည့်အချက်များ

- ဆီလီကာနှင့် အောက်ဆီဂျင် စနစ်တို့ကို စနစ်တကျ စောင့်ကြည့်ရန်။
- ကုန်ကြမ်းစာများကို လေထုထဲသို့ မထွက်စေရန်၊ ကုန်ထုတ်လုပ်သည့်နေရာများကို အကာအရံပေးရန်။
- အန္တရာယ်ရှိ ရန်ပုံစံများကို ပတ်ဝန်းကျင်ထိခိုက်မှုမရှိစေရန် စနစ်အစီအစဉ်များကို သတ်မှတ်ချက်များနှင့်အညီ စောင့်ကြည့်ရန်။
- ကွန်ကရစ် ပေါင်းစပ်မှုအစီအစဉ်များကို သိမ်းဆည်းခြင်းဖြင့် သေဆုံးခြင်း သို့မဟုတ် ကာကွယ်ရေးအစီအစဉ်များကို လိုက်နာရန်။
- ကွန်ကရစ် ပေါင်းစပ်မှုအစီအစဉ်များကို လိုက်နာရန်။
- ကွန်ကရစ် ပေါင်းစပ်မှုအစီအစဉ်များကို လိုက်နာရန်။

ကြွင်းကျန်သက်ရောက်မှု

အရည်အမျိုးအစား	ပမာဏ (M = T + E + D + I + R)					အရေကြီးအသားအဆင့် (Imp)	သီးသော်လျှောက်မှုအဆင့် (M x Imp)	သက်ရောက်မှုအဆင့်
	T	E	D	I	R			
လုပ်ငန်းဆောင်ရွက်ခြင်းနှင့် ပြုပြင်ထိန်းသိမ်းခြင်း၊ ဆေးသုံးစွဲခြင်းများ	၃	၁	၁	၁	၁	၇ (အလယ်အလတ်)	၇ (အလယ်အလတ် x အဆင့်အဆင့်)	လွန်လွန်းစွာ

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မြေအရည်အသွေး သက်ရောက်မှုနှင့် လျှော့ချရမည့် အစီအစဉ်များ

□ တည်ဆောက်ခြင်းကာလ/ ဝိတ်သိမ်းခြင်းကာလ

သက်ရောက်မှု

အရည်အမျိုးအစား	ပမာဏ (M = T + E + D + I + R)					အရေကြီးအသားအဆင့် (Imp)	သီးသော်လျှောက်မှုအဆင့် (M x Imp)	သက်ရောက်မှုအဆင့်
	T	E	D	I	R			
ဆောက်လုပ်ရေးအစီအစဉ်များ (ပြုလုပ်ခြင်း)	၃	၁	၁	၁	၁	၅ (အလယ်အလတ်)	၅ (အလယ်အလတ် x အဆင့်အဆင့်)	အလယ်အလတ်

ကြွင်းကျန်သက်ရောက်မှု

အရည်အမျိုးအစား	ပမာဏ (M = T + E + D + I + R)					အရေကြီးအသားအဆင့် (Imp)	သီးသော်လျှောက်မှုအဆင့် (M x Imp)	သက်ရောက်မှုအဆင့်
	T	E	D	I	R			
ဆောက်လုပ်ရေးအစီအစဉ်များ (ပြုလုပ်ခြင်း)	၃	၁	၁	၁	၁	၅ (အလယ်အလတ်)	၅ (အလယ်အလတ် x အဆင့်အဆင့်)	အလယ်အလတ်

လျှော့ချရမည့်အချက်များ

- ဆောက်လုပ်ရေးအစီအစဉ်များကို စနစ်တကျ စောင့်ကြည့်ရန်။
- လုပ်ငန်းဆောင်ရွက်ခြင်းနှင့် ပြုပြင်ထိန်းသိမ်းခြင်း၊ ဆေးသုံးစွဲခြင်းများကို လိုက်နာရန်။
- ဆောက်လုပ်ရေးအစီအစဉ်များကို လိုက်နာရန်။
- ဆောက်လုပ်ရေးအစီအစဉ်များကို လိုက်နာရန်။
- ဆောက်လုပ်ရေးအစီအစဉ်များကို လိုက်နာရန်။

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အနံ့အရည်အသွေးတိုင်းတာခြင်း

မူ	အမည်အရည်အသွေး	နေရာ
၁	အနံ့အရည်အသွေး (၁)	စီမံခန့်ခွဲခြင်း
၂	အနံ့အရည်အသွေး (၂)	စီမံခန့်ခွဲခြင်း
၃	အနံ့အရည်အသွေး (၃)	Condenser
၄	အနံ့အရည်အသွေး (၄)	စီမံခန့်ခွဲခြင်း
၅	အနံ့အရည်အသွေး (၅)	စီမံခန့်ခွဲခြင်း
၆	အနံ့အရည်အသွေး (၆)	စီမံခန့်ခွဲခြင်း
၇	အနံ့အရည်အသွေး (၇)	စီမံခန့်ခွဲခြင်း

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အနံ့ထွက်ရှိမှုနှင့် သက်ရောက်မှုများ

အနံ့ထွက်ရှိမှု		
စဉ်	အနံ့ထွက်ရှိမှုအမျိုးအစား	ပမာဏ (ppm)
၁	မီးရောင်ဆိုင်	၀.၀၀
၂	မီးရောင်	၀.၀၂
၃	Condenser	၀
၄	ထိန်းချုပ်စနစ်	၀
၅	စက်မှုပစ္စည်းထုတ် (စိုက်ခင်းစနစ်)	၀
၆	စက်မှုပစ္စည်းထုတ် (လုပ်ငန်းစဉ်)	၀
၇	စက်မှုပစ္စည်းထုတ် (လုပ်ငန်းစဉ်)	၀

အနံ့ထွက်ရှိမှုအမျိုးအစားများ

သက်ရောက်မှု

လုပ်ငန်းလည်ပတ်သည့်ကာလ

- မော်ဒယ်ဆိုင်
- မော်ဒယ်ဆိုင်
- အသက်ရှူစနစ်ကြောင့်
- အသက်ရှူစနစ်ကြောင့်

လျှော့ချရမည့်အစီအစဉ်

လုပ်ငန်းလည်ပတ်သည့်ကာလ

- အသက်ရှူစနစ်အမျိုးအစားကို လိုအပ်သည့်အမျိုးအစားနှင့် အရွယ်အစားကို ရွေးချယ်ခြင်း
- လုပ်ငန်းစဉ်များ စာရွက်စာတမ်းများ ထုတ်ရှိသော စာရွက်စာတမ်းများနှင့် အသက်ရှူစနစ်များ စနစ်ဆိုင်ရာများကို ပြန်လည်စစ်ဆေးခြင်းနှင့် စနစ်ဆိုင်ရာ စစ်ဆေးခြင်း
- စီမံကိန်းအမျိုးအစား မော်ဒယ်ဆိုင်များကို လိုအပ်သည့်အမျိုးအစားများဖြင့် အသက်ရှူစနစ်များကို ပြန်လည်စစ်ဆေးခြင်း
- အသက်ရှူစနစ်များအသက်ရှူစနစ်အမျိုးအစားများကို အသက်ရှူစနစ်များကို ပြန်လည်စစ်ဆေးခြင်း

စီမံခန့်ခွဲမှုမျိုးကွဲများ လေ့လာမှု

စီမံခန့်ခွဲမှုမျိုးကွဲများ လေ့လာမှုအတွက် စီမံခန့်ခွဲမှု ၃ ကိုလိုဒီတာ အတွင်းရှိ မြေအောက်ရေစနစ်များနှင့် စီမံခန့်ခွဲမှုမျိုးကွဲများအားလုံးတွင် လေ့လာခဲ့ပါသည်။

လေ့လာခဲ့သော အမျိုးအစားများမှာ - ခရု၊ ယောက်သွားနှင့် Planktonများ ငါး၊ ငှက်၊ နို့တိုက်သတ္တဝါများ အပင်မျိုးစိတ်များ ဖြစ်ပါသည်။

(IUCN Red List)

မျိုးစိတ်များ	IUCN RED LIST STATUS				
	DD (အချက်အလက်ပြည့်စုံမှု မရှိသည့် မျိုးစိတ်)	LC (မျိုးကွဲများ အန္တရာယ်ရှိသည့် မျိုးစိတ်)	NT (မျိုးကွဲများ အန္တရာယ်ရှိသည့် မျိုးစိတ်)	VU (မျိုးကွဲများ အန္တရာယ်ရှိသည့် မျိုးစိတ်)	EN (မျိုးကွဲများ အန္တရာယ်ရှိသည့် မျိုးစိတ်)
အပင်	၂	၁၆	၁	-	-
ငှက်	-	၂၈	-	-	-
နို့တိုက်သတ္တဝါများ	-	၁	-	-	-
ငါး	-	၁၉	၂	၁	-

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အပင်မျိုးစိတ်များလေ့လာမှု

၁၅ မီတာ x ၁၅ မီတာ ရှိသော စုစုပေါင်း ၁၈ ဣယျာဉ် နမူနာကောက်ယူခဲ့ပြီး အပင်မျိုးစိတ်စုစုပေါင်း ၂၅ မျိုးအား လေ့လာတွေ့ရှိရခဲ့သည်။

မျိုးစိတ်အလိုက် မျိုးစိတ်စွဲစာရင်း

အပင်မျိုးစိတ်များ

လှေလှော်သည့် မြေယာ

ခရု
Azadirachta indica A. Juss.

ယောက်သွား
Dalbergia paniculata Roob.

ခရု
Sesquialterea indica Willd.

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ငှက်မျိုးစိတ်များလေ့လာမှု

Transect Line Method ဖြင့် လေ့လာခဲ့ပြီး စုစုပေါင်း ငှက်မျိုးစိတ် ၂၈ မျိုး တွေ့ရှိရခဲ့သည်။

မျိုးစိတ်အလိုက် မျိုးစိတ်စွဲစာရင်း

ငှက်မျိုးစိတ်များ လေ့လာခြင်း

ငှက်မျိုးစိတ်များ လေ့လာခြင်း
Bird Watching

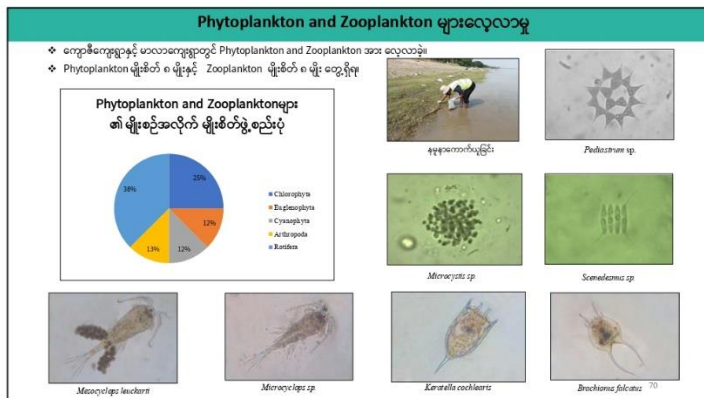
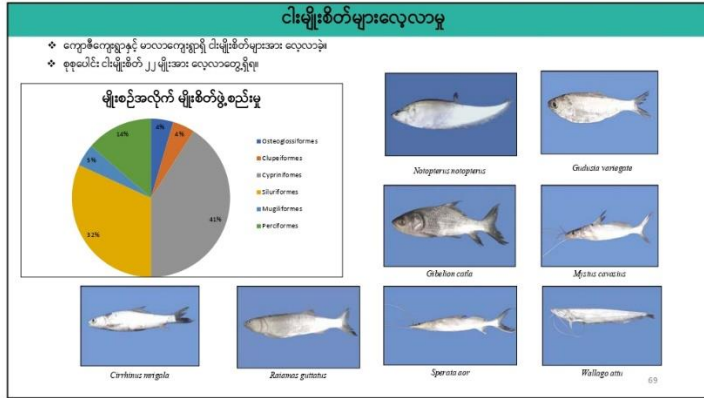
ရေကန်
Nalcyus sumatrensis

မေ့လျော့
Anas platyrhynchos

ရွှေငါးငွေ့
Agathina taphia

ရွက်ခွက်
Pycnonotus cafer

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ဝေမျိုးစုံ မျိုးကွဲများအပေါ် သက်ရောက်မှုနှင့် လျော့ချရမည့် အစီအစဉ်များ

□ တည်ဆောက်ခြင်းကာလ/ ပိတ်သိမ်းခြင်းကာလ သက်ရောက်မှု

အချိန်အမျိုးအစား	ပမာဏ (M = T + E + D + I + R)						အကျိုးဖြစ်ထွန်းမှုအဆင့် (Imp)	သိသာထင်ရှားမှုအဆင့် (M x Imp)	သက်ရောက်မှုအဆင့်
	T	E	D	I	R	M			
တိရစ္ဆာန်များအား စောင့်ရှောက်မှုများအား ထိခိုက်စေခြင်း၊ တည်ဆောက်ရေး/ ပိတ်သိမ်းရေး လုပ်ငန်းများအားလုံးပါရှိခြင်း	၃	၂	၁	၁	၁	၈ (အလယ် အလတ်)	နိမ့်	(အလယ် အလတ် x နိမ့်)	မသေးလှပါဘဲ
တိရစ္ဆာန်များအား စောင့်ရှောက်မှုများအား ထိခိုက်စေခြင်း၊ တည်ဆောက်ရေး/ ပိတ်သိမ်းရေး လုပ်ငန်းများအားလုံးပါရှိခြင်း	၃	၁	၁	၁	၁	၇ (သေး လှသော သက် ရောက်မှု)	နိမ့်	(သေးလှသော သက်ရောက်မှု x နိမ့်)	လျော့ချမှုရှိနိုင် သေး

ပြင်ဆင်မှုသက်ရောက်မှု

အချိန်အမျိုးအစား	ပမာဏ (M = T + E + D + I + R)						အကျိုးဖြစ်ထွန်းမှုအဆင့် (Imp)	သိသာထင်ရှားမှုအဆင့် (M x Imp)	သက်ရောက်မှုအဆင့်
	T	E	D	I	R	M			
တိရစ္ဆာန်များအား စောင့်ရှောက်မှုများအား ထိခိုက်စေခြင်း၊ တည်ဆောက်ရေး/ ပိတ်သိမ်းရေး လုပ်ငန်းများအားလုံးပါရှိခြင်း	၃	၁	၁	၁	၁	၇ (သေး လှသော သက် ရောက်မှု)	နိမ့်	(သေးလှသော သက်ရောက်မှု x နိမ့်)	လျော့ချမှုရှိနိုင် သေး

❖ မြေပြင်နှင့် လေထုအား ဖြည့်လျှောက်ပေး ထိခိုက်လွယ်သော အရာများကို မြေအောက်မှ အစားထိုးပေးခြင်းဖြင့် မြေပြင်နှင့် လေထုအား ထိခိုက်စေခြင်း မရှိစေရန် ဖြစ်နိုင်ပါသည်။

❖ မြေပြင်နှင့် လေထုအား ဖြည့်လျှောက်ပေး ထိခိုက်လွယ်သော အရာများကို မြေအောက်မှ အစားထိုးပေးခြင်းဖြင့် မြေပြင်နှင့် လေထုအား ထိခိုက်စေခြင်း မရှိစေရန် ဖြစ်နိုင်ပါသည်။

❖ မြေပြင်နှင့် လေထုအား ဖြည့်လျှောက်ပေး ထိခိုက်လွယ်သော အရာများကို မြေအောက်မှ အစားထိုးပေးခြင်းဖြင့် မြေပြင်နှင့် လေထုအား ထိခိုက်စေခြင်း မရှိစေရန် ဖြစ်နိုင်ပါသည်။

❖ မြေပြင်နှင့် လေထုအား ဖြည့်လျှောက်ပေး ထိခိုက်လွယ်သော အရာများကို မြေအောက်မှ အစားထိုးပေးခြင်းဖြင့် မြေပြင်နှင့် လေထုအား ထိခိုက်စေခြင်း မရှိစေရန် ဖြစ်နိုင်ပါသည်။

စီမံချိမ်းမီ ချီးကျူးမှုများအပေါ် သက်ရောက်မှုနှင့် လျှော့ချရမည့် အစီအစဉ်များ

□ လုပ်ငန်းလည်ပတ်ခြင်းကာလ

သက်ရောက်မှု

အစဉ်အမှတ်	ပမာဏ (M+T+E+D+I+R)						အရေးကြီးဆုံး အဆင့် (Imp)	သီးခြားစီမံခန့်ခွဲမှု အဆင့် (M x Imp)	သက်ရောက်မှု အဆင့်	
	T	E	D	I	R	M				
စက်ရုံ၏ ထုတ်လုပ်မှုလုပ်ငန်း များလည်ပတ်ခြင်း	၂	၂	၂	၂	၂	၂	၁၀ (အလယ် အလတ်)	အသင့်အတင့်	အလယ် အလတ် x အသင့်အတင့်	အလယ် အလတ်


လျှော့ချရမည့်အချက်များ

- စက်ရုံ၏ ဓနိယာအစိတ်စုတွင် အပူများ ဖြစ်ပေါ်ခြင်း (Green Space) များ လုပ်ဆောင်ထားခြင်းဖြင့် စီမံချိမ်းမီ ချိမ်းမီမှုများနှင့် လေထုအညစ်အကြေး အထိန်းသိမ်းခြင်း။
- စီမံကိန်း၏ ဓနိယာအတွင်း ဥပမာ (၂) လိုက်လံသည့်နေရာများတွင် ဥပမာ ချိမ်းမီအထိမ်းချိမ်းမီအား ဖြစ်ပေါ်ခြင်း။
- မျိုးသစ်ရရှိ အန္တရာယ်ရှိသည့်စိုက်ပျိုးရေး နှားပါး အပင်မျိုးစိတ်များအား စီမံကိန်းဓနိယာအတွင်း ဖြစ်ပေါ်ခြင်း ဖြစ်ပေါ်ခြင်း။
- စီမံကိန်းဓနိယာအတွင်း ဆောင်းဇွန်များ တိရစ္ဆာန်များ ဝင်ရောက်ခြင်း ဖြစ်ပေါ်ခြင်းများအတွက် ဖမ်းဆီးခြင်းအား ဖျင့်ဖြင့်ဖြင့် သက်ဆိုင်ရာ ဌာနများနှင့် ပူးပေါင်း၍ ဆောင်ရွက်ရမည် ဖြစ်ပါသည်။

ရွှင်းကျန်သက်ရောက်မှု

အစဉ်အမှတ်	ပမာဏ (M+T+E+D+I+R)						အရေးကြီးဆုံး အဆင့် (Imp)	သီးခြားစီမံခန့်ခွဲမှု အဆင့် (M x Imp)	သက်ရောက်မှု အဆင့်	
	T	E	D	I	R	M				
စက်ရုံ၏ ထုတ်လုပ်မှုလုပ်ငန်း များလည်ပတ်ခြင်း	၂	၁	၂	၁	၁	၁	၀ (အလယ် အလတ်)	အသင့်အတင့်	အလယ်အလတ် x အသင့်အတင့်	အလယ် အလတ်

ယာဉ်သွားလာမှုအခြေအနေများ လေ့လာမှု



ယာဉ်သွားလာမှုအခြေအနေများ လေ့လာမှု

- ယာဉ်သွားလာမှုအခြေအနေများကို စက်ရုံအရရှိ ချောင်းမြို့ပြ-မြို့လမ်းနှင့် ဖြေလျှော့ပေးပါသည်။
- ကျောက်လှေခံသောအချိန်တွင် ယာဉ်သွားလာမှုအခြေအနေများကို ဆန်းစစ်ရန်လိုအပ်ပါသည်။ အစီအစဉ်အပေါ် အသေးစိတ် ဖော်ပြထားပါသည်။

စဉ်	အမျိုးအစား	နေရာ	စုစုပေါင်း အခြေအနေ
၁	နေရာ (၁)	ညောင်ဦး မြို့-မြို့လမ်း	ရှင်လင်းဘေးယာဉ် သွားလာမှု

ယာဉ်သွားလာမှုသက်ရောက်မှုနှင့် လျှော့ချရမည့် အစီအစဉ်များ

□ တည်ဆောက်ခြင်းနှင့် လုပ်ငန်းလည်ပတ်ခြင်းကာလ

သက်ရောက်မှု

ကာလ	အစဉ်အမှတ်	ပမာဏ (M+T+E+D+I+R)						အရေးကြီးဆုံး အဆင့် (Imp)	သီးခြားစီမံခန့်ခွဲမှု အဆင့် (M x Imp)	သက်ရောက်မှု အဆင့်
		T	E	D	I	R	M			
တည်ဆောက်ခြင်း	ယာဉ်သွားလာမှု	၃	၂	၂	၁	၁	၉ (အလယ် အလတ်)	အလယ် အလတ်	(အလယ်အလတ် x အလယ်အလတ်)	အလယ် အလတ်
လုပ်ငန်းလည်ပတ်ခြင်း	အလှူ သက်ရောက်မှု	၃	၂	၃	၁	၁	၁၀ (အလယ် အလတ်)	အသင့်အတင့်	(အလယ်အလတ် x အသင့်အတင့်)	အလယ် အလတ်

လျှော့ချရမည့်အချက်များ

- တည်ဆောက်ခြင်းကာလ
 - လမ်းများအား ပုံမှန်ပြင်ဆင်ခြင်း၊ သွားလာမှု လွယ်ကူမှုအတွက် စီမံကိန်းအတွင်း လမ်းအသစ်များအား ဖောက်လုပ်သွားမည်။
 - စီမံကိန်းဓနိယာအတွင်း ယာဉ်ကြွင်းကွန်ကရစ်များ ဖြစ်ပေါ်လာကာ သိုလှောင်သော ယာဉ်သွားလာရေး ထိန်းချုပ်မှု စနစ်များ တည်ဆောက် သွားမည်။

ရွှင်းကျန်သက်ရောက်မှု

ကာလ	အစဉ်အမှတ်	ပမာဏ (M+T+E+D+I+R)						အရေးကြီးဆုံး အဆင့် (Imp)	သီးခြားစီမံခန့်ခွဲမှု အဆင့် (M x Imp)	သက်ရောက်မှု အဆင့်
		T	E	D	I	R	M			
တည်ဆောက်ခြင်း	ယာဉ်သွားလာမှု	၃	၂	၂	၁	၁	၉ (အလယ် အလတ်)	နိမ့်	(အလယ်အလတ် x နိမ့်)	နိမ့်
လုပ်ငန်းလည်ပတ်ခြင်း	အလှူ သက်ရောက်မှု	၃	၂	၃	၁	၁	၁၀ (အလယ် အလတ်)	နိမ့်	(အလယ်အလတ် x နိမ့်)	နိမ့်

လူမှုစီးပွား အခြေအနေများ လေ့လာမှု

လူမှုစီးပွားအခြေအနေများ လေ့လာမှု

- လူမှုစီးပွားအခြေအနေများကို စုစည်းအတိုင်အတာသတ်မှတ်ခြင်းအတွက် စီမံကိန်းကော်မရှု ထားသော ကျွေးမွေးရေးအဖွဲ့အစည်းများနှင့် ဆောင်ရွက်ခြင်း ဖြစ်ပါသည်။
- စီမံကိန်းဓနိယာအရရှိ ဆောင်ရွက်မှု မကျင့်ကျင့်မှု မလုပ်ဆောင်မှုများ တွင် လေ့လာခဲ့ပါသည်။



လူမှုစီးပွား အခြေအနေများ လေ့လာမှု

လူဦးရေဆိုင်ရာအချက်အလက်များ

စဉ်	မြို့နယ်	ကျေးရွာ	လူဦးရေ	အိမ်ထောင်စု	အသက်	
					၁၈ နှစ် အထက်	၁၈ နှစ် အထက်
၁	တောင်သာမြို့နယ်	ကျောစီကျေးရွာ	၃,၃၇၉	၇၅၃	၇,၁၉၃	၁၀,၁၁၇
၂	တောင်သာမြို့နယ်	မာလာကျေးရွာ	၁,၉၁၇	၅၅၂	၉၅,၈၈၇	၁၃၄,၆၇၇

Source- HA Survey Team, 2023

စီးပွားရေးအခြေအနေများ

စဉ်	မြို့နယ်	ကျေးရွာ	နိတ်ပျိုးရေ	ဖျော့ညည်	ကုန်သွယ်ရေး	အစိုးရဝန်ထမ်း	အထွေထွေလုပ်သား	ကုမ္ပဏီဝန်ထမ်း	အခြား
၁	တောင်သာမြို့နယ်	ကျောစီကျေးရွာ	၅၀၀	၆	-	၁၅၀	၁၅၀	၇၀	-
၂	တောင်သာမြို့နယ်	မာလာကျေးရွာ	၁၅၀	၁၅၀	-	၅၀	-	၃	-

Source- HA Survey Team, 2023

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လူမှုစီးပွား အခြေအနေများ လေ့လာမှု

ကုန်မာရေးဆိုင်ရာ အချက်အလက်များ

စဉ်	မြို့နယ်	ကျေးရွာ	ပြည်သူ့ဆေးရုံ	ပုဂ္ဂလိကဆေးရုံ	ဆေးခန်း	ကျေးလက်ဆေးခန်း	ဆေးဆိုင်	အခြား
၁	တောင်သာမြို့နယ်	ကျောစီကျေးရွာ	၁	-	-	-	-	-
၂	တောင်သာမြို့နယ်	မာလာကျေးရွာ	-	-	-	၁	-	-

Source- HA Survey Team, 2023

ပညာရေးဆိုင်ရာ အချက်အလက်များ

စဉ်	မြို့နယ်	ကျေးရွာ	မူကြို	မူလတန်းကျောင်း	မူလတန်းလွန်ကျောင်း	အလယ်တန်းကျောင်း	အထက်တန်းကျောင်း	ကိုယ်ပိုင်ကျောင်း
၁	တောင်သာမြို့နယ်	ကျောစီကျေးရွာ	-	-	-	-	၁	၄
၂	တောင်သာမြို့နယ်	မာလာကျေးရွာ	-	-	-	-	၁	-

Source- HA Survey Team, 2023

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လူမှုစီးပွားအပေါ်ကောင်းကျိုးသက်ရောက်မှု

- စီမံကိန်းတည်ရှိရာဒေသအနီးအနားရှိ ပြည်သူများအတွက် အလုပ်အကိုင်အခွင့်အလမ်းရရှိစေခြင်း။
- အလုပ်သမားများအတွက် လူမှုရေးခြေမာမှုမရှိဘဲ တန်ဖိုးတင်မှု သင့်တင့်သော အခွင့်အရေးများနှင့် ပေါင်းသင်းဆက်ဆံခြင်း။
- စီမံကိန်းလုပ်ငန်းကြောင့် အနီးနားဆက်စပ်လျက်ရှိသော အဖွဲ့အစည်းများအတွက် အကျိုးမြတ်ရရှိစေခြင်း။
- အလုပ်သမားရေးဆိုင်ရာ ဥပဒေများနှင့်အညီ သေချာစွာ ဆောင်ရွက်ခြင်း။
- ကလေးလုပ်သားများ ခေါ်ယူခြင်းအား ရှောင်ရှားခြင်း။
- ကုန်ဆာရေးနှင့် ဘေးကင်းလုံခြုံသည့် လုပ်ငန်းခွင်အား တိုးမြှင့်တည်ထောင်ခြင်း။
- အလုပ်သမားများ၏ ဘေးကင်းလုံခြုံရေးအတွက် စီမံခန့်ခွဲမှုများနှင့် လုံလောက်သော အသုံးစရိတ် ထောက်ပံ့မှုများပေးခြင်း။
- စီမံကိန်းဆိုင်ရာ ဥပဒေဆိုင်ရာ ဖွံ့ဖြိုးတိုးတက်ရေး အစီစဉ်များအား အကောင်အထည် ဖော်ဆောင်ခြင်း။
- အရည်အချင်းရှိသောဝန်ထမ်းများဖြစ်စေသည့် လေ့ကျင့်သင်ကြားပေးခြင်း။
- ဒေသဆိုင်ရာ ဂိုဏ်းပွားစုံကျေးဇူးများအား နားလည်သဘောပေါက်ခြင်းနှင့် ထိန်းသိမ်းစောင့်ရှောက်ခြင်း။
- ဤသို့သော စီမံကိန်းလုပ်ငန်းများကြောင့် နိုင်ငံတော်ဝင်ငွေ နှင့် အန္တရာယ်ကင်းစေခြင်း။

လုပ်ငန်းခွင်ဘေးအန္တရာယ်ဖြစ်နိုင်ခြေ ဆန်းစစ်ခြင်း

အန္တရာယ်အမျိုးအစား	စဉ်	အရင်အခြေနှင့် ဖြစ်နိုင်သော အန္တရာယ်	လျော့ချရန်အညွှန်းတမ်းများ	သိသာထင်ရှားမှု
လေထုညစ်ညမ်းခြင်း	၁	ဧရာမြေပြင် (ရက်ပတ္တမြားစက်ရုံအစားအရောင်းဌာနကြောင့် ဖြည့်တင်းသည့်အခါအစားအရောင်းဌာန အသုံးပြုစနစ်အား ပြန်လည်ထိန်းသိမ်းခြင်းကြောင့် ဖြစ်တော်မူနိုင်ပါသည်။)	• ဆောက်လုပ်လုပ်ငန်းခွင်အတွင်း လုပ်ငန်းခွင်ပုံစံ လိုအပ်ချက်များကို စီမံခြင်း။ • ဖွဲ့စည်းမှုအသုံးပြုစနစ်ကို သေချာစီစဉ်ကာလအတွင်း စီမံခြင်း။ • ဖောက်ဖျက်မှုများကို စောင့်ကြည့်ခြင်း။	မြင့်
	၂	ကုန်တင်ကားများ၊ အရာထူး ပြုတ်ကားခြင်း ထိခိုက်ခြင်း ကျစ်ကြပ်မှုများကို သယ်ဆောင်ခြင်းနှင့် သယ်ယူရာတွင် ထိခိုက်မှုများဖြစ်ခြင်း။	• ကုန်တင်ကားများဖြင့် မသင့်တော် ဖွဲ့စည်းမှုအား တင်ကြားစေရန်အား ရှောင်ရှားခြင်း။ • သယ်ယူပို့ဆောင်ရာတွင် တန်ဖိုးတင်ဆောင်မှုအား စစ်ဆေးခြင်း။ • ဖောက်ဖျက်မှုများကို စောင့်ကြည့်ခြင်း။	အလယ်အလတ်
	၃	ဆောက်လုပ်ရေး/စီမံကိန်းအစီအစဉ်များ လိုအပ်ခြင်း (အမြင့်မြင့်မြေပြင်၊ မြေပြင်မြင့် စက်ရုံများအားကြောင့် ဖြစ်တော်မူနိုင်ပါသည်။)	• မြေထောက်မြေခံစား နေရာများတွင် အလုပ်လုပ်နေစဉ် လိုအပ်ချက်များကို စီမံခြင်း။ • လုပ်ငန်းခွင်အတွင်း လမ်းများ ပြုပြင်ဆင်ခြင်းအား ပြုလုပ်ခြင်း။ • ဆောက်လုပ်ရေးစနစ်အား စောင့်ကြည့်ခြင်း။	အလယ်အလတ်
ပညာရေးဆိုင်ရာ	၁	စက်ရုံလည်ပတ်ခြင်းနှင့် ထိခိုက်ခြင်း (လုပ်ငန်းအန္တရာယ် ကျွမ်းကျင်မှုနှင့် ဆောင်ရွက်နိုင်စွမ်းအား အခြေခံ ပြုစုခြင်း ချို့ယွင်းခြင်း အတွက်ပညာရေး)	• မြေထောက်မြေခံစား နေရာများတွင် အလုပ်လုပ်နေစဉ် လိုအပ်ချက်များကို စီမံခြင်း။ • လုပ်ငန်းခွင်အတွင်း လမ်းများ ပြုပြင်ဆင်ခြင်းအား ပြုလုပ်ခြင်း။ • ဖောက်ဖျက်မှုများကို စောင့်ကြည့်ခြင်း။ • ပြုစုနိုင်စွမ်းအား စောင့်ကြည့်ခြင်း။	အလယ်အလတ်

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လူမှုအကျိုးတူပေးပေါင်းပါဝင်မှု (CSR) အစီအစဉ်

❖ မြန်မာ့ရင်းနှီးမြှုပ်နှံမှုဘဏ်မှန်၏ ချွတ်တားသော စည်းလမ်းများအပိုင်း အပြတ်စွာ ၂၈% ကို (CSR) အတွက် အသုံးပြုခြင်း။

❖ အဆိုပြုစီမံကိန်းမှလည်း CSR အစီအစဉ်များမှတစ်ဆင့်ဆောင်ရွက်ခြင်း။

လူထုအကျိုးပြုပေးပါဝင်မှုအတွက် လှူဒါန်းရန်စံစဉ်



စဉ်	လုပ်ဆောင်ဖွယ်	တာဝန်ခံအဖွဲ့အစည်း	ကြိမ်နှုန်း	ခန့်မှန်းစရိတ် (ပြန်မာကျပ်)
၁။		လှူဒါန်းမှု		
၁။	စီမံကိန်းအောက်ခံကုမ္ပဏီရှိ ရွာများတွင် လယ်စားကံ လှည့်ပေးခြင်း၊ ဆေးရုံဆောက်လုပ်ကုသမှုများ ဆောင်ရွက်ခြင်း။	စီမံကိန်းအဆိုပြုသူ	နှစ်စဉ်	၂,၀၀၀,၀၀၀
၂။		လှူဒါန်းမှု		
၂။	စီမံကိန်းအောက်ခံကုမ္ပဏီရှိ ရွာများရှိ စတင် ကျောင်းများတွင် အဆောက်အအုံများ ဆောက်လုပ်ပေးခြင်း။	စီမံကိန်းအဆိုပြုသူ	နှစ်စဉ်	၂,၀၀၀,၀၀၀
၃။		ကျွမ်းကျင်မှု		
၃။	စီမံကိန်းအောက်ခံကုမ္ပဏီရှိ ကျေးရွာများတွင် စတင်ကုသမှုများ ဆောင်ရွက်ခြင်း၊ စီမံကိန်းရရှိရန်အတွက် ကျေးရွာတိုင်းရှိအဖွဲ့အစည်း ဆောင်ရွက်ပေးခြင်း။	စီမံကိန်းအဆိုပြုသူ	နှစ်စဉ်	၂,၅၀၀,၀၀၀
၄။		တာဝန်ခံအဖွဲ့		
၄။	စီမံကိန်းအောက်ခံကုမ္ပဏီရှိ ကျေးရွာများရှိ သန့်ရှင်းရေးအဖွဲ့များ ဆောင်ရွက်ပေးခြင်း။	စီမံကိန်းအဆိုပြုသူ	နှစ်စဉ်	၂,၀၀၀,၀၀၀
		စုစုပေါင်း		၈,၅၀၀,၀၀၀

ကျေးဇူးတင်ပါသည်

Hexagonal Angle International Consultants Co., Ltd.

၉၅

အကြံပြုချက်များနှင့် ဆွေးနွေးလိုသည့် အကြောင်းအရာများ လွတ်လပ်စွာ မေးမြန်းနိုင်ပါသည်။

Hexagonal Angle International Consultants Co., Ltd.

၉၆

Appendix(K)
Suggestion letters of Public Disclosure



မြို့နယ်မီးသတ်ဦးစီးမှူးရုံး
တောင်သာမြို့



MCCM ရေနံချက်စက်ရုံ

တောင်သာမြို့

မြို့နယ် မီး သတ် ဦး စီး မှူး ရုံး
မြင်း ခြံ ခ ရိပ်၊ တောင် သာ မြို့
စာ အ မှတ်၊ ၃၀၈ / ၁၀ / ၅ / ဦး ၁
ရက် စွဲ ၊ ၂၀၂၃ ခုနှစ် ၊ ဇူလိုင်လ ၂၇ ရက်

အကြောင်းအရာ။ မြို့နယ်မီးသတ်ဦးစီးဌာနမှ MCCM ရေနံချက်စက်ရုံအား စစ်ဆေးတွေ့ရှိချက်၊
သုံးသပ်ချက်၊ အကြံပြုချက်များအား ပေးပို့ခြင်း

စစ်ဆေးတွေ့ရှိချက်-

- ၁။ မီးသတ်ရေလှောင်ကန် ၁၀၀၀၀၀ ဂါလံဆန် ရေကန်ရှိခြင်း။
- ၂။ ပိုက်လိပ်တပ်ဆင်ထားသော Fire Hydrant (၃)လက်မ (၁၂) ငုတ်ရှိခြင်း။
- ၃။ 50 Kg မီးသတ်ဆေးဘူး (၁၅)ဘူးရှိခြင်း။
- ၄။ 5 Kg မီးသတ်ဆေးဘူး (၃၀)ဘူးရှိခြင်း။
- ၅။ 3 Kg မီးသတ်ဆေးဘူး (၃၀)ဘူးရှိခြင်း။
- ၆။ Foam ဆေးရည် (၁၀)ပေပါ ရှိခြင်း။
- ၇။ Fire Alarm (မီးလန့်အချက်ပေးကိရိယာ) Auto Manutial တပ်ဆင်ထားခြင်း။
- ၈။ Fire Nozal ဖြင့်တပ်ဆင်ထားသော Primerပါ မီးသတ်စက်ကလေး (၁)လုံးရှိခြင်း။

တောင်သာမြို့နယ်မီးသတ်ဦးစီးမှူးရုံး၏ သုံးသပ်ချက်-

MCCM ရေနံချက်စက်ရုံသည် မီးသတ်ဦးစီးဌာန၏ ဥပဒေ၊ နည်းဥပဒေများနှင့်အညီ မီးဘေးကြိုတင်ကာကွယ်ရေးလုပ်ငန်းများအား စနစ်တကျ လိုက်နာဆောင်ရွက်ထားရှိခြင်း၊ မီးလောင်မှုဖြစ်ပွားလာပါက အရေးပေါ်တုံ့ပြန်ဆောင်ရွက်နိုင်ရန် သီးသန့်မီးသတ်တပ်ဖွဲ့ ဖွဲ့စည်းထားရှိခြင်း၊ ခေတ်မီဓာတုဗေဒ မီးငြိမ်းသတ်ရေး ပစ္စည်းကိရိယာများဖြစ်သော မီးသတ်ဆေးဘူး၊ ရေဖြင့်ပက်ဖျန်းနိုင်သော Foam ဆေးရည်များကို လုံလောက်စွာ ထားရှိပြီးဖြစ်သည့်အတွက်ကြောင့် ကြီးမားစွာ မီးလောင်မှုမဖြစ်နိုင်ပါဟု သုံးသပ်ပါသည်။

တောင်သာမြို့နယ်မီးသတ်ဦးစီးမှူးရုံး၏ အကြံပြုချက်များ-

- ၁။ စက်ရုံဝန်းအတွင်းအပြင်နှင့် သို့လှောင်ကန်ပတ်ဝန်းကျင်၌ မြက်ပင်များ၊ ကိုင်းပင်များ၊ အမှိုက်သရိုက်များအား မီးကူးစက်ပြန့်ပွားမှုမရှိအောင် အမြဲရှင်းလင်းထားရန်။
- ၂။ ပင်မစက်ရုံဝန်းနှင့် လောင်စာသိုလှောင်ကန်များတွင် အမြှုပ်မီးသတ်ဆေးရည် ပတ်ဖြန်းနိုင်ရေး စနစ် (Fixed Installation Foam Inlet System)များ ထားရှိရန်နှင့် မီးသတ်ယာဉ်၏ ပိုက်ဆက်များဖြင့် အသင့်တပ်ဆင်နိုင်ရေး (Foam Inlet) ပိုက်ခေါင်းများတပ်ဆင်ထားရန်။

- ၃။ မီးလောင်မှုဖြစ်ပွားလာပါက ချက်ချင်းမီးငြိမ်းသတ်နိုင်ရေးအတွက် ဆီမီးသတ်ယာဉ်(သို့မဟုတ်) Foam Tender များဝယ်ယူထားရှိရန်။
- ၄။ စက်ရုံ/သိုလှောင်ကန်များအနီးတွင် ခိုင်မာတောင့်တင်းသည့် (Fire Point)များ မီးချိတ်၊ မီးကပ်၊ သဲခြောက်၊ သဲပုံးများ၊ ဂေါ်ပြား၊ လှေကားများ ပြည့်စုံစွာထားရှိရန်။
- ၅။ ဓာတုဗေဒပေါင်ဒါမှုန့်ခြောက်မီးသတ်ဆေးဘူး (Dry Chemical Powder)များအား မီးသတ်တပ်ဖွဲ့၏ ညွှန်ကြားချက်အတိုင်း မပျက်/ မကွက် ပြည့်စုံစွာထားရှိရန်။
- ၆။ စက်ရုံ/သိုလှောင်ကန်များတွင် သိုလှောင်မည့်ပမာဏအား အဖြူရောင်အောက်ခံပေါ်တွင် အနီရောင်စာလုံးဖြင့်ရေးသားထားရန်နှင့် တားမြစ်နယ်မြေသတ်မှတ်၍ မီးသတ်ပေးဆိုင်ဘုတ်များ တပ်ဆင်ထားရှိရန်။
- ၇။ စက်ရုံ/သိုလှောင်ကန်များတွင် အရေးကြီး၊ အရေးပေါ်ကိစ္စရပ်များ ဖြစ်ပေါ်လာပါက ချက်ချင်း ပိတ်နိုင်မည့် ပင်မအဆိုရှင် (Main Valve)များတပ်ဆင်ထားရှိရန်။
- ၈။ မြို့နယ်/ ခရိုင်/ တိုင်း/ ဌာနချုပ်မှ သင်တန်းဖွင့်လှစ်ပေးသည့် မီးသတ်သင်တန်းများ (Fire Safety Manager) သင်တန်းများအား မပျက်/ မကွက် တက်ရောက်နိုင်စေရန်နှင့် မိမိဝန်ထမ်းများအား စေလွှတ်ပေးနိုင်ရန်။
- ၉။ စက်ရုံအတွင်း အသုံးပြုလျက်ရှိသော မီးဘေးလုံခြုံရေးသုံးပစ္စည်းဖြစ်သော မီးသတ်ဆေးဘူးများသည် နှစ်ကာလကြာမြင့်နေသည့်အတွက်ကြောင့် သုံးစွဲနိုင်မှုအခြေအနေအားနည်းခြင်းအား ဆောင်ရွက် ထားရှိရန်။
- ၁၀။ ရေနံနှင့်သတ္တုတွင်းဝန်ကြီးဌာန၊ အာဏာပိုင်အဖွဲ့အစည်းများ၊ မြို့နယ်မီးသတ်ဦးစီးဌာန၏ စစ်ဆေး အကြံပြုချက်များအပေါ် မပျက်/ မကွက် လိုက်နာဆောင်ရွက်ရန်။
သို့ဖြစ်ပါ၍ မြင်းခြံခရိုင်၊ တောင်သာမြို့နယ်၊ ကျောဒီကျေးရွာတွင် တည်ရှိသော MCCM ရေနံချက်စက်ရုံအား တောင်သာမြို့နယ်မီးသတ်ဦးစီးဌာနမှ စစ်ဆေးတွေ့ရှိချက်၊ သုံးသပ်ချက်၊ အကြံပြုချက်များအား အထက်ပါအတိုင်း ပေးပို့အကြောင်းကြားအပ်ပါသည်။

မြို့နယ်မီးသတ်ဦးစီးမှူး
ကျော်စွာ ၊ (ဦးစီးအရာရှိ)

မိတ္တူ

ရုံးလက်ခံ

Appendix (L)

Acceptance Invitation Letter, Attendance List and Suggestion Letters
of Public Consultation Meeting

အမည် ဦးကျော်စွာ.....

လိပ်စာ မြောက်ဦးလမ်း.....

MCCM Company Limited ၏ အသေးစားရေနံချက်လုပ်ငန်း၏ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း (EIA) အစီရင်ခံစာအတွက် ဒေသခံပြည်သူများ၏ သဘောထားအမြင်များနှင့် အကြံပြုချက်များတောင်းခံခြင်း

- လူမှုစီးပွား နှင့် အခြား အကျိုးအမြတ်များကို လုံလုံအောင် အကဲဖြတ်ချက်ချခြင်း
- မြေအောက်ရေနှင့် မြေအောက်အပူရေများကို ထိခိုက်စေခြင်း ရှောင်ရှားရန်
- လူမှုအကျိုးစီးပွားကို ထိခိုက်စေခြင်း ရှောင်ရှားရန်

အမည် ဦးစိုးမင်း.....

လိပ်စာ မြောက်ဦးလမ်း.....

MCCM Company Limited ၏ အသေးစားရေနံချက်လုပ်ငန်း၏ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း (EIA) အစီရင်ခံစာအတွက် ဒေသခံပြည်သူများ၏ သဘောထားအမြင်များနှင့် အကြံပြုချက်များတောင်းခံခြင်း

- ပတ်ဝန်းကျင်၏ မြေအောက်ရေနှင့် မြေအောက်အပူရေများကို ထိခိုက်စေခြင်း ရှောင်ရှားရန်
- မြေအောက်ရေနှင့် မြေအောက်အပူရေများကို ထိခိုက်စေခြင်း ရှောင်ရှားရန်
- လူမှုအကျိုးစီးပွားကို ထိခိုက်စေခြင်း ရှောင်ရှားရန်
- အမျိုးမျိုးသော အကျိုးစီးပွားများကို ထိခိုက်စေခြင်း ရှောင်ရှားရန်

အမည်လှိုင်စိန်စိန်.....

လိပ်စာလမ်းမတော်.....

MCCM Company Limited ၏ အသေးစားရေနံချက်လုပ်ငန်း၏ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း (EIA) အစီရင်ခံစာအတွက်
ဒေသခံပြည်သူများ၏ သဘောထားအမြင်များနှင့် အကြံပြုချက်များတောင်းခံခြင်း

- ရေ၊ လျှပ်စီးဓာတ်၊ မြေအောက်ရေ၊ မြေအောက်ရေ၊ မြေအောက်ရေ၊ မြေအောက်ရေ
- မြေအောက်ရေ၊ မြေအောက်ရေ၊ မြေအောက်ရေ၊ မြေအောက်ရေ
- မြေအောက်ရေ၊ မြေအောက်ရေ၊ မြေအောက်ရေ၊ မြေအောက်ရေ
- မြေအောက်ရေ၊ မြေအောက်ရေ၊ မြေအောက်ရေ၊ မြေအောက်ရေ

အမည်အောင်စိန်စိန်.....

လိပ်စာလမ်းမတော်.....

MCCM Company Limited ၏ အသေးစားရေနံချက်လုပ်ငန်း၏ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း (EIA) အစီရင်ခံစာအတွက်
ဒေသခံပြည်သူများ၏ သဘောထားအမြင်များနှင့် အကြံပြုချက်များတောင်းခံခြင်း

- အသေးစားရေနံချက်လုပ်ငန်း၏ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း
- အသေးစားရေနံချက်လုပ်ငန်း၏ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း
- အသေးစားရေနံချက်လုပ်ငန်း၏ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း
- အသေးစားရေနံချက်လုပ်ငန်း၏ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း
- အသေးစားရေနံချက်လုပ်ငန်း၏ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း

အမည်စိန်စန်းသန်းစန်း.....

လိပ်စာကျောက်တန်းရွာ.....

MCCM Company Limited ၏ အသေးစားရေနံချက်လုပ်ငန်း၏ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း (EIA) အစီရင်ခံစာအတွက် ဒေသခံပြည်သူများ၏ သဘောထားအမြင်များနှင့် အကြံပြုချက်များတောင်းခံခြင်း

- ၁။ ရုပ်ရွာ ဘာရေး၊ မှာရေး ကိစ္စများတွင် ကမ္ဘာ့ပိုင်ဆောင်ရွက်ရန်။
- ၂။ ကျေးရွာ ဖွံ့ဖြိုးရေးလုပ်ငန်းများတွင် ပါဝင်ကူညီရန်။
- ၃။ စက်မှုပတ်ဝန်းကျင် သန့်ရှင်းရေးအား ဂရုစိုက်ရန်။
- ၄။ ကျေးရွာရှိ လူမှုများတွင် ကလောင်ကိုင်ကန့်သတ်ပေးမှု ပါဝင်ပေးရန်။
- ၅။ စက်မှုကုန်များ ပေးကောင်းပေးသည့် ချွတ်စေရန် ထိန်းသိမ်းပေးရန်။

အမည်စိန်စန်းသန်းစန်း.....

လိပ်စာကျောက်တန်းရွာ.....

MCCM Company Limited ၏ အသေးစားရေနံချက်လုပ်ငန်း၏ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း (EIA) အစီရင်ခံစာအတွက် ဒေသခံပြည်သူများ၏ သဘောထားအမြင်များနှင့် အကြံပြုချက်များတောင်းခံခြင်း

- ကျေးရွာတွင် လမ်းပို့သော အန္တရာယ်များကို ဖြစ်ခြင်း
- လူမှုစစ်ကိုးကွယ်မှု ချစ်ခြင်း
- ကျေးရွာရှိ အစားအသောက်များကို ဖြစ်ခြင်း

အမည်
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လိပ်စာ
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MCCM Company Limited ၏ အသေးစားရေနံချက်လုပ်ငန်း၏ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း (EIA) အစီရင်ခံစာအတွက်

ဒေသခံပြည်သူများ၏ သဘောထားအမြင်များနှင့် အကြံပြုချက်များတောင်းခံခြင်း

- လမ်းဖွဲ့စဉ်၊ ပူးတွဲရှိမည့် ကျွဲကွေးများ ပြုပြင်ထိန်းသိမ်းရန်
- မိမိတို့အကျိုးစီးပွားကို ထိခိုက်စေမည့် အခြေအနေအထားများ ရှိပါက
- မြေသက်သာရေးများကို စစ်ဆေးစစ်ချက်ပြုစာချုပ်ချုပ်ဆိုရန်
- ဒေသခံများ၏ စီးပွားရေး ဖွံ့ဖြိုးရေးကို ထိခိုက်စေမည့် အခြေအနေအထားများ ရှိပါက

အမည်
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လိပ်စာ
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MCCM Company Limited ၏ အသေးစားရေနံချက်လုပ်ငန်း၏ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း (EIA) အစီရင်ခံစာအတွက်

ဒေသခံပြည်သူများ၏ သဘောထားအမြင်များနှင့် အကြံပြုချက်များတောင်းခံခြင်း

- ဒေသခံများ၏ မြေယာများကို ထိခိုက်စေမည့် အခြေအနေအထားများ ရှိပါက
- လူမှုရေး၊ ဘာသာရေး၊ ပြုစုမှုများတွင် ကျွဲကွေးများ ပြုပြင်ထိန်းသိမ်းရန်
- လူမှုရေး၊ ဘာသာရေး၊ ပြုစုမှုများကို ထိခိုက်စေမည့် အခြေအနေအထားများ ရှိပါက

အမည် . ဦးစိုးလင်း

လိပ်စာ . ကျေးရွာကြီးကျေးရွာ

MCCM Company Limited ၏ အသေးစားရေနံချက်လုပ်ငန်း၏ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း (EIA) အစီရင်ခံစာအတွက် ဒေသခံပြည်သူများ၏ သဘောထားအမြင်များနှင့် အကြံပြုချက်များတောင်းခံခြင်း

- ကျေးရွာ သို့မဟုတ် ရေအတွက် ထိန်းသိမ်းစောင့်ရှောက်မှုများ ဆောင်ရွက်ရန်
- အမှိုက်ပျက်စီးမှု၊ စနစ်တကျ စွန့်ပစ်ရန်၊
- ရပ်ရွာကို စွန့်ခွာခြင်းနှင့် အမြဲပါဝင်ရန်၊
- ကျန်းမာရေး၊ စရိတ်များ ဆောင်ရွက်ပေးရန်၊

အမည် . ဦးလှညင်မောင်

လိပ်စာ . အင်းဝကျေးရွာ

MCCM Company Limited ၏ အသေးစားရေနံချက်လုပ်ငန်း၏ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း (EIA) အစီရင်ခံစာအတွက် ဒေသခံပြည်သူများ၏ သဘောထားအမြင်များနှင့် အကြံပြုချက်များတောင်းခံခြင်း

- စက်မှုစွန့်ပစ်မှု ဖြစ်ပေါ်လာသည့် အနံ့၊ အနံ့ထွက်မှုနှင့် ပတ်ဝန်းကျင် ရေအရရှိရန် ဆောင်ရွက်ပေးပါရန်၊
- မော်တော်ယာဉ်များ၊ လူများ၊ ကုန်ပစ္စည်းများ မောင်းနှင်ခြင်းပါရန်၊
- ကျေးရွာအနီးအနား ကျောင်း၊ ဗုဒ္ဓဘုရား၊ စက်မှုထုတ်ကုန်မှုများ၊ အနံ့ထွက်မှုများ၊ ကုန်ပစ္စည်းများပါရန်၊
- ပြန်လည်ထူထောင်မှု၊ အနံ့ထွက်မှု၊ အနံ့ထွက်မှုနှင့် အနံ့ထွက်မှုများ ရေအရရှိရန် စီမံအောင်မြင်ပေးပါရန်၊
- အမှိုက်ပျက်စီးမှုနှင့် အနံ့ထွက်မှုများ ရေအရရှိရန် စီမံအောင်မြင်ပေးပါရန်၊

Appendix (M)
Complaint Form of Grievance Redress Mechanism

မကျေလည်မှုများတိုင်ကြားခြင်း ပုံစံ

အမည် -----

ရက်စွဲ -----

နေရပ် -----

မှတ်ပုံတင် -----

လုပ်ငန်းမှ ဝန်ထမ်းဖြစ်ပါက

ရာထူး -----

မကျေလည်မှုဖြစ်ပွားသည့် နေ့စွဲ၊ အချိန်၊ နေရာ

မကျေလည်မှုဖြစ်ပွားသည့် အကြောင်းအရာအသေးစိတ်

(ပါဝင်သည့် လူပုဂ္ဂိုလ်များ၊ ထိခိုက်သည့်ဖြစ်ရပ်၊ မကျေလည်သည့်အကြောင်းအရာများဖော်ပြရန်)

မကျေမှုကို ဖြေရှင်းပေးစေလိုသည့် အကြံပြုလိုသည့်နည်းလမ်း

တိုင်ကြားသူ လက်မှတ်

Appendix (N)
Social Survey Forms

ကျေးရွာအချက်အလက်ဆိုင်ရာ စစ်တမ်းမေးခွန်းများ

နေ့စွဲ _/_/_/____

ကျေးရွာ _____ ကျေးရွာအုပ်စုအမည် _____
 မြို့နယ်အမည် _____ အုပ်ချုပ်ရေးမှူးအမည် _____

အပိုင်း ၁: ကျေးရွာအုပ်ချုပ်ရေးစီမံခန့်ခွဲမှု
 စီမံခန့်ခွဲမှုဖွဲ့စည်းထားပုံ

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အပိုင်း ၂: လူမှုရေးဆိုင်ရာ အချက်အလက်များ

၁။ အိမ်ထောင်စုအရေအတွက်နှင့်လူဦးရေများ

အရေအတွက်	၂၀၂၂ ခုနှစ်
လူဦးရေ	
အိမ်ထောင်စုများ	

၂။ လူဦးရေအမျိုးအစားခွဲခြားခြင်း

ဖော်ပြချက်များ	လူဦးရေအရေအတွက်	%
၁. လိင်အမျိုးအစား		
- ယောက်ျား		
- မိန်းမ		
၂. အသက်		
- အသက် ၁၈ နှစ်အောက်များ		
- အသက် ၁၈ နှစ်အထက်များ		
- အသက် ၅၅ နှစ်အထက်များ		

ဖော်ပြချက်များ	လူဦးရေအရေအတွက်	%
မှတ်ချက်:		

၃။ ဒေသဆိုင်ရာ အချက်အလက်များ

အမျိုးအစား	အရေအတွက်	တည်နေရာ
ရေရှိနိုင်သောနေရာများ		
အဝီစီတွင်း		
စီးပွားရေးလုပ်ကိုင်နိုင်သောနေရာများ		
လူနေရပ်ကွက်များ		
အပန်းဖြေနေရာများ		
ကျေးရွာအတွင်းတိုင်းရင်းသားမျိုးနွယ်စုများ သီးခြားနေထိုင်နိုင်သောနေရာများ		
ရေနုတ်မြောင်းများ		
အမှိုက်စွန့်ပစ်သည့်နေရာ		
ဈေး		
လက်လီအရောင်းဆိုင်		
စက်ရုံ		
ဘုန်းကြီးကျောင်း		
ခရစ်ယာန်ဘုရားကျောင်း		
ဗလီ		
သင်္ချိုင်း		

အမျိုးအစား	အရေအတွက်	တည်နေရာ
ဆေးရုံ		
ကျန်းမာရေးစင်တာ		
ဆေးဆိုင်		
ကျေးရွာခန်းမ/ဓမ္မရုံ		

၄။ ပညာရေး

ကျောင်းအမျိုးအစား	ကျောင်းအရေအတွက်	ဆရာမအရေအတွက်	ကျောင်းသား/သူအရေအတွက်	ကျေးရွာအတွင်း/အပြင်
၁. မူကြို				
၂. မူလတန်းကျောင်း				
၃. မူလတန်းလွန်ကျောင်း				
၄. အလယ်တန်းကျောင်း				
၅. အလယ်တန်းကျောင်း (ခွဲ)				
၆. အထက်တန်းကျောင်း				
၇. ကိုယ်ပိုင်ကျောင်း				
၈. ဘုန်းတော်ကြီးသင်ပညာရေး				

၅။ ကျေးရွာတွင်ထိခိုက်လွယ်သောလူများ(မသန်စွမ်း)

ထိခိုက်လွယ်သော လူများ	အိမ်ထောင်စုအရေအတွက်	ထိခိုက်လွယ်သူများကို ဘယ်လိုဂရုစိုက်ကြပါသလဲ
၁. မိသားစုတွင် မသန်စွမ်းသူများ		
၂. အသက် ၆၀ ကျော် အိမ်ထောင်ဦးစီးများ		
၃. အမျိုးသမီးဦးဆောင်သောအိမ်ထောင်စုများ		

၄. အိမ်ထောင်စုတွင်တစ်ဦးတည်းသာနေထိုင်သောသူများ		
၅. အိမ်ရာမရှိသူများ		
၆. အခြား		

၆။ တိုင်းရင်းသားမျိုးနွယ်စုများ/ ကိုးကွယ်သည့်ဘာသာ

ဒေသခံတိုင်းရင်းသားမျိုးနွယ်စု	အိမ်ထောင်စု အရေအတွက်	ကိုးကွယ်သည့် ဘာသာ	ဘာသာစကား	စံထားမှု/ ယုံကြည်မှု
၁.				
၂.				
၃.				
၄.				
၅.				

၇။ ဤရွာထဲတွင်မည်ကဲ့သို့သောအဖွဲ့အစည်းများရှိပါသလဲ။

အဖွဲ့အစည်းအမည်	အဖွဲ့ဝင်များ၏အရေအတွက်	စွမ်းဆောင်ချက်များ

အပိုင်း ၃: စီးပွားရေးဆိုင်ရာ အချက်အလက်များ

၈။ အဓိကအလုပ်အကိုင်များ

အဓိကအလုပ်အကိုင်များ	အိမ်ထောင်စုအရေအတွက်
စိုက်ပျိုးရေး	
အရောင်းအဝယ်	
ကုန်သွယ်ရေး	
အစိုးရဝန်ထမ်း	
အထွေထွေလခစားအလုပ်သမား	
ကုမ္ပဏီဝန်ထမ်း	
အခြား	
*အလုပ်လက်မဲ့ပုဂ္ဂိုလ်များ (ကျောင်းပြီးနောက် အရွယ်ရောက်သူများ (သို့) အသက် ၁၈-၆၀ ကြား ရှိသူများ)	

*အလုပ်ခွင်တွင် အလုပ်မလုပ်နိုင်သောအိမ်ရှင်မများနှင့် အသက် ၁၈-၆၀ အရွယ်များ

၉။ ကျေးရွာအတွင်းကျွမ်းကျင် အလုပ်သမားများနှင့် ကျွမ်းကျင်မှုနည်းသော အလုပ်သမားများ၏ အလုပ်အကိုင် အခွင့်အလမ်းနှင့် လစာအခြေအနေများ

အလုပ်အကိုင်	တစ်ရက်ဝင်ငွေ	
	ကျွမ်းကျင်အလုပ်သမား	ကျွမ်းကျင်မှုနည်းသော အလုပ်သမားများ
လူငယ်(ကျား)(အသက် ၁၈-၂၅)		
လူငယ်(မ)(အသက် ၁၈-၂၅)		
လူလတ်(ကျား)(၂၅-၄၅)		
လူလတ်(မ)(၂၅-၄၅)		
လူကြီး(ကျား)(၄၅-နှစ်အထက်)		
လူကြီး(မ) (၄၅-နှစ်အထက်)		

၁၀။ မိုးရာသီနှင့် နွေရာသီတွင် သီနှံစိုက်ပျိုးစနစ်များ (ဆန်စပါး၊ ပြောင်း၊ ငရုတ်၊ ကြက်သွန်နီ၊ ကြက်သွန်ဖြူ၊ ပဲ၊ ရာသီပေါ်သီးနှံများ စသည်)

စိုက်ပျိုးသီးနှံ အမျိုးအစား	စိုက်ပျိုးသောလ	ရိတ်သိမ်းသောလ	ဧရိယာ (ဧက)	ထွက်ရှိမှုပမာဏ

၁၁။ တိရစ္ဆာန်မွေးမြူရေး

တိရစ္ဆာန်အမျိုးအစား	အိမ်ထောင်စု
ဝက်	
ကြက်/ငှက်များ	
ကျွဲ/ခွားများ	
အခြား	

၁၂။ ကျေးရွာ (သို့) ကျေးရွာအနီးနားတွင် ဖွံ့ဖြိုးတိုးတက်ရေးလုပ်ငန်းများရှိပါသလား။ (ရှိ/မရှိ) _____
 ရှိခဲ့လျှင်ဖော်ပြပေးရန်

စီးပွားရေးအမျိုးအစား	ရင်းနှီးမြှုပ်နှံသူ	တည်နေရာ	ဝန်ထမ်းအရေအတွက်	မှတ်ချက်
၁.				
၂.				
၃.				
၄.				

အပိုင်း ၄: ကျန်းမာရေးဆိုင်ရာ အချက်အလက်များ

၁၃။ ကျန်းမာရေးဆိုင်ရာဝန်ဆောင်မှုများ

ဝန်ဆောင်မှု အမျိုးအစား	အရေအတွက်	နေရာ
၁. ဆေးရုံ (အစိုးရ)		
၂. ဆေးရုံ (ပုဂ္ဂလိက)		
၃. ဆေးခန်း		
၄. ဒေသန္တရကျန်းမာရေးဆေးခန်းများ		
၅. ဆေးဆိုင်		
၆. အခြား		

၁၄။ အဖြစ်များသောရောဂါများ

ရောဂါအမျိုးအစားများ	ဖြစ်/ မဖြစ် (ဖြစ်ခဲ့လျှင် အကြိမ်အရေအတွက်)	ရောဂါအမျိုးအစား	ဖြစ်/ မဖြစ် (ဖြစ်ခဲ့လျှင် အကြိမ်အရေအတွက်)
ဝမ်းပျက်ဝမ်းလျှောရောဂါ		အရေပြားယားယံခြင်း	
ဝမ်းကိုက်ရောဂါ		ငှက်ဖျားရောဂါ	

ရောဂါအမျိုးအစားများ	ဖြစ်/ မဖြစ် (ဖြစ်ခဲ့လျှင် အကြိမ်အရေအတွက်)	ရောဂါအမျိုးအစား	ဖြစ်/ မဖြစ် (ဖြစ်ခဲ့လျှင် အကြိမ်အရေအတွက်)
မျက်စိနာရောဂါ		အသက်ရှူလမ်းကြောင်းဆိုင်ရာရောဂါ	
အူရောင်ငန်းဖျားရောဂါ		သွေးလွန်တုပ်ကွေးရောဂါ	
အစာအိမ်ရောဂါ		တီဘီရောဂါ	
ကိုဗစ်-၁၉ ရောဂါ		အခြား	

အပိုင်း ၅: အခြေခံအဆောက်အအုံ

၁၅။ ရေအရင်းအမြစ်အသုံးချမှုများနှင့် ထောက်ပံ့ပေးမှုများ

က။ အိမ်သုံးရေအရင်းအမြစ်: _____

ပမာဏ/လုံလောက်မှု/အရည်အသွေး: _____

ခ။ သောက်သုံးရေရေအရင်းအမြစ်: _____

ဂ။ ရေရှားပါးမှုပြဿနာများရှိပါသလား။ (ရှိ/မရှိ) _____

အကယ်၍ရှိခဲ့လျှင် မည်သို့ဖြေရှင်းခဲ့သည့်ကို ဖော်ပြပါ။ _____

ဥပမာ။ ။ တွင်းရေ/ သဘာဝ ရေအရင်းအမြစ်များ (မြစ်၊ ချောင်း စသည့် သောက်ရေ နှင့် သုံးရေ အတွက် ထောက်ပံ့ပေးခြင်းများ)

ပမာဏ/ လုံလောက်မှု/အရည်အသွေး: _____

ဃ။ ဧရာဝတီမြစ်ရေကို အသုံးပြုမှုရှိ/ မရှိ - _____

င။ ရှိခဲ့လျှင် မည်သို့အသုံးပြုသနည်း။ _____

၁၆။ သယ်ယူပို့ဆောင်ရေး

က။ ရွာ/ ရပ်ကွက်တွင် အများဆုံးအသုံးပြုသောယာဉ်အမျိုးအစားများကို နံပါတ်စဉ်လိုက်ဖော်ပြပါ။

၁။ _____ ၃။ _____

၂။ _____ ၄။ _____

ခ။ ရွာ/ရပ်ကွက်လမ်းအမျိုးအစား (ဥပမာ။ မြေသားလမ်း၊ ကျောက်ခင်းလမ်း၊ ကွန်ကရစ်လမ်း)

၁၇။ လျှပ်စစ်ဓာတ်အား

က။ ဤရွာ/ရပ်ကွက်တွင် လျှပ်စစ်ဓာတ်အား ရရှိမှုရှိပါသလား။ (ရှိ/မရှိ) _____

ခ။ ရရှိခဲ့လျှင် မည်သည့်နေရာမှ ရယူပါသလဲ။ _____

၁၈။ စွမ်းအင်အရင်းအမြစ်

ထမင်းဟင်းချက်ပြုတ်သောအခါ ဘယ်လိုစွမ်းအင်အရင်းအမြစ်ကို အသုံးပြုပါသလဲ။

(က) လျှပ်စစ် (ခ) ထင်း (ဂ) မီးသွေး (ဃ) ဖွဲ (င) ဂတ်စ် အခြား _____

အပိုင်း ၆: ကျေးရွာမြေအသုံးချမှုများ

၁၉။ ကျေးရွာ/ ရပ်ကွက်မြေဧရိယာ

၁) စုစုပေါင်းခန့်မှန်းကျေးရွာမြေ _____ ဧက

၂) လူနေဧရိယာ _____ ဧက

၃) လယ်/ယာမြေဧရိယာ _____ ဧက

၄) မြဲမြံ _____ ဧက

၅) စားကျက်မြေ _____ ဧက

၆) ပြည်သူပိုင်မြေ _____ ဧက

၇) အသုံးမချသောမြေဧရိယာ _____ ဧက

၈) သစ်တောမြေဧရိယာ _____ ဧက

၉) အခြားမြေများ _____ ဧက

အပိုင်း ၇: ရိုးရာယဉ်ကျေးမှု အခန်းကဏ္ဍများ

၂၀။ ရိုးရာယဉ်ကျေးမှုနှင့်ဆိုင်သောနေရာများ

၁) သမိုင်းဝင်နေရာများ

၂) ရှေးဟောင်းယဉ်ကျေးမှုဆိုင်ရာနေရာများ

၃) ဘာသာရေးဆိုင်ရာနေရာများ

အပိုင်း ၈: အမြင်ပိုင်းဆိုင်ရာ အခန်းကဏ္ဍများ

၂၁။ အလှအပဆိုင်ရာရှုမြင်ကွင်းများ

၁) ခရီးသွားများကိုဆွဲဆောင်နိုင်သောနေရာများ _____

၂) မြင်ကွင်းအားဖြင့် အရေးကြီးသည့် နေရာများ _____

ကျေးရွာ/ ရပ်ကွက်ဖွံ့ဖြိုးရေးအတွက် ဦးစားပေးလိုအပ်ချက်များ

စီမံကိန်းအကြောင်းသိပါသလား။ မည်သို့သိရှိပါသနည်း။ (သူငယ်ချင်း၊ မိတ်ဆွေ၊ ကိုယ်တိုင်မျက်မြင်သိရှိ၊ အခြား)

စီမံကိန်းအကြောင်းနှင့် ထိုစီမံကိန်းကြောင့် ဖြစ်ပေါ်လာနိုင်သော လူမှုဝန်းကျင်ထိခိုက်မှုအပေါ် မည်မျှသိရှိထားပါသနည်း။

စီမံကိန်းဖြစ်ပေါ်လာမှုကို သဘောကျပါသလား။ စီမံကိန်းအပေါ် မျှော်မှန်းချက်များအကြောင်းကို ဖော်ပြပါ။

အပိုင်း ၉: ဒေသမျိုးရင်း၊ မျိုးစိတ်များ

၂၂။ စီမံကိန်းဧရိယာတွင် ယခင်က အသုံးပြုခဲ့သည့် မြေယာအသုံးချမှုများကို ဖော်ပြပါ။

၂၃။ တိရစ္ဆာန်များ

၁. လွန်ခဲ့တဲ့ ၁၀ နှစ်အတွင်း ရှိခဲ့ပြီး ယခုမတွေ့ရတော့သော တိရစ္ဆာန်မျိုးစိတ်များကို ဖော်ပြပါ။

၂. ယခင်ကမရှိပဲ ယခုတွေ့လာရသော တိရစ္ဆာန်မျိုးစိတ်များကို ဖော်ပြပါ။ _____

၃. ဤဒေသတွင် တားမြစ်ထားသော တိရစ္ဆာန်မျိုးစိတ်များကို ဖော်ပြပါ။ _____

၄. ဤဒေသတွင် အများဆုံးတွေ့ရလေ့ရှိသော တိရစ္ဆာန်မျိုးစိတ်များကို ဖော်ပြပါ။ _____

၂၄။ အပင်များ

၁. လွန်ခဲ့တဲ့ ၁၀ နှစ်အတွင်း ရှိခဲ့ပြီး ယခုမတွေ့ရတော့သော အပင်များကို ဖော်ပြပါ။

၂. ဤဒေသတွင် ခုတ်ရန်တားမြစ်ထားသော/ ထိန်းသိမ်းထားသော အပင်ကြီးများရှိပါက ဖော်ပြပါ။

၃. ဤရွာတွင် စီးပွားဖြစ် ဥယျာဉ်စိုက်ခင်းများရှိပါသလား။ (ရှိ/ မရှိ) _____

၄. ဥယျာဉ်စိုက်ခင်းရှိလျှင် အမျိုးအစားကိုဖော်ပြပါ။ _____

၅. ဤဒေသတွင် ဆေးဝါးအဖြစ်အသုံးဝင်သော အပင်များတွေ့ရှိရပါသလား။ (ရှိ/မရှိ) _____

၆. ရှိလျှင်အပင်၊ အမျိုးအစားများကို ဖော်ပြပေးပါ။ _____

အပိုင်း ၁၀: သဘာဝဘေးအန္တရာယ်ဆိုင်ရာအချက်အလက်များ

၂၅။ ယခင်က မိုးများခြင်းကြောင့် ရေကြီး၊ရေလျှံခြင်းများဖြစ်ပွားပါသလား။ ဖြစ်ပွားလျှင် မည်သည့်နှစ်များတွင် ဖြစ်ခဲ့ပါသလဲ။ _____

၂၆။ ယခင် မြေပြိုမှုများဖြစ်ပွားပါသလား။ ဖြစ်ပွားလျှင် မည်သည့်နှစ်များတွင် ဖြစ်ခဲ့ပါသလဲ။

၂၇။ ယခင်က ငလျင်လှုပ်ခတ်မှုများဖြစ်ပွားပါသလား။ ဖြစ်ပွားလျှင် မည်သည့်နှစ်များတွင် ဖြစ်ခဲ့ပါသလဲ။

ဖြေဆိုသူအမည် -

ဖြေဆိုသူဖုန်းနံပါတ် -

ဖြေကြားပေးမှုအား အထူးကျေးဇူးတင်ရှိပါသည်။

Appendix (O)

Approval Letter for Technological Rule and Safety

ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော်အစိုးရ
လျှပ်စစ်နှင့်စွမ်းအင်ဝန်ကြီးဌာန
မြန်မာ့ရေနံဓာတုဗေဒလုပ်ငန်း
နေပြည်တော်

Tel: 067- 411059 ; Fax: 067- 411094 စာအမှတ်၊ ၁၅၀၄(၅)/ရေနံ-၃၀/၂၀၁၈-၂၀၁၉(၁၈၅၄)
E-mail : mpeict@gmail.com ရက်စွဲ ၊ ၂၀၁၉ ခုနှစ်၊ မေလ ၁၃ ရက်

သို့

MCCM Co.Ltd

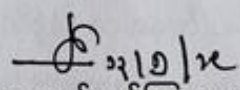
အကြောင်းအရာ။ အသေးစားရေနံချက်လုပ်ခြင်းလုပ်ငန်း(Mini Refinery)လုပ်ကိုင်ဆောင်ရွက်
ခွင့်ပြုပါရန် အဆိုပြုလျှောက်ထားခြင်းကိစ္စ

ရည်ညွှန်းချက် ။ MCCM Co.Ltd ၏ ၆- ၁၁ -၂၀၁၈ ရက်စွဲပါ စာအမှတ် ၁-၂/ MCCM-
၂၀၁၈ လျှောက်လွှာနှင့်ပူးတွဲပါ Technical Proposal စာအုပ်

၁။ MCCM Co.,Ltd သည် မန္တလေးတိုင်းဒေသကြီး၊ မြင်းခြံခရိုင်၊ တောင်သာမြို့နယ်၊ ကျောစီ
ကျေးရွာမြေနေရာတွင် အသေးစားရေနံချက်လုပ်ခြင်းလုပ်ငန်း (Mini Refinery) လုပ်ကိုင်ဆောင်
ရွက်ခွင့်ပြုပါရန် မြန်မာ့ရေနံဓာတုဗေဒလုပ်ငန်းမှ သတ်မှတ်ထားသော နည်းပညာပိုင်းဆိုင်ရာ
အချက်အလက်များနှင့် စာရွက်စာတမ်း များ၊ Layout Drawing ၊ Detail Process Flow Diagram ၊
Equipment Detail Drawing ၊ Equipment List ၊ Pump List များပူးတွဲလျက် ရည်ညွှန်း
ချက်ပါစာဖြင့် တင်ပြလျှောက် ထားလာပါသည်။

၂။ ကုမ္ပဏီမှ အဆိုပြုတင်ပြလာသော နည်းပညာပိုင်းဆိုင်ရာ အချက်အလက်များနှင့်
စာရွက်စာတမ်းများ၊ Layout Drawing ၊ Detail Process Flow Diagram ၊ Equipment Detail
Drawing ၊ Equipment List ၊ Pump List များစိစစ်ခဲ့ရာ မြန်မာ့ ရေနံဓာတုဗေဒလုပ်ငန်းမှ
သတ်မှတ်ထားသော နည်းပညာပိုင်းဆိုင်ရာ စည်းကမ်းချက်များနှင့်ပြည့်စုံပြီး ဘေးအန္တရာယ်
ကင်းရှင်းရေးအတွက်လိုက်နာရမည့်အစီအမံများကိုလည်းစနစ်တကျ တည်ဆောက်တပ်ဆင်
မည်ဖြစ် ကြောင်းနှင့် လိုအပ်သောစာရွက်စာတမ်းအထောက်အထား များလည်းပြည့်စုံကြောင်း
စစ်ဆေးတွေ့ရှိရပါသည်။

၃။ သို့ဖြစ်ပါ၍ MCCM Co.Ltd အနေဖြင့် အဆိုပြုတင်ပြထားသည့် နည်းပညာ ပိုင်းဆိုင်ရာ အချက်အလက်များနှင့် စာရွက်စာတမ်းများ၊ Layout Drawing ၊ Detail Process Flow Diagram ၊ Equipment Detail Drawing ၊ Equipment List ၊ Pump List များအတိုင်း တည်ဆောက်မည်ဆိုပါက သက်ဆိုင်ရာဌာနများမှ တည်ဆောက်ခွင့်ရယူပြီး ရေနံယိုစိမ့်မှု မဖြစ် ပွားစေရေးအစီအမံနှင့် သဘာဝပတ်ဝန်းကျင်ထိခိုက်မှု အစီအမံများရေးဆွဲလိုက်နာ ဆောင်ရွက် သွားလျှင် လျှပ်စစ်နှင့်စွမ်းအင်ဝန်ကြီးဌာန၊ မြန်မာ့ရေနံဓာတုဗေဒလုပ်ငန်းအနေဖြင့် အသေးစား ရေနံချက်လုပ်ခြင်း လုပ်ငန်းလိုင်စင်အား ခွင့်ပြုထုတ်ပေးနိုင်ပါသဖြင့် လိုအပ်သလို ဆက်လက် ဆောင်ရွက်နိုင်ပါရန် အကြောင်းကြားပါသည်။


 ဦးဆောင်ညွှန်ကြားရေးမှူး(ကိုယ်စား)
 (နေလင်း၊ ညွှန်ကြားရေးမှူး-ကုန်ထုတ်)

မိတ္တူကို

- လျှပ်စစ်နှင့်စွမ်းအင်ဝန်ကြီးဌာန
- မန္တလေးတိုင်းဒေသကြီးအစိုးရအဖွဲ့
- ရေနံနှင့်သဘာဝဓာတ်ငွေ့စီမံရေးဦးစီးဌာန
- ရေနံနှင့်ရေနံထွက်ပစ္စည်း ဆိုင်ရာလုပ်ငန်းများ ထိန်းသိမ်းကြီးကြပ်ရေးဆပ်ကော်မတီ
(မန္တလေးတိုင်းဒေသကြီး)
- ရုံးလက်ခံ

Appendix (P)
Material Safety Certificate

**QINGDAO SANHUAN COLORCHEM CO., LTD.**

RM2301, BUILDING 4, PENGLINANHUA Plaza,
12 LIAOYANG EAST ROAD, QINGDAO, CHINA
EMAIL: michael@cncolorchem.com

TEL: 0086 532 88978177/88978188
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WEBSITE: www.cncolorchem.com

MATERIAL SAFETY DATA SHEET**Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION**

Product Name: SOLVENT GREEN 5

Color Index Name: SOLVENT GREEN 5

Chemical Formula: C₃₀H₂₈O₄

Molecular Weight: 452.54

CAS No.: 79869-59-3

Manufacturer Identification:

QINGDAO SANHUAN COLORCHEM CO., LTD.

RM 2301, BUILDING 4, PENGLINANHUA PLAZA, 12 LIAOYANG EAST ROAD,
QINGDAO, CHINA

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Email: michael@cncolorchem.com

Section 2 - COMPOSITION, INFORMATION ON INGREDIENTS

Ingredient	CAS No.	Content%	Hazardous
SOLVENT GREEN 5	79869-59-3	100	No

Section 3 - HAZARDS IDENTIFICATION**Emergency Overview**

Color: GREEN

Form: Powder

Odor: Odorless

Target Organs: None

Most Important Hazards: Harmful if swallowed. May cause stomach discomfort. Respiratory Irritation. May cause irritation to eyes. May cause skin irritation in sensitive individuals. Possible risks of Irreversible effects.

Potential Health Effects

Eye: Dust may cause irritation and inflammation

Skin: Prolonged or repeated contact may cause skin irritation

Ingestion: Harmful if swallowed. May cause gastrointestinal irritation with nausea, vomiting and diarrhea.

Inhalation: May cause irritation of the respiratory tract.

Chronic Effects of Exposure

None known



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Section 4 - FIRST AID MEASURES

Eye: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid immediately.

Skin: Get medical aid if irritation develops or persists. Flush skin with plenty of soap and water.

Ingestion: If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.

Inhalation: Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid immediately.

Notes to Physician: Treat symptomatically and supportively.

Section 5 - FIRE FIGHTING MEASURES

General Information

As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritation and highly toxic gases may be generated by thermal decomposition or combustion.

Extinguishing Media

Use agent most appropriate to extinguish fire. (Water, Foam, Dry Chemical)

Autoignition Temperature: Not available

Flash Point: Not available

NFPA Rating: Not Published.

Explosion Limits Lower: Not available

Explosion Limits Upper: Not available

Section 6 - ACCIDENTAL RELEASE MEASURES

General Information

Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks

Vacuum or sweep up material and place into a suitable disposal container. Clean up spills immediately, observing precautions in the Protective Equipment section. Avoid generating dusty conditions.



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Section 7 - HANDLING AND STORAGE

Handling

Approved respirator. Chemical safety goggles. Rubber gloves. Use only in chemical fume hood. Safety shower and eye-bath. Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Avoid ingestion and inhalation.

Storage

Preserve in tight and light-resistant containers. Store in a cool, dry place. Keep containers tightly closed.

Section 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION

Engineering Controls

Equipped with an eyewash facility and a safety shower. Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels.

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to minimize contact with skin.

Respirators: Wear an approved respirator when necessary.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Solid

Appearance: Green powder

Odor: odorless

Vapor Pressure: Negligible.

Vapor Density: Not available.

Evaporation Rate: Negligible.

Viscosity: Not available.

Boiling Point: Not applicable.

Freezing/Melting Point: Not available.

Autoignition Temperature: Not applicable.

Flash Point: Not applicable.

Decomposition Temperature: No information.

Explosion Limits Lower: Not available.

Explosion Limits Upper: Not available.

Specific Gravity/Density: Not available.



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Molecular Formula: C₃₀H₂₈O₄

Molecular Weight: 452.54

Section 10 - STABILITY AND REACTIVITY

Chemical Stability: Stable under normal temperatures and pressures.

Conditions to Avoid: Incompatible materials, excess heat, strong oxidants.

Incompatibilities with Other Materials: Strong Oxidizing agent, strong reducing agent.

Hazardous Decomposition Products: Irritating and toxic fumes and gases

Hazardous Polymerization: Will not occur.

Section 11 - TOXICOLOGICAL INFORMATION

RTECS#: Unlisted

LD50/LC50:

Carcinogenicity: Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.

Epidemiology: No information present.

Teratogenicity: No information present.

Neurotoxicity: No information present.

Mutagenicity: Mutagenicity data reported.

Other Studies: See actual entry in RTECS for complete information.

Acute effects may be harmful by inhalation, ingestion, or skin absorption.

Cause eye and skin irritation. Material is irritating to mucous membranes and upper respiratory tract. To the best of our knowledge, the chemical, physical and toxicological properties have not been thoroughly investigated.

Section 12 - ECOLOGICAL INFORMATION

No information available.

Section 13 - DISPOSAL CONSIDERATIONS

Waste Disposal Method

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.



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Section 14 - TRANSPORT INFORMATION

This product is not hazardous under the applicable DOT, ICAO/IATA, or IMDG regulations.

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable

Section 15 - REGULATORY INFORMATION

European/International Regulations

US FEDERAL

Canada

WGK

Non hazardous chemical, no special labeling is required.

Section 16 - ADDITIONAL INFORMATION

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.