



ENVIRONMENTAL IMPACTS ASSESSMENT
of
The Construction and Operation of Sugar Factory (1)
Near
Hsen Taw Village, Ko Hsaing Village Tract Area,
Mong Yai Township, Shan State
by
Than Daung Oo Co., Ltd



(Myanmar Environment Sustainable Conservation)

February, 2024



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ACRONYMS AND ABBREVIATION

ADB	Asian Development Bank
ASEAN	Association of South-East Asian Nations
BAT	Best Available Technology
BOD	Biochemical Oxygen Demand
CHS	Community Health and Safety
CGM	Complaints and Grievances Mechanism
CIA	Cumulative Impact Assessment
CIM	Cumulative Impact Management
COD	Chemical Oxygen Demand
CSR	Corporate Social Responsibility
dBA	Decibel A- weighting
ECD	Environmental Conservation Department
EHS	Environmental Health and Safety
EIA	Environmental Impact Assessment
EITI	Extractive Industry Transparency Initiative
EMP	Environmental Management Plan
EPS	Environmental Performance Standards
ESP	Electro Static Precipitator
EU	European Union
FD	Forest Department
FGD	Focal Group Discussion
GBH	Girth at Breast Height
GDP	Gross Domestic Products
GHGs	Green House Gases (Glass House Gases)
GIS	Geographic Information System
ID	Identity Card
IEE	Initial Environmental Examination
IFC	International Finance Corporation
IEA	International Energy Agency
ILO	International Labour Organization
ISO	International Standard Organization
IUCN	International Union for Conservation of Nature and Natural Resources

KII	Key Informant Interview
kWh	Kilo Watt Hour
L&FS	Life & Fire Safety
MESC	Myanmar Environment Sustainable Conservation
MIC	Myanmar Investment Commission
MMSP	Management and Monitoring Sub-Plans
MOECA	Ministry of Environmental Conservation and Forestry
MONREC	Ministry of Natural Resources and Environmental Conservation
MP	Monitoring Plan
NCEA	National Commissions of Environmental Affairs
NECC	National Environmental Conservation Committee
NECCCC	National Environmental Conservation and Climate Change Central Committee
NEQ	National Environmental Quality
NGO	Non-Government Organization
NO ₂	Nitrogen Dioxide
OEHD	Occupational Environmental Health Division
OHS	Occupational Health and Safety
PEB	Payment for Ecosystem Benefits
PES	Payment for Ecosystem Services
PM	Particulate Matter
PM _{2.5-10}	Particulate Matter between 2.5-10 microns
PPE	Personnel Protection Equipment
RSPM	Respiratory Suspended Particulate Matter
5Rs	Reduce, reuse, recover, recycle and redesign
SIA	Social Impact Assessment
SO ₂	Sulphur Dioxide
SPM	Suspended Particulate Matter
SS	Secondary Source
STD	Sexually Transmitted Diseases
TDS	Total Dissolved Solids
TSS	Total Suspended Solid
TSPM	Total Suspended Particulate Matter
VESC	Valued Environmental and Social Component
WHO	World Health Organization

အကျဉ်းချုပ်အစီရင်ခံစာ

ဤအရာသည် သံတောင်ဦးကုမ္ပဏီလီမိတက်မှ ပြုလုပ်သော ရှန်တော်ကျေးရွာအနီး၊ ခိုဆိုင်းကျေးရွာအုပ်စု၊ မိုင်းရယ်မြို့နယ်၊ ရှမ်းပြည်နယ်တွင် သကြားစက်ရုံတည်ဆောက်ခြင်းနှင့် စီမံကိန်းလည်ပတ်ခြင်း၏ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း(EIA) အတွက် ဖြစ်သည်။

သံတောင်ဦးကုမ္ပဏီသည် မြန်မာ့ရင်းနှီးမြှုပ်နှံမှုကော်မရှင်မှ ခွင့်ပြုမိန့်ရရှိထားပြီးဖြစ်ပါသည်။ (ခွင့်ပြုမိန့်အမှတ် ၂၀၉/၂၀၁၉၊ ရက်စွဲ။ ၂၇၊ နိုင်းဝင်ဘာလ၊ ၂၀၁၉)

အဆိုပါသကြားစက်ရုံစီမံကိန်းအတွက် နယ်ပယ်အတိုင်းအတာသတ်မှတ်ခြင်း (Scoping) အစီရင်ခံစာနှင့် လုပ်ဆောင်ရမည့်လုပ်ငန်းတာဝန်များ (TOR) ကို သက်ဆိုင်ရာဌာနသို့ တင်ပြခဲ့ပြီး ဖြစ်ပါသည်။ အဆိုပါနယ်ပယ်အတိုင်းအတာ သတ်မှတ်ခြင်း (Scoping) အစီရင်ခံစာကို သက်ဆိုင်ရာဌာနမှ ၁၅-၂-၂၀၂၃ တွင် အတည်ပြုခဲ့ပြီးဖြစ်ပါသည်။ (စာအမှတ်၊ အီးအိုင်အေ-၁/၇/အတည်ပြု (SR) (၄၃၃/၂၀၂၃)၊ ရက်စွဲ။ ၁၅-၂-၂၀၂၃

ဤပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း (EIA) အစီရင်ခံစာသည် နယ်ပယ်အတိုင်းအတာ သတ်မှတ်ခြင်း (Scoping) အစီရင်ခံစာနှင့် လုပ်ဆောင်ရမည့်လုပ်ငန်းတာဝန်များ (TOR) ပြီးနောက် နောက်ထပ်တင်ပြသော အစီရင်ခံစာဖြစ်သည်။

စီမံကိန်းအဆိုပြုတင်ပြသူ

သံတောင်ဦးကုမ္ပဏီလီမိတက်သည် ၁၅-၆-၂၀၁၈ ခုနှစ်တွင် တရားဝင် မှတ်ပုံတင်ထားသော ကုမ္ပဏီတစ်ခု ဖြစ်သည်။ (ကုမ္ပဏီမှတ်ပုံတင်အမှတ်- ၂၃၃/၂၀၁၈-၁၉ (မန္တလေး) ရင်းနှီးမြှုပ်နှံမှုနှင့် ကုမ္ပဏီများ ညွှန်ကြားမှုဦးစီးဌာန၊ အမျိုးသားစီမံကိန်းနှင့် စီပွားရေးဖွံ့ဖြိုးတိုးတက်မှုဝန်ကြီးဌာန)။ မှတ်ပုံတင်အမှတ် အသစ်မှာ ၁၁၇၈၀၀၉၃၈ ဖြစ်သည်။

- စီမံကိန်းအဆိုပြုတင်ပြသူ - သံတောင်ဦးကုမ္ပဏီလီမိတက်
- ရုံးချုပ် (မန္တလေး) - အမှတ် ၆၀၈၊ ၇၈ လမ်း၊ ၂၆x၂၇ လမ်းကြား၊ ဟေမာလေရပ်ကွက်၊ ချမ်းအေးသာဇံမြို့နယ်၊ မန္တလေးတိုင်းဒေသကြီး
- ဖုန်း - ၀၉- ၈၉၁၀၀၀၉၈၈၊ ၀၉- ၈၉၁၀၀၀၉၈၉
- အီးမေးလ် - thandaungoo.info@gmail.com
- ဆက်သွယ်ရန်လူပုဂ္ဂိုလ် - ဦးလင်းသိန်းအောင် (အုပ်ချုပ်မှုမန်နေဂျာ)
- ဖုန်း - ၀၉-၉၇၇၁၅၅၁၃၃၆၊ ၀၉-၄၄၄၀၀၂၆၀၀

- အီးမေးလ် - lintheinaung777@gmail.com
- စီမံကိန်းတည်နေရာ - ရှန်တော်ကျေးရွာ၊ ခိုဆိုင်းကျေးရွာအုပ်စု၊ မိုင်းရယ်မြို့နယ်၊ လားရှိုးခရိုင်၊ ရှမ်းပြည်နယ်မြောက်ပိုင်း (၎င်းသည် သီပေါ-မိုင်းရယ် လမ်းမကြီး၏ တောင်ဘက် ၇ မိုင်အကွာ၊ မိုင်တိုင်အမှတ် ၃၇/၂)
- ကိုဩဒိနိတ် - မြောက်လတ္တီတွဒ် ၂၂ ဒီဂရီ ၂၀ မိနစ် ၄၂.၃၇ စက္ကန့်၊ အရှေ့လောင်ဂျီတွဒ် ၉၇ ဒီဂရီ ၅၃ မိနစ် ၅၁.၄၇ စက္ကန့်
- ဖုန်း (စီမံကိန်းတည်နေရာ) - ၀၉ ၄၄၆၇၈၁၈၀

ကုမ္ပဏီတွင် အလုပ်အမှုဆောင်နှင့် အုပ်ချုပ်မှုအဖွဲ့များ (၁၁)ယောက် ပါဝင်သည်။ ဦးသိန်းမြင့် (ခေါ်) ချောင်ဖင် (အုပ်ချုပ်မှု ဒါရိုက်တာ)၊ ဦးကျော်မြင့်ဦး၊ ဦးကျော်ရှိန်၊ ဦးကျော်ဝေ (ခေါ်) စန်းဝေဟွာ၊ ဦးအိုက်မောင် (ခေါ်) လီစွမ်ရီ၊ ဦးမျိုးမြင့်အောင်၊ ဦးစိန်မျိုးအောင်၊ ဦးရှိပြင်ရင်၊ ဦးသိန်းထွန်း၊ ဦးထွန်းဝင်းနှင့် ဦးရေချမ်း တို့မှာ ဒါရိုက်တာများ ဖြစ်ကြသည်။

အတိုင်ပင်ခံအဖွဲ့အစည်း Myanmar Environment Sustainable Conservation (MESC) Co., Ltd အကြောင်း

မြန်မာ့ပတ်ဝန်းကျင် ရေရှည်တည်တံ့ရန်ထိန်းသိမ်းရေး ကုမ္ပဏီလီမိတက် (MESC) သည် အမျိုးသားစီမံကိန်းနှင့်စီးပွားရေးဖွံ့ဖြိုးတိုးတက်မှုဝန်ကြီးဌာနတွင် --- စာအမှတ်။ ရက-စ (၀) ၀၀၁/၂၀၁၄ (၀၀၄၇၂၀)၊ ရက်စွဲ။ ၆-၆-၂၀၁၄၊ မှတ်ပုံတင်လက်မှတ်အမှတ် ၈၃၀/၂၀၁၄-၂၀၁၅ (၂၀-၅-၂၀၁၄)ဖြင့် ၂၀၁၄ ခုနှစ်၌ တရားဝင်မှတ်ပုံတင်ထားသော အတိုင်ပင်ခံအဖွဲ့အစည်းတစ်ခု ဖြစ်သည်။

အတိုင်ပင်ခံအဖွဲ့အစည်း မြန်မာ့ပတ်ဝန်းကျင် ရေရှည်တည်တံ့ရန် ထိန်းသိမ်းရေးကုမ္ပဏီလီမိတက် (MESC)၏ ကြားကာလ ယာယီလိုင်စင်အမှတ်သည် ၀၀၀၃ ဖြစ်သည်။ (ရက်စွဲ။ ၁-၇-၂၀၁၇၊ ECD)

- ဆက်သွယ်ရန်လိပ်စာ - အခန်း(၅-ခ)၊ တိုက်အမှတ်(၆၇/၆၉)၊ ပါရမီလမ်း၊ (၁၆)ရပ်ကွက်၊ လှိုင်မြို့နယ်၊ ရန်ကုန်တိုင်းဒေသကြီး
- ဆက်သွယ်ရန် ပုဂ္ဂိုလ် - ဦးမြင့်ကျော်သူရ
- ဖုန်း - +၉၅ ၉ ၄၂၀၁၀၅၀၇၁
- ဆက်သွယ်ရန် ဖုန်းနံပါတ် - +၉၅ ၉ ၇၃၀၄၄၉၀၃
- အီးမေးလ် - myanmar.esc@gmail.com

အမည်	နိုင်ငံသားနှင့် နိုင်ငံသား မှတ်ပုံတင် အမှတ်	ECD မှတ်ပုံတင် အမှတ်	ကျွမ်းကျင်ဘာသာရပ်
ဦးမြင့်ကျော်သူရ M.Sc (သတ္တဗေဒ)	မြန်မာ ၁၂/ ဒဂတ(နိုင်) ၀၂၈၃၄၉	၀၀၀၆	ဂေဟစနစ်နှင့်ဇီဝမျိုးစုံမျိုးကွဲ လူမှုရေးဆိုင်ရာ သရုပ်ခွဲဆန်းစစ်ခြင်းနှင့် လေ့လာခြင်း၊ အထွေထွေ ပတ်ဝန်းကျင် စီမံခန့်ခွဲခြင်း
ဦးစောဟန်ရှိန် B.Sc (ရုက္ခဗေဒ) M.Sc(အက္ခရာဝါဏိဗေဒ)	မြန်မာ ၁၀/ မလမ(နိုင်) ၀၀၈၁၇၃	၀၀၀၇	ဂေဟစနစ်နှင့်ဇီဝမျိုးစုံမျိုးကွဲ၊ ဘေးအန္တရာယ်ရှိမှု ဆန်းစစ်ခြင်းနှင့် ဘေးအန္တရာယ် စီမံခန့်ခွဲခြင်း၊ ရေထု ညစ်ညမ်းမှုကြိုတင်ကာကွယ်ခြင်း၊ ထိန်းချုပ်ခြင်း၊ စောင့်ကြပ်ကြည့်ရှုခြင်းနှင့် ထိခိုက်မှုကြိုတင်ခန့်မှန်းခြင်း
ဦးတင်ထွန်းအောင် B.Sc (Engineering)	မြန်မာ ၁၂/ ဥတမ(နိုင်) ၁၇၂၁၁၁	၀၀၀၉	လေထုညစ်ညမ်းမှုစောင့်ကြပ်ကြည့်ရှုခြင်း
ဦးသန်းစိုးဦး M.Sc (သစ်တော)	မြန်မာ ၉/ မနမ (နိုင်) ၀၅၀၈၀၈	၀၀၀၁၁	မြေအသုံးချမှု၊ သဘာဝသယံဇာတစီမံအုပ်ချုပ်ခြင်း (သစ်တော)
ဦးဥက္ကာကျော်သူ (ဘူမိဗေဒ) B.Sc	မြန်မာ ၇/ ရတရ (နိုင်) ၀၉၀၃၇၁	၀၀၀၁၂	ဘူမိဗေဒဆိုင်ရာဆန်းစစ်လေ့လာခြင်း၊ မြေဆီလွှာထိန်းသိမ်းခြင်း
ဒေါ်သင်းသင်းရီ B.Sc (ဓာတုဗေဒ)	မြန်မာ ၁၂/ သယက(နိုင်) ၀၃၉၂၉၂	၀၀၀၁၃	လေထုညစ်ညမ်းမှုကြိုတင်ကာကွယ်ခြင်းနှင့် ထိန်းချုပ်ခြင်း၊ ဆူညံသံနှင့်တုန်ခါမှု၊ မိုးလေဝသနှင့် လေအရည်အသွေး ဆန်းစစ်ခြင်းနှင့် ကြိုတင် ခန့်မှန်းခြင်း၊ ဇလဗေဒ၊ မြေပေါ်ရေနှင့် မြေအောက်ရေ ထိန်းသိမ်းခြင်း
ဒေါက်တာထင်သော်ကောင်း M.B.B.S	မြန်မာ ၁၃/ဘအန (နိုင်) ၂၂၂၇၂၃	အချိန်ပိုင်း	လုပ်ငန်းခွင်ကျန်းမာရေးနှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေး

ဒေါ်သီသီစန်း L.L.B	မြန်မာ ၁၂/သကတ (နိုင်) ၁၅၀၄၂၄	အချိန်ပိုင်း	ဥပဒေရေးရာလေ့လာမှုနှင့် သရုပ်ခွဲ ဆန်းစစ်ခြင်း
ဦးသူရကို B.A (History)	မြန်မာ ၁၂/ကမန (နိုင်) ၁၂၄၈၂၄	၀၀၂၇၇	လူမှုရေးဆိုင်ရာ သရုပ်ခွဲဆန်းစစ်ခြင်းနှင့် လေ့လာခြင်း၊ ရှေးဟောင်းသုတေသနနှင့် ယဉ်ကျေးမှုအမွေအနှစ်၊ ဆူညံသံနှင့် တုန်ခါမှု
ဒေါ်နင်းနုအောင် M.Sc (Environmental Planning and Mangement) B.E (Materials and Metallurgy)	မြန်မာ ၈/မကန (နိုင်) ၂၀၄၃၇၀	အချိန်ပိုင်း	စွန့်ပစ်အစိုင်အခဲနှင့် စီမံခန့်ခွဲခြင်း ဘေးအန္တရာယ်

MESCတွင် အချိန်ပိုင်း ဝန်ထမ်းများလည်း ပါရှိသည်။ စီမံကိန်းအဆိုပြုတင်ပြသူနှင့် အတိုင်ပင်ခံအဖွဲ့ အစည်းအကြောင်းများကို မိတ်ဆက်ခြင်းအခန်းတွင် ပြည့်စုံစွာတင်ပြမည်ဖြစ်သည်။

မူဝါဒ၊ တရားရေးရာဖွဲ့စည်းပုံမူဘောင်

အစိုးရ၏ ပတ်ဝန်းကျင်ဆိုင်ရာမူဝါဒ သည်တိုင်းပြည်ဖွံ့ဖြိုးမှုများလုပ်ဆောင်ရာတွင် ပတ်ဝန်းကျင်ကို ကာကွယ်ရန်နှင့် ထိန်းသိမ်းရန်တို့ဖြစ်၍ စဉ်ဆက်မပြတ်ဖွံ့ဖြိုးရန်အတွက် ရည်ရွယ်ပါသည်။

ဤအရာများကို အခန်း (၃) တွင် စီမံကိန်းအဆိုပြုတင်ပြသူ၏ ပတ်ဝန်းကျင်နှင့်လူမှုရေးရာမူဝါဒ ဖော်ပြထားပါသည်။ ရုပ်ပိုင်းဆိုင်ရာနှင့် လူမှုပတ်ဝန်းကျင်ဆိုင်ရာတို့နှင့်သက်ဆိုင်သော ဥပဒေများ၊ နည်းဥပဒေများ၊ စည်းမျဉ်းများနှင့် လမ်းညွှန်ချက်များကို လိုက်နာပါမည်။ ကုမ္ပဏီသည် စီမံကိန်းအား ပတ်ဝန်းကျင်နှင့်လူမှုရေးလိုက်လျောညီထွေဖြစ်ခြင်း၊ စီးပွားရေးနှင့်ကိုက်ညီသော စီမံကိန်းဖြစ်စေရန် လုပ်ဆောင်ပါမည်။

သက်ဆိုင်သော ဥပဒေ၊ နည်းဥပဒေနှင့်စည်းမျဉ်းများ (၄၈) ခုကိုစာရင်းပြုစု၍ သက်ဆိုင်သော ပုဒ်မခွဲများကို ကောက်နုတ်တင်ပြထားပါသည်။ နိုင်ငံတကာကွန်ဗင်းရှင်းများနှင့် သဘော တူညီမှုများကိုလည်း စာရင်းပြုစုတင်ပြထားပါသည်။

သက်ဆိုင်သော ဥပဒေများ၊ နည်းဥပဒေများနှင့် စည်းမျဉ်းအမည်များမှာ -

- ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဥပဒေ၊ ၂၀၁၂၊ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးနည်းဥပဒေ၊ ၂၀၁၄၊ ပတ်ဝန်းကျင်ထိန်းသိမ်းမှုဆိုင်ရာလုပ်ထုံးလုပ်နည်း၊ ၂၀၁၅၊ အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (စွန့်ထုတ်မှု) လမ်းညွှန်ချက်၊ ၂၀၁၅၊ အလုပ်ရုံအက်ဥပဒေ၊ ၁၉၅၁၊ ဘွိုင်လာဥပဒေ၊ ၂၀၁၅၊ ရေအရင်းအမြစ်နှင့် မြစ်ချောင်းများထိန်းသိမ်းရေးဥပဒေ၊ ၂၀၀၆၊ ပြည်သူ့ကျန်းမာရေး ဥပဒေ၊ ၁၉၇၂၊ လုပ်ငန်းခွင်ကျန်းမာရေးနှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေး ဥပဒေ၊ ၂၀၁၉ အစရှိသည်တို့ဖြစ်သည်။

ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ဦးစီးဌာနမှ ချမှတ်ထားသော အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး လမ်းညွှန်ချက် (လေ၊ စွန့်ထုတ်မှု၊ ဆူညံသံ၊ အနံ့) ကိုလည်း ဖော်ပြထားပါသည်။

(က) လေအရည်အသွေး

သံတောင်ဦး ကုမ္ပဏီလီမိတက်သည် လေအရည်အသွေးအတွက် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ဦးစီးဌာန မှ ချမှတ်ထားသော (ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး နှင့် သစ်တောရေးရာ ဝန်ကြီးဌာန (MOECF)၊ ယခုအခါ MONREC လက်အောက်ရှိ ECD မှ အမိန့်ကြော်ငြာစာအမှတ် ၆၁၅/၂၀၁၅၊ ဒီဇင်ဘာ ၂၀၁၅၊ ကုဒ်အမှတ် ၁.၁ မှ) အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေးထုတ်လွှတ်မှု ယေဘုယျ လမ်းညွှန်ချက် တန်ဖိုး ကို လိုက်နာပါမည်။

(ခ) စွန့်ထုတ်မှုများ

သံတောင်ဦး ကုမ္ပဏီလီမိတက်သည် စွန့်ထုတ်မှုအဆင့်အတွက် သကြားထုတ်လုပ်ခြင်း ဆိုင်ရာ အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေးထုတ်လွှတ်မှု လမ်းညွှန်ချက် တန်ဖိုး ကို လိုက်နာပါမည်။ (MONREC၊ ECD မှ အမိန့်ကြော်ငြာစာအမှတ် ၆၁၅/၂၀၁၅၊ ဒီဇင်ဘာ ၂၀၁၅) ကုဒ်အမှတ် ၂.၃.၁.၇။

သံတောင်ဦး ကုမ္ပဏီလီမိတက်သည် အမျိုးသားသောက်သုံးရေအရည်အသွေး စံချိန်စံညွှန်း ကိုလည်း လိုက်နာပါမည်။

(ဂ) ဆူညံသံအဆင့်

ဆူညံသံအတွက် အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေးထုတ်လွှတ်မှု လမ်းညွှန်ချက် ယေဘုယျတန်ဖိုး (MOECF မှ အမိန့်ကြော်ငြာစာအမှတ် ၆၁၅/၂၀၁၅၊ ဒီဇင်ဘာ ၂၀၁၅) ကုဒ်အမှတ် ၁.၃)

သကြားစက်ရုံများ စီမံကိန်းလည်ပတ်ခြင်းအတွက် အပြည်ပြည်ဆိုင်ရာစံချိန်စံညွှန်းနှင့် လမ်းညွှန်ချက်များကို အင်တာနက်မှ ဒေါင်းလုတ်ဆွဲ၍ ဖော်ပြထားပါသည်။

စီမံကိန်းအဆိုပြုတင်ပြသူနှင့် အတိုင်ပင်ခံအဖွဲ့အစည်းတို့မှ ပြုလုပ်ထားသော ကတိကဝတ်များကို ဖော်ပြထားပါသည်။ ကုမ္ပဏီသည် အသားတင်အမြတ်၏ ၂ ရာခိုင်နှုန်းကို CSR အစီအစဉ် ဆောင်ရွက်ခြင်းအတွက် အသုံးပြုပါမည်ဟု ကတိကဝတ်ပြုပါသည်။ ကုမ္ပဏီသည် အကျိုးအမြတ်မရခင် ကတည်းက ဒေသဖွံ့ဖြိုးမှုများကို လုပ်ဆောင်နေပါသည်။

ဒေသဖွံ့ဖြိုးရေးအနေဖြင့် သံတောင်ဦးကုမ္ပဏီလီမိတက်သည် အဆိုပါဧရိယာတွင် ကျောက်လမ်း (၇) မိုင်အရှည်လမ်းခင်းပေးခြင်း၊ ရှန်တော်ကျေးရွာအတွက် စီမံစမ်းမု ရေကိုသွယ်ယူပေးခြင်းနှင့် ကျေးရွာအတွက် ကွန်ကရစ်ရေကန်တည်ဆောက်ပေးထားပါသည်။ ကုမ္ပဏီသည် ဒေသအတွက် လျှပ်စစ်မီးပေးခြင်း၊ ကျောင်းပြုပြင်ပေးခြင်းနှင့် ကျောင်းအသစ်တည်ဆောက်ပေးခြင်းတို့ကို လုပ်ဆောင် ပေးရန် အစီအစဉ်ရှိပါသည်။ သွားရေးလာရေး လွယ်ကူစေရန် ရှန်တော်တံတား (ကွန်ကရစ်နှင့် သံတောင် ၁၀၀ ပေ x ၂၄ ပေ) ကိုတည်ဆောက်ပေးခဲ့ပါသည်။ ကုမ္ပဏီသည် ရှန်တော်ကျေးရွာအတွက် မူလတန်းကျောင်းနှင့် ဆရာမဌာနရမ်းပေးထားပါသည်။ ကုမ္ပဏီသည် CSR အစီအစဉ်အတွက် ကျပ် ၁,၀၀၂,၁၄၈,၆၁၅ ကိုသုံးစွဲပြီးဖြစ်ပါသည်။

သံတောင်ဦးကုမ္ပဏီလီမိတက်သည် မိခင်ကုမ္ပဏီဖြစ်သော ငွေရည်ပုလဲအုပ်စုကုမ္ပဏီအဖွဲ့ဖြစ်သည်။ ငွေရည်ပုလဲအုပ်စုကုမ္ပဏီသည် ဤဒေသတွင် ကောင်းမွန်သော နာမည်ရှိပါသည်။ ထို့ကြောင့် မိခင်ကုမ္ပဏီနှင့် ကုမ္ပဏီအဖွဲ့ဖြစ်သော သံတောင်ဦးကုမ္ပဏီလီမိတက်တို့သည် ဤဒေသ၏ အဖွဲ့အစည်းများဖြင့် ကောင်းမွန်သည့် ဆက်ဆံရေးရှိပါသည်။

ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဆိုင်ရာ ကော်မတီ (ECC) ကို၂၀၂၁ ခုနှစ်တွင်ဖွဲ့စည်း၍ အဆိုပါ ဖွဲ့စည်းပုံကို ဖော်ပြထားပါသည်။

အပြည်ပြည်ဆိုင်ရာ ဘဏ္ဍာရေးကော်ပိုရေးရှင်း (IFC)မှ ချမှတ်ထားသော ပတ်ဝန်းကျင်နှင့်လူမှုရေး ဆိုင်ရာ စံချိန်စံညွှန်းများကိုဖော်ပြထားပါသည်။

နောက်ဆုံးတွင် ပတ်ဝန်းကျင်ကျန်းမာရေးနှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေး (EHS)၊ လုပ်ငန်းခွင် ကျန်းမာရေးနှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေး (OHS)နှင့် ဒေသ ကျန်းမာရေးနှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေး (CHS) အကြောင်းတို့ကို အကျဉ်းချုပ်ဖော်ပြထားပါသည်။

အခန်း (၃) တွင် မူဝါဒ၊ တရားရေးရာနှင့် ဖွဲ့စည်းပုံမူဘောင်တို့ကို အသေးစိတ်ဖော်ပြထားပါသည်။

စီမံကိန်းအသေးစိတ်အကြောင်းအရာနှင့် အခြားဆောင်ရွက်နိုင်သော ရွေးချယ်ခြင်း

စီမံကိန်းသည် ရှန်တော်ကျေးရွာအနီးရှိဆိုင်းကျေးရွာအုပ်စု၊ မိုင်းရယ်မြို့နယ်၊ ရှမ်းပြည်နယ်တွင် သကြားစက်ရုံတည်ဆောက်ခြင်းနှင့် စီမံကိန်းလည်ပတ်ခြင်းအတွက် သံတောင်ဦးသကြားစက်ရုံ (၁) ဖြစ်သည်။

ကိုဩဒိနိတ်များမှာ မြောက်လတ္တီတွဒ် ၂၂ ဒီဂရီ ၂၀ မိနစ် ၄၂.၃၇ စက္ကန့်၊ အရှေ့လောင်ဂျီတွဒ် ၉၇ ဒီဂရီ ၅၃ မိနစ် ၅၁.၄၇ စက္ကန့်၊ ပင်လယ်ရေမျက်နှာပြင်အမြင့် ၂၇၉၀ ပေတွင်တည်ရှိပါသည်။

စီမံကိန်းသည် ရှန်တော်ကျေးရွာ၏ မြောက်ဘက် ၀.၅ မိုင်အကွာနှင့် နားလုံကျေးရွာ၏ ၁.၈ မိုင်အကွာတွင် တည်ရှိပါသည်။ ၎င်းသည် မိုင်းရယ်မြို့၏ အနောက်တောင်ဘက် ၁၀ မိုင်အကွာ၊ လားရှိုးမြို့၏ အရှေ့တောင်ဘက် ၄၃ မိုင်အကွာ၊ မန္တလေး၏ အရှေ့မြောက်ဘက် ၁၁၉ မိုင်အကွာနှင့် ရန်ကုန်မြို့၏ အရှေ့မြောက်ဘက် ၃၉၀ မိုင်အကွာတွင် တည်ရှိပါသည်။

စီမံကိန်းဧရိယာသည် ၁၄၈ ဧကရှိပါသည်။ စက်ရုံသည် တစ်နေ့ကို ကြံတန်ချိန် ၅,၀၀၀ ကြိတ်ဝါးနိုင်၍ တစ်နေ့ သကြားဖြူ ၅၀၀ တန် ထွက်ရှိမည် ဖြစ်သည်။

ခန့်မှန်းဘတ်ဂျတ်မှာ ကျပ်သန်းပေါင်း ၈၈၁၂၄.၉၈ ဖြစ်သည်။ တည်ဆောက်ရေးကာလမှာ (၃)နှစ်ဖြစ်၍ စီမံကိန်းလည်ပတ်ချိန်ကာလမှာ နှစ်(၃၀) ဖြစ်သည်။

စီမံကိန်းနေရာ၏ အဓိကအဆောက်အဦ (စက်မှုဆိုင်ရာအဆောက်အဦ) များမှာ အလေးချိန် ကတ္တာ၊ သကြားကြိတ်စင်ဌာန၊ သကြားကြိုချက်ဌာန၊ ပါကင်ဌာန၊ ပန်းများထားရှိရာနေရာ၊ တာဘိုင်ဌာန၊ ဘိုင်လာဌာန၊ အဓိကသိုလှောင်ရုံ၊ စိုက်ပျိုးရေးထုတ်ကုန်များအတွက် သိုလှောင်ရုံ၊ သကြားသိုလှောင်ရုံ၊ ကားပြင်ဌာနနှင့် ဓါတ်ခွဲခန်း စသည်တို့ဖြစ်သည်။

လူနေအဆောက်အဦများလည်းပါဝင်ပါသည်။

- ရုံးခန်း၊ အစည်းအဝေးခန်းမ၊ ဧည့်သည်ခန်းများ၊ အရာရှိအဆောက်အဦ (၂) ခု၊ အလုပ်သမား အဆောက်အဦ (၂) ခု၊ စားသောက်သည့်နေရာနှင့် ဆေးခန်း

ရေကို နန်းလောင်းချောင်းနှင့် သကြားစက်ရုံအနီးရှိ စိမ့်ရေတို့မှ ရယူသုံးစွဲမည် ဖြစ်သည်။

လျှပ်စစ်ကို မြောက်ဘက် (၇)မိုင်ဝေးသော ကုန်းညိုကျေးရွာမှ ၃၃ ကေပီလိုင်းရယူသုံးစွဲပါသည်။

နှစ်စဉ်ကုန်ကြမ်း (ကြံ) လိုအပ်ချက်မှာ ၆၃၀,၀၀၀ တန်ဖြစ်သည်။ နှစ်စဉ်အလုပ်လုပ်ချိန်မှာ ၁၀၀-၁၂၀ ရက် (ကြံရာသီ) ဖြစ်ပါသည်။ အသုံးပြုသော ဓါတုဗေဒပစ္စည်းများမှာ ထုံးမှုန့်၊ ဆာလဖာ၊ ဖော့စဖောရစ်အက်ဆစ်၊ kurifloc၊ အဝတ်လျှော်ဆိုးဒါ အစရှိသည်တို့ဖြစ်ပါသည်။

တည်ဆောက်ရေးကာလတွင် ဝန်ထမ်း (၃၇၀) ဦးနှင့် စီမံကိန်းလည်ပတ်ချိန်တွင် ဝန်ထမ်း (၂၅၄) ဦးဖြစ်ပါသည်။ တရုတ်ပညာရှင် (၃၅) ဦးနှင့် ယာယီလုပ်သားများလည်း ရှိပါသည်။

အလုပ်လုပ်ချိန် ၈နာရီ/တစ်နေ့၊ ၄၀နာရီ/တစ်ပတ် ဖြစ်သည်။

သကြားထုတ်လုပ်မှုနည်းစနစ်မှာ ကမ္ဘာသုံးဖြစ်သော ကြံကို လှိုင်းတုံးများဖြင့် "ဖိ" နှင့် "ညှစ်"ခြင်းဖြင့် အရည်ထွက်လာစေပါသည်။ အဆိုပါအရည်ကို ကြိုချက်နှင့် သကြားပုံအပွင့်ဖော်ခြင်းတို့ ဖြစ်ပါသည်။ သကြားထုတ်လုပ်ခြင်းနည်းစနစ်ကို အခန်း (၄) တွင် အသေးစိတ်ဖော်ပြထားပါသည်။

အဓိကစက်မှုဆိုင်ရာ စွန့်ပစ်ပစ္စည်းများမှာ ကြိတ်၊ မြှုပ်ချေး၊ တင်လဲရည်၊ ပြာ၊ စွန့်ပစ်ရေနှင့် ထုတ်လွှတ်မှု (ဖန်မှုန့်၊ မီးခိုး၊ PM) တို့ဖြစ်သည်။ သကြားစက်ရုံတွင် ကြိတ်အမြောက်အမြား ထွက်ရှိခြင်းကြောင့် သေချာစီမံခန့်ခွဲမှုမပြုလုပ်လျှင် ပတ်ဝန်းကျင်ကိုကြီးမားသော ခြိမ်းခြောက်မှုကြီးတစ်ခုဖြစ်သည်။ သို့ပေမယ့် ထွက်ရှိလာသော ကြိတ်များကို ဘွိုင်လာအတွက် လောင်စာအဖြစ်အသုံးပြု၍ အကျိုးသက်ရောက်စွာ အစိုင်အခဲစွန့်ပစ်ပစ္စည်းပြဿနာကို ဖြေရှင်းပါသည်။ မြှုပ်ချေးနှင့် တင်လဲရည်ကို မတူညီသောနည်းဖြင့် ပြန်လည်အသုံးပြုပါသည်။ အမှန်တကယ်တွင် မည်သည့်အရာမျှ မစွန့်ပစ်ရပေ။ ဤအကြောင်းအရာများကို နောက်ပိုင်းတွင် အခန်း (၄)၌ အသေးစိတ်ဖော်ပြပါမည်။

စီမံကိန်းအားအခြားဆောင်ရွက်နိုင်သောနည်းလမ်းများ

ပတ်ဝန်းကျင်ဆိုင်ရာသေးအန္တရာယ်ကင်းစေရန် အခြားဆောင်ရွက်နိုင်သော နည်းလမ်းသရုပ်ခွဲဆန်းစစ်ခြင်းကို လုပ်ဆောင်ပါသည်။ နည်းလမ်းများမှာ စီမံကိန်းတည်နေရာ၊ ပြန်လည်နေရာချထားခြင်း၊ အလှည့်ရွေးခြင်း၊ ပစ္စည်းများရွေးချယ်ခြင်း၊ စွမ်းအင်၊ နည်းပညာ/နည်းစနစ်၊ လိုအပ်ချက်၊ လုပ်ဆောင်ချက် အစရှိသော အခြားဆောင်ရွက်နိုင်သောနည်းလမ်းများဖြစ်ပါသည်။ ဘာစီမံကိန်းမှ မပြုလုပ်လျှင် ဘာမျှ အခြားဆောင်ရွက်စရာမလိုပေ။

စီမံကိန်းနေရာအတွက်ကိုတော့ သည်ထက်ကောင်းသည့်နေရာမမြင်ပေ။ အနီးနားတွင် အမျိုးမျိုးသော ကုန်ကြမ်းဖြစ်သော ကြံစိုက်ခင်းများ အဆင်သင့်ရနိုင်ခြင်းကြောင့်ဖြစ်သည်။ ကုန်ကြမ်းဖြစ်သော ကြံကို နောင်ချိုမြို့နယ်မှ အခြားသော ကြံစိုက်ခင်းများမှလည်း ဝယ်ယူနိုင်ပါသည်။ နည်းပညာအနေဖြင့် "ဖီ" သို့မဟုတ် "ညှစ်" နည်းပညာသည် သကြားထုတ်လုပ်မှုအတွက် အကောင်းဆုံး နည်းပညာဖြစ်သည်။ အခြားဆောင်ရွက်နိုင်သောနည်းလမ်းများအကြောင်းကို အခန်း (၄) တွင် အကျဉ်းချုပ်ဖော်ပြထားပါသည်။

ပတ်ဝန်းကျင်အခြေအနေ

ဧရိယာသည် အတော်အသင့် မြေပြန့်ဖြစ်၍ လှိုင်းပမာ မို့မောက်နိမ့်ပွမ်း ရှမ်းကုန်းပြင်ဖြစ်သည်။ အနီးအနားရှိပတ်ဝန်းကျင် ဧရိယာတွင် အဓိကအားဖြင့် စိုက်ပျိုးမြေများ၊ လယ်ကွင်းများ၊ ယာများနှင့် လူနေဧရိယာများဖြစ်သော ကျေးရွာ (၂)ရွာ ပါဝင်သည်။ ဧရိယာတစ်ခုလုံးအနေဖြင့် မြေမျက်နှာသွင်ပြင်အနေအထားမှာ လှိုင်းပမာ မို့မောက်နိမ့်ပွမ်းနေသော တောင်ကုန်း အသေးလေးများဖြစ်ပါသည်။

တောင်ဘက် ၀.၅ မိုင်အကွာတွင် ရှန်တော်ကျေးရွာနှင့် အရှေ့တောင်ဘက် ၁.၈ မိုင်အကွာတွင် နားလုံကျေးရွာ ရှိပါသည်။ အဆိုပါကျေးရွာ (၂) ရွာလုံးသည် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း လေ့လာသည့် ဧရိယာတွင်ပါဝင်ပါသည်။

စီမံကိန်း၏ အနောက်ဘက်ကပ်လျက်တွင် ကုမ္ပဏီမှပိုင်သော ၁၆၂ ဧက ကြံစိုက်ခင်းရှိပါသည်။

စီမံကိန်းပတ်ပတ်လည် ဧရိယာတစ်ခုလုံးတွင် လယ်ကွင်းများနှင့် ယာများဖြစ်ကြပါသည်။

ပတ်ဝန်းကျင်၏ ရုပ်ပိုင်းဆိုင်ရာ၊ ဇီဝပိုင်းဆိုင်ရာ၊ လူမှုစီးပွားရေးဆိုင်ရာ၊ ယဉ်ကျေးမှုဆိုင်ရာနှင့် မျက်စိပဒေသာဖြစ်သော ရှုခင်းရှုကွက်ဆိုင်ရာတို့ကို အခြေခံအချက်အလက်များအနေဖြင့် ကောက်ယူခဲ့ ပါသည်။

မိုးလေဝသအချက်အလက်များကို မိုင်းရယ်မိုးလေဝသဌာနမှ ရရှိပါသည်။ လအလိုက် အမြင့်ဆုံး အပူချိန်မှာ ၂၀၁၇ ခုနှစ် မေလတွင် (၃၅.၄°C) ဖြစ်၍ အနိမ့်ဆုံးအပူချိန်မှာ ၂၀၁၀ ခုနှစ် ဇန်နဝါရီလတွင် ၄.၉°C) ဖြစ်သည်။ အမြင့်ဆုံးမိုးရေချိန်မှာ ၂၀၁၉ ခုနှစ်တွင် (၆၀.၈၃ လက်မ) ဖြစ်၍ အနိမ့်ဆုံးမိုးရေချိန်မှာ ၂၀၁၉ ခုနှစ်တွင် (၃၄.၆၈ လက်မ) ဖြစ်သည်။ အမြင့်ဆုံးစိုထိုင်းစကို ၂၀၁၀ နှင့် ၂၀၁၆ ခုနှစ် ဒီဇင်ဘာလတွင် (၉၀%) နှင့် အနိမ့်ဆုံးစိုထိုင်းစကို ၂၀၁၃ ခုနှစ် မတ်လတွင် (၃၉%) တို့ဖြစ်သည်။ အမြင့်ဆုံး လေတိုက်နှုန်းမှာ ၂၀၁၇ ခုနှစ် မေလတွင် (၂၇.၆ mph) နှင့် အနိမ့်ဆုံးလေတိုက်နှုန်းမှာ ၂၀၁၁ ခုနှစ် နိုဝင်ဘာလတွင် (၂.၄ mph) တို့ဖြစ်သည်။ အမြင့်ဆုံးအငွေ့ပျံခြင်းမှာ ၂၀၁၉ ခုနှစ်တွင် (၁၉၈၅ mm) နှင့် အနိမ့်ဆုံးအငွေ့ပျံခြင်းမှာ ၂၀၁၁ ခုနှစ် ဒီဇင်ဘာလတွင် (၉၄၄ mm) ဖြစ်သည်။

အခြားရုပ်ပိုင်းဆိုင်ရာအနေဖြင့် ဥပမာ-မြေမျက်နှာသွင်ပြင်၊ ဘူမိဗေဒ၊ ထိတွေ့ဝန်းကျင် လေ၊ ဆူညံသံ၊ ရေ အစရှိသည်တို့ကိုလည်း လေ့လာမှတ်တမ်းတင်ခဲ့ပါသည်။ ဘူမိဗေဒနှင့်ဆိုင်သော အချက်အလက်ကို ကုမ္ပဏီဘူမိဗေဒပညာရှင်ဆီမှ ရရှိပါသည်။ စီမံကိန်းတည်နေရာသည် ထုံးကျောက် အခြေခံရှိသော နေရာဖြစ်သည်။ ဇလဗေဒအနေဖြင့် အနောက်ဘက်တွင် ချောင်းတစ်ခုရှိ၍ အမည်မှာ နမ့်လောင်းချောင်းဖြစ်ပြီး မြောက်မှတောင်သို့ စီးဆင်းပါသည်။

ထိတွေ့ဝန်းကျင်ဆိုင်ရာ လေ၊ ဆူညံသံနှင့်ရေအရည်အသွေးကို အခြေခံအချက်အလက်အဖြစ် လေ့လာမှတ်တမ်းတင်ခဲ့ပါသည်။ ကောက်ယူလာသောဧရိယာရှိ တန်ဖိုးများကို ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ဦးစီးဌာန (ECD) မှချမှတ်ထားသော NEQE လမ်းညွှန်ချက်နှင့်အတူ ယှဉ်တွဲဖော်ပြပါသည်။

မြေအရည်အသွေး

မြေနမူနာများကို စက်ရုံ၊ နားလုံကျေးရွာနှင့် ရှန်တော်ကျေးရွာတို့မှ ကောက်ယူ၍ ခွဲခြားစိတ်ဖြာရန်အတွက် ရန်ကုန်သို့ ယူဆောင်လာပါသည်။

စက်ရုံကိုဩဒိနိတ် - မြောက်လတ္တီတွဒ် ၂၂ ဒီဂရီ ၂၀ မိနစ် ၁၉.၇ စက္ကန့်၊ အရှေ့လောင်ဂျီတွဒ် ၉၇ ဒီဂရီ ၅၄ မိနစ် ၄၁.၅ စက္ကန့် ၊ ရက်စွဲ။ ၁၁-၆-၂၀၂၃

နားလုံကျေးရွာကိုဩဒိနိတ် - မြောက်လတ္တီတွဒ် ၂၂ ဒီဂရီ ၁၈ မိနစ် ၀၃.၅ စက္ကန့်၊ အရှေ့လောင်ဂျီတွဒ် ၉၇ ဒီဂရီ ၅၅ မိနစ် ၃၈.၇ စက္ကန့် ၊ ရက်စွဲ။ ၁၁-၆-၂၀၂၃

ရှန်တော်ကျေးရွာကိုဩဒိနိတ် - မြောက်လတ္တီတွဒ် ၂၂ ဒီဂရီ ၁၉ မိနစ် ၃၄.၅ စက္ကန့်၊ အရှေ့လောင်ဂျီတွဒ် ၉၇ ဒီဂရီ ၅၄ မိနစ် ၄၆.၆ စက္ကန့် ၊ ရက်စွဲ။ ၁၁-၆-၂၀၂၃

ရလဒ်များမှာ အောက်ပါအတိုင်း ဖြစ်ပါသည်။

စဉ်	နမူနာကောက်ယူသည့်နေရာ	ယူနစ်	Lead (Pb)	Cadmium (Cd)	Chromium (Cr)
၁။	စက်ရုံ	ppm	2	Not Detected	Not Detected
၂။	နားလုံကျေးရွာ	ppm	2.72	0.004	Not Detected
၃။	ရှန်တော်ကျေးရွာ	ppm	1.78	0.006	Not Detected

ရေအရည်အသွေး

နမ့်လောင်းချောင်းတစ်လျှောက်မှ နမူနာများ၊ နားလုံကျေးရွာနှင့် ရှန်တော်ကျေးရွာမှ ရေနမူနာများကို ကောက်ယူ၍ ရေကို ရန်ကုန်သို့ ယူဆောင်ကာ အသိမှတ်ပြု ဓာတ်ခွဲခန်းတွင် ရေအရည်အသွေးကို စစ်ဆေးခဲ့ပါသည်။ ရေနမူနာ ကောက်ယူသော ကိုဩဒိနိတ် တည်နေရာ များမှာ အောက်ပါအတိုင်းဖြစ်ပါသည်။

- နားလုံကျေးရွာကိုဩဒိနိတ် - မြောက်လတ္တီတွဒ် ၂၂ ဒီဂရီ ၁၈ မိနစ် ၀၂.၇ စက္ကန့်၊ အရှေ့လောင်ဂျီတွဒ် ၉၇ ဒီဂရီ ၅၅ မိနစ် ၃၈.၁ စက္ကန့်
- ရှန်တော်ကျေးရွာကိုဩဒိနိတ် - မြောက်လတ္တီတွဒ် ၂၂ ဒီဂရီ ၁၉ မိနစ် ၃၉.၅ စက္ကန့်၊ အရှေ့လောင်ဂျီတွဒ် ၉၇ ဒီဂရီ ၅၄ မိနစ် ၅၀.၂ စက္ကန့်

နမ့်လောင်းချောင်းတစ်လျှောက်လေးပွင့် ကိုဩဒိနိတ်များမှာ -

- နေရာ (၁) - မြောက်လတ္တီတွဒ် ၂၂ ဒီဂရီ ၂၀ မိနစ် ၃၇.၇၂ စက္ကန့်၊ အရှေ့လောင်ဂျီတွဒ် ၉၇ ဒီဂရီ ၅၄ မိနစ် ၃၂.၅၀ စက္ကန့်
- နေရာ (၂) - မြောက်လတ္တီတွဒ် ၂၂ ဒီဂရီ ၂၀ မိနစ် ၁၀.၁ စက္ကန့်၊ အရှေ့လောင်ဂျီတွဒ် ၉၇ ဒီဂရီ ၅၄ မိနစ် ၁၁.၀ စက္ကန့်
- နေရာ (၃) - မြောက်လတ္တီတွဒ် ၂၂ ဒီဂရီ ၂၀ မိနစ် ၀၀.၀ စက္ကန့်၊ အရှေ့လောင်ဂျီတွဒ် ၉၇ ဒီဂရီ ၅၄ မိနစ် ၂၂.၄ စက္ကန့်
- နေရာ (၄) - မြောက်လတ္တီတွဒ် ၂၂ ဒီဂရီ ၁၉ မိနစ် ၄၆.၅၃ စက္ကန့်၊ အရှေ့လောင်ဂျီတွဒ် ၉၇ ဒီဂရီ ၅၄ မိနစ် ၃၉.၃၇ စက္ကန့်

ရလဒ်များမှာ အောက်ပါအတိုင်း ဖြစ်ပါသည်။

စဉ်	ပါရာမီတာများ	နေရာ -၁	နေရာ -၂	နေရာ -၃	နေရာ -၄	နားလုံကျေးရွာ	ရှန်တော်ကျေးရွာ	NEQEG လမ်းညွှန်ချက်တန်ဖိုးများ
၁။	Total coliform	30 CFU/100 ml	30 CFU/100 ml	36 CFU/100 ml	10 CFU/100 ml	40 CFU/100ml	8 CFU/100ml	3 (0-100 per ml)
၂။	Fecal coliform	10 CFU/100 ml	10 CFU/100 ml	12 CFU/100 ml	4 CFU/100 ml	12 CFU/100ml	2 CFU/100ml	0 (0-100 per ml)
၃။	Colour	10	20	30	5	40	5	Non-set, TCU 15
၄။	Turbidity	26	38	52	10	62	7	NTU 5
၅။	Arsenic	Nil	Nil	Nil	Nil	Nil	Nil	0.05 mg/l
၆။	Nitrate	0.6	5.3	0.8	0.7	1.0	0.5	50 mg/l
၇။	Manganese	Nil	Nil	Nil	Nil	Nil		0.4 mg/l
၈။	Chloride	3	3	3	3	2	4	250 mg/l
၉။	Hardness	144	140	140	142	142	154	500 mg/l (as CaCO ₃)
၁၀။	Iron	0.62	0.77	0.82	0.38	0.89	0.35	1 mg/l
၁၁။	pH	7.2	7.3	7.3	7.3	7.4	7.3	6.5-8.5
၁၂။	Sulphate	10	18	20	13	25	15	250 mg/l
၁၃။	Total dissolved solid	150	147	149	149	213	170	1000 mg/l

စွန့်ထုတ်ရေ

စွန့်ပစ်ရေနေရာမှရေနှင့် နောက်ဆုံးစွန့်ပစ်ရေကန်မှ ရေများကို ယူဆောင်၍ ရန်ကုန်ရှိ အသိအမှတ်ပြု ဓါတ်ခွဲခန်းတွင် စစ်ဆေးခဲ့ပါသည်။

- (က) စွန့်ထုတ်ရေ - မြောက်လတ္တီတွဒ် ၂၂ ဒီဂရီ ၂၀ မိနစ် ၂၂.၀ စက္ကန့်၊ အရှေ့လောင်ဂျီတွဒ် ၉၇ ဒီဂရီ ၅၄ မိနစ် ၂၃.၀ စက္ကန့်
- (ခ) နောက်ဆုံးစွန့်ပစ်ကန် - မြောက်လတ္တီတွဒ် ၂၂ ဒီဂရီ ၂၀ မိနစ် ၁၈.၄၂ စက္ကန့်၊ အရှေ့လောင်ဂျီတွဒ် ၉၇ ဒီဂရီ ၅၄ မိနစ် ၂၀.၅၄ စက္ကန့်

ရလဒ်များမှာ အောက်ပါအတိုင်း ဖြစ်ပါသည်။

စဉ်	ပါရာမီတာများ	စွန့်ထုတ်ရေ	နောက်ဆုံးစွန့်ပစ်ကန်	NEQEG လမ်းညွှန်ချက်တန်ဖိုးများ
၁။	5-day Biochemical oxygen demand	10	40	50 mg/l
၂။	Chemical oxygen demand	32	96	250 mg/l
၃။	Oil and grease	<5	6	10 mg/l
၄။	pH	7.6	8.0	6-9 S.U
၅။	Temperature increase	25°	25°	< 3 °C
၆။	Total coliform	40 CFU/100ml	80 CFU/100ml	400 CFU/100ml
၇။	Total nitrogen	15.6	8.7	10 mg/l
၈။	Total phosphorus	1	4.7	2 mg/l
၉။	Total suspended solid	22	55	50 mg/l

မှတ်ချက် - Total nitrogen, Total phosphorus နှင့် TSS တို့သည် လမ်းညွှန်ချက် တန်ဖိုးထက်များနေပါသည်။ အကြောင်းကိုတော့အတိအကျမသိပေမယ့် ရေထဲတွင် အော်ဂဲနစ်မြင့်မားနေ သောကြောင့် ဖြစ်သည်။

ထိတွေ့လေအရည်အသွေး

လေအရည်အသွေးကို စက်ရုံ၊ နားလုံကျေးရွာနှင့်ရှန်တော်ကျေးရွာတို့တွင် တိုင်းတာခဲ့ပါသည်။ ထို့အပြင် ဘွိုင်လာ (မီးခိုးခေါင်းတိုင်) မှလေကိုလည်း တိုင်းတာခဲ့ပါသည်။

- စက်ရုံကိုဩဒိနိတ် - မြောက်လတ္တီတွဒ် ၂၂ ဒီဂရီ ၂၀ မိနစ် ၁၉.၇ စက္ကန့်၊ အရှေ့လောင်ဂျီတွဒ် ၉၇ ဒီဂရီ ၅၄ မိနစ် ၄၁.၅ စက္ကန့်၊ ရက်စွဲ။ ၇-၆-၂၀၂၃
- နားလုံကျေးရွာကိုဩဒိနိတ် - မြောက်လတ္တီတွဒ် ၂၂ ဒီဂရီ ၁၈ မိနစ် ၀၃.၈ စက္ကန့်၊ အရှေ့လောင်ဂျီတွဒ် ၉၇ ဒီဂရီ ၅၅ မိနစ် ၃၉.၀ စက္ကန့်၊ ရက်စွဲ။ ၈-၆-၂၀၂၃
- ရှန်တော်ကျေးရွာကိုဩဒိနိတ် - မြောက်လတ္တီတွဒ် ၂၂ ဒီဂရီ ၁၉ မိနစ် ၃၄.၉ စက္ကန့်၊ အရှေ့လောင်ဂျီတွဒ် ၉၇ ဒီဂရီ ၅၄ မိနစ် ၄၆.၉ စက္ကန့်၊ ရက်စွဲ။ ၉-၆-၂၀၂၃
- မီးခိုးခေါင်းတိုင် ကိုဩဒိနိတ် - မြောက်လတ္တီတွဒ် ၂၂ ဒီဂရီ ၂၀ မိနစ် ၁၉.၅၃ စက္ကန့်၊ အရှေ့လောင်ဂျီတွဒ် ၉၇ ဒီဂရီ ၅၄ မိနစ် ၃၉.၈၄ စက္ကန့်၊ ရက်စွဲ။ ၇-၆-၂၀၂၃

ရလဒ်များမှာ အောက်ပါအတိုင်း ဖြစ်ပါသည်။

စဉ်	ပါရာမီတာများ	ယူနစ်	စက်ရုံ	နားလုံကျေးရွာ	ရှန်တော်ကျေးရွာ	NEQEG လမ်းညွှန်ချက်တန်ဖိုးများ
၁။	Nitrogen dioxide	µg/m ³	15.91	20.56	35.76	200 µg/m ³ (per hour)
၂။	Ozone	µg/m ³	0.88	0.82	0.79	100 µg/m ³ (8 hours period)
၃။	PM ₁₀	µg/m ³	55.62	20.23	27.44	50 µg/m ³ (24 hours)
၄။	PM _{2.5}	µg/m ³	35.50	10.75	15.76	25 µg/m ³ (24 hours)
၅။	Sulphur dioxide	µg/m ³	3.15	0	0	20 µg/m ³ (24 hours)
၆။	VOC	ppb	0.02	0	ND	NG

၇။	Ammonia	ppm	4	0	2.92	NG
၈။	Carbon dioxide	ppm	329.07	309.63	284.58	NG
၉။	Carbon monoxide	ppm	2.35	0	0.11	NG
၁၀။	Oxygen	%	20.44	20.30	20.58	NG
၁၁။	Wind direction	-	SE	SW	SE	NG
၁၂။	Wind Speed	mph	1.91	1.35	0.42	NG

မှတ်ချက် - တန်ဖိုးအားလုံးမှာ လမ်းညွှန်ချက်တန်ဖိုးအတွင်း ရှိသော်လည်း စက်ရုံမှ PM₁₀ နှင့် PM_{2.5} တန်ဖိုးများသည် လမ်းညွှန်ချက်တန်ဖိုးထက် အနည်းငယ် များနေပါသည်။ ဤအရာသည် ကွင်းဆင်းဆောင်ရွက်ချိန်အတွင်းတွင် စက်ရုံလုပ်ဆောင်ချက်များကြောင့်ဖြစ်သည်။ အချို့ပါရာ မီတာများအတွက် နှိုင်းယှဉ်ရန် လမ်းညွှန်ချက် တန်ဖိုးများမရှိပေ။

မီးခိုးခေါင်းတိုင်ထုတ်လွှတ်မှု (လောင်စာ : ကြံဖတ်)

စဉ်	ပါရာမီတာများ	ယူနစ်	တိုင်းတာရလဒ်	Small Combustion Facilities ထုတ်လွှတ်မှုလမ်းညွှန်ချက်
၁။	O ₂	%	18.23	-
၂။	CO	mg/Nm ³	3429	-
၃။	CO ₂	%	2.6	-
၄။	NO ₂	mg/Nm ³	52	650
၅။	SO ₂	mg/Nm ³	97	2000
၆။	PI	%	0.62	

ဆူညံသံ

ဆူညံသံများကို စက်ရုံ၊ နားလုံကျေးရွာနှင့် ရှန်တော်ကျေးရွာများတွင် တိုင်းတာခဲ့ပါသည်။ တိုင်းတာခြင်းနေရာများမှာ လေတိုင်းသည့်နေရာများနှင့် တူညီပါသည်။

ရလဒ်များမှာ အောက်ပါအတိုင်းဖြစ်သည်။

	စက်ရုံ		နားလုံကျေးရွာ		ရှန်တော်ကျေးရွာ		NEQEG လမ်းညွှန်ချက်	
	နေ့	ည	နေ့	ည	နေ့	ည	နေ့	ည
(လူနေဧရိယာ, အဖွဲ့အစည်း, ပညာရေး)	78.27	80.93	59.83	51.76	54.66	50.82	55	45
စက်မှုဆိုင်ရာ	-	-	-	-	-	-	70	70

မှတ်ချက် - ဆူညံသံများမှာ NEQEG လမ်းညွှန်ချက်တန်ဖိုးများထက် မြင့်နေပါသည်။ အဘယ့်ကြောင့်ဆိုသော် တိုင်းတာရေးအတွက် မီးစက်အသုံးပြုခြင်းကြောင့်ဖြစ်သည်။

တုန်ခါမှု

စက်ရုံအတွင်း တိုင်းတာမှုရလဒ်မှာ ၂.၁ mm/s ဖြစ်သည်။

အနံ့

အနံ့လမ်းညွှန်ချက်မှာ ၅-၁၀ ဖြစ်သည်။ (၁၀ ထက်မကျော်ရ)

ဖိတ်ခိုင်းဆိုင်ရာ

၁။ အပင်

အပင် မျိုးစိတ် ၈၂ မျိုး (သဘာဝနှင့်စိုက်ပျိုးပင်များ)

၂။ သားရဲတိရစ္ဆာန်

ငှက် ၉၅ မျိုး

ကုန်းနေရေနေတွားသွားသတ္တဝါ ၁၄ မျိုး

နို့တိုက်သတ္တဝါ ၆ မျိုး

ဝါး ၁၀ မျိုး တို့ကို အမျိုးအစားခွဲခြားနိုင်ခဲ့ပါသည်။ (အချို့မှာ တစ်ဆင့်ခံသတင်းအချက်အလက် များသာဖြစ်သည်။) ဤအရာများကို နောက်ပိုင်း အခန်း ၅၊ ၅.၆ တွင် စာရင်းပြုစုဖော်ပြထားပါသည်။

ဧရိယာသည် စိုက်ပျိုးမြေဖြစ်သောကြောင့် သဘာဝဇီဝမျိုးစုံမျိုးကွဲသည် မရှိသလောက် နည်းပါသည်။ သေးငယ်သောသဘာဝအပင်များ (ဥပမာ - ချုံ၊ ပင်ပျော့၊ မြက်အစရှိသော) နှင့် ငှက်များကို တွေ့ရမည်။ ကြီးမားသော နို့တိုက်သတ္တဝါမတွေ့ရှိပေ။

လူမှုစီးပွားရေးဆိုင်ရာ

တောင်ဘက် ၂ မိုင်ပတ်လည်တွင်အတွင်းတွင် ကျေးရွာ ၂ ရွာရှိပါသည်။ သူတို့မှာ ရှန်တော်ကျေးရွာနှင့် နားလုံကျေးရွာတို့ဖြစ်ကြပါသည်။

ဤကျေးရွာ ၂ ရွာကို လူမှုစီးပွားရေး ဆန်းစစ်ခြင်း ပြုလုပ်ခဲ့ပါသည်။

နားလုံကျေးရွာသည် အတော်အသင့်ကြီးမား၍ ရှန်တော်ကျေးရွာသည် သေးငယ်သော ကျေးရွာဖြစ်သည်။

ကျေးရွာ ၂ ရွာ၏ လူဦးရေများမှာ -

- နားလုံ ကျေးရွာ - ၃၀၃ ဦး (ကျား-၁၄၄၊ မ-၁၅၉)
- ရှန်တော် ကျေးရွာ - ၇၅ ဦး (ကျား-၄၀၊ မ-၃၅)

ဤကျေးရွာ ၂ ရွာရှိ လူဦးရေ ၁၀၀ ရာခိုင်နှုန်းသည် ရှမ်းဖြစ်ကြ၍ ၁၀၀ ရာခိုင်နှုန်း ဗုဒ္ဓဘာသာများဖြစ်ကြသည်။

နားလုံကျေးရွာအတွက် ဗမာစာတက်မြောက်မှုနှုန်းမှာ ၄၀ ရာခိုင်နှုန်းနှင့် ရှမ်းဘာသာစာ တက်မြောက်မှုနှုန်းမှာ ၆၀ ရာခိုင်နှုန်းဖြစ်သည်။

ရှန်တော်ကျေးရွာအတွက် စာတက်မြောက်မှုနှုန်းမှာ မသိရပေ။

ရှန်တော်ကျေးရွာ၏ အဓိကအလုပ်အကိုင်မှာ စိုက်ပျိုးရေး (၉၆) ရာခိုင်နှုန်းဖြစ်၍ နားလုံကျေးရွာ အဓိကအလုပ်အကိုင်မှာ စိုက်ပျိုးရေး (၈၀) ရာခိုင်နှုန်းဖြစ်သည်။ အဓိကစိုက်ပျိုးသီးနှံများမှာ စပါး၊ ပြောင်းဖူး၊ ကြံနှင့် ပဲတို့ဖြစ်ကြပါသည်။ အစိုးရဝန်ထမ်းမရှိပေ။

ဧရိယာ၏ နေ့စဉ်လုပ်အားခမှာ ကျပ် ၄၀၀၀-၅၀၀၀ အတွင်းဖြစ်သည်။ ကျေးရွာ ၂ ရွာစလုံးကို ကားဖြင့်သွားလာနိုင်၍ မြောက်ဘက် ၇-၈ မိုင် သီပေါ-မိုင်းရယ်လမ်းမကြီးရှိပါသည်။

နားလုံကျေးရွာသည် လျှပ်စစ်မီးမရရှိသေးပေ။ အိမ်အားလုံးမှာ ညအချိန်တွင် အလင်းအတွက် ဆိုလာအသုံးပြုကြပါသည်။

နားလုံကျေးရွာတွင် ကျောင်းသား (၄၀ ဦး)၊ ဆရာ (၁) ယောက်ရှိသော အခြေခံမူလတန်းကျောင်း တစ်ကျောင်းရှိပါသည်။ ရှန်တော်ကျေးရွာတွင် ကျောင်းသား (၂၀ ဦး)၊ ဆရာ (၁) ယောက်ရှိသော ကုမ္ပဏီဆောက်လုပ်ပေးထားသော အခြေခံမူလတန်းကျောင်းတစ်ကျောင်းရှိပါသည်။

ကျေးရွာ ၂ ရွာလုံးတွင် ကျေးရွာ ဆေးပေးခန်း သို့မဟုတ် ကျေးရွာ စာကြည့်တိုက်မရှိပေ။

ကျေးရွာ ၂ ရွာလုံးတွင် စိမ့်ရေ၊ ချောင်းရေ သို့မဟုတ် ချောင်းဘေးတွင် ရေတွင်းတူး၍ ရယူသုံးစွဲကြပါသည်။

ကျေးရွာ ၂ ရွာလုံး၏ အိမ်ခြေအများစုမှာ သစ်သားအိမ် သွပ်မိုးများဖြစ်ကြပါသည်။ နားလုံကျေးရွာ တွင် လက်ကိုင်ဖုန်း (၁၀၀) ရာခိုင်နှုန်း၊ ရှန်တော် ကျေးရွာတွင် လက်ကိုင်ဖုန်း (၅၀) ရာခိုင်နှုန်း၊ နားလုံကျေးရွာ တွင် မော်တော်ဆိုင်ကယ် (၈၀) ရာခိုင်နှုန်းနှင့် ရှန်တော် ကျေးရွာတွင် မော်တော်ဆိုင်ကယ် (၁၀၀) ရာခိုင်နှုန်းရှိပါသည်။

ယဉ်ကျေးမှုဆိုင်ရာ

ကျေးရွာ ၂ ရွာလုံးမှ ဒေသခံ (၁၀၀) ရာခိုင်နှုန်းအားလုံးမှာ ရှမ်းလူမျိုးများဖြစ်၍ ဗုဒ္ဓဘာသာများ ဖြစ်ကြပါသည်။

ရှန်တော်ကျေးရွာတွင် ဘုန်းကြီးကျောင်းမရှိ၍ နားလုံးကျေးရွာတွင် ဘုန်းကြီး ၂ ပါးရှိသော ဘုန်းကြီးကျောင်းတစ်ကျောင်းရှိပါသည်။

ကျေးရွာ၏ သက်ကြီးရွယ်အိုများသည် ဥပုသ်နေ့ (လပြည့်နေ့၊ ရက်ဥပုသ်နေ့) တွင် ဘုန်းကြီးကျောင်း သွားကြပါသည်။

ရှန်တော်ကျေးရွာသူ/သားများသည် လပြည့်အတွင်းနှင့် လတစ်လ၏ လပြည့်နေ့တစ်နေ့တွင် နတ်ကိုးကွယ်ကြပါသည်။ နားလုံးကျေးရွာသူ/သားများသည် တော်သလင်းလ (စက်တင်ဘာ/ အောက်တိုဘာ) ၁၀ ရက်နေ့တွင် နတ်ပွဲကျင်းပကြပါသည်။ သူတို့လည်းပဲ ကထိန်ပွဲကျင်းပကြပါသည်။ ဧရိယာတွင် ဘာသာရေးဆိုင်ရာ အဆောက်အဦ သို့မဟုတ် ဘုရားမရှိပေ။

မျက်စိပဒေသာဖြစ်သောရှုခင်းရှုကွက်ဆိုင်ရာ

မြေမျက်နှာသွင်ပြင်သည် လယ်ကွင်းများ၊ ယာများ၊ သကြားစက်ရုံ၊ အနီးနားတွင် ကြံခင်းများနှင့်၊ ကျေးရွာ ၂ ရွာတို့ရှိပါသည်။

သကြားစက်ရုံနှင့် ဆက်စပ်အဆောက်အဦများသည် အဆိုပါဧရိယာတွင် ထိုးထွက်နေပါသည်။

ငေးမောစရာနေရာ၊ လှပသော မြေမျက်နှာသွင်ပြင်၊ မှတ်တမ်းတင်ထားသော အထင်ကရ နေရာတို့မရှိပေ။ သမိုင်းဆိုင်ရာ၊ ယဉ်ကျေးမှုဆိုင်ရာနှင့် ဘာသာရေးဆိုင်ရာ အဆောက်အဦလည်း မရှိပေ။

သက်ရောက်မှုများဆန်းစစ်ခြင်းနှင့် ဖြေလျော့နိုင်မည့်နည်းလမ်းများ

စီမံကိန်းသည် စီမံကိန်းလည်ပတ်လျက်ရှိသောကြောင့် လက်တွေ့ဆန်သော ရည်ရွယ်ချက်ဖြင့် စီမံကိန်းလည်ပတ်ခြင်းကာလနှင့် စီမံကိန်းပိတ်သိမ်းခြင်းကာလတို့ အတွက် ဖြစ်နိုင်ချေရှိသော သက်ရောက်မှုများနှင့် ဖြေလျော့နိုင်မည့် နည်းလမ်းများကို အနှစ်ချုပ်၍ ဖော်ပြထားပါသည်။

စီမံကိန်းလည်ပတ်ခြင်းကာလအတွင်းတွင်

စဉ်	သက်ရောက်မှု	ဖြေလျော့နိုင်မည့်နည်းလမ်းများ
၁။	ပတ်ဝန်းကျင် လေထု အပေါ် သက်ရောက်မှု	<ul style="list-style-type: none"> - ECD မှ ချမှတ်ထားသော NEQEG ထုတ်လွှတ်မှု လမ်းညွှန်ချက်များအတိုင်း လိုက်နာခြင်း၊ - လေထု ထုတ်လွှတ်မှုများကို တတ်နိုင်သမျှ လျှော့ချခြင်း နှင့် ထိန်းချုပ်ရန် ကြိုးပမ်းခြင်း - သဘာဝ ပတ်ဝန်းကျင်နှင့် လိုက်လျောညီထွေဖြစ်မည့် မီးခိုးထုတ်လွှတ်မှု နည်းသော ကိရိယာများ/ စက်ပစ္စည်းများ/ယာဉ်များ ကို ဝယ်ယူခြင်း - ကြံဖတ်များ ပြည့်ဝစွာ လောင်ကျွမ်းစေခြင်း - ပြာ လျှော့ချသည့် ကိရိယာများ ကို အသုံးပြုခြင်း ဥပမာ- အမှုန်ဖမ်းစက် နှင့် စစ်ထုတ်အိတ်များ - ပြာမှုန်များကို ရေးဖျန်း စနစ်တပ်ဆင် အသုံးပြုခြင်း (ရေစိုခံခြင်း) - စက်ပစ္စည်းများ ကိုင်တွယ်ခြင်း လည်ပတ်ခြင်း နှင့် ထိန်းသိမ်းခြင်း အတွက် သင့်တော်သော လေ့ကျင့်မှုများ ပေးခြင်း - အစိုင်အခဲ စွန့်ပစ်ပစ္စည်းများကို ဟင်းလင်းပွင့် မီးပုံရိုးခြင်းများကို ရှောင်ရှားခြင်း၊ - ယာဉ်သွားလာမှုကို ကန့်သတ်ခြင်း၊ - ထုံးမှုန့် ဖိတ်စင်ခြင်းကို ကာကွယ်ခြင်း - ဖုန်မှုန့်များနှင့် မီးခိုးများကို လျှော့ချရန်အတွက် စက်ရုံ ဝန်းပတ်လည်တွင် အပင်များကို စိုက်ပျိုးခြင်း - ဖုန်ထခြင်းအတွက်ရေဖြန်းခြင်း - လုပ်သားများကို လုံလောက်သော PPEs ထောက်ပံ့ပေးခြင်း - ဖြေလျော့နိုင်မည့် လုပ်ဆောင်မှုများကို စောင့်ကြပ် ကြည့်ရှုခြင်း

<p>၂။ ဆူညံသံ နှင့် တုန်ခါမှု</p>	<ul style="list-style-type: none"> - ECD မှ ချမှတ်ထားသော NEQEG ထုတ်လွှတ်မှု လမ်းညွှန်ချက်များအတိုင်း လိုက်နာခြင်း၊ - ဆူညံသံနှင့် တုန်ခါမှုများကို တတ်နိုင်သမျှ လျော့ချခြင်း နှင့် ထိန်းချုပ်ရန် ကြိုးပမ်းခြင်း - သဘာဝ ပတ်ဝန်းကျင်နှင့် လိုက်လျောညီထွေဖြစ်မည့် ဆူညံသံအဆင့် ထုတ်လွှတ်မှု နည်းသော ကိရိယာများ/ စက်ပစ္စည်းများ/ယာဉ်များ ကို ဝယ်ယူခြင်း - စက်ပစ္စည်းများ/ယာဉ်များ ကို ကောင်းစွာ လည်ပတ် စေခြင်းနှင့် ထိန်းသိမ်းခြင်း - Silencer တပ်ဆင်ခြင်း - noise barrier/sound insulation များကို တပ်ဆင်ခြင်း - ယာဉ်သွားလာမှု အရှိန် ကန့်သတ်ခြင်း - တုန်ခါမှု ပြင်းသည့် စက်ပစ္စည်း များတွင် absorber များ တပ်ဆင်ခြင်း - တည်ငြိမ်သော အောက်ခံကို အသုံးပြုခြင်း - ဆူညံသံကို စုပ်ယူရန်အတွက် စိမ်းလမ်းဧရိယာ ဖန်တီးထားခြင်း - PPEs ထောက်ပံ့ပေးခြင်း - လျော့ပါးစေရေး လုပ်ငန်းများကို စောင့်ကြပ်ကြည့်ရှုခြင်း
<p>၃။ အစိုင်အခဲ စွန့်ပစ်ပစ္စည်း ကြောင့်သက်ရောက်မှုများ</p>	<ul style="list-style-type: none"> - စွန့်ပစ်ပစ္စည်း စီမံခန့်ခွဲခြင်း၊ စွန့်ပစ်ပစ္စည်း လျော့ချခြင်း၊ နှင့် အသုံးပြုခြင်း အတွက် အစီအစဉ်ရေးဆွဲခြင်းနှင့် လုပ်ဆောင်ခြင်း - လောင်စာအတွက် စွန့်ပစ်အမှိုက် ကို အသုံးပြုခြင်း - တင်လဲရည်ကို ပြန်လည်အသုံးပြုခြင်း၊ အီသနော ထုတ်လုပ်ခြင်း အတွက် လည်း ထည့်သွင်းစဉ်းစားခြင်း - "မြှုပ်ချေး" (cachaza) ကို အရည်အသွေးမြင့် မြေဩဇာ အဖြစ် မြေဆွေးလုပ်ခြင်း - မြေဆီလွှာ အေးအောင် ပြုလုပ်ခြင်းအတွက် ခြောက်သွေ့သော အချိန်တွင် (ထုံး အခဲ) ကိုအသုံးပြုခြင်း - ပြာများကို စနစ်တကျ စုဆောင်းပြီး ပြာစုကန် အတွင်း တွင် သိုလှောင်ခြင်း၊ ပြာများကို ဆောက်လုပ်ရေး ပစ္စည်းများ အဖြစ် ပြုလုပ်ခြင်း၊ မြေဩဇာအဖြစ်အသုံးပြုခြင်း

		<ul style="list-style-type: none"> - လုပ်သားများကို စွန့်ပစ်ပစ္စည်း များ ကို သင့်တော်သော ကိုင်တွယ်ခြင်း သင်ကြား လေ့ကျင့်ပေးခြင်း၊ - အစိုင်အခဲစွန့်ပစ်ပစ္စည်းများကို ဟင်းလင်းပွင့် မီးပုံရှိခြင်းများ ကို ရှောင်ရှားခြင်း၊ - 5 Rs နိယာမ အတိုင်းတတ်နိုင်သမျှ လိုက်နာခြင်း - သတ်မှတ် အမှိုက်ပုံတွင် သာလျှင် စွန့်ပစ်ပစ္စည်းများကို စွန့်ပစ်ခြင်း - လျော့ပါးစေရေး လုပ်ငန်းများကို စောင့်ကြပ်ကြည့်ရှုခြင်း
၄။	အရည် စွန့်ပစ်ပစ္စည်း ၏ သက်ရောက်မှုများ	<ul style="list-style-type: none"> - ECD မှ ချမှတ်ထားသော NEQEG စွန့်ထုတ်မှု လမ်းညွှန်ချက် များအတိုင်း လိုက်နာခြင်း၊ - ရေဆိုး စီမံခန့်ခွဲခြင်း၊ နှင့် ရေဆိုး လျော့ချခြင်း၊ အတွက် အစီအစဉ်ရေးဆွဲခြင်းနှင့် လုပ်ဆောင်ခြင်း - ရေကို အကျိုးရှိရှိ အသုံးပြုခြင်းနှင့် ထိန်းသိမ်းခြင်းဆိုင်ရာ အသိပညာများကို မြှင့်တင်ခြင်း - ညစ်ညမ်းသော ရေစီးကြောင်းမှ ညစ်ညမ်းမှု မရှိသော ရေစီးကြောင်းကို ခွဲခြားထားခြင်း - ပြန်လည်အသုံးပြုခြင်း - အစိုင်အခဲ စွန့်ပစ်ပစ္စည်းများ ရေဆိုးမြောင်းထဲသို့ ဝင်ရောက်ခြင်းကို ကာကွယ်ခြင်း ဖြင့် ဇီဝရေဆိုးများကို လျော့ချခြင်း - ရေစီးကြောင်းထဲသို့ တိုက်ရိုက်စီးဆင်းမှုကို ကာကွယ်ခြင်း - ရေကို ပြန်လည်ပြုပြင်ခြင်း နှင့် ပြန်လည်အသုံးပြုခြင်း - ရေဆိုး ကို သမာရိုးကျ နည်းလမ်းကို အသုံးပြု၍ ပြန်လည်သန့်စင်ခြင်း (ရှုပ်ပိုင်းဆိုင်ရာ သန့်စင်ခြင်း) - လုပ်သားများကို အိမ်တွင်း အလေ့အကျင့်ကောင်း များနှင့် စွန့်ပစ်ပစ္စည်း များကို သင့်တော်သော ကိုင်တွယ်ခြင်းများကို သင်ကြားလေ့ကျင့်ပေးခြင်း၊ - ရေနေစဉ် သုံးစွဲမှုကို စစ်ဆေးခြင်းနှင့် စောင့်ကြပ်ကြည့်ရှုခြင်း - ရေယိုဖိတ်မှုများအတွက် ကန်များ၊ ပိုက်များနှင့် ရေပိုက်ခေါင်းများကို ပုံမှန်စစ်ဆေးခြင်း နှင့် ၎င်းတို့ကို ချက်ချင်း ပြင်ဆင်ခြင်း - ဖြေလျော့နိုင်မည့် လုပ်ဆောင်မှုများကို စောင့်ကြပ် ကြည့်ရှုခြင်း

၅။	အနံ့	<ul style="list-style-type: none"> - အနံ့အတွက်အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်ကို လိုက်နာခြင်း - အော်ဂဲနစ်စွန့်ပစ်ပစ္စည်းများကို ပြာကန်များနှင့် စွန့်ပစ်ရေကန်ထဲတွင် မစုပုံစေခြင်း - တက်နိုင်သမျှ ရေထဲမှ အော်ဂဲနစ်များကို လျော့ချခြင်း၊ အော်ဂဲနစ်စွန့်ပစ်ပစ္စည်းများကို ဖမ်းယူရန် ဇကာများတပ်ခြင်းနှင့် စွန့်ပစ်ပစ္စည်းများကို ဆယ်ယူခြင်း - ပြာကန်များထဲတွင် ကြံဖတ်ပြာများ စုပုံလာလျှင် over head ကရိန်းဖြင့် ဆယ်ယူခြင်း - စွန့်ပစ်ရေကန်ထဲတွင် အနည်အနှစ်များ အနည်ထိုင်လာလျှင် ဆယ်ယူခြင်း - ပြာစွန့်ပစ်ပစ္စည်းများကို မြေဩဇာအဖြစ် ပြုလုပ်၍ ကြံတောင်သူများအတွက် ကြံစိုက်ခင်းတွင် အသုံးပြုစေခြင်း - စွန့်ပစ်ရေကန်တွင် အနံ့ကိုလျော့ချရန် ပုံမှန်ထုံးဖြူးခြင်း - ကြိတ်ဆောင်နှင့် ကျိုချက်ဆောင်တို့၏ အလုပ်လုပ်သော ကြမ်းပြင်တွင် နေ့စဉ် ဆေးကြောခြင်း - စက်ရုံပတ်လည်တွင် ကြီးမြန်ပင်များ စိုက်ပျိုးခြင်း၊ အပင်များသည် အနံ့စုပ်ယူစေခြင်း - စွန့်ပစ်ရေကန်၊ ပြာကန်၊ တင်လဲရည်ကန်တို့ကို အနံ့ထွက်မထွက် အပတ်စဉ် စစ်ဆေးခြင်း
၆။	ရေထု ပတ်ဝန်းကျင် အပေါ် သက်ရောက်မှု	<ul style="list-style-type: none"> - ရေထု ပတ်ဝန်းကျင်ကာကွယ်ခြင်းနှင့် ထိန်းသိမ်းခြင်း အတွက် ညစ်ညမ်းခြင်းကို ထိန်းချုပ်ခြင်း နှင့် အစီအစဉ် ရေးဆွဲခြင်း - ဥပဒေနှင့် နည်းဥပဒေများကို လိုက်နာခြင်း (ရေအရင်းအမြစ်နှင့်မြစ်ချောင်းများ ထိန်းသိမ်းရေး ဥပဒေ (၂၀၀၆)) - ECD မှ ချမှတ်ထားသော NEQEG စွန့်ထုတ်မှု လမ်းညွှန်ချက်များအတိုင်း လိုက်နာခြင်း၊ - နမ့်လောင်းချောင်းကို ညစ်ညမ်းစေသော နည်းလမ်းအားလုံးကို ရှောင်ရှားခြင်း - ချောင်း အတွင်းသို့ အစိုင်အခဲ စွန့်ပစ်ပစ္စည်းများ၊ အရည် စွန့်ပစ်ပစ္စည်းများ စွန့်ပစ်ခြင်းကို ရှောင်ရှားခြင်း

		<ul style="list-style-type: none"> - ချောင်း အတွင်းသို့ လောင်စာဆီများ ဖိတ်စင်ခြင်းကို ရှောင်ရှားခြင်း - ရေကို အကျိုးရှိရှိ အသုံးပြုခြင်းနှင့် ထိန်းသိမ်းခြင်းဆိုင်ရာ အသိပညာများကို မြှင့်တင်ခြင်း - ရေအသုံးပြုမှုကို ဖော်ပြထားသော ဘောင်အတွင်း ရှိကြောင်း သေချာစေခြင်း - နမ့်လောင်းချောင်းအား အရည်အသွေးရော၊ အရေအတွက်ရော သက်ရောက်မှုမရှိစေခြင်း - အအေးခံသည့် စင်နှင့် အအေးခံသည့် ကန်များမှ ဖြတ်လာသော ရေများကို ပြန်လည် အသုံးပြုခြင်း - ရေယိုစိမ့်မှု မရှိကြောင်း သေချာစေရန် သင့်တော်သော ရေပိုက်ကို အသုံးပြုခြင်း - ဖြေလျော့နိုင်မည့် လုပ်ဆောင်မှုများကို စောင့်ကြပ် ကြည့်ရှုခြင်း
၇။	ယဉ်ကြောပိတ်ဆို့မှုအပေါ် သက်ရောက်မှုများ	<ul style="list-style-type: none"> - မတော်တဆမှု လုံးဝ မရှိစေရန် ကြိုးစားဆောင်ရွက်ခြင်း - အမြန်လမ်းမကြီး ၂၀၀၀ ကို လိုက်နာခြင်း - သင့်တော်သည့် နေရာများတွင် အမြန်နှုန်း သတ်မှတ်ထားသော ဆိုင်းဘုတ်များ ထားရှိခြင်း - အန္တရာယ်ကင်းရှင်းစွာ ကားမောင်းခြင်းအတွက် ယာဉ်မောင်းများ ကိုလေ့ကျင့် သင်ကြားပေးခြင်း - ကုန်တင်ယာဉ်များ ဝန်ပိုတင်ခြင်းကို ရှောင်ရှားခြင်း - လမ်းအန္တရာယ် ကင်းရှင်းရေး အတွက် လူထု အသိပညာပေး လှုပ်ရှားမှုများကို လုပ်ဆောင်ခြင်း - ယာဉ် တစ်စီးချင်းစီအတွက် မှတ်တမ်းစာအုပ် ထားရှိခြင်း - ယာဉ်သွားလာမှု များ ကို အချိန်ဇယားရေးဆွဲခြင်း - ဖြေလျော့နိုင်မည့် လုပ်ဆောင်မှုများကို စောင့်ကြပ် ကြည့်ရှုခြင်း
၈။	လုပ်ငန်းခွင် ကျန်းမာရေး နှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေး ဆိုင်ရာ ပြဿနာများ	<ul style="list-style-type: none"> - စက်ရုံအတွင်း ဘေးကင်းပြီး ကျန်းမာရေး အတွက် သင့်တော်သည့် လေထုအတွက် စီမံခန့်ခွဲခြင်း နှင့် အစီအစဉ် ရေးဆွဲခြင်း - မတော်တဆမှု လုံးဝ မဖြစ်စေရန် ထိန်းသိမ်းခြင်း

		<ul style="list-style-type: none"> - အလုပ်ရုံများအက် ဥပဒေ (၁၉၅၁)၊ ဘျိုင်လာ ဥပဒေ (၂၀၁၅)၊ အလုပ်သမား လျော်ကြေး အက်ဥပဒေ (၁၉၂၃) ကို လိုက်နာခြင်း - ECD မှ ချမှတ်ထားသော NEQEG ထုတ်လွှတ်မှု နှင့် ဆူညံသံ လမ်းညွှန်ချက်များအတိုင်း လိုက်နာခြင်း၊ - လုပ်သားများကို ကောင်းမွန်သော အလုပ်လုပ်ခြင်း အလေ့ကျင့်ကောင်းများ၊ လုံခြုံရေး အလေ့ကျင့်ကောင်းများ နှင့် ကျန်းမာရေး အသိပညာနှင့် တစ်ကိုယ်ရေ သန့်ရှင်းရေး အတွက် ပညာပေးခြင်း လေ့ကျင့်ပေးခြင်း နှင့် ကြီးကြပ်ခြင်း - ဓာတုပစ္စည်းများ ကိုင်တွယ်ခြင်းအတွက် ကိရိယာများ လည်ပတ်ခြင်း အတွက် ကျွမ်းကျင်မှုများ အတွက် ၎င်းတို့ကို ပညာပေးခြင်း လေ့ကျင့်ပေးခြင်း နှင့် ကြီးကြပ်ခြင်း (ဥပမာ- ထုံး၊ ဆာလဖာ) - စက်ပစ္စည်းများ/ကိရိယာများ ပုံမှန် ထိန်းသိမ်းခြင်း၊ ပုံမှန်ဆီ ထိုးခြင်း - လုံလောက်သော PPEs များကို ထောက်ပံ့ပေးခြင်း - အရေးပေါ် အစီအစဉ် အတွက် ဂရုတစိုက် အစီအစဉ် ဆွဲခြင်း - မီးငြိမ်းသတ်ခြင်းနှင့် ရှေးဦးသူနာပြုသင်တန်းများ ထောက်ပံ့ ပေးခြင်း - စက်ရုံတွင် ဆေးပေးခန်းထားရှိခြင်း၊ ရှေးဦးသူနာပြုဆေးပုံး များကို လုံလောက်သော ဆေးဝါးများဖြင့် ထားရှိခြင်း၊ လုံလောက်သော မီးဘေးအန္တရာယ်နှင့်ဆိုင်သော ကိရိယာ တန်ဆာပလာများကို ထားရှိခြင်း (ဥပမာ-မီးသတ်ဆေး ဗူးများ၊ ရေငုတ်များ) - ကြက်ခြေနီ အသင်းများ၊ လူနာတင်ယာဉ်၊ နှင့် မီးသတ်၊ အစရှိသည်တို့၏ ဖုန်းနံပါတ်များ နှင့် လိပ်စာများကို လူတိုင်း မြင်နိုင်စေရန် ကပ်ထားခြင်း - စက်ရုံအတွက်အာမခံ ထားရှိခြင်း နှင့် မီးအာမခံ လည်း ထားခြင်း - ဖြေလျော့နိုင်မည့် လုပ်ဆောင်မှုများကို စောင့်ကြပ် ကြည့်ရှုခြင်း
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<p>၉။ ဖြစ်နိုင်ခြေ ရှိသော လူမှုရေး ဆိုင်ရာ ပြဿနာများ</p>	<ul style="list-style-type: none"> - ဒေသခံများ၏ လူမှု စီးပွား ဘဝအပေါ် ဖြစ်နိုင်ခြေ ရှိသော ဆိုးကျိုးသက်ရောက်မှုများကို ကာကွယ်ခြင်း သို့မဟုတ် လျော့ချခြင်း - လူထုနှင့် ကောင်းမွန်သော ဆက်ဆံရေးကို တည်ဆောက်ခြင်းနှင့် ထိန်းသိမ်းခြင်း - လူထုတွေ့ဆုံဆွေးနွေးပွဲများကို အခါအားလျော်စွာ ကျင်းပခြင်း - လုပ်သားများကို ကျင့်ဝတ်သိက္ခာရှိစေခြင်းနှင့် ဒေသခံများ၏ ဓလေ့ ထုံးတမ်း အစဉ်အလာများကို လေးစားလိုက်နာခြင်း အတွက် အသိပညာပေးခြင်း - လူမှုရေးအလေ့အကျင့်ဆိုးများ၊ ကိုယ်ကျင့်တရားဖောက်ပြန်ခြင်းများ အတွက် စီမံခန့်ခွဲခြင်း - အမျိုးသား နှင့် အမျိုးသမီး လုပ်သားများကို နေရာ ခွဲခြားပေးထားခြင်း - အလုပ်ခွင် စည်းမျဉ်းစည်းကမ်းများနှင့် ကျင့်ဝတ် စည်းမျဉ်းစည်းကမ်းများကို မှန်ကန်စွာ လေ့ကျင့် သင်ကြားပေးခြင်း များကို ထောက်ပံ့ပေးခြင်း - သက်သာ ချောင်ချိရေး အစီအစဉ်ကို ထောက်ပံ့ပေးခြင်း - လုပ်သားများကို စည်းကမ်းလိုက်နာစေရန် ပညာပေးခြင်း - လုပ်သားများကို တန်းတူညီမျှ ဆက်ဆံခြင်း - အပြစ်လုပ်သူများကို အပြစ်ပေးအရေးယူသည့် လုပ်ဆောင်မှုများ လုပ်ဆောင်ခြင်း - အလုပ်ချိန် အတွင်း အရက်သေစာများ သောက်သုံးခြင်းကို တားမြစ်ခြင်း၊ ဆေးအသုံးပြုခြင်းကို တားမြစ်ခြင်း၊ - လုံလောက်သော တစ်ကိုယ်ရေ သန့်စင်ရေး လိုအပ်ချက်များကို ထောက်ပံ့ပေးခြင်း ဥပမာ- သန့်စင်ခန်း ရေချိုးခန်း အစရှိသည်ဖြင့် - ဒေသခံများ၏ အသံကို နားထောင်ခြင်း - CSR ကို တတ်နိုင်သမျှ လက်တွေ့ကျကျ စီစဉ်ခြင်း နှင့် လုပ်ဆောင်ခြင်း - ဖြေလျော့နိုင်မည့် လုပ်ဆောင်မှုများကို စောင့်ကြပ်ကြည့်ရှုခြင်း
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<p>၁၀။ ဖြစ်နိုင်ခြေ ရှိသော လုံခြုံရေး ဆိုင်ရာ ပြဿနာများ</p>		<ul style="list-style-type: none"> - စီမံကိန်းနေရာ၏ လုံခြုံရေး စီမံခန့်ခွဲခြင်း - စီမံကိန်းနေရာကို အသုံးဝင်သော ခြံခတ်ခြင်း/နံရံကာခြင်း - အဝင်အထွက်များ အားလုံးကို ထိန်းချုပ်ထားခြင်း- လုံခြုံရေး ဂိတ်များ ထားခြင်းနှင့် လုံခြုံရေး ဝန်ထမ်းများ ထားခြင်း - ဒေသခံများနှင့် အလုပ်သမားများ ရောနှောနေထိုင်ခွင့် မပြုခြင်း - လုပ်သားများကို အနီးရွာများအတွင်း သို့ ခွင့်ပြုမိန့် မရှိဘဲ မသွားလာစေခြင်း - ပစ္စည်းများကို သော့ခတ်၍ သိမ်းဆည်းထားခြင်း - အပြစ်လုပ်သူများကို အပြစ်ပေးအရေးယူသည့် လုပ်ဆောင်မှုများ လုပ်ဆောင်ခြင်း - လွယ်ကူစွာ ခွဲခြားနိုင်စေရန် လုပ်သားအားလုံးကို ID ကဒ်များ ထောက်ပံ့ပေးထားခြင်း - လုပ်သားအားလုံးကို တူညီသောဝတ်စုံ ထောက်ပံ့ပေးထားခြင်း - ဖြေလျော့နိုင်မည့် လုပ်ဆောင်မှုများကို စောင့်ကြပ်ကြည့်ရှုခြင်း
<p>၁၁။ ဖြစ်နိုင်ခြေရှိသော မြင်ကွင်း ဆိုင်ရာ သက်ရောက်မှုများ</p>		<ul style="list-style-type: none"> - မြင်ကွင်းပဒေသများ အပေါ် အလေးထား၍ သကြားစက်ရုံ စီမံကိန်း အစီအစဉ်ကို အကောင်အထည် ဖော်ခြင်း - စက်ရုံ၏ ဂုဏ်သရေ နှင့် လှပမှုကို မြှင့်တင်ခြင်း - သွားရာ လမ်းတစ်လျှောက်၏ ဘေးနှစ်ဘက်လုံးတွင် အရိပ်ရ အပင်များ စိုက်ပျိုးခြင်း၊ စီမံကိန်းနေရာအတွင်း နှင့် ပတ်လည်တွင် အရိပ်ရ အပင်များ၊ အသီးပင်များ နှင့် အလှပင်များ စိုက်ပျိုးခြင်းဖြင့် အစိမ်းရောင်ဇုန် နှင့် ဧရိယာကို ဖန်တီးခြင်း - အနီးဝန်းကျင်ရှိ သဘာဝ အပင်များကို ထိန်းသိမ်းခြင်း - အဆောက်အအုံများ နှင့် ဖွဲ့စည်းပုံများအတွက် မျက်စိ အေးစေသော အရောင်နှင့် ဆေးကို အသုံးပြုခြင်း - လုံခြုံရေး အကြောင်းအတွက် ညအချိန်တွင် အလင်း အသုံးပြုမှုကို သင့်တော်သော အလင်းရောင် ပေးခြင်း၊ အလင်းအလွန်အကျွံ အသုံးပြုမှုကို ရှောင်ရှားခြင်း - အင်းဆက်များ စုပုံခြင်းကို ရှောင်ကျဉ်ရန် အဝါရောင်မီးကို အဖြူရောင်မီးအစား အသုံးပြုခြင်း၊ အင်းဆက်များ စုပုံလာပါက မီးကို ခဏ ပိတ်ထားခြင်း - ဖြေလျော့နိုင်မည့် လုပ်ဆောင်မှုများကို စောင့်ကြပ်ကြည့်ရှုခြင်း

စီမံကိန်းပိတ်သိမ်းခြင်း/ပြန်လည်ထူထောင်ခြင်း ကာလအတွင်းတွင်

စဉ်	သက်ရောက်မှု	လျော့ပါးစေရေးနည်းလမ်းများ
၁။	လုပ်ငန်းခွင် ကျန်းမာရေး နှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေး ဆိုင်ရာ ပြဿနာများ	<ul style="list-style-type: none"> - အကျိုးသက်ရောက်သော စီမံကိန်းနေရာ ပိတ်သိမ်းခြင်း အတွက် စီမံခန့်ခွဲခြင်း - ပိတ်သိမ်းခြင်းလုပ်ငန်းများ လုပ်ဆောင်ရန် ပိတ်သိမ်းခြင်း ကန်ထရိုက်တာများကို ငှားရမ်းခြင်း - ပြန်လည်အသုံးမပြုနိုင်သော ပစ္စည်းများကို စွန့်ပစ်ခြင်း၊ ပြန်လည် အသုံးပြုနိုင်သည်များကို ရောင်းရန်ထားခြင်း သို့မဟုတ် ပြန်လည် အသုံးချခြင်း - မြေပြင်နှင့် မြေဆီလွှာကို ပြန်လည် ထိန်းသိမ်းခြင်း - မြေပြင်ပေါ်တွင် အပင်များ ပြန်လည် စိုက်ပျိုးခြင်းနှင့် ပြန်လည်ထူထောင်ခြင်း- အမျိုးမျိုးသော အပင်မျိုးစိတ်များကို ရွေးချယ်ခြင်း - ပိတ်သိမ်းခြင်း လုပ်ငန်းများ လုပ်ဆောင်ပြီးနောက် အပေါက်များ၊ တွင်းများ ချိုင့်များ ကျန်ရှိနေပါက အပင်များ ပြန်လည်စိုက်ပျိုးခြင်းကို လုပ်ဆောင်နိုင်ရန် အတွက် ၎င်းတို့ကို ပထမအနေဖြင့် မြေစာများ မြေပြန်လည် ဖြည့်ပြီးနောက် မြေဆီလွှာများဖြင့် ပြန်လည်ဖြည့်ခြင်း - ဖြေလျော့နိုင်မည့် လုပ်ငန်းများကို စောင့်ကြပ်ကြည့်ရှုခြင်း
၂။	ဖြစ်နိုင်ခြေရှိသော ကြွင်းကျန် သက်ရောက်မှုများ	<ul style="list-style-type: none"> - ပိတ်သိမ်းခြင်းလုပ်ငန်းများ လုပ်ဆောင်ရန် ပိတ်သိမ်းခြင်း ကန်ထရိုက်တာများကို ငှားရမ်းခြင်း - စီမံကိန်းနေရာ ကို ရှင်းလင်းခြင်း နှင့် သန့်ရှင်းခြင်း - မြေများ ညစ်ညမ်းနေပါက ဖယ်ရှားခြင်း - နောက်ဆုံးအကြိမ် လေ၊ ရေနှင့် မြေ အရည်အသွေးကို လည်း စစ်ဆေးခြင်း - ပြန်လည်ထူထောင်ရေး လုပ်ငန်းများ (သစ်တောများ ပြန်လည်စိုက်ပျိုးခြင်း) ကို ဆက်လက် လုပ်ဆောင်ခြင်း - ထိရောက်သော သစ်တောများ ပြန်လည်စိုက်ပျိုးခြင်း အတွက် ပြန်လည်ထူထောင်ရေး ကန်ထရိုက်တာများကို ငှားရမ်းခြင်း

တင်ပြထားသောသက်ရောက်မှုတစ်ခုစီတိုင်းအတွက် ဖြေလျော့နိုင်မည့်နည်းလမ်းများကို အခန်း(၆) တွင် အသေးစိတ်ဖော်ပြထားပါသည်။

ကောင်းကျိုးသက်ရောက်မှုအနေဖြင့် စီမံကိန်းကာလနှစ်ပေါင်း (၃၀)ကျော် အလုပ်သမား(၂၅၄)ဦး အလုပ်အကိုင်ရရှိမည်ဖြစ်၍ စီးပွားရေးပိုမိုကောင်းမွန်လာပါက အလုပ်အကိုင်အခွင့်အလမ်း ပိုမိုရရှိလာမည် ဖြစ်သည်။

နိုင်ငံတော်အနေဖြင့် စီမံကိန်းမှ ကျပ်သန်းပေါင်း ၈၈,၁၂၄.၉၈ တိုက်ရိုက်ရင်းနှီးမြှုပ်နှံမှုကြောင့် တိုင်းပြည်၏ GDP တိုးလာပါသည်။ စီမံကိန်းကြောင့် သကြားထုတ်လုပ်မှု ပိုမိုတိုးတက်လာပြီး ဒေသ၏အစားအသောက် ဆိုင်ရာကဏ္ဍဖွံ့ဖြိုးတိုးတက်လာမည်။

ဤအခန်း(၆)၏ အခန်းခွဲတွင် စီမံကိန်းနှင့်သက်ဆိုင်သော ဖြစ်နိုင်ခြေရှိမှုကို ဆန်းစစ် အကဲဖြတ်ခြင်းနှင့် စက်မှုဆိုင်ရာ ဘေးအန္တရာယ်နှင့် သဘာဝပြင်းထန်မှုများကို အမျိုးအစား ခွဲခြားခြင်း ဖြစ်သည်။ ဆန်းစစ်အကဲဖြတ်ခြင်းသည် လက်ရှိစီမံကိန်း လည်ပတ်ခြင်းကာလနှင့် နောက်ပိုင်း စီမံကိန်း ပိတ်သိမ်းချိန်အတွင်းတို့ကို ခွဲခြားထားပါသည်။ စက်ရုံမှထွက်ရှိသော စက်မှုဆိုင်ရာစွန့်ပစ်ပစ္စည်းဖြစ်သော ဥပမာ- ကြံဖတ်၊ ပြာနှင့် မြှုပ်ချေးထွက်ရှိမည်ဖြစ်၍ ထိုအရာများမှာ ဘေးအန္တရာယ်စွန့်ပစ်ပစ္စည်းမဟုတ်ပေ။ ဤစက်မှုဆိုင်ရာစွန့်ပစ်ပစ္စည်းများအတွက် ဖြေလျော့နိုင်မည့် နည်းလမ်းများကို ဆွေးနွေးတင်ပြပါမည်။

အခန်း(၆)၏ အခြားခေါင်းစဉ်ခွဲသည် ကြွင်းကျန်သက်ရောက်မှုများနှင့် ဘေးအန္တရာယ်ဖြစ်မှု ဖြစ်ပါသည်။ ကြွင်းကျန်သက်ရောက်မှုနှင့် ဘေးအန္တရာယ်ဖြစ်မှုများကို သီအိုရီအရနှင့် လက်တွေ့ဆန်သော ချဉ်းကပ်နည်း များဖြင့် ပြုလုပ်ခဲ့ပါသည်။

လွှမ်းမိုး၍ ဘေးအန္တရာယ် ဆန်းစစ်အကဲဖြတ်ခြင်းကို ပညာရှင်များမှ ခန့်မှန်းနည်းလမ်းကို အခြေခံ၍ IFC ဇယား (ဖြစ်နိုင်ခြေ x အကျိုးဆက်) တို့ကို အခြေခံ၍ ဇယားဖြင့် ဖော်ပြထားပါသည်။

နောက်ဆုံးခေါင်းစဉ်ခွဲသည် ပြီးပြည့်စုံသော စောင့်ကြပ်ကြည့်ရှုလေ့လာခြင်းလုပ်ဆောင်၍ ဤအရာကို ဇယားဖြင့် ဖော်ပြထားပါသည်။

စောင့်ကြပ်ကြည့်ရှုလေ့လာရန် ပါရာမီတာများမှာ စီမံကိန်းလည်ပတ်စဉ်ကာလတွင် (၃၂)ချက်နှင့် စီမံကိန်းပိတ်သိမ်းချိန်တွင် (၅)ချက်ဟူ၍ အသီးသီးဇယားဖြင့် ဖော်ပြထားပါသည်။ တိကျသော စောင့်ကြပ်ကြည့်ရှုခြင်း အစီအစဉ်ကို နောက်ပိုင်း အခန်း-၈ (EMP) တွင် ဖော်ပြထားပါသည်။

ဆက်စပ်သက်ရောက်မှုဆန်းစစ်ခြင်း

စက်ရုံမှ ထွက်သော စက်မှုဆိုင်ရာ စွန့်ပစ်ပစ္စည်းဖြစ်သော ကြံဖတ်များ အမြောက်အမြားထွက်ရှိ မည်ဖြစ်သည်။ သို့သော် ကြံဖတ်အားလုံးကို မီးရှို့၍ ဘွိုင်လာ လောင်စာအဖြစ် ပြန်လည်အသုံးပြုပါသည်။ ထို့ကြောင့် ဆက်စပ်သက်ရောက်မှု မရှိနိုင်ပေ။ ပြာသည်လည်း အမြောက်အမြားထွက်နိုင်၍ ပြာကန်ထဲတွင် ပုံမှန်စုဆောင်းပါမည်။ နောက်ပိုင်းတွင် ပြာများကို မြေဩဇာအဖြစ်ပြုလုပ်၍ စိုက်ပျိုးခြင်းအတွက် အသုံးပြုပါသည်။ ပြာရေများကို ပြာကန် (၄) ကန်ထဲတွင် အဆင့်ဆင့်သိုလှောင်ပါသည်။

သံတောင်ဦးသကြားစက်ရုံ (၂) သည် စီမံကိန်းနေရာ၏ အနောက်ဘက်တွင် ဖြစ်၍ ၎င်းသည် ယခုအချိန်တွင် အစောပိုင်းတည်ဆောက်ရေးကာလဖြစ်သည်။ အဆိုပါကြီးမားသော စက်ရုံသည် တစ်ရက်လျှင် သကြား ၁,၂၀၀ တန် ထွက်ရှိမည်ဖြစ်သည်။ ထို့ကြောင့် အဆိုပါစက်ရုံစီမံကိန်းလည်ပတ်လျှင် ကြီးမားသော တစ်စတစ်တိုးလာသော သက်ရောက်မှုဖြစ်ပေါ်လာနိုင်ပါသည်။

လက်ရှိတွင် တည်ရှိပြီးသော သံတောင်ဦးသကြားစက်ရုံ အမှတ်-၁ (အဆိုပြုစီမံကိန်း) သည် တစ်နေ့ ကြိတ်ချိန် ၅,၀၀၀ ကြိတ်ဝါးနိုင်၍ သကြားတစ်နေ့ကို တန်ချိန် ၅၀၀ ထုတ်လုပ်နိုင်ပါသည်။ တစ်နှစ်အတွင်းလျှင် သက်ရှိအရင်းအမြစ်ဖြစ်သော (ကြံ)အပေါ် ဆက်စပ်သက်ရောက်မှု မြင့်မားနိုင်ပါသည်။ သို့ပေမယ့် စက်ရုံသည် တစ်နှစ်လျှင် ရက်ပေါင်း ၁၅၀ သာလည်ပတ်ပါသည်။ ကုမ္ပဏီသည် စက်ရုံအား ထိန်းသိမ်း၊ ပြုပြင်၊ သန့်ရှင်းရေးလုပ်ရန်နှင့် စွန့်ပစ်အစိုင်အခဲ၊ စွန့်ပစ်ရေတို့ကို စနစ်တကျစွန့်ပစ်ရန် လုံလောက်သော အချိန် ၇ လရပါသည်။ တစ်နှစ်ပြီးတစ်နှစ် ဆက်စပ်သက်ရောက်မှုဖြစ်ပေါ်လာနိုင်ပေ။ ထို့ကြောင့် စီမံကိန်းသက်တမ်းအဆုံးတွင် ဆက်စပ်သက်ရောက်မှုမဖြစ်ပေါ်ပေ။ ကျန်သောလအတွင်းတွင် တောင်သူများသည် ကြံပင်များကို အကျိုးသက်ရောက်စွာ ပြန်လည်စိုက်ပျိုးနိုင်ပါသည်။

ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် (EMP)

ဤအခန်း (၈) သည် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် (EMP) နှင့် စောင့်ကြပ်ကြည့်ရှုလေ့လာခြင်း အစီအစဉ် (MP) တို့ဖြစ်သည်။

ဤအခန်းတွင် အခန်းခွဲ (၆) ခုပါဝင်၍ အမည်များမှာ အကျဉ်းချုပ်အစီရင်ခံစာ၊ စီမံကိန်းအကြောင်း အရာအသေးစိတ်၊ ကျန်းမာရေးမူဝါဒ၊ တရားရေးရာလိုအပ်ချက်နှင့် ဖွဲ့စည်းပုံမူဘောင်၊ သက်ရောက်မှု များနှင့် ဖြေလျော့နိုင်မည့်နည်းလမ်းများ အကျဉ်းချုပ်၊ ဘတ်ဂျက်၊ စီမံခန့်ခွဲမှုနှင့် စောင့်ကြပ်ကြည့်ရှု လေ့လာခြင်းအစီအစဉ်နှင့် အစီအစဉ်ခွဲတစ်ခုစီတွင် ပါဝင်ရမည့် ခေါင်းစဉ် များတို့ဖြစ်ပါသည်။ ဤအရာသည် သီးသန့်ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် (EMP) အစီရင်ခံစာတစ်ခု မဟုတ်သောကြောင့် အားလုံးကို အကျဉ်းချုပ်ဖော်ပြထား၍ အချို့ကို ဇယားဖြင့်ဖော်ပြထားပါသည်။ ကျန်းမာရေးမူဝါဒကို အကျဉ်းချုပ်ရှင်းပြထား၍ သက်ရောက်မှုနှင့်ဖြေလျော့နိုင်မည့်နည်းလမ်းများကို အကျဉ်းချုပ်ဖော်ပြထား ပါသည်။

ဆူညံသံနှင့်တုန်ခါမှု၊ စွန့်ပစ်ပစ္စည်း၊ ဘေးအန္တရာယ်ရှိစွန့်ပစ်ပစ္စည်း၊ စွန့်ပစ်ရေနှင့် မိုးရေ လေအရည်အသွေး၊ အနံ့၊ ဓါတုဗေဒပစ္စည်းများ၊ ရေအရည်အသွေး၊ တိုက်စားခြင်းနှင့် အနည်ကျခြင်း၊ ဇီဝမျိုးစုံမျိုးကွဲ၊ လုပ်ငန်းခွင်ကျန်းမာရေးနှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေး၊ ယဉ်ကျေးမှုဆိုင်ရာအမွေအနှစ်၊ အလုပ်အကိုင်ရရှိရေးနှင့် သင်တန်းပေးခြင်း၊ အရေးပေါ်တုန့်ပြန်မှု၊ ယဉ်ကြောပိတ်ဆို့မှုနှင့် မျက်စိပဒေသာ ရှောင်ရှားကွက်တို့အတွက် စီမံခန့်ခွဲမှုနှင့် စောင့်ကြပ်ကြည့်ရှုလေ့လာခြင်း အစီအစဉ်တို့ကို ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်း လုပ်ထုံးလုပ်နည်း၊ ၂၀၁၅ (အမိန့်ကြော်ငြာစာအမှတ် ၆၁၆/၂၀၁၅၊ အပိုဒ်ခွဲ ၈၊ ၈.၆) အရ အသေးစိတ်ရေးသားထားပါသည်။

စီမံကိန်းလည်ပတ်ခြင်းကာလနှင့် စီမံကိန်းပိတ်သိမ်းခြင်းကာလ အတွင်းတွင်လုပ်ဆောင်မည့် စောင့်ကြပ်ကြည့်ရှုလေ့လာခြင်း အစီအစဉ်ကို အနှစ်ချုပ်၍ ဇယားပုံစံဖြင့် ဖော်ပြထားပါသည်။

စီမံကိန်းလည်ပတ်ခြင်းကာလအတွင်းတွင် စောင့်ကြပ်ကြည့်ရှုလေ့လာခြင်း အစီအစဉ်အနှစ်ချုပ်

စဉ်	သက်ရောက်မှု	စောင့်ကြပ်ကြည့်ရှုလေ့လာရမည့် ပါရာမီတာများ	NEQEG လမ်းညွှန် ချက်တန်ဖိုး	စောင့်ကြပ် ကြည့်ရှုလေ့လာ ရမည့်နေရာ	အကြိမ်အရေ အတွက်	တာဝန်ရှိလူပုဂ္ဂိုလ်	ကုန်ကျစရိတ် (တစ်ကြိမ်)	မှတ်ချက်
၁။	ဆူညံသံနှင့် တုန်ခါမှု	dB(A) နေ့နှင့်ည	70 dB(A) 55 dB(A) and 45 dB(A)	ဆူညံသံ စက်ရုံ Coordinate: 22°20'19.7"N, 97°54'41.5"E နားလုံကျေးရွာ Coordinate: 22°18'03.8"N, 97°55'39.0"E ရှန်တော်ကျေးရွာ Coordinate: 22°19'34.9"N, 97°54'46.9"E	ခြောက်လ တစ်ကြိမ် ခြောက်လ တစ်ကြိမ် ခြောက်လ တစ်ကြိမ်	EMP အဖွဲ့ဝင်များနှင့်ငှားရမ်းပညာရှင်များ EMP အဖွဲ့ဝင်များနှင့်ငှားရမ်းပညာရှင်များ EMP အဖွဲ့ဝင်များနှင့်ငှားရမ်းပညာရှင်များ	ကျပ် ၁၀၀,၀၀၀ ကျပ် ၁၀၀,၀၀၀ ကျပ် ၁၀၀,၀၀၀	ပညာရှင် ငှားရမ်းရမည် ပညာရှင် ငှားရမ်းရမည် ပညာရှင် ငှားရမ်းရမည်

				တုန်ခါမှု စက်ရုံ Coordinate: 22°20'13.9"N, 97°54'36.2"E	ခြောက်လတစ်ကြိမ်	EMP အဖွဲ့ဝင်များနှင့် ရမ်းပညာရှင်များ	ကျပ် ၁၀၀,၀၀၀	ပညာရှင် ရမ်းရမည်
၂။	စွန့်ပစ်ပစ္စည်း	<ul style="list-style-type: none"> - စက်မှုဆိုင်ရာ စွန့်ပစ်ပစ္စည်း အထူးသဖြင့် ပြာစုဆောင်းခြင်း၊ သိုလှောင်ခြင်းနှင့် ပြန်လည်အသုံးပြုခြင်းအား စောင့်ကြပ်ကြည့်ရှုလေ့လာခြင်း - လူသုံးစွန့်ပစ်ပစ္စည်းများ၊ စုဆောင်းခြင်းနှင့် စွန့်ပစ်ခြင်းတို့အား စောင့်ကြပ်ကြည့်ရှုလေ့လာခြင်း 	-	<p>နောက်ဆုံးစွန့်ပစ်ကန် Coordinate: 22°20'18.41"N, 97°45'33.76"E</p> <p>စက်ရုံဝန်းအတွင်း အမှိုက်စွန့်ပစ်သည့်နေရာ 22°20'18.41"N, 97°54'33.76"E</p>	အပတ်စဉ်	EMP အဖွဲ့ဝင်များ	အခမဲ့	
			-		အပတ်စဉ်	EMP အဖွဲ့ဝင်များ	အခမဲ့	

၃။	ဘေးအန္တရာယ်ရှိ စွန့်ပစ်ပစ္စည်း	<ul style="list-style-type: none"> - အသုံးပြုပြီးသောဆီနှင့် အင်ဂျင် ဝိုင်းများကို စွန့်ပစ်ခြင်းအား စောင့်ကြပ်ကြည့်ရှုလေ့လာခြင်း - ထွက်ရှိလာသောမီးသီးအဟောင်း၊ ဇကာအဟောင်း၊ ဘတ္တရီအိုး အဟောင်းများနှင့် စွန့်ပစ်ခြင်းအား စောင့်ကြပ်ကြည့် ရှုလေ့လာခြင်း 	-	ဆီသိုလှောင်ကန် 22°20'9.90"N, 97°54'47.54"E စက်ရုံဝန်းအတွင်း အမှိုက်စွန့်ပစ် သည့်နေရာ 22°20'18.41"N, 97°54'33.76"E	လစဉ် လစဉ်	EMP အဖွဲ့ဝင်များ EMP အဖွဲ့ဝင်များ	အခမဲ့ အခမဲ့	
၄။	ရေအရည်အသွေး/စွန့်ထုတ်မှု	<u>ရေအရည်အသွေး</u> Total coliforms Fecal coliforms Turbidity Arsenic Lead Nitrate Manganese Chloride Hardness Iron pH	3 (0-100ml) 0 (0-100ml) 5 NTU 0.01 mg/l 0.01 mg/l 50 mg/l 0.4 mg/l 250 mg/l 500 mg/l 1 mg/l 6.5 – 8.9 SU	နမ့်လောင်းချောင်း (နေရာ-၁) Coordinate: 22°20'37.72"N, 97°54'32.50"E နမ့်လောင်းချောင်း (နေရာ-၂) Coordinate: 22°20'10.1"N, 97°54'11.0"E	ခြောက်လ တစ်ကြိမ် ခြောက်လ တစ်ကြိမ်	EMP အဖွဲ့ဝင်များနှင့်ငှားရမ်းပညာရှင်များ EMP အဖွဲ့ဝင်များနှင့်ငှားရမ်းပညာရှင်များ	ကျပ် ၂၀၀,၀၀၀ ကျပ် ၂၀၀,၀၀၀	ပညာရှင်ငှားရမ်းရမည် ပညာရှင်ငှားရမ်းရမည်

		Sulphate Total Dissolved Solids	250 mg/l 1000 mg/l	နမ့်လောင်းချောင်း (နေရာ-၃) Coordinate: 22°20'00.0"N, 97°54'22.4"E	ခြောက်လ တစ်ကြိမ်	EMP အဖွဲ့ဝင်များနှင့် ရမ်းပညာရှင်များ	ကျပ် ၂၀၀,၀၀၀	ပညာရှင် ရမ်းရမည်
				နမ့်လောင်းချောင်း (နေရာ-၄) Coordinate: 22°19'46.53"N, 97°54'39.37"E	ခြောက်လ တစ်ကြိမ်	EMP အဖွဲ့ဝင်များနှင့် ရမ်းပညာရှင်များ	ကျပ် ၂၀၀,၀၀၀	ပညာရှင် ရမ်းရမည်
				နားလုံကျေးရွာ Coordinate: 22°18'02.7"N, 97°54'32.50"E	ခြောက်လ တစ်ကြိမ်	EMP အဖွဲ့ဝင်များနှင့် ရမ်းပညာရှင်များ	ကျပ် ၂၀၀,၀၀၀	ပညာရှင် ရမ်းရမည်
				ရှန်တော်ကျေးရွာ Coordinate: 22°19'39.5"N, 97°54'50.2"E	ခြောက်လ တစ်ကြိမ်	EMP အဖွဲ့ဝင်များနှင့် ရမ်းပညာရှင်များ	ကျပ် ၂၀၀,၀၀၀	ပညာရှင် ရမ်းရမည်

		<u>စွန့်ထုတ်ရေ</u> 5 days BOD COD Oil and grease pH Temperature increase Total coliform Total nitrogen Total phosphorus Total suspended solids	50 mg/l 250 mg/l 10 mg/l 6-9 S.U <3° 400CFUmg/l 10 mg/l 3 mg/l 50 mg/l	<u>စွန့်ထုတ်ရေ</u> Coordinate: 22°20'22.0"N 97°54'23.0"E <u>နောက်ဆုံးစွန့်ပစ်</u> <u>ရေကန်</u> Coordinate: 22°20'18.42"N 97°54'20.54"E	<u>ခြောက်လ</u> <u>တစ်ကြိမ်</u> <u>ခြောက်လ</u> <u>တစ်ကြိမ်</u>	EMP အဖွဲ့ဝင်များနှင့် ရမ်းပညာရှင်များ EMP အဖွဲ့ဝင်များနှင့် ရမ်းပညာရှင်များ	ကျပ် ၂၀၀,၀၀၀ ကျပ် ၂၀၀,၀၀၀	ပညာရှင် ရမ်းရမည် ပညာရှင် ရမ်းရမည်
၅။	လေအရည်အသွေး	<u>လေအရည်အသွေး</u> NO ₂ O ₃ PM ₁₀ PM _{2.5} SO ₂ VOC Ammonia Carbon dioxide Carbon monoxide	200 µg/m ³ 100 µg/m ³ 50 µg/m ³ 25 µg/m ³ 20 µg/m ³ 400 µg/m ³ NG NG NG	<u>စက်ရုံ</u> Coordinate: 22°20'19.7"N, 97°54'41.5"E <u>နားလုံကျေးရွာ</u> Coordinate: 22°18'03.8"N, 97°55'39.0"E	<u>ခြောက်လ</u> <u>တစ်ကြိမ်</u> <u>ခြောက်လ</u> <u>တစ်ကြိမ်</u>	EMP အဖွဲ့ဝင်များနှင့် ရမ်းပညာရှင်များ EMP အဖွဲ့ဝင်များနှင့် ရမ်းပညာရှင်များ	ကျပ် ၁,၇၀၀,၀၀၀ ကျပ် ၁,၇၀၀,၀၀၀	ပညာရှင် ရမ်းရမည် ပညာရှင် ရမ်းရမည်

				ရှန်တော်ကျေးရွာ Coordinate: 22°19'34.9"N, 97°54'46.9"E	ခြောက်လတစ်ကြိမ်	EMP အဖွဲ့ဝင်များနှင့် ရမ်းပညာရှင်များ	ကျပ် ၁,၇၀၀,၀၀၀	ပညာရှင် ရမ်းရမည်
၆။	အနံ့	- နောက်ဆုံးစွန့်ပစ်ရေကန်ကို စောင့်ကြပ်ကြည့်ရှု လေ့လာခြင်း	-	နောက်ဆုံးစွန့်ပစ် ရေကန် Coordinate: 22°20'18.42"N 97°54'20.54"E	ခြောက်လတစ်ကြိမ်	EMP အဖွဲ့ဝင်များနှင့် ရမ်းပညာရှင်များ	ကျပ် ၃၀၀,၀၀၀	ပညာရှင် ရမ်းရမည်
၇။	ခါတုပေဒပစ္စည်း	- ခါတုပေဒပစ္စည်းများကို ကိုင် တွယ်ခြင်းနှင့် အသုံးပြုခြင်းအား စောင့်ကြပ်ကြည့်ရှု လေ့လာခြင်း	-	ခါတုပေဒပစ္စည်း သိုလှောင်ရုံ Coordinate: 22°20'19.28"N 97°54'43.03"E	အပတ်စဉ်	EMP အဖွဲ့ဝင်များ	အခမဲ့	

၈။	မြေဆီလွှာ (ညစ်ညမ်းခြင်း၊ တိုက်စားခြင်း)	- မြေဆီလွှာညစ်ညမ်းခြင်းအား စောင့်ကြပ်ကြည့်ရှု လေ့လာခြင်း	-	စက်ရုံဝန်းအတွင်း Coordinate: 22°20'19.7"N, 97°45'41.5"E	ခြောက်လ တစ်ကြိမ်	EMP အဖွဲ့ဝင်များနှင့် ရမ်းပညာရှင်များ	ကျပ် ၁၄၀,၀၀၀	ပညာရှင် ရမ်းရမည်
			-	နားလုံကျေးရွာ Coordinate: 22°18'03.5"N, 97°55'38.7"E	ခြောက်လ တစ်ကြိမ်	EMP အဖွဲ့ဝင်များနှင့် ရမ်းပညာရှင်များ	ကျပ် ၁၄၀,၀၀၀	ပညာရှင် ရမ်းရမည်
			-	ရှန်တော်ကျေးရွာ Coordinate: 22°19'34.5"N, 97°54'46.6"E	ခြောက်လ တစ်ကြိမ်	EMP အဖွဲ့ဝင်များနှင့် ရမ်းပညာရှင်များ	ကျပ် ၁၄၀,၀၀၀	ပညာရှင် ရမ်းရမည်

စီမံကိန်းပိတ်သိမ်းခြင်းကာလအတွင်းတွင် စောင့်ကြပ်ကြည့်ရှုလေ့လာခြင်း အစီအစဉ်အနှစ်ချုပ်

စဉ်	သက်ရောက်မှု	စောင့်ကြပ်ကြည့်ရှုလေ့လာရမည့်ပါရာမီတာများ	NEQEG လမ်းညွှန်ချက် တန်ဖိုး	စောင့်ကြပ်ကြည့်ရှုလေ့လာရမည့်နေရာ	အကြိမ်အရေအတွက်	တာဝန်ရှိ လူပုဂ္ဂိုလ်	ကုန်ကျစရိတ် (တစ်ကြိမ်)	မှတ်ချက်
၁။	ဆူညံသံနှင့်တုန်ခါမှု	dB(A) နေ့နှင့်ည	70 dB(A) 55 dB(A) and 45 dB(A)	စက်ရုံအဟောင်း နေရာ Coordinate: 22°20'19.7"N, 97°54'41.5"E နားလုံကျေးရွာ Coordinate: 22°18'03.8"N, 97°55'39.0"E ရှန်တော်ကျေးရွာ Coordinate: 22°19'34.9"N, 97°54'46.9"E	နောက်ဆုံး အကြိမ် နောက်ဆုံး အကြိမ် နောက်ဆုံးအ ကြိမ်	EMP အဖွဲ့ဝင်များနှင့် ရမ်းပညာရှင်များ EMP အဖွဲ့ဝင်များနှင့် ရမ်းပညာရှင်များ EMP အဖွဲ့ဝင်များနှင့် ရမ်းပညာရှင်များ	ကျပ် ၁၀၀,၀၀၀ ကျပ် ၁၀၀,၀၀၀ ကျပ် ၁၀၀,၀၀၀	ပညာရှင် ရမ်းရမည် ပညာရှင် ရမ်းရမည် ပညာရှင် ရမ်းရမည်

				တုန့်ခါမှု စက်ရုံ Coordinate: 22°20'13.9"N, 97°54'36.2"E	နောက်ဆုံးအ ကြိမ်	EMP အဖွဲ့ဝင်များနှင့် ရမ်းပညာရှင်များ	ကျပ် ၁၀၀,၀၀၀	ပညာရှင် ရမ်းရမည်
၂။	စွန့်ပစ်ပစ္စည်း (စီမံကိန်းပိတ်သိမ်း ခြင်း စွန့်ပစ်ပစ္စည်း၊ အမှိုက်သရိုက်များ)	စီမံကိန်းပိတ်သိမ်းခြင်းလုပ်ငန်း (ဖျက်သိမ်းခြင်း၊ ဖြိုဖျက်ခြင်း) နှင့်အမှိုက်သရိုက် အမြောက် အမြားထွက်ရှိမှုတို့ကို စနစ် တကျစွန့်ပစ်ခြင်းနှင့် စီမံကိန်း နေရာအား သပ်သပ်ရပ်ရပ် ထားရှိခြင်းအား စောင့်ကြပ် ကြည့်ရှုလေ့လာခြင်း	-	စက်ရုံအဟောင်း နေရာ Coordinate: 22°20'14.25"N, 97°54'40.04"E	အပတ်စဉ်/ လစဉ်	EMP အဖွဲ့ဝင်များ	အခမဲ့	-
၃။	ရေအရည်အသွေး	ရေအရည်အသွေး Total coliforms Fecal coliforms Turbidity Arsenic Lead Nitrate Manganese Chloride	3(0-100ml) 0(0-100ml) 5 NTU 0.01 mg/l 0.01 mg/l 50 mg/l 0.4 mg/l 250 mg/l	နမ့်လောင်းချောင်း (နေရာ-၁) Coordinate: 22°20'37.72"N, 97°54'32.50"E	နောက်ဆုံးအ ကြိမ်	EMP အဖွဲ့ဝင်များနှင့် ရမ်းပညာရှင် များ	ကျပ် ၂၀၀,၀၀၀	ပညာရှင် ရမ်းရမည်

		Hardness	500 mg/l	နမ့်လောင်းချောင်း (နေရာ-၂) Coordinate: 22°20'10.1"N, 97°54'11.0"E	နောက်ဆုံးအ ကြိမ်	EMP အဖွဲ့ဝင်များနှင့် ရမ်းပညာရှင်များ	ကျပ် ၂၀၀,၀၀၀	ပညာရှင် ရမ်းရမည်
		Iron	1 mg/l					
		pH	6.5 – 8.9 SU					
		Sulphate	250 mg/l					
		Total Dissolved Solids	1000 mg/l	နမ့်လောင်းချောင်း (နေရာ-၃) Coordinate: 22°20'00.0"N, 97°54'22.4"E	နောက်ဆုံးအ ကြိမ်	EMP အဖွဲ့ဝင်များနှင့် ရမ်းပညာရှင်များ	ကျပ် ၂၀၀,၀၀၀	ပညာရှင် ရမ်းရမည်
				နမ့်လောင်းချောင်း (နေရာ-၄) Coordinate: 22°19'46.53"N, 97°54'39.37"E	နောက်ဆုံးအ ကြိမ်	EMP အဖွဲ့ဝင်များနှင့် ရမ်းပညာရှင်များ	ကျပ် ၂၀၀,၀၀၀	ပညာရှင် ရမ်းရမည်
				နားလုံကျေးရွာ Coordinate: 22°18'02.7"N, 97°54'32.50"E	နောက်ဆုံးအ ကြိမ်	EMP အဖွဲ့ဝင်များနှင့် ရမ်းပညာရှင်များ	ကျပ် ၂၀၀,၀၀၀	ပညာရှင် ရမ်းရမည်
				ရှန်တော်ကျေးရွာ Coordinate: 22°19'39.5"N, 97°54'50.2"E	နောက်ဆုံးအ ကြိမ်	EMP အဖွဲ့ဝင်များနှင့် ရမ်းပညာရှင်များ	ကျပ် ၂၀၀,၀၀၀	ပညာရှင် ရမ်းရမည်

		<u>Effluent</u> 5 days BOD COD Oil and grease pH Temperature increase Total coliform Total nitrogen Total phosphorus Total suspended solid	50 mg/l 250 mg/l 10 mg/l 6-9 S.U <3° 400CFU mg/l 10 mg/l 3 mg/l 50 mg/l	စွန့်ပစ်ရေ Coordinate: 22°20'22.0"N 97°54'23.0"E နောက်ဆုံး စွန့်ပစ်ရေကန် Coordinate: 22°20'18.42"N 97°54'20.54"E	နောက်ဆုံး အကြိမ် နောက်ဆုံး အကြိမ်	EMP အဖွဲ့ဝင်များနှင့် ရမ်းပညာရှင်များ EMP အဖွဲ့ဝင်များနှင့် ရမ်းပညာရှင်များ	ကျပ် ၂၀၀,၀၀၀ ကျပ် ၂၀၀,၀၀၀	ပညာရှင် ရမ်းရမည် ပညာရှင် ရမ်းရမည်
၄။	လေအရည်အသွေး	NO ₂ O ₃ PM ₁₀ PM _{2.5} SO ₂ VOC	200 µg/m ³ 100 µg/m ³ 50 µg/m ³ 25 µg/m ³ 20 µg/m ³ 400 µg/m ³	စက်ရုံအဟောင်း နေရာ Coordinate: 22°20'19.7"N, 97°54'41.5"E နားလုံကျေးရွာ Coordinate: 22°18'03.8"N, 97°55'39.0"E	နောက်ဆုံး အကြိမ် နောက်ဆုံး အကြိမ်	EMP အဖွဲ့ဝင်များနှင့် ရမ်းပညာရှင်များ EMP အဖွဲ့ဝင်များနှင့် ရမ်းပညာရှင်များ	ကျပ် ၁,၇၀၀,၀၀၀ ကျပ် ၁,၇၀၀,၀၀၀	ပညာရှင် ရမ်းရမည် ပညာရှင် ရမ်းရမည်

				ရှန်တော်ကျေးရွာ Coordinate: 22°19'34.9"N, 97°54'46.9"E	နောက်ဆုံး အကြိမ်	EMP အဖွဲ့ဝင်များနှင့် ရမ်းပညာရှင်များ	ကျပ် ၁,၇၀၀,၀၀၀	ပညာရှင် ရမ်းရမည်
၅။	မြေဆီလွှာ (ညစ်ညမ်းခြင်း၊ တိုက်စားခြင်း)	- မြေအရည်အသွေးစမ်းသပ် တိုင်းတာခြင်း	-	စက်ရုံဝန်းအတွင်း Coordinate: 22°20'19.7"N, 97°45'41.5"E နားလုံကျေးရွာ Coordinate: 22°18'03.5"N, 97°55'38.7"E ရှန်တော်ကျေးရွာ Coordinate: 22°19'34.5"N, 97°54'46.6"E	နောက်ဆုံးအ ကြိမ် နောက်ဆုံးအ ကြိမ် နောက်ဆုံးအ ကြိမ်	EMP အဖွဲ့ဝင်များနှင့် ရမ်းပညာရှင်များ EMP အဖွဲ့ဝင်များနှင့် ရမ်းပညာရှင်များ EMP အဖွဲ့ဝင်များနှင့် ရမ်းပညာရှင်များ	ကျပ် ၁၄၀,၀၀၀ ကျပ် ၁၄၀,၀၀၀ ကျပ် ၁၄၀,၀၀၀	ပညာရှင် ရမ်းရမည် ပညာရှင် ရမ်းရမည် ပညာရှင် ရမ်းရမည်

ပုံမှန်ခြောက်လတစ်ကြိမ်တိုင်းတာ၍ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးသို့ တင်ပြပါမည်။

ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် (EMP) ကိုလုပ်ဆောင်ရန်အတွက် အဓိကဘတ်ဂျက်၏ ၀.၅ ရာခိုင်နှုန်းကို ကျပ် ၄၄၀,၆၂၄,၉၀၀ ကို ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် (EMP) ရန်ပုံငွေအဖြစ် ထားရှိပါသည်။

ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် (EMP) ရန်ပုံငွေကို အစီအစဉ်တစ်ခုစီဖြစ်သော EMP အဖွဲ့ ဖွဲ့ခြင်းအတွက်ကုန်ကျစရိတ်၊ စွမ်းဆောင်ရည်မြှင့်သင်တန်းများအတွက်ကုန်ကျစရိတ်၊ ကိရိယာတန်ဆာ ပလာများ ဝယ်ယူခြင်းအတွက်၊ ဖြေလျော့နိုင်မည့်နည်းလမ်းများအတွက် ကုန်ကျစရိတ်၊ စောင့်ကြပ်ကြည့်ရှု လေ့လာခြင်းအတွက်၊ အရေးပေါ် အတွက်ကုန်ကျစရိတ်နှင့် အထွေထွေကုန်ကျစရိတ်တို့ဖြစ်ပါသည်။ အသေးစိတ်ကုန်ကျစရိတ်မှာ အောက်ပါအတိုင်းဖြစ်သည်-

- EMP အဖွဲ့ ဖွဲ့စည်းရန်အတွက် ကုန်ကျစရိတ်	၂ ရာခိုင်နှုန်း	(ကျပ် ၈,၈၁၂,၄၉၈)
- EMP အတွက် အမှန်တကယ် ကုန်ကျမည့် ကုန်ကျစရိတ်		
(က) ဖြေလျော့နိုင်မည့် နည်းလမ်း များအတွက်	၂၅ ရာခိုင်နှုန်း	(ကျပ် ၁၁၀,၁၅၆,၂၂၅)
(ခ) စောင့်ကြပ်ကြည့်ရှု လေ့လာခြင်း အတွက်	၂၅ ရာခိုင်နှုန်း	(ကျပ် ၁၁၀,၁၅၆,၂၂၅)
- ပစ္စည်းကိရိယာဝယ်ယူမှုအတွက် ကုန်ကျစရိတ်	၂၀ ရာခိုင်နှုန်း	(ကျပ် ၈၈,၁၂၄,၉၀၀)
- စွမ်းဆောင်ရည်မြှင့် သင်တန်း များအတွက် ကုန်ကျစရိတ်	၇ ရာခိုင်နှုန်း	(ကျပ် ၃၀,၈၄၃,၇၄၃)
- အရေးပေါ် အစီအစဉ်အတွက် ကုန်ကျစရိတ်	၁၀ ရာခိုင်နှုန်း	(ကျပ် ၄၄,၀၆၂,၄၉၀)
- အစီရင်ခံတင်ပြခြင်း လုပ်ငန်းအတွက် ကုန်ကျစရိတ်	၈ ရာခိုင်နှုန်း	(ကျပ် ၃၅,၂၄၉,၉၉၂)
- အထွေထွေ ကုန်ကျစရိတ် (EMPအဖွဲ့ဝင်ဖြစ်သော ရွာသား နှစ်ယောက်အတွက် အပါအဝင်)	၃ ရာခိုင်နှုန်း	(ကျပ် ၁၃,၂၁၈,၇၄၇)

၎င်း EMP ရန်ပုံငွေ (ကျပ် ၄၄၀,၆၂၄,၉၀၀) သည် စီမံကိန်းကာလ နှစ်ပေါင်း ၃၀ လောက်နိုင်သည်ဟု မျှော်လင့်ရပါသည်။ သို့ပေမယ့် လိုအပ်ခဲ့လျှင် ပိုက်ဆံကို ရန်ပုံငွေထဲသို့ ထပ်မံထည့်ပါမည်။

အထက်မှာဖော်ပြထားသကဲ့သို့ရန်ပုံငွေအားဖြေလျော့နိုင်မည့်နည်းလမ်းများနှင့် စောင့်ကြပ်ကြည့်ရှု လေ့လာခြင်းအတွက် အဓိကသုံးစွဲပါမည်။

လူထုတွေ့ဆုံဆွေးနွေးခြင်း

လူထုတွေ့ဆုံဆွေးနွေးခြင်းသည် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း (EIA) ၏ မရှိမဖြစ် အရေးပါသောအစိတ်အပိုင်းဖြစ်သည်။ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း (EIA) လုပ်ငန်းတွင် လူထုပူးပေါင်းပါဝင်ခြင်းသည် စီမံကိန်းကို လက်ခံနိုင်မှုနှင့် နားလည်နိုင်မှု မြင့်တက်စေပါသည်။

သံတောင်ဦးကုမ္ပဏီလီမိတက်သည် အချိန်နှင့်အမျှ ဒေသခံများဖြင့် အစည်းအဝေးများ ကျင်းပပါသည်။

ပထမဆုံးလူထုတွေ့ဆုံဆွေးနွေးခြင်းအစည်အဝေးကို ကုမ္ပဏီဝန်းအတွင်းတွင် ၂၉-၁၂-၂၀၁၉ ကျင်းပခဲ့ပါသည်။ အဆိုပါအစည်းအဝေးတွင် မိုင်းရယ်လွှတ်တော်ကိုယ်စားလှယ်၊ ဦးစိုင်းမြင့်ထူး၊ ရှမ်းပြည်နယ်မှ ကိုယ်စားလှယ်တစ်ဦး၊ ကျေးရွာအုပ်ချုပ်ရေးမှူးများနှင့် ဒေသခံများ စုစုပေါင်း ၂၆၀၀ တက်ရောက်ကြ၍ အများစုမှာ ကြံစိုက်တောင်သူများဖြစ်ကြသည်။ အဓိကဆွေးနွေးခြင်းသည် သကြားစက်ရုံနှင့် ကြံစိုက်ပျိုးခြင်းအကြောင်းဖြစ်သည်။

(က)နယ်ပယ်အတိုင်းအတာသတ်မှတ်ခြင်းလေ့လာချိန်အတွင်းတွင်ပြုလုပ်သော လူထုတွေ့ဆုံဆွေးနွေးခြင်း

နယ်ပယ်အတိုင်းအတာသတ်မှတ်ခြင်းလေ့လာချိန်အတွင်းတွင် လူထုတွေ့ဆုံဆွေးနွေးခြင်းကို ရှန်တော်ကျေးရွာတွင် ၂၃-၂-၂၀၂၀ နှင့်အခြားပွဲကို နားလုံကျေးရွာတွင် ၁၄-၂-၂၀၂၀ ခုနှစ်တွင် ကျင်းပခဲ့ပါသည်။

ရှန်တော်ကျေးရွာတွင်ပြုလုပ်သောလူထုတွေ့ဆုံဆွေးနွေးခြင်း၊ ၁၃-၂-၂၀၂၀

အစည်းအဝေးတွင် ကျေးရွာအုပ်ချုပ်ရေးမှူး ဦးလုံစုမိနှင့် ရွာသူ/သား (၄)ဦးဖြစ်သော ဒေါ်ပါလုံ၊ ဒေါ်နန်းလှယုံ၊ ဦးထွန်းအောင်နှင့် ဦးလုံကျန်တို့မှ အမြင်သဘောထားများကို ကုမ္ပဏီအား မေးမြန်းခဲ့ပါသည်။ သူတို့အားလုံးသည် စီမံကိန်းကို ထောက်ခံပါသည်။ အဘယ့်ကြောင့်ဆိုသော် ကုမ္ပဏီသည် သူတို့စိုက်ပျိုးသော ကြံအားလုံးကိုဝယ်ယူမည်ဟု သိရသောကြောင့်ဖြစ်သည်။ သကြားစက်ရုံကို မည်သူမျှ ကန့်ကွက်သူမရှိပေ။

ဒေါ်နန်းလှယုံမှ ကုမ္ပဏီတာဝန်ရှိသူအား ကျေးရွာမီးပေးရန်အတွက် မေးမြန်းခဲ့ပါသည်။ ဦးစိုင်းဘမင်းမှ စက်ရုံလည်ပတ်လျှင် ဤအရာအတွက် အကောင်းဆုံးလုပ်ပေးပါမည်ဟု ပြောကြားခဲ့ပါသည်။ (ဧရိယာတစ်ခုလုံးတွင် လျှပ်စစ်မီးမရှိပေ)

နားလုံကျေးရွာတွင်ပြုလုပ်သောလူထုတွေ့ဆုံဆွေးနွေးခြင်း၊ ၁၄-၂-၂၀၂၀

အစည်းအဝေးတွင် ကျေးရွာအုပ်ချုပ်ရေးမှူး ဦးဖေထွန်းနှင့် ကျေးရွာသူ/သား (၃) ဦးဖြစ်သော ဒေါ်နန်းယုံ၊ ဒေါ်နန်းပန်နှင့် ဒေါ်နန်းအောက်တို့မှ အမြင်သဘောထားများပြောကြားခဲ့ပါသည်။

ဒေါ်နန်းယုံမှ ကျေးရွာနှင့် သကြားစက်ရုံကြား လမ်းကွေ့ကောက်နေသည်ကို သွားရသည့် လမ်းတိုစေရန် လမ်းအား ဖြောင့်စေချင်သည်။ ဦးဖေထွန်းနှင့် ဒေါ်နန်းအောက်မှ ကျေးရွာမီးပေးရန်နှင့် လမ်း၊ ကျောင်းပြုပြင်ပေးရန် တောင်းဆိုခဲ့ပါသည်။

ကုမ္ပဏီမှတာဝန်ရှိသူ ဦးစိုင်းဘမင်းမှ လက်ရှိတွင် စက်ရုံတည်ဆောက်ရေးသည် အဓိကတာဝန် ဖြစ်နေပါသည်။ ထို့ကြောင့် သူမှ ကျေးရွာမီးပေးခြင်း၊ လမ်းနှင့် ကျောင်းပြုပြင်ခြင်းများကို ခဏသည်းခံပြီး စောင့်ပေးရန်ပြောကြားခဲ့ပါသည်။

စီမံကိန်းကို မည်သူမျှ မကန့်ကွက်ပေ။ အစည်းအဝေး ၂ ခုစလုံးသည် ရင်းနှီးမှုဖြင့် အဆုံးသတ်ခဲ့ပါသည်။ ကုမ္ပဏီသည် ဒေသအဖွဲ့အစည်းများဖြင့် ကောင်းမွန်သောဆက်ဆံရေးရှိပါသည်။

သံတောင်ဦးကုမ္ပဏီလီမိတက်သည် ဧရိယာ၏ ကျောက်လမ်း ၇ မိုင်အရှည်ကို လမ်းခင်းပေးခြင်း၊ ရှန်တော်ကျေးရွာအတွက် စိမ့်ရေမှ ရေသွယ်တန်းပေးခြင်းနှင့် ကျေးရွာအတွက် အများသုံးကွန်ကရစ်ရေကန် တည်ဆောက်ပေးခဲ့ပါသည်။ ကျေးရွာ ၂ ရွာ သွားရေးလာရေးလွယ်ကူစေရန် တံတားအသစ်တစ်စင်း၊ ရှန်တော်တံတား (ကွန်ကရစ်၊ သံဘောင် ၁၀၀ ပေ x ၂၄ ပေ)ကို တည်ဆောက်ဆဲဖြစ်ပါသည်။

(ခ) ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းလေ့လာချိန်အတွင်းတွင်ပြုလုပ်သော လူထုတွေ့ဆုံဆွေးနွေးခြင်း

ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း လေ့လာချိန်အတွင်းတွင် ပြုလုပ်သော လူထုတွေ့ဆုံ ဆွေးနွေးခြင်း နားလုံးကျေးရွာတွင်တစ်ပွဲနှင့် ရှန်တော်ကျေးရွာတွင် တစ်ပွဲ ၂ ပွဲကျင်းပခဲ့ပါသည်။

နားလုံးကျေးရွာတွင် ပြုလုပ်သောလူထုတွေ့ဆုံဆွေးနွေးခြင်း၊ ၁၀-၆-၂၀၂၃

၁၀:၀၀ မှ ၁၁:၀၀ တွင် ကျေးရွာဘုန်းကြီးကျောင်းတွင် ပြုလုပ်သောအစည်းအဝေး၌ ဦးလုံစုမ်နှင့် ကျေးရွာသူ/သား ၂ ဦးမှ အမြင်သဘောထားများကို ပြောကြားခဲ့ပါသည်။

ဦးလုံစုမ်မှ သကြားစက်ရုံလုပ်ဆောင်ခြင်းကြောင့် ကျွန်တော်ဒေသခံများ၏ စီးပွားရေးအခြေအနေ တိုးတက်လာပါသည်။ ယခင်ကဆိုလျှင် ကြံစိုက်ပျိုးသူများသည် ဆင်းရဲကြပါသည်။ ယခုအခါတွင် ကျပ်သိန်းပေါင်းများစွာ ဝင်ငွေရသောကြောင့် ကားများတောင်စီးနိုင်နေပါသည်ဟု ပြောကြားခဲ့ပါသည်။

ဦးလုံကော်မှ ဤစီမံကိန်းကြောင့် လမ်းများကောင်းမွန်၍ ဒေသစီးပွားရေးလည်းတိုးတက်လာသည် ဟုပြောကြားခဲ့ပါသည်။

ဦးစိုင်းယုံခမ်မှ ကုမ္ပဏီမှ ကျွန်တော်တို့အား ကြံစိုက်ပျိုးခြင်းနည်းပညာများနှင့် အကူအညီများ ပေးခြင်းကြောင့် ကြံပိုမိုစိုက်ပျိုးနိုင်၍ ဝင်ငွေတိုးနေပါသည်ဟု ပြောကြားခဲ့ပါသည်။

အစည်းအဝေးကို ရင်းနှီးစွာဖြင့် အဆုံးသတ်ခဲ့ပါသည်။

ကျွန်တော်ကျေးရွာတွင် ပြုလုပ်သောလူထုတွေ့ဆုံဆွေးနွေးခြင်း၊ ၁၀-၆-၂၀၂၃

၁၃:၀၀ မှ ၁၄:၀၀ ထိကျေးရွာအုပ်ချုပ်ရေးမှူးအိမ်တွင် အစည်းအဝေးကျင်းပခဲ့ပါသည်။ အစည်းအဝေးကျင်းပနေချိန်တွင် ကျေးရွာအုပ်ချုပ်ရေးမှူး ဦးဖေထွန်းနှင့် ဒေသခံ (၃) ဦးမှ အမြင်သဘောထားများ ပြောကြားခဲ့ပါသည်။

ဦးဖေထွန်းမှ သကြားစက်ရုံပေါ်ပေါက်လာသောကြောင့် ကြံပိုမိုစိုက်ပျိုးနိုင်၍ ဝင်ငွေလည်း တိုးနေပါသည်။ လမ်းတွေလည်းကောင်းမွန်လာပြီဟု ပြောကြားခဲ့ပါသည်။

ဦးလုံကြာမှ ကျွန်တော်တို့ကျေးရွာကို စက်ရုံမှ လျှပ်စစ်မီးပေးထားပါသည်။ ကုမ္ပဏီမှ ကျောင်းတစ်ကျောင်းလည်းဆောက်လုပ်ပေးထားပါသည်။ ထို့ကြောင့် ကုမ္ပဏီအား ကျေးဇူးတင်ပါသည်ဟု ပြောကြားခဲ့ပါသည်။

ဦးစိုင်းလှမှ ကျွန်တော်တို့အား ကြံစိုက်ပျိုးခြင်းနည်းပညာများနှင့် အကူအညီများပေးခြင်းကြောင့် ကြံပိုမိုစိုက်ပျိုးနိုင်၍ ဝင်ငွေတိုးနေပါသည်ဟု ပြောကြားခဲ့ပါသည်။

ဦးအုန်းမှ သကြားစက်ရုံပေါ်ပေါက်လာသောကြောင့် ပိုမိုစိုက်ပျိုးနိုင်၍ ဝင်ငွေကောင်းလာပါသည်။ ယခင်ကဆိုလျှင် ကျွန်တော်တို့မှာ အလုပ်မရှိ ဆင်းရဲကြပါသည်။ ယခုအခါ ပိုက်ဆံသိန်းပေါင်းများစွာရရှိ၍ စီးပွားရေးတွေ တိုးတက်နေပါသည်ဟု ပြောကြားခဲ့ပါသည်။

အစည်းအဝေးကို ရင်းနှီးစွာဖြင့် အဆုံးသတ်ခဲ့ပါသည်။

အစည်းအဝေးအားလုံးကို အခန်း (၉) တွင် အသေးစိတ်ဖော်ပြထားပါသည်။

နောက်လာမည့်လူထုတွေ့ဆုံဆွေးနွေးပွဲများအတွက် အကြံပြုချက်များနှင့် GRM အစီအစဉ် ကိုလည်း ရှင်းပြထားပါသည်။

လူထုတွေ့ဆုံဆွေးနွေးခြင်းအစည်းများ၏ သတင်းအချက်အလက်အတိုများကို အတိုင်ပင်ခံ အဖွဲ့အစည်း၏ ဖေ့စ်ဘွတ်ဝတ်ဆိုဒ်ဖြစ်သော www.myanmarenvionmentsustainableconservation တွင် တင်ပြထားပါသည်။ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း (EIA) အစီရင်ခံစာအတည်ပြုပြီးလျှင် အဆိုပါဝတ်ဆိုဒ်နှင့် မိခင်ကုမ္ပဏီ၏ ဝတ်ဆိုဒ်ဖြစ်သော www.ngweyipale.com တွင် အစီရင်ခံစာ၏ အစိတ်အပိုင်းကို လွှင့်တင်ပါမည်။

EXECUTIVE SUMMARY

This is the Environmental Impact Assessment (EIA) report for the construction and operation of the Sugar Factory near Hsen Taw Village, Ko Hsaing Village Tract Area, Mong Yai Township, Shan State by Than Daung Oo Co., Ltd.

Than Daung Oo Co., Ltd has already obtained the permit from Myanmar Investment Commission (MIC), (Permit No.209/2019; date: 27-11-2019).

First of all a scoping study for the sugar factory project was conducted and the Scoping Report and Term of Reference (TOR) was submitted to the relevant authority. The said scoping report was approved by the authority on 15-2-2023. (Document: EIA – 1/7/approved (SR) (433/2023); dated 15-2-2023).

This EIA report is the follow-up report after the said Scoping Report and TOR.

The Project Proponent

Than Daung Oo Co., Ltd is registered as a company limited by shares on 15-6-2018 (Document: Certificate of Incorporation No.233/2018-2019 (MDY); Directorate of Investment and Company Administration). The new registration number is 117800938.

Name of Project Proponent	: Than Daung Oo Co., Ltd
Address (Head office)	: No. 607, 78 th Street (between 26 th and 27 th Street); Hay Mar Zala Ward, Chan Aye Tharzan Township, Mandalay Region.
Telephone	: 09 891000988, 09 89100989
Email	: thandaungoo.info@gmail.com
Contact person	: U Lin Thein Aung (Administration Manager)
Telephone	: 09 977150336, 09 444002600
Email	: lintheinaung777@gamal.com
Location of project site	: At Hsen Taw Village, Ko Hsaing Village Tract Area, Mong Yai Township, Lashio District Northern Shan State (It is 7 mile south of Hsi Paw-Mong Yai Highway at mile stone No.37/2).
The coordinates are	: N. Lat. 22° 20' 42.37" and E. Long. 97° 53' 51.47" and the elevation is 2790 feet asl.
Phone (project site)	: 09 44678180

The company has 11 executive and administrative members. U Thein Myint @ U Chaung Hpin is the managing director while the 10 directors are: U Kyaw Myint Oo, U Kyaw Shein, U Kyaw Wai @ San Wai Hwar, U Ai Maung @ Lee Syun Sho, U Myo Myint Aung, U Sein Myo Aung, U Shi Pyin Yinn, U Thein Tun, U Tun Win and U Yae Chan.

About the consultant firm

The consultant firm, Myanmar Environment Sustainable Conservation Co., Ltd was officially registered in 2014 as a consultant service company at the Ministry of National Planning and Economic Development. Document: Yaka-8(Ga) 001/2014(004720); date: 6-6-2014. Registration No.830/2014-2015 (20-5-2014). The registration number is 110649193. The Transitional Registration/License number of MESC is No. 0003, ECD, dated 1-7-2017.

Contact address : Room No. (B.5), Building No. 67/69, Parami Road, Ward No.16, Hlaing Township, Yangon.

Contact person : Myint Kyaw Thura

Phone : 959 420105071

: 959 73044903

E mail : myanmar.esc@gmail.com

Name	Nationality & National Registration Card No.	Registration /license No. by ECD	Designation
U Myint Kyaw Thura M.Sc (Zoology)	Myanmar 12/Da Ga Ta (N)028349	0006	Managing Director, Biodiversity Specialist (Fauna), EIA practitioner and EIA Appraiser
U Saw Han Shein B.Sc (Botany) M.Sc (Marine Biology)	Myanmar 10/Ma La Ma(N)008173	0007	Retired Professor, EIA Practitioner and Appraiser
U Tin Tun Aung B.Sc (Engineering)	Myanmar 12/U Ka Ma (N)172111	0009	Engineer and EIA practitioner
U Than Soe Oo M.Sc (Forestry)	Myanmar 9/Ma Na Ma (N) 050808	00011	EIA practitioner
U Oakka Kyaw Thu B.Sc (Geology)	Myanmar 7/Ya Ta Ya (N) 090371	00012	Geologist
Daw Thin Thin Yee B.Sc (Chemistry)	Myanmar 12/Tha Ga Ka (N)039292	00013	Chemical Environment Researcher, Computer Programmer
Dr. Htin Thaw Kaung M.B.B.S	Myanmar 13/ Pa Ha Na (N) 222723	Freelance	Occupational Health and Safety

Daw Thi Thi San L.L.B	Myanmar 12/ Tha Ka Ta (N) 150424	Freelance	Legal Analysis
Daw Hnin Nu Nu Aung M.Sc (Environmental Planning and Mangement) B.E (Materials and Metallurgy)	Myanmar 8/ Ma Ka Na (N) 204370	Applied	Environmental Engineer (Waste management)
U Thura Ko B.A (History)	Myanmar 12/Ka Ma Na (N) 124824	00277	Socio-economic expert, and also involved cultural heritage, ambient air, water quality, noise and vibration and soil

MESC has also part time members working as free lances. More about the project proponent and the consultant firm is described in the Introduction.

Policy, legal and administrative frame work

The environment policy of the government is to protect and conserve the environment while striving for national development; and to aim for sustainable development.

In this **Chapter-3**, first of all corporate Environmental and social policies of the project proponent is mentioned. The first and foremost policy is to comply with laws, rules and regulation relating to the physical and social environment. The company will implement the project which will be environmentally sound, socially sustainable and economically viable.

Forty eight applicable law, rules and regulations are listed and relevant articles are excerpted. International conventions and agreements are also listed.

Laws, rules and regulation of great relevant are:

- The Environmental Conservation Law, 2012; The Environmental Conservation Rules, 2014; Environmental Impact Assessment Procedure, 2015; National Environmental Quality (Emission) Guideline, 2015, the Factories Act, 1951; The Boiler Law, 2015; the Conservation of Water Resource and Rivers Law, 2006; the Public Health Law, 1972 and Occupational Health and Safety Law (2019), among others.

National Environmental Quality Guidelines (air emission, effluent, noise level, odor) prescribed by ECD are reproduced.

(a) Air emission

Than Daung Oo Co., Ltd will follow the general National Environmental Quality guideline values for air emission as prescribed by the Environmental Conservation Department (from Notification No.615/2015, December 2015, by ECD, then under the Ministry of Environmental Conservation and Forestry (MOECAAF), now MONREC, Code No. 1.1.

(b) Effluent

Than Daung Oo Co., Ltd will follow the National Environmental Quality sugar manufacturing guideline values for effluent levels (Notification No.615/2015, December 2015, by ECD, MOECAAF), Code No. 2.3.1.7

And also Than Daung Oo Co., Ltd will follow National Drinking Water Quality Standards.

(c) Noise level

The National Environmental Quality general guideline for noise (from Notification No.615/2015, December 2015, by MOECAAF), code No.1.3.

International standard and guideline for operation of sugar factories are downloaded from the internet and reproduced.

The commitments made by the project proponent as well as by the consultant firm are mentioned. The Company commits 2% of its net profits for the implementation of CSR programme. The company has already involved in community assistance and community development even before any profit is realized yet.

As a form of community development Than Daung Oo Co., Ltd has constructed a gravel road 7 miles long for the area, has sourced the water from a spring for Hsen Taw Village and has constructed a community concrete water tank of the village. The company has plan for village electrification, renovation of school and construction of a new school building for the communities. For the sake of easy transportation for nearby villages a new bridge, the Hsen Taw bridge (concrete and iron framed 100' x 24') was constructed. The company has built a primary school and hired teachers for Hsen Taw Village. The company has already spent Ks 1,002,148,615 for CSR programme.

Than Daung Oo Co., Ltd is a subsidiary of the parent company, the Ngwe Yi Pale' Group of Company. Ngwe Yi Pale' Group of Company is noted for its philanthropic mentality in this region. Therefore both the parent company and the subsidiary company, Than Daung Oo Co., Ltd, have good and very cordial relation with the local communities of this region.

The institutional frame work of Environmental Conservation Committee- ECC was formed in 2021.

The environmental and social performance standard by the International Finance Corporation (IFC) is briefly described.

Finally Environmental Health and Safety (EHS), Occupational Health and Safety (OHS) and Community Health and Safety (CHS) to be followed are briefly mentioned.

Policy, legal and institutional frame works are described in detail in Chapter-3.

Project description and alternative selection

The project is for the construction and operation of a sugar factory, to be called Than Daung Sugar Factory No.1 near Hsen Taw Village, Ko Hsaing Village Tract Area, Mong Yai Township, and Shan State.

The coordinates: N. Lat. 22° 20' 42.37" and E. Long. 97° 53' 51.47" and the elevation is 2790 feet asl.

The site is 0.5 miles north of Hsen Taw Village and 1.8 miles north of Na Long Village. It is 10 miles south west of Mong Yai Town and 43 miles south east of Lashio City; 119 miles north east of Mandalay and 390 miles north east of Yangon City.

The project site is has an area of 148 acres. The factory will have a capacity of milling 5,000 metric tons of raw super cane and producing 500 metric tons of white sugar per day.

The estimated budget is Ks 88,124.98 million. The Construction Phase and Operation Phase are estimated at 3 years and 30 years, respectively.

The main components (industrial buildings) of the project site include: weight unit; Sugar cane milling department; boiling, crystallization and packing departments, pump house unit, turbine unit, boiler unit; main warehouse, warehouse for agri-products, and warehouse for sugar, workshop/repair shop; and laboratory, among others.

The residential buildings include:

- Main office, meeting hall, guest house, 2 officer buildings, 2 employee buildings, messing hall and clinic.

Water is sourced from Nant Laung Chaung and also a spring nearby.

Electricity is sourced from National Gridline Electricity, from Kone Nyo village sub-station 33KV line, 7 miles away in the north.

The annual raw material (Sugar Cane) requirement is estimated at 630,000 tons. The annual operational days are 100-120 days (during sugar cane season). The chemical to be used are: Lime powder, sulphur, phosphoric acid, kurifloc, washing soda, etc.

370 employees are employed during Construction Phase and 254 will be employed during the Operation Phase. In addition 35 Chinese experts will be employed on the temporary basis.

Working hours is 8 hrs/day; 40 hrs/week.

The technology used for production of sugar is the universally known "press" or "squeeze" technology where sugar canes are pressed by roller mills and pressing out the juice. The juice is boiled and crystallized and manufacture into sugar. Sugar manufacturing process is described in technical details later in Chapter 4.

The main industrial wastes to be generated are: bagasse (pulp or fiber), cachaza (mud), molasse, ash, waste water and emission (dust, smoke, PM etc.). Huge quantity of bagasse is generated at the sugar mill and poses a major environmental threat to the surrounding if not well-managed. However all the bagasse generated will be reused as fuel burner for boiler thereby tackling the solid waste issue effectively. Cachaza and molasse are all reused in different ways and virtually none are discarded. These are described in technical details later in Chapter 4.

The project alternatives

From environmental safe guard view point alternative analysis is conducted. The options are: site location alternative, relocation alternative, reorientation alternative, materials alternative, energy alternative, technology/methodology alternative, demand alternative, activities alternative and "no go alternative"/"no project alternative".

Better alternative for site cannot be seen; there are various sugar cane fields in the near and far vicinity where raw materials are readily available. Raw sugar cane can be also procured from many other cane fields in the Naungkhio Township area. As regarded technology, the "press" or "squeeze" technology is the best technology appropriate for the production of sugar, so far. As regards other alternatives these are briefly described in Chapter-4.

The surrounding environment

The area is a relatively flat and undulating land on the high land Shan plateau. The surrounding area consists of mainly cultivated lands, fields or farm and residential areas, 2 villages in the vicinity. The terrain on the whole is undulating small hills and valleys.

There are only two villages in the south; namely, Hsen Taw Village 0.5 mile in the south and Na Long Village, 1.8 miles in the south east. These two villages are incorporated into EIA sturdy area.

In the adjacent west of the project site is the 162 acres sugar cane farm owned by the company.

On the whole the surrounding area consists of small fields and farms all around the project site area.

The studies on the physical, biological, socio-economics, cultural and visual components of the surrounding environment are conducted and baseline data collected.

Meteorological data are collected from Meteorological Department, Mong Yai Town. The monthly maximum temperature (35.4°C) was recorded in May, 2017 while the minimum (4.9°C) was recorded in January, 2010. The year 2016 has the highest rainfall (60.83 inch) while the year 2019 has the lowest (34.68 inch). The highest humidity value, 90 occurred in December, 2010 and 2016 while the lowest, 39, occurred in March, 2013. The highest wind speed (27.6 mph) was recorded in May, 2017 while the lowest (2.4 mph) was recorded in November, 2011. The highest evaporation value of 1985 mm was recorded in 2019, while the lowest evaporation value of 994 mm was recorded December 2011.

Other physical characteristics e.g. - topography, geology, ambient air, noise, water etc. are also studied and recorded. Geological data are secondary data obtained from company geologists. The project site area is underlain by limestone of Permian to Triassic Periods; predominantly limestone of Permian. As regards hydrology there is a stream, Nant Laung Chaung in the west which flows generally from north to south, forming the western boundary of the said 162 acres sugar cane field and also part of the north west boundary of the project site.

Baseline data on ambient air, noise level and water quality are studied and recorded. The values recorded area compared with the NEQ guideline values prescribed by ECD.

Soil quality

Soil samples were taken at the factory, Na Long village and Hsen Taw and analyzed at a laboratory in Yangon.

The coordinate for Factory: N. Lat. 22° 20' 19.7" and E. Long. 97° 54' 41.5";
date: 11-6-2023

The coordinate for Na Long village: N. Lat. 22° 18' 03.5" and E. Long. 97° 55' 38.7";
date: 11-6-2023

The coordinate for Hsen Taw village: N. Lat. 22° 19' 34.5" and E. Long. 97° 54' 46.6";
date: 11-6-2023

The results were as follows:

Sr. No	Sample plot	Units	Lead (Pb)	Cadmium (Cd)	Chromium (Cr)
1.	At the factory	ppm	2	Not Detected	Not Detected
2.	Na Long village	ppm	2.72	0.004	Not Detected
3.	Hsen Taw village	ppm	1.78	0.006	Not Detected

Water quality

For water samples along the Nant Laung stream were collected and analysis made at a registered laboratory in Yangon. Coordinates for sampling points (stations) were as follow:

Na Long village, coordinate : N. Lat. 22° 18' 02.7"; E. Long. 97° 55' 38.1"

Hsen Taw village, coordinate : N. Lat. 22° 19' 39.5"; E. Long. 97° 54' 50.2"

Four points along the Nant Laung Chaung, Coordinates:

Point St.1 : N. Lat. 22° 20' 37.72"; E. Long. 97° 54' 32.50"

Point St.2 : N. Lat. 22° 20' 10.1"; E. Long. 97° 54' 11.0"

Point St.3 : N. Lat. 22° 20' 00.0"; E. Long. 97° 54' 22.4"

Point St.4 : N. Lat. 22° 19' 46.53"; E. Long. 97° 54' 39.37"

The results are as follow:

Sr. No.	Parameters	St.1	St.2	St.3	St.4	Na Long village	Hsen Taw village	NEQEG guideline values
1.	Total coliform	30 CFU/ 100ml	30 CFU/ 100ml	36 CFU/ 100ml	10 CFU/ 100ml	40 CFU/ 100ml	8 CFU/ 100ml	3 (0-100 per ml)
2.	Fecal coliform	10 CFU/ 100ml	10 CFU/ 100ml	12 CFU/ 100ml	4 CFU/ 100ml	12 CFU/ 100ml	2 CFU/ 100ml	0 (0-100 per ml)
3.	Colour	10	20	30	5	40	5	Non-set, TCU 15
4.	Turbidity	26	38	52	10	62	7	NTU 5
5.	Arsenic	Nil	Nil	Nil	Nil	Nil	Nil	0.05 mg/l
6.	Nitrate	0.6	5.3	0.8	0.7	1.0	0.5	50 mg/l
7.	Manganese	Nil	Nil	Nil	Nil	Nil		0.4 mg/l
8.	Chloride	3	3	3	3	2	4	250 mg/l
9.	Hardness	144	140	140	142	142	154	500 mg/l (as CaCO ₃)
10.	Iron	0.62	0.77	0.82	0.38	0.89	0.35	1 mg/l
11.	pH	7.2	7.3	7.3	7.3	7.4	7.3	6.5-8.5
12.	Sulphate	10	18	20	13	25	15	250 mg/l
13.	Total dissolved solid	150	147	149	149	213	170	1000 mg/l

Effluent

Water samples from discharge point and final waste water ponds were taken and analysed at a registered laboratory in Yangon.

(a) Discharge water : N. Lat. 22° 20' 22.0"; E. Long. 97° 54' 23.0"

(b) Waste water pond (final) : N. Lat. 22° 20' 18.42"; E. Long. 97° 54' 20.54"

The results were as follow:

Sr. No.	Parameters	Final discharge raw water	Final waste water pond	NEQEG guideline value
1	5-day Biochemical oxygen demand	10	40	50 mg/l
2	Chemical oxygen demand	32	96	250 mg/l
3	Oil and grease	<5	6	10 mg/l
4	pH	7.6	8.0	6-9 S.U
5	Temperature increase	25°	25°	< 3 °C
6	Total coliform	40 CFU/100ml	80 CFU/100ml	400 CFU/100ml
7	Total nitrogen	15.6	8.7	10 mg/l
8	Total phosphorus	1	4.7	2 mg/l
9	Total suspended solid	22	55	50 mg/l

Note –Total nitrogen, Total phosphorus and TSS are higher than guideline values. The reasons are not exactly known; might be due to high level of organic in the water.

Ambient air quality

Air quality was measured at the factory, Na Long Village and Hsen Taw Village; in addition air from boiler (stack) was also measured.

Factory: the coordinates: N. Lat. 22° 20' 19.7" and E. Long. 97° 54' 41.5"; date: 7-6-2023

Na Long village: the coordinates: N. Lat. 22° 18' 03.8" and E. Long. 97° 55' 39.0"; date: 8-6-2023

Hsen Taw village: the coordinates: N. Lat. 22° 19' 34.9" and E. Long. 97° 54' 46.9"; date: 9-6-2023

Stack: the coordinates: N. Lat. 22° 20' 19.53" and E. Long. 97° 54' 39.84"; date: 7-6-2023

The results are as follow:

Sr. No.	Parameters	Units	At factory	Na Long village	Hsen Taw village	NEQEG guideline values
1.	Nitrogen dioxide	$\mu\text{g}/\text{m}^3$	15.91	20.56	35.76	200 $\mu\text{g}/\text{m}^3$ (per hour)
2.	Ozone	$\mu\text{g}/\text{m}^3$	0.88	0.82	0.79	100 $\mu\text{g}/\text{m}^3$ (8 hours period)
3.	PM ₁₀	$\mu\text{g}/\text{m}^3$	55.62	20.23	27.44	50 $\mu\text{g}/\text{m}^3$ (24 hours)
4.	PM _{2.5}	$\mu\text{g}/\text{m}^3$	35.50	10.75	15.76	25 $\mu\text{g}/\text{m}^3$ (24 hours)
5.	Sulphur dioxide	$\mu\text{g}/\text{m}^3$	3.15	0	0	20 $\mu\text{g}/\text{m}^3$ (24 hours)
6.	VOC	ppb	0.02	0	ND	NG
7.	Ammonia	ppm	4	0	2.92	NG
8.	Carbon dioxide	ppm	329.07	309.63	284.58	NG
9.	Carbon monoxide	ppm	2.35	0	0.11	NG
10.	Oxygen	%	20.44	20.30	20.58	NG
11.	Wind direction	-	SE	SW	SE	NG
12.	Wind Speed	mph	1.91	1.35	0.42	NG

Note – On the whole the values were within the guideline values, except PM10 and PM2.5 at the factory premise where the values were a little higher. These might be due to activities taking places at the factory during the time of survey work. Guideline values for some parameters, not available.

Emission at stack (Fuel burner : bagasse)

Sr. No.	Parameters	Unit	Measurements Result	Small Combustion Facilities Emission Guideline
1	O ₂	%	18.23	-
2	CO	mg/Nm ³	3429	-
3	CO ₂	%	2.6	-
4	NO ₂	mg/Nm ³	52	650
5	SO ₂	mg/Nm ³	97	2000
6	PI	%	0.62	

Noise levels

Noise levels were also measured at the factory, Na Long village and Hsen Taw village. Measuring points (coordinates) were the same as for air quality measurements.

The results were as follow:

	At the factory site		At Na Long village		At Hsen Taw village		NEQEG guideline	
	Day	Night	Day	Night	Day	Night	Day	Night
(Residential, institutional, educational)	78.27	80.93	59.83	51.76	54.66	50.82	55	45
Industrial commercial	-	-	-	-	-	-	70	70

Note – On the whole the noise levels at the factory and the two villages were higher than NEQEG guideline values due to the fact that generator has to be used for measuring.

Vibration

The result is 2.1 mm/s inside the factory.

Odour

Guideline standard for odourant is 5 – 10 (not exceed 10)

Biological component

1. Flora

82 species of flora (natural vegetation and cultivated plants)

2. Fauna

95 species of avian fauna (birds)

14 species of herpetofauna (amphibians and reptiles)

6 species of mammalian fauna (mammals)

10 species of aquatic fauna (fish) were found and identified. (Some were from secondary information only). These are listed in described later in Chapter 5, 5.6.

The area being cultivated land of fields and farms the large natural biodiversity (forest) is almost non-existent. Only small natural vegetation (e.g. shrub, herb, grass etc.) and birds are normally found. There are also no large or medium size mammals (only rodents).

Socio economic component

There are only two villages in the south within the 2 miles radius. They are: Hsen Taw village and Na Long village.

Socio-economic assessment of these two villages was conducted.

Na Long is a relatively large village while Hsen Taw village is just a small village (helmet).

The populations of the two villages are:

Na long village : 75 (M-40, F-35)

Hsen Taw village : 303 (M-144, F-159)

100% of the people of these two villages are Shan, and 100% are Buddhists.

The adult literacy rate for Na Long is 40% for Bamar language and 60% for Shan dialect.

The adult literacy rate for Hsen Taw is not known.

As regards main occupation 96% and 80% are farmers' cultivators for Hsen Taw and Na Long, respectively. The main crops are rice, maize, sugar cane and peanut. There are no government employees.

The daily wages for the area range between Ks. 4000 – Ks. 5000. As regards infrastructure and service both villages are accessible by motor road (gravel road) and both are linked to Hsi Paw – Mong Yai highway, 7-8 miles in the north.

Na long village villages is not electrified. All households use solar panels for lighting at night.

Na Long has a primary school (BEPS) with 40 students and 1 teacher; Hsen Taw village has one private primary school built by the company with 1 teacher and 20 students.

Both villages have no village clinic and no village library.

Both villages have water sourced from spring or stream or from water pools dug beside the stream.

The majority of households at both villages have wooden house with corrugated iron roofing and either wooden walls or bamboo walls. 100% and 50% of households at Na Long and Hsen Taw, respectively, have hand phone; while 80% and 100% of households at Na Long and Hsen Taw, respectively, have motor cycles.

Cultural component

Hundred percent of the villagers from both villages are Shan nationals and Buddhists.

Hsen Taw village has no monastery while Na Long has one Buddhist monastery with only two monks.

Only a few of the village elders go to the monastery during Sabbath days (the full moon, and new moon and 8th day of the Burmese months).

The villagers of Hsen Taw village propitiate the "Nats" (the guardian spirits) during the Full Moon day and New Moon Day of a month. The villagers of Na Long have a Nat Festival on the 10th day of the Burmese month, Taw Tha Linn (September/October). They also celebrate the Buddhist Katina (Katein) religious festival day. There are no religious monuments or pagoda in the area.

Visual component

The landscape consists of many small fields and farms, the sugar factory, and adjacent sugar cane field and two said villages.

The sugar factory and facilities stand out prominently in the area.

There are no scenic spot, beautiful landscape and outstanding land mark. There are also no historical, cultural and religious monuments.

Risks and impacts assessment and mitigation measures

As the project is already in the Operation Phase, for pragmatic purpose, only the impacts during the Operation Phase and Decommissioning Phase together with mitigation measures to be put in places will be outlined.

During the Operation Phase

Sr. No.	Impact	Mitigations
1.	Impact on air environment	<ul style="list-style-type: none"> - Comply with NEQ emission guideline by ECD - Try to control and mitigate air emission as practical as possible - Procure eco-friendly equipment/machinery/vehicles that generate less smoke - Ensure for complete combustion of bagasse waste - Apply ash reduction equipment, eg. dust collector, filter bag - Apply wet scrubber system (water dozing) - Proper training, operation and maintenance of machinery/equipment - Avoid open burning of solid waste - Restrict vehicular movements - Prevent spillage of lime powder, - Plant trees around the compound to mitigate dust and smoke - Spray water for dust suppression. - Provide adequate PPEs to workers - Monitor the mitigation works

2.	Noise and vibration	<ul style="list-style-type: none"> - Comply with NEQEG guideline by ECD - Try to manage and mitigate noise and vibration - Procure machinery/equipment/vehicle that are eco-friendly; emitting lower noise level - Maintain and operate machinery/vehicle well - Install silencer - Install noise barrier/sound insulation - Limit the speed of truck - Install absorber on machine that vibrate violently - Implement stable foundation - Create green belt to absorb noise - Provide PPEs - Monitor the mitigation actions
3.	Impact of solid waste	<ul style="list-style-type: none"> - Plan and execute waste management, waste minimization and utilization - Use bagasse waste for fuel - Recycle molasse; also consider for production of ethanol - Compost "mud" (cachaza) into high quality organic fertilizer - Use dry lime (solid lime) for soil conditioning - Systematically collect ash and store in ash pools; process ash into construction material; also use then as fertilizer and soil conditioner. - Educate workers for proper handling of waste - Avoid open burning of solid waste - Follow the 5Rs principles for waste, if the is possible - dispose waste only at approved landfill or dumping site - Monitor the mitigation work
4.	Impact of liquid waste	<ul style="list-style-type: none"> - Comply with NEQ effluent guideline by ECD - Plan and execute the management of waste water and reduction of waste water - Promote awareness on the efficient use of water and conservation of water - Segregate non-contaminated waste water stream from contaminated stream; reuse - Reduce the organic load of waste water by preventing the entry of solid waste into the waste water stream; install screen or filter; - Prevent direct run off to water course - Recycle process water and reuse

		<ul style="list-style-type: none"> - Duly treat waste water applying conventional method (physical treatment); screening, sedimentation, and removal of sediment. - Educate and train workers for good housekeeping practice and proper handling of waste water - Check and monitor daily use of water - Regularly check the tanks, pipes, taps for water leakage and fix them immediately - Monitor the mitigation works
5	Odour	<ul style="list-style-type: none"> - Comply with NEQEG guideline for odour. - Ensure that organic wastes are not accumulated in the ash ponds and waste water pond. - Reduce the load of organic in the water as practical as possible – install screen/filter to retain organic waste and manually remove the waste; - Large quantity of bagasse ash will be accumulated in the ash ponds; install an overhead crane to mechanically remove the ash sediment. - Relatively small quantity of sediment (sludge) will be settled at the waste water pond; mechanically removed the sediment and discarded. - Give away the ash waste to the local sugar cane planters; used some as fertilizer and soil conditioner in the greening. - Regularly apply lime powder in waste water pond to mitigate odour also grow water hyacinth to purify water and mitigate odour. - Wash down work floors at milling and process plants daily. - Plant fast growing tree around the premise; trees will abate odour to some extent. - Check waste water pond, ash pond, molasse tanks weekly for any smell or odour (olfactory testing by smelling).
6.	Impact on water environment	<ul style="list-style-type: none"> - Plan and manage for water environment protection and water conservation - Follow rules and regulation (The Conservation of Water Resources and River Law, 2006) - Comply with NEQ effluent guideline by ECD - Avoid by all means the pollution of Nant Long rivulet - Avoid disposing of solid and liquid waste into the rivulet (stream) - Avoid spillage of fuel oil into the rivulet - Promote awareness of efficient use of water and water conservation

		<ul style="list-style-type: none"> - Ensure that the consumption of water is in the work frame - Ensure that the water sourcing from Nant Long rivulet do not qualitatively and quantitatively impact the rivulet water. - Recycle water, through cooling tower and series of cooling tanks - Apply appropriate plumbing and ensure that there is no leakage of water - Monitor the mitigation works
7.	Impact on traffic	<ul style="list-style-type: none"> - Try to achieve zero road accident - Comply with Highway Law, 2000 - Set up signage for speed limit at appropriate places - Educate and train the drivers for defensive driving - Avoid over loading of truck - Conduct public education campaign for road safety - Keep a log book for each vehicle - Schedule vehicular movements - Monitor the mitigation actions
8.	Occupational health and safety issue	<ul style="list-style-type: none"> - Plan and manage for a safe and healthy atmosphere inside the factory - Try to achieve zero accidents - Comply with Factories Act, 1974; Boiler Law, 2015; Workmen Compensation Act, 1923 - Also comply with NEQ guideline for emission and noise by ECD - Educate, train and supervise workers for good working practice, good safety practice and good health and hygiene practice - Educate, train and supervise them for skill, for operation of equipment, for handling for chemicals (eg. lime, sulphur) - Keep all machinery/equipment well-maintained and well-operated - Provide adequate PPEs - Carefully plan for emergency procedure - Provide First Aid and Firefighting training - Set up a factory clinic; first aid kits to be well stocked with medicines and drugs; provide adequate fire fighting equipments (eg. fire extinguishers, hydrants etc.) - Display addresses and phone numbers of Red Cross Society, Ambulance Service, Fire brigade etc. so that every one can easily see

		<ul style="list-style-type: none"> - Take out insurance for the factory, also take out fire insurance - Monitor the mitigation actions
9.	Potential social issue	<ul style="list-style-type: none"> - Prevent or minimize negative impact on socio-economic life of the local - Build and maintain good relation with locals - Hold public consultation from time to time - Educate the workers for etiquette, and respect the custom and tradition of the locals - Manage misbehaviours and social illness of workers - Keep separate housing for male and female workers - Provide proper training on work place regulation and code of conducts - Provide welfare programme - Educate and discipline workers - Deal with workers on a fair and square basis - Take punitive action to wrong doer - Prohibit the drinking of alcohol during working hours; ban the use of narcotics - Provide adequate sanitation eg-toilet, baths etc. - Heed to the voice of the locals - Plan and implement CSR as practical as possible - Monitor the mitigation actions
10.	Potential security issue	<ul style="list-style-type: none"> - Manage security of the site - undertake effective fencing/walling of the site - Control all accesses; set up security gates; deploys guards - Do not let workers mingle freely with locals - Do not let the workers enter the neighbouring village without pre-authorization; - Put certain materials under lock and key - Apply punitive measures to wrong doer - Provide ID cards for all for easy identification - Provide uniform for all - Monitor the mitigation works
11.	Potential visual impact	<ul style="list-style-type: none"> - Plan and excute for a sugar factory project which is focused on visual appeal - Enhance the splendor and beauty of the factory - Plant shade trees along both sides of access road; plant shade trees, fruit trees and ornamental trees in and around the site; create green zones and belts - Conserve natural vegetation in the vicinity

		<ul style="list-style-type: none"> - Use eyes pleasing paints and colours for buildings and structure - Provide appropriate lighting at night only for security reason; avoid the use of excessive light - Use yellow light instead of white light to mitigate insect aggregation; if insect aggregate turn off the light for a while - Monitor the mitigation works
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During the Decommissioning/Rehabilitation Phase

Sr. No.	Impact	Mitigation
1.	Occupational health and safety issue	<ul style="list-style-type: none"> - Manage for effective decommissioning of site. - Hire decommissioning contractor to do the work. - Dispose materials that are no longer useable; redeploy or put up for sale those that are useable - Restore the ground and soil profile. - Revegetate and rehabilitate the ground, select a variety of plant species. - Backfill pits, dents and depressions, if any remain after decommissioning; backfill first with overburden and then put top soil on top to facilitate revegetation. - Monitor the mitigation works
2.	Potential residual impacts	<ul style="list-style-type: none"> - Hired a decommissioning contractor to do the work - Clean and tidy up the site - Remove contaminated soil, if any - Test the quality of air, water and soil for the last time - Continue rehabilitation (reforestation) work - Hired a rehabilitation contractor and party for effective reforestation

All the said impacts and mitigation measures to be put in place for each and every impact are described in technical detail in the Chapter-6.

The positive (beneficial) impacts during the long Operation Phase of 30 plus years will be many. The positive impacts are in the form of provision of permanent jobs for 254 employees and the chance of more employment opportunities as the business progress.

At national level the benefit from the project will accrue to the nation in the form of direct investment of Ks 88,124.98 million, increasing the GDP of the country. The project will play an active role in the increased production of sugar and to the development of food industrial sector of the region.

A subsection of this Chapter-6 is on the identification and assessment of the likelihood and severity of natural and industrial hazards relevant to the project. The assessment is divided into the present Operation and the later Decommissioning Phase. Large quantity of industrial waste e.g. bagasse, ash and "mud" are generated from the factory, but none of them are hazardous. Mitigation/mediation measures for these industrial wastes are discussed.

Another subsection of Chapter-6 is on characterization and assessment of any residual impacts and risks. Both residual and risk assessment are made, including both theoretical and pragmatic approach.

The overall risk assessment (impact assessment) based from Expert consensus method and IFC table (likelihood x consequence) in tabulated forms.

The last subsection deals with comprehensive monitoring to be conducted and this is shown in tabulated form.

32 and 5 components/parameters to be monitored (overall, generalized monitoring) during the Operation and Decommissioning Phases, respectively, are shown in tabulated forms. Specific monitoring plan is shown later in Chapter 8, (EMP).

Cumulative impact assessment

Large quantity of industrial waste e.g. bagasse will be generated from the factory. But as all bagasse waste will be totally reused as fuel for boiler there can be no cumulative impact. Large quantity of ash will be generated but will be regularly collected and dried and store in ash pools. Later the ash will be removed and will be used as soil conditioner/fertilizer for plant. The ash water will be stored steps by steps in 4 ash pools.

The Than Daung Oo Sugar Factory 2 in the west of the site is now in its early Construction Phase. This larger factory will have a capacity of producing 1,200 tons of sugar per day. Therefore, when in operation there will be a big simultaneous cumulative impact from this new sugar factory.

At the moment the existing Than Daung Oo sugar factory No.1 (the project factory) can consume 5,000 tons of raw sugar cane for production of 500 tons of sugar. The cumulative successive impact on the living resources (sugar cane) can be very high in the duration of one year. But the factory is operational for only about 150 days per year. The company has adequate time (7 months per year) for maintenance, cleaning, tidying up the factory and premise and systematic disposal of all solid and liquid water. There can be no cumulative impacts per year and hence no cumulative impact at the end of the project life is envisaged. Sugar cane plants can be replenished (regrown) effectively by sugar cane farmers during the remaining months.

Environmental management plan (EMP)

This **Chapter-8** is all about Environmental Management Plan (EMP) and Monitoring Plan (MP).

This chapter includes 6 sections, namely, executive summary, project description, health policy, commitment, legal requirement and institutional arrangement, summary of impacts and mitigation measures, overall budget, management and monitoring sub-plan and contents each sub-plan. As this is not a standalone EMP report, all are summarized as far as possible, some are shown in tabulated forms. Health policy is briefly mentioned, impact and mitigation measures are briefly summarized again. Management and monitoring sub-plan for noise and vibration, waste, hazardous waste, waste water and storm water, air quality, odour, chemicals, water quality, erosion and sedimentation, biodiversity, occupational health and safety, community health and safety, cultural heritage, employment and training, emergency response, traffic and aesthetic beauty are described in technical details (in accordance with EIA Procedure, No.616/2015, as prescribed by ECD) in Chapter 8, (8.6).

Summary of monitoring plan during the Operation Phase and Decommissioning Phase are shown in tabulated forms.

Summary of monitoring plan during the Operation Phase

Sr.	Components/ issue	Parameters to be monitored	NEQEG guideline values	Monitoring spot/site	Frequency	Responsible person	Cost (once off)	Remark
1	Noise and vibration level	dB(A) day and night	70 dB(A) 55 dB(A) and 45 dB(A)	<u>Noise</u> At the factory Coordinate: 22°20'19.7"N, 97°54'41.5"E	semi- annually	EMP cell members and hired technicians	Ks 100,000	Technicians have to be hired
				At Na Long village Coordinate: 22°18'03.8"N, 97°55'39.0"E	semi- annually	EMP cell members and hired technicians	Ks 100,000	Technicians have to be hired
				At Hsen Taw village Coordinate: 22°19'34.9"N, 97°54'46.9"E	semi- annually	EMP cell members and hired technicians	Ks 100,000	Technicians have to be hired
				<u>Vibration</u> At the factory Coordinate: 22°20'13.9"N, 97°54'36.2"E	semi- annually	EMP cell members and hired technicians	Ks 100,000	Technicians have to be hired
2	Waste	- monitor industrial wastes especially ash collection and storage and reuse	-	At final waste water pond Coordinate: 22°20'18.41"N, 97°45'33.76"E	weekly	EMP cell members	Free of charges	

		- monitor domestic wastes, collection and disposal	-	At landfill (inside factory compound) 22°20'18.41"N, 97°54'33.76"E	weekly	EMP cell members	Free of charges	
3	hazardous waste	- monitor collection of used oil and engine oil and disposals	-	near fuel depot 22°20'9.90"N, 97°54'47.54"E	monthly	EMP cell members	Free of charge	
		- monitor generation of old lamps, bulbs, old filters, old batteries etc and disposals		At landfill (inside factory compound) 22°20'18.41"N, 97°54'33.76"E	monthly	EMP cell members	Free of charge	
4	Water quality/ effluent	<u>Water quality</u>						
		Total coliforms	3(0-100ml)	At Nant Laung chaung (St-1)	semi-annually	EMP cell members and hired technicians	Ks 200,000	Technicians have to be hired
		Fecal coliforms	0(0-100ml)	Coordinate: 22°20'37.72"N, 97°54'32.50"E				
		Turbidity	5 NTU	At Nant Laung chaung (St-2)	semi-annually	EMP cell members and hired technicians	Ks 200,000	Technicians have to be hired
		Arsenic	0.01 mg/l	Coordinate: 22°20'10.1"N, 97°54'11.0"E				
		Lead	0.01 mg/l	At Nant Laung chaung (St-3)	semi-annually	EMP cell members and hired technicians	Ks 200,000	Technicians have to be hired
		Nitrate	50 mg/l	Coordinate: 22°20'00.0"N, 97°54'22.4"E				
		Manganese	0.4 mg/l					
		Chloride	250 mg/l					
		Hardness	500 mg/l					
Iron	1 mg/l							
p ^H	6.5 – 8.9 SU							
Sulphate	250 mg/l							
Total Dissolved Solids	1000 mg/l							

		<u>Effluent</u> 5 days BOD COD Oil and grease pH Temperature increase Total coliform Total nitrogen Total phosphorus Total suspended solids	50 mg/l 250 mg/l 10 mg/l 6-9 S.U <3° 400CFUmg/l 10 mg/l 3 mg/l 50 mg/l	At Nant Laung chaung (St-4) Coordinate: 22°19'46.53"N, 97°54'39.37"E At Na Long village Coordinate: 22°18'02.7"N, 97°54'32.50"E At Hsen Taw village Coordinate: 22°19'39.5"N, 97°54'50.2"E At discharge water, Coordinate: 22°20'22.0"N 97°54'23.0"E At final waste water pond, Coordinate: 22°20'18.42"N 97°54'20.54"E	semi-annually semi-annually semi-annually semi-annually semi-annually	EMP cell members and hired technicians EMP cell members and hired technicians EMP cell members and hired technicians EMP cell members and hired technicians EMP cell members and hired technicians	Ks 200,000 Ks 200,000 Ks 200,000 Ks 200,000 Ks 200,000	Technicians have to be hired Technicians have to be hired Technicians have to be hired Technicians have to be hired Technicians have to be hired
5	Air quality and emission	<u>Air quality</u> NO ₂ O ₃ PM ₁₀ PM _{2.5}	200 µg/m ³ 100 µg/m ³ 50 µg/m ³ 25 µg/m ³	At the factory Coordinate: 22°20'19.7"N, 97°54'41.5"E	semi-annually	EMP cell members and hired technicians	Ks 1,700,000	Technicians have to be hired

		SO ₂ VOC Ammonia Carbon dioxide Carbon monoxide	20 µg/m ³ 400 µg/m ³ NG NG NG	At Na Long village Coordinate: 22°18'03.8"N, 97°55'39.0"E At Hsen Taw village Coordinate: 22°19'34.9"N, 97°54'46.9"E	semi- annually semi- annually	EMP cell members and hired technicians EMP cell members and hired technicians	Ks 1,700,000 Ks 1,700,000	Technicians have to be hired Technicians have to be hired
6	Odour	- monitor at waste water pond	-	At final waste water pond, Coordinate: 22°20'18.42"N 97°54'20.54"E	semi- annually	EMP cell members and hired technicians	Ks 300,000	Technicians have to be hired
7	Chemical	- monitor handling and uses of chemicals	-	at chemical store Coordinate: 22°20'19.28"N 97°54'43.03"E	weekly	EMP cell members	Free of charge	
8	Soil (contamination erosion)	- monitor contamination of soil; testing soil quality	- -	Inside the factory compound Coordinate: 22°20'19.7"N, 97°45'41.5"E At Na Long village Coordinate: 22°18'03.5"N, 97°55'38.7"E At Hsen Taw village Coordinate: 22°19'34.5"N, 97°54'46.6"E	semi- annually semi- annually semi- annually	EMP cell members and hired technicians EMP cell members and hired technicians EMP cell members and hired technicians	Ks 140,000 Ks 140,000 Ks 140,000	Technicians have to be hired Technicians have to be hired Technicians have to be hired

Summary of monitoring plan during the Decommissioning Phase

Sr.	Components/ issue	Parameters to be monitored	NEQEG guideline values	Monitoring spot/site	Frequency	Responsible person	Cost (once off)	Remark
1	Noise and vibration	dB(A) day and night	70 dB(A)	At old plant site Coordinate: 22°20'19.7"N, 97°54'41.5"E	last time	EMP cell members and hired technicians	Ks 100,000	Technicians have to be hired
			55 dB(A) and 45 dB(A)	At Na Long village Coordinate: 22°18'03.8"N, 97°55'39.0"E	last time	EMP cell members and hired technicians	Ks 100,000	Technicians have to be hired
				At Hsen Taw village Coordinate: 22°19'34.9"N, 97°54'46.9"E	last time	EMP cell members and hired technicians	Ks 100,000	Technicians have to be hired
				<u>Vibration</u> At the factory Coordinate: 22°20'13.9"N, 97°54'36.2"E	last time	EMP cell members and hired technicians	Ks 100,000	Technicians have to be hired

2	Waste (decommissioning wastes, debris)	- monitor decommissioning works (dismantling, demolition) and generation of huge quantity of debris, and systematic disposal and tidying up of the site	-	At the old plant; Coordinate: 22°20'14.25"N, 97°54'40.04"E	weekly/ monthly	EMP cell members	Free of charges	-
3	Water quality	<u>Water quality</u> Total coliforms Fecal coliforms Turbidity Arsenic Lead Nitrate Manganese Chloride Hardness Iron p ^H Sulphate Total Dissolved Solids	3(0-100ml) 0(0-100ml) 5 NTU 0.01 mg/l 0.01 mg/l 50 mg/l 0.4 mg/l 250 mg/l 500 mg/l 1 mg/l 6.5 – 8.9 SU 250 mg/l 1000 mg/l	At Nant Laung chaung (St-1) Coordinate: 22°20'37.72"N, 97°54'32.50"E At Nant Laung chaung (St-2) Coordinate: 22°20'10.1"N, 97°54'11.0"E At Nant Laung chaung (St-3) Coordinate: 22°20'00.0"N, 97°54'22.4"E At Nant Laung chaung (St-4) Coordinate: 22°19'46.53"N, 97°54'39.37"E	last time last time last time last time	EMP cell members and hired technicians EMP cell members and hired technicians EMP cell members and hired technicians EMP cell members and hired technicians	Ks 200,000 Ks 200,000 Ks 200,000 Ks 200,000	Technicians have to be hired Technicians have to be hired Technicians have to be hired Technicians have to be hired

				At Na Long village Coordinate: 22°18'02.7"N, 97°54'32.50"E	last time	EMP cell members and hired technicians	Ks 200,000	Technicians have to be hired
				At Hsen Taw village Coordinate: 22°19'39.5"N, 97°54'50.2"E	last time	EMP cell members and hired technicians	Ks 200,000	Technicians have to be hired
		<u>Effluent</u> 5 days BOD COD Oil and grease pH Temperature increase Total coliform	50 mg/l 250 mg/l 10 mg/l 6-9 S.U <3° 400 CFU	At discharge water, Coordinate: 22°20'22.0"N 97°54'23.0"E	last time	EMP cell members and hired technicians	Ks 200,000	Technicians have to be hired
		Total nitrogen Total phosphorus Total suspended solid	10 mg/l 3 mg/l 50 mg/l	At final waste water pond, Coordinate: 22°20'18.42"N 97°54'20.54"E	last time	EMP cell members and hired technicians	Ks 200,000	Technicians have to be hired
4	Air quality and emission	NO ₂ O ₃ PM ₁₀ PM _{2.5} SO ₂ VOC	200 µg/m ³ 100 µg/m ³ 50 µg/m ³ 25 µg/m ³ 20 µg/m ³ 400 µg/m ³	At old plant site Coordinate: 22°20'19.7"N, 97°54'41.5"E	last time	EMP cell members and hired technicians	Ks 1,700,000	Technicians have to be hired
				At Na Long village	last time	EMP cell members and hired technicians	Ks 1,700,000	Technicians have to be

				Coordinate: 22°18'03.8"N, 97°55'39.0"E At Hsen Taw village Coordinate: 22°19'34.9"N, 97°54'46.9"E	last time	technicians EMP cell members and hired technicians	Ks 1,700,000	hired Technicians have to be hired
5	Soil (contamination erosion)	- test soil quality	-	Inside the factory compound Coordinate: 22°20'19.7"N, 97°45'41.5"E At Na Long village Coordinate: 22°18'03.5"N, 97°55'38.7"E At Hsen Taw village Coordinate: 22°19'34.5"N, 97°54'46.6"E	last time last time last time	EMP cell members and hired technicians EMP cell members and hired technicians EMP cell members and hired technicians	Ks 140,000 Ks 140,000 Ks 140,000	Technicians have to be hired Technicians have to be hired Technicians have to be hired

Semi-annual monitoring report will be submitted to ECD regularly.

As regards overall budget for implementation of EMP 0.5% of the main budget (which is equivalent to Ks 440,624,900) is set aside for EMP fund.

The EMP fund is then allotted for each programme, namely, cost of organizing EMP, cost for capacity building and training, cost for partial procurement of small equipment and device, cost for execution of mitigation, cost for monitoring, for emergency and miscellaneous. The detailed costs are as follows:

- Cost of organizing EMP	2% of EMP fund	(Ks 8,812,498)
- Cost for actual execution and dissemination of EMP in the forms of:		
(a) Taking mitigation measure	25% of EMP fund	(Ks 110,156,225)
(b) Monitoring actions	25% of EMP fund	(Ks 110,156,225)
- Cost for partial procurement of equipment and materials	20% of EMP fund	(Ks 88,124,980)
- Cost for capacity building and training	7% of EMP fund	(Ks 30,843,743)
- Cost for emergency/contingency (for probable emergency cases)	10% of EMP fund	(Ks 44,062,490)
- Cost for reporting, documentation work	8% of EMP fund	(Ks 35,249,992)
- Miscellaneous (including casual fees for two villagers, who are EMP cell members)	3% of EMP fund	(Ks 13,218,747)

It is expected that the EMP fund (Ks 440,624,900) can cover the whole life of the project life of 30 plus years. However, if necessary more money will be added to the fund.

As shown above most of the fund will be used for taking mitigation measures and monitoring works.

Public consultation

Public consultation meeting is an integral part of EIA, IEE and EMP. Involving the public participation is fundamental to increasing the understanding and acceptance of the project.

Than Daung Oo Co., Ltd has held many meeting with the locals from time to time.

The first official public consultation meeting was held on 29-12-2019 at the company premise. That meeting was attended by U Sai Myint Htoo, member of Hluttaw for Mong Yai Township constituent, one representative from the Shan State Progressive Party, village administration and local people totaling 2600 people, most of them are local sugar cane planters. The matters discussed included the sugar factory project and cultivation of sugar cane.

(a) Public consultation meeting during the Scoping study

During the scoping study two public consultation meeting were held; one at Hsen Taw village on 13-2-2020 and another at Na Long village on 14-2-2020.

Public consultation meeting at Hsen Taw village, 13-2-2020

During that meeting the Village Administration, U Lone Sone and four villagers, namely, Daw Par Lone, Daw Nan Hla Yone, U Htun Aung and U Lone Kyan gave comments and expressed their gratitude to the company for community assistance. They all spoke in support of the project as they all know that the company will purchase all the sugar cane they produced. None of the attendances has spoken against the sugar factory project.

Daw Nan Hla Yone asked for village electrification and responsible officer of the company, U Sai Ba Min replied that when the factory is in operation the company will do its best for this. (The whole area has no access to gridline electricity.).

Public consultation meeting at Na Long village, 14-2-2020

During the meeting the village administrator, U Pe Htun and three villagers, namely Daw Nan Yone, Daw Nan Pan and Daw Nan Ouk gave comments; all of them thanked the company for giving all necessary assistance to their village.

Daw Nan Yone asked for straighting the bend road to shorten the distance between the village and the sugar factory. U Pe Htun and Daw Nan Ouk requested for village electrification and road and school renovation.

The responsible officer of the company, U Sai Ba Min replied that at the moment they were tied up with the main task of major construction of the factory. So he asked them to be patient and wait for village electrification and road and school renovation.

No one of the participant were against the project. Both meetings have ended in a cordial and friendly manner. The company has good relation with the local communities, who were very familiar with this company and its parent company, Ngwe Yi Pale Co., Ltd.

As a form of community development Than Daung Oo Co., Ltd has constructed a gravel road, 7 miles long for the area; has sourced the water from a spring for Hsen Taw village and has constructed a concrete community water tanks for the village. For the sake of easy transportation for the two villages a new bridge, the Hsen Taw Bridge (concrete and iron framed 100' x 24') is in the process of construction.

(b) Public consultation during EIA study

During the EIA study trip two public consultation meetings were held, one at Na Long village and another at Hsen Taw village.

Public consultation meeting at Na Long village, 10-6-2023,

From 10:00 to 11:00 hours, at the village Buddhist monastery during the meeting the village administrator, U Lone Sone and two villagers gave comments and expressed their opinions.

U Lone Sone said that due to the implementation of this sugar factory project the economic situation of our local people has improved greatly. Formerly sugar cane planters were mostly poor; now many have earned millions of kyats; some even could afford cars now.

U Lone Kaw, one local, said that due to this project roads were upgraded and the local economy has improved greatly.

U Sai Yone Khan, one local, said that agricultural experts of the company provided us with technology for sugar cane cultivation as well as other assistances. We could now increase our sugar cane planting and increase our incomes.

The meeting has ended in a friendly cordial manner.

Public consultation meeting at Hsen Taw village, 10-6-2023,

From 13:00 hours to 14:00 hours, at the resident of the village administrator. During the meeting the village administrator, U Pe Htun and three locals gave comments and expressed their views.

U Pe Htun said that due to the emergence of the sugar factory now our locals could plant more sugar cane and increase our income on a steady basis. The roads were also greatly improved.

U Lone Kyar, one local said that now the factory has also electrified our village. A new school has been constructed by the company. We thanked the company very much.

U Sai Lu, one local said that agricultural experts from the company have taught us new technology for sugar cane cultivation and also provided assistance. These were of great assistance to our local sugar cane planters; we thanked the company for this.

U Ohn, one local said that due to the emergence of this sugar factory we could plant more sugar cane resulting in better income. Formerly many of us were jobless and poor; now many of us could earn up to millions of kyats and the local economy has improved a lot.

The meeting has ended in a cordial and friendly manner.

All the minutes of all the meetings are described in details later in Chapter 9.

Recommendation for future public consultation meetings and setting up of Grievance Redress Mechanism (GRM) programme are also mentioned.

The short information about the public consultation meetings was launched at the Facebook website of the consultant firm, www.myanmarenvironmentalsustainableconservation.com; when this EIA report is approved part of the report will be launched at the said Facebook website and also the website of the parent company, www.ngweyipale.com.

2. INTRODUCTION

Sugar is a very important ingredient in the food of mankind, and actually essential food commodity.

Sugar, $C_{12}H_{22}O_{11}$, provide source of energy in human diet. However excessive consumption of sugar cane lead to greater accumulation of fat, fatty liver disease, obesity, diabetes, heart disease, cancer and tooth decay.

Temperate consumption of sugar provides energy and is good for the health and well-being of human body; temperate consumption is a must.

In addition to providing sweet taste and flavor it plays a very important role in fermenting many kinds of foods and beverages. The food industry cannot go on without sugar.

Sugar is globally produced from two kinds of crops, namely, Sugar cane and sugar beet. Sugar canes are mostly grown in tropical countries while sugar beets are grown in temperate countries. It is estimated that the global production of sugar cane alone is about 500 million tons.

During the past few years and at the present the sugar market in Myanmar is unstable. The export of sugar to China normally fluctuates. When there is great demand in China the export will increase resulting in more sugar cane acreage but when the demand is low there will be less sugar cane plantation. Many merchants used to import sugar from Thailand and re-export it to China.

Than Daung Oo Co., Ltd can contribute to the stability of sugar market in Myanmar in many ways. 60% of its sugar will be for export while 40% will be for local market. This project will surely enhance commercial sugar production in Myanmar. At the local and district level this project boost the local economy by ensuring the long term income security of the sugar cane farmers of the region. Farmers can sell all their produces to the company. Many locals will be employed for long term at the factory.

2.1 Presentation of the project proponent

Than Daung Oo Co., Ltd was registered as a limited company by shares on 15-6-2018 (Document: certificate of incorporation No.233/2018-2019 (MDY): Directorate of Investment and Company Administration). The registration number is 117800938.

The company has obtained the permit from Myanmar Investment Commission (MIC). (Permit No.209/2019; dated 27-11-2019).

The company has also obtained the Certificate ISO 20000. (Certificate No. 23IFLN03.) and FDA certificate No. MM 23 M 11 00015.

The company is the subsidiary company of the parent company, the Ngwe Yi Pale' Group of Companies, a conglomerate involves in a variety of big business.

About the project proponent, Than Daung Oo Co., Ltd

Name of the project proponent : Than Daung Oo Co., Ltd

Address (Head office) : No. 607, 78th Street (between 26th x 27th Street), Hay Mar Zala Ward, Chan Aye Thar Zan Township, Mandalay Region, Myanmar

Telephone : 09 891000988, 09 891000989

E-mail : thandaungoo.info@gmail.com

Contact person : U Lin Thein Aung (Administration Manager)

Phone : 09 977150336, 09 444002600

E-mail : lintheinaung777@gmail.com

Location of project site : At Hsen Taw Village, Ko Hsaing Village Tract, Mong Yai Township, Lashio District Northern Shan State (It is 7 miles south of Hsi Paw-Mong Yai Highway at mile stone No. 37/2

The coordinates are : N. Lat. 22° 20' 42.37" and E. Long. 97° 53' 51.47" and the elevation is 2790 feet. asl.

Phone (project site) : 09 446738180

The company has one managing director and 10 directors.

The company is 100% owned by nationals.

Particulars of executive and administrative body

Name	Nationality & National Registration Card No.	Address of resident	Designation
U Thein Myint @ Chaung Hpin	Myanmar 13/Na Kha Na (AEI)000017	No.(415), S2, Pyay Gyi Yan Lon Quarter, Aung Myay Thar Zan Township, Mandalay	Managing Director
U Kyaw Myint Oo	Myanmar 9/Ah Ma Za (N) 022665	No. 62/S2, Pyay Gyi Yanlon Quarter, Aung Myay Tharzan Township, Mandalay	Director
U Kyaw Shein	Myanmar 9/Ma Na Ma (AEI)000048	No.1/7, Theik Pan Street, Mahar Myaing (1)Quarter, Mahar Aung Myay Township, Mandalay	Director

U Kyaw Wai @ San Wai Hwar	Myanmar 9/Ma Na Ma (N) 020951	No. 237, 34 th Street, Bet: (84 th x 85 th) Street, Aung Myay Tharzan Township, Mandalay	Director
U Ai Maung @ Lee Syun Sho	Myanmar 9/Ma Ya Ma (N)080982	No.561, Bet: (33 th x 34 th) Street, Aung Nan Yeikthar (West) Qtr, Chan Aye Thar Zan Township, Mandalay	Director
U Myo Myint Aung	Myanmar 13/La Ya Na (AEI)000608	Building (A), Room (G-3), Shwe Gone Thu Housing, Pan Hlaing Quarter, Kyimyindaing Township, Yangon	Director
U Sein Myo Aung	Myanmar 9/Ma Na Ma (N)098578	No.561, Bet: (33 th x 34 th) Street, Pyay Gyi Yan Lon Quarter, Aung Myay Thar Zan Township, Mandalay	Director
U Shi Pyin Yinn	Myanmar 13/Ka Na Ma (N)012586	No.568, 32 th Street, Between 81 th x 82 th Street, Aung Nan East Qtr., Chan Aye Tharzan Township, Mandalay	Director
U Thein Tun	Myanmar 9/Ma Na Ma (N) 031133	No. 176, 26 th Street, Bet: (81 th x 82 th) Street, Pyay Gyi Kyat Thayae East Quarter, Aung Myay Tharzan Township, Mandalay	Director
U Tun Win	Myanmar 9/Ma Ya Ma (N)053811	No.76, Pyay Gyi Yan Lon Quarter, Aung Myay Tharzan Township, Mandalay	Director
U Yae Chan	Myanmar 13/Ka La Ta (N)001234	Kha Quarter, Na Ma (6), Lashio Township, Shan	Director

Number of the shares so allotted payable in cash - 200,000 Shares
Nominal amount of the shares so allotted - 20,000,000,000 Kyats
Amount paid or due and payable on cash such share - 10,000 Kyats

Share members have taken the number of shares as follow:

U Thein Myint @ Chaung Hpin has taken - 39,834 number of shares
U Kyaw Myint Oo has taken - 10,000 number of shares
U Kyaw Shein has taken - 11,833 number of shares
U Kyaw Wai @ San Wai Hwar has taken - 48,334 number of shares
U Kyaw Win Soe - 3,333 number of shares

U Ai Maung @ Lee Syun Sho has taken	-	3,333	number of shares
U Myint Naing @ Aei Shein has taken	-	3,333	number of shares
U Myo Myint Aung has taken	-	16,667	number of shares
U Saw Oo has taken	-	3,333	number of shares
U Sein Myo Aung has taken	-	3,333	number of shares
U Shi Pyin Yinn has taken	-	23,334	number of shares
U Hla Win @ Shin Si	-	20,000	number of shares
U Tun Naing	-	3,333	number of shares
U Tun Win	-	<u>10,000</u>	<u>number of shares</u>
Total	-	200,000	number of shares



ကုမ္ပဏီမှတ်ပုံတင်လက်မှတ်
Certificate of Incorporation

သံတောင်ဦးကုမ္ပဏီလီမိတက်
THAN DAUNG OO COMPANY LIMITED
Company Registration No. 117800938

မြန်မာနိုင်ငံကုမ္ပဏီများအက်ဥပဒေ ၁၉၁၄ ခုနှစ် အရ

သံတောင်ဦးကုမ္ပဏီလီမိတက်

အား ၂၀၁၈ ခုနှစ် ဇွန်လ ၁၅ ရက်နေ့တွင်
အစုရှယ်ယာအားဖြင့် တာဝန်ကန့်သတ်ထား သည့် အများနှင့်မသက်ဆိုင်သောကုမ္ပဏီ
အဖြစ် ဖွဲ့စည်းမှတ်ပုံတင်ခွင့် ပြုလိုက်သည်။

This is to certify that
THAN DAUNG OO COMPANY LIMITED
was incorporated under the Myanmar Companies Act 1914 on 15 June
2018 as a Private Company Limited by Shares.

ကုမ္ပဏီမှတ်ပုံတင်အရာရှိ
Registrar of Companies

ရင်းနှီးမြှုပ်နှံမှုနှင့်ကုမ္ပဏီများညွှန်ကြားမှုဦးစီးဌာန
Directorate of Investment and Company Administration



Former Registration No. 233/2018-2019(MDY)

Figure-1: Certificate of Incorporation



Form (3)

P000158

THE REPUBLIC OF THE UNION OF MYANMAR

Myanmar Investment Commission

PERMIT

Permit No. 209 / 2019

Dated 27 November 2019

This permit is issued by the Myanmar Investment Commission in accordance with Section 25 (c) of the Myanmar Investment Law.

- (1) Investor Name THEIN MYINT @ CHAUNG HPIN
- (2) Citizenship MYANMAR
- (3) Residential Address NO. 5-B, 26th STREET, BETWEEN 63th x 64th STREET, CHANAYETHAZAN TOWNSHIP, MANDALAY
- (4) Name and Address of Principal Organization THAN DAUNG OO COMPANY LIMITED, NO. 27, 78th STREET, BETWEEN 26thx27th STREET, CHANAYETHAZAN TOWNSHIP, MANDALAY
- (5) Place of incorporation MYANMAR
- (6) Type of Business PRODUCTION AND SALES OF SUGAR
- (7) Place(s) of Investment Project KWIN NO. OSS, KYAY TAING PYIN KWIN, KAWNG-HSAI VILLAGE TRACT, MONGYAI TOWNSHIP, LASHIO DISTRICT, SHAN STATE
- (8) Foreign Capital Amount NIL
- (9) Period for Foreign Capital to be brought in NIL
- (10) Total Amount of Capital (Kyat) 88,124.980 MILLION (INCLUDING US\$ 45.060 MILLION)
- (11) Construction/ Preparation Period 3 YEARS
- (12) Validity of Permit 50 YEARS
- (13) Form of Investment WHOLLY MYANMAR OWNED
- (14) Name of Company Incorporated in Myanmar THAN DAUNG OO COMPANY LIMITED



Thaung Tun
(Thaung Tun)
Chairperson

Figure-2: MIC Permit

Certificate of Registration

This is to Certify that
Food Safety Management System of

**THAN DAUNG OO COMPANY LIMITED
(THAN DAUNG OO WHITE SUGAR AND MOLASSES)**

KWIN NO. OSS, KYAY TAING PYIN KWIN, KAWNG-HSAI VILLAGE TRACT, MONGYAI
TOWNSHIP, LASHIO DISTRICT, SHAN STATE, MYANMAR.

has been assessed and found to conform to the requirements of
ISO 22000:2018
for the following scope :

MANUFACTURING OF SUGAR AND MOLASSES
(CATEGORY C & SUBCATEGORY CIV)

Certificate No	: 23IFLN03	Issuance Date	: 03/01/2023
Initial Registration Date	: 03/01/2023		
Date of Expiry	: 02/01/2026		
1st Surv. Due	: 03/12/2023	2nd Surv. Due	: 03/12/2024

Director



ACCREDITED
Management Systems
Certification Body
MSCB-119



AQC MIDDLE EAST LLC

Head Office: Office No. 02, Ground Floor, Sharjah Media City, Sharjah, UAE. e-mail: info@aqcworld.com.

*Validity of the Certificate is subject to successful completion of surveillance audit on or before of due date. (in case surveillance audit is not allowed to be conducted, this certificate shall be suspended/withdrawn).

Certificate Verification: Please Re-check the validity of certificate at <http://www.aqcworld.com/activeclients.aspx> or www.aqcworld.com at Active Clients.
Certificate is the property of AQC Middle East LLC and shall be returned immediately when demanded

ISO 22000:2018



Figure-3: ISO certificate



The Government of the Republic of the Union of Myanmar
 Ministry of Health
 Department of Food and Drug Administration



အစားအသောက်ထုတ်လုပ်ခြင်းထောက်ခံချက်လက်မှတ်
RECOMMENDATION FOR FOOD MANUFACTURING

ကျန်းမာရေးဝန်ကြီးဌာန၊ အစားအသောက်နှင့် ဆေးဝါးကွပ်ကဲရေးဦးစီးဌာနသည် အမျိုးသား အစားအသောက်ဥပဒေ ပုဒ်မ(၁၀)အရ အောက်ပါလုပ်ငန်းအား ဤထောက်ခံချက်ကို ထုတ်ပေးလိုက်သည်။

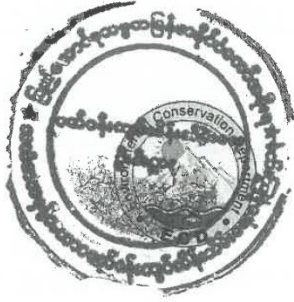
Ministry of Health, Department of Food and Drug Administration issued this certificate for the under-mentioned food manufacturing facility according to the Section (10) of the National Food Law.

စက်ရုံအမည်	သံတောင်ဦးသကြားစက်ရုံ
Factory Name	Than Daung Oo Sugar Factory
စက်ရုံလိပ်စာ	ကွင်းအမှတ် (OSS)၊ ကြေးတိုင်ပြင်ကွင်း၊ ခိုဆိမ်းကျေးရွာအုပ်စု၊ မိုင်းရယ်မြို့နယ်၊ လားရှိုးခရိုင်၊ ရှမ်းပြည်နယ်၊ မြန်မာ
Factory Address	KWIN NO. OSS, KYAY TAING PYIN KWIN, KAWNG-HSAI VILLAGE TRACT, MONGYAI TOWNSHIP, Lashio District, Shan State, Myanmar
Company Registration No	117800938
ထောက်ခံချက်ထုတ်ပေးသည့် အစားအသောက်အမျိုးအစား	ချိုစေသောအရာများ (ပျားရည်)
Product range	Sweeteners, including honey
ထောက်ခံချက်အမှတ်	MM 23 M 11 00015
ထုတ်ပေးသည့်ရက်စွဲ	၂၀၂၃ ခုနှစ်၊ ဩဂုတ်လ (၂၂) ရက်
Date of Issue	22 nd August, 2023
ကုန်ဆုံးရက်စွဲ	၂၀၂၆ ခုနှစ်၊ ဇွန်လ (၂၇) ရက်
Expiry Date	27 th June, 2026



စာမျက်နှာ(၂)၏ စာမျက်နှာ(၁)

Figure-4: FDA certificate



ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော်အစိုးရ
 သယံဇာတနှင့်သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာန
 ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန
 ညွှန်ကြားရေးမှူးချုပ်ရုံး

စာအမှတ်၊အီးအိုင်အေ-၁/၇/အတည်ပြု(SR)(၄၃၃/၂၀၂၃)
 ရက်စွဲ ၊ ၂၀၂၃ ခုနှစ် ဖေဖော်ဝါရီလ ၁၅ ရက်

သို့

အုပ်ချုပ်မှုဒါရိုက်တာ

THAN DAUNG OO Co.,Ltd

ကွင်းအမှတ်(OSS)၊ ကြေးတိုင်းပြင်ကွင်း၊ ခိုဆိုင်းကျေးရွာအုပ်စု၊ မိုင်းရယ်မြို့နယ်၊ လားရှိုးခရိုင်၊
 ရှမ်းပြည်နယ်(မြောက်ပိုင်း)

၀၉-၄၄၆၇၃၈၁၈၊ thandaungoo.info@gmail.com

အကြောင်းအရာ။ THAN DAUNG OO Co.,Ltd. မှ ရှမ်းပြည်နယ်(မြောက်ပိုင်း)၊ လားရှိုးခရိုင်၊
 မိုင်းရယ်မြို့နယ်၊ ခိုဆိုင်းကျေးရွာအုပ်စုတွင် အကောင်အထည်ဖော်
 ဆောင်ရွက်မည့် သကြားဖြူထုတ်လုပ်ခြင်းလုပ်ငန်းအတွက် တင်ပြလာသော
 နယ်ပယ်အတိုင်းအတာသတ်မှတ်ခြင်း အစီရင်ခံစာအား အတည်ပြုကြောင်း
 ပြန်ကြားခြင်း

- ရည်ညွှန်းချက်။
- (၁) THAN DAUNG OO Co.,Ltd. ၏ (၁-၂-၂၀၂၁) ရက်စွဲပါစာအမှတ်-
 သံတောင်ဦး/ ၂၀၂၁(၂)/ ဌာန-၉(၁)
 - (၂) ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန၊ ဦးစီးရုံးချုပ်၏ ၂၆-၁၀-၂၀၂၂ ရက်စွဲပါ
 စာအမှတ်၊ အီးအိုင်အေ-၁/၇/အတည်ပြု (SR) (၂၈၄၀/၂၀၂၂)
 - (၃) သယံဇာတနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ဝန်ကြီးဌာန၊
 ပြည်ထောင်စုဝန်ကြီးရုံး၏ ၄-၁၁-၂၀၂၂ ရက်စွဲပါစာအမှတ်၊ (သစ်တော)
 ၃(၂)/၁၆(ဃ)(၃၇၅၃/၂၀၂၂)

၁။ အကြောင်းအရာပါကိစ္စနှင့်ပတ်သက်၍ THAN DAUNG OO Co.,Ltd. မှ ရှမ်းပြည်နယ်
 (မြောက်ပိုင်း)၊ လားရှိုးခရိုင်၊ မိုင်းရယ်မြို့နယ်၊ ခိုဆိုင်းကျေးရွာအုပ်စု၊ ကြေးတိုင်းပြင်ကွင်း၊ ကွင်းအမှတ်
 (OSS) ရှိ မြေဧရိယာ (၁၄၈) ဧကအပေါ်တွင် အကောင်အထည်ဖော် ဆောင်ရွက်မည်ဖြစ်ပါသည်။
 စီမံကိန်းဧရိယာမှာ သကြားစက်ရုံနှင့်ခြံဝန်းမှာ (၁၄၈) ဧက၊ သကြားစိုက်ခင်း (၃)ခုရှိပြီး၊ စုစုပေါင်း
 ဧကမှာ (၇၂၂) ဧကဖြစ်ပါသည်။ ခန့်မှန်းဘတ်ဂျက်မှာ ကျပ်သန်းပေါင်း (၈၈၁၂၄.၉၈)ဖြစ်ပြီး ထုတ်လုပ်မှု

Figure-5: Scoping report approval letter by the authority

2.2 Presentation of the environmental and social experts

About the consultant firm, Myanmar Environment Sustainable Conservation Co., Ltd (MESC)

Myanmar Environment Sustainable Conservation, MESC is a consultant firm officially registered in 2014 as a limited company (a consultant/service company) at the Ministry of National Planning and Economic Development. Document: YaKa-8(Ga) 001/2014(004720), dated: 6th June, 2014. Registration No. 830/2014-2015, (20-5-2014). The new company registered number is 110649193.

The Transitional Registration/License No. of the consultant firm, MESC is No. 0003, ECD, Dated 1st July 2017.

Contact Address : Room no. (B -5), Building no.67/69, Parami Road, 16 Ward, Hlaing Township, Yangon Region

Contact person : Myint Kyaw Thura
95 9 420105071

Contact number : 95 9 73044903

E-mail : myanmar.esc@gmail.com

Facebook website : www.myanmar.environment.sustainable.conservation.com

Members of MESC who are IEE/EIA appraisers, or IEE/EIA practitioners or who are involved in this IEE/EIA project are as follows:

Name	Nationality & National Registration Card No.	Registration /license No. by ECD	Designation
U Myint Kyaw Thura M.Sc (Zoology)	Myanmar 12/Da Ga Ta (N)028349	0006	Managing Director, Biodiversity Specialist (Fauna), EIA practitioner and EIA Appraiser
U Saw Han Shein B.Sc (Botany) M.Sc (Marine Biology)	Myanmar 10/Ma La Ma(N)008173	0007	Retired Professor, EIA Practitioner and Appraiser
U Tin Tun Aung B.Sc (Engineering)	Myanmar 12/U Ka Ma (N)172111	0009	Engineer and EIA practitioner
U Than Soe Oo M.Sc (Forestry)	Myanmar 9/Ma Na Ma (N) 050808	00011	EIA practitioner
U Oakka Kyaw Thu B.Sc (Geology)	Myanmar 7/Ya Ta Ya (N) 090371	00012	Geologist

Daw Thin Thin Yee B.Sc (Chemistry)	Myanmar 12/Tha Ga Ka (N)039292	00013	Chemical Environment Researcher, Computer Programmer
Dr. Htin Thaw Kaung M.B.B.S	Myanmar 13/ Pa Ha Na (N) 222723	Freelance	Occupational Health and Safety
Daw Thi Thi San L.L.B	Myanmar 12/ Tha Ka Ta (N) 150424	Freelance	Legal Analysis
Daw Hnin Nu Nu Aung M.Sc (Environmental Planning and Mangement) B.E (Materials and Metallurgy)	Myanmar 8/ Ma Ka Na (N) 204370	Applied	Environmental Engineer (Waste management)
U Thura Ko B.A (History)	Myanmar 12/Ka Ma Na (N) 124824	00277	Socio-economic expert, and also involved cultural heritage, ambient air, water quality, noise and vibration and soil

Actually members of MESC always work together wholly as a tight-knit group in writing of each and every EMP/IEE/EIA report.

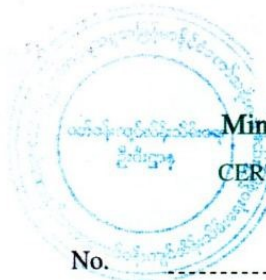
In preparation and writing the report MESC group works in a well-coordinated manner with a close-knit mentality. Serious discussions and deliberations are the norm of the day. Internationally accepted methodology and practice are applied such as desktop survey; site visiting and conduction visual inspections and investigations of physical, biological, socio-economic, cultural and visual components; collection and documentation of primary and secondary data and information; interviews through structured questionnaires, and holding public consultation meeting to ensure transparency and to assess public opinions, views etc. Experts Judgment or Experts Consensus or Ad hoc method is applied.

MESC has also part time members working as free lances.

The firm is not in a position to employ all its part time members on a permanent basis.

These are botanists, zoologists, ornithologists, ecologists, aquatic ecologists, social scientists, engineers, geologists as well as legal experts and medical officers (doctor) working with this firm.

For the physical and chemical environmental studies MESC has to hire experts, say for example, from registered laboratory in Yangon. Since portable test kits are sometime not reliable, experts have to be hired for the analysis of air quality. Experts from registered laboratories were hired for the analysis of water (or samples have to be sent to the laboratory) and soil.



REPUBLIC OF THE UNION OF MYANMAR

Ministry of Natural Resources and Environmental Conservation

CERTIFICATE FOR TRANSITIONAL CONSULTANT REGISTRATION

(ကြားကာလအကြံပေးလုပ်ကိုင်သူမှတ်ပုံတင်ခြင်းအထောက်အထားလက်မှတ်)



No. 0003 Date 10.03.2018

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၊ ၅၁၆/၂၀၁၅ အရ သယံဇာတနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာနသည် ဤအထောက်အထားလက်မှတ်ကို အဖွဲ့အစည်းအား ထုတ်ပေးလိုက်သည်။)

- (a) Name of Organization (အဖွဲ့အစည်းအမည်) Myanmar Environment Sustainable Conservation-MESC
- (b) Name of the representative in the organization (အဖွဲ့အစည်းကိုယ်စားလှယ်၏ အမည်) U Myint Kyaw Thura
- (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/ Da Ga Ta (N) 028349
- (e) Address of organization (ဆက်သွယ်ရန်လိပ်စာ) Room No. B-5, Building No.72, Marlar Myaing 6th street, 16 Ward, Hlaing Township, Yangon. myanmar_esc@gmail.com , 09 73044903
- (f) Type of Consultancy (အကြံပေးလုပ်ကိုင်မှုအမျိုးအစား) Organization
- (g) Duration of validity (သက်တမ်းကုန်ဆုံးရက်) 31 March 2018



EXTENSION
 သက်တမ်းတိုးခြင်း
 The VALIDITY of this certificate is extended for one year from (1.4.2018) to (31.3.2019)
 ဤလက်မှတ်အား (၀-၄-၂၀၁၈) ရက်နေ့မှ (၃၁-၃-၂၀၁၉) ရက်နေ့အထိ တစ်နှစ်သက်တမ်း တိုးခြင်းသည်
 Soc Naing
 13.9.2018
 For Director General (Soc Naing, Director)
 Environmental Conservation Department

Handwritten signature of the Director General.

Director General
Environmental Conservation Department
Ministry of Natural Resources and Environmental Conservation

Areas of Expertise Permitted
(ခွင့်ပြုသည့် ကျွမ်းကျင်မှုနယ်ပယ်များ)

1. Air Pollution Control
2. Ecology and Biodiversity
3. Facilitation of Meeting
4. Geology and Soil
5. Land use
6. Modeling for Water Quality
7. Socio-Economy
8. Water Pollution Control

EXTENSION
သက်တမ်းတိုးမြှင့်ခြင်း
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)လ သက်တမ်းတိုးမြှင့်သည်။
Sa Aung Thu
For Director General
(Sa Aung Thu, Director)
Environmental Conservation Department

EXTENSION
သက်တမ်းတိုးမြှင့်ခြင်း
The VALIDITY of this certificate is extended for one year from (1.1.2020) to (31.12.2020)
ဤလက်မှတ်အား (၁-၁-၂၀၂၀) ရက်နေ့မှ (၃၁-၁၂-၂၀၂၀) ရက်နေ့အထိ တစ်နှစ် သက်တမ်းတိုးမြှင့်သည်။
Soe Naing
For Director General
(Soe Naing, Director)
Environmental Conservation Department

EXTENSION
သက်တမ်းတိုးမြှင့်ခြင်း
The VALIDITY of this certificate is extended for nine months from (1.4.2019) to (31.12.2019)
ဤလက်မှတ်အား (၁-၄-၂၀၁၉) ရက်နေ့မှ (၃၁-၁၂-၂၀၁၉) ရက်နေ့အထိ (၉)လ သက်တမ်းတိုးမြှင့်သည်။
Soe Naing
For Director General
(Soe Naing, Director)
Environmental Conservation Department

EXTENSION
သက်တမ်းတိုးမြှင့်ခြင်း
The VALIDITY of this certificate is extended for six month from (1.1.2021) to (30.6.2021)
ဤလက်မှတ်အား (၁-၁-၂၀၂၁) ရက်နေ့မှ (၃၀-၆-၂၀၂၁) ရက်နေ့အထိ (၆)လ သက်တမ်းတိုးမြှင့်သည်။
Soe Naing
For Director General
(Soe Naing, Director)
Environmental Conservation Department

EXTENSION
သက်တမ်းတိုးမြှင့်ခြင်း
The VALIDITY of this certificate is extended for six months from (1.7.2021) to (31.12.2021)
ဤလက်မှတ်အား (၁-၇-၂၀၂၁) ရက်နေ့မှ (၃၁-၁၂-၂၀၂၁) ရက်နေ့အထိ (၆)လ သက်တမ်းတိုးမြှင့်သည်။
Soe Naing
For Director General
(Soe Naing, Director)
Environmental Conservation Department

EXTENSION (သက်တမ်းတိုးမြှင့်ခြင်း)
The VALIDITY of this certificate is extended for one year from (1.1.2022) to (31.12.2022)
ဤလက်မှတ်အား (၁-၁-၂၀၂၂) ရက်နေ့မှ (၃၁-၁၂-၂၀၂၂) ရက်နေ့အထိ တစ်နှစ် သက်တမ်းတိုးမြှင့်သည်။
Soe Naing
For Director General
(Soe Naing, Director)
Environmental Conservation Department

EXTENSION (သက်တမ်းတိုးမြှင့်ခြင်း)
The VALIDITY of this certificate is extended for six months from (1.1.2023) to (30.6.2023)
ဤလက်မှတ်အား (၁-၁-၂၀၂၃) ရက်နေ့မှ (၃၀-၆-၂၀၂၃) ရက်နေ့အထိ (၆)လ သက်တမ်းတိုးမြှင့်သည်။
Sa Aung Thu
For Director General
(Sa Aung Thu, Director)
Environmental Conservation Department

Figure-6: Certificate of consultant firm

ဆေးတက္ကသိုလ်-မကွေး



ဆေးပညာဘွဲ့

..... ဦးထွန်းပေါ် ၏ သား/သမီး ဧရာဝတီတောင်ပိုင်းတိုင်းဒေသကြီး အား
ဆေးပညာဘွဲ့ကို အပ်နှင်းချီးမြှင့်လိုက်သည်။

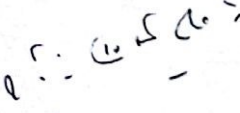

အထူးအောင်မြင်သည့် ဘာသာရပ်
.....
.....

ဘွဲ့ရသူ မှတ်ပုံတင်အမှတ် ၁၉၅၇/၂၀၁၁ (၂၀၀၉ ခုနှစ်၊ နိုဝင်ဘာလ)


မော်ကွန်းထိန်း
ဆေးတက္ကသိုလ်၊ မကွေး
ဥက္ကဋ္ဌ

မကွေး မြို့




ပါမောက္ခချုပ်
ဆေးတက္ကသိုလ်၊ မကွေး


၂၀၁၀ ခု၊ ဇူလိုင်လ ၁၉ ရက်နေ့။

Figure-7: Certificate of Dr. Htin Thaw Kaung



ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော်
ပြည်ထောင်စုတရားလွှတ်တော်ချုပ်

တရားလွှတ်တော်ရှေ့နေဖြစ်ကြောင်းအသိအမှတ်ပြုလက်မှတ်

မှတ်ပုံတင်အမှတ်၇၂၅၇၇.....

.....ဦးမြသိင်္ဂီ.....၏ ဘေး/သမီးဖြစ်သူ ..ဥက္ကဋ္ဌအဖြစ်ဖြင့်.....
 ရာဇဝတ်မှုကြီးကြပ်ရေးအဖွဲ့ဝင်အဖြစ်(၆၇).....အရက်အဖွဲ့ဝင်အဖြစ်(၆၆).....
အဖွဲ့ဝင်အဖြစ်ဖြင့်..... အဖွဲ့သားမှတ်ပုံတင်အမှတ် / နိုင်ငံသားစိစစ်ရေးကတ်ပြားအမှတ်
 ၅/၁၁၁၁(၆၆)၁၅၀၇၄...အား ၂၀၁၂ ခုနှစ်၊ဧပြီလ..... လ၊ရက်နေ့တွင်
 တရားလွှတ်တော်ရှေ့နေများကောင်စီ အက်ဥပဒေ ပုဒ်မ ၈ ပါ ပြဋ္ဌာန်းချက်များအရ တရားလွှတ်တော်ရှေ့နေများ
 မှတ်ပုံတင်စာရင်း၌ အပည့်တင်သွင်းပြီးဖြစ်၍ တရားလွှတ်တော်ရှေ့နေဖြစ်ကြောင်း အသိအမှတ်ပြုလိုက်သည်။



အမိန့်အရ

(စိန်သန်း)
 အကြံပေးချုပ်

ရက်စွဲ၊ ၂၀၁၂ ခုနှစ်၊ဧပြီလ..... လ၂၂.....ရက်

Figure-8: Certificate of Daw Thi Thi San



YANGON TECHNOLOGICAL UNIVERSITY

Postgraduate Diploma

The Postgraduate Diploma (*Environmental Planning and Management*)
is awarded to *MAY 2018*

Ms Hnin Nu Nu Aung, son / daughter of *U. Thar Htay*

Citizenship Scrutiny Card No. ... *81 Ma Ka Na (Ning) 204370*

Graduate Registration No. *29015*



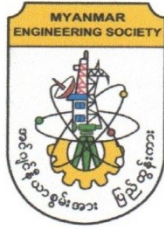
Thant Hantint
Registrar

[Signature]
Rector

Yangon Technological University
[Signature]

Yangon Technological University
[Signature]

Date: ... *3 MAR 2019*



Certificate of Completion

This is to certify that

HNIN NU NU AUNG

has successfully completed the training on

Wastewater Treatment System Course

from 27 January 2018 to 4 March 2018

Total Training Hours: 36 Hours

Certificate No. WWTSC-2018-01-011

Issue Date: 4 March, 2018



[Signature]
Engr. Aung Myint P.E.
President

Myanmar Engineering Society

Figure-9: Certificates of Daw Hnin Nu Nu Aung

2.3 Presentation of Health Experts for the project with Health Impact

As regards health expert the Consultant Firm (MESC) is not in a position yet, to employ health experts for EIA.

However, the consultant firm (MESC) has one part time medical officer Dr. Htin Thaw Kaung (MBBS), who cannot be called an HIA expert yet.

One of the senior members, U Myint Kyaw Thura is the General Secretary of Myanmar Environmental Assessment Association (MEAA) and holds an HIA certificate. (Online training on HIA cosponsored by IFC, Australia Aid and MEAA, Oct 2010. One junior member U Thura Ko has attended special lecture classes provided by HIA experts from MEAA.

Ambient air/emission and water quality/effluent, noise and vibration are measured and analysed by experienced technicians hired by ECD.

One day when Health Impact Assessment (HIA) becomes mandatory the company and consultant firm will hire health experts, for this matter.

\

3. ENVIRONMENTAL POLICY, LEGAL AND INSTITUTIONAL FRAME WORK

Environmental policy of Myanmar

The environmental policy is to protect and conserve the environment while striving for national development. In other word to aim for sustainable development.

The National Environmental Policy (2019) is:

- to achieve harmony and balance between socio-economic, natural resources and environment through the integration of environmental considerations into the development process enhancing the quality of life of all its citizens

In short, the policy covers three strategic areas:

- (a) Clean environment and health, functioning ecosystem
- (b) Sustainable development, and
- (c) Mainstreaming environmental protection and management.

Myanmar is cooperating with the international community to draft a national environment policy and adopt its main tasks in order to contribute to sustainable development, policies, strategies and work programmes relating to climate change, a framework for a green economy and strategies and work programmes for waste management.

The nation is in the process of formulating a new and comprehensive national environmental policy. Since 2015 United Nations Development Programme (UNDP) has been supporting the government to formulate a new national environmental policy that places environmental consideration at the centre of efforts to promote economic and social development, reduce poverty and mitigate and adapt to climate change and natural disasters.

This national environmental policy will ensure environmental protection and sustainable development across the country.

The pragmatic aim is to integrate environmental governance into the national economic development programme. This is indeed a new multifaceted national environmental policy and strategic frame work that address new challenges.

3.1 Corporate Environmental and Social policies of Than Daung Oo Co., Ltd

(Reproduced from: International Finance Corporation (IFC), Policy on Environmental and Social Sustainability, 2012)

There are eight performance standards for a big company to do business in a new area. The project proponent will follow these standards as practical as possible. At the moment the company has not yet any written policy or written statement on environment.

I) Assessment and Management of Environmental and Social Risks and Impacts

- identify and evaluate environmental and social risks and impacts of the project
- adopt mitigation measures to avoid, or if avoidance is not possible, minimize or mitigate the impact; compensate for the impacts on people and on the environment
- promote improved environmental and social performance through the effective use of management system
- ensure that grievances from the effected people are responded and managed appropriately
- promote and provide means for adequate engagement with the community throughout the project period

II) Labour and Working Conditions

- promote the fair treatment, non-discrimination and equal opportunity of workers
- establish, maintain and improve the worker-management relationship
- promote compliance with national employment and labour laws
- promote safe and healthy working conditions and the health of workers
- avoid the use of forced labour and child labour

III) Resource Efficiency and Pollution Prevention

- avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities
- promote more sustainable use of resources, including energy and water
- reduce project-related GHG emissions

IV) Community Health, Safety and Security

- avoid adverse impact on the health and safety of the community during the project life
- ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimizes risks to the community

V) Land Acquisition and Involuntary Resettlement

- avoid, and when avoidance is not possible, minimize displacement by exploring alternative project designs
- avoid forced eviction

- avoid, or where avoidance is not possible, minimize social and economic impacts from land acquisition or restriction on land use by
 - (i) providing compensation for loss of assets at replacement cost (value of asset plus transaction costs), and
 - (ii) ensure that resettlement activities are implemented with appropriate disclosure of information, consultation and the informed participation of those effected
- improve or restore, the livelihoods and standards of living of displaced persons

VI) Biodiversity Conservation and Sustainable Management of living Natural Resources

- protect and conserve biodiversity
- maintain the benefits from ecosystem services
- promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities

VII) Ethnic Peoples

- ensure that the development process fosters full respect for the human rights, dignity, aspirations, culture, and natural resource-based livelihoods of Ethnic peoples
- avoid adverse impacts of project on local people, or when avoidance is not possible, minimize and/or compensate for such impacts
- promote sustainable development benefits and opportunities for local people in a culturally appropriate manner
- establish and maintain an ongoing relationship with these people throughout the project period
- respect and preserve the culture, knowledge and practices of local peoples

VIII) Cultural Heritage

- protect cultural heritage from the adverse impacts of project activities and support its preservation
- promote the equitable sharing of benefits from the use of cultural heritage

Principle for Environmental and Social Sustainability

The ethical code for 21th century big business is not to make profit at the expense of the environment and the local community.

The big company should not focus only on economically viable venture but also on functionally sound and ecologically viable as well as socially sustainable venture.

Environmental and social policy of Than Daung Oo Co., Ltd

The company pledges to comply with all the environmental Laws, Rules and Regulation concerning the manufacturing and marketing of sugar. The company also pledges to do the business that will be environmentally sound as far as possible.

The company will endeavor to:

- Operate the factory with an environmentally and socially responsible manner and to comply with laws and regulation
- Prevent pollution of surrounding area; monitoring and adopting suitable measures for environment protection
- Implement EMP effectively to mitigate pollution of water, land, air, noise and dust and proper disposal of waste
- Develop green belt in available space
- Conservation of natural resources water and energy as far as possible
- Create environmental awareness among employees and local community through education and training
- Duly compensate for any loss or damage of local people properties
- Duly implement meaningful CSR programme (2% of the net profit will be set aside for execution of CSR programme).

Corporate Social Responsibility (CSR)

CSR has become mandatory in most developed countries. It has also become mandatory for big companies doing business in developing countries. In fact it has become an official policy of many big companies worldwide.

A big company that is doing business in an area must commit itself to environmental and social sustainability. The motto is "**do not harm the environment and the people**".

The company must take the responsibility for community development as far as possible. A certain amount of budget or 2 percent of the net profit has to be allocated for CSR activities, it is learnt.

Many view CSR as a form of compensation for the environmental and socio-economic components impacted. The main objective of CSR is more than mitigation and compensation; but also for the economic and social development of the community impacted by the project. The compensation for land or property lost or damaged due to project, the construction of school, and clinic, the improvement for infrastructure and the provision of alternative livelihoods, donations, charities etc. are parts of CSR activities. The CSR activities must be meaningful and effective, not a mere formality.

The main essence of CSR is taking the responsibility for the community development. And the main principles of CSR are:

- not to destroy the environment
- not to infringe on human rights
- not to get involve in child labour or forced labour, and
- not to get involve in bribery and corruption in league with corrupt officials or authorities when doing business.

CSR programme implemented

Than Daung Oo Co., Ltd has already spent Ks 1,002,148,6155 in various aspects of CSR. Than Daung Oo Co., Ltd, has so far, implemented the CSR programme in the form of building a bridge, renovation of gravel road, construction of a primary school, and sourcing of water from a spring and construction a large community water tank (concrete tank) for community assistance and development.

Commitment

The project proponent is commitment itself to the continuation of its CSR programme. 2% of the net profit will be allotted for execution of CSR programme.

U Sein Myo Aung
Executive Director
Than Daung Oo Co., Ltd

3.2 Policy and legal frame work

Article 48 of Myanmar Constitution (2008) clearly states that "The Union shall protect and conserve natural environment".

Environmental conservation is an obligation of every citizen of Myanmar as per the Myanmar Constitution (2008), Section 8, Article 390 of the Constitution states that: "Every citizen has the duty to assist the Union in carrying out the following matter:

(b) Environmental conservation

The National Environmental Policy (2019) is:

- to achieve harmony and balance between socio-economic, natural resources and environment through the integration of environmental considerations into the development process enhancing the quality of life of all its citizens

There were/are several laws or Acts since the colonial days which were/are in one way or another pertaining to the environmental and social elements of the country.

The conservation of the environment was/is one of the priorities of successive governments.

3.2.1 Applicable laws and rules

Than Daung Oo Co., Ltd will comply with the following laws.

1. The Environmental Conservation Law, 2012
2. The Environmental Conservation Rules, 2014
3. Environmental Impact Assessment Procedure, 2015
4. National Environmental Quality (Emission) Guideline, 2015
5. The Conservation of Water Resources and Rivers Law, 2006
6. The Forest Law, 2018
7. The Conservation of Biodiversity and Protected Areas Law, 2018
8. Protection and Preservation of Antique Objects Law, 2015
9. The Protection and Preservation of Cultural Heritage Regions Law, 2019
10. The Protection and Preservation of Ancient Monument Law, 2015
11. Myanmar Investment Law, 2016
12. Myanmar Investment Rules, 2017
13. Farmland Law, 2012

14. The Factories Act, 1951
15. Prevention of Hazards from Chemical Substances Law, 2013
16. The Boiler Law, 2015
17. The Myanmar Fire Brigade Law, 2015
18. Electricity Law, 2014
19. Myanmar Engineering Council Law, 2013
20. Private Industry Enterprise Law, 1990
21. Employment and Skill Development Law, 2013
22. The Ethnic Rights Protection Law, 2015
23. The Ethnic Rights Protection Rules, 2019
24. Myanmar Insurance Law, 1993
25. Social Security Law, 2012
26. The Labour Organization Law, 2011
27. Workmen Compensation Act, 1951
28. The Leave and Holiday Act, 1951
29. The Settlement of Labour Disputes Law, 2012
30. Payment and Wages Law, 2016
31. Minimum Wages Law, 2013
32. The Control of Smoking and Consumption of Tobacco Product Law, 2016
33. The Public Health Law, 1972
34. Occupational Health and Safety Law, 2019
35. Prevention and Control of Communicable Diseases Law, 1995
36. The Export and Import Law, 2012
37. Myanmar Highway Law, 2000
38. Law on Standardization, 2014
39. The Petroleum and Petroleum Products Law, 2017
40. Myanmar Companies Law, 2017

41. Vehicle Safety and Motor Vehicle Management Law, 2020
42. Vehicle Safety and Motor Vehicle Management Rules, 2022
43. Industrial Use Explosive Substances, 2018
44. The Explosive Substances Act, 1908
45. The Conservation of Water Resources and Rivers Rule, 2013
46. The Petroleum Rules, 1937
47. Law Relating to Aquaculture, 1989
48. Fresh Water Fisheries Law, 1991
49. The Sugar Act or Sugar Law is still in the draft status at the Pyi Thu Hlutaw, it is learnt

The above-mentioned 49 laws, rules and guidelines are directly or indirectly related to sugar business. The company shall comply with all these laws. Since these laws cover a very wide spectrum and various aspects, the company is not in a position to read and study all these laws. The company, therefore, has hired a legal expert to deal with the details of these laws.

When implementing the project and doing the sugar business the company authority will apply the common sense and simple logics not to pollute the air, water, land and the community. When it comes to details the legal expert hired by the company will assist the company to comply with these laws, accordingly.

Staffs shall be educated and trained for environmental awareness and for maintenance of environmental performance during the entire life of the project.

However, certain points or Articles of the law which are of great environmental relevant to sugar business are excerpted and reproduced as follows:

Sr.No.	Laws and Regulations	Relevant Articles	Commitments
1	The Environmental Conservation Law, 2012	Section-7:	<p>Project Proponent has to comply with:</p> <p>(d): The ministry prescribes environmental quality standards including standards on emission, effluents, solid wastes, production procedures, processes and products for conservation and enhancement of environmental quality;</p> <p>(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>
		Section-14:	<p>Project Proponent has to comply with:</p> <p>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.</p>
		Section-15:	<p>Project Proponent has to comply with:</p> <p>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.</p>

		Section-24:	Project Proponent has to comply with: 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 organization to carry out inspections.
		Section-29:	Project Proponent has to comply with: No one shall violate any prohibition contained in the rules, notification, orders, directives and procedures issued under this Law.
		Section-32:	Project Proponent has to comply with: 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.
2	The Environmental Conservation Rules, 2014	Rules 56:	Project Proponent has to carry out: The person who carries out any project, business or activity shall arrange and carry out for conducting the EIA for any project, business or activity by qualified third person or organization accepted by the ministry (MONREC)
		Rule-69	Project Proponent commits to comply with this rules: (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 hazardous waste or hazardous material stipulated by notification under the Law and any these rules at any place which may affect the public directly or indirectly.

			(b): Any person shall not carry out the action which can be damaged to natural environment which is changing due to ecosystem and such system, except the permission of the relevant Ministry in order to the interest of the public.
3	Environmental Impact Assessment Procedure, 2015	Section -102	<p>Project Proponent has to comply with:</p> <p>The project Proponent shall bear full legal and financial responsibility for:</p> <ul style="list-style-type: none"> (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 (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:	<p>Project Proponent has to comply with:</p> <p>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 condition when providing services to the project.</p>

		Section-104:	<p>Project Proponent has to comply with:</p> <p>The project proponent shall be responsible for and shall fully and effectively implement, all requirements set forth in ECC, applicable laws, the rules, this procedure and standards.</p>
		Section-105:	<p>Project Proponent has to comply with:</p> <p>The project proponent shall timely notify and identify in writing to the ministry, providing detailed information as the proposed project's potential adverse impacts.</p>
		Section-106:	<p>Project Proponent has to comply with:</p> <p>The project proponent shall, during all phase of the project (Preconstruction, 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.</p>
		Section-107:	<p>Project Proponent has to comply with:</p> <p>The project proponent shall notify and identify in writing to the ministry any breaches of its obligations or other performance failures or violations of the ECC and the EMP as soon as reasonably possible and in any event, in respect of any breach which would have a serious impact or where the urgent attention or the ministry is or may be required, within not later than twenty-four (24) hours, and in all cases within seven (7) days the project proponent becoming aware of such accidents.</p>

		Section-108:	<p>Project Proponent has to comply with:</p> <p>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.</p>
		Section-109:	<p>Project Proponent has to comply with:</p> <p>The monitoring reports shall include:</p> <ul style="list-style-type: none"> 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 EMP and recommendations for remedying those difficulties and steps proposed to prevent or avoid similar future difficulties d) Number and type of non-compliance with the EMP and proposed remedial measures and timelines for completion of remediation e) Accidents or incidents relating to the occupational and community health and safety, and the environment, and f) Monitoring data of environmental parameters and conditions as committed in the EMP or otherwise required.
		Section-110:	<p>Project Proponent has to comply with:</p> <p>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 relate to National Security concerns) publicly available on the Project's website, at public meeting places (e.g libraries, community halls) and at the</p>

			Project offices. Any organization or person may request a digital copy of a monitoring report and the Project shall, with ten (10) days of receiving such request, submit a digital copy via email or as may otherwise be agreed upon with the requestor.
		Section-113:	<p>Project Proponent has to comply with:</p> <p>For purpose of monitoring and inspection, the Project Proponent:</p> <ul style="list-style-type: none"> (a) Shall grant to the Ministry and/or its representatives, at any time during normal working hours, access to the Project's offices and to the Project site and any other location at which the Project activities or activities related to the Project are performed; and (b) From time to time as and when the Ministry may reasonably require, shall grant the Ministry access to the Project's offices and to the Project site and any other location at which the Project activities or activities related to the Project are performed.
		Section-115:	<p>Project Proponent has to comply with:</p> <p>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.</p>
		Section-117:	<p>Project Proponent has to comply with:</p> <p>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 information storage, and persons.</p>

4	National Environmental Quality (Emission) Guideline, 2015		Project Proponent has to comply with: All the guidelines that are of relevance for this project are shown under a separate section of this report.
5	The Conservation of Water Resources and Rivers Law, 2006	Section-8:	Project Proponent has to comply with: No person shall: (a) Carry out any act or channel shifting with the aim to ruin the water resources and river and creeks. (b) Cause the wastage of water resources willfully.
		Section-11:	Project Proponent has to comply with: 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.
		Section-19:	Project Proponent has to comply with: No one shall dispose of any substance into the river, creek that may cause damage to water way or change of water course from the bank or vessel which is plying, vessel which has berthed, anchored, stranded or sunk.
		Section-21:	Project Proponent has to apply for permission: No one shall: (a) build lavatories unsuitable to the urban and rural community lifestyle in the bank area and watercourse area. (b) drill well or pond or dig earth without the permission of the Directorate.

		Section-24:	<p>Project Proponent has to comply with:</p> <p>No one shall:</p> <p>(a) violate the conditions relating to navigation of vessels in rivers and creeks prescribed by the Directorate for conservation of water resources, rivers and creeks.</p> <p>(b) violate the conditions prescribed by the Directorate so as not to cause water pollution and change of watercourse in rivers and creeks.</p>
		Section-29:	<p>Project Proponent has to comply with:</p> <p>Whoever attempts or conspires or abets in the commission of an offence under this law shall be punished with the punishment provided for such offence in this law.</p>
		Section-30:	<p>Project Proponent has to comply with this approval:</p> <p>Any government department and organization or any person desirous of constructing drainage, utilizing river water intake, constructing bridged spanning rivers, connecting underground pipe, connecting underground electric cables, connecting underground telecom cable or digging in river or creeks, bank boundary and water front boundary, under the requirement of work, shall in order not to adversely affect the water resources and river and creeks, carry out only after obtaining the approval of the Ministry of Transport.</p>
6	The Forest Law, 2018	Section-12:	<p>Project Proponent has to apply for approval:</p> <p>Whoever, within a forest land and forest covered land at the disposal of the Government:- (a) is desirous of carrying out any development work or economic scheme shall obtain the prior approval of the Ministry (of Natural Resources and Environmental Conservation);</p>

		<u>Section-40:</u>	<p>Project Proponent commits to pay:</p> <p>Whoever commits any of the following acts shall, on conviction, be punished with fine which may not exceed kyats 300,000 or with imprisonment for a term which may not exceed 1 year or with both:</p> <ul style="list-style-type: none"> (a) trespassing and encroaching in a reserved forest; (c) breaking up any land, clearing, digging or causing damage to the original condition of the land without a permit in a reserved forest;
		Section-41:	<p>Project Proponent commits to pay:</p> <p>Whoever commits any of the following acts shall, on conviction, be punished with fine ranging from kyats 300,000 to 500,000 or which may not exceed 2 years or with both:</p> <ul style="list-style-type: none"> (a) extracting, moving, keeping in possession unlawfully any forest produce, with the exception of timber from teak and reserved tree, without a permit; (b) selling or utilizing in other works, forest produce extracted under section 18 subsection (d), without the prior permission of the person authorized to grant permission for extraction.
		Section-42:	<p>Project Proponent commits to pay:</p> <p>Whoever commits any of the following acts shall, on conviction, be punished with fine ranging from kyats 500,000 to 1,000,000 or with imprisonment for a term which may not exceed to 7 years or with both:</p> <ul style="list-style-type: none"> (a) felling, cutting, girdling, marking, lopping, tapping or injuring by fire or otherwise any tree in a reserved forest; (b) extracting, moving, keeping in possession unlawfully timber from reserved tree other than teak without a permit;

7	The Conservation of Biodiversity and Protected Areas Law, 2018	Section-21:	<p>Project Proponent has to comply with:</p> <p>The Director General may, with the approval of the Minister:</p> <p>(b) allow person who has been permitted to conduct research to collect, transport and possess protected wild plants from the Protected Areas by an individual for the purpose of scientific research including experiment and reproduction.</p>
		Section-29:	<p>Project Proponent has to comply with:</p> <p>With the approval of the Ministry, the Director General:</p> <p>(a) shall check whether the licence application for a zoological garden or botanical garden conforms with the specified terms and conditions, and issue a licence if the conditions are met;</p> <p>(b) may withdraw a licence within the prescribed period or cancel it if a person who receives a licence violates the prescribed terms and conditions.</p>
		Section-35:	<p>Project Proponent commits to pay:</p> <p>A park warden may pass an administrative order against any person to pay a fine from a minimum kyats 30,000 to a maximum kyats 100,000 if he commits any of the following acts within a protected area or a zoological garden or botanical garden which is administered by the Government or in which the Government has subscribed share capital:</p> <p>(a) entering a prohibited area without permission;</p> <p>(c) digging on the land, cultivating or carrying out any activity;</p> <p>(d) extracting, collecting or destroying in any manner, any kind of wild flora or cultivated plant.</p>

		Section-39:	<p>Project Proponent commits to pay:</p> <p>Whoever commits any of the following acts shall, on conviction, be punished with imprisonment for a term not exceeding 3 years or with a fine from a minimum of kyats 200,000 to a maximum of kyats 500,000, or with both:</p> <p>(a) intentionally polluting soil, water or air, damaging a water-course or poisoning water or electrifying water, or using chemical or explosive materials in the water within the protected area;</p>
8	Protection and Preservation of Antique Objects Law, 2015	Section-12:	<p>Project Proponent has to comply with:</p> <p>A person who finds any object which has no owner or custodian shall promptly inform the relevant Ward or Village-Tract Administration if he known or it seems reasonable to assume that the said object is an antique object.</p>
9	Protection and Preservation of Cultural Heritage Regions Law, 2019	Section-13:	<p>Project Proponent has to comply with:</p> <p>A person desirous of carrying out one of the following shall abide by the provisions of other existing laws and also apply to the Department in accordance with stipulation to obtain prior permission under this law:-</p> <p>(a) Within the ancient monumental zone or the ancient site zone</p> <ol style="list-style-type: none"> (1) Construction or extending a building (2) Renovating the ancient monument or extending the boundary of its enclosure; <p>(b) Within the preserved or protected zone, constructing extending, renovating a hotel, motel, guest house, lodging house or industrial building or extending the boundary of its enclosure</p>

			<p>(c) Within the culture heritage region:</p> <ol style="list-style-type: none"> (1) Carrying out the renovation and maintenance work of the ancient monument without altering the original ancient form and structure or original workmanship; (2) Carrying out archeological excavations; (3) Building road, constructing bridge, irrigation canal and embankment or extending the same
		Section-21:	<p>Project Proponent has to comply with:</p> <p>No person shall, without prior permission granted under this Law, carry out an-of the following in the cultural heritage region.</p> <p>(b) carrying out archeological excavation.</p>
		Section-22:	<p>Project Proponent has to comply with:</p> <p>No person shall construct a building which is not in conformity with the conditions prescribed region wise by The Ministry of Culture in the cultural heritage region.</p>
10	Protection and Preservation of Ancient Monuments Law, 2015	Section-12:	<p>Project Proponent has to comply with:</p> <p>Anyone who has found an ancient building of 100 years or more of age without owner on the ground, underground above the water or under the water has to inform, if the building is recognized as or believed to be an ancient monument , the nearest village or township administration department.</p>
		Section-15:	<p>Project Proponent has to comply with:</p> <p>Every person desirous to engage in the following within the area of certain ancient monuments has to apply for the permission of the administration department:</p>

			<p>(b) Constructing industrial building</p> <p>(e) Digging a well, pond</p> <p>(h) Constructing buildings near an ancient monument if this violets the structural rules approved by the ministry.</p> <p>The administration development can approve or reject an application submitted under section 14 or 15 after having analyzed it.</p>
		Section-20:	<p>Project Proponent has to comply with:</p> <p>No one is allowed to do any of the following acts likely to cause damage to an ancient monument within the boundary without prior written permission of the administration department</p> <p>(b) Using and driving heavy machines and vehicles which may cause vibration within the area of an ancient monument</p> <p>(f) Releasing of chemical waste which can cause pollution of ancient monument and the natural environment</p>
11	Myanmar Investment Law, 2016	Section-50:	<p>Project Proponent has to pay:</p> <p>(d) The investor shall register the land lease contract at the Office of Registry of Deeds in accordance with the Registration Act.</p>
		Section-51:	<p>Project Proponent has to comply with:</p> <p>The investor:</p> <p>(a) May appoint any citizen who is a qualified person as senior manager, technical and operational expert, and advisor in his investment within the union in accordance with the law.</p> <p>(b) The investor shall appoint them to replace, after providing for capacity building programs in order to be able to appoint citizens to different level positions of management, technical and operational experts, and advisors;</p>

			<p>(c) shall appoint only citizens for works which does not require skill</p> <p>(d) shall appoint skilled citizen and foreign workers, technicians, and staff by signing an employment contract between employer and employee in accordance with the labor laws and rules;</p>
		Section-65:	<p>Project Proponent has to comply with:</p> <p>The investor:</p> <p>(f) Shall not make any significant alternation of topography or elevation of the land on which he is entitled to lease or to use, without the approval of the commission.</p> <p>(g) Shall abide by applicable laws, rules, procedures and best standards practiced internationally for this investment so as not to cause damage, pollution, and loss to the natural and social environment and not to cause damage to cultural heritage;</p> <p>(i) Shall close and discontinue the investment only after payment of compensation to employees in accordance with applicable laws for any breach of employment contracts, closure of investment, sale and transfer of investment, discontinuation of investment, or reduction of workforce;</p> <p>(j) Shall pay wages and salaries to employees in accordance with applicable laws, rules, procedures, directives and so forth during the period of suspension of investment for a credible reason;</p> <p>(k) Shall pay compensation and indemnification in accordance with applicable laws to the relevant employee or his successor for injury, disability, disease and death due to the work;</p>

			<p>(l) Shall supervise foreign experts, supervisors and their families, who employ in their investment, to abide by the applicable laws, rules, orders and directives, and the culture and traditions of Myanmar;</p> <p>(m) Shall respect and comply with the labor laws;</p> <p>(o) Shall pay effective compensation for loss incurred to the victim, if there are damage to the natural environment and socioeconomic losses caused by logging or extraction of natural resources which are not related to the scope of the permissible investment, except from carrying out the activities required to conduct investment in a permit or an endorsement.</p> <p>(p) Shall allow the Commission to inspect in any places, when the Commission informs the prior notice to inspect the investment;</p> <p>(q) Shall take in advance permit or endorsement of the Commission for the investments which need to obtain prior approval under the Environmental Conservation Law and the procedures of environmental impact assessment, before undertaking the assessment, and shall submit the situation of environmental and social impact assessment to the Commission along the period of activities of the investments which obtained permit or endorsement of the Commission.</p>
		Section-66:	<p>Project Proponent has to comply with:</p> <p>Subject to the assessment under section 65 (q), the Commission may administer the investments to carry out necessary, including to conduct or suspend.</p>

		Section-73:	Project Proponent has to comply with: 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.
12	Myanmar Investment Rules, 2017	Rules-190	Project Proponent has to carry out: An Investor to whom section 65(q) of the Law applies shall Submit confirmation of its compliance with the applicable requirements of the Environmental Conservation Law, rules and environmental impact assessment procedures to undertake, obtain and implement an initial environmental examination, assessment, certificate and management plan as those requirements are met. The approval of the Commission for continuation of the Investment shall base on its compliance.
		Rules-202:	Project Proponent has to comply with: The Investor must comply with the conditions of the Permit and other applicable laws when making an Investment.
		Rules-203:	Project Proponent has to comply with: The investor shall fully assist the negotiating processes with the relevant government departments and government organizations for the affected persons due to investment plans.
		Rules-206:	Project Proponent has to comply with: It 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:	<p>Project Proponent has to carry out:</p> <p>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:</p> <ul style="list-style-type: none"> (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.
13	Farmland Law, 2012	Chapter III Section-9:	<p>Project Proponent has to comply with:</p> <p>The person who has the right to use the farmland shall have the following rights:</p> <ul style="list-style-type: none"> (a) right to have the farmland in possession, right to use the farmland, right to enjoy the benefit arises from this right; (b) right to sell, mortgage, lease, exchange and gift on the whole or part of the right to use the farmland in accord with the stipulated terms and conditions;
		Chapter IV Section-12:	<p>Project Proponent has to comply with:</p> <p>The person who has the right to use the farmland:</p> <ul style="list-style-type: none"> (a) shall carry out the farmland as prescribed in this Law; (b) shall pay land revenue and other taxes levied by the Ministry relating to the farmland;

		Chapter X Section-30:	Project Proponent has to comply with: (b) The relevant Region or State Government Organization may permit to use the farm land by other means except low land (paddy land) with the recommendation of the Region or State Administrative Body of the farmland.
		Chapter XII Section-35:	Project Proponent has to comply with: Any person who has the right to use the farmland fails to comply with the order passed under Section 19 or the order or decision passed in the dispute of the right to use the farmland under this Law shall, on conviction, be punished with imprisonment for a minimum of six months to a maximum of two years and shall also be liable to fine for a minimum of three hundred thousand kyats to a maximum of five hundred thousand kyats.
14	The Factories Act, 1951		Project Proponent has to comply with: The law contains 10 Chapters and 109 articles. Purpose: to ensure the health, safety, welfare, fair working time the clean environment for the employees working inside a factory. This law focuses on all stipulation for the employer (project owner). The project owner should abide by nearly all sections in this Act. The project owner has to abide by all provisions for healthy, safety, welfare, (Chapter 3, 4, 5 respectively) working-hours and other needs. The project owner shall ask its legal expert to study this Act in details for his advice. This Act also contains the provision for chemicals management and storage. The chemicals use in the manufacturing of motorcycle, paints, thinners, varnishes etc, may not require permits. Since iron smelting will not be involved permit for "hot work" may not be also necessary.

			<p>Chapter-8 is on the employment of young person.</p> <p>Chapter-9 deals with punishment and procedure for employer who violates this law.</p> <p>This factories Acts requires all factories to have proper pollution control measures such as air pollution, sewage and waste water treatment system and solid waste management system.</p>
15	Prevention of Hazard from Chemical Substances Law, 2013	Section-14:	<p>Project Proponent has to comply with:</p> <p>The Central Supervisory Board:-</p> <p>(a) shall grant the licence with regulations, if permit to grant the licence, after being paid the licence fees.</p>
		Section-15:	<p>Project Proponent has to comply with:</p> <p>A person who has obtained a licence, before starting the respective chemical and related substances business:-</p> <p>(a) Shall be inspected for the safety and the power of resistance of the machinery and equipments by the respective Supervisory Board and Board of Inspection;</p> <p>(b) Shall be attended the person who serve in the work to the respective foreign trainings or the training and the expert trainings on prevention of hazard from the chemical and related substances opened by the government department and the government organizations.</p>
		Section-16:	<p>Project Proponent has to comply with:</p> <p>A person who has obtained a license:-</p> <p>(a) Shall abide by the license regulation;</p> <p>(b) Shall perform to abide strictly the instructions for being safety in</p>

			<p>using the chemical and related substances by himself and also the persons who serve the work;</p> <p>(c) Shall keep the required safety equipment enough in the chemical and related substances businesses, furthermore shall grant the personal protection equipment and dresses free of charge to the working persons;</p> <p>(d) Shall make the course of training and study and instruction if necessary to the working persons for using the occupational safety equipment, the personal protection equipment and the dresses systematically in the chemical and related substances business;</p> <p>(e) Shall be inspected by the respective Supervisory Board and Board of Inspection in respect of whether or not the hazard may impact on the Human Being and Animals' health and the environment;</p> <p>(f) Shall make medical checkup the working persons who will work in the chemical and related substances business and shall permit to serve in that work after obtaining the recommendation that his health is suitable for that work. This medical checkup records shall be kept systematically;</p> <p>(g) Shall send the copy of informative letter of the permission to the respective Department of Township Administration, if the hazardous chemical or related substances are permitted to store;</p> <p>(h) Shall acquire in advance the guidance and agreement of the respective Department of Fire Brigade, if the business that is worried to fire hazard is operated by using the fire hazard substances or the explosive substances;</p> <p>(i) Shall transport only the permitted amount of the chemical and related substances in accordance with the prescriptive stipulations, if they are transported in local;</p>
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			(j) Shall take the permission from the Central Supervisory Board if the chemical and related substance is altered and transferred from one place to any other place which contained in the license;
		Section-17:	<p>Project Proponent has to comply with:</p> <p>A person who has obtained a license, shall put the insurance in accordance with prescriptive stipulations to be able to pay the compensation, if the impact and damage is occurred on the Human Being and Animals or the environment in respect of the chemical and related substances businesses.</p>
		Section-20:	<p>Project Proponent has to comply with:</p> <p>A person who has obtained a licence shall apply the related chemical and related substances that will be used in his chemical and related substances business in accordance with the stipulations to the Central Supervisory Board.</p>
		Section-21:	<p>Project Proponent has to comply with:</p> <p>The Central Supervisory Board scrutinizes the application according to section 20 and if it is in accord with the stipulations, shall issue the registration certificate with regulations after being paid the registration fees for the respective chemical and related substances.</p>
		Section-22:	<p>Project Proponent has to comply with:</p> <p>A person who has obtained the registration certificated shall abide the regulations consisted in the registration certificate furthermore shall also abide the order and instructions issued occasionally by the Central Supervisory Board.</p>

		Section-23:	<p>Project Proponent has to comply with:</p> <p>A person who has obtained the registration certificate:-</p> <ul style="list-style-type: none"> (a) shall apply to register again, to the Central Supervisory Board if the chemical and related substances, which are not contained in the registered list, are used; (b) shall inform and submit the unused chemical and related substances list to the Central Supervisory Board, although which are contained in the registered list.
			<p>Project Proponent has to comply with:</p> <p>control and decrease the hazard of the chemical and related substances:-</p> <ul style="list-style-type: none"> (a) Classifying the hazard level to protect in advance the hazard according to the properties of the chemical and related substances; (b) Expressing the Material Safety Data Sheet and Pictogram; (c) Providing the safety equipment, the personal protection equipment to protect and decrease the accident and attending to the training to be used systematically; (c) Performing in accordance with the stipulations in respect of transporting, possessing, storing, using, discharging the chemical and related substances; (d) Not being imported or exported the chemical and related substances banned by the Central Supervisory Board and the machinery and equipment which are used them.

		Section-27:	Project Proponent has to comply with: A person who has obtained the license to be complied the following matters to
16	The Boiler Law, 2015	Section-5:	Project Proponent has to comply with: Any person desirous to use a boiler for any enterprise shall register under this law.
		Section-6:	Project Proponent has to comply with: A boiler shall be manufactured in accord with Myanmar standards and international standards.
		Section-7:	Project Proponent has to comply with: The documents and certificates relating to the boiler shall be attached to the application and submitted to the inspector when applying for the registration of the boiler under section-5.
		Section-12:	Project Proponent has to comply with: The owner shall: (a) Apply to the respective inspector to obtain certificates in accord with the prescribed manner. (b) Apply to register only for the boiler constructed in accord with Myanmar standards or international standards.
		Section-14:	Project Proponent has to comply with: The owner shall apply to the respective inspector in advance in order to obtain permission though he or she has obtained the certificate or the provisional order if desirous to carry out any of the following matters: (a) Using the boiler at more than allowable pressure (b) Repairing, altering adding or renewing any steam-pipe, pipe or any mounting or other fitting attached such steam pipe, feed-pipe or mounting or other fitting attached to the boiler.

		Section-15:	Project Proponent has to comply with: The owner shall submit the certificate or provisional order when so requested by the respective government department and organization as may be necessary.
		Section-18:	Project Proponent has to comply with: The owner shall inform immediately to the inspector if any accident occurs.
		Section-19:	Project Proponent has to comply with: The owner shall not: (a) use a boiler at a pressure higher than allowable pressure; (b) repair and alter or force to repair and alter the safety valve to exceed allowable pressure; (c) do any act contained in sub-section (b) of section 14 without permission.
		Section-20:	Project Proponent has to comply with: The owner shall not use the following boiler: (a) Boiler without certificate or provisional order (b) Boiler of which certificate or provisional order is void (c) Boiler of which certificate or provisional order is revoked.
		Section-21:	Project Proponent has to comply with: The owner shall engrave the register number specified by the chief inspector in accord with the prescribed manner.

		Section-22:	<p>Project Proponent has to comply with:</p> <p>The owner:</p> <ul style="list-style-type: none"> (a) has the right to use a boiler in accord with the prescribed manner if he or she obtains certificate or provisional order; (b) may, if desirous to alter the term of the certificate or provisional order, apply in advance for inspection before the expiry of the term of such certificate or provisional order.
		Section-24:	<p>Project Proponent has to comply with:</p> <p>The owner shall not:</p> <ul style="list-style-type: none"> (a) Carry out with the person who has not boiler repairer certificate on the receipt of notice to repair, alter, add or renew any boiler, steam pipe, feed pipe or any mounting or other fitting attached to such boiler, steam-pipe and feed pipe. (b) Assign any person to charge the boiler used in the work except the person who operates and maintains the boiler
		Section-29:	<p>Project Proponent has to comply with:</p> <ul style="list-style-type: none"> (a) Any person desirous to obtain a boiler attendant certificate may apply to the respective inspector in accord with the stipulations;
		Section-30:	<p>Project Proponent has to comply with:</p> <p>The boiler attendant shall:</p> <ul style="list-style-type: none"> (a) have the right to operate the boiler which is issued certificate or provisional order with the approval of the owner;
		Section-31:	<p>Project Proponent has to comply with:</p> <p>The boiler attendant shall not use the boiler at more than allowable pressure.</p>

		Section-38:	Project Proponent has to comply with: The inspector, in accord with the prescribed manners, shall: (a) Inspect the boiler existing within the area where he is responsible, (b) Inspect any boiler existing anywhere according to the assignment of the Chief Inspector.
		Section-40:	Project Proponent has to comply with: During performing under section 38, an inspector may enter and inspect any place or building in which he has reason to believe that a boiler is in use.
		Section-59:	Project Proponent has to comply with: No one shall amend, alter, deface, destroy the form and make invisible the register number engraved under section 21.
		Section-62:	Project Proponent has to comply with: No one shall adjust and alter the safety valve in order to exceed the allowable pressure on his volition or under the instruction of the owner.
17	The Myanmar Fire Brigade Law, 2015	Section-24:	Project Proponent has to comply with: No person shall fail to abide by the directives in respect of fire precaution and prevention issued under section -16 by the Township Fire Service Department.
		Section-25:	Project Proponent has to comply with: The owner or manager of the factory, workshop, work site or business exposed to fire hazard shall: (a) Not fail to form the reserve fire bridge (b) Not fail to provide materials and apparatus for fire precaution and prevention, in conformity with the directive of the Fire Service Department

18	Electricity Law, 2014	Section-10:	<p>Project Proponent has to comply with:</p> <p>When engaging in electricity activities, the ministry, the relevant region or state government and the head ("oozi") of the relevant self-administered division or self-administered zone –</p> <p>(b) shall carry out an environmental impact assessment (EIA) in order to minimize the impact on the environment in accordance with the provisions stipulated in the Environmental Conservation Law. They shall pay compensation for the impact and contribute to the environmental conservation fund. Private entrepreneurs holding a license must also comply with these points</p>
		Section-18:	<p>Project Proponent has to comply with:</p> <p>The license holder has the right to engage in electric power generation and distribution only after having received the electrical hazards safety certificate from the chief inspector.</p>
		Section-20:	<p>Project Proponent has to comply with:</p> <p>The license holder must abide by the rules, regulations, notifications, orders, directives and procedures issued by the relevant ministry relating to the licensed electricity activities.</p>
		Section-21:	<p>Project Proponent has to comply with:</p> <p>(a) The license holder shall, if he fails to comply with the law, rules, regulations, procedures, orders and directions or the specified quality, standards and norms, be responsible in accordance with the law if any person or organization is affected or suffers a loss as a result.</p>

		Section-22:	Project Proponent has to comply with: (a) The license holder shall be responsible in accordance with the law if any person or organization is affected or suffers a loss due to his negligence in performance;
		Section-24:	Project Proponent commits to pay the compensation: A power consumer must, if damage or loss occurs to other electric power consumers or any electricity activities due to his negligence, pay compensation calculated in accordance with the specified method of the ministry.
		Section-26:	Project Proponent has to comply with: The license holder must comply with the following- (a) Electricity exploration must be done in accordance with the law; (b) In electric power generation, transmission and distribution- (1) Electrical power must be generated as specified in the license; (2) Instruments for measuring electric power and protective equipment must be systematically used and maintained in accordance with the stipulations.
		Section-27:	Project Proponent has to comply with: The license holder and the authorized person must inform the chief inspector and the relevant department in charge immediately if an electrical hazard has accidentally occurred when generating, transmitting, distributing or consuming electric power.
		Section-29:	Project Proponent has to comply with: The relevant ministry must inspect quality and norm specifications relating to factories and workshops, machineries and equipment installed in such factories and workshops, commercial buildings, imported electrical appliances and equipment which are sold locally.

		<u>Section-33:</u>	Project Proponent has to comply with: The chief inspector, the inspector and the persons assigned by them, shall have the right to enter into any place and any building in the performance of their duties.
		<u>Section-40:</u>	Project Proponent has to comply with: The license holders comply with the rules, norms and procedures issued by the ministry and must accept necessary inspections by the relevant government departments and organizations.
			Project Proponent has to comply with: <u>Section-68:</u> If the negligence or irresponsibility of the license holder or of persons assigned by him has caused injury, disability or death by electrocution or fire, the aggrieved person has the right to request compensation from the license holder as follows- (a) If the aggrieved person is entitled to compensation according to the existing labour compensation law, the compensation specified in this law; (b) If the aggrieved person is not entitled to compensation according to the existing labour compensation law, the compensation specified in the rules, issued under this law
19	Myanmar Engineering Council Law, 2013	Section-34:	Project Proponent has to comply with: 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 the law, the executive committee may take the following administrative actions:

			<ul style="list-style-type: none"> (a) Giving a warning; (b) Assessing a suitable fine; (c) Suspending the registration certificate, (d) Cancelling the registration certificate.
		Section-37:	<p>Project Proponent has to comply with:</p> <p>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 engineers appointed in a government department or an organization in the performance of their duties.</p>
20	Private Industrial Enterprise Law, 1990	Section-4:	<p>Project Proponent has to comply with:</p> <ul style="list-style-type: none"> (a) Any person desirous of conducting any private industrial enterprise; (b) Any person conducting any private industrial enterprise on the day this Law is enacted; by using any type of power which is three horsepower and above or manpower of ten wage-earning workers and above shall register under this Law.
		Section-11:	<p>Project Proponent has to comply with:</p> <ul style="list-style-type: none"> (d) supervising to ensure the compliance by the entrepreneurs in the conducting of the industrial enterprises in accordance with the basic principles;
		Section-13:	<p>Project Proponent has to comply with:</p> <p>The duties of the entrepreneur are as follows:-</p> <ul style="list-style-type: none"> (a) Shall pay the registration fees, fees for the renewal of registration and other payable duties and taxes prescribed by the Directorate;

			<p>(b) Shall abide by the terms and conditions of the registration certificate;</p> <p>(c) Shall conduct the enterprise by opening an account with the relevant bank in the name of its registered enterprise;</p> <p>(f) Shall shift the place of enterprise, change the nature of enterprise, amalgamate enterprises and split up enterprises only with the approval of the Directorate;</p> <p>(g) Shall abide by the orders and directives issued from time to time by the Ministry and the Directorate;</p> <p>(h) Shall also abide by the existing laws.</p>
		Section-15:	<p>Project Proponent has to comply with:</p> <p>The entrepreneur has the right to carry out the followings:-</p> <p>(a) appointing foreign experts and technicians with the approval of the Ministry;</p> <p>(b) carrying out change of the name of enterprise, transfer of ownership, temporary suspension or permanent closing down of the enterprise in the manner prescribed and with the approval of the Directorate.</p>
		Section-16:	<p>Project Proponent has to comply with:</p> <p>The Director General shall, in order that entrepreneurs may, have the right to enjoy, submit to the Private Industrial Enterprise Co-ordination Body and carry out in respect of the following matters:-</p> <p>(a) land, water, power, communication and transport et cetera required for use in his enterprise;</p> <p>(b) exemptions and reliefs from taxes;</p> <p>(c) loans for fixed capital and working capital;</p>

			<p>(d) raw materials, machinery and spare parts required locally and from abroad for his enterprise;</p> <p>(e) local and foreign technical know-how for enhanced production of goods and for improvement in the quality of finished goods;</p> <p>(f) to acquire local and foreign markets;</p> <p>(g) to acquire industrial areas and leased land for industrial enterprises.</p>
		Section-26:	<p>Project Proponent has to comply with:</p> <p>No one shall conduct a private industrial enterprise contained in section ~ without obtaining registration under this Law.</p>
		Section-27:	<p>Project Proponent has to comply with:</p> <p>An entrepreneur:</p> <p>(a) In distributing and selling the goods he has produced shall not sell without a trade mark;</p> <p>(b) Shall not violate any provision of section 13;</p> <p>(c) Shall not fail to comply with any order or decision passed by the Minister and the Director General.</p>
		Section-28:	<p>Project Proponent has to pay:</p> <p>Whoever violates the provision of section 26 shall, on conviction:-</p> <p>(a) in the case of conducting a small scale private industrial enterprise, he punished with fine which may extend from a minimum of kyats 5,000 to a maximum of kyats 10,000;</p> <p>(h) in the case of conducting a medium scale private industrial enterprise, he punished with fine which may extend from a minimum of kyats 10,000 to a maximum of kyats 20,000:</p>

			(c) in the case of conducting a large scale private industrial enterprise be punished with fine which may extend from a minimum of kyats 20,000 to a maximum of kyats 50,000.
		Section-29:	<p>Project Proponent has to pay:</p> <p>If a person who is convicted of an offence under Section 28 continues in the commission of such offence, he shall be punished with fine at the following rate for each day of the extent of the period of continuance thereof: -</p> <p>(a) in the case of a small scale private industrial enterprise, at the rate of kyats 100:</p> <p>(h) in the case of a medium scale private industrial enterprise, at the rate of kyats 150:</p> <p>(c) in the case of a large scale private industrial enterprise, at the rate -. of kyats 200.</p>
21	Employment and Skill Development Law, 2013	Section-5:	<p>Project Proponent has to comply with:</p> <p>(a) (1) If the employer has appointed the employee to work for an employment, the employment agreement shall be made within 30 days. But it shall not be related with government department and organization for a permanent employment.</p> <p>(2) If pre training period and probation period are stipulated before the appointment the said trainee shall not be related with the stipulation of sub-section (1).</p> <p>(b) The following particulars shall be included in the employment agreement:</p> <p>(1) The type of employment;</p> <p>(2) The probation period;</p>

			<ul style="list-style-type: none"> (3) Wage, salary; (4) Location of the employment; (5) The term of the agreement; (6) Working hour; (7) Day off, holiday and leave; (8) Overtime; (9) Meal arrangement during the work hour; (10) Accommodation; (11) Medical treatment; (12) Ferry arrangement to worksite and travelling; (13) Regulations to be followed by the employees; (14) If the employee is sent to attend the training, the limited time agreed by the employee to continue to work after attending the training; (15) Resigning and termination of service; (16) Termination of agreement; (17) The obligations in accord with the stipulation of the agreement; (18) The cancellation of employment agreement mutually made between employer and employee; (19) Other matters; (20) Specifying the regulation of the agreement, amending and supplementing; (21) Miscellaneous.
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			<p>(c) The worksite regulations contained in the employment agreement shall be in compliance with any existing law and the benefits of the employee shall not be less than those of the any existing law.</p> <p>(d) According to the employment agreement, the Ministry shall issue the notification for paying the stipulated compensation to the employee by the employer, if the work is completed earlier than the stipulated period or the whole work or any part of it have to be terminated due to unexpected condition or the work has to be terminated due to various conditions.</p> <p>(e) The employment agreement made under sub-section (a) shall be related with daily wage workers, piece rate workers who are appointed temporarily in the government department and organization.</p> <p>(f) The worksite regulations and benefits contained in the employment agreement mutually made between the employer and employee or among the employees shall be amended as necessary, in accord with the existing law.</p> <p>(g) The employer shall send a copy of the employment agreement made between the employer and employee, to the relevant employment and labour exchange office within the stipulated period and shall get the approval of it.</p> <p>(h) The employment agreement made before the enforcement of this law shall be confirmed up to the end of the term of the original agreement.</p>
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		Section-14:	<p>Project Proponent has to comply with:</p> <p>Employer shall conduct occupational training to enhance the skills of workers who are to be employed as well as workers who are presently employed in accordance with the requirements of the enterprise and the policy of the Skills Development Agency</p>
		Section-20:	<p>Project Proponent has to comply with:</p> <p>The duties of the Registered Training Centre are as follows:-</p> <ul style="list-style-type: none"> (a) Documenting the training program matters described below and submitting the same to the Skills Development Agency for approval:- <ul style="list-style-type: none"> (1) Occupational Competency Standards (2) Curriculum (3) Location of the Training Centre, buildings and facilities. (4) Names of the Instructors and their qualifications (5) Duration of the training course (6) Training Methodology and Training Aids (7) Certificates to be awarded (8) Training Fee (9) Other matters prescribed by the Occupational Competency Standards and Training Committee (b) Making Training Contract with the trainee (c) Maintaining the personal data of the trainees (d) Within 15 days of completion of the training program, submitting a report of the training program to the Skills Development Agency.

			<p>(e) If the Training Centre is to be handed over to another person who wants to establish a training centre, to inform the Skills Development Agency at least 30 days in advance prior to such transfer.</p> <p>(f) If it is desirous to terminate the training centre, to transfer the trainees together with the remaining training costs to another centre offering the same training course.</p>
		Section-30:	<p>Project Proponent has to comply with:</p> <p>(a) The employers of Industrial and Service Enterprises shall pay contribution to the fund every month without fail amounting to not less than below 0.5% of the payroll of his workers up to the level of supervisors of the workers.</p>
		Section-30:	<p>Project Proponent has to comply with:</p> <p>(b) The employer shall not deduct the contribution paid under subsection (a) to the fund from the wages of the workers.</p>
22	The Ethnic Rights Protection Law, 2015	Section-5:	<p>Project Proponent has to comply with:</p> <p>Indigenous people (ta-ne tain-yin-tha) should receive complete and precise information about extractive industry project and other business activities in their area before project implementation so that negotiation between groups and the Government/companies can take place.</p>
		Chapter V Section-5:	<p>Project Proponent has to comply with:</p> <p>The matters of the project shall completely be informed, coordinated and performed with the relevant local ethnic groups in the case of development works, major projects, business and extraction of natural resources will be implemented within the area of ethnic groups.</p>

23	The Ethnic Rights Protection Rules, 2019	Rules-20:	<p>Project Proponent has to comply with: The project proponent who will implement the project in the ethnic group area shall:</p> <ul style="list-style-type: none"> (a) explain in details in local's language/dialect, in advance about the positive and negative effect of the project to the ethnic people in the local area. (b) comply with policy, strategy and action plan as prescribed in Myanmar Sustainable Development Plan (MSDP) (c) in order to know any impact on the physical and social environment, conduct Enviornmental and Soical Impact Assessment (ESIA) in accordance with regulation. (d) all stages and activities of ESIA must be explained to and consulted with the ethnic gruop in a transparent manner
		Rules-21:	<p>Project Proponent has to comply with: The proponent shall:</p> <ul style="list-style-type: none"> (a) report in details about the project preparatoin works as mentioned in R-20 to the Ministry before implementation of the project and wait for approval from the Ministy. after completion of project advance plan and project completion report must be submitted to the Ministry
24	Myanmar Insurance Law, 1993	Section-15:	<p>Project Proponent has to comply with: Owner of motor vehicles shall effect life insurance for a minor</p>
		Section-16:	<p>Project Proponent has to comply with: An entrepreneur or 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 effect compulsory General Liability Insurance with the Myanmar Insurance.</p>

25	Social Security Law, 2012	Section-11:	<p>Project Proponent has to comply with:</p> <p>(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:</p> <ul style="list-style-type: none"> (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, warehouse- es 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 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;
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			<ul style="list-style-type: none"> (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 coordination with the Social Security Board and with the approval of the Union Government.
		Section-11:	<p>Project Proponent has to comply with:</p> <ul style="list-style-type: none"> (b) The project owner will register to the respective social security office.
		Section-15:	<p>Project Proponent has to comply with:</p> <ul style="list-style-type: none"> (a) The project owner will pay the social security fund for four types of social security (b) establishments determined by the Ministry of Labour from time to time, in co-ordination with the Social Security Board and with the approval of the Union Government; that they shall be applied with the provisions of compulsory registration for Social Security System and benefits contained in this Law.

		Section-18:	Project Proponent has to pay: (b) The project owner will pay the fund which has to be paid by him together with the funds which have to be paid from the salaries of the employees.
		Section-48:	Project Proponent has to pay: (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-49:	Project Proponent has to comply with: (a) The employers and insured of establishments where the employer had registered compulsorily under sub-section (a) of section 48 or where the employer had registered voluntarily under sub-section (b) of section 48 who have paid contribution to employment injury benefit fund shall not apply to the provisions contained in the Workmen's Compensation Act in respect of the employment injury benefit. (b) The insured that has affected insurance for employment injury benefit under sub-sections (a) and (b) of section 48 shall only be entitled to employment injury benefits contained in this Law.
		Section-75:	Project Proponent has to comply with: The project owner will submit the lists and records, provided in article 75, to related social security office.

26	The Labour Organization Law, 2011	Section-17:	<p>Project Proponent has to comply with:</p> <p>The labour organization shall have the right to carry out freely in drawing up their constitution and rules, in electing their representatives, in organizing their administration and activities or in formulating their programmes the labour organization has the right to negotiate and settle with the employer if the workers are unable to obtain and enjoy the right of the workers contained in the labour laws and to submit demands to the employer claim in accord with the relevant law if the agreement cannot be reached.</p>
		Section-18:	<p>Project Proponent has to comply with:</p> <p>The labour organizations have 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 reason of such dismissal were based on labour organization membership or activities, or were not in conformity with the labour law.</p>
		Section-19:	<p>Project Proponent has to comply with:</p> <p>The labour organizations have the right to send representation to the Conciliation Body in settling the dispute between the employer and the worker. Similarly, they have the right send representatives to the Conciliation Tribunal formed with the representatives from the various levels of labour organization.</p>
		Section-20:	<p>Project Proponent has to comply with:</p> <p>In discussing with the Government the employer and the complaining workers in respect of workers' right or interests contained in the labour laws, the representative of the labour organization also have the right to participate and discuss.</p>

		Section-21:	Project Proponent has to comply with: The labour organizations have the right to participate in solving the collective bargains of the workers in accord with the labour laws.
		Section-22:	Project Proponent has to comply with: The labour organizations shall carry out peacefully in carrying out holding meetings, going on strike and carrying out other collective activities in accord with the procedure, regulations, by-law and any directives prescribed by the relevant labour Federation ship.
27	Workmen's Compensation Act, 1923		Project Proponent has to comply with: It was/is an Act to provide for the payment by certain classes of employers to their workmen of compensation for injury by accidents. This law was amended in 2005 by chairman of the State Peace and Development Council. Since the rate in kyats for compensation during the 1920s are no longer applicable (workable) the rate for compensation are increased. The rate shall be according to the Notification by the existing Ministry of Labour. E.g. fine which may extend to "Ks 100" is substituted by "Ks 10,000".
		Section-13:	Project Proponent has to comply with: Compensation shall be paid in line with the provision of the said law.
28	Leaves and Holiday Act, 1951		Project Proponent has to comply with: The law contains 18 sections and the purpose is for regulating the taking of leaves and holidays, covering the hours of work, weekly rest and paid leave. Three types of leaves, namely Earned leave, casual leave and leave on Medical Certificate are stipulated. The holidays during that period (the 19505) include: Independence Day, Fullmoon of Tabaung, Thingyan, Burmese New Year, May Day, Full Moon of

			Kason, Resistance Day, beginning of Buddhist Lent, Martyrs' Day, End of Buddhist Lent, Full Moon of Tansaungmone, and National Day. One Islam Holiday and Hindu Holiday are official but are not written in the Act, but are notified in short advance.
29	Settlement of Labour Dispute Law, 2012	Section-38:	Project Proponent has to comply with: No employer shall fail to negotiate and coordinate in respect of the complaint with the prescribed period without sufficient cause.
		Section-39:	Project Proponent has to comply with: No employer shall alter the condition of service relating to workers concerned in such dispute at the consecutive period before commencing the dispute within the period under the investigation of the dispute before the Arbitration Body or Tribunal, to affect the interest of such workers immediately.
		Section-40:	Project Proponent has to comply with: No party shall proceed to lock-out or strike without accepting negotiation, conciliation and arbitration by Arbitration Body in accord with this law in respect of a dispute.
		Section-43:	Project Proponent has to comply with: No person shall fail to abide by or carry out any condition contained in agreement concluded before the Conciliation Body in respect of individual dispute or collective dispute.
		Section-51:	Project Proponent has to comply with: It an employer in the course of settlement of dispute commits any action omission without sufficient case, which by causing 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.

30	Payment and Wages Law, 2016	Section-3:	<p>Project Proponent has to comply with:</p> <p>The employer:</p> <p>(a) shall pay wages to the workers employing in his business in local currency or foreign currencies stipulated by the Central Bank of Myanmar. Such payment may be paid in cash or cheque or deposit into the bank account of the worker with the agreement between the employer and the worker.</p> <p>(b) In paying such wages:</p> <p>(i) if it is necessary to pay particular benefit, profits and opportunities for workers working in commerce, production and service businesses, it may be paid in cash or some in cash and some in things set up by local price on own volition of workers in accordance with the stipulations.</p> <p>(ii) For workers employing in agriculture and livestock breeding business, it may be paid some wage in cash and something set up by local price according to custom, or on the volition of majority of worker or by collective agreement. In paying so, it shall be for personal use and the interest of his family, and shall be appropriate and equitable.</p> <p>(c) If any worker is conscripted under the Public Military Service Law, the (60) days of wages shall be paid as a special right.</p>
		Section-4:	<p>Project Proponent has to comply with:</p> <p>The employer:</p> <p>(a) shall pay wages at the end of the work or at the time agreed to pay to the worker for hourly, daily, weekly or other part time work, or temporary or piece work;</p>

			<p>(b) shall not exceed one month than the period agreed with the worker under sub-section (a) to pay wages;</p> <p>(c) shall pay the wages for the permanent work monthly. In making such payment:</p> <p>(i) if workers are not more than 100, wages shall be paid at the end of the period for payment of wage;</p> <p>(ii) If workers are more than 100, it shall be paid no later than five days after the end of the period for payment of wage;</p> <p>(d) shall pay the due wages within two working days from the date of termination, if a worker is terminated;</p> <p>(e) shall pay the wages at the end of the period for payment of wages, if a worker resigns on his own volition by sending prior written notice of resignation;</p> <p>(f) shall pay the due wages to a legal heir within two working days after the decease, if a worker is deceased;</p> <p>(g) shall pay all wages on a working day.</p>
		Section-5:	<p>Project Proponent has to comply with:</p> <p>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.</p>
		Section-6:	<p>Project Proponent has to comply with:</p> <p>The Department may, with the approval of the Ministry, allow the employers to postpone payment within the appropriate time under stipulated conditions, if it is scrutinized that the submission under Section5should be allowed.</p>

		Section-7:	<p>Project Proponent has to comply with:</p> <p>The employer:</p> <ul style="list-style-type: none"> (a) may deduct from wages, except leaves which are entitled wages under the relevant law and public holidays, for the absent period from work; (b) may deduct expenses which are allowance for accommodation and ferry service arranged by the employer, meal allowance, electricity charges, water service charges and income taxes liable to paid by workers and cash paid in excess under a mistake, which are not included in the expression of wages under this Law; (c) may deduct advance payment or reimburse or saving for the worker or any contribution under any law demanded by a worker from wages. (d) may deduct from the wages of the worker under a decision of a Court or Arbitration Council or Arbitration Body.
		Section-8:	<p>Project Proponent has to comply with:</p> <p>The employer shall not deduct from the wages of the worker except deduction from wages in accordance with provisions of Section 7 and Section 11.</p>
		Section-9:	<p>Project Proponent has to comply with:</p> <p>In deducting from wages under Section 7, all deductions made by the employer shall not exceed 50 percent of the wages of a worker except deduction from wages for the failure of a worker to perform his duty.</p>

		Section-10:	<p>Project Proponent has to comply with:</p> <p>The employer:</p> <ul style="list-style-type: none"> (a) shall obtain prior approval of the Department for what deduction can be made from wage and how much can be deducted before deducting anything stipulated as a fine under section 11. (b) shall post the approval contained in sub-section (a) in conspicuous places at relevant factory and work; (c) shall not exceed fine deducted for compensation than the value of damage or loss by action or omission of a worker; (d) in deducting from wages under Section 11: <ul style="list-style-type: none"> (i) shall not deduct from wages without giving right to defence of the worker; (ii) shall not deduct more than 5 percent of the monthly wages of the worker. (e) shall not absolutely deduct as the fine from a worker under 16 years of age; (f) may cally out the date of payment of passing fine in accordance with the agreement between the employer and the worker; (g) shall deduct from wages for compensation due to loss of property within a limited period by an agreement of the relevant Township Conciliation Body; (h) shall enter the deducting cash from wages into the register and systematically maintain it;
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			<p>(i) shall submit a report of the deduction from wages to the Department;</p> <p>(j) shall use fines of deduction from wages under sub-section (b) of Section 11 for the worker benefit in coordination with legally registered Labour aryанизation in the factory.</p>
		Section-11:	<p>Project Proponent has to comply with:</p> <p>The employer may designate as fine to compensate for the following acts and omissions of a worker and deduct from his wages:</p> <p>(a) any loss of property and cash expressly entrusted to the worker by the employer due to intentional negligence and carelessness or dishonest acts or omissions of the worker, which is caused directly by the carelessness and mistake of such worker;</p> <p>(b) violation of any terms or conditions stipulated as fines in the employment agreement.</p>
		<u>Section-12:</u>	<p>Project Proponent has to comply with:</p> <p>The worker:</p> <p>(a) may request to the employer to be settled by himself or legally registered labour organization or the Workplace Coordination Committee in the factory if the following conditions occur;</p> <p>(i) deduction from wages obtainable without credible reason;</p> <p>(ii) failure to pay overdue payment of wages.</p> <p>(b) may submit to the inspector to solve the problem, if the employer fails to solve the problem asked under sub-section (a), within six months from the date of deduction or failure to pay.</p>

		Section-13:	<p>Project Proponent has to comply with:</p> <p>(a) The inspector may scrutinize such submission under sub-section (b) of the Section 12 and, if necessary, interrogate the relevant persons and make an appropriate order.</p> <p>(b) The worker or employer may file an appeal to the chief inspector, if he does not satisfy the order made under sub-Section (a), within 30 days from the date of such order.</p> <p>(c) The chief inspector may make an appropriate order after scrutinizing the appeal under sub-section (b) and hearing the employer and the worker.</p> <p>(d) The order of the Chief Inspector is final.</p>
		Section-14:	<p>Project Proponent has to comply with:</p> <p>If a worker has worked overtime he has the right to be paid according to the rate of payment designated.</p>
		Section-22:	<p>Project Proponent has to comply with:</p> <p>No employer shall not violate sections 4, 5, 8, 9 and 11 regarding payment and term and rate of payment.</p>
		Section-23:	<p>Project Proponent has to comply with:</p> <p>No employer shall violate the rules, decrees and prohibition regarding payment to its employees.</p>
		Chapter-III:	<p>Project Proponent has to comply with:</p> <p>(7) The Employer...</p> <p>(a) Can deduct from wages for absences except when such absence is during a public holiday or entitled leave, according to the law.</p>

			<p>(b) Accommodation charges and transportation charges, meal allowances, charges for water and electricity, taxes and errors in payment shall be allowed for deduction.</p> <p>(c) Can deduct from pre-issued, expensed and saved (or) contributed amount according to the law upon the employee contract.</p> <p>(d) The Employer can deduct with the judgment of the Court of Arbitrator Jury Council.</p> <p>(8) The Employer cannot deduct except the deduction in accordance with Section 7 and Section II.</p> <p>(9) The total amount of other deductions, except when the employee fails to perform their duties, shall not be more than 50% of the employee's wages.</p> <p>(10) The Employer must...</p> <p>(a) According to Section 11 of this Act, get permission from the Department concerning "why" and "how" prior to making deductions from wages.</p> <p>(b) Permissions stated in sub-section (a) shall be publicly posted.</p> <p>(c) Fines must not exceed the value of damage caused by the action or cost of performance failure of the employee.</p> <p>(d) According to Section 4 of this Act, when making a specific deduction...</p> <p>(1) Do not deduct without allowing an appeal from the Employee.</p> <p>(2) Do not deduct more than 5% of the monthly wages.</p>
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			<p>(e) No deduction is allowed from a worker under 16 years old.</p> <p>(f) The timeframe for deductions shall be set upon an agreement from both sides.</p> <p>(g) Deductions shall be carried out within the limited timeframe upon the agreement of the Township Arbitration Council set in accordance with Law.</p> <p>(h) Every deduction must be well documented.</p> <p>(i) You must submit a monthly report to the Department concerning deductions.</p> <p>(j) Fines deducted according to Section 11 sub-section (b) must be used for the social welfare of the employees upon discussion with a registered labor organization.</p> <p>11. Employers shall fine for the following actions or performance failure by the employees...</p> <p>(a) Direct damage which is either intentional or due to negligence or due to the failure of the employee concerned with company property to take proper care.</p> <p>(b) A breach of the employment contract or breach of any rules for which a fine had been previously set.</p> <p>12. If a worker...</p> <p>(a) Encounters any one of the following situations, he/she shall ask directly or via a registered Labor Organization or by the in-house Workplace Coordination Committee to the Employer:</p> <p>(1) Any unreasonable deduction from wages</p> <p>(2) Payment which is not made by the due date.</p>
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			<p>(b) If the Employer takes no action, although asked in accordance with Section 12 Sub-Section (a), the Employee can present this to the Inspector within 6 month from the date of the deduction or from the date of the failure to render payment.</p> <p>13. (a) The Inspector shall issue a decree after reviewing the case presented in accordance with Section 12 Sub-Section (b).</p> <p>(b) Not only the Employee, but also the Employer, has 30 days to appeal to the Chief of Inspector if they are not satisfied with the order.</p> <p>(c) The Chief of Inspector shall decree after reviewing the appeal applied in accordance with Sub-Section (b).</p> <p>(d) The Chief of Inspector's decision will be the final decision</p>
		Chapter-8	<p>Project Proponent has to pay: Deals with penalties for violation of the law. The penalties range from:</p> <ul style="list-style-type: none"> - Imprisonment of no more than 3 months and fine not more than Ks 500,000. - Imprisonment of no more than 3 months and fine at least Ks 2,000,000. - Imprisonment of up to 6 months and fine at least Ks 5,000,000.
31	The Minimum Wage Law, 2013	Section-12:	<p>Project Proponent has to comply with: The employer:</p> <ul style="list-style-type: none"> (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;

			<p>(d) Shall pay the minimum wage to the workers working in the commercial, production and service business in cash. Moreover, if the specific benefits, interests or opportunities are to be paid, it may be paid in cash or partly in cash and partly in property, with prevailing regional price, jointly according to the desire of the worker;</p> <p>(e) In paying minimum wage to the workers working in the agricultural and livestock business, some cash and some property at prevailing regional price may be paid jointly according to local custom or desire of the majority of workers or collective agreement. Such payment shall be for any personal use and benefit of the worker and his family and the value shall also be considerable and fair.</p>
		Section-13:	<p>Project Proponent has to comply with:</p> <p>The employer:</p> <p>(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;</p> <p>(b) Shall prepare and maintain the lists, schedules, documents and wages of the workers correctly;</p> <p>(c) Shall report the lists, schedules and documents prepared and maintained under sub-Section (b) to the relevant department in accord with the stipulations;</p> <p>(d) Shall accept the inspection when summoned by the inspection officer. Moreover, he shall produce the said lists and documents upon asking to submit;</p>

			<p>(e) Shall allow the entry and inspection of the inspection officer to the commercial, production and service businesses, agricultural and livestock breeding workplaces and give necessary assistances;</p> <p>(f) If the workers cannot work due to sickness, shall give them holiday for medical treatment in accord with the stipulations;</p> <p>(g) If the funeral matter of the member of the family of worker or his parent occurs, shall give holiday without deducting from the minimum wage, in accord with the stipulations.</p>
		Section-18:	<p>Project Proponent has to comply with:</p> <p>The inspection officer:</p> <p>(a) Has the right to enter and inspect the relevant commercial, production and service workplaces, agricultural and livestock breeding workplaces and inspect whether or not they comply with and carry out in accord with the rules, notifications, orders, directives and procedures under this Law, whether or not the lists, schedules and documents, wages relating to the workers are prepared correctly, and whether or not such lists, schedules and documents are reported to the Department in accord with the stipulations;</p> <p>(b) May summon, inspect the relevant persons under the assignment of duty by the Department, asking and copying for the relevant lists, schedules and documents.</p> <p>(c) If there are outside workers at employer, has the right to inspect information relating to such outside workers, their names and addresses and the right to ask for and copy their lists and documents and lists relating to minimum wage;</p>

			<p>(d) In carrying out under sub-section (a), (b) and (c) relating to inspection, if required by the employer to produce the document, shall show the civil service identify card issued by the relevant department;</p> <p>(e) Report to the Department in accord with the stipulations relating to the finding under sub-sections (a), (b) and (c), and documents and papers called for.</p>
32	The Control of Smoking and Consumption of Tobacco Product Law, 2016	Section-9:	<p>Project Proponent has to comply with: The person in charge at the factory shall:-</p> <p>(a) Keep the caption and mark referring that it is a non-smoking area the place mentioned.</p>
		Section-6:	<p>Project Proponent has to comply with: In accordance with stipulation.</p> <p>(b) Arrange the specific place where smoking is allowed as mentioned in section-7 and keep the caption and mark also referring that it is a specific place where smoking is allowed, in accordance with the stipulation</p> <p>(c) Supervise and carry out measures so that no one shall smoke at the non-smoking area.</p> <p>(d) Accept the inspection when the supervisory body comes to the place for which he is responsible.</p>
33	Public Health Law, 1972	Section-3:	<p>Project Proponent has to comply with: The company shall cooperate with the authorized person or organization in line with the law and shall abide by any instruction or stipulation for public health.</p>

		Section-5:	Project Proponent has to comply with: The company shall accept any inspection anytime and anywhere if it is needed.
34	Occupational Health and Safety Law, 2019	Section-12:	Project Proponent has to comply with: The Employer shall, in accordance with the stipulations of the Ministry: (a) appoint the Person In-charge for Occupational Safety and Health to closely supervise safety and health of Workers in line with the type of Industry/Business; and (b) form the respective Occupational Safety and Health Committee in line with the type of Industry/Business comprising equal number of Employer and Worker representatives to become safe and healthy Workplace on condition that the number of Workers in his/her Industry/Business exceeds the number determined by the Ministry for that purpose. The Occupational Safety and Health of female Workers shall be considered according to the nature of Industry/Business when forming such Occupational Safety and Health Committee.
		Section-14:	Project Proponent has to comply with: Persons In-charge for Occupational Safety and Health shall comply with this Law and rules, orders, directives and procedures made under this Law to make the Workplace to be a safe Workplace that is good for health.
		Section-16:	Project Proponent has to comply with: Inspection Officers shall enter the Workplaces to which this Law applies and inspect Occupational Safety and Health conditions and direct Employers for their compliance and report the findings to the Chief Inspection Officer.

		Section-17:	<p>Project Proponent has to comply with:</p> <p>Inspection Officers have the powers to perform the following for Occupational Safety and Health in accordance with their codes of conduct:-</p> <ul style="list-style-type: none"> (a) the power to enter, inspect and inquire at any Workplaces related to this Law at any time by showing the Inspection Officer's identity without warrant; (b) the power to look at, make copies of and seize as evidence as required documents and records in connection with Workplaces and Processes; (c) the power to take photos and record videos in connection with Workplaces and Processes that may be harmful to Occupational Safety and Health; (d) the power to assess and measure and take records of the extent of impairment and duration caused to the environment of the Workplace due to loudness, light, heat, coldness, particles, gas and Hazardous Materials, and obtain the assistance of the expert in the relevant field of study if required; (e) the power to inquire of any person in the Workplace during working hours with the assistance of the Recognised Doctor to check any conditions that put or are likely to put Workers in contact with Occupational Disease; and (f) the power to require responsible persons at clinics or hospitals to deliver, with the stipulated security grade, medical treatment records of the Worker who is under treatment or information relating to death due to Occupational Accident or Occupational Disease, or autopsy results asked by the Department in the stipulated form.
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		Section-18:	<p>Project Proponent has to comply with:</p> <p>Inspection Officers shall, with the approval of the Chief Inspection Officer, order the Employer to temporarily close a whole or part of the Workplace, and notify the relevant Departments if required, if they believe that an Occupational Accident, Occupational Disease, Hazardous Event or Major and Serious Occupational Accident occurs or is likely to occur because:</p> <ul style="list-style-type: none"> (a) it is not appropriate to continue doing the Industry/Business due to dangerous Workplace condition, or unsafe operation carried by Workers, or existence of Hazardous Materials and Hazardous Machines, or layout and function of Workplace, part of the machine or equipment; (b) it is not appropriate to continue doing the Industry/Business due to breach or incompliance with any of the provisions of this Law; (c) it deems that Workers in the Workplace are in danger due to acts, omissions, negligence or carelessness; or (d) it needs to evacuate Workers from hazards because an Occupational Accident or accident is about to occur.
		Section-26:	<p>Project Proponent has to comply with:</p> <p>The Employer shall be responsible to: -</p> <ul style="list-style-type: none"> (a) arrange as required to assess the risks of Workplace, Process and machines and materials used thereat; (b) arrange as required to assess the likelihood of occurrence of hazards at the Workplace and to the environment;

			<ul style="list-style-type: none"> (c) arrange to have Workers medical checked-up by the Recognized Doctor in accordance with stipulations whether they suffer from any Occupational Disease; (d) arrange to improve the Workplace until it is safe and good for health based on the findings as per sub-sections (a), (b) and (c) (e) provide Workers with sufficient number of personal protective clothing, materials and facilities prescribed and approved by the Department on free of charge basis and cause Workers to wear them while working; (f) prescribe precautionary plans and plans for emergency; (g) provide a clinic, appoint the Registered Doctors and nurses and provide medicines and supporting equipment for any Industry/Business where the number of Workers is not less than the number determined by the Ministry; (h) make necessary arrangements for managers, Workers and members of the Occupational Safety and Health Committee including (Employer) himself/herself to attend Occupational Safety and Health training courses stipulated by the Ministry in accordance with their departments or types of work; (i) make necessary arrangements to enable immediate reporting to the Person In-charge for Occupational Safety and Health or manager in case where a Worker suffers an Occupational Accident or his/her life or health is likely to be in danger; (j) arrange to prevent any persons in the Workplace from Occupational Safety and Health risks occurred due to materials, machines or wastes used in the Workplace or Process;
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			<ul style="list-style-type: none"> (k) immediately stop the Process, evacuate Workers and conduct necessary rescue plans if any Occupational Accident is about to occur. If possible, Workers will be relocated to another appropriate safe Workplaces; (l) display Occupational Safety and Health instructions, danger signs, notices, posters and signage for directions in accordance with stipulations; (m) arrange to be complied with precautions when entering restricted hazardous Workplaces; (n) arrange to disseminate Occupational Safety and Health manuals and guidelines issued by the relevant Ministries for knowledge, technology, information and skills not only to Workers but also to related persons or raise their awareness or knowledge thereof; (o) lay down the fire safety plan, perform fire drilling and train Workers to use fire extinguishers systematically; (p) allow the Chief Inspection Officer and Inspection Officers to enter Workplaces, inquire, request documents and information or seize exhibits; (q) cause Workers to work only for the specified working hours if they have to work in Hazardous Industry/Business and Workplace; and (r) Incur the expenses for Occupational Safety and Health matters.
		Section-27:	<p>Project Proponent has to comply with:</p> <p>No Employer shall dismiss or demote a Worker: -</p> <ul style="list-style-type: none"> (a) during any period before a medical certificate is issued by the Registered Doctor for occupational injury or by the Recognized Doctor for contact with Occupational Disease;

			<p>(b) because the said Worker has addressed a complaint for hazardous or health detrimental condition;</p> <p>(c) because the said Worker has conducted the responsibilities of Occupational Safety and Health Committee; or</p> <p>(d) because the said Worker has refused to work in any condition where an Occupational Accident or Occupational Disease is about to occur.</p>
		Section-34:	<p>Project Proponent has to comply with:</p> <p>The Employer is responsible to undertake the following in accordance with the stipulations: -</p> <p>(a) informing the Department in case of an Occupational Accident, Hazardous Event or Major and Serious Occupational Accident;</p> <p>(b) if a Worker is in contact with a stipulated Occupational Disease or contaminated or likely to be contaminated due to materials or Process used, sending a report to the Department together with a medical report prepared by the Recognized Doctor.</p>
		Section-36:	<p>Project Proponent has to comply with:</p> <p>(a) Inspection Officers must perform inspection as required if any Occupational Accident, Hazardous Event, Occupational Disease or Occupational Contamination breaks out.</p> <p>(b) No one shall, without consent of the Chief Inspection Officer, remove, conceal, add or change a whole or part of the materials, machines, equipment, layout, documents or signs relating to the occurrence of an Occupational Accident, Hazardous Event, Occupational Disease or Occupational Contamination.</p>

35	Prevention and Control of Communicable Diseases Law, 1995	Section-3:	<p>Project Proponent has to comply with:</p> <p>In order to prevent the outbreak of Communicable Diseases the Department of Health shall implement the following project activities.</p> <ul style="list-style-type: none"> (a) Immunization of children by injection or orally. (b) immunization of those who have attained majority, by injection or orally, when necessary; (c) carrying out health educative activities relating to Communicable Disease.
		Section-4:	<p>Project Proponent has to comply with:</p> <p>When a principal epidemic disease of a notifiable disease occurs:-</p> <ul style="list-style-type: none"> (a) Immunization and other necessary measures shall be undertaken by the Department of Health, in order to control the spread thereof (b) The public shall abide by the measures undertaken by the Department of Health under sub-section (a)
		Section-9:	<p>Project Proponent has to comply with:</p> <p>The head of the household or any member of the household shall report immediately to the nearest health department or hospital when any of the following events occur:-</p> <ul style="list-style-type: none"> (a) Rat fall (b) Outbreak of a principal epidemic disease (c) Outbreak of a noticeable disease

		Section-11:	Project Proponent has to comply with: In order to prevent and control the spread of a principal 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 examination of stool, urine, sputum and blood sample to be carried out (d) Causing investigation by injection to be carried out (e) Carrying out any other investigation.
36	The Export and Import Law, 2012	Section-6:	Project Proponent has to comply with: Without obtaining license, no person shall export or import the specific goods which is to obtain permission
		Section-7:	Project Proponent has to comply with: A person who obtain any license shall not violet the conditions contained in the license.
37	Highways Law, 2000	Section-7:	Project Proponent has to comply with: Whoever without the permission of the Public Works commits any of the following acts shall, on conviction, be punished with imprisonment for a term which may extend to 3 years or with fine or with both:- (b) constructing the building within the boundary of the highway
		Section-8:	Project Proponent has to comply with: 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:- (b) planting, cutting or destroying tree or crops within the boundary of the highway without permission of Public Works

		Section-9:	Project Proponent has to comply with: Whoever commits any of the following acts shall, on conviction, be punished with imprisonment for a term which may extend to 3 months or with fine or with both:- (b) setting up the signboard of advertisement within the boundary of high ways without permission of Public Works
38	Law on Standardization, 2014	Chapter (VI): Section-17:	Project Proponent has to comply with: A person desirous of obtaining certificate of certification shall apply to the department and organization which has obtained the accreditation.
		Chapter (VII): Taking Action by Committee Section-19:	Project Proponent has to comply with: The Committee may, if it is found out that holder of certificate of certification violates any term or condition contained in the relevant recommendation, pass any of the following administrative orders: (a) warning; (b) suspending the certificate of certification for limited period; (c) cancelling the certificate of certification
		Section-26:	Project Proponent has to comply with: If any person who obtained certificate of certification uses standardization mark on the product which is not in conformity with the relevant standard or relating to service shall be punished with imprisonment for a term not exceeding one year or with fine not more than one million Kyats or with both.

39	The Petroleum and Petroleum Products Law, 2017	Rule -9:	<p>Project Proponent has to comply with: The Ministry of Transport and communications shall carry out the following functions relating to any petroleum and petroleum products.</p> <p>(a) Issuing license to vehicles, vessels and barges that carry any petroleum and petroleum product.</p> <p>(c) Determine and supervision on ports for vessels and barges that carry out import, export and transport by water in accordance with procedures</p>
		Rule -10:	<p>Project Proponent has to comply with: The ministry shall:</p> <p>(a) Issue licence for the right to store for the storage tanks and warehouses</p> <p>(b) Issue transport permit for the vehicles, vessels and barges that shall carry any petroleum and petroleum product</p> <p>(d) If it occurs environmental impact, in carrying out petroleum and petroleum product business activities, taking action, as necessary in accordance with the existing laws of on-site inspection.</p> <p>(e) Determine 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.</p>
		Rule -11:	<p>Project Proponent has to comply with: On all receptacles containing any dangerous petroleum and petroleum product the warning sign of danger by stamping, embossing, painting, printing or any other means shall be expressed. If it is impossible to express as such, similar warning signs of the nature of danger of gasoline, spirit or petroleum shall be expressed in writing at the ostensible place in salient words or signs near the receptacle.</p>

		Rule -31:	<p>Project Proponent has to comply with:</p> <p>Any license:</p> <ul style="list-style-type: none"> (a) Shall not violet any prohibition contained in the rules, regulations, bye-laws, notifications, orders, directives, procedure and conditions or fail the duty to implement (c) Shall not import, transport, store, sell and distribute the dangerous petroleum and petroleum products or non-dangerous petroleum and petroleum product except by the means stipulated in the law (d) Shall not have the right to carry out without under taking the environmental impacts, in operating petroleum and petroleum product business activities.
40	Myanmar Companies Law, 2017		<p>Project Proponent has to comply with:</p> <p>457. General penalty provisions</p> <ul style="list-style-type: none"> (a) A person, including a company, who <ul style="list-style-type: none"> (i) does an act or thing that the person is forbidden to do by or under a provision of this Law; (ii) does not do an act or thing that the person is required or directed to do by or under a provision of this Law; or (iii) otherwise contravenes a provision of this Law; is guilty of an offence by virtue of this sub-section, unless that or another provision of this Law provides that the person is not guilty of an offence. (b) A person who is guilty of an offence against this Law, whether by virtue of sub-section (a) or otherwise, is punishable by a penalty not exceeding the penalty applicable to the offence.

			(c) Where a provision of this Law (other than this section) provides that the penalty applicable to a contravention of a particular provision of this Law is a specified penalty, pecuniary or otherwise, the penalty applicable to an offence constituted by a contravention of the particular provision is the specified penalty.
41	Vehicle Safety and Motor Vehicle Management Law, 2020	Section-9:	Project Proponent has to comply with: The ministry must implement the following will the approval of the Union Government. (a) designate and restrict the areas for the movement of vehicles used inside the nation.
		Section-12:	Project Proponent has to comply with: The ministry shall: (c) as regards initial motor vehicle registration, must issue the safety and environmental regulation, and standards.
		Section-14:	Project Proponent has to comply with: The power and responsibilities of the Directorate are as follows: (r) must designate motor vehicle speed on the roads used by public.
		Section-18:	Project Proponent has to comply with: The motor vehicle owner: (a) must maintain the motor vehicle in accordance with the standards fixe by the Directorate for safety driving.
		Section-81:	Project Proponent has to comply with: No one must not carry or transport dangerous goods without regulation or public areas.

42	Vehicle Safety and Motor Vehicle Management Rules, 2022		Project Proponent commits to comply with this rules: There are 16 chapters and 379 Rules in this Vehicle Safety and Motor Vehicle Management Rules, 2022. The project proponent will comply with this law; a leagl expert is hire to do all this works.
43	Industrial Use Explosive Substances, 2018	Section-6:	Project Proponent has to comply with: (c) In accordance with Section 6 (a) the inspector General, after receiving the directives from the said Ministry, shall inform the applicant to build the magazine on the site approved by the chief of staff (Army) office. The magazine must comply with all requirements.
		Section-13:	Project Proponent has to comply with: The license holder desirous of continual storage of explosives must apply to the Inspector General for extension of license 30 days before the end of the license period.
		Section-14:	Project Proponent has to comply with: (b) Upon finding that the application is in accordance with rules and regulations the Inspector General can extend the license with the approval of the Ministry.
		Section-15:	Project Proponent has to comply with: The license holder: (a) shall systematically store the explosives not more than the quantity approved. (b) must undergo the inspection by the Inspector General or inspection officer.

			<p>(c) in case loss, burn, explosive, damage of explosives and injuries or deaths of people must promptly report to the nearest Police Station and inform the Inspector General at the same time.</p> <p>(d) must pay for the license to the Directorate office according the rate fixed by the Ministry.</p>
		Section-16:	<p>Project Proponent has to comply with: The license holder:</p> <p>(a) must store the explosives only in the licensed magazine.</p> <p>(b) must prepare in advance for the safety transportation, manufacturing, use and keeping of explosives according to rules and regulations.</p>
		Section-18:	<p>Project Proponent has to comply with: The license holder must not refuse the inspection by the Inspector General or inspection officer.</p>
		Section-20:	<p>Project Proponent has to comply with: No one must not:</p> <p>(a) receive and store explosives in unlicensed magazine.</p> <p>(b) must not entrust and store explosive in unlicensed magazine.</p>
		Section-21:	<p>Project Proponent has to comply with: No license holder:</p> <p>(a) must not keep and store explosives more than the quantity approved.</p> <p>(b) in accordance with Section-15, subsection (c) in case of accident the license holder must not fail to report promptly to the nearest police station and the Inspector General at the same time. after the end of license period must not keep and store the explosives without extension of the license period.</p>

44	The Explosive Substances Act, 1908	Section-3:	<p>Project Proponent has to comply with:</p> <p>Any person who unlawfully and maliciously causes by any explosive substance an explosion of a nature likely to endanger life or to cause serious injury to property shall, whether any injury to person or property has been actually caused or not, be punished with transportation for life or any shorter term, to which fine may be added, or with imprisonment for a term which may extend to ten years, to which fine may be added.</p>
		Section-4:	<p>Project Proponent has to comply with:</p> <p>Any person who unlawfully and maliciously-</p> <ul style="list-style-type: none"> (a) does any act with intent to cause by an explosive substance, or conspires to cause by an explosive substance, an explosion in the Union of Burma of a nature likely to endanger life or to cause serious injury to property; or (b) makes or has in his possession or under his control any explosive substance with intent by means thereof to endanger life, or cause serious injury to property in the Union of Burma, or to enable any other person by means thereof to endanger life or cause serious injury to property in the Union of Burma; <p>Shall, whether any explosion does or does not take place and whether any injury to person or property has been actually caused or not, be punished with transportation for a term which may extend to twenty years, to which fine may be added, or with imprisonment for a term which may extend to seven years, to which fine may be added.</p>

		Section-5:	<p>Project Proponent has to comply with:</p> <p>Any person who makes or knowingly has in his possession or under his control any explosive substance, under such circumstances as to give rise to a reasonable suspicion that he is not making it or does not have it in his possession or under his control for a lawful object, shall, unless he can show that he made it or had it in his possession or under his control for a lawful object, be punishable with transportation for a term which may extend to fourteen years, to which fine may be added, or with imprisonment for a term which may extend to five years, to which fine may be added.</p>
45	The Conservation of Water Resources and Rivers Rule, 2013	Rule-8: Chapter-3,	<p>Project Proponent has to comply with:</p> <p><u>Protection of water pollution and conservation of environment</u></p> <p>No one:</p> <ul style="list-style-type: none"> (a) must not pollute the river water by dumping hazardous substance into the water (b) must not dump plastic bags, any plastic materials or nylon ropes into the water (c) must not construct latrine by the river side to prevent water pollution by human wastes (d) must not dump any human wastes, fuel oils, chemical toxic wastes into the water (e) all activities should be executed according to international standards.
		Rule-9:	<p>Project Proponent has to comply with:</p> <p>Anyone who has committed such an offence must pay for this to the Directorate</p>

		Rule-53: Chapter-11,	Project Proponent has to comply with: <u>Construction of buildings/structures on the river bank premise</u> Anyone who want to construct any buildings or structures near the river must obtain permit from the relevant Ministry and Directorate.
46	The Petroleum Rules, 1937	CHAPTER III Chapter III, Part I: Rule-24:	Project Proponent has to comply with: Prevention of accidents. — All due precautions shall be taken at all times to prevent accident by fire or explosion.
		Rule-25:	Project Proponent has to comply with: Prevention of escape of Petroleum. — All due precautions shall be taken at all times to prevent any escape of petroleum during transport especially into any drain, sewer, harbour, river or water course.
		Rule-26:	Project Proponent has to comply with: Empty receptacles. — All empty tanks or other receptacles which have contained class I petroleum or which have contained class II petroleum in bulk shall, except when they are opened for the purpose of cleaning them and rendering them free from petroleum vapour, be kept securely closed unless they have been thoroughly cleaned and freed from petroleum vapour.
		Part IV: Rule-63:	Project Proponent has to comply with: Prohibition of fires and smoking. — (1) No fire or other artificial light capable of igniting inflammable vapour shall be allowed on any vehicle containing petroleum in bulk. (2) No person shall smoke while on or attending such a vehicle. (3) No article or substance capable of causing fire or explosion shall be carried on such a vehicle.

			<p>Explanation. — For the purposes of this rule any tank or other receptacle which has contained petroleum and which has not been thoroughly cleaned and freed from inflammable vapour shall be deemed to contain petroleum.</p>
		Rule-64:	<p>Project Proponent has to comply with:</p> <p>Filling and discharge of tanks. —</p> <p>(1) Tank-wagons, lorries or carts transporting petroleum shall only be filled or discharged by means of metal pipes or armoured hose in which the armouring is electrically continuous throughout.</p> <p>(2) Tanks, other than fuel tanks on vehicles, containing Class - I petroleum shall not be filled or discharged—</p> <p>(i) within 30 meters of any fire, furnace or artificial light capable of igniting inflammable vapour ; or</p> <p>(ii) at any place where the lorry, wagon or cart is exposed to sparks:</p> <p>Provided that the distance specified in clause (i) may be reduced to 9 meters when the petroleum is filled or discharged under seal and closed vapour return pipe lines are provided:</p> <p>Provided further that the distance specified in clause (i) may be reduced to the figure 4 meters prescribed in the licence in Form K where the petroleum is filled, stored and discharged into a tank in any premises licensed in that Form.</p> <p>Explanation. — A pipe supplying liquid to a tank is “under seal” to the tank if it is screwed to the tank or otherwise attached so that no liquid or vapour can escape into the air except through an approved vent.</p>

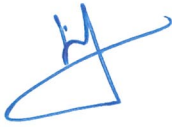
		Rule-65:	Project Proponent has to comply with: Means of extinguishing fire to be carried. — An adequate supply of dry sand or other efficient means of extinguishing fire shall be carried in an easily accessible position on every vehicle transporting petroleum in bulk by road.
		Rule-66:	Project Proponent has to comply with: Prohibition as to public service vehicles. — Petroleum shall not be transported on any public vehicles which is carrying passengers.
		Rule-67:	Project Proponent has to comply with: Vehicles to be constantly attended. — (1) Every vehicle while engaged in the transport of petroleum by road shall be constantly attended by at least one person: Provided that such vehicles may be left unattended in places previously approved by the Chief Inspector. (2) Every vehicle on which more than 4,500 litres of petroleum is being transported by road, or which while transporting any petroleum by road is being trailed by another vehicle, shall so long as it is in motion, be attended by at least two persons.
		Rule-77:	Project Proponent has to comply with: Approval of vehicles for transport in bulk necessary. — (1) Petroleum in bulk shall not be transported by land except under a licence granted under these rule in a vehicle of a type approved in writing by the Chief Inspector. (2) All such vehicles other than those exclusively used for the transport of class III petroleum shall have a stamped, embossed, painted or printed warning exhibiting in conspicuous characters the words “Petrol”, “Motor Spirit”, “Kerosene” or an equivalent warning of the nature of the contents. (3) Every such vehicle and its fittings shall be maintained in good condition.

		<p>CHAPTER IV Storage of Petroleum Requiring License</p>	<p>Project Proponent has to comply with:</p> <p>91. <i>Precautions against fire.</i> –</p> <p>(1) No person shall smoke in any installation or storage shed.</p> <p>(2) No person shall carry matches, fuses or other appliance for producing ignition or explosion in any installation or storage shed which is used for the storage of dangerous petroleum.</p> <p>(3) No fire, furnace or other source of heat or light capable of igniting inflammable vapour shall be allowed in any licensed installation or storage shed save in places specially authorized by the licensing authority for the purpose.</p> <p>(4) An adequate supply of dry sand or earth together with the necessary implements for its convenient application, or other efficient means of extinguishing petroleum fires, shall always be kept in every installation and in or adjacent to every storage shed.</p>
			<p>Project Proponent has to comply with:</p> <p>95. <i>Exclusion of unauthorized persons.</i> –</p> <p>(1) Every installation shall be surrounded by a wall or fence of at least six feet in height:</p> <p>Provided that nothing in this sub-rule shall apply to an installation licensed under the rules in force immediately before these rules come into operation unless its fencing is considered by the licensing authority to be unsatisfactory:</p> <p>Provided further that the Chief Inspector may waive this sub-rule in the case of an installation connected with a pump outfit and floating storage barges, under such conditions as he deems necessary.</p> <p>(2) Precaution shall be taken to prevent unauthorized persons from having access to any storage shed or installation.</p>

			<p>Project Proponent has to comply with:</p> <p>100. Construction of tank. – Every tank or other receptacle used for the storage of petroleum in bulk other than well-head tank shall be constructed of iron or steel properly erected and designed according to sound engineering practice and, together with all pipes and fittings shall be so constructed and maintained as to prevent any leakage of petroleum.</p>
			<p>Project Proponent has to comply with:</p> <p>102. Earthing of tanks. – All tanks or other receptacles for the storage of petroleum in bulk other than well-head tank or tanks for receptacles of less than 10,000 gallons capacity containing heavy petroleum shall be electrically connected with the earth in an efficient manner by means of not less than two separate and distinct connections placed at opposite extremities of such tank or receptacles. The roof and all metal connections of such tank or receptacle shall be in efficient electrical contact with the body of such tank or receptacle.</p>
47	Law Relating to Aquaculture, 1989	Section 29:	<p>Project Proponent has to comply with:</p> <p>No person shall do the following:</p> <p>(b) Obstructing navigation and flowing of water or polluting of the water within the fisheries water or abetting such acts</p>
48	Fresh Water Fisheries Law, 1991	Section-40:	<p>Project Proponent has to comply with:</p> <p>No one shall cause harassment of fish and other aquatic organisms or pollution of water in a fresh water fisheries water.</p>

Commitment

Than Daung Oo Co., Ltd will comply with the above- mentioned laws, rules, regulation, particularly, the relevant section/subsection excerpted and reproduced above.

A handwritten signature in blue ink, consisting of a stylized, cursive script that is difficult to decipher but appears to be the name of the signatory.

U Sein Myo Aung
Executive Director
Than Daung Oo Co., Ltd

3.2.2 International conventions treaties and agreement (concerning environmental affairs)

Myanmar has either signed or ratified no less than thirty treaties, conventions and protocols concerning environment, it is learnt.

Some of the regional conventions or protocols signed or ratified by Myanmar are:

- (i) ASEAN Agreement on Conservation of Nature and Natural Resources. Kuala Lumpur, 1985
- (ii) Agreement on Aquatic Centre in Asia and Pacific Bangkok, 1988
- (iii) ASEAN Agreement on Tran-boundary Haze Pollution, 2002
- (iv) Establishment of ASEAN Regional Centre for Biodiversity, 2005

Some of the international conventions and protocol which are of importance are:

- (i) Convention on Wetlands of internationally importance, RAMSAR 1971 and amended, 1987
- (ii) Convention for the protection of World Culture and National Heritages. Paris, 1972.
- (iii) Convention on International trade in Endangered Species of wild Fauna and Flora. Washington, 1973, and amended, Bonn, 1979.
- (iv) Convention on conservation of migratory species of wild animals. Bern, 1983.
- (v) Vienna convention for the protection of Ozone Layer. Vienna, 1985.
- (vi) Convention on Biological Diversity. Rio-de-Janero, 1992
- (vii) U N Frame work Convention on Climate Change, 1992.
- (viii) Kyoto Protocol on the frame work convention on climate change. Kyoto, 1998
- (ix) Protocol on Bio safety. Cartagena, 2000
- (x) Convention on Persistent Organic Pollution (POP). Stockholm, 2004
- (xi) UN Climate Change Conference, COP 21 (conference of the parties) 21, Paris, 2015
- (xii) UN Climate change conference, COP 22, Marrakesh, 2016
- (xiii) UN Climate change Conference, COP 23, Colombo, 2017
- (xiv) UN Climate change Conference, COP 24, Katowice, 2018
- (xv) UN Climate change Conference, COP 25, Madrid, 2019
- (xvi) UN Climate change Conference, COP 26, Glasgow, 2021
- (xvii) UN Climate change Conference, COP 27, Sharm el-sheik, 2022
- (xviii) UN Climate Change Conference, COP 28, Dubai, 2023

3.2.3 National and international standards and guideline

I. National Environmental Quality Guideline by Environmental Conservation Department (ECD)

(a) Air quality and emission

Than Daung Oo Co., Ltd will follow the general National Environmental Quality guideline values for air emission as prescribed by the Environmental Conservation Department (from Notification No.615/2015, December 2015, by ECD, then under the Ministry of Environmental Conservation and Forestry (MOECAAF), now MONREC, Code No. 1.1.

Parameter	Averaging Period	Guideline Value $\mu\text{g}/\text{m}^3$
Nitrogen dioxide	1-year	40
	1-hour	200
Ozone	8-hour daily maximum	100
Particulate matter PM ₁₀ ^a	1-year	20
	24-hour	50
Particulate matter PM _{2.5} ^b	1-year	10
	24-hour	25
Sulfur dioxide	24-hour	20
	10-minute	500

^a Particulate matter 10 micrometers or less in diameter

^b Particulate matter 2.5 micrometers or less in diameter

(b) Effluent

Than Daung Oo Co., Ltd will follow the National Environmental Quality sugar manufacturing guideline values for effluent levels (Notification No.615/2015, December 2015, by ECD, MOECAAF), Code No. 2.3.1.7.

Effluent levels

Parameter	Unit	Guideline value
5 day biochemical oxygen demand	mg/l	50
Active ingredients/Antibiotics	To be determined on a case specific basis	
Biocides	mg/l	0.05
Chemical oxygen demand	mg/l	250
Oil and grease	mg/l	10
pH	S.U. ^a	6-9
Temperature increase	°C	<3 ^b
Total coliform bacteria	100 ml	400
Total nitrogen	mg/l	10
Total phosphorus	mg/l	2
Total suspended solids	mg/l	50

^a Standard unit

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

National Drinking Water Quality Standard (2019)

Parameters	Unit	Standard values*	WHO Guideline Values [□]
Total Coliforms	Acceptable/No objectionable	3	None specified (recommended median value – 0 per 100 ml)
Fecal Coliforms	Acceptable/No objectionable	0	Must not be detectable in any 100 ml sample (recommended median value - 0 per 100 ml)
Taste	Acceptable/No objectionable taste		Non set (recommended median value - 3 DN)
Odor	Acceptable/No objectionable odor		Non set (recommended median value - 3 DN)
Color	True Color Unit (TCU)	15	Non set (recommended median value - 15)
Turbidity	Nephelometric Turbidity Unit (NTU)	5	Non set (recommended median value - 5)

Arsenic	mg/L	0.05	0.01 mg/l
Lead	mg/L	0.01	0.01 mg/l
Nitrate	mg/L	50	50 mg/l
Manganese	mg/L	0.4	0.4 mg/l
Chloride	mg/L	250	Non set (recommended median value - 250)
Hardness	mg/L as CaCO ₃	500	Non set (recommended median value - 500)
Iron	mg/L	1	Non set (recommended median value – 0.3)
pH	-	6.5 to 8.5	Non set (recommended median value - 6.5 to 8.5)
Sulphate	mg/L	250	Non set (recommended median value - 250)
Total Dissolved Solid (TDS)	mg/L	1,000	Non set (recommended median value - 1,000)

(c) Noise level

The National Environmental Quality general guideline for noise (from Notification No.615/2015, December 2015, by MOECAP), code No.1.3.

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

(d) Odour

Guideline standard for odorant unit is between 5 and 10.

II. International standards and guideline

(a) For sugar manufacturing

- 1) Aspects of Occupational Health in the sugar cane industry. <https://www.ncbi-nim-nih.gov>>
- 2) CEFS (European committee for sugar manufactures). 2001. Guide to establishing BAT in sugar industry.
- 3) Hazards of sugar factory. <https://rishumancon.com>tag>hazards>
- 4) IFC. EHS guidelines for sugar manufacturing, April, 2007.
- 5) ILO Standard on occupational safety and health (OSH). <ilo.org.global>standards>
- 6) N.S.W. Sugar milling, waste minimization and energy efficiency. <http://www.deh.gov.au/settlement/industry/nswsugar.html>
- 7) Phosphoric Acid (H_3PO_4) dosing in sugar industry. <www.sugarprocesstech.com>phosphoric>
- 8) Production of milk of lime for sugar cane industry. <https://www.researchgate.net>publication>
- 9) Queen land Government. HS code for sugar industry. <http://www.dir.gov.au/workplace/law/code/sugar>
- 10) Sugar mill safety. <http://www.worksafe.qd.gov.an>>
- 11) Sugar production. <www.carmeuse.agriculture.com>sugar>
- 12) Sugar cane process waste. <http://www.jstor.org>stable>
- 13) Sulphitation in white sugar manufacture. <https://archive.org>stream>
- 14) To ward sustainable decommissioning. <sitercourse.worldbante.org>resources>
- 15) Decommissioning process guide. <http://its.edu>--->archive>
- 16) Decommissioning Phase procedure HUD. <http://www.hud.gov>

(b) For sugar factory structural integrity

- 1) Building and Engineering work. <www.iso.org>iso>catalogue>
- 2) ISO.91. Construction materials and building. <https://www.iso.org>ics>
- 3) Guidelines for structural engineering. <https://www.bca.gov.sg>other>psi>
- 4) IBC. International building code.
- 5) IFC Construction and infrastructure guideline. <www.ifc.org>wps>wcm>connect>

The above-mentioned standards and guidelines are intended for both developed and developing countries. Than Daung Oo Co., Ltd will do its best to follow these guidelines and standards as practical as possible.

3.3 Contractual and other commitments

Than Daung Oo Co., Ltd has contracted two construction companies, namely, Soe Tint Aung Industry (STI) company and Lin Zaw Aung company, for the construction of the prosed sugar factory.

Contracted agreement was signed between these two construction companies and Than Daung Oo Co., Ltd.

Construction has completed and the factory is already in operation.

Commitment made by the project proponent

- (a) First of all the project proponent declares that the information in the report is, to the best of its knowledge, true, accurate and complete.
- (b) The EIA report has been prepared in strict compliance with applicable laws, rules, regulations, guidelines and procedures.
- (c) The project proponent will at all times comply fully with the commitments, mitigation measures, and plans in the EIA Report. (Re: EIA Procedure; Notification No.616/2015; Section 62, a-c)


Than Daung Oo Co., Ltd commits to create a healthy and safe working place and working condition. First priority will be given to the Occupational Health and Safety of the workers and the Environmental, Health and Safety of all workers and the community. The Company will strictly follow the National Environmental Quality (air emission and effluent) Guidelines prescribed by ECD.

The company pledges not to pollute the air, water and land environment as practical as possible throughout the entire life of the project from the Construction Phase through the Operation Phase to the Decommissioning and Rehabilitation Phase. The Company will monitor and adopt suitable measures for environmental protection. And the company will follow all at the mitigation measures to be taken and the EMP implemented as prescribed in this EIA report.

The company is committed to the provision of adequate fund for implementation of all mitigation measures and execution of EMP. Moreover more staff/workers will be employed, where necessary, for the successful meaningful implement of mitigation measure and execution of EMP.

The company is committed to the promise of adequate fund for implementation of all mitigation measures and execution of ESMP. Moreover more staff/workers will be employed, where necessary for the successful and meaningful implement of mitigation measure and execution of ESMP.

The company pledges to spend 2% of its net profit for the implementation of CSR. The company has already spent about Kyats 1,002,148,615 for CSR programme (See ANNEX). The company will continue to implement the CSR programme and also continue its donation and charity works for community assistance and community development.



U Sein Myo Aung

Executive Director

Than Daung Oo Co., Ltd

Commitment made by the consultant firm, MESC

The consultant firm, Myanmar Environment Sustainable Conservation (MESC) declares that the information submitted in this EIA report is, to the best of its knowledge, true and accurate up to the date of submitting of this report.

The report has been prescribed by MESC with utmost effort with all reasonable skills, care and diligence within the term of contract with the client (Than Daung Oo Co., Ltd). Recommendations are based on the experiences of its members applying internationally accepted practices, using professional judgement and based on the available information.

Above all, the preparation of this report strictly followed the environmental regulation and guidelines set up, and particularly the format for EMP laid down, by the Environmental Conservation Department (ECD) of the Ministry of Natural Resources and Environmental Conservation (MONREC). (Environmental Impact Assessment Procedure. Notification Number.616/2015, 29-12-2015)

The report is strictly confidential between Than Daung Oo Company Limited and the consultant firm, MESC, until it is submitted to the authorities concerned.



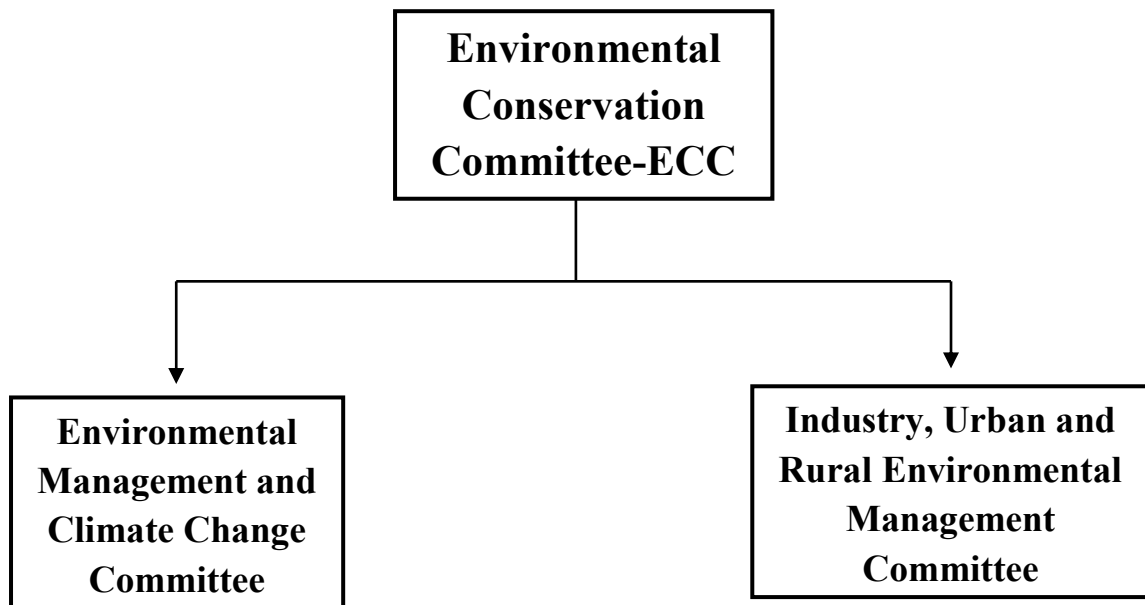
U Myint Kyaw Thura,
Managing Director

Myanmar Environment Sustainable Conservation
(MESC)

3.4 Myanmar Government Institutional Frame Work

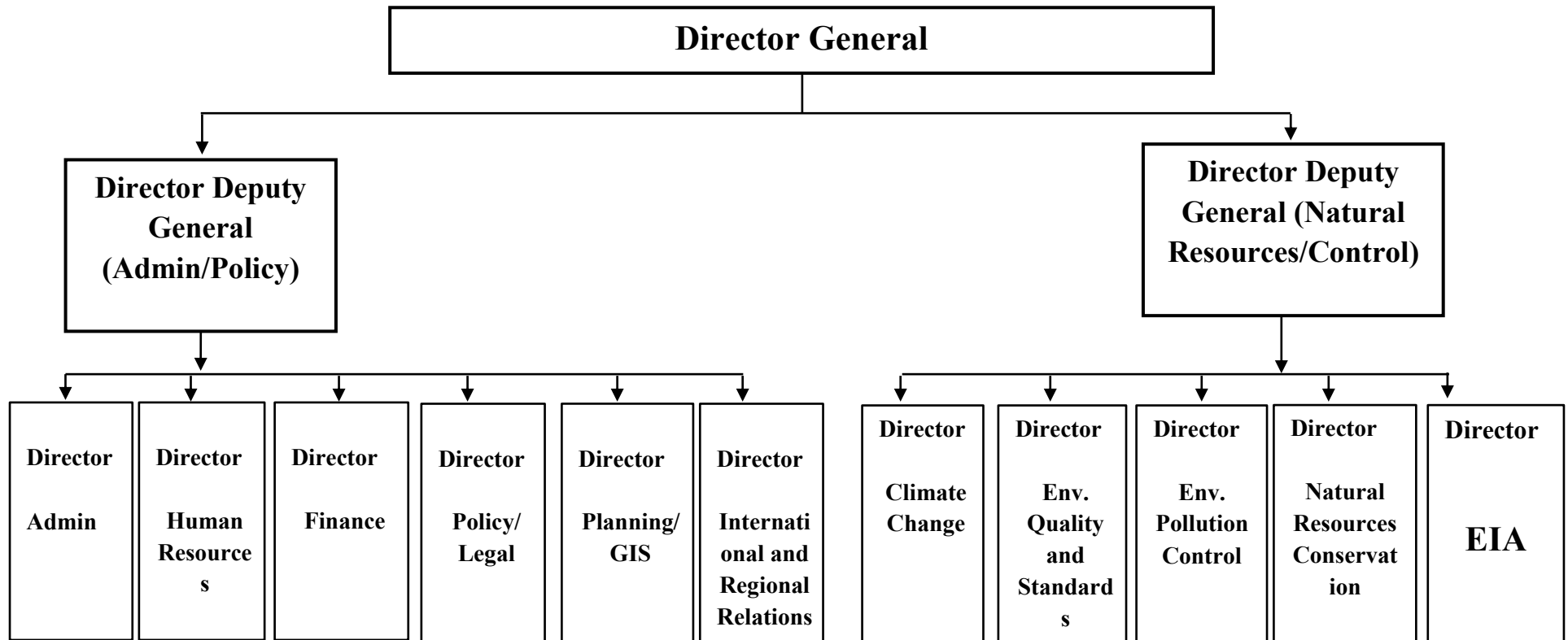
The National Environmental Conservation Committee (NECC) was formed in 2011 with the aim to achieve sound environmental management in the country. It is enlarged and reorganized as National Environmental Conservation and Climate Change Central Committee (NECCCCC).

Later the Environmental Conservation Committee- ECC was formed in 2021. The institutional organization of ECC is as follow:



Institutional organization of ECD

ECD is a major department under MONREC and is headed by a director general. Under the Director General are one Deputy Director General and 4 Directors at the directorate. ECD is the focal and coordinating agency for the overall environmental management of the country. It is also directly responsible for all the management of IEE, EIA, EMP etc. activities taking places all over the country.



These eleven departments are each headed by a director.

The main tasks of ECD include:

- implementing environmental conservation policy
- designing and implementing monitoring programmes
- prescribing environmental quality standards and,
- conducting activities relating to waste management and conducting environmental impacts assessments

Environmental Conservation Departments at States and Regional levels under the Directorate were established in all the 14 States and Regions of the nation. At each State/Region level there are one Director, one Deputy Director and four Assistance Director. This will surely greatly enhance the conservation of the environment and especially the management of the environment of the country.

Institutional Arrangement of Than Daung Oo Co., Ltd

Institutional Arrangement (staff organization) of the company is depicted.

Sr.No	Designation	Number of employee	Monthly salaries (Ks)
1	Factory General Manager	1 Person	Ks 1,170,000
2	Technician	1 Person	Ks 1,220,000
3	Depute FGM	2 Persons	Ks 1,000,000
4	Regional Communication Manager	1 Person	Ks 1,000,000
5	Head of Department	1 Person	Ks 770,000
6	Section Head	1 Person	Ks 645,000
7	Asst; Section Head	4 Persons	Ks 520,00
8	Executive	11 Persons	Ks 450,000
9	Supervisor	16 Persons	Ks 237,500
10	Asst; Shift Leader	13 Persons	Ks 215,000
11	Shift Leader	16 Persons	Ks 190,000
12	Skill Worker 1	40 Persons	Ks 165,000
13	Skill Worker 2	110 Persons	Ks 155,000
14	Skill Worker 3	164 Persons	Ks 145,000
15	Translator	3 Persons	Ks 190,000
16	Chief	6 Persons	Ks 145,000
17	Regional Communication Helper	1 Person	Ks 300,000
	Total	391 Persons	
	Daily Wages Total	98 Persons	
	Chinese Experts/Technicians	35 Persons	
	Grand Total	524 Persons	

Note – 35 foreign experts/technicians are temporary staffs who are involved in procurement of machinery/equipment, installation of machinery/equipment, providing training and maintenance works.

3.5 Project environmental and social standards

The International Finance Corporation (IFC) has developed a policy on Environmental and Social Sustainability (2012). That includes eight Environmental and Social Performance standards for a big company to do business in a new area. There are:

(1) Assessment and Management of Environmental and Social Risks and Impacts

- identify and evaluate environmental and social risks and impacts of the project
- adopt mitigation measures to avoid, or if avoidance is not possible, minimize or mitigate the impact; compensate for the impacts on people and on the environment
- promote improved environmental and social performance through the effective use of management system
- ensure that grievances from the effected people are responded and managed appropriately
- promote and provide means for adequate engagement with the community throughout the project period

(2) Labour and Working Conditions

- promote the fair treatment, non-discrimination and equal opportunity of workers
- establish, maintain and improve the worker-management relationship
- promote compliance with national employment and labour laws
- promote safe and healthy working conditions and the health of workers
- avoid the use of forced labour and child labour

(3) Resource Efficiency and Pollution Prevention

- avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities
- promote more sustainable use of resources, including energy and water
- reduce project-related GHG emissions

(4) Community Health, Safety and Security

- avoid adverse impact on the health and safety of the community during the project life
- ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimizes risks to the community

(5) Land Acquisition and Involuntary Resettlement

- avoid, and when avoidance is not possible, minimize displacement by exploring alternative project designs
- avoid forced eviction
- avoid, or where avoidance is not possible, minimize social and economic impacts from land acquisition or restriction on land use by
 - (iii) providing compensation for loss of assets at replacement cost (value of asset plus transaction costs), and
 - (iv) ensure that resettlement activities are implemented with appropriate disclosure of information, consultation and the informed participation of those effected
- improve or restore, the livelihoods and standards of living of displaced persons

(6) Biodiversity Conservation and Sustainable Management of living Natural Resources

- protect and conserve biodiversity
- maintain the benefits from ecosystem services
- promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities

(7) Ethnic Peoples

- ensure that the development process fosters full respect for the human rights, dignity, aspirations, culture, and natural resource-based livelihoods of ethnic peoples
- avoid adverse impacts of project on ethnic people, or when avoidance is not possible, minimize and/or compensate for such impacts
- promote sustainable development benefits and opportunities for ethnic people in a culturally appropriate manner
- establish and maintain an ongoing relationship with these people throughout the project period
- respect and preserve the culture, knowledge and practices of ethnic peoples

(8) Cultural Heritage

- protect cultural heritage from the adverse impacts of project activities and support its preservation
- promote the equitable sharing of benefits from the use of cultural heritage

3.6 Health standards for projects with health impacts

In implementation of sugar factory project there can be impacts such as the issues of accidents and injuries at the factory. IFC has set up Environmental Health and Safety (EHS) guidelines for the operation of sugar factories and most of all these guidelines are reproduced in this report. IFC has also set up EHS general guidelines that encompass Environmental Health and Safety (EHS) as well as Occupational Health and Safety (OHS) and Community Health and Safety (CHS).

Environmental Health and Safety (EHS) aspects

This main section includes:

- a) air emission and ambient air quality
- b) energy conservation
- c) waste water and ambient water quality
- d) water conservation
- e) hazardous materials management
- f) waste management
- g) noise management and
- h) contaminated land management

Occupation Health and Safety (OHS) aspects

The Occupation Health and Safety guideline by IFC encompasses:

- general facility design and operation
- physical hazards
- chemical hazards
- biological hazards
- radiological hazards
- Personal Protective Equipment (PPE)
- special hazard environments
- communication, training and monitoring

Community Health and Safety (CHS) aspects

The Community Health and Safety guideline by IFC encompasses:

- water quality and availability
- structural safety of project infrastructure
- life and fire safety L&FS
- traffic safety
- transport of hazardous materials and disease prevention
- emergency preparedness and response

3.6.1 Occupational Health and Safety (OHS) by ILO

OHS is defined by International Labour Organization (ILO) as:

- The science of the anticipation, recognition, evaluation and control of hazards arising in or from the work place that could impair the health and well-being of workers taking into account the possible impact on the surrounding communities and the general environment.

Some core principles of OHS

- All workers have rights and employers must ensure that:
 - work should take place in a safe and health working environment;
 - condition of work should be consistent with worker's well-being and human dignity;
- Occupational safety and health policy must be established
- Social partners (employers and employees) and other stakeholders must be consulted
- OHS programmes and policies must aim at both prevention and protection
- Continuous improvement of OHS must be promoted
- Health promotion is a central element of OHS practices
- Compensation, rehabilitation and curative services must be made available to workers who suffer occupational injuries, accidents and work related diseases
- Education and training are vital components of safe, healthy working environment
- OHS policy must be enforced

4. PROJECT DESCRIPTION AND ALTERNATIVE SELECTION

4.1 Background

The project proponent, Than Daung Oo Co., Ltd was registered as a company limited by share on 15-6-2018. (Document: Certificate of Incorporation No.233/2018-2019 (MDY); Directorate of Investment and Company Administration). The new registration number is 117800938.

The company has obtained the permit from Myanmar Investment Commission (MIC); permit number 209/2019; dated 27-11-2019. The company has also obtained the Certificate ISO 20000. (Certificate no. 23IFLN03.) and FDA certificate no. MM 23 M 11 00015.

The parent company is Ngwe Yi Pale Group of companies, which was registered, is 2014; Ngwe Yi Pale group of companies is involved in a variety of business such as cement production, sugar production, and mining, among others.

The project proponent, Than Daung Oo Co., Ltd has contracted the consultant firm, MESC for conducting EIA and preparation of EIA report for the operation of Than Daung Oo Sugar Factory, No.1.

In this project context sugar is manufactured by "press" or "Squeeze" method by pressing the juice of sugar cane with rollers and the subsequent boiling, clarification, evaporation and crystallization of juice to sugar.

4.2 Project location, overview map and layout maps

The Than Daung Oo Sugar Factory 1 is located near Hsen Taw village, Ko Hsaing village Tract area, Mong Yai Township, Lashio District, and Shan State.

The coordinate are: N. Lat. 22° 20' 42.37", E. Long. 97° 53' 51.47" and the elevation is 2790 feet above sea level.

The project site (factory site) is 0.5 mile north of Hsen Taw village and 1.8 miles north of Na Long village, (the only 2 villages in the area).

(It is 10 miles south west of Mong Yai Town and 43 miles south east of Lashio City; 119 miles north east of Mandalay City and 390 miles north east of Yangon City.

The project factory site has an area of 148 acres.

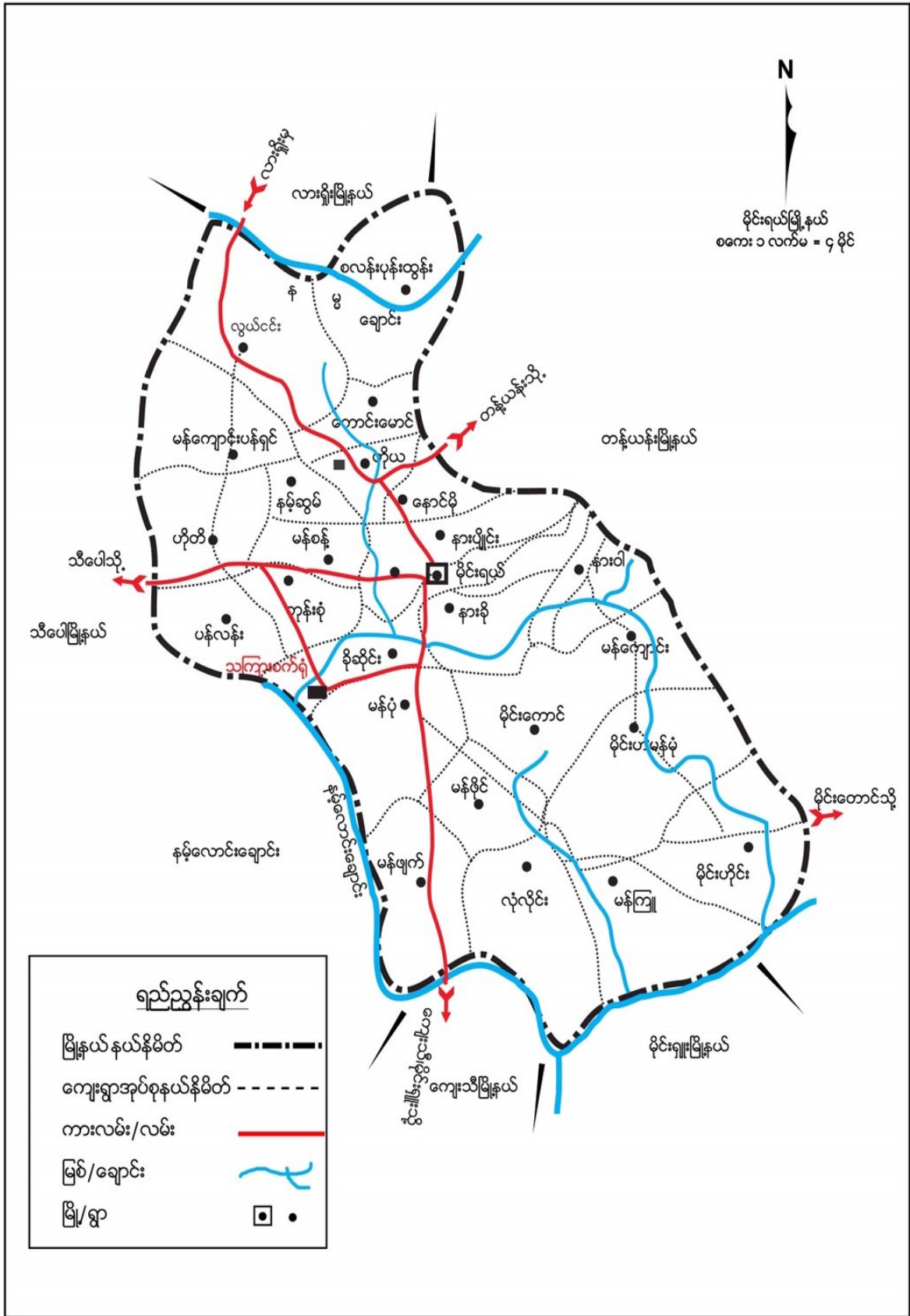


Figure-10: Map of Mong Yai Township showing sugar factory (black square)

ဤတိုင်းဒေသကြီး / ပြည်နယ်၊ ပြည်ထောင်စုနယ်မြေစီမံခန့်ခွဲရေးကော်မတီ
 ရာထူးသိမ်းနှုန်းကုန်ကြမ်းရာထူးသိမ်းနှုန်းတစ်နိုင်တစ်ပိုင်စိုက်ပျိုးမှုအတွက် လုပ်ပိုင်ခွင့်ပြုသော ခွင့်ပြုစီနံ

လုပ်ငန်းစာတွဲအမှတ် - / / - / (စိုက်ပျိုး/ မိုင်းရယ်) ခုနှစ်၊ မှတ်ပုံတင်စာရင်း
 စာအုပ်တွင် - ခုနှစ်၊ အမှတ်စဉ်- (လက်မှတ်) အဖြစ်ရေးသွင်းပြီး။

အောက်ပါဇယားတွင် ဖော်ပြသော စက ခန့်ရှိ မြေလွတ်၊ မြေလပ်နှင့် မြေရိုင်းကို
 ကျော့ဘက်တွင် ဖော်ပြထားသည့် စည်းကမ်းချက်များနှင့်အညီ ရန်ကုန် ပြည်နယ်/တိုင်းဒေသကြီး၊
 ကြည်မြစ်တိုင် မြို့နယ်၊ ရပ်ကွက်/ကျေးရွာနေ ဦးလှစ် ၏ သား/ သမီး ဦး/ဒေါ်/ အဖွဲ့အစည်း
 ဦးမြင့်အောင် အား ရာထူးသိမ်း(ကြံ) စိုက်ပျိုးရန် (မှ ထိ) နှစ်ပေါင်း() နှစ် လုပ်ပိုင်ခွင့်
 ပြုလိုက်သည်။

လုပ်ပိုင်ခွင့်ပြုသည့် မြေလွတ်၊ မြေလပ်နှင့် မြေရိုင်းများနှင့်စပ်လျဉ်းသည့်အချက်အလက်များ

 တိုင်းဒေသကြီး/ ပြည်နယ်၊ ခရိုင်၊ မိုင်းရယ် မြို့နယ်

ရပ်ကွက်/ ကျေးရွာအုပ်စု	ကွင်း		ဦးပိုင်/ မြေတွက် အမှတ်	ဧရိယာ		နယ်နိမိတ်
	အမှတ်	အမည်		ဧက	ဒဿ မ	
၁	၂	၃	၄	၅	၆	၇
မိုရိုင်း	0.5.5	ကြေးတိုင်ပြင်	-	၁၄၈	၀၀	*သက်သေခံမြေပုံတွင် ဖော်ပြထားသည့် အတိုင်း ဖြစ်ပါသည်။
			စုစုပေါင်း	၁၄၈	၀၀	

ဧရိယာမြေပုံတင်ထားပြီးသောစခန်း ဧရိယာအခြေခံအလံဖျိနိုင်ပါသည်

Figure-11: Document showing plot of land

စည်းကမ်းချက်များ

- ၁။ မည်သည့်သီးနှံစိုက်ပျိုးရန်အတွက် ရွာသီလီခုံ(ကြံ) ခွင့်ပြုခြင်း။
 လုပ်ကိုင်ခွင့်ပြုသည့် မြေလွတ် : ပထမနှစ် ၂၂၂၀ စက
 မြေလပ်၊ မြေရိုင်းစိုက်ထာအနက် : ဒုတိယနှစ် ၄၄၄၀ စက
 တစ်နှစ်လျှင်အနည်းဆုံးမည်မျှစိုက်ပျိုး : တတိယနှစ် ၄၄၄၀ စက
 လုပ်ကိုင်မည်ဟုသတ်မှတ်ခြင်း : စတုတ္ထနှစ် ၃၇၀၀ စက
- ၂။ ခွင့်ပြုထားသည့်မြေကို ရွာသီလီခုံ(ကြံ) စိုက်ပျိုးမှုအတွက်သာလျှင် အသုံးပြုရမည်။
 အခြားသီးနှံများအား ရွာသီလီခုံ(ကြံ) စိုက်ပျိုးအောင်မြင်မှုကို အနောက်အယုက် မြစ်ဖျာ သက်ဆိုင်ရာက
 ပြဌာန်းမှသာလျှင် စိုက်ပျိုးခွင့်ရှိသည်။
- ၃။ ခွင့်ပြုထားသည့်မြေကို သတ်မှတ်ထားသောလုပ်ငန်းမှအပ အခြားလုပ်ငန်းမလုပ်ကိုင်ရ။ အကယ်၍
 ပြောင်းလဲ လုပ်ကိုင်လိုလျှင် ကြိုတင်ခွင့်ပြုချက် ရယူရမည်။
- ၄။ သတ်မှတ်ထားသော အာမခံကြေးကို ပေးသွင်းရမည်။
- ၅။ မိမိလုပ်ကိုင်ခွင့်ရရှိထားသည့်မြေအတွက် သတ်မှတ်ထားသော မြေခွန်ကို သတ်မှတ် ကာလ အတွင်း
 အကျေ ပေးဆောင်ရမည်။
- ၆။ ခွင့်ပြုထားသည့်မြေပေါ်တွင် လုပ်ကိုင်ရမည့်လုပ်ငန်းကို သတ်မှတ်ထားသောအချိန်အတွင်း ပြီးစီး
 ဆောင်လုပ်ကိုင်ရမည်။ အကယ်၍ သတ်မှတ်ကာလအတွင်း မူလတင်ပြထားသော လုပ်ငန်း
 အစီအစဉ်အတိုင်း ဆောင်ရွက်ခြင်းမရှိပါက တင်သွင်းထားသော အာမခံကြေးကို နိုင်ငံတော်
 ဘဏ္ဍာငွေအဖြစ် လိုအပ်သလို သိမ်းယူခြင်းခံရမည့်အပြင် လုပ်ပိုင်ခွင့်၊ အသုံးပြုခွင့် ပေးထား
 သောမြေကို ပြန်လည်သိမ်းယူခြင်းခံရမည်။
- ၇။ ခွင့်ပြုထားသည့်မြေကို ပြည်ထောင်စုအစိုးရအဖွဲ့၏ ခွင့်ပြုချက်မရှိဘဲ ရောင်းချခြင်း၊ ပေါင်နှံခြင်း၊
 ပေးကမ်းခြင်း၊ အငှားချထားခြင်း၊ အခြားနည်းဖြင့်လွှဲပြောင်းခြင်း သို့မဟုတ် ခွဲစိတ်ခြင်း မပြုရ။
- ၈။ ခွင့်ပြုထားသည့်လုပ်ငန်းအမျိုးအစားနှင့် ယင်းနှင့်ဆက်သွယ်လျက်ရှိသော စီးပွားရေး လုပ်ငန်းကိုသာ
 လုပ်ကိုင်ရမည်။
- ၉။ ခွင့်ပြုချက်ရယူထားသော လုပ်ငန်းမှအပ မြေပေါ် မြေအောက်ရှိ အခြားသယံဇာတ ပစ္စည်း များကို
 ထုတ်ယူခြင်း မပြုရ။
- ၁၀။ ခွင့်ပြုထားသောမြေအတွင်း သယံဇာတပစ္စည်းများနှင့် ရှေးဟောင်းယာဉ်ကျေးမှုအမွေ အနှစ်
 များတွေ့ရှိ၍ ပြည်ထောင်စုအစိုးရအဖွဲ့က လိုအပ်လျှင် ခွင့်ပြုထားသောမြေအနက် လိုအပ်မည့်
 မြေဧရိယာကို ပြန်လည် သိမ်းယူသည့်အခါ ပြည်ထောင်စုအစိုးရ ညွှန်ကြားသည့်အတိုင်း ပြန်လည်
 အပ်နှံရမည်။
- ၁၁။ ခွင့်ပြုထားသောမြေအတွင်း နိုင်ငံတော်အကျိုးငှာ အခြေခံအဆောက်အအုံစီမံကိန်း သို့မဟုတ် အထူး
 စီမံကိန်းလုပ်ငန်းများ ဆောင်ရွက်ရန် လိုအပ်ခြင်းအတွက် ခွင့်ပြုထားသောမြေအနက် လိုအပ်မည့်
 မြေဧရိယာကို ပြန်လည်သိမ်းယူသည့်အခါ ပြည်ထောင်စုအစိုးရ ညွှန်ကြားသည့် အတိုင်း
 ပြန်လည်အပ်နှံရမည်။
- ၁၂။ မြေယာလုပ်ပိုင်ခွင့်၊ အသုံးပြုခွင့်ရရှိပြီးနောက် ဆက်လက်လုပ်ကိုင်အသုံးပြုနိုင်ခြင်း မရှိပါက
 စီမံခန့်ခွဲရေးကော်မတီ သို့ ပြန်လည်အပ်နှံရမည်။
- ၁၃။ ရွှေစီး တိုင်းဒေသကြီး/ပြည်နယ်၊ ပြည်ထောင်စုနယ်မြေစီမံခန့်ခွဲရေးကော်မတီ ၏(၂၄-၅-၂၀၁၉) ရက်နေ့
 အစည်းအဝေးအမှတ်စဉ် (၄/၂၀၁၉)၊ ဆုံးဖြတ်ချက်အမှတ် ၅(၂၅) အရ လက်မှတ်ရေးထိုး
 ထုတ်ပေးခြင်းဖြစ်ပါသည်။



အတွင်း ဝန်ထမ်း ၂၂/၈/၁၉
 မြေလွတ်မြေလပ်နှင့်မြေရိုင်းများစီမံခန့်ခွဲရေးကော်မတီ
 ရုံးစိုက်ခြင်းနယ်
 ဥက္ကဋ္ဌ/အတွင်းရေးမှူး

ရွှေစီး တိုင်းဒေသကြီး/ပြည်နယ်၊ ပြည်ထောင်စုနယ်မြေစီမံခန့်ခွဲရေးကော်မတီ

စာအမှတ် ၁၇၃/မလရ/ခွင့်ပြုမိန့်/ (၂၀၁၉)
 ရက်စွဲ ၂၀၁၉ ခုနှစ်၊ ဩဂုတ်လ (၂၂) ရက်

Figure-12: Document showing plot of land

မြေစာရင်းပုံစံ - ၁၀၅



2018-057647

သက်သေခံ မှန်ကန်ကြောင်း သက်သေခံ
 သောလက်ရှိမြေပုံတွင် ယခုနှစ်အသုံးပြုသော ဦးပိုင်မြေပုံ
 သက်သေခံ လက်ခံရေးကူးရန်ပုံစံ

DALMS



ထိုင်းဒေသကြီး/ပြည်နယ်	
ရှမ်း	
ခရိုင်	
လားရှိုး	
မြို့နယ်/မြို့နယ်ခွဲ	
ရပ်ကွက်/ကျေးရွာအုပ်စု	နံမှန်းမြေပုံညွှန်း UTM-2297-15, A-872709, B-878705, C-879704, D-883697, E-877695
ရွာ	
ကွင်း/အတွက်အမှတ်နှင့်အမည်	
ဦးပိုင်အမှတ်/မြေကွက်အမှတ်	

ဦးပိုင်အမှတ်	အခွန်စည်းကြပ်ခံရသူ/မိုင်ရှင်/ဂရန်ရှင်/အငှားဂရန်ရှင်အမည်	ပိုင်ဆိုင်ခွင့်	မြေမျိုးနှင့်အတန်း	ဧရိယာ (ဧက)	မှတ်ချက်
		NV FV	မြေပိုင်း	၁၄၈.၀၀	မြေပိုင်းအတွက် မြေပိုင်းစီမံခန့်ခွဲရေးဦးစီးဌာန၏ တောင်းကြားချက် (၂၀၁၈.၄.၂၀၁၉) မှန်ကန်စေရန်။ ၂၀၁၈/၂၀၁၉

ရေးကူးပေးသည့်အကြောင်းအရာ **မြေပိုင်း၊ မြေပိုင်း ယူပိုင်ခွင့်အတွက်ထားရန်**
 (အထက်ဖော်ပြပါအကြောင်းအရာအတွက်သာ အသုံးပြုခွင့်ရှိသည်)

လျှောက်ထားသူအမည် - **ဦးမျိုးမြင့်စော**
 လျှောက်လွှာတင်သည့်နေ့စွဲ - (၂၀၅.၈.၂၀၁၉)
 လျှောက်ထားသူထံထုတ်ပေးသည့်နေ့စွဲ - (၂၀၅.၈.၂၀၁၉)
 ယခုအထက်တွင်ပြဆိုသောမြေပုံမှာ မှန်ကန်သောစာရင်းစာရင်းရေးကူးထားသော (၂၀၁၈-၂၀၁၉) ခုနှစ် အတွက် နောက်ဆက်တွဲတိုင်းခြင်းတွင် ယင်းမြေပုံကို မြေပုံဖြစ်ကြောင်း သက်သေခံလက်မှတ် ရေးထိုးပါသည်။

အမှုတွဲထိန်း/မြေတိုင်းစာရေးလက်မှတ် - **မြေပိုင်း-၄ မြို့နယ်လယ်ယာမြေပုံစီမံခန့်ခွဲရေးဦးစီးဌာန**
 နေ့စွဲ - (၂၀၅.၈.၂၀၁၉)

မှိုက်ဆိုင်စစ်ဆေးပြီး မှန်ကန်ပါသည်။
 လက်မှတ်ထုတ်ပေးပြီး မှန်ကန်ပါသည်။
 (စောမင်းနိုင်) နေ့စွဲ - (၂၀၅.၈.၂၀၁၉)

စိစစ်အတည်ပြုပါသည်။
မြို့နယ်လယ်ယာမြေပုံစီမံခန့်ခွဲရေးနှင့် စာရင်းအင်းဦးစီးဌာန
 နေ့စွဲ (၂၀၅.၈.၂၀၁၉)

Figure-13: Document showing plot of land

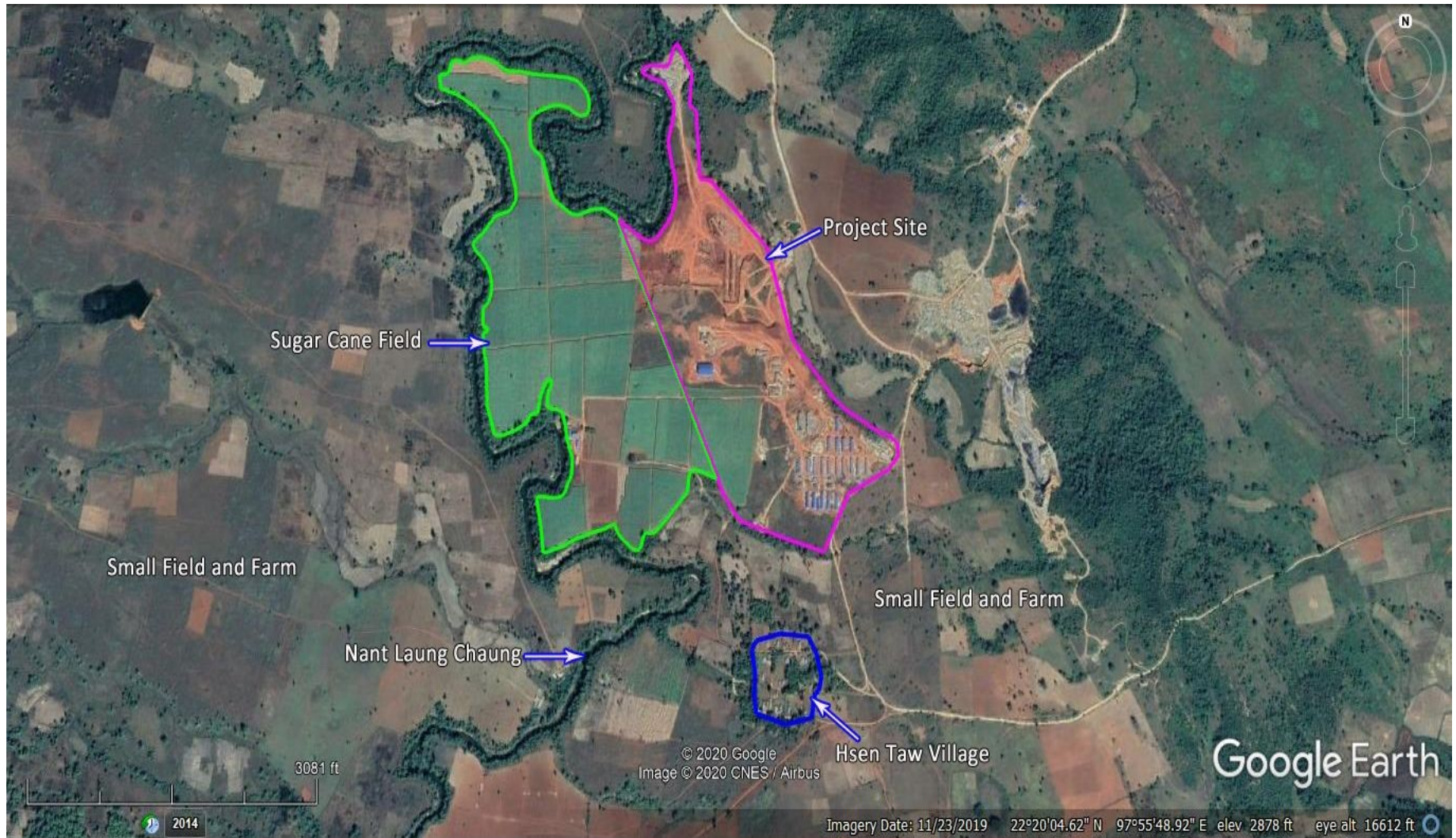
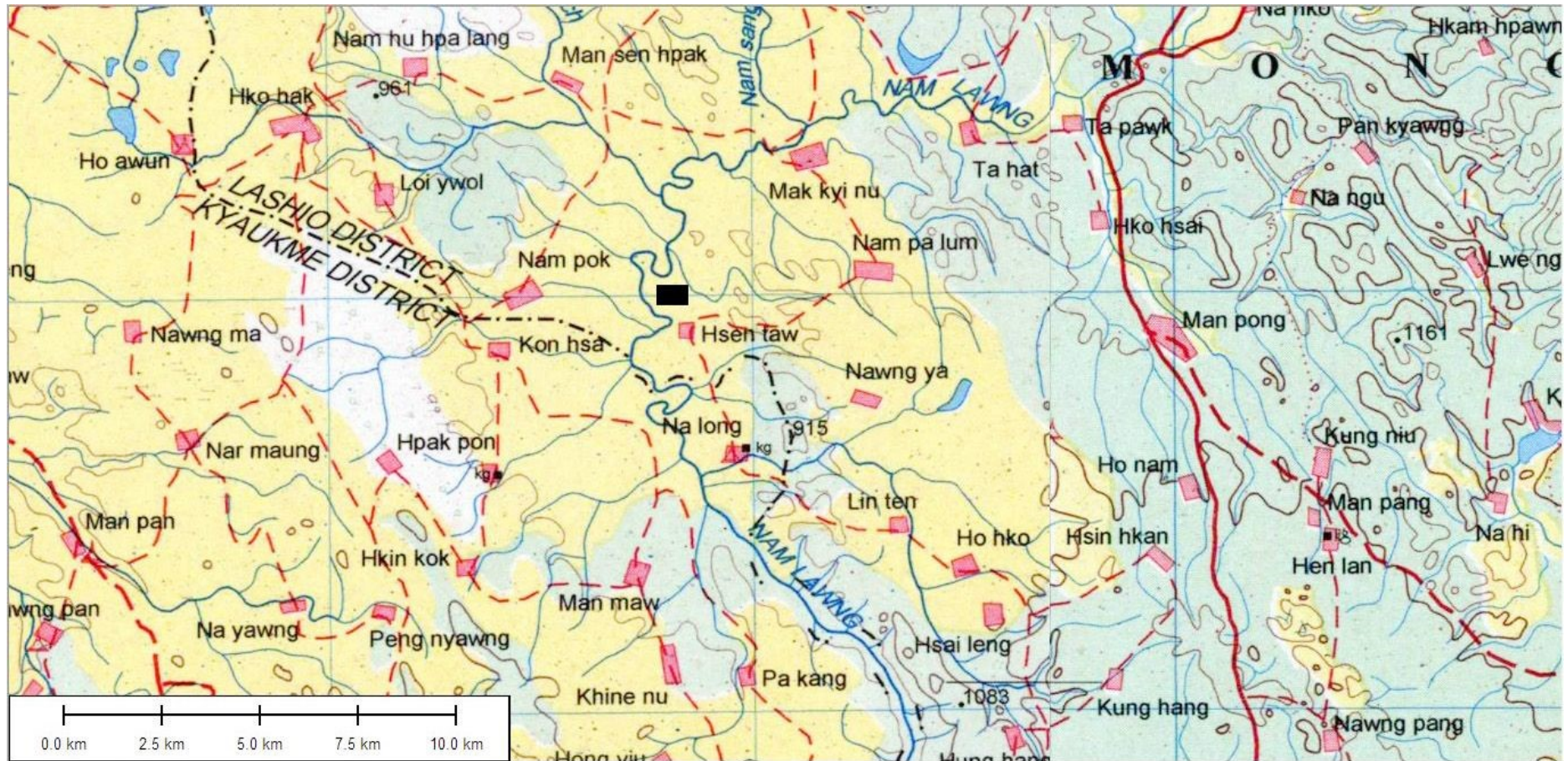


Figure-14: Satellite image of the proposed project and its environs



Legend

- - - motor road
- township/village
- ~ ~ ~ river/stream
- project site

Figure-15: Map of part of Mong Yai Township showing proposed project site



Figure-16: Satellite image showing project plot and position of corners

The coordinates at each corner are as follows:

- A. 22°20'20.49"N, 97°54'28.79"E
- B. 22°20'28.45"N, 97°54'34.97"E
- C. 22°20'35.24"N, 97°54'31.70"E
- D. 22°20'36.02"N, 97°54'34.93"E
- E. 22°20'38.21"N, 97°54'36.04"E
- F. 22°20'35.21"N, 97°54'37.85"E
- G. 22°20'31.92"N, 97°54'37.61"E
- H. 22°20'31.40"N, 97°54'38.42"E
- I. 22°20'24.46"N, 97°54'38.95"E
- J. 22°20'24.31"N, 97°54'40.23"E
- K. 22°20'17.57"N, 97°54'47.21"E
- L. 22°20'8.80"N, 97°54'50.05"E
- M. 22°19'58.27"N, 97°55'2.59"E
- N. 22°19'53.96"N, 97°54'56.63"E
- O. 22°19'48.70"N, 97°54'53.71"E
- P. 22°19'51.57"N, 97°54'43.82"E

In the adjacent west of the project site is the sugar cane field No.1 with an area of 162 acres owned by Than Daung Oo Co., Ltd. In the vicinity all around are numerous small fields and farms.

The only water course in the area is Nant Laung stream which generally flows from south to north but meanders along the southern, western and northern borders line of the sugar cane field No.1.

As there are only small fields and farming in the surround area there is no forest but only trees dotted along the banks of the Nant Laung stream.

The plot of land was formerly a farm land and was officially purchased from a local, U Lone Sai.

The land uses of the area used to be small plots of fields and farms where rice, maize, peanut and sugar cane are grown.

Now the sugar factory compound has become small industrial area.

4.3 Project development and implementation schedule

Pre-construction Phase	Construction Phase	Operation Phase	Decommissioning Phase
← 1 year → (2018)	← 3 years → (2019-2021)	← 30 plus years → (2021-2051)	← 1 years → (2052)

During Preconstruction Phase : 1 year (Planning and paper works)

During Construction Phase : 3 years (Procurement, construction and installation)

During Operation Phase : 30 plus years (Long term Operation and maintenance)

During Decommissioning/Rehabilitation Phase : 1 year (Decommissioning/Rehabilitation to original ecology as far as possible)

(The project is already in the early Operation Phase).

The four phases can be very briefly summarized as follows:

(1) Preconstruction Phase

The works involve planning, drawing and a variety of paper works and also bureaucratic procedures. It is difficult to estimate the time for Preconstruction Phase but 1 year is allotted for this phase. This phase has already completed.

(2) Construction Phase

The main tasks involved procurement of building materials, machinery and equipment etc. Preparation and mobilization work; then actual construction of buildings and structures commenced. A building contractor was hired; later installation, fabrication and finishing works followed. The Construction Phase has already completed (the construction has started on 1-4-2019 and completed on 1-3-2021).

(3) Operation Phase

The project is already in the Operation Phase; started on 18-3-2021.

After test running and preparation work actual operation will commence. During this long Operation Phase the daily and routine manufacturing and production of quality sugar will be undertaken. The work during this long phase also involves the regular procurement of raw material (Sugar Cane) and other materials and chemicals. The regular maintenance works and the implementation of Environmental Management Plan as well as mitigation measures and monitoring will be also undertaken. Depending on the supply condition of sugar cane the operating days for one year are estimated as 100 – 120 days per year (only during the sugar cane season).

This long Operation Phase will last for at least 30 years and is renewable and so may be up to 30 plus years.

(4) Decommissioning/Rehabilitation Phase

The Decommissioning and Rehabilitation Phase is estimated to be at most 1 year.

The decommissioning works eg. isolation and shut down of the factory, demolition, dismantling and removal works and final tidy up works can take only a few weeks. A decommissioning contractor will be hired to do the works.

The rehabilitation in the form of replanting trees will take several months, probably up to 1 year.

4.4 Description of the project

Size : The total area of the project site is 148 acres. The plot of land is irregular in shape; the much larger southern portion is allotted for the office, meeting room, assembly hall and mostly residential area (including 1 guest house, 4 officers housings, 19 employee housings).

The layout plan for the whole project site is as follows:

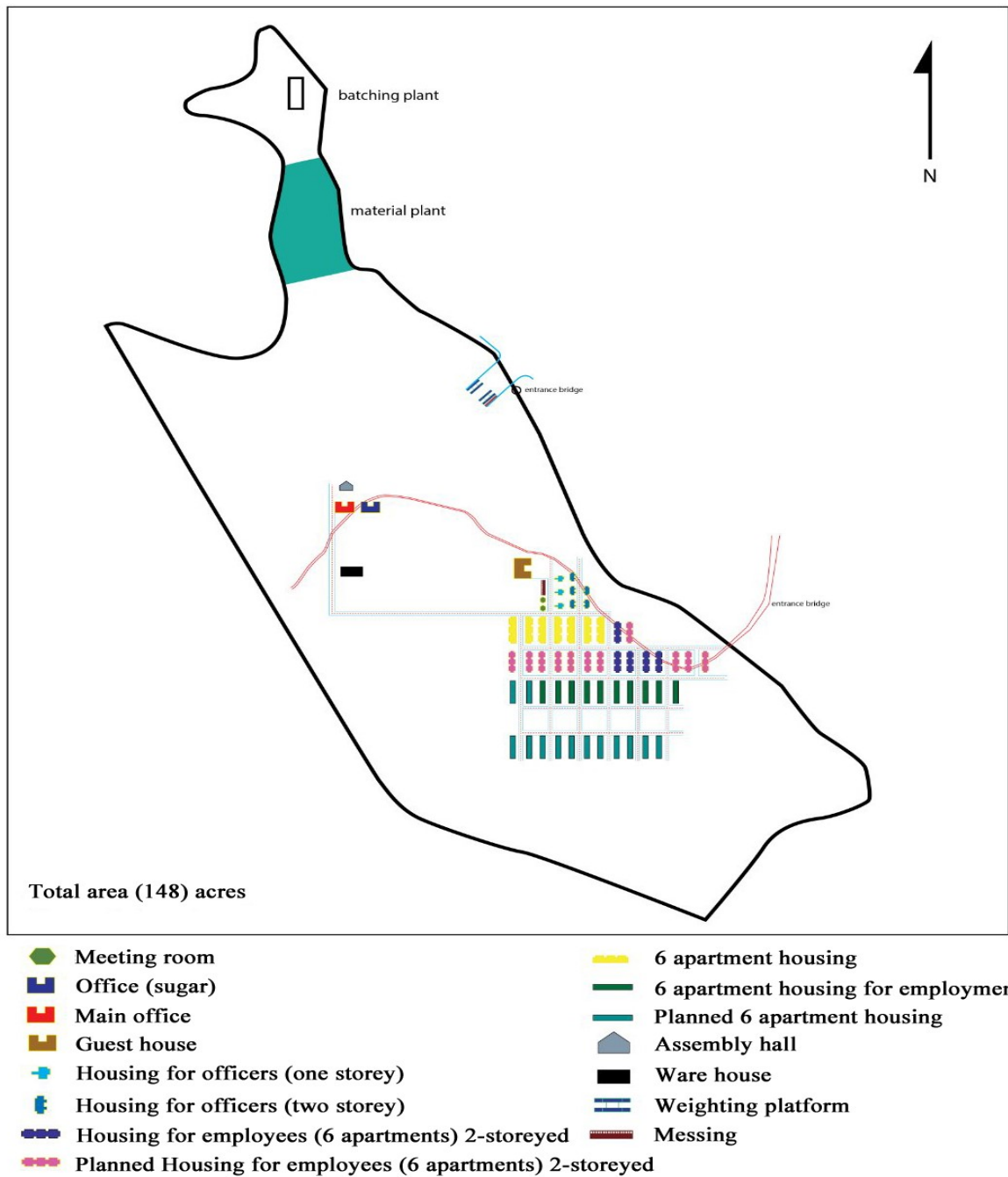


Figure-17: Layout plan for the whole site



Figure-18: Model of the sugar factory

Infrastructure and installations

The 7 miles access road to Psi-paw – Mong Yai High Way in the north is constructed by the company. In addition access road (general road) to Hsen Taw village and Na Long village is constructed by the company.

The factory as well as these two villages have how easy access to Psi-paw – Mong Yai Road.

The company has also electrified the Hsen Taw village.

Main buildings and structures

The main buildings and structures of the site include the followings –

No.	Particulars	Qty.	Dimension
1.	Sugar cane milling department	1	400' x 100' x 50'
2.	Boiling, crystallization, packing department	1	400' x 100' x 80'
3.	Pump house unit	1	150' x 40' x 18'
4.	Molasse storage tanks	2	Ø 112' x 40'
5.	Turbine unit	1	100' x 70' x 50'
6.	Boiler unit	1	150' x 100' x 80'
7.	Meeting hall	1	60' x 30' x 12'
8.	Main office	1	108' x 72' x 12'
9.	Guest house	1	96' x 54' x 14'
10.	Officers housing	2	44' x 62' x 14'
11.	Employee housing 1	15	144' x 24' x 10'
12.	Employees housing 2	4	60' x 30' x 10'

13.	Officer housing	2	171' x 32' x 23'
14.	Weight	1	20' x 48' x 12'
15.	Messing	1	82' x 92' x 15'
16.	Warehouse for agri-products	1	100' x 165' x 23'
17.	Workshop/repair shop	1	177' x 54' x 18'
18.	Laboratory	1	118' x 54' x 12'
19.	Warehouse for sugar	2	100' x 300' x 18'
20.	Main warehouse	1	80' x 160' x 18'
21.	Clinic	1	24' x 48' x 12'



Figure-19: Factory



Figure-20: Main office



Figure – 21: Weighting scale



Figure – 22: Turbine house and control room



Figure – 23: Boiler House



Figure – 24: Cooling Tower



Figure – 25: Workshop



Figure – 26: Finish goods warehouse (packing department)



Figure – 27: Chemical Warehouse



Figure – 28: Molasses Tanks



Figure – 29: Lime Store



Figure – 30: Laboratory



Figure – 31: Factory Clinic



Figure-32: Guest house



Figure-33: Housing for officers



Figure-34: Housing for officer (Head of Department)



Figure-35: Housing for officers (Junior)



Figure-36: Messing Hall



Figure-37: Bachelor lines

Layout plan (floor plan) of the factory

The floor plan of the factory is shown below:

ငွေရည်ပုလဲကုမ္ပဏီအုပ်စု၊ သံတောင်ဦးကုမ္ပဏီလီမိတက်
တစ်ရက်လျှင် ကြံတန်ချိန် (၅၀၀၀)ကြိတ်ဝါးမည့် သကြားစက်ရုံသစ်၏
စက်ပိုင်းဆိုင်ရာ အဆောက်အဦ အကွက်ချပုံစံ **(Floor Plan)**

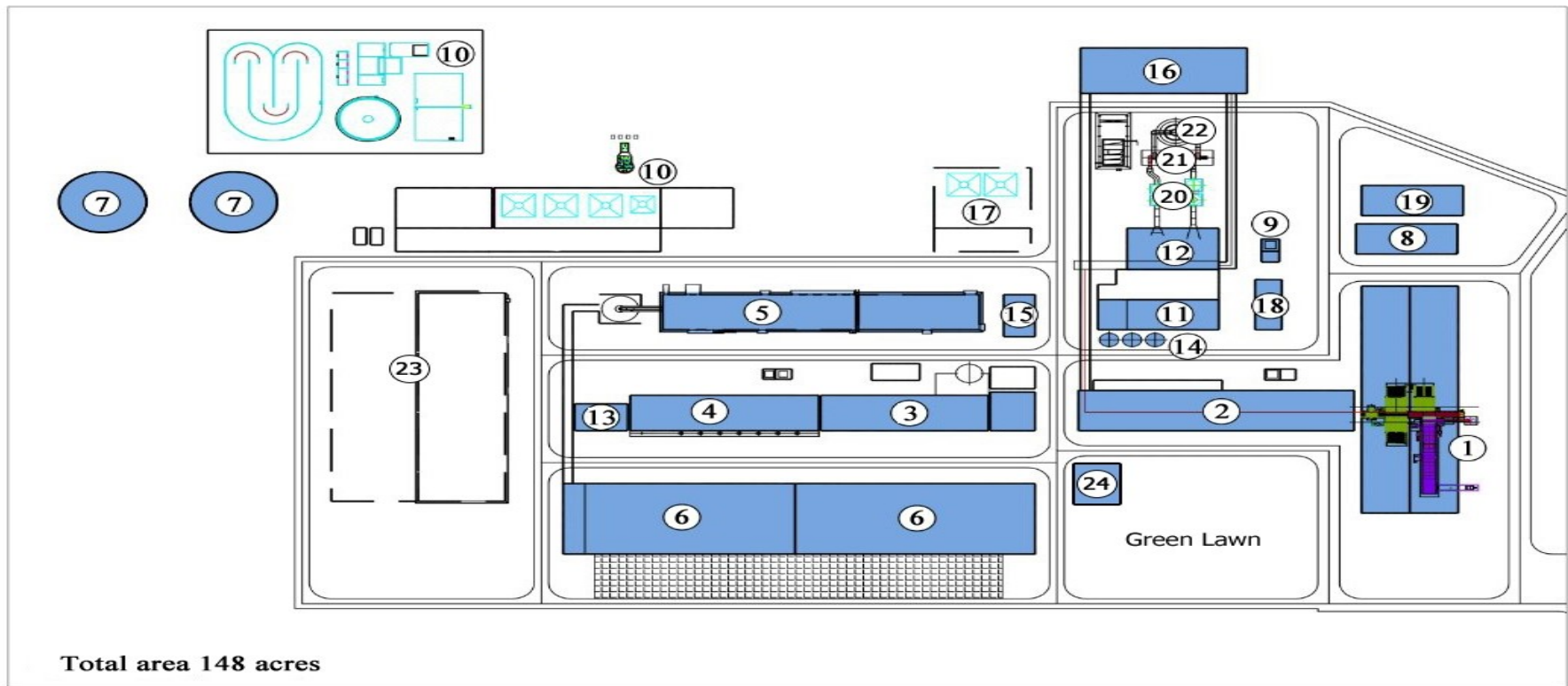


Figure-38: Layout plan (floor plan) for the sugar factory

- | | |
|--|--|
| 1. Automatic unloading area | 13. Blower |
| 2. Milling and extraction unit | 14. Purified water tanks (water purification unit) |
| 3. Juice boiling unit | 15. Lime water tank |
| 4. Juice evaporation, crystallization unit | 16. Bagasse dump site |
| 5. Packing unit | 17. Cooling tower |
| 6. Sugar storage unit | 18. Generator house |
| 7. Molasses storage tanks | 19. Repair shop/store |
| 8. Work shop | 20. 20. ID Fan |
| 9. Turbine water cooling unit | 21. 21. Dust collector |
| 10. Water treatment units | 22. 22. Stack |
| 11. Turbine | 23. Ware house for final product |
| 12. Boiler unit | 24. Laboratory |

Machinery and equipment

Heavy machinery, used mainly during the construction and the vehicles are listed below –

Excavator	- 1 Nos.
Backhoe	- 1
Wheel loader	- 2
Dump truck	- 4
Crane	- 1
Cement mixer	- 2

Vehicles

Office vehicle	- 4 Nos.
Motorcycle	- 20 Nos.



Figure-39: Some of the heavy machinery

List of machinery and equipment (imported) for the sugar factory is shown in ANNEX.

4.4.1 Other aspects of the project (in brief)

The budget is Ks. 88124.98 millions.

Factory capacity: can mill 5,000 tons of raw sugar cane per day and can produces 500 tons of white sugar per day.

Raw materials (sugar cane) requirement

The annual sugar cane requirement is estimated at 630,000 tons.

The company has its own sugar cane fields. There are numerous local sugar cane fields in the vicinity. The company can also source raw sugar cane from Naunghkio Township area. Sugar cane will be delivered to the factory by trucks by sugar cane merchants. It is estimated that up to 300 trucks will deliver sugar cane per day (during the sugar cane season and milling season) while 40% will be local market.

60% of the white sugar produced will be for export (mainly to China) while 40% will be for local market.

Factory operational days : 100 – 120 days per year (only sugar cane season).

Staff strength

Construction Phase : 150 employed by the company plus 220 construction workers contracted from STI Co., Ltd and Lin Zaw Aung Co., Ltd Construction companies.

Operation Phase : 254 permanent staff and 35 Chinese engineers/technicians for temporary basis (for installation and test running). In addition there are about 98 daily wages mostly from Hsen Taw and Na Long villages.

(The Chinese are warned not to interfere in the politics or internal affairs of the country. Of course, interference in the internal affair of the by Chinese experts is not heard; there is no such precedent).

Salaries : From Ks 145,000 to Ks 1,220,000.

Working hours : 8 hours/days; 40 hours/week (3 shifts of 24 hours).

Source of electricity

Electricity is sourced from national gridline electricity, from Kone Nyo Village substation 33KV line, 7 miles in the north. The 33KV will be stepped down to the required KV for the factory.

Electricity can be also obtained from the burning of bagasse. The company has one 90 tons boiler (bagasse boiler); (90t/hr, 3.8MPa (a)) and two turbines, one 6MW and one 9MW. the maximum generation of electricity is 15MW. The company has also 2000KVA and one 625KVA generators as backup system.



Figure-40: Transformer and generator house

Source of water

Water is sourced from Nant Laung Chaung and also from a spring nearby. Water is available the whole year round and is not an issue. The company has no plan from sourcing ground water.

The company has one main concrete tank, (dimension 18' x 18' x 7', capacity 14,000 gallons), one overhead tank dimension 16' x 16' x 6', capacity 12,000 gallons), 5 concrete tanks for family line (total capacity 20,000 gallons) and one more overhead concrete tank for office (dimension 18' x 18' x 7', capacity 14,000 gallons). In addition there is one overhead tank (capacity 150 gallons) each for two housings for foreign engineers.

Annual water requirement is estimated at 1,200,000 tons (10,000 tons/day of 120 working days).



Figure-41: Nant Laung Stream



Figure-42: Underground spring and pump house (the water is distributed to Hsen Taw village)



Figure-43: Overhead tank and concrete ground tank (water purification system is inside)



Figure-44: Water purification system



Figure-45: One of five the concrete water tanks for family line

Annual fuel requirement

Diesel 656,250 litres

Petroleum/gasoline 33,075 litres

Lubricants:

Engine oil 24,413 litres

Gear oil 8,663 litres

Hydraulic oil 7,088 litres

Turbine oil 3,150 litres

Fuel oil and lubricant will be procured from Mandalay City. The company has a fuel depot comprising 4 cylindrical drums with the total capacity of 34,597 gallons capacity.

At the moment the company has already procured 44 fire extinguishers for prevention, and fighting fire.



Figure-46: Fuel depot

Raw materials and estimated annual requirement

Sugar cane	:	630,000 tons
Phosphoric acid	:	315 tons
Sulphur	:	882 tons. (for sulphitation)
Lime powder	:	2,268 tons. (for juice clarification)
Kurifloc	:	9,450 kg (flocculation-sedimentation catalyst)
Washing soda	:	8,190 kg
Tri-sodium phosphate	:	1,575 kg
Plastic bag	:	1,386,000 nos.
Penium bag	:	1,386,000 nos.

As mentioned earlier the company has 3 sugar cane fields with a total area of 722 acres. Raw sugar cane will be also procured from Mong Yai, Hsi Paw and Kyay Thee Man San Township areas. The company has good agreement with all the sugar cane farmers in the near and far vicinities.

All chemicals and materials will be procured from Mandalay City. A portion of the store will be partitioned for storage of these chemicals, none of which are toxic or hazardous.

See also ANNEX for Material Safety Data Sheet (MSDS) for the said chemicals.



Figure-47: Sugar cane field adjacent west of the factory

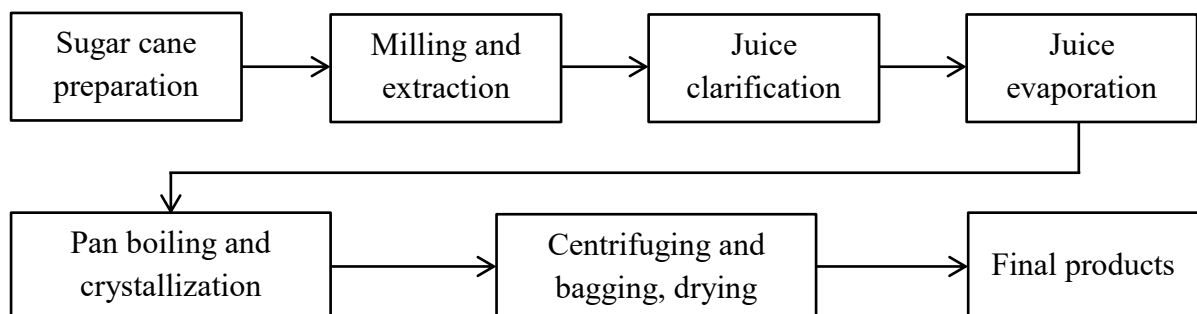
4.4.2 Technology, The process of making sugar from sugar cane, in brief

Technology and Production Process: Sugar cane is the raw material for the manufacturing and production of sugar. The cane comes from Mong Yai, Naunghkio and Yartsauk Townships.

The technology is the "press" or "squeeze" technology or mechanical technology where sugar cane is pressed by roller mills and pressing out the juice.

(Diffusion leaching process technology is not applied here) After the juice is extracted the main processes, namely, clarification, evaporation and crystallization follow. The product is refined and the final product is white quality sugar.

Simplified flow chart diagram showing main steps in manufacturing process of sugar



1. Cane preparation (leaves removal, washing)

The main objective is the cutting of sugar cane stems into smallest pieces for crushing and milling. These pieces of cane have to undergo six steps of milling for the optimal extraction of juice.

Raw material sugar canes transported by trucks and arrived at the centre are weighed with a computerized weighing machine. After that the raw material is sent to feeder bay (hopper) with the aid of 4 cranes. From then the raw materials get into the two conveying machines, belt conveyors. One of the conveying machines is installed with a cane leveller to regulate the flow of raw materials (cane).

The raw material (cane) is then cut with two cane cutters; after several steps of cuttings and shredding the stems of canes are transformed into smallest pieces. This is done in order to achieve the Preparation Index of at least 85% and also achieve the Mill Extraction rate of 96%.

2. Milling and extraction

In order to maintain the constant per hour milling rate pieces of shredded cane are passed through a Nuclear Weight scale. A magnetic device is used to attract and remove iron particles, if any, among the crush cane materials. This is done so as to prevent the iron particles from damaging the mill rollers. The crushed cane materials devoid of iron particles are then milled/crushed at 5 milling/crushing machines. The cane juice produced is mixed with line water and phosphoric acid and then conveyed to cane juice purification unit.

The bagasse produced from the milling and extraction activities is sent to the boiler unit for use as burner.

3. Juice clarification

The aim of clarification is for the removal of non-sugary substances and for the prevention of losses as far as possible in doing so. Another aim is to acquire pure and bright juice.

At the juice clarification unit the juice is heated with two Juice Heaters to a temperature of 60-65°C. In order to maintain pH of 6.9-7.1 the juice is mixed with milk lime and treated with sulphur gas (known as sulphitation). The juice is then heated with another two Juice Heaters to a temperature of 98-102°C. It is then conveyed to the clarifier. In order to enhance sedimentation a flocculation-sedimentation a catalyst solution (kurifloc) is added into the clarifier. The suspended and turbid cane juice is filtered by Rotary Vacuum Filter. The filtered or clarified juice is heated at the third Juice Heater up to a temperature of 110-125°C. The filtrate, known as mud or cachaza, is used as organic fertilizer in agriculture.

4. Juice evaporation

Juice evaporation unit is responsible for the evaporation of clarified juice and the subsequent crystallization of sugar.

The clarified juice (110-125°C) coming from the clarification unit is conveyed to five evaporators. After undergoing evaporation process the juice is transformed into a syrup with the Brix of 55°-65° (viscosity). The second sulphitation (treatment with sulphur gas) is undertaken and the syrup is conveyed to the crystallization unit.

5. Pan boiling for crystallization

Crystallization is a main important step in the manufacturing of sugar. The aim is to produce sugar crystals from the syrup, and:

- a) To optimize the production of sugar crystals
- b) To produce sugar crystals of appropriate size
- c) To produce white sugar
- d) To optimize the recovery of crystals from syrup and
- e) To reduce the purity of the final molasses.

At the crystallization unit the syrup is panned in "C" Vacuum Pan and "C" massecuite is produced. After undergoing continuous centrifugation "C" sugar and final molasses are produced.

"C" sugar is dissolved and then panned in "B" Vacuum Pan and "B" Massecuite is produced. The "B" class Massecuite undergoes continuous centrifugation and "B" class sugar and "B" class molasses are produced. The "B" class sugar is dissolved and panned in "A" class Vacuum Pan and "A" class Massecuite is produced. The "A" massecuite is then passed through batch centrifuges and "A" class sugar and "A" class molasses are finally separated and produced.

The "A" class molasses is reused for the production of "B" class massecuite and the "B" class molasses is reused for the production of "C" class massecuite.

6. Massecuite cooling, separation of sugar from molasses and drying of sugar (also known as centrifuging and bagging)

A, B and C massecuites have to be cooled before undergoing centrifugation. Especially this has to be undertaken for C massecuite. The massecuite panned from the boiling pan has a temperature of 65-70°C and sugar is dissolved in the massecuite-molasses mixture. The cooling process results in the crystallization of sugar thus preventing the loss of sugar and at the same time reducing the quantity of molasses.

Sugar produced from "A" centrifuge has relatively high content of moisture. For the long term storage and prevention of hygroscopic condition the wet "A" sugar is dried on a Hopper and Dryer machine. The sugar coming out of Hopper and Dryer must have a moisture content of less than 0.1%.

Before packing or bagging the dried sugar coming out of the Hopper and Dryer a magnetic separator device is used to remove iron particles, if any, from the sugar substance. A Grader is also used for grading the size of sugar crystals in order to get sugar crystal of appropriate size. Crystals with size larger than required size are dissolved and reused for manufacturing of sugar.

The dried and graded sugar is then temporarily stored in Sugar Bin and then packed in bags of 50 kilograms or 30 vises by means of automatic packing machine.

7. Final Products

It is estimated that 500 tons of quality sugar final products (or 10,000 bags of 50 kg sugar) will to be produced per day. 6000 bags (60%) will be for export and 4000 bags (40%) will be for local market. For export heavy trucks will be deployed for transportation to Musae (the border town) and then into China.

For local markets: trucks will deliver the sugar bags to Mandalay City and Taunggyi City or sugar merchant will come and purchase the sugar at the factory.

The brand name on the sugar bag is "Than Daung Oo".



Figure-48: The brand name and specification



Figure-49: Weighing sugar cane together with truck



Figure-50: Unloading sugar cane



Figure-51: Conveying sugar cane from hopper



Figure-52: Conveying shredded sugar cane to mill



Figure-53: Milling sugar cane



Figure-54: Mixed juice tanks



Figure-55: Conveying bagasse to boiler unit



Figure-56: Control room

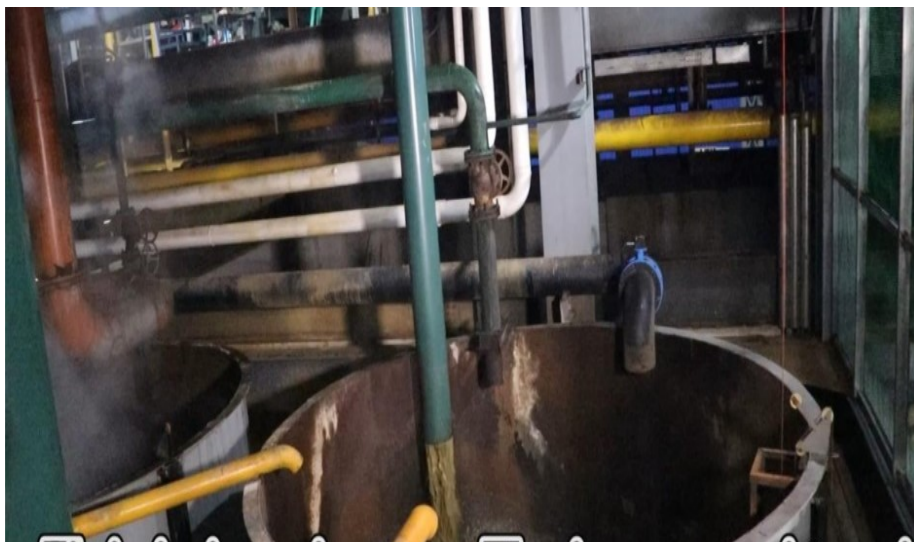


Figure-57: Collecting juice



ထုံးရောခြင်း၊ ကန့်ခိုးရိတ်ခြင်းနှင့် pH ထိန်းညှိခြင်း

Figure-58: Mixing lime, sulphitation and regulating pH



Figure-59: Pouring clear juice from sedimentation tank



Figure-60: Measuring SO₂ content



Figure-61: Boiling syrup by evaporators



Figure-62: Crystallizing syrup



Figure-63: Drying sugar crystals

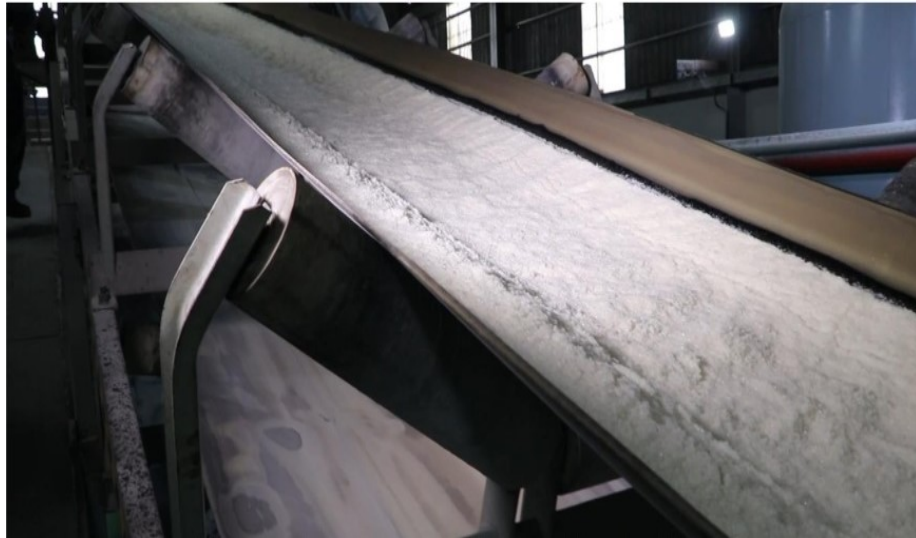


Figure-64: Conveying dried sugar crystals to storage tank

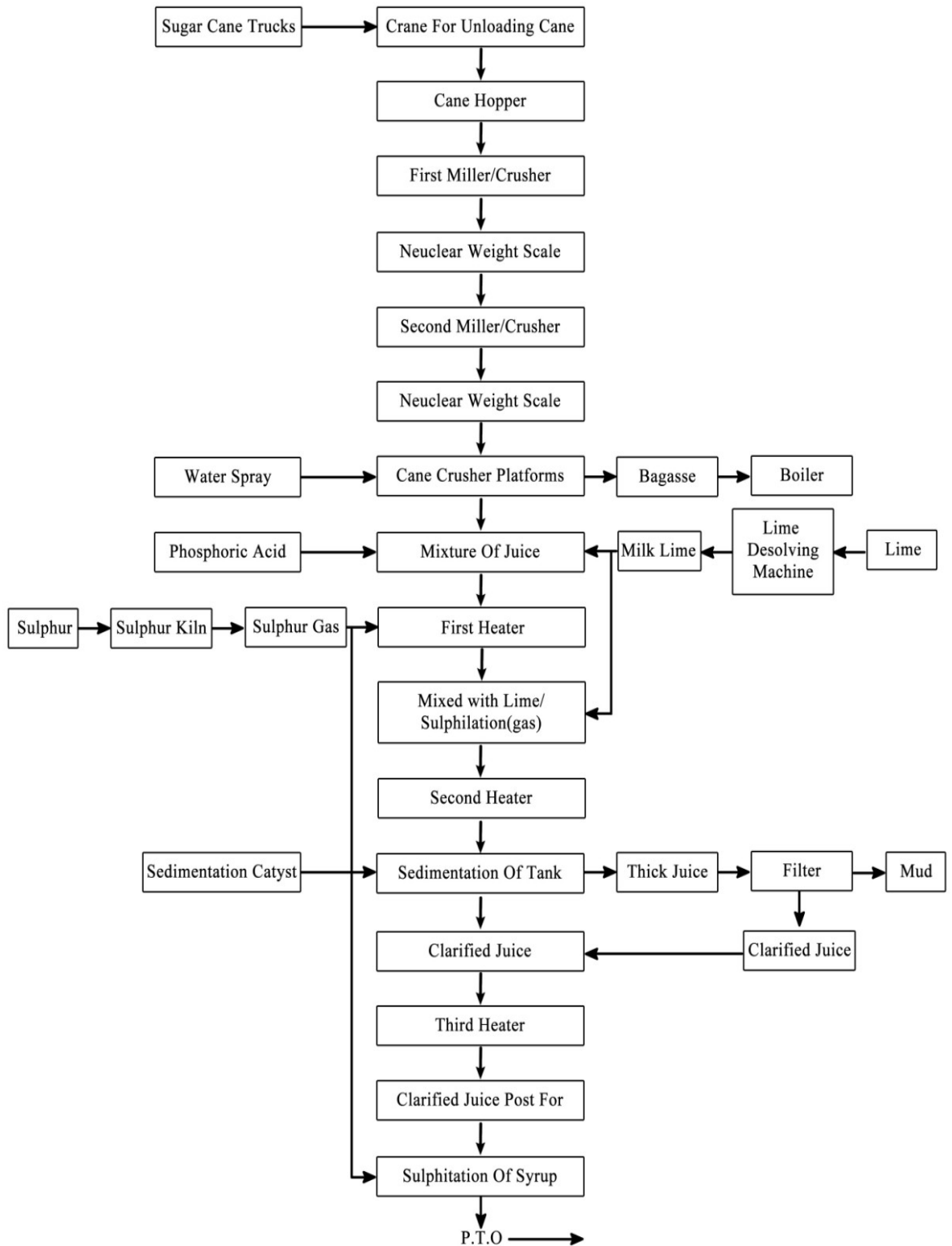


Figure-65: Packing sugar



Figure-66: Finished sugar products inside warehouse

Steps In Sugar Manufacturing Process



Steps In The Manufacturing Of Sugar

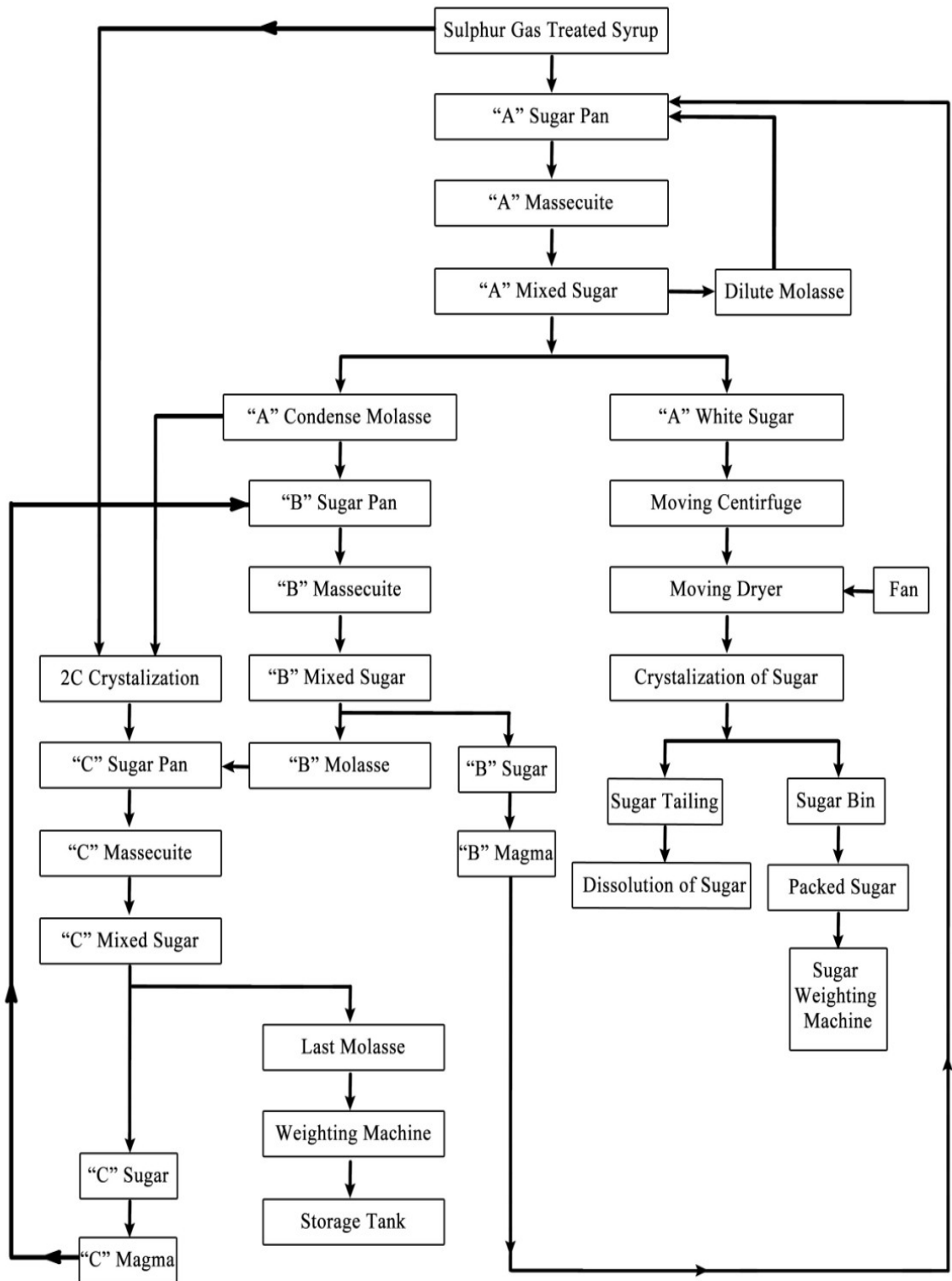


Figure – 67: Comprehensive flow chart diagram for manufacturing of sugar

Another vision for manufacturing of quality sugar is depicted in diagrams as follow:

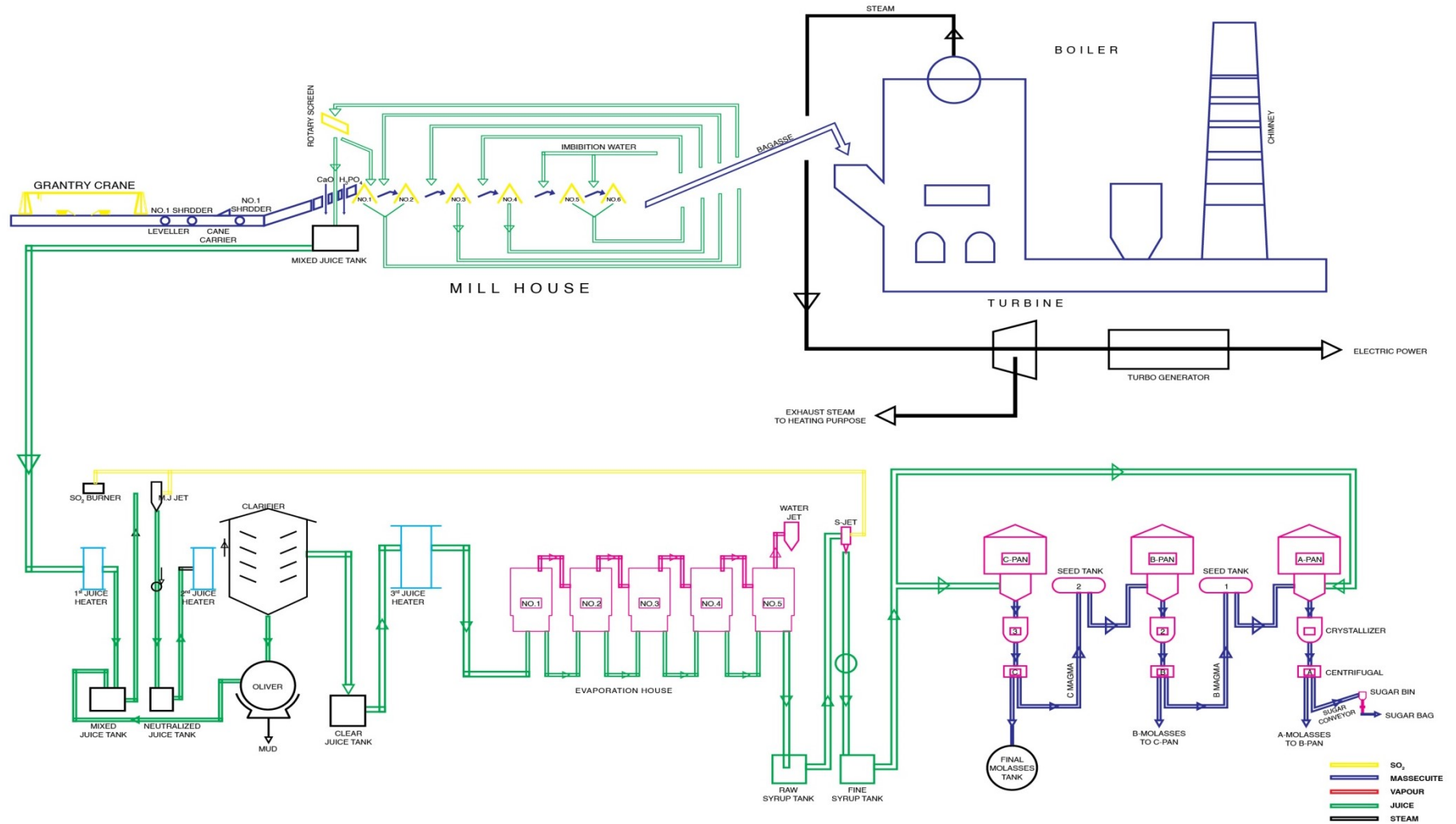


Figure-68: Diagrammatic flow chart in the manufacturing of white sugar

4.4.3 Waste generation

Solid wastes, emissions, effluents and disturbances and management in brief

(a) Industrial solid wastes

From milling plant

- Bagasse (pulp or fiber) is generated in huge quantity after milling and extraction of juice from sugar cane stem.

It is estimated that 1400 tons of bagasse is generated from this factory per day. (One ton of sugar cane produces 280 kg of bagasse).

All bagasse are reused as fuel burner (bio burner) for boiler.

From process plant (mill)

- Sugar press mud (cachaza) is generated as filtrate from clarification of juice after filtration.

It is estimated that 17 tons of cachaza is generated per day.

Cachaza (mud) are stored at mud pool (cachaza pool) and later processed and used as bio-fertilizer for the three sugar cane fields owned by the company and distributed to local sugar cane farmers who need it.

- Molasses is produced from final crystallization of sugar. It is estimated that 225 tons of molasses is produced per day. All molasses are reused in the process of manufacturing sugar.
- Ash (bagasse ash) is produced from the burning of bagasse which is used as burner. It is estimated that 60 tons of bagasse ash is generated per day.

Other industrial solid wastes generated in small quantity are:

- Packing materials, spent filter materials, active carbon, residual acid from chemical clearing of equipment, resin etc. It is not practical to estimate the quantity as generation is not daily or weekly but from time to time.

These are regularly collected and disposed at the landfill outside sugar cane field No.1.

(b) Domestic solid wastes

These are in the form of office waste, kitchen waste (food wastes or organic wastes), wastes from housings, bottles, trash, debris which are generated in relatively quantity per day. Based from the general domestic solid wastes generation formula (0.3 kg/capacity/day). The generation of domestic solid waste from 254 employees will be 76.2 kg/day.

These are systematically collected in various wastes bins of two kinds (recyclable and non-recyclable) (totaling 30 bins); some are reused, while some are disposed at small 17 dumps sites and the company's landfill; while some are incinerated outside the premise. Some organic wastes are made in compost for use in the company's sugar cane fields.



Figure-69: Waste bin



Figure-70: Landfill

(c) Emissions

The main emission is from the factory stack (known as point source emission or stationary emission) PM (PM₂₅, PM₁₀, PM_{2.5}), SO₂, NO₂, CO₂ are the main pollutants while CO, CH₄, VOC and hydrocarbon etc. are also common pollutants.

As a general rule, for every ton of sugar produced 241 kg of CO₂ are generated. Therefore it is estimated that 120.5 tons of CO₂ will be generated and released into the atmosphere per day. Based from "emission factor" concerning the production of sugar, it is estimated that:

- 48 tons of fly ash and 12 tons of bottom ash (bagasse ash) will be generated per day. (In other words, 60 tons of PM (PM₂₅, PM₁₀, PM_{2.5} will be generated per day).
- 67 kg of NO₂ will be generated per day.
- 19 kg of SO₂ will be generated per day.
- 120 kg of CO₂ will be generated per day.

(d) Effluents

The source of waste water (effluent) are from boiler blow down (boiler house), from mill house (mill plant) and process house (process plant).

The waste water from boiler blow down (together with ash) will flow into the concrete ash pond.

The waste water from mill house and process house will be discharged into the waste water pond quite efficient for the moment of waste water, both at ash pond and waste water pond.

Hugh quantity of water is required for a sugar mill. To make sugar from one ton of cane 2 tons of water has to be used of which 0.4 tons will end up as effluent. In this proposed factory context of 5,000 tons of sugar cane 10,000 tons of water will be consumed per day and 4000 tons will be become waste water, but most will be recirculated and reused through cooling tower and cooling ponds. However, up to 800 tons of water can end up as waste water. The waste water from a sugar factory has high BOD, COD and total dissolved solids. Waste water contain high organic matters (especially), nutrient, oil and grease, chloride, sulphide and sometimes, heavy metal. The waste water with high organic contents will produce bad odour and will be highly polluted. Treatment is imperated, therefore lime powder will be applied and the remaining small quantity of waste water will dry up in the final waste water pond.

The company will ensure that both the ash pond and waste water pond are not over loaded with organic substances. (Over loading of organic substance can cause high BOD and COD and can eventually lead to generation of bad odour).

Screen and filters will be installed to retain organic load and regular manual removal will be undertaken before the load entering ash pond and /or waste water pond. The ash sediment in ash ponds will be mechanically removed with an over head crane. The removed wet ash will be used for fertilizer or solid conditioner or give away to local sugar cane planers.

The sediment of the waste water pond will be also mechanically removed and disposed all used fertilizer. It is expected that the quantity of sediment (sludge) at the sediment pond will be small. Part of the water from waste water pond is used for watering sugar cane plants. Various trees were planted around the waste water pond to partially mitigate odour if any. Lime powder will be applied weekly at the waste water pond. The company believes that the recirculation of water; screening, filtration of organic load; the removal of sediment and disposal and the application of lime powder will effectively mitigate impact of waste water.

When the factory is in operation for some year (4-6) years the conventional treatment of waste water that involves:

- Screening and filtration and removal of organic loads, sedimentation and disposal (physical treatment), aeration of pond water (biological treatment), either application of lime powder or chlorination (chemical treatment) and final discharge will be considered and executed but not at the moment now.

(e) Disturbance

On the whole noise level in a sugar factory is high, coming from a variety of sources; rotating machinery, cane milling, lime milling, ventilators, turbines, compressor, generators etc.

Heavy machinery and vehicular movements also emit high noise level.

Management of wastes, effluent, emission disturbance

These are described later in Chapter 6, 6.2.1.3, mitigation measures to be taken in detail. In fact all solid waste can be reused:

Industrial wastes

- bagasse will be reused as fuel burner instead of coal; surplus bagasse can be used as pulp for manufacturing pulp for making paper and paper board (actually all are used up as burner). There is a temporary bagasse store house and the bagasse open yard.
- molasses actually cannot be termed as waste; it can be used for making alcohol (rum) and ethanol, as sweetener and flavor in candy; it can be used in the production of vinegar, citric acid, etc.; blackstrap molasses is good as medicine (good as brain booster, for curing fatigue, anxiety, stress, prevent anemia, lower blood sugar); low grade molasses are used as mixed animal feeds (actually all molasses will be sold). There are two molasses storage tanks.

- sugar press mud (cachaza) can be composted into high quality organic fertilizer; it can be made into EM in Bokashi organic fertilizer, press mud based gypsum fertilizer, press mud based dolomite fertilizer; also for the production of Triple sugar phosphate fertilizer, Potash (potassium chloride) fertilizer and ash etc. (actually all are used up as fertilizer and sold to cane farmers). There is a temporary storage area underneath roofing.
- dry lime (solid lime) can be made into soil conditioning products for agriculture. There is a small storage area inside the building.
- ash (bagasse ash) when mixed with cement can be used as construction material; it is rich in potassium and can be partially used as fertilizer in small quantity. (actually all are used up as mixture of fertilizer). There is an ash with 4 steps for temporary storage of ash, which will be removed with overhead crane. Mitigation measures are described later in chapter 6, 6.2.1.3.

Hazardous waste

In sugar processing and refining such chemicals have to be used:

- Sulphur powder, lime powder, phosphoric acid powder, washing soda, kurifloic (flocculant), tri-sodium phosphate and sodium chloride. There are generally mild chemicals, none of them are hazardous except phosphoric acid is greatly diluted and neutralized by large quantity of water in sugar clarification and therefore the resultant waste water is not hazardous. Anyway workers will be educated, trained and supervised for the safety storage, handling and uses of these chemical.

Used fuel oil, used engine oil, old batteries, old lamps/bulbs old filters toner etc are also considered hazardous. Used fuel oil and engine oil will be collected in old drums and give away to local recyclers. Small quantity of batteries, lamps, filters etc will be simply dumped at the landfill in the south east corner of the factory premise.

Domestic Wastes

Domestic waste from office workers' trash and debris in small quantity are collected garbage bin, recyclable and non-recyclable and disposed at landfill in the south east within the premise.

Medical wastes from the clinic

The clinic is more like a dispensary or First Aid room. Medicine will be dispensed to sick and injured workers. Seriously sick or injured workers will be given first aid treatment at the clinic and immediately admitted to the nearest Mong Yai Township Hospital, the company has emergency response plan and contingency plan for this; a vehicle will be kept always at the ready for this.

Small quantity of medical wastes such as used cotton, gauge, syringes and needles, plasters, old medicine bottles or containers etc will be discarded at the said landfill. (Unlike a hospital there will be no major medical waste or hospital waste such as: imputed limbs or body parts, viural parts and stomach contents, blood, body fluid, vomits etc.)

Wastes from factory laboratory very small quantity of wastes (chemical waste water) are generated from the lab. E.g. from test tubes, flasks, etc. and are simply washed down with water at the sink and flow into the drain.

Emission

The main point source (stationary) emission is from the stack (50m high). Emission management systems (wet scrubber system, dust collector system induced fan system) is installed between boiler unit and the stack. The company will apply wet scrubber method to mitigate emission.

Regular water dozing (water sprinkling) is conducted. Sprinkling/Spraying will suppress fly ash and also greatly reduced PM. Lime water is effective for desulphurization. The company also installs dust collector system to mitigate PM. The dust collected is regularly removed and discharged at the landfill. An induced fan unit will be also installed to enhance the air flow into the stack and beyond. Environmentally the burning of bagasse or rice husk or rice straw is not so bad as the burning of coal (from internet).Therefore factories that use coal as burner used to install electrostatic precipitator (ESP) and continuous flue gas analyzer. Sugar factory that use bagasse as burner do not usually installed ESP or continuous flue gas analyzer. The costs associated with these two equipment's are too high. (Therefore real time monitoring cannot be done yet.)

Mitigation measures are described later in chapter 6, 6.2.1.3.



Figure – 71: Dust collector and ID fan

Effluent

The main source of waste water are from milling plant and process plant; also smaller quantity in occasionally generated from the boiler unit (boiler blow down).

The waste water from the mill plant and process plant will be finally discharged into the ash pond with 4 compartments. The waste water from boiler blow down (together with ash) will flow into the ash pond. All pond will be concrete pond the prevent percolation.

High quantity of water (about 10,000 gallons) have to be used per day but the large majority is recirculated. (Cooling tower and cooling ponds will be constructed). Cooled water will be collected in a large cold water pond. The sediment is mechanically removed once a month. It is expected that large quantity of ash will end up in the ash pond (about 12 tons of bagasse ash will be generated a day). An overhead crane installed over the ash pond will mechanically remove the ash. As mentioned earlier ash will be used as fertilizer or soil conditioner or given away to local sugar cane planters.

The waste water from ash pond processing area all end up in the final waste water pond.

To prevent accidental spillage or over flow network of drainage system is constructed.

No special effluent treatment is considered yet. (When the factory is in operation for some years conventional treatment that involves: screening, sedimentation, aeration, chlorination, and final discharge will be applied, if required. Since the water is almost 90% recirculated. This may not be necessary.

Mitigation measures are described later in chapter 6, 6.2.1.3.

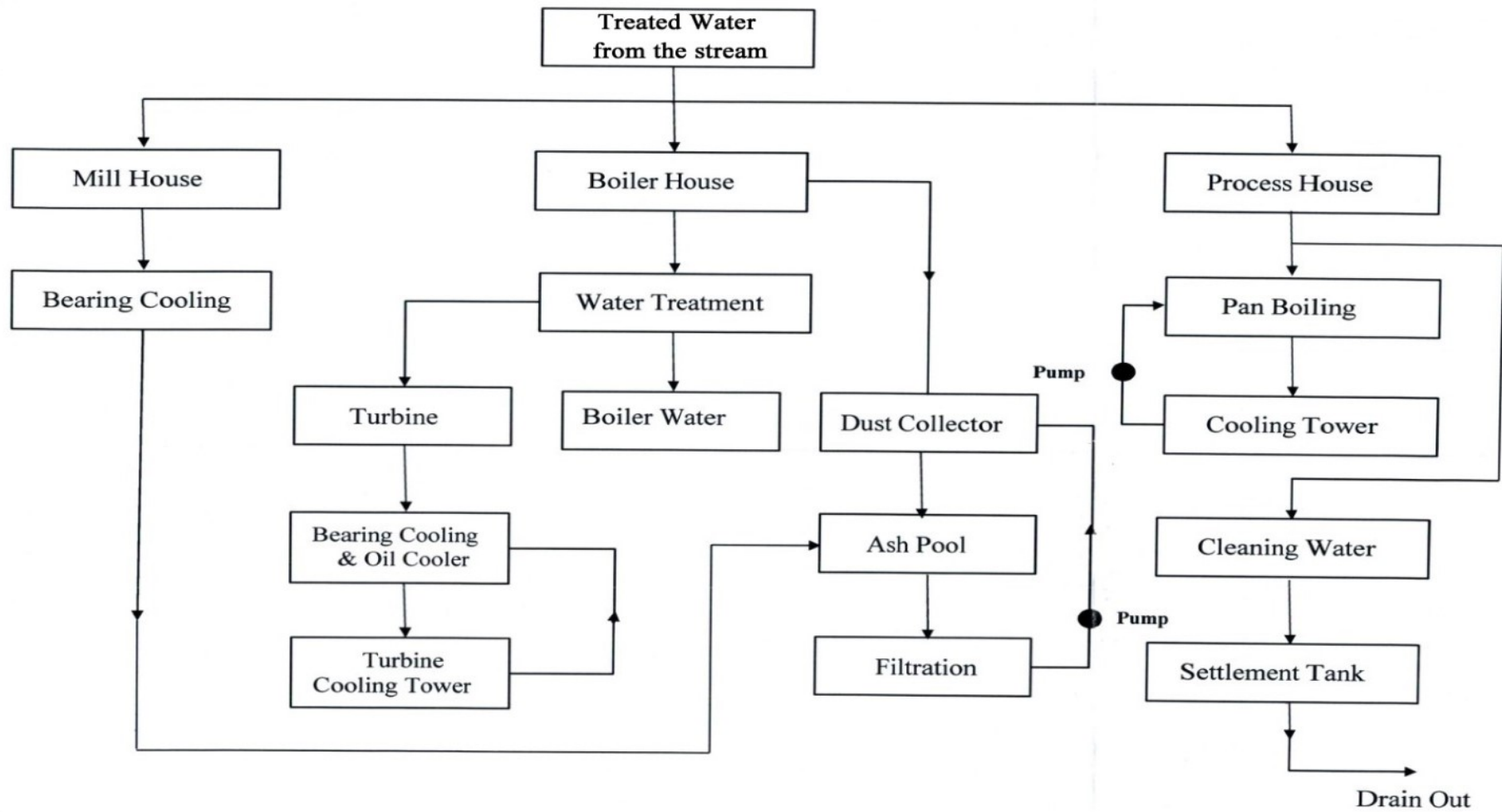


Figure-72: Schematic diagram showing circulation and final discharge



Figure-73: The final waste water pond (part of the water is pumped up and used for watering sugar cane plantation)

Disturbances (Noise, Odour)

A sugar factory is noisy factory. Different option of mitigation measures to be taken are described later in chapter 6, 6.2.1.3.

The one plausible mitigation is wearing of ear plugs, ear muffs by workers exposed to long hour of high noise level.

Odour

Odour is a form of air pollution but the source is from waste water. Waste water especially those from processing plant contain high quantity of organic substance and high BOD, COD levels of not well managed the waste water can emit bad odour.

It is not wise to mitigate odour but it has to be prevented or avoided in the first place. Check the level of BOD, COD and organic waste; control or mitigate to prevent odour. The pragmatic way is not to overload the waste water with organic substances. Regular removal of organic load (sediment) and application of lime powder regularly will mitigate odour. Lime powder is effective for desulphurization and will prevent occurrence of hydrogen sulphide (H₂S).

Options of Mitigation measures to be taken are described later in chapter 6, 6.2.1.3.

(f) Greening; creation of green zone, green belt and green lawns

The project proponent has allotted a space in the eastern part of the premise for the creation of a green lawn and for aesthetic landscaping, where grass, flowering plants and ornamental plants are grown.

In addition shade trees and fruit trees as well as good quality timber producing trees are planted in all available spaces and along both sides of all roads.

The company has set up a plant nursery for big plants and for vegetables. The project proponent has so far planted 5160 teaks, 159 rain trees, 133 jack fruits, 800 *cassia siamea*, 3637 *mangiumcia*, 150,000 golden dewdrop, 6000 *phlox*, 6000 *biophyton sp.*, 354 *mexican bayans*, 329 star flowers, 269 mahogany; among others.

In addition the company is involved in growing a variety of vegetables in large scale and is freely given to its staffs and employees. For instance, vegetables such as:

- Radish, lettuce, gourd, tomatoes, carrot, chili, onion, mustard, pumpkin, bean, water cress, Roselle, lady finger, bitter ground, cucumber, ridged ground, among other.



Figure-74: Greening the factory compound

4.5 Description of selected alternative

From environmental safeguard view point alternative analysis is an important tool for the best selection of the project site, technology to be followed and operational mechanism in term of environmental acceptability of the chosen method. Alternative analysis provides information about the advantages and disadvantages; quantifies the environmental impact to the extent possible and attaches economic values where feasible for each alternative considered.

For successful implementation of a project a number of alternative have to be considered and the better or best alternative have to be selected and implemented.

All alternatives should be taken into consideration during the start of the Preconstruction (Planning) Phase of the project. Alternatives to be considered can be categorized into, site location alternative, relocation alternative, orientation alternative, material alternative, energy alternative, technology (methodology) alternative, demand alternative, supply alternative, activities alternative, and "no go" alternative (no project alternative).

As project operation goes on, mitigation alternative and alternative for better EMP can be also considered.

Two main examples are:

(a) Site location alternative

In this era of environmental awareness the site with the following attributes/characteristics shall not be selected:

- It is inside a protected area or wildlife sanctuary or bird sanctuary or ecologically fragile jungle, wetland etc.
- It is too close to a big lake or reservoir that serves as drinking water source for a city or big community.
- It is inside or too close to historical, cultural religious monuments and archeological sites.
- It is inside agricultural lands or animal farm.
- It is prone to natural disasters eg. earthquakes floods violent storms, land slides etc.
- It has issues of land disputes or land grabbing etc.

Other Alternatives to be considered for site selection include:

- Availability of land
- Accessibility and logistics
- Availability of water and/or natural resources or materials eg. for construction work.
- The price of land
- Locals perception.

(b) The "no go alternative" or "no project alternative"

When the "negative aspects" outweigh "the positive ones" and/or when the disadvantages outweigh the "advantages" then the final decision will be the "no project alternative". Or when it becomes clear that the project is economically, socially and environmentally not feasible the "no project alternative" has to be chosen.

4.6 Comparison and selection of the preferred alternatives

a) Site location alternative

Than Daung Oo Co., Ltd has selected the site because it is devoid of all the six undesirable attributes/characteristics mentioned above (4.5, a).

The land is available at a reasonable price; the locals are quite willing to lease (sell) their land. Accessibility is perfect --- the sugar factory will share the 7 miles access already constructed by the company.

b) Relocation alternative

Relocation alternative to a different site is an alternative available for the project implementation. However there is no reason for relocation. The company has already selected this site and has invested a large sum of money for this.

The company has good relation with the locals who are expecting to grow more sugar cane and boost their economy when the proposed sugar factory is in operation. Many are also expecting for employment opportunities at the proposed sugar factory.

c) Orientation alternative

The factory is a large factory with a capacity of milling 500 tons of sugar cane a day. The design engineers and architects of the company have already carried out meticulous details study for the lay out design. The available land is exactly sufficient for the construction of the sugar factory complex. All available spaces have been allotted for the construction of buildings and structures of the factory complex as well as residential and office area. No better alternative can be considered in term of orientation as there are no more available space left.

d) Material alternative

Materials in the form of building materials and machinery have been already selected during the Preconstruction Phase. When the construction permit is obtained the construction works will commence.

As regards building materials the company had selected locally sourced sand, gravel, cement metal bars, timber etc of quality or accepted material (eg. sand from fresh water rivers/streams is preferred to sand from marine origin).

As regards machinery and equipment the company had selected modern and internationally accepted ones particularly machinery and equipment that are eco-friendly. Ecofriendly machinery are preferred to conventional ones.

e) Energy alternative

Although the site has access to national gridline electricity from Kone Nyo village sub-station, Than Daung Oo Co., Ltd however has its own generator for generation of electricity in case of power failure. Moreover electricity is also produced from boiler. As regards fuel for burner the readily available bagasse waste is preferred to fuel wood. This is an environmentally friendly practice and at the same time it solves the generated waste, bagasse issue. Small quantity of coal has to be used for kindling fire.

Coal is preferred to fire wood as it generates less smoke and no tree has to be cut.

Regarding fuel oil the company has no chance to select sulphur free fuel oil, but to procure fuel oil that is available in the country.

f) Technology/methodology alternative

There are two main technologies for extraction of sugar juice from sugar cane. The so called "pressing or squeezing process" and the "diffusion leaching process". The company prefers "the pressing/squeezing process" to the "diffusion leaching process".

The first one involves roller mills which press out the juice. It is used widely in most countries; and the technology is quite a simple mechanical process but the technology is sound. The second technology, diffusion leaching process involves a complex chemical processes which is not suitable in the region for the time being.

On the whole the company has applied the modern technology rather than the old or conventional technology.

g) Demand alternatives

In the future the company shall consider for the application of solar panels (solar energy) for lighting at night and for domestic used inside the factory compound rather than totally relying on gridline electricity all the time. This can reduce the burden on gridline quite considerably.

h) Supply alternative

For the consumption of water, fuel and energy the company shall adhere to the principle of conservation rather than using them extravagantly; conservation is preferred to extravagance. Rather than totally relying solely on ground water. The company will consider for the harvest of rain. Rain water can be used for watering plants, washing machinery and vehicles, suppressing dust etc.

i) Activities alternatives

The company will educate, train and supervise its staff for good working practice, good safety practice and good environmental practice rather than follow the traditional/conventional way in performing their jobs.

The company will educate and train them to "work smarter" rather than "work harder". "Work smarter" is preferred to "work harder" because it can bring better result.

Will educate them to walk or ride bicycle rather than riding car when commuting to and from workplace to conserve fuel and to contribute to emission reduction. Non-carbon emission commuting is preferred to carbon emission commuting.

j) The "no go alternative" or "no project alternative"

This sugar factory will no doubt contribute to the development of the industrial sector in the form of emergence of a new sugar mill. It will also contribute to the industrial development of food sector in the form of more sugar for local consumption and for export. It will contribute to the stabilization of the sugar market.

Since the advantages outweigh the disadvantages in many aspects the "no project alternative" is out of the question. The project will proceed and progress smoothly. The "no go" or "no project alternative" will only mean that the local area will remain in its previously backward and undeveloped condition.

This last option (alternative), that is the no-go alternative or no project alternative will simply mean no development in the economy of the region and country; no improvement in the sugar cane agricultural sector and the sugar industry. Without this sugar factory the existing land use is not profitable to the optimum; the existing agricultural practices are not as profitable as compared to sugar cane cultivation; and there will be no or little employment opportunities without the sugar factory. None of the benefits realized from this sugar factory will be realized by the country which remains lagging behind in development when compared with its neighbours.

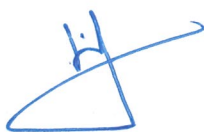
In addition there will be no taxes or revenues for the nation if the no project alternative is selected.

As time goes on during the Operation Phase there can arise "mitigation" alternative and/or "EMP alternative". As new technologies are emerging quite rapidly nowadays the company will be ready to adopt any state-of-the-art technology, or in other words, better alternatives.

When the Operation Phase has ended the company will consider for implementation of decommissioning process and the follow-up rehabilitation process. Instead of following the old conventional approach in undertaking decommissioning task the company will adopt a better decommissioning alternative method which can emerge in the near future.

Commitment

The Project proponent, Than Daung Oo Co., Ltd will do its best for operation of the sugar factory in an environmentally sound manner as far as possible.



U Sein Myo Aung

Executive Director

Than Daung Oo Co., Ltd

5. DESCRIPTION OF THE SURROUNDING ENVIRONMENT

5.1 Setting the study limits

The designated EIA study area is the Than Daung Oo Co., Ltd factory premise of 148 acres and neighbourhood within the 2 miles radius. The surrounding area consists of mostly small fields and farms almost everywhere with no forest. In the adjacent west is the company sugar cane farm (162 acres). Half mile in the south is the Hsen Taw Village and about 1.8 miles further south is the Na Long Village.

The only water course in the south and west is the Nant Laung Stream which meanders along the southern border of the company's sugar cane farm and also the western and northern border of this farm Nant Laung stream generally flows from south to north.

As there is no forest or significant biological component there can be only insignificant or minor impact on the biological environment due to the activities of the project.

The impact on the socio-economic and cultural components will be also minor. There are no important cultural or religious monuments to be impacted by the project's activities.

As a part of socio-economic impact assessment the two villages, Hsen Taw and Na Long, are incorporated into the study area.

The coordinates of these two villages are:

- Hsen Taw village : N. Lat. 22° 19' 34.9" and E. Long. 97° 54' 46.9"
- Na Long village : N. Lat. 22° 18' 03.8" and E. Long. 97° 55' 39.0"

The environmental and social study area covers an area of 12.5 square miles which is mostly occupied by the fields and farms, the factory compound, the adjacent sugar cane field, the abandoned coal mine, and two residential areas (two villages area).

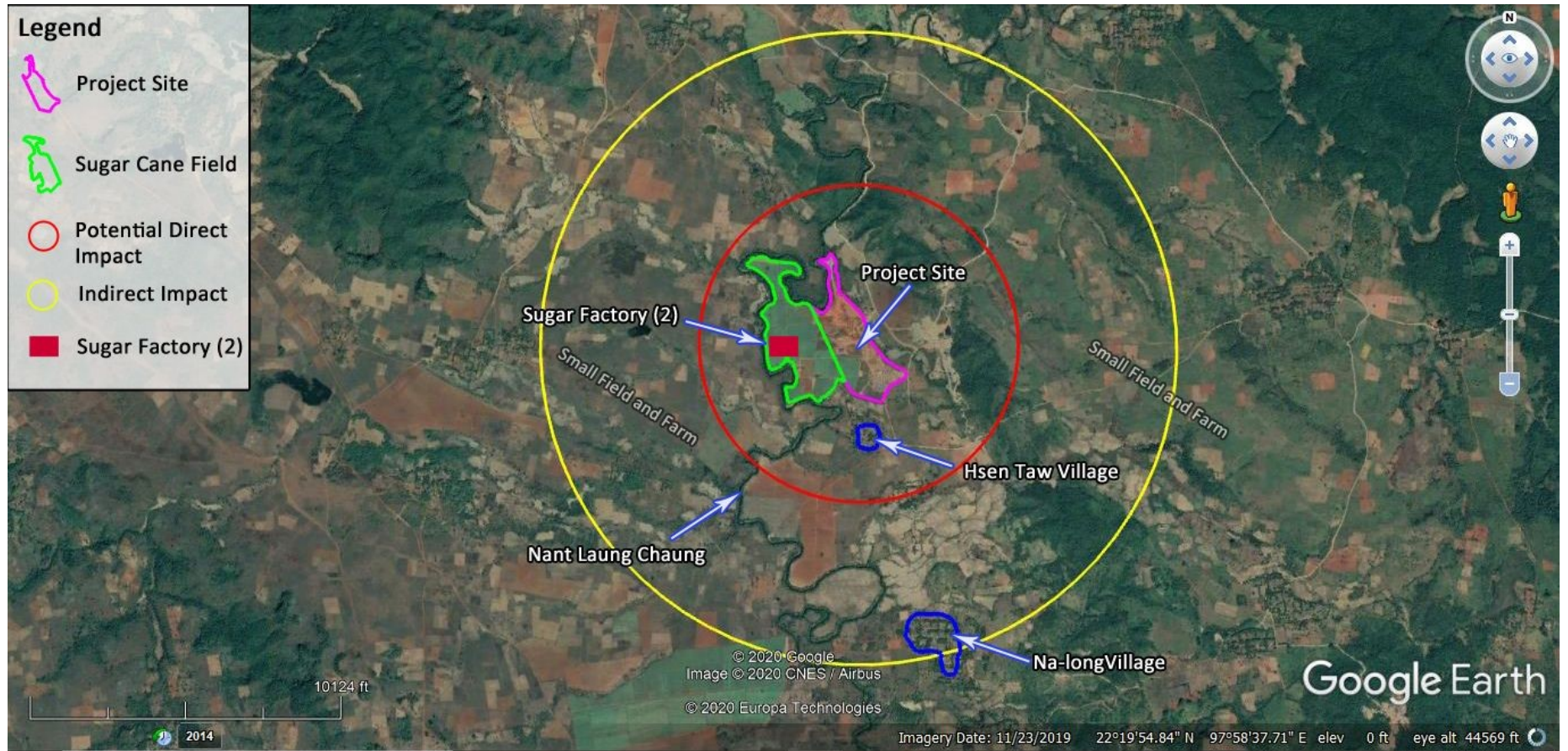


Figure-75: Satellite image showing study area and limits

5.2 Methodology and objectives

EIA work involved the visual inspection of the area, the surveying work and collection of baseline environmental and social data.

The methodology comprises desktop survey, field study, consultation meeting and the gathering of information and data and report writing.

Desktop survey covers the reviewing of all available report and literature.

(a) Physical parameters

The physical data such as air quality, particulate matter (PM), SO₂, NO₂ and noise were all primary data, collected through field survey. The data for water analysis were also primary data. Basic geological data is secondary data from a previous geological data.

All geological data are secondary data from the findings of Myanmar geologists in previous study from internet.

All meteorological data, monthly rainfall, monthly maximum and minimum temperature, humidity, wind speed etc. were secondary data. They were obtained from Mong Yai Township Meteorology Office.

(b) Biological parameters

The data on the biological components particularly flora were all primary data. All data on flora, birds, reptiles, amphibian as well as the large majority of aquatic organisms, if present, were collected through this field surveys.

As wildlife are non-existence in this cultivated area the flora remain the main biological component for study. The flora study involved the overall view of the forest and classification of forest type; distribution pattern, if possible, transect walk through the forest and on the spot identification of species. However in this study there was no forest in the vicinity to study.

(c) Socio-economic parameters

As regards socio-economic data most were secondary data. These were gathered by means of conducting Key Informant Interview (KII) and also from certain Secondary Source (SS). Certain primary data were acquired by means of visual observation, inspection, transect walks and focal group discussion (FGD).

Desktop survey is also sometimes applied if there are previous data and information regarding the socio-economic aspects of the area.

(d) Cultural/religion parameter

As for cultural components there were no important cultural, religious, historical and archeological monuments or sites in the area. The exceptional case: there is one Buddhsit monastery in Na Long village while there is none in Hsen Taw village.

There is no likelihood of that monastery to be impacted by this project.

(e) Visual component parameter

In the case of visual component there is no visual component to be impacted by the project.

There are no outstanding landmark and site of aesthetic beauty and scenic spots to be impacted. There are only numerous small fields and farms.

Tools, instruments, data and information

Advanced tools such as EPAS air sampler and EPAS Haz scanner with auto sensors are used. The EXTECH Sound Level Meter is used for measuring sound level. The BEME-TECH Vibration Meter is used for measuring vibration.

Portable water test kits are not so reliable and water samples have to be brought back to Yangon for analysis at a registered private laboratory. The technicians at this laboratory carried out the analysis work.

All geological data are secondary information from the findings of geologists in previous study.

All meteorological data, monthly rainfall, monthly maximum and minimum temperature, humidity, wind speed etc. were secondary data. They were obtained from Mong Yai Township Meteorology Office.

The essential tool for EIA biological survey work include computer, GPS, camera, telescopes (especially for birds) binoculars, hand lens, compass, herbarium press, measuring tapes, ropes, pruners and cutter, tool for catching and trapping wild life (snare, trap, scoop, nets stakes etc), lamp and torch for night survey for nocturnal animals. Chemical preservatives (alcohol, formalin) together with plastic containers of various sizes for the preservation of specimens (especially those that could not be identified during the survey trip but to be identified later) were also necessary.

As there is no forest Google earth satellite imagery was applied only for overview survey of the wide area in generate, comprising fields and farms, project areas, areas of 2 villages, stretch of Nant Laung stream, and bush here and there.

Objective

The main objective is the collection, recording and documentation of all baseline data on the physical, biological, socio-economic, cultural and visual components of the area for the preparation of EIA report.

Another objective is the gathering of all available secondary information and practical as possible.

5.3 Public administration and planning

Hsen Taw village and Na Long village are under the jurisdiction of Ko Hsaing village tract, Mong Yai Township, Lashio District, Shan State.

At the moment there is no known industrial development plan for the area from the Union level, State level and Township level. There is also no known rural development, urban development and agricultural development plan for the area at the Union level, State level and Township level.

So far, there is no known plan for socio-economic development for Ko Hsaing Village Tract. There is yet, no such plan for future agricultural development or industrial development for this area. There is yet, no such plan at the Union Government level, Shan State level and at Mong Yai Township level.

There may be certain rural development plan, (general socio-economic aspects) implemented by NGO or INGO in the area but the EIA team does not have yet any information about this.

Except the existing Than Daung Oo Sugar Factory (1) there are no other existing sugar factories owned by other companies and also no other factories or plants or industrial establishments in the area.

However, Than Daung Oo Co., Ltd has a plan for establishing a new sugar factory, to be called Than Daung Oo Sugar Factory (2) just west of the existing factory, inside the sugar cane field No.1.

5.4 Legally protected area

The 148 acres plot was purchased by the company from U Lone Hsaing, a local. In the adjacent west is the 162 acres sugar cane field No.1 owned by the company.

There is no Reserved Forest or legally protected areas in this area. The whole area outside the factory compound comprises farmland, gently undulating terrain and residential areas, that is, the two village areas.

There are no clearly demarcated public forests, in near and far vicinity. There are also no parks, wildlife sanctuaries, scientific reserves, nature reserves, geophysical significant reserves, nature reserves nominated by MONREC, protected archeological area or area of historical significance.

There are no known protected cultural heritage spots in the form of a big sacred tree or sacred rock.

In the north east about ½ mile away is a low mountain range running from northwest to south east direction with degraded forest.

5.5 Physical components of the surrounding environment

5.5.1 Topography

The area on the whole is a relatively flat terrain area of the high land Shan plateau, with a low mountain range 3 ½ miles in the north east. Small plots of sugar cane field, rice fields, peanut and maize farms dominate the area with only 2 villages in the south. There are no forests in the vicinity.

The only water source in the Nant Laung Chaung, a relatively large stream, which generally flows from a south to north direction, but greatly meandering along its source.

The elevation at the project site is 2790 feet asl.



Figure – 76: Panoramic view of the area

5.5.2 Water courses

The above-mentioned Nant Laung stream is the main water course of the area. There are also some much smaller streams and springs in the area. For example, the villagers of Hsen Taw source their water from a small stream (no name) and spring, while the villagers of Na Long source their water from a small stream, Nant Khan Stream and also from man-made water pools beside that stream.

There are no shallow wells or tube wells in both villages.

5.5.3 Geology, soil and hydrology/hydro geology

The data on geology etc. are the secondary data obtained from the geologists.

The region is within the Eastern Highland Belt, Geo-tectonic zone of Myanmar. This belt is characterized by major geologic components such as highly folded rocks of Paleozoic Era, partly metamorphosed. There are limestone layers in two horizons; one in Silurian to Devonian Periods, another in carboniferous to Permian Periods.

The project site is underlain and dominated by limestone of Permian to Triassic Periods.

The limestone is massive and its bedding, which is stiff and jointed at an interval of 50cm to 3m is scarcely seen at the site.

Geological components distributed at the project site generally from top to bottom are: to top soil, debris deposit and calcite deposit, siltstone and limestone.

The top soil includes organic debris (humus) sand, sandy clay and certain gravel. The soil type on the whole is highly leached, iron-rich and reddish brown soil. The soil type, according to FAO classification, is Acrisol.

As mentioned earlier there is a relatively large stream, Nant Laung Chaung, greatly meandering from south to north, west of the project site along the western border of sugar cane field No.1, owned by the company. It is a relatively slow flowing stream with clear water.

The depth of the stream water near the project site is relatively deep, about waist depth.

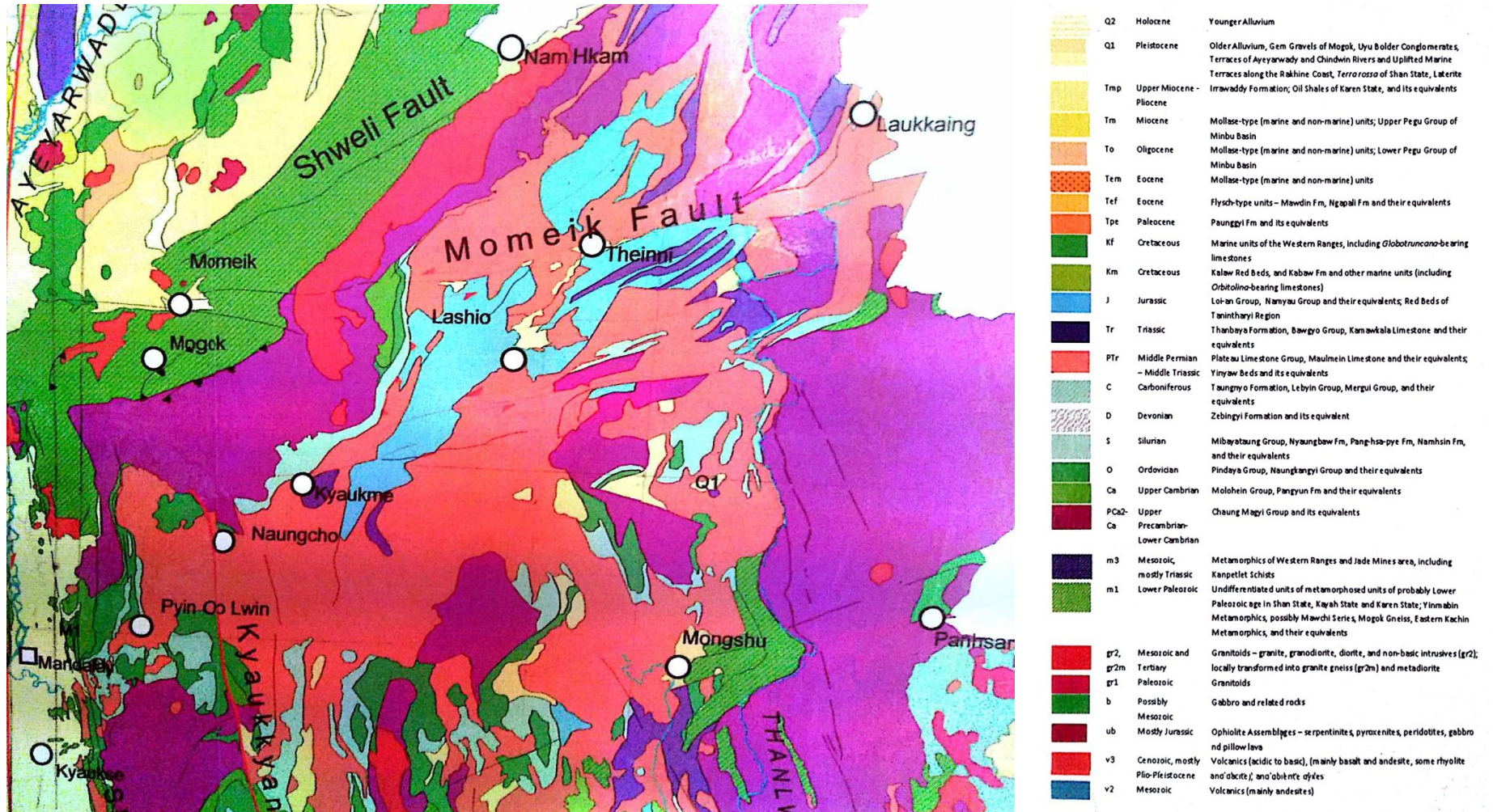


Figure-77: General geology of the area

Soil samples (surface soil)

Soil samples were collected from the following points.

1. Project Site, coordinates : N. Lat. 22° 20' 19.9"; E. Long. 97° 54' 40.8";
date: 11-6-2023
2. Na Long village, coordinate : N. Lat. 22° 18' 03.5"; E. Long. 97° 55' 38.7";
date: 11-6-2023
3. Hsen Taw village, coordinate : N. Lat. 22° 19' 34.5"; E. Long. 97° 54' 46.4";
date: 11-6-2023

The soil samples were brought back to Yangon and analysed at the Ministry of Agriculture and Irrigation (Department of Land Use) laboratory.

Soil samples were test for heavy metals such as Lead (Pb), Chromium (Cr) and Cadmium (Cd) only.

The results are as follow:

Soil test results

Sr. No	Sample plot	Units	Lead (Pb)	Cadmium (Cd)	Chromium (Cr)
1.	At the factory	ppm	2	Not Detected	Not Detected
2.	Na Long village	ppm	2.72	0.004	Not Detected
3.	Hsen Taw village	ppm	1.78	0.006	Not Detected

Note: The values at all 3 points are lower than Maximum permissible limit (MPL). Ref: FAO, U. Ewers (1999). Cadmium was not detected at the project site; while Chromium was not detected at all 3 points.

The soil samples were free of contamination by fuel, hydrocarbons, SO₂ and toxic substances.



Figure – 78: Taking soil sample from the project site



Figure – 79: Taking soil sample from Na Long village



Figure – 80: Taking soil sample from Hsen Taw village

5.5.4 Environmental quality

(a) Water quality

Water samples were collected from the following collection points on 12-6-2023.

1. At the factory, coordinates:
 - (a) Discharge water : N. Lat. 22° 20' 22.0"; E. Long. 97° 54' 23.0"
 - (b) Waste water pond (final) : N. Lat. 22° 20' 18.42"; E. Long. 97° 54' 20.54"
2. Na Long village, coordinate : N. Lat. 22° 18' 02.7"; E. Long. 97° 55' 38.1"
3. Hsen Taw village, coordinate : N. Lat. 22° 19' 39.5"; E. Long. 97° 54' 50.2"
4. Four points along the Nant Laung Chaung, Coordinates:
 - Point St.1 : N. Lat. 22° 20' 37.72"; E. Long. 97° 54' 32.50"
 - Point St.2 : N. Lat. 22° 20' 10.1"; E. Long. 97° 54' 11.0"
 - Point St.3 : N. Lat. 22° 20' 00.0"; E. Long. 97° 54' 22.4"
 - Point St.4 : N. Lat. 22° 19' 46.53"; E. Long. 97° 54' 39.37"

The water samples were kept in the sampling bottles provided by the laboratory (sealed with black plastic sheets) and brought back to Yangon (no preservatives used) and analysed at a registered laboratory, the ISO.TECH laboratory, Insein, Yangon. (Also see ANNEX).



Figure – 81: Water sample taken from discharge water



Figure – 82: Water sample taken from waste water pond (final)



Figure – 83: Water sample taken from Nant Laung Chaung (St.1)



Figure – 84: Water sample taken from Nant Laung Chaung (St.2)



Figure – 85: Water sample taken from Nant Laung Chaung (St.3)



Figure – 86: Water sample taken from Nant Laung Chaung (St.4)



Figure – 87: Water sample taken from Na Long Village



Figure – 88: Water sample taken from Hsen Taw Village

Table – 1: Results of effluents

Sr. No.	Parameters	Final discharge raw water	Final waste water pond	NEQEG guideline value
1	5-day Biochemical oxygen demand	10	40	50 mg/l
2	Chemical oxygen demand	32	96	250 mg/l
3	Oil and grease	<5	6	10 mg/l
4	pH	7.6	8.0	6-9 S.U
5	Temperature increase	25°	25°	< 3 °C
6	Total coliform	40 CFU/100ml	80 CFU/100ml	400 CFU/100ml
7	Total nitrogen	15.6	8.7	10 mg/l
8	Total phosphorus	1	4.7	2 mg/l
9	Total suspended solid	22	55	50 mg/l

Note – Regarding the values at the factory (discharge water and final waste water pond); generally they are within the standard values. The exceptional cases: total nitrogen at final waste water pond, total phosphorus at discharge water and TSS at waste water pond are higher than the standard values.

The reason or reasons were not exactly known. However, it can be speculated that the organic contents in the waste water (effluent) was high.

The results are as follow:

Table-2: Results of effluents water quality at four points along the stream and at two villages

Sr.	Parameters	St.1	St.2	St.3	St.4	Na Long village	Hsen Taw village	MNDWQS guideline values
1	Total coliform	30 CFU/100 ml	30 CFU/100 ml	36 CFU/100 ml	10 CFU/100 ml	40 CFU/100 ml	8 CFU/100 ml	3 (0-100 per ml)
2	Fecal coliform	10 CFU/100 ml	10 CFU/100 ml	12 CFU/100 ml	4 CFU/100 ml	12 CFU/100 ml	2CFU/100 ml	0 (0-100 per ml)
3	Colour	10	20	30	5	40	5	Non-set, TCU 15
4	Turbidity	26	38	52	10	62	7	NTU 5
5	Arsenic	Nil	Nil	Nil	Nil	Nil	Nil	0.05 mg/l
6	Nitrate	0.6	5.3	0.8	0.7	1.0	0.5	50 mg/l
7	Manganese	Nil	Nil	Nil	Nil	Nil	Nil	0.4 mg/l
8	Chloride	3	3	3	3	2	4	250 mg/l
9	Hardness	144	140	140	142	142	154	500 mg/l (as CaCO ₃)
10	Iron	0.62	0.77	0.82	0.38	0.89	0.35	1 mg/l
11	pH	7.2	7.3	7.3	7.3	7.4	7.3	6.5 – 8.5
12	Sulphate	10	18	20	13	25	15	250 mg/l
13	Total dissolved solid	150	147	149	149	213	170	1000 mg/l

Note – With the exception of turbidity and color all the values were lower than the Myanmar National Drinking Water Quality Standard guideline values. **The reason or reasons were not exactly known.** The nature of slow flowing Nant Laung Chaung is relatively turbid. The values for turbidity at all six points were higher than the standard NTU 5. The unit used for total coliform and fecal coliform (based on 100 ml) are also lower than the guideline value

(b) Ambient air quality

Ambient air qualities were measured at the following 3 points:

1. At the factory; coordinate : N. Lat. 22° 20' 19.7"; E. Long. 97° 54' 41.5"; date: 7-6-2023
2. At the Na Long village : N. Lat. 22° 18' 03.8"; E. Long. 97° 55' 39.0"; date: 8-6-2023
3. At the Hsen Taw village : N. Lat. 22° 19' 34.9"; E. Long. 97° 54' 46.9"; date: 9-6-2023



Figure – 89: Measuring air quality at factory



Figure – 90: Measuring air quality at Na Long village



Figure – 91: Measuring air quality at Hsen Taw village

PM₁₀, PM_{2.5}, SO₂ and other 7 parameters were measured for 24 hours period; Ozone for 8 hours period and NO₂ for 1 hour period.

The equipment used was EPAS air sampler, EPAS Haz Scanner.

The results were as follow:

Table-3: Results of ambient air quality

Parameter	Units	At factory	Na Long village	Hsen Taw village	NEQEG Guideline Value (µg/m ³)
Nitrogen dioxide	µg/m ³	15.91	20.56	35.76	200 µg/m ³ (per hour)
Ozone	µg/m ³	0.88	0.82	0.79	100 µg/m ³ (8 hrs period)
PM ₁₀	µg/m ³	55.62	20.23	27.44	50 µg/m ³ (24 hrs)
PM _{2.5}	µg/m ³	35.50	10.75	15.76	25 µg/m ³ (24 hrs)
Sulfur dioxide	µg/m ³	3.15	0	0	20 µg/m ³ (24 hrs)
VOC	ppb	0.02	0	ND	NG
Ammonia	ppm	4	0	2.92	NG
Carbon dioxide	ppm	329.07	309.63	284.58	NG
Carbon monoxide	ppm	2.35	0	0.11	NG
Oxygen	%	20.44	20.30	20.58	NG
Wind direction	-	SE	SW	SE	NG
Wind speed	mph	1.91	1.35	0.24	NG

Note – On the whole the values were within the guideline values, except PM₁₀ and PM_{2.5} at the factory premise where the values were a little higher. These might be due to activities taking places at the factory during the time of survey work. Guideline values for some parameters, not available.



Figure: Wind Speed and Wind Direction 7.6.2023 - 8.6.2023 (Blowing From)

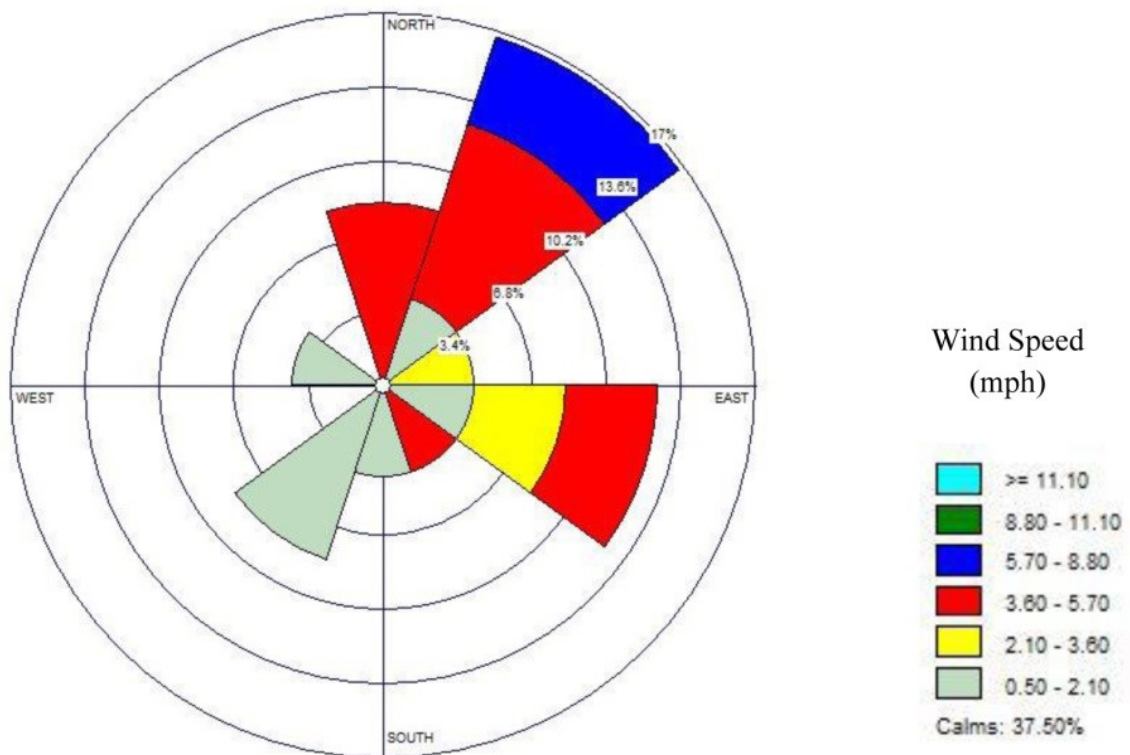


Figure-92: Wind rose map for one day (at factory)

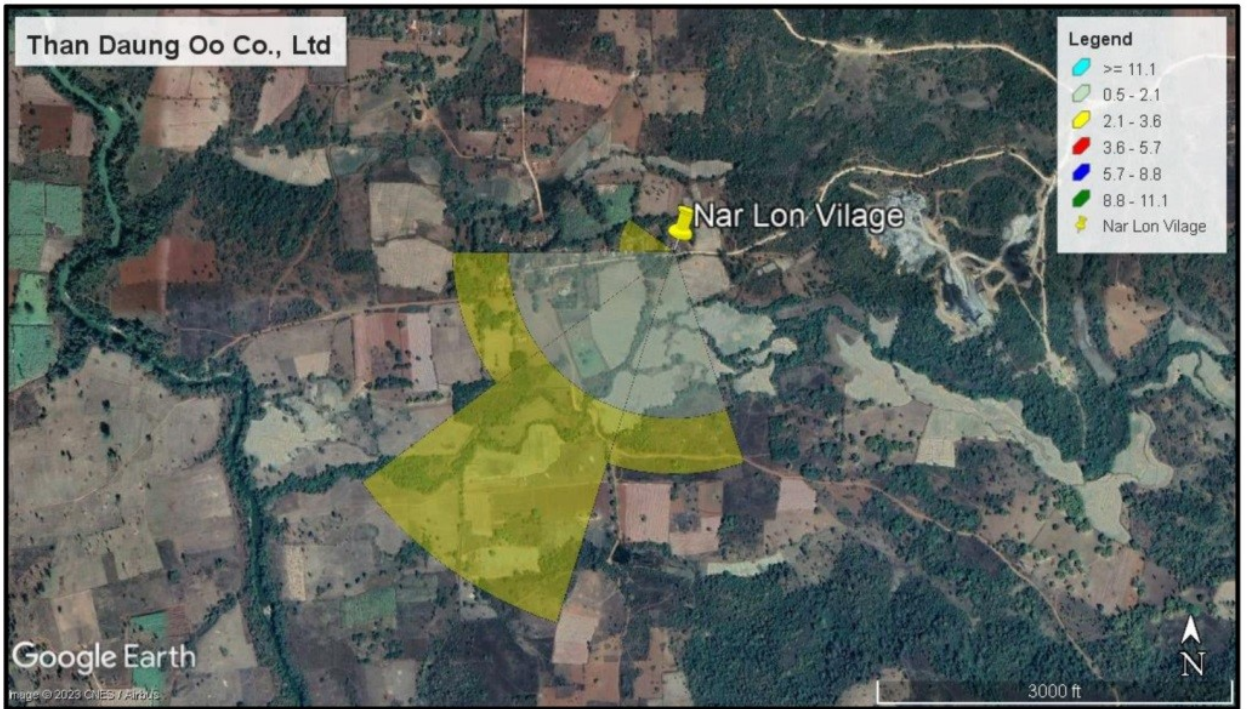


Figure: Wind Speed and Wind Direction 8.6.2023 - 9.6.2023 (Blowing From)

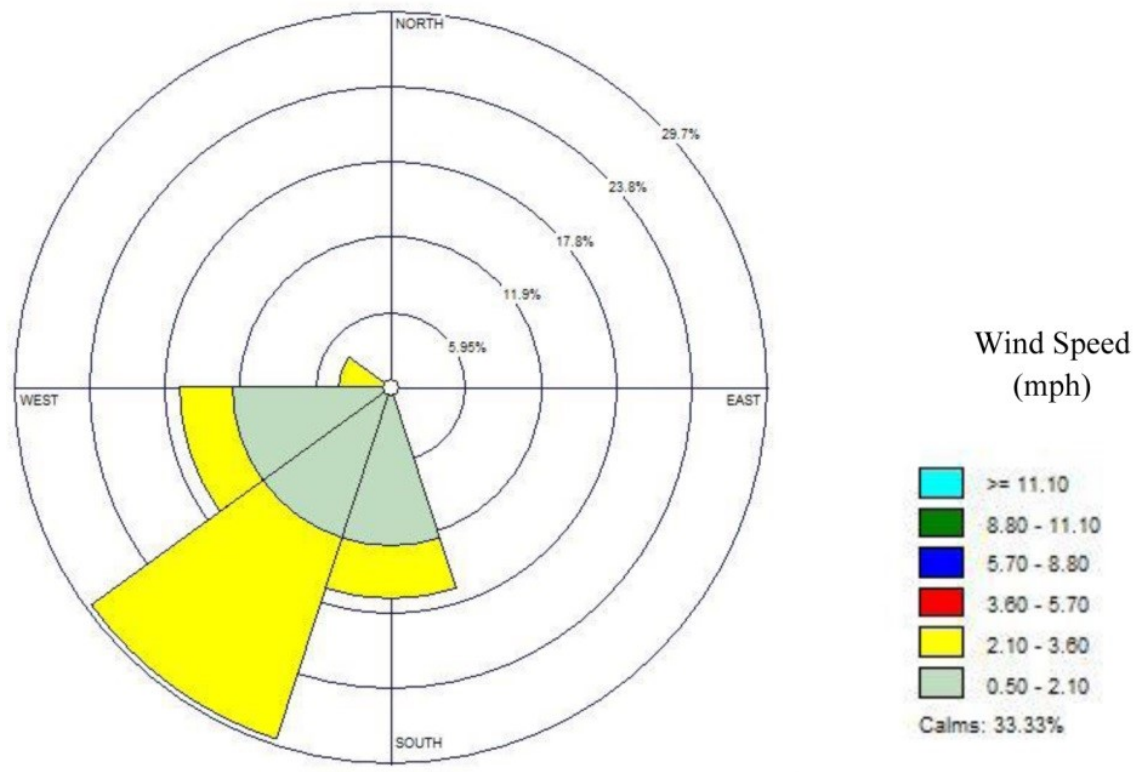


Figure-93: Wind rose map for one day (Na Long village)



Figure: Wind Speed and Wind Direction 9.6.2023 - 10.6.2023 (Blowing From)



Figure-94: Wind rose map for one day (Hsen Taw village)

Emission at stack

Bagasse was used as fuel burner for boiler. The emission at stack (50m) was measured and the results were as follow:

At factory premise; coordinate : N. Lat. 22° 20' 19.68"; E. Long. 97° 54' 39.83"



Figure-95: Measuring stack emission

The results were as follow:

Table-4: Results of stack emission

Sr. No.	Parameter	Units	Measurement Result	Small Combustion Facilities Emission Guideline
1	O ₂	%	18.23	-
2	CO	mg/Nm ³	3429	-
3	CO ₂	%	2.6	-
4	NO ₂	mg/Nm ³	52	650
5	SO ₂	mg/Nm ³	97	2000
6	PI	%	0.62	

Note – Small combustion facilities emission guideline values for some parameter, e.g. O₂, CO, CO₂, PI were not available.

(c) Noise level

Noise levels (sound levels) were measured at three points/spots as follow:

- (1) At factory premise; coordinate : N. Lat. 22° 20' 19.7"; E. Long. 97° 54' 41.5";
date: 7-6-2023
- (2) At Na Long village; coordinate : N. Lat. 22° 18' 03.8"; E. Long. 97° 55' 39.0";
date: 8-6-2023
- (3) At Hsen Taw village; coordinate : N. Lat. 22° 19' 34.9"; E. Long. 97° 54' 46.9";
date: 9-6-2023

EXTECH sound level meter was used for measuring sound level.

Vibration was measured only inside the factory; BEME-TECH vibration meter was used.

Sound (noise) levels were measured for 24 hours period while vibration was measured for 1 hour.



Figure-96: Measuring noise level at factory



Figure-97: Measuring noise level at Na Long village



Figure-98: Measuring noise level at Hsen Taw village

Table-5: Quality of ambient noise level (dBA) by sample sites (compared with NEQEG guideline)

	At the factory site		At Na Long village		At Hsen Taw village		NEQEG guideline	
	Day	Night	Day	Night	Day	Night	Day	Night
(Residential, institutional, educational)	-	-	59.83	51.76	54.66	50.82	55	45
(Industrial, commercial)	78.27	80.93	-	-	-	-	70	70

Note – On the whole the noise level were higher than the guidelines values. At the factory the noise level for "industrial, commercial area" was higher than the guideline values.

In the same way the noise level values at Na Long village (residential area) were higher than the guideline values. At Hsen Taw village the value for day time was a little lower but that for night time was higher than the guideline value.

As the factory is in operation day and night the noise levels (day and night) were always high due to higher activities. Generator has to be used for measuring noise level at village, that is the reason why the noise levels are relatively high.

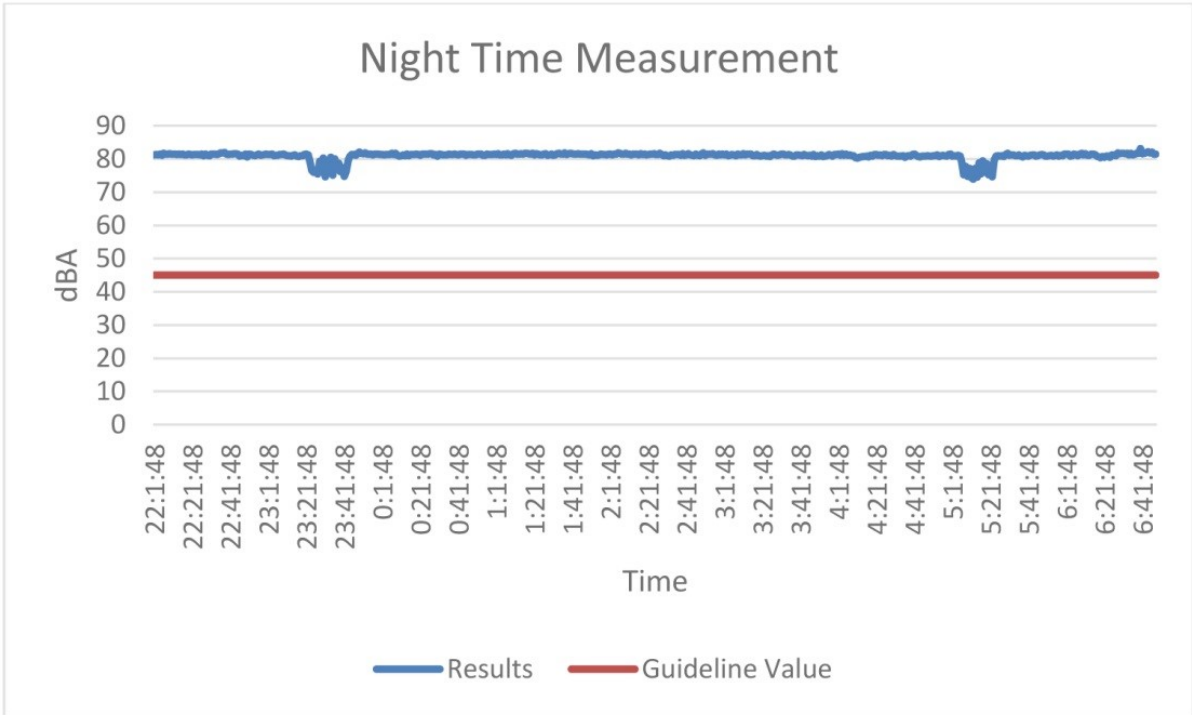
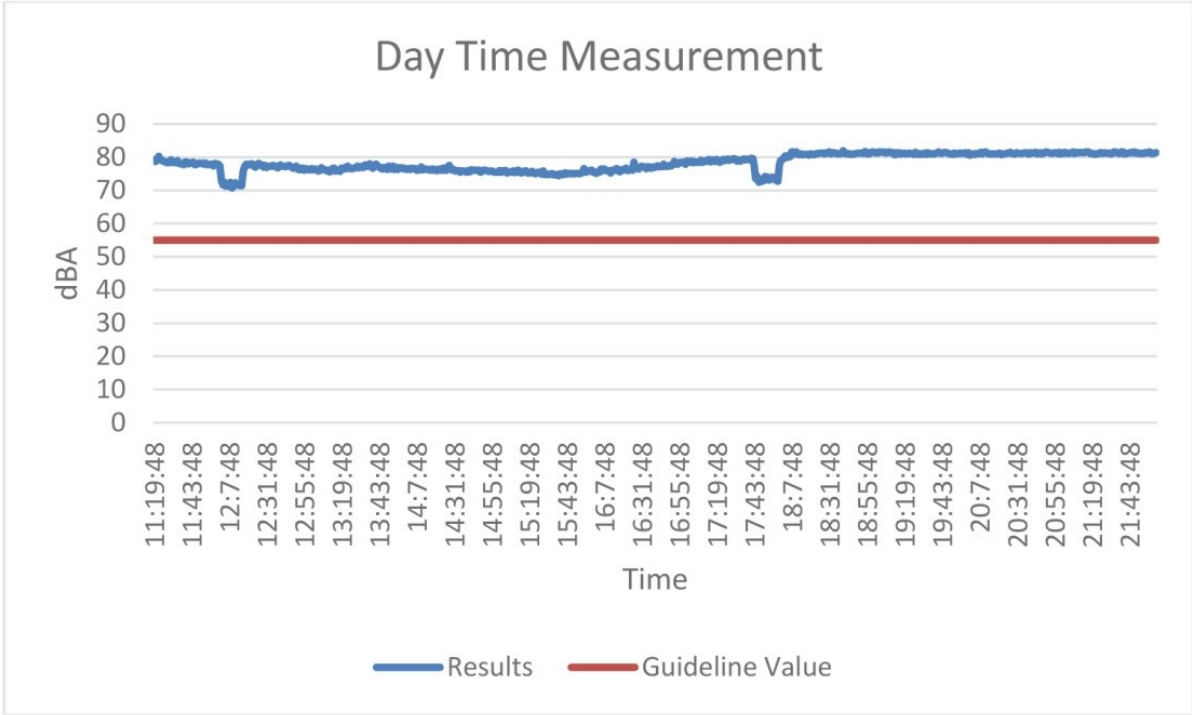


Figure-99: Noise measurement record for factory

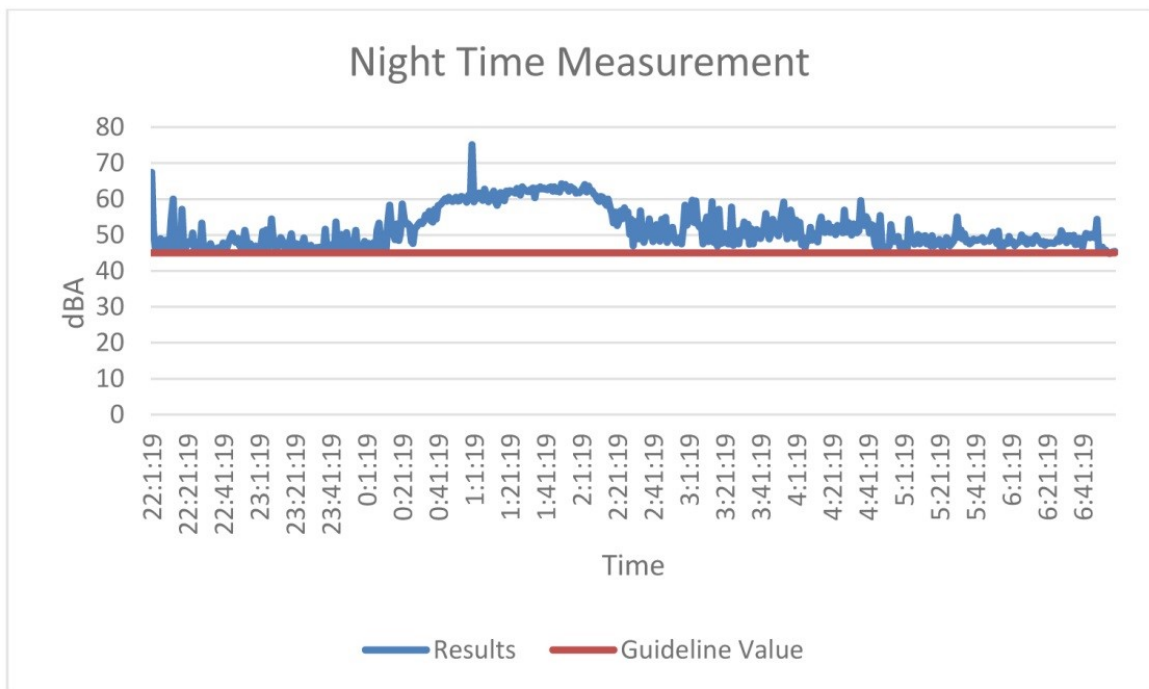
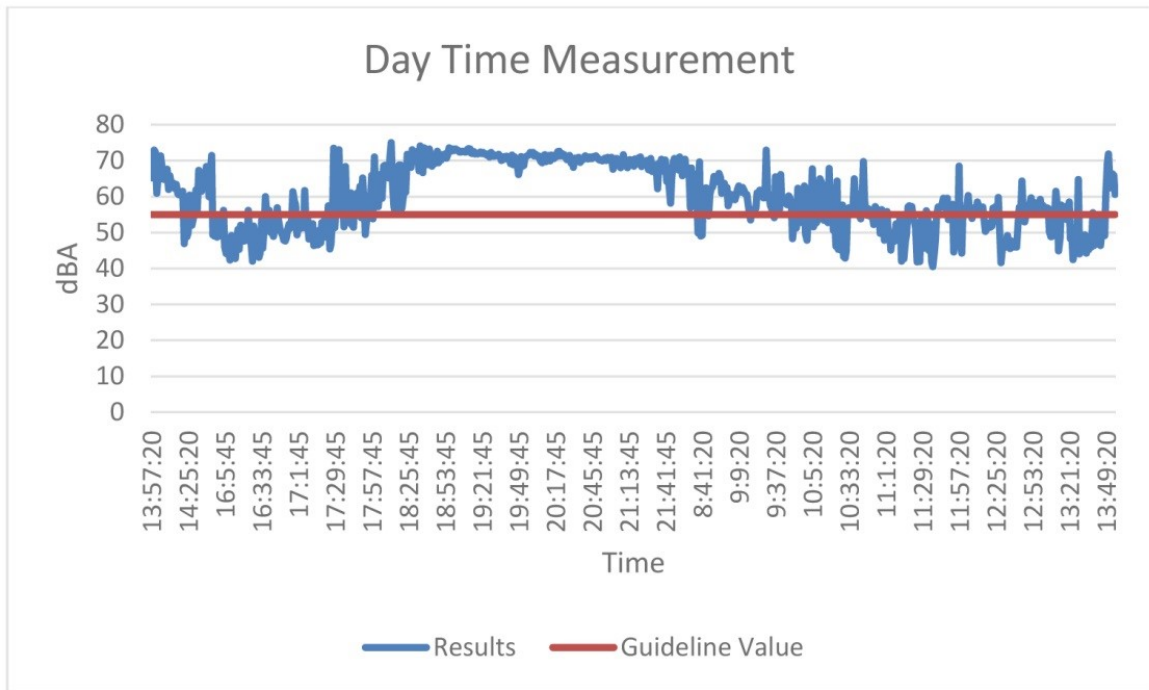


Figure-100: Noise measurement record for Na Long village

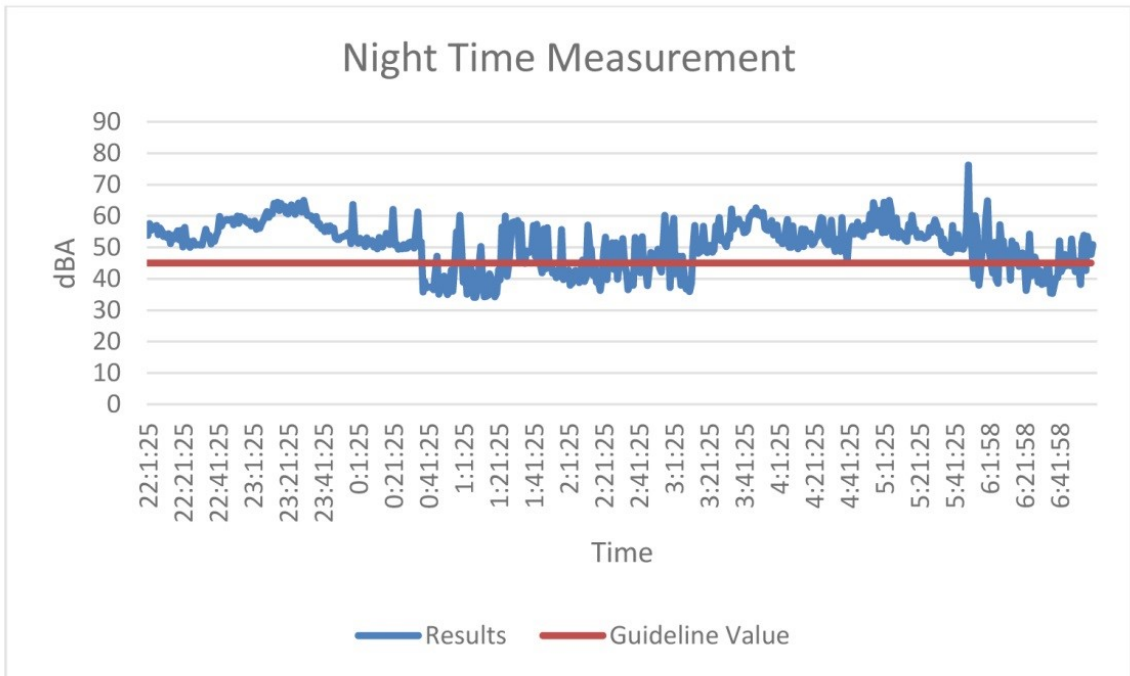
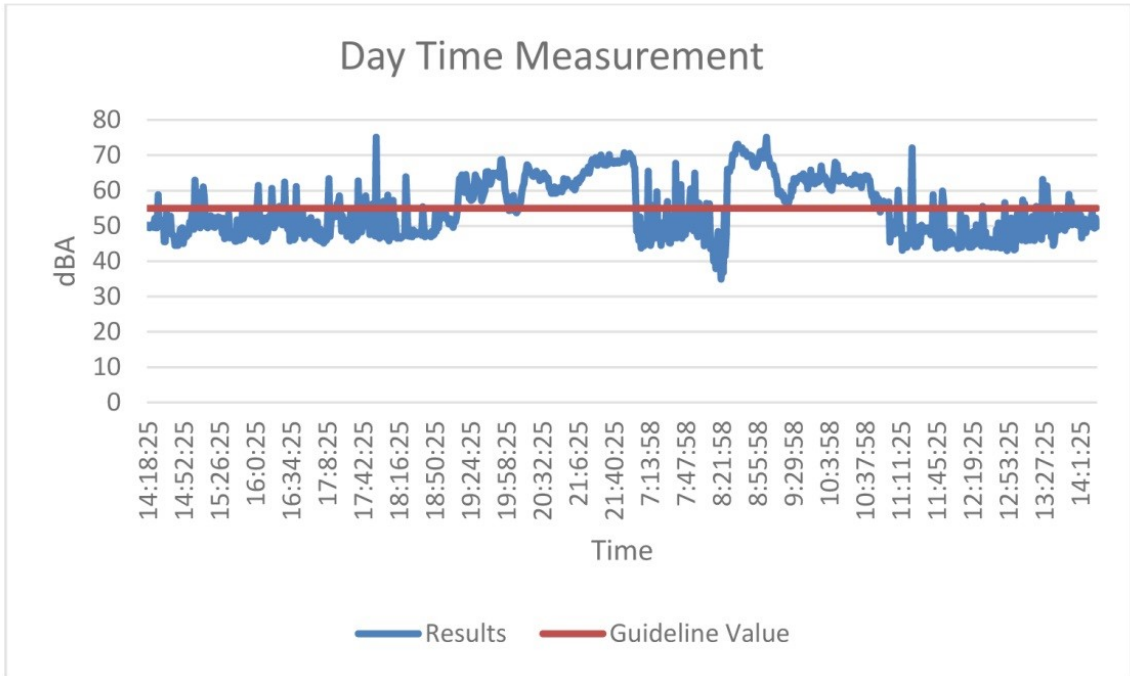
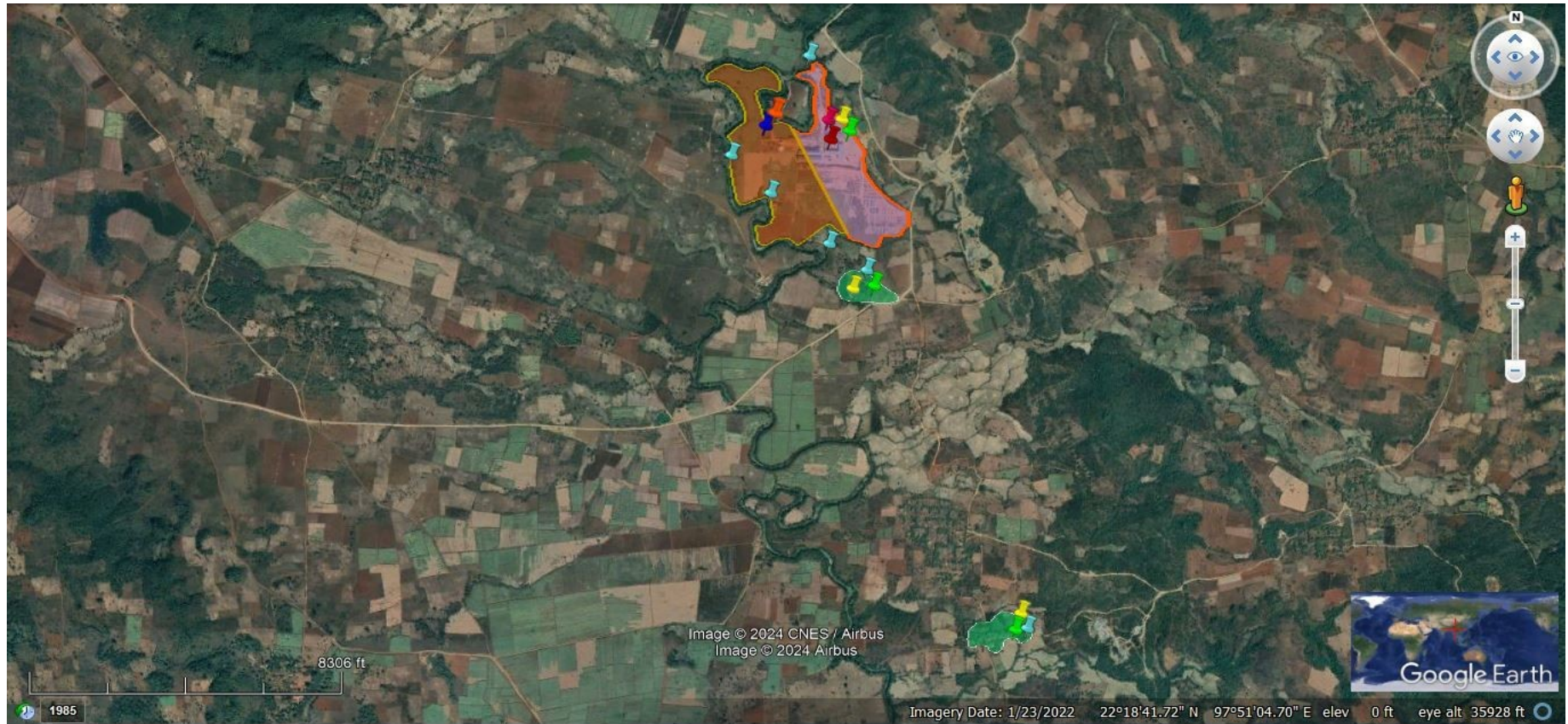


Figure-101: Noise measurement record for Hsen Taw village

Vibration

At factory premise; coordinate : N. Lat. 22° 20' 14.64"; E. Long. 97° 54' 42.91"; date: 7-6-2023. The result is 2.1 mm/s inside the factory.



LEGEND

- | | | |
|--|---|---|
|  Measuring points of air and, noise |  Sampling points of water |  Measuring point of waste water pond (final) |
|  Sampling points of soil |  Measuring point of stack emission |  Measuring point of discharge water |
| | |  Measuring point of vibration |

Figure – 102: Satellite image showing spots where air quality, noise level, stack emission, vibration were measured and soil and water samples were taken

5.5.5 Climate

The climate is the hot wet tropical monsoon climate with relatively high temperature the whole year through. But as the elevation is relatively high it is cool to relatively cold in the cool season. There is a dry season (March – June) a wet season (June to September) and a cool season (November – end of February). This is just the generalized pattern.

Table – (6), (7), (8), (9) and (10) show the monthly maximum, minimum mean temperature, rainfall, humidity, wind speed and evaporation during (2010-2023). The data were secondary ones acquired from the Mong Yai Township Meterology and Hydrology Department.

Table – 6: Monthly minimum and maximum temperature (°C) of Mong Yai Township during 2013-2023 May

MONTHLY TEMPERATURE(DEGREE CENTEGRADE) OF MONGYAI FOR (2010-2014)									
2010		2011		2012		2013		2014	
MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
28.4	4.9	25.1	5.9	25.9	6.2	26.1	6.0	26.5	6.0
29.5	5.8	28.4	5.6	29.6	5.9	30.9	9.1	28.4	7.8
31.8	11.4	29.3	11.4	31.8	10.6	32.9	11.9	32.2	11.7
33.7	17.0	30.8	15.8	33.3	15.5	34.4	15.9	34.0	15.6
33.8	20.6	30.9	15.8	33.5	19.6	31.0	19.6	33.1	20.3
30.7	21.9	30.1	21.9	31.3	22.1	31.5	21.6	31.8	22.8
29.5	20.5	30.6	21.6	29.5	21.8	29.3	22.0	30.0	22.7
30.5	21.6	29.8	21.2	30.4	21.5	29.4	21.6	29.7	22.3
30.5	20.6	30.5	21.3	30.5	19.7	30.3	21.2	30.2	21.4
29.2	18.5	29.1	18.5	30.7	17.7	28.2	18.9	29.2	18.2
27.2	12.2	27.6	11.0	28.1	15.6	29.4	14.2	27.9	14.3
25.2	8.1	25.7	9.3	26.2	8.4	24.4	8.4	25.7	9.3

MONTHLY TEMPERATURE(DEGREE CENTEGRADE) OF MONGYAI FOR (2015-2019)									
2015		2016		2017		2018		2019	
MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
24.7	9.1	23.2	6.9	25.1	8.4	25.4	8.6	26.4	8.8
27.5	7.3	26.9	9.6	28.1	9.0	28.3	8.8	27.6	8.9
323.0	11.7	31.3	13.0	30.1	12.4	32.4	12.0	32.1	11.7
31.0	17.2	34.0	16.6	34.1	16.6	32.2	16.4	32.3	16.8
32.5	19.5	31.4	19.7	35.4	20.2	32.6	20.1	31.4	20.4
31.1	22.4	30.4	22.6	32.1	22.9	31.1	22.5	30.7	22.7
28.5	22.0	29.2	22.0	29.9	22.6	30.7	23.0	30.9	22.8
29.6	22.4	30.6	22.1	31.6	22.6	30.0	22.6	29.5	22.3
30.8	22.0	30.7	21.5	30.8	20.9	31.7	21.9	31.1	21.3
28.6	17.5	30.1	20.2	30.4	19.5	30.4	20.5	31.2	20.8
27.4	14.4	28.4	15.5	28.9	15.0	28.6	13.7	28.4	16.0
24.6	11.2	26.9	10.8	25.5	8.0	26.4	9.2	26.2	11.3

MONTH	MONTHLY TEMPERATURE(DEGREE CENTEGRADE) OF MONGYAI FOR (2020-2023)									
	2020		2021		2022		2023		2024	
	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
JANUARY	25.4	8.6	26.4	8.8	25.3	9.0	27.0	7.1		
FEBRUARY	28.3	8.8	27.6	8.9	27.6	6.6	29.5	9.8		
MARCH	32.4	12.0	32.1	11.7	33.0	14.2	30.9	13.4		
APRIL	32.2	16.4	32.3	16.8	31.3	17.5	34.5	16.7		
MAY	32.6	20.1	31.4	20.4	30.1	20.4	32.1	20.0		
JUNE	31.1	22.5	30.7	22.7	30.0	22.5				
JULY	30.7	23.0	30.9	22.8	31.7	22.4				
AUGUST	30.0	22.6	29.5	22.3	31.5	22.5				
SEPTEMBER	31.7	21.9	31.1	21.3	31.1	21.8				
OCTOBER	30.4	20.5	31.2	20.8	30.2	20.1				
NOVEMBER	28.6	13.7	28.4	16.0	29.7	12.8				
DECEMBER	26.4	9.2	26.2	11.3	27.1	11.7				

During the last 14 years, the month May, 2017, had recorded the highest temperature (35.4°C) while January 2010 had the lowest temperature record (4.9 °C).

Table – 7: Shows the monthly rainfall and total rainfall of Mong Yai Township during 2010-2023

Month	MONTHLY RAINFALL (INCHES) OF MONGYAI FOR (2010-2019)									
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
January	–	0.20	0.43	0.20	–	2.17	0.39	0.63	1.93	2.95
February	–	–	–	–	1.06	–	0.95	–	Trace	0.24
March	0.59	2.16	0.71	0.12	–	–	0.08	0.87	0.04	0.47
April	0.75	3.90	0.71	0.35	0.79	2.12	2.32	4.56	1.73	1.06
May	2.61	6.97	6.42	4.72	1.34	3.27	5.59	5.36	7.91	1.78
June	9.02	5.67	9.53	6.57	5.83	3.62	7.72	4.21	12.80	5.47
July	9.21	8.22	16.22	12.83	11.81	18.03	8.15	10.12	13.31	4.41
August	9.57	11.46	8.74	12.68	9.68	9.14	13.58	9.29	10.51	8.46
September	5.00	6.62	2.24	12.44	3.70	4.56	8.82	4.45	8.66	5.63
October	7.56	3.93	1.06	9.92	2.72	4.14	10.47	5.98	7.01	2.48
November	0.62	0.48	2.72	–	0.87	2.12	2.48	4.61	0.04	1.50
December	2.87	0.27	–	0.04	0.58	0.32	0.28	0.79	1.18	0.23
TOTAL	47.80	49.88	48.78	59.87	38.38	49.49	60.83	50.87	65.12	34.68

Month	MONTHLY RAINFALL (INCHES) OF MONGYAI FOR (2020-2023)									
	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
January	2.83	–	0.20	–						
February	–	1.50	0.08	0.47						
March	–	–	0.74	0.83						
April	2.64	1.33	3.00	1.81						
May	4.02	7.13	8.74	4.84						
June	11.45	2.64	4.88							
July	4.10	5.86	11.53							
August	8.15	10.95	9.73							
September	8.38	6.89	3.93							
October	3.98	1.46	6.89							
November	1.93	2.44	–							
December	–	0.59	0.04							
TOTAL	47.48	40.79	49.76	7.95	0.00	0.00	0.00	0.00	0.00	0.00

A comparison of rainfall patterns during the last 14 years (2010-2023) revealed that the year 2016 had the maximum annual total rainfall–60.83 inches while the year 2019 had the minimum – 34.68.

Table – 8: Monthly humidity (%) of Mong Yai Township during (2010-2023)

Month	Relative Humidity (%) of MONGYAI For (2010 - 2019)										
	M.S.T	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
January	09 30	83	86	83	81	78	86	83	86	89	87
	18 30	53	70	66	67	68	67	68	64	68	66
February	09 30	74	76	74	72	75	77	80	79	76	80
	18 30	50	51	52	57	60	63	54	46	52	52
March	09 30	72	87	67	61	63	62	67	70	70	69
	18 30	42	54	41	39	42	40	40	42	44	42
April	09 30	62	74	59	58	55	68	60	73	66	61
	18 30	45	64	47	42	36	52	42	51	50	32
May	09 30	67	77	68	75	65	70	74	73	76	54
	18 30	54	69	60	70	57	58	67	56	65	40
June	09 30	81	84	76	79	77	77	82	77	80	76
	18 30	74	78	72	70	74	72	72	71	78	68
July	09 30	85	82	85	86	86	85	84	82	84	80
	18 30	80	76	76	80	74	83	80	75	74	73
August	09 30	86	87	83	89	83	83	86	83	87	83
	18 30	80	83	76	82	78	79	77	73	78	75
September	09 30	86	85	82	87	85	82	84	82	85	81
	18 30	79	79	79	82	78	78	77	77	77	77
October	09 30	86	88	82	86	85	82	82	84	88	86
	18 30	79	82	77	83	79	78	82	78	70	82
November	09 30	86	82	86	83	87	87	88	83	86	85
	18 30	77	78	79	77	78	78	78	76	75	79
December	09 30	90	89	87	86	88	86	90	89	91	86
	18 30	76	74	73	78	72	67	75	78	76	75

Month	Relative Humidity (%) of MONGYAI For (2020 - 2023)									
	M.S.T	2020	2021	2022	2023	2024	2025	2026	2	
January	09 30	86	85	81	79					
	18 30	69	61	73	71					
February	09 30	75	77	66	73					
	18 30	50	55	48	58					
March	09 30	58	66	64	70					
	18 30	35	41	45	51					
April	09 30	61	64	69	57					
	18 30	45	45	58	40					
May	09 30	68	74	77	69					
	18 30	52	64	71	59					
June	09 30	78	76	78						
	18 30	70	72	73						
July	09 30	79	79	80						
	18 30	73	74	76						
August	09 30	84	85	80						
	18 30	79	83	74						
September	09 30	82	80	83						
	18 30	79	78	80						
October	09 30	83	78	81						
	18 30	76	70	81						
November	09 30	86	85	78						
	18 30	75	85	80						
December	09 30	89	87	85						
	18 30	72	80	81						

A comparison of the values of mean monthly humidity (%) for the last 14 years showed that the highest value, 90 occurred in December, 2010 and 2016 while the lowest, 39, occurred in March, 2013.

Table – 9: Monthly wind speed (mph) of Mong Yai Township during (2010-2023)

MONTH	MONTHLY MAXIMUM SURFACE WIND SPEED (m.p.h) OF MONGYAI FOR (2010-2014)									
	2010		2011		2012		2013		2014	
	ddd	ff	ddd	ff	ddd	ff	ddd	ff	ddd	ff
JANUARY	W	7.2	S	12.0	NW	6.0	NW	6.0	SW	7.2
FEBRUARY	SW	7.2	NW	12.8	SW	12.2	W	7.2	SW	12.0
MARCH	NW	12.0	SW	9.6	NW	10.2	NW	12.4	SW	9.6
APRIL	SW	12.0	NW	12.0	SW	8.1	SW	10.4	NW	7.2
MAY	SW	7.2	SW	4.8	NE	10.2	W	7.2	NW	30.5
JUNE	NW	16.0	SW	6.0	SW	12.0	SW	7.2	SW	25.0
JULY	NW	4.8	NW	7.2	S	6.2	SW	7.2	S	19.1
AUGUST	NE	4.8	SW	4.8	SW	6.4	SW	7.2	SW	18.4
SEPTEMBER	SW	6.0	NW	4.8	SW	4.8	SW	9.6	NW	16.2
OCTOBER	S	6.0	SW	4.8	SW	7.2	W	7.2	SW	15.7
NOVEMBER	SW	7.2	SE	2.4	S	4.8	NW	7.2	SW	15.6
DECEMBER	W	4.8	SW	6.1	SW	6.0	W	7.2	SE	17.1

MONTH	MONTHLY MAXIMUM SURFACE WIND SPEED (m.p.h) OF LASHIO FOR (2015-2019)									
	2015		2016		2017		2018		2019	
	ddd	ff	ddd	ff	ddd	ff	ddd	ff	ddd	ff
JANUARY	SW	21.2	SW	15.0	SW	16.6	SW	18.3	S	14.8
FEBRUARY	W	15.6	SW	20.0	SW	17.9	SW	19.4	W	23.1
MARCH	W	23.0	SW	23.9	SW	20.1	W	22.0	W	18.7
APRIL	SW	26.8	NW	26.4	SE	20.3	NW	16.0	SW	18.3
MAY	SW	25.2	NW	26.6	W	27.6	SW	19.4	W	23.9
JUNE	SW	20.8	S	16.6	SW	20.2	SE	22.0	SE	22.3
JULY	SW	18.1	SW	22.1	SW	18.1	SW	19.0	SW	21.4
AUGUST	SW	19.5	W	19.4	SW	* 23.0	W	15.1	SW	22.7
SEPTEMBER	SW	16.6	S	12.6	NW	20.8	S	16.0	SW	23.3
OCTOBER	NW	11.6	SW	11.1	SW	17.4	NE	18.4	NE	11.6
NOVEMBER	SW	13.8	SW	20.1	SW	12.4	NW	15.0	SW	9.9
DECEMBER	NW	4.8	S	19.2	NW	12.4	NW	15.6	S	13.6

MONTH	MONTHLY MAXIMUM SURFACE WIND SPEED (m.p.h) OF MONGYAI FOR (2020-2023)									
	2020		2021		2022		2023		2024	
	ddd	ff	ddd	ff	ddd	ff	ddd	ff	ddd	ff
JANUARY	SW	18.4	SW	24.9	SW	20.2	NW	13.2		
FEBRUARY	NW	25.4	NW	11.1	SW	22.2	SW	13.4		
MARCH	NW	21.2	NW	13.6	NW	16.2	SW	15.3		
APRIL	NW	20.7	NW	22.6	SW	20.5	SW	19.1		
MAY	SW	22.2	SW	20.4	NW	22.4	N	16.7		
JUNE	SW	17.1	SW	19.4	SW	17.2				
JULY	SW	17.7	W	15.2	SW	22.1				
AUGUST	SW	16.6	SW	14.3	NW	13.4				
SEPTEMBER	SW	19.7	SW	16.7	W	13.4				
OCTOBER	SW	10.6	SW	13.9	NW	13.4				
NOVEMBER	W	10.5	NW	16.4	SW	13.4				
DECEMBER	SW	15.4	SW	15.6	SW	13.4				

The highest wind speed (27.6 mph) was recorded in May, 2017 while the lowest (2.4 mph) was recorded in November, 2011. The direction of prevailing winds were generally from South West to North East during the rainy season while during the cool season the general direction were from North East to South West. But during the hot dry season the winds were irregular and there were no perceptible prevailing wind with regular direction.

However, seasonal Typhoons occurring in the South China Sea can cause temporary in prevailing wind pattern for a few days and the occurrence of rain for a few day.

There are no forest but only fields and farms in this area. No forest has to be cleared and therefore the project cannot have contributed to climate change. The temperature data during 10 years periods do not indicate any trend for increase in temperature year after year or a trend for a decrease in rainfall year after year.

Table – 10: Monthly evaporation (mm) of Mong Yai Township during (2010-2023)

MONTH	MONTHLY EVAPORATION (mm) OF MONGYAI FOR 2010 TO-2023													
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
JANUARY	85	64	72	76	63	65	70	57	81	92	79	85	70	71
FEBRUARY	157	119	107	95	94	99	141	110	109	123	102	72	81	96
MARCH	205	144	101	132	119	148	140	112	151	150	164	117	139	112
APRIL	196	160	120	73	147	132	186	85	158	231	139	125	128	157
MAY	148	60	151	145	150	146	127	150	146	262	169	126	100	125
JUNE	79	54	104	102	78	111	101	129	125	200	147	122	99	
JULY	65	74	103	120	158	56	90	149	135	170	139	118	129	
AUGUST	71	56	97	110	91	106	119	142	131	203	125	98	122	
SEPTEMBER	91	70	87	109	113	141	102	122	154	185	150	119	110	
OCTOBER	61	52	85	106	104	124	97	121	109	161	146	114	107	
NOVEMBER	72	80	76	136	71	85	85	150	107	125	103	83	96	
DECEMBER	47	61	69	54	56	65	72	75	85	83	79	70	86	
TOTAL	1277	994	1172	1258	1244	1278	1330	1402	1491	1985	1542	1249	1267	561

The highest evaporation value of 1985 mm was recorded in 2019, while the lowest evaporation value of 994 mm was recorded December 2011.

5.5.6 Vegetation cover

As already mentioned earlier there are only field and farms and residential areas with literally no forest or wood or shrub land. The area is dominated by only cultivated plants and wild herbs. There is only a green line of small trees and bush along the small stream Nant Laung Chaung. Except medium size trees along the stream and cultivated fruit trees in and around the villages. There is no forest or wood.

5.5.7 Natural hazards

There were no precedents of natural hazards such as earth quakes, extreme weather events, floodings, droughts and major wild fires etc within memories of 5 decades, it is learnt.

The area being in a flat terrain of high altitude, 2790 feet asl, is not prone to flood.

When the unprecedented major floods that wreaked havoc on 11 of the 14 States and Regions of the country occurred in 2016 this area was luckily spared.

The major floods (July 2021) that wreak havoc in Bago and Taninthayi Regions, Mon and Kayin state here little or no effect on this area.

The major flood (Aug. 2023) that occurred in Kayin, Mon, Bago, Ayeyawaddy, Magway, Kachin, Chin and Thnintharyi (State and regions) did not have any effect on then high land area. (Bago Region and Mon State were the most effected retions).

A glimpse at the meteorological data during the last ten years did not reveal any extreme events regarding monthly rainfalls and monthly temperature. The data did not also reveal any evidence to speculate for global warming or climate change. (No sign of gradual increases in temperature over the last 7 years or the gradual decrease in rainfall over that period.)

The area is within the Momeik Fault Line Zone which runs from west to east. Further in the north is the Shweli Fault which runs from south west to north east. Much further away in the south west is the larger Kyauk Kyan Fault Line which runs from north to south. All these three fault lines are generally not active faults.

5.6 Biological components of the surrounding environment

5.6.1 Flora species

The vegetation within the two miles radius of the site are studied in detail while a few are studied outside the area of study limit.

There is no forest or wood, only farm land and scrub land. Only cultivated plants dominate the whole area. As mentioned above there is a green line of natural vegetation (small trees and bush) along the Nant Laung stream. There are also fruit trees and shade trees inside and around the villages. The proposed site is devoid of natural trees only small shrub, herb and grass. Only basic taxonomic study (on the spot identification of plants) was conducted. Quantitative ecological study could not be conducted due to lack of forest.

Diversity

A total of 82 species of plants (natural and artificial vegetation) are recorded.

The inventory of plant species recorded for the whole area is as follow:

Table – 11: List of plant species (natural vegetation and artificial) found and recorded

No.	Botanical name	Myanmar name	Family name	Habitat	IUCN (2023)
1	<i>Acacia mangium</i> Willd.	Man-gyan-shar	Fabaceae	T	
2	<i>Adiantum caudatum</i> L.	Daung-mauk	Pteridaceae	Fern	
3	<i>Aganosma siamensis</i> Craib.	Unknown	Apocynaceae	S	
4	<i>Ageratum conyzoides</i> L.	Ka-too-pho	Asteraceae	S	
5	<i>Allium ampeloprasum</i> L.	Kyet-thon-myeik	Alliaceae	H	LC
6	<i>Amaranthus spinosus</i> L.	Hin-nu-nwe-su-yit	Amaranthaceae	H	
7	<i>Andropogon fastigiatus</i> Sw.	Indaing-Myet	Poaceae	G	
8	<i>Artocarpus heterophyllus</i> Lam.	Pein-nel	Moraceae	T	
9	<i>Bidens pilosa</i>	Mote-soe-ma-hlan	Asteraceae	H	
10	<i>Blechnum finlaysonianum</i> Wall.	Unknown	Aspleniaceae	F	
11	<i>Bougainvillea glabra</i>	Set-ku-pan	Nyctaginaceae	C/C	LC
12	<i>Butea frondosa</i> Roxb.	Pauk-pin	Fabaceae	T	
13	<i>Callicarpa macrophylla</i> Vahl.	Taw-pe-pot	Lamiaceae	H	LC
14	<i>Capsicum annuum</i> L.	Nga-yote-thee	Solanaceae	H	LC
15	<i>Careya arborea</i> Roxb.	Ban-bwe	Lecythidaceae	T	
16	<i>Carmona ventricosum</i>	Kyant-sa-pin	Boraginaceae	S	

17	<i>Carica papaya</i> L.	Thin-baw	Caricaceae	ST	DD
18	<i>Cassia siamea</i> Lam.	Mel-zali	Caesapiniaceae	T	LC
19	<i>Catharanthus roseus</i> (L.) G. Don	Thinbaw-ma-nyo	Apocynaceae	S	
20	<i>Celosia argentea</i>	Taw-kyat-mauk	Amanranthaceae	H	LC
21	<i>Citrus aurantifolium</i> (Christm) Sw.	Than-payar	Rutaceae	T	
22	<i>Costus speciosus</i> Smith.	Pha-laung-taung-mway	Costaceae	H	
23	<i>Crassocephalum rubens</i> (Juss. ex. Jacq)	A-pyar-yaung-nay-kyar-yine	Asteraceae	C/C	
24	<i>Crotalaria sericea</i> Petz.	Taw-pike-san	Fabaceae	S	
25	<i>Curcuma amada</i> Robx.	Tha-yet-kin	Zingiberaceae	H	
26	<i>Curcuma longa</i> L.	Na-nwin	Zingiberaceae	H	DD
27	<i>Cycas revoluta</i> Thunn.	Mone-tine	Cycadaceae	Fern	LC
28	<i>Cymbidium aliofolium</i> (L.) Sw.	Pan-swe-gyo	Orchidaceae	Epiphyte	
29	<i>Cyperus compressus</i> L.	Wet-lar	Cyperaceae	H	
30	<i>Cyperus odoratus</i> L.	Myat-mone-nyin		H	LC
31	<i>Dendrobium delacouri</i> Guillaumin.	Pa-dauk-thit-kwa	Orchidaceae	H	
32	<i>Dendrobium nathanielis</i> Rchb.f.	Ngar-yoe-thit-kwa	Orchidaceae	Epiphyte	
33	<i>Eleusine indica</i> Gaertn.	Sin-ngo-myat	Poaceae	G	LC
34	<i>Emblica officinalis</i> Gaertn.	Zi-phyu	Euphorbiaceae	T	
35	<i>Eugenia fruticosa</i> Roxb.	Tha-pyay-ni	Myrtaceae	ST	
36	<i>Euphorbia continifolia</i> L.	Ruby-nyuang	Euphorbiaceae	T	
37	<i>Euphorbia heterophylla</i> L.	Say-palae	Euphorbiaceae	S	LC
38	<i>Ficus carica</i> L.	Tha-phan	Moraceae	T	LC
39	<i>Ficus religiosa</i> L.	Baw-di-nyaung	Moraceae	T	LC
40	<i>Ficus semicordata</i> Ham.	Ka-dut	Moraceae	T	LC
41	<i>Ganoderma lucidum</i> (Curis) P.Karst	Mho	Ganodermataceae	Fungi	
42	<i>Grangea maderaspatana</i> (L.) Poir.	Taw-ma-nyo-lone	Asteraceae	H	LC
43	<i>Heliotropium indicum</i> L.	Sin-na-maung-kyi	Boraginaceae	H	
44	<i>Ichnocarpus frutescens</i> (L.) R. Br.	Taw-sapel	Apocynaceae	C/C	
45	<i>Impatiens balsamina</i> L.	Dan-dalat-pin	Balsaminaceae	H	
46	<i>Jatropha curcas</i> (L.)	Kyet-su	Euphorbiaceae	ST	LC
47	<i>Lantana camara</i> L.	Sein-napan	Verbenaceae	S	
48	<i>Leucas aspera</i> (Willd.)	Pint-ku-htate-pat	Lamiaceae	S	
49	<i>Ludwigia octovalvis</i> (Jacq.)	Taw-lay-nyin	Onagraceae	H	LC
50	<i>Merremia emarginata</i> (Burm.f.) Hallier f.	Say-myin-kwar	Convolvulaceae	C	
51	<i>Mikania micrantha</i> HBK.	Bi-zet-nwe	Asteraceae	C	
52	<i>Mimosa pudica</i> L.	Hti-ka-yone	Mimosaceae	S	LC
53	<i>Mimusops elengi</i> L.	Kha-yay	Sapotaceae	T	LC
54	<i>Nerium oleander</i> L.	Nwe-thar-ki-pan	Apocynaceae	C/C	LC

55	<i>Oroxylum indicum</i> Vent.	Kyaung-shar	Bignoniaceae	T	S
56	<i>Oxalis corniculata</i> L.	Mwo-chin	Oxalidaceae	H	
57	<i>Pholidota imbricata</i> Hook.	Pa-tee-sint-thit-kwa	Orchidaceae	Epiphyte	
58	<i>Picrorhiza kurroa</i> Royle.	Pint-ku-htate-pat	Scrophulariaceae	H	
59	<i>Podocarpus macrophyllus</i> (Thunb.)	Thit-min	Podocarpaceae	ST	
60	<i>Polygonum aviculare</i> L.	Pa-zun-sar	Polygonaceae	H	
61	<i>Polystichum munitum</i>	Unknown	Dryopteridaceae	H	
62	<i>Portulaca umbraticola</i> Kurth.	Myay-pyit-pan	Portulacaceae	H	
63	<i>Ricinus communis</i> L.	Kyet-su	Euphorbiaceae	ST	
64	<i>Saccharum officinarum</i> L.	Kyan	Poaceae	G	
65	<i>Samanea saman</i>	Kokko	Fabaceae	T	LC
66	<i>Scoparia dulcis</i>	Dan-ta-thu-kha	Scrophulariaceae	H	
67	<i>Selenicereus grandiflorus</i> (L.) Bri.&Rose	Nya-mway-pan	Cactaceae	S	LC
68	<i>Sesbania grandiflora</i> (L.) Poir.	Pauk-pan-phyu	Fabaceae	ST	DD
69	<i>Solanum indicum</i> L.	Kha-yan-ka-sot	Solanaceae	S	
70	<i>Solanum torvum</i>	Kazaw-kha	Solanaceae	S	
71	<i>Sphagneticola calendulacea</i> (L.)	Nay-kyar-ka-lay	Asteraceae	H	
72	<i>Syzygium cumini</i> (L.)	Tha-pyay-phyu	Myrtaceae	T	LC
73	<i>Tabebuia caraiba</i>	Tha-pyay-bu-ta	Bignoniaceae	T	
74	<i>Tabernaemontana divaricata</i> (L.) R. Br. ex Roem. & Schult	Za-let-pan	Apocynaceae	S	
75	<i>Tamarindus indica</i> L.	Magyi	Caesalpiniaceae	T	
76	<i>Tectona grandis</i> L.	Kyun	Verbenaceae	T	EN
77	<i>Terminalia mantaly</i> H.perris	Taiwan-banda	Combretaceae	T	LC
78	<i>Trichoglottis fasciata</i> Rchb.f.	Myin-kyar-thit-kwa	Orchidaceae	Epiphyte	
79	<i>Urceola lucida</i> (Wall. ex. G. Don) Benth. ex Kurz	Kyet-paung	Apocynaceae	C/C	
80	<i>Urena lobata</i> L.	Kat-say-nal	Malvaceae	S	LC
81	<i>Vernonia cinerea</i> (L.)	Ka-too-pyan	Asteraceae	H	
82	<i>Wedelia calendulaceae</i> Nees.	Nay-kyar-kalay	Asteraceae	H	

T = Tree

C/C = Climber/Creeper

ST = Small Tree

B = Bamboo

H = Herb

G = Grass

S = Shrub

F = Fern

C = Climber

EN - Endangered

LC - Least Concern

5.6.2 Fauna species

5.6.2.1 Avian fauna (birds)

Birds are very mobile animals and can be found in virtually all kinds of a land area (either living in or entering the area). The birds found during the EIA study are mostly either from the row of small trees and bush along the stream or from fruit/shade trees inside or around the villages. They are very rarely found in the small bush inside the project site and near vicinity.

The data are primary data during EIA study conducted by MESC team.

Random surveys as well as transect line in the designated study area are carried out, going to places or spots including inside and around villages where birds are expected to be seen.

Diversity

A total of 95 species of avian fauna (birds) belonging to 43 families were recorded. Inventory list of bird species is as follow:

Table-12: List of bird species recorded from and around the study area

No.	Common New Name	Scientific name	IUCN (2023)
	PHASIANIDAE: PERDICINAE		
1	Chinese Francolin	<i>Francolinus pintadeanu</i>	LC
	ANTIDAE: DENDROCYGNINAE		
2	Lesser Whistling-Duck	<i>Dendrocygna javanica</i>	LC
	ANATIDAE: ANATINAE		
3	Indian Spot-billed Duck	<i>Anas poecilorhyncha</i>	LC
	ARDEIDAE: BOTAURINAE		
4	Cinnamon Bittern	<i>Ixobrychus cinnamomeus</i>	LC
	ARDEIDAE: ARIDEINAE		
5	Black-crowned Night-Heron	<i>Nycticorax nycticorax</i>	LC
6	Little Heron	<i>Butorides striata</i>	LC
	ARDEIDAE: ARIDEINAE		
7	Eastern Cattle Egret	<i>Bubulcus coromandus</i>	LC
8	Great Egret	<i>Ardea alba</i>	LC
	PHALACROCORACIDAE		
9	Little Cormorant	<i>Phalacrocorax niger</i>	LC

	FALCONIDAE: ACCIPITRINAE		
10	Himalayan Griffon	<i>Gyps himalayensis</i>	NT
	RALLIDAE		
13	White-breasted Waterhen	<i>Amaurornis phoenicurus</i>	LC
	TURNICIDAE		
14	Barred Buttonquail	<i>Turnix suscitator</i>	LC
	VANELLIDAE		
15	Red-wattled Lapwing	<i>Vanellus indicus</i>	LC
	COLUMBIDAE: COLUMBINAE		
16	Rock Pigeon	<i>Columba livia</i>	LC
17	Oriental Turtle-Dove	<i>Streptopelia orientalis</i>	LC
18	Spotted Dove	<i>Streptopelia chinensis</i>	LC
	PSITTACIDAE: PSITTACINAE		
19	Grey-headed Parakeet	<i>Psittacula finschii</i>	NT
	CUCULIDAE: CUCULINAE		
20	Chestnut-winged Cucukoo	<i>Clamator coromandus</i>	LC
21	Plaintive Cuckoo	<i>Cacomantis merulimus</i>	LC
22	Asian Koel	<i>Eudynamys scolopacaceus</i>	LC
	CUCULIDAE: PHAENICOPHAEINAE		
23	Green-billed Malkoha	<i>Rhopodytes tristis</i>	LC
	CUCULIDAE: CENTROPODINAE		
24	Greater Coucal	<i>Centropus sinensis</i>	LC
25	Lesser Coucal	<i>Centropus bengalensis</i>	LC
	TYTONIDAE: TYTONINAE		
26	Common Barn-Owl	<i>Tyto alba</i>	LC
	STRIGIDAE		
27	Asian Barred Owlet	<i>Glaucidium cuculoides</i>	LC
	APODIAE: APODINAE		
28	House Swift	<i>Apus affinis</i>	LC
	CORACIIDAE		
29	Indian Roller	<i>Coracias benghalensis</i>	LC

	ALCEDINIDAE: HELICYONINAE		
30	Stork-billed Kingfisher	<i>Pelargopsis capensis</i>	LC
	ALCEDINIDAE: ALCEDININAE		
31	Blue-eared Kingfisher	<i>Alcedo meninting</i>	LC
32	Common Kingfisher	<i>Alcedo atthis</i>	LC
	MEROPIDAE		
33	Little Green Bee-eater	<i>Merops orientalis</i>	LC
34	Chestnut-headed Bee-eater	<i>Mecops leschenaulti</i>	LC
	RAMPHASTIDAE: MEGALAIMINAE		
35	Great Barbet	<i>Megalaima virens</i>	LC
36	Lineated Barbet	<i>Megalaima lineata</i>	LC
37	Blue-throated Barbet	<i>Megalaima asiatica</i>	LC
38	Coppersmith Barbet	<i>Megalaima haemaccephala</i>	LC
	PICIDAE: PICINAE		
39	Grey-headed Woodpecker	<i>Picus canus</i>	LC
	CAMPEPHAGIDAE		
40	Scarlet Minivet	<i>Pericrocotus speciosus</i>	LC
	ORIOOLIDAE		
41	Black-hooded Oriole	<i>Oriolus xanthornus</i>	LC
	ARTAMIDAE		
42	Ashy Woodswallow	<i>Artamus fuscus</i>	LC
	AEGITHINIDAE		
43	Common Iora	<i>Aegithina tiphia</i>	LC
	DICRURIDAE		
44	Black Drongo	<i>Dicrurus macrocercus</i>	LC
45	Ashy Drongo	<i>Dicrurus leucophaeus</i>	LC
46	Bronzed Drongo	<i>Dicrurus aeneus</i>	LC
47	Hair-crested Drongo	<i>Dicrurus hottentottus</i>	LC
	CORVIDAE		
48	Eastern Jungle Crow	<i>Corvus levaillantii</i>	LC
	LANIIDAE		
49	Burmese Shrike	<i>Lanius colluriooides</i>	LC
	NECTARINIIDAE		
50	Purple Sunbird	<i>Cinnyris asiaticus</i>	LC

51	Ruby-cheeked Sunbird	<i>Chalcoparia singalensis</i>	LC
	DICAEIDAE		
52	Scarlet-backed Flowerpecker	<i>Dicaeum cruentatum</i>	LC
	CHLOROPSEIDAE		
53	Goldren-fronted Leafbird	<i>Chloropsis aurifrons</i>	LC
	PLOCEIDAE		
54	Baya Weaver	<i>Ploceus philippinus</i>	LC
	ESTRILDIDAE: ESTRILDINAE		
55	Red Avadavat	<i>Amandava amandava</i>	LC
56	White-rumped Munia	<i>Lonchura striata</i>	LC
57	Scaly-breasted Munia	<i>Lonchura punctulata</i>	LC
	PASSERIDAE		
58	Plain-backed Sparrow	<i>Passer flaveolus</i>	LC
59	Eurasian Tree-Sparrow	<i>Passer montanus</i>	LC
	MOTACILLIDAE		
60	Paddyfied Pipit	<i>Anthus rufulus</i>	LC
	EMBERIZIDAE		
61	Cersted Bunting	<i>Emberiza lathami</i>	LC
	STURNIDAE: STURNINAE		
62	White-vented Myna	<i>Acridotheres grandis</i>	LC
63	Collared Myna	<i>Acridotheres albocinctus</i>	LC
64	Common Myna	<i>Acridotheres tristis</i>	LC
65	Black-collared Starling	<i>Gracupica nigricollis</i>	LC
66	Chestnut-tailed Starling	<i>Sturnus malabaricus</i>	LC
	MUSCICAPIDAE: SAXICOLINAE		
67	Eastern Stonechat	<i>Saxicola maurus</i>	LC
68	Pied Bushchat	<i>Saxicola caprata</i>	LC
	MUSCICAPIDAE: MUSCICAPINAE		
69	Hill Blue Flycatcher	<i>Cyornis banyumas</i>	LC
70	Oriental Magpie-Robin	<i>Copsychus saularis</i>	LC
71	White-rumped Shama	<i>Copsychus malabaricus</i>	LC
	STENOSTIRIDAE		
72	Grey-headed Canary-Flycatcher	<i>Culicicapa ceylonensis</i>	LC
	PYCNONOTIDAE		
73	Black-crested Bulbul	<i>Pycnonotus flaviventris</i>	LC
74	Flavescent Bulbul	<i>Pycnonotus flavescens</i>	LC

75	Red-whiskered Bulbul	<i>Pycnonotus jocosus</i>	LC
76	Northern Sooty-headed Bulbul	<i>Pycnonotus aurigaster schauenseei</i>	LC
	HIRUNDINIDAE: HIRUNDININAE		
77	Barn Swallow	<i>Hirundo rustica</i>	LC
78	Striated Swallow	<i>Cecropis striolata</i>	LC
	TIMALIIDAE		
79	Yellow-eyed Babbler	<i>Chrysomma sinense</i>	LC
80	Oriental White-Eye	<i>Zosterops palpebrosus</i>	LC
81	Pin-Striped Tit-Babbler	<i>Macronus gularis</i>	LC
82	Chestnut-capped Babbler	<i>Timalia pileata</i>	LC
83	Puff-throated Babbler	<i>Pellorneum ruficeps</i>	LC
84	Black-throated Laughingthrush	<i>Dryonastes chinensis</i>	LC
85	Greater Necklaced Laughingthrush	<i>Garrulax pectoralis</i>	LC
86	White-browed Laughingthrush	<i>Pterorhinus sannio</i>	LC
	CISTICOLIDAE		
87	Zitting Cisticola	<i>Cisticola juncidis</i>	LC
88	Common Tailorbird	<i>Orthotomus sutorius</i>	LC
89	Rufescent Prinia	<i>Prinia rufescens</i>	LC
90	Grey-breasted Prinia	<i>Prinia hodgsonii</i>	LC
91	Yellow-bellied Prinia	<i>Prinia flaviventris</i>	LC
92	Plain Prinia	<i>Prinia inornata</i>	LC
93	Striated Prinia	<i>Prinia crinigera</i>	LC
94	Brown Prinia	<i>Prinia polychroa</i>	LC
95	Hill Prinia	<i>Prinia atrogularis</i>	LC

5.6.2.2 Herpetofauna (amphibian and reptiles)

As there is no natural forest but only farm land, bush and herb herpetofauna are rare to very rare.

The data for herpetofauna are also primary data during the EIA study conducted by consultant firm, MESC.

Diversity

A total of 14 amphibians and reptiles species were recorded. They belong to 7 families. There are 4 species of amphibian, 6 species of lizard and 3 species of snake. The inventory of list of herpetofauna species is as follow:

Table- 13: List of herpetofauna recorded from the study environs

No.	Family Name	Scientific Name	Common Name	IUCN (2023)
1	Bufonidae	<i>Duttaphyrnus melanostictus</i>	Common Toad	LC
2	Dicroglossidae	<i>Fejervarya limnocharis</i>	Paddy Frog	LC
3	Microhylidae	<i>Kaloula pulchra</i>	Asian Painted Frog	LC
4		<i>Microhyla heymonsi</i>	Narrow-mouthed Frog	LC
5	Agamidae	<i>Calotes emma</i>	Forest Lizard	LC
6		<i>Calotes vericolor</i>	Garden Fence Lizard	LC
7		<i>Calotes mystaceus</i>	Blue Forest Lizard	LC
8	Gekkonidae	<i>Hemidactylus frenatus</i>	Asian House Gecko	
9		<i>Hemidactylus garnotii</i>	Garnot's House Gecko	LC
10	Scincidae	<i>Eutropis multifasciata</i>	Common Sun Skink	LC
11		<i>Sphenomorphus maculatus</i>	Spotted-forest Skink	LC
12	Colubridae	<i>Ptyas korros</i>	Javan Rat Snake	NT
13		<i>Amphiesma stolatum</i>	Yellow-striped Keelback Snake	LC
14		<i>Flowea piscator</i>	Chequered Water Snake Keelback	

5.6.2.3 Mammalian fauna

There are no large mammals; only squirrel, Pallas's Squirrel *Callosciurus erythraeu*, Western Striped Squirrel *Tamiops maclellandii*, Irrawaddy Squirrel *Callosciurus pygerythrus* (LC), Northern Treeshrew *Tupaia belangeri* (LC) and rat, *Rattus rattus* (LC) and mouse, *Mus musculus* (LC).

5.6.2.4 Aquatic animals

Aquatic animals are not studied as they are almost non-existence in this Nant Laung Stream. From secondary information from locals these fish are known to inhabit the stream but are very rare now: *Anabas testudina* (LC), *Lapidocephalichirys guntea*, *Chana striata*, *C. gaucha*, *Mystus vittatus* (LC), *Punticus stigma*, *Burbus* sp, *Sperata* sp, *Cirrhinus morigala* and *P. chola*.

Generally speaking there are virtually no natural biodiversity to be considerably impacted by the activities of the project. All natural plants found are common and ubiquitous plant. The birds are very mobile animals and cannot be easily impacted. The fish are already almost non-existence in the stream.

5.7 Infrastructure and services

The company has constructed a 7 miles access road, (gravel road) from the project site to Psi-paw-Mong Yai High-way in the north. In addition the company has also constructed gravel road from the site to Hsen Taw and Na Long villages. (The area has good access to both Psi-paw Town and Mong Yai Town.

There are private transportation system (passenger buses) plying between Psi-paw Town and Mong Yai Town and beyond. Many locals use their own motorcycles for transportation.

The two said village formerly did not have access to gridline electricity. But now Hsen Taw village is electrified with electricity generated from the burning of bagasse.



Figure-103: Hsen Taw Village



Figure-104: Na Long Village

The following table is about facts and figures of infrastructure and services for the nearby two villages.

Table-14: Data on infrastructure and services

No.	Infrastructure and services	Hsen Taw Village (Ko Hsaing Village Tract)	Na Long Village (Wan Maw Village Tract)
1.	Access by motor road	√ (Link to Hsi Paw-Mong Yai Highway in the north 7 miles away)	√ (Link to Hsi Paw-Mong Yai Highway in the north 8 miles away)
2.	Access to National Gridline Electricity	x	x
3.	Education facilities - Primary School	√ (Private Primary School built by the company)	√
	- Number of students	20	40
	- Number of teachers	1	1
	- Adult literacy rate %	NA	40% (Bamar language) 60% (Shan dialect) One graduate
4.	Health facilities - Village clinic	x (Have to go to the company clinic or to Mong Yai Hospital)	x (Have to go to the company clinic or to Mong Yai Hospital)
5.	Village library	x	x
6.	Source of water	From spring and stream	From Nant Khan Stream and water/pools beside the stream

Note – Source from KII interview.

5.8 Socio-economic component of the surrounding environment

5.8.1 Livelihood and income

Na Long village is a relatively large village while Hsen Taw is a small village (hemlet). A rapid assessment of the socio-economic of the area was carried out on two villages, namely Hsen Taw and Na Long Villages.

The assessment was conducted applying desktop survey (from available information), visual inspection and through Key Information Interview (KII) applying predesigned questionnaires.

Table-15: Social economic attributes (facts and figures) of two villages

No.	Attributes	Hsen Taw Village (Ko Hsaing Village Tract)	Na Long Village (Wan Maw Village Tract)
1	Houses	17	102
2	House holds	17	102
3	Population	75 (Male 40, Female 35)	303 (Male 144, Female 159)
4	Ethnicity (%) Shan Others	100% -	100% -
5	Religions Buddhist	100%	100%
6	Occupation (% of house hold) Farmers/cultivators (%) (Rice, maize, sugar cane, peanut) Factories workers (%) Seasonal jobs/odd jobs (%)	96% 4% 0%	80% 1% 19%
7	Government employees Daily wages (in Kyats)	- Ks-4000	- Ks-4000-5000

5.8.2 Access to public service and natural resources

As mentioned earlier the two villages are now easily accessible by motor road, constructed by the company.

Hsen Taw village is now electrified by the company. As regards education status the smaller Hsen Taw village has one private primary school built by the company with 20 students and 1 teacher. Na Long village has a primary school with 40 students and only 1 teacher.

Both villages have no village library.

As regards health status both villages have no village clinic. (They either go to the company's factory clinic or to Mong Yai Hospital).

Sources of water: both villages have no shallow wells or tube wells; they source water from spring or stream (or small man made water pools beside the spring). The company has constructed a community water pond (concrete) for Hsen Taw village.

There are no non-living natural resources such as minerals, limestone, granite etc.

Living natural resources like treads, usually small ores, ore cut for making fire wood; no large tree suitable for timber extraction. Edible wild vegetable are collected for household consumption only.



Figure-105: Private primary school (affiliated) at Hsen Taw village built by the company



Figure-106: Primary school at Na Long Village



Figure-107: Concrete water pond constructed by the company for Hsen Taw Village



Figure-108: Nant Khan Stream near Na Long Village

5.8.3 Land use

The land use of the whole area is predominantly in the form of cultivated land, mostly farm land and few paddy fields, plantation and residential area, the two villages. There is no reserved forest or vacant or fallow land.

The project site was formerly a farm land purchased by the project proponent.

After the establishment of Than Daung Oo Sugar Factory (1) the premise of the factory becomes industrial land use. When the planned Than Daung Oo Sugar Factory (2) comes into existence the land use area will increase.

On the whole the land uses pattern of the whole area has changed little during the last couple of decades. As the area is a rural agricultural area every village has sufficient lands for cultivation and most are fertile lands.

Sugar cane is the main cultivated plant while peanut, maize and rice are other important crops. Each village has common fruit trees and shade trees which are the norm of a rural village.



Figure – 109: Sugar cane field

The land use of Mong Yai Township (from secondary Information)

(a) Cultivated land (acreage)		
Paddy field	-	12,399 acres
Farmland	-	28,186 acres
Garden/orchard	-	4,998 acres
Crude farm (Kaing)	-	147 acres
(b) Reserved forest/Protected area	-	21,147 acres
(c) Virgin forest	-	223,459 acres
(d) Virgin land	-	176,612 acres
(e) Industrial area	-	3 acres

5.8.4 Population (Basic demography)

The basic demography, population, (male, female) and households of the two villages are shown in the following table.

Table – 16: Basic demography of two villages

Sr.	Villages	Houses/Households	Population	Male	Female
1.	Hsen Taw village	17/17	75	40	35
2.	Na Long village	102/102	303	144	159

100% of the people of both villages are Shan National and 100% are Buddhists.

5.8.5 Other socio-economic indicators

Table – 17: Basic data on other socio-economic status (poverty, unemployment, illiteracy rate)

Sr. No	Parameter	Name of villages	
		Hsen Taw village	Na Long village
1.	Poverty rate	Relatively high	Relatively high
2.	Unemployment	Relatively high (most are farmers)	Relatively high (most are farmers)
3.	Adult literacy rate	NA	40% (Bamar language) 60% (Shan dialect)

Table-18: Materials possession/life style

No	Materials possession	Hsen Taw Village	Na Long Village
1.	- Wooden house, corrugated iron roofing, wood wall (%)	-	42%
	- Wooden house, corrugated iron roofing, bamboo wall (%)	100 %	50%
	- Wooden house, corrugated iron roofing, brick wall (%)	-	8%
2.	- Car (number)	-	13
	- Motorcycle (%)	100%	80%
	- Television (%)	NA	80%
	- Hand phone (%)	50%	100%
	- Trawler-G	3	13
	- Hand-held tractors	7	60

Note – Based from predesigned/pre-structured interview.

- (a) **Poverty:** Poverty is high to very high, as it is the case of the large majority of rural villages in Myanmar. But when compared with most poor rural villages from the Dry Zone Area, Delta Area and Chin State these villages are on the whole better off.
- (b) **Employment:** The rate of employment is quite high given the fact that there are abundant land areas for cultivation. The majority are farmers (rice, maize, peanut) and sugar cane planters. A few are working odd jobs or seasonal jobs (daily wages are Ks 4000 for Hsen Taw village and Ks 4000-5000 for Na Long village).
- (c) **Literacy rate:** Not available for Hsen Taw village; but at Na Long (the larger village) 40% of adults can read and write Burmese language while 60% can read and write Shan Dialect. There is only one graduate at Na Long village.

5.9 Public Health Component of the surrounding environment

Both villages do not have village clinic or dispensary. The sick or injured villagers have to go to Mong Yai Township hospital for treatment. Many also come to the factory's clinic which provide free medical treatment or giving away medicines or drugs (serious cases have to be hospitalized at Mong Yai Hospital).

Mong Yai Township hospital, 10 miles away in the north east in the nearest hospital in the area.

The factory's clinic has only one nurse and a few first aid workers.



Figure-110: Mong Yai hospital



Figure-111: Factory clinic

Health data for Mong Yai Township are as follow:

Table-19: Health data for Mong Yai Township

Sr. No.	Name of disease	Cases	Remark
1.	Malaria	3	No mortality
2.	Cholera	604	1 mortality
3.	Tuberculosis	57	5 mortality
4.	Dysentery	106	No mortality
5.	ARI	600	3 mortality
6.	HIV/AIDS	1	No mortality

Source: MIMU

5.10 Cultural compound of the surround environment

Hundred percent of the villagers from both villages are Shan nationals and 100% are Buddhists.

Hsen Taw Village has no Buddhist Monastery; while Na Long Village has also one Buddhist Monastery with two monks.

Only a few of them go to the monastery during Sabbath days (the full moon and new moon, and 8th days of the Burmese months).

The villagers of Hsen Taw Village propitiate the "Nats" (the village guardian spirits or spirits of the area) during the Full Moon day and New Moon day of a month.

The villagers of Na Long Village have a "Nat" Festival on the 10th day of the Burmese month, Taw Tha Linn (September/October). They also celebrate the Buddhist Katina (Katein) religious festival day.

With the exception of the one Buddhist monastery in Na Long village there is no religious monument in the area. Impact on religious monument is not anticipated.



Figure-112: Hsen Taw Village Nat shrine



Figure-113: Na Long Village monastery



Figure-114: Na Long Village pagoda



Figure-115: "Pareik" platform at Na Long Village

There is no famous pagoda in this area, but only at Lashio City. While Hsen Taw has no Buddhist monastery the larger village Na Long has one village Buddhist monastery with a pagoda. However, there is no pagoda festival or grand religious festival. The villagers, especially the elders, go to the monastery during the Sabbath Day (full moon day, new moon day, and the two 8th days of the Burmese months). They take refuge and observe the eight or nine precepts (Thi-La) administered by the abbot monk of the monastery.

Many Bamars still worship the "nats" or guardian spirits and the locals here are not an exception. The Myanmar Buddhists believe in the 31 abodes (realms) of life. The lowest abode (realm) of "nats" or "Satu-maha-rit" is close to that of human abode and these "nats" are worshipped.

Many still keep this tradition of worshipping or rather propitiating the nats while the main faith in Buddhism. Offertory (Hnget-pyaw-pwei, Ohn-pwei) for the nat spirits usually

included one coconut and three or fire combs of banana arranged on a receptacle, a large bowl or tray. Or the offertory can be a coconut (Nat-ohn-thee) hung up at a place as offering for the nat spirit/spirits.

A Bamar Buddhist village usually has a big sacred tree (usually a big ficus tree, *Ficus religiosa*) with a nat shrine underneath that tree. The nat spirst is believed to be the guardian spirit of the village. There is no such sacred tree with "Nat" shrine at both villages.

Regarding cultural, historical and archeological heritage there are no sites, structures and objects in this area. There are also no sites or objects of natural values such as scenic spot and outstanding landscape. There are also no sites or objects of spiritual values such as sacred sites, sacred trees, sacred rocks etc in the area.

There are no religious, cultural, historical and archeological sites or structures to be impacted due to the implementation of the project.

5.11 Visual components of the surrounding environment

The overall flat terrain landscape consists of many small fields and farms, the proposed project site, and its adjacent sugar cane field and Hsen Taw Village in the south and Na Long Village further south.

The Than Daung Oo Sugar Factory (1) is now standing out prominently in the area. This can have certain impact on the visual component of the area. But as fast growing trees are now planted the factory will be in harmony with it surrounding environment.

There is a green line of small trees and bush along both side of the meandering Nant Laung Chaung. There are green spots here and there and inside or around the two villages where there are fruit trees and shade trees.

There are no scenic spots, beautiful landscapes and outstanding landmarks/landscapes to be impacted due to implementation of the project. There is also no famous religious monument or historical monument to be impacted.

The emergence of a large sugar factory and its facilities has greatly altered the natural landscape of the area to agreat extent. But on the whole this large factory does not seriously impact the overall visual components of the area.

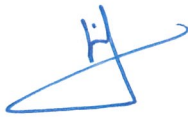
When trees planted around the Than Daung Oo Sugar Factory (1) and insdie the factory coomound are fully grow the factory complex will be in harmony with its surrounding to some extent. The factory complex does not stand out in too contrast with its surrounding.

The company has already involved in creating green belt and green zone inside and outside the factory compound.

Regarding sight pollution the company will avoid the excessive use of bright light at night to avoid the impact of light offensive to the neighbours at night.

Commitment

Than Daung Oo Co. Ltd is committed to running the sugar production business without any serious adverse impact on the physical, biological, socio-economic, cultural and visual components of its surrounding environment. Mitigation measures will be duly taken whenever, and wherever necessary.

A handwritten signature in blue ink, consisting of a stylized 'U' and 'A' intertwined.

U Sein Myo Aung
Executive Director
Than Daung Oo Co., Ltd

6. IMPACTS AND RISKS ASSESSMENT AND MITIGATION MEASURES

6.1 Impacts and risk assessment methodology

The basic methodology comprises desktop survey (literature survey, if any), actual field and inspection, consultation meeting for gathering data and information and report writing.

The assessments are based from previous personal experience and also from theoretical knowledge from literature. Consideration, prediction, anticipation and identification of risks and impacts and subsequent assessment are made after visual inspection, testing and comprehension group discussions among EIA practitioners and appraisers.

In short the methodology is Experts Consensus method (Ad hoc method) in combination with matrix risks/impacts rating method. Risk/impact assessment for all impact are summarized at the end of impact and mitigation measure (at the end of section 6.2.1) later.

The tools and equipment used for assessment of impact on the physical components are the same as those mentioned earlier in chapter 5. eg, EPAS air sampler, EPAS Haz Scanner, EXTECH Sound Level meter, BEME-T ECH Vibration Meter and Portable Water Test Kit.

Water samples and soil samples were collected and analyzed at registered laboratories in Yangon.

Meteorological data/information for several years are secondary data gathered from Township Meteorological department to investigation if there is any trend of increase in temperature and rain fall etc over the years.

Visual inspection is an essential methodology for identifying all the impacts on the physical, biological, socio-economic, cultural and visual components of the environment. Therefore visual inspection and information/data gathering are the only effective tools.

The baseline data or background data for the physical, biological, socio-economic, cultural and visual components of environment were carried out. (These were already mentioned in **Chapter-5**). These baseline/background data could be one day in the future compared with the actual impacts during the Construction and Operation Phase.

Prediction, anticipation, identification and assessment of impacts/potential impacts are extrapolated from all the main activities involve in sugar project. The main activities such as clearing of vegetation for site and access road, the construction activities during the whole Construction Phase and most of all operation activities during the whole long Operation Phase and lastly all activities during the Decommissioning Phase.

Since impacts are the resultants of the above-mentioned activities. Each and every activity and the resultant impacts are considered, predicted, identified and assessed. Mitigation measure for each and every impact/potential impact is then prescribed.

6.2 Impact and risk identification, assessment and mitigation measures for each project phase

The project is already in the early Operation Phase. However to uphold a standard EIA report the impacts assessment are made encompassing all the four phases, namely, Preconstruction, Construction, Operation and Decommissioning Phase. The assessments also cover all the five environmental components of the surrounding environment, namely, the physical, biological, socio-economic, cultural and visual components.

6.2.1 Identification and assessment of environmental impacts during the four phases of the project

6.2.1.1 During the Preconstruction Phase

Generally speaking there should be no negative impacts during this Pre-construction Phase. However negative/potential negative impacts of socio-economic aspects can happen as follows:

The potential hiking of prices of land and property and mitigation measure to be taken

During the Pre-construction Phase greedy speculators can hike the price of land and property. The price of land can go up considerably or exorbitantly even before the implementation of the projects. Even rumours can lead to the hiking of land and property prices.

As the area is a rural and relatively isolated area it is hoped that this impact will not be so high. On the other hand high inflation has become a common phenomenon and away of life in this country.

Mitigation (out line)

The project proponent will take the following mitigation measures:

There are no quick fix measures for this. Early public consultation meetings are necessary. The company shall uphold transparency and explain the true situation of the project. The company shall tell them not to have too high an expectation on the project. The company as well as the locals should realize that inflation is just a normal phenomenon of the country. There is no effective remedy for inflation. The officials of the company shall not involve in speculation activity.

6.2.1.2 During the Construction Phase

1) Impacts on air environment and mitigation measures to be taken

During the Construction Phase vegetation clearing, land leveling, removal of top soil, digging, and all kinds of earth works for construction and all construction works lead to the generation of dust.

The operations of machinery and vehicles also lead to the generation of smoke (gas emission) from the exhaust systems.

Dust of PM₁₀ is nuisance but that of PM_{2.5} and PM₁ are of serious health concern. Smoke and its constituent CO is hazardous to human.

(a) Nature of impact: dust

Dust is the main issue during Construction Phase. Wind direction plays an important role in the impact. The clearing of land and earth works such as excavation, digging and refilling of earth greatly generate dust.

Vehicular movements as well as operations of other equipment, engines and pumps emit lot of dust.

These processes together with wind erosion of open or disturbed ground would generate dust and could have quite a severe impact. Nuisance and health impact are associated with increased level of dust. The air dust pollution could cause eye problem, allergy, skin disease, respiratory and lung diseases.

Dust of PM₁₀, and above are a nuisance, but PM_{2.5}, PM₁ are of serious health concern.

(b) Nature of impact: smoke (fugitive emission)

Smoke generated during Construction Phase will be low. The source of emission is from vehicles and some machines used during construction works, such as engines and pumps.

Health impact associated with smoke increased with level of smoke. The emission of Green House Gas can leads to global climate change.

Mitigation (out line)

The project proponent shall take the following mitigation measures:

(a) Mitigation for dust

When clearing the ground vegetation must be removed together (mixed) so that the plant material helps to hold the soil. Or vegetation can be stripped and spread on the newly made soil stockpile; this will minimize emission of dust due to wind. As mentioned earlier, avoid clearing vegetation too far advance of construction.

Spray water regularly for suppression of dust. Plant trees at vacant spots; select hardy, fast growing species and create green zone and green belt. Trees play an important role in minimizing dust; they reduce wind speed and trap a lot of dust.

Restrict vehicular movements; car driven at reduced speed generates much lesser dust; maintain road clear of mud and dirt.

Limit open stockpile of earth and minimize drop height when loading and unloading earth. Stop earth works eg- digging, excavation, loading, unloading etc. for a while when strong wind is blowing.

Cover hauls trucks (earth, sand) with sheet or tarpaulin during transportation.

Provide Personnel Protection Equipment (PPEs) such as face mask, nose and mouth cover, to workers exposed to dust during earth works or other construction works and so on.

Manage dust and smoke as practical as possible. Try to meet the NEQ (emission) guideline values prescribed by ECD (NO_x $200\mu\text{g}/\text{m}^3$, PM_{10} $50\mu\text{g}/\text{m}^3$ and SO_2 $20\mu\text{g}/\text{m}^3$; **See Chapter-2, 2.4**).

The local community should be able to file complaints regarding dust and smoke.

(b) Mitigation for smoke

All the smoke/gaseous emission is fugitive smoke/emission (not point source smoke from a stack) and is temporary and intermittent.

Regularly check the engine of vehicles and other machines; well-maintained and operated engines reduce smoke emission; use fuel oil with low sulphur.

Use environmentally friendly up-to-date instrument, for example, engine with higher fuel efficiency.

Equip instruments and machines with air pollution control devices to minimize exhaust emission. (These may not be readily available but Than Daung Oo Co., Ltd will consider this for the near future.)

Avoid vehicles and instruments left running unnecessary.

Avoid open burning of solid wastes of all kinds, through segregate, recycle and then for disposal at approved dump site (land fill).

Keep equipment, machinery and vehicles well-maintained and well operated to minimize smoke.

Provide PPEs such as nose and mouth covers and face masks to workers exposed to smoke. Trees in the site will effectively sequester (remove) CO_2 in the smoke. Therefore plant trees along both sides of the access road; in all available spaces in the site and around the reservoir.

Try to meet the NEQ (emission) guideline values prescribed by ECD (NO_x $200\mu\text{g}/\text{m}^3$, PM_{10} $50\mu\text{g}/\text{m}^3$ and SO_2 $20\mu\text{g}/\text{m}^3$; **See Chapter-3**). The local community should be able to file complaints regarding dust and smoke.

2) Impact: noise and vibration and mitigation measure to be taken

Noise and vibration are generated during all kind of construction works: at the construction of access road and civil works at the site.

Movement of heavy machinery and heavy trucks generated loud noise and vibration. Gravel roads produce more noise and vibration than tarred ones.

The loading and unloading of materials also generate noise and vibration.

Normal civil works such as carpentry works involve noisy saws and planes, noisy drilling machine and also sound of hammer etc.

Environmental noise level that is acceptable rating level for noise (NEQEG) is 70dBA during daytime and night. Internationally accepted noise level in the work place should not exceed 85dBA.

Pump and generator are also sources of noise. Prolonged exposure above 85 dBA can impair hearing and can be a major health impact. Noise generally causes nuisance and disturbance to the community. Noise would scare away all the wildlife animals if any, including birds. High noise level can cause high blood pressure and heart attack.

Vibration is generated from machinery or mechanical operation during construction work and also from heavy vehicles on the access road. Vibration is usually associated with loud noise; it can damage machines and equipments and also buildings or structures. On the whole vibration during the Construction Phase will be low. However vibration can occur due to heavy machinery and heavy trucks.

Mitigation (out line)

The project proponent will take the following mitigation measures:

Plan and implement in the Preconstruction Phase for procurement of equipment and vehicles that are eco-friendly and emit lower noise level.

As the project site is isolated noise is not an issue for the community. Noise can have minor impact on the employees.

The best way to mitigate noise is at its source. Noise specification of equipment and vehicles should be taken into consideration when ordering equipments and vehicles. (This will be mentioned in EMP in Planning Phase.)

All noisy machines and equipment should be fitted with noise muffler or silencers if possible. Place noisier machines away from other working units.

No construction work at night. Schedule high noise activity only at certain period during day time hours.

Big trees and vegetation, if any, in and around the project site effectively absorb noise. Keep trees intact as far as possible; avoid unnecessarily cutting of trees.

Provide adequate PPEs such as ear muffs, ear plugs etc. to workers at all activities/locations that exceed permissible occupational noise level limit standard.

Vibration due to heavy truck from road can be mitigated by ensuring a flat and smooth road surface; paved road is much better than unpaved road; tarred road is better than concrete road. Limit the speed of vehicular movements to reduce noise and vibration.

Well-maintained and well-operated machine produce less vibration, therefore, give priority to maintenance and efficient operation of machines.

Foundation for the installation of the machine should be firm and durable. This reduces vibration and protects machinery and equipment from damage. It is standard practice to mount machines in such a manner to minimize vibration. Install vibration absorbers where possible.

Plan and execute the management of noise and vibration as practical as possible.

Try to meet the NEQ (emission) guidelines for noise level prescribed by ECD (Noise level for day time 55-70dBA; night time 45-70dBA; See Chapter-3).

3) Impact on water environment and mitigation measure to be taken

The company source water from Nant Laung stream. Although the demand for water during the Construction Phase may not be as high as during the Operation Phase the need for water during the Construction Phase is not so low either. Relatively large quantity of water has to be used in mason work or concrete work such as the mixing of cement, sand, lime with water. The domestic consumption of the water by more than 370 workers can also have impact on the quantity of available water.

Water has to be used in occasional suppression of dust and washing of vehicles and machinery. The potential impacts on surface water can be:

(a) Surface water

- Can be potential contamination of surface water due to spillages of hydrocarbons and contaminated runoff sources from contaminated soil.
- Potential altered surface flow dynamic due to removal of top soil and alteration in the on site topography.
- Increase of siltation in the stream with the runoff carrying sediment; increased runoff from cleared area (during the rainy season only).

Mitigation (out line)

The project proponent will take the following mitigation measures:

Practice water conservation; minimize use of water and recycle, if possible. Minimize use of water by using low consumption appliances. Discipline worker for conservation of water for domestic uses. Harvest rain water for various uses during the rainy season, if necessary.

During the Construction Phase the use of water will be substantial for instance, cement batching, occasional dust suppression and washing of machinery and vehicle. Educate the workers for good water conservation practices.

Prevent the contamination of surface water by all means. Avoid the spillage of fuel oil and hydrocarbon into any surface water body eg- stream. Also avoid disposal of solid and liquid wastes into the water body.

Manage and prevent the contamination of soil by fuel spills which will eventually percolate into ground water. Oil spills should not be washed down with water but absorbent should be used instead.

4) Impacts on soil and mitigation measures to be taken

The impacts on land and soil are due to:

- The construction of access road involving land clearing, land cuts, digging and excavation and other earth works.
- The construction of the facility at the site that include the factory and all its facilities, buildings and structures involving land clearing, digging, excavation and other earth works.

The impact on the land and soil will be in the forms of:

- Destruction of original soil.
- Desturction of soil profile and soil structure.
- Soil impacted due to heavy machinery movement erosion and sedimentation.
- Soil contamination and subsequent ground water contamination due to oil spill and/or chemical spill.
- Soil pollution and subsequent ground water pollution due to unmanaged domestic wastes disposal.

Mitigation (out line)

The project proponent will take the following mitigation measures:

Plan and execute the management of soil as practical as possible.

Avoid unnecessarily digging or excavation of earth to minimize the destruction of soil.

Avoid the indiscriminate dumping of solid waste on land (also into the small stream).

Schedule the construction works so that large area of soil were not laid bare during the monsoon months. Do not clear the land in advance more than necessary. Phase the earth work (in the early period of construction) so that it was limited to workable size only to a minimum area.

Resurface and stabilized the exposed ground surface as soon as possible, that is, after earth work.

To prevent subsequent siltation or settlement, drain or ditch must have adequate backfill and after completion of back fill the surface should be restored to its original condition. Prevent wash water from carrying earth and materials into drainage system causing siltation.

Manage the overall erosion and sedimentation control during the Construction Phase, particularly during the rainy season.

Soil compacted by heavy and vehicles will be raked and restored to original condition.

Pit and dents shall be backfilled and ground will be leveled after construction work.

5) Impact of wastes and mitigation measure to be taken

The waste here refers to construction tailings and debris and domestic waste (solid and liquid) generated by construction workers during the Construction Phase.

Solid waste generated during the construction phase will be large quantity of debris in the form of bits and pieces of building materials, iron materials, timber, and soft wood, left over construction tailings.

Many of the leftover materials are unused or surplus materials because even well-experienced planning and design engineers may not be able to estimate the exact quantity of building materials to be used. There will always be unused or surplus timbers and other building materials. Unless systematically resold, reused and recycled and systematically disposed these materials can pose a great impact on the area. After three years of construction work, ill-disciplined workers without good house-keeping practice can also litter the site to a great extent.

Domestic waste (solid and liquid) comes from office; housings for workers, kitchen, messing hall etc.

The waste can be in the form of solid waste, waste water and spill or leak that contaminated the soil.

The spill or leakage of fuel oil, and grease etc could be also substantial if there is a lack of discipline among the workers.

Mitigation (out line)

The project proponent will take the following mitigation measures:

Plan and execute the management of waste (solid and liquid) and try to meet the statutory requirements regarding waste (solid, liquid) disposal.

All unused or surplus building materials can be sold to others who need it. The large majority of debris can be also put up for sale since most can be reused or recovered. Even left over building materials can be sold. Those that should be disposed off should be disposed at an approved land fill.

Always avoid open burning of debris.

The best thing to do would be to hire a contractor for the clearing job after the construction phase.

There will not be any substantial waste water during the Construction Phase. All required water will be used mostly for domestic consumption.

Discipline workers for good house-keeping practice; demand the building contractor to do this and ask him to take responsibility for the conducts of his construction workers.

6) Potential impact on biodiversity and mitigation measure to be taken

There will be little or no impact on natural biodiversity as the surrounding areas comprise small paddy fields and farms (rice, peanut, sugar cane). However there are a few small trees and bush along the Nant Laung Chaung (stream). The impact, if any will be negligible.

Mitigation (out line)

The project proponent will take the following mitigation measures:

- Comply with Environmental Conservation Law, 2012 and Rules, 2014.
- Plan for the protection of biodiversity, if any.
- Execute minimum disturbance on the biodiversity and habitat.
- Restrict the clearing of vegetation including bush and grass; do not clear vegetation more than necessary for construction work.
- Keep big trees in the vicinity, if any, contact as far as possible.
- Minimize dust impact on nearby trees.
- Prevent spillage of fuel;
- Restrict the movement of vehicles and heavy machinery that can impact vegetation.
- Avoid open burning of debris.
- Educate workers on wildfire awareness.
- Plant trees, revegetate the area; create green belt or green zone as far as possible inside the compound.

7) Impact on traffic and mitigation measure to be taken

The site is within a rural area, not on a high way with heavy traffic. However activities during the Construction Phase have the potential for impact on traffic. The mobilization activities involve the mobilization of building materials, machinery and equipment and construction workers and amenities, and the transportation activities later. All these activities represent a noticeable increase in the number of vehicles travelling along the highway and then the access road. There can have impacts on traffic in the forms of traffic congestion, and traffic accidents. The later can involves vehicular collisions and collision with human and domestic animals.

Heavy trucks and all kinds of vehicles travelling through or travelling pass a village can cause nuisance and disturbance to the locals e.g. noise, vibration, dust etc.

Although traffic on the whole is light in this area drivers should be trained for defensive driving and zero accident, especially when passing through villages.

Mitigation (out line)

The project proponent will take the following mitigation measures:

- Plan and implement traffic management; schedule the timing for vehicular movement to avoid busy traffic hours.
- Educate the drivers for defensive driving and try to maintain zero accident.
- Also educate them for driving heavy truck, with slow speed; especially reduce the speed when passing near or through the village for prevention of road accident and for reducing the generation of dust due to trucks movements.
- Set up speed limit and traffic sign board along the road at suitable spots. Keep the vehicles well-maintained and well-operated for safety reason.
- Avoid over loading vehicles; comply with the requirement of Road Authority; always check the weight when loading.
- Avoid spilling of earth or other material from trucks during transportation.
- Keep a log book for each vehicle.
- Avoid driving at night as far as possible.
- The local community should be able to file complaint regarding traffic.

8) Occupational health and safety issue and mitigation measure to be taken

Accidents can occur from time to time during construction work either to construction workers or neighbours if they are close to construction site. This can also happen to passers-by near the construction site.

The slipshodness of the construction workers and the falling of bits and pieces of construction materials or tools from above can cause minor or major injury to other workers or passers-by.

Certain accidents can be fatal.

The 10 most common construction site accidents worldwide are:

- fall from heights (scaffolding); slip and fall; electrocution; falling debris, materials and objects; getting caught-in between objects and materials; fire and explosion; over exertion; machinery accidents; getting hit by a vehicle; and trench (for wiring and pipes) collapses.

Accidents in the workplace or at the site can happen due to unskilled workers or careless workers during the Construction Phase. Construction work is hectic in nature and so it is quite difficult to create an accident free (zero accident) working environment during the Construction Phase.

The potential for fire breakout cannot be totally ruled out. So too is the potential for vehicular accident and electrocution.

The lack of emergency and health service can be a constraint regarding provision of health care for workers in potential emergency. If an accident that effect many people occurs the available service in the area may be prone to inadequate. The township hospital at Mong Yai, of course, cannot solve such a serious problem. Most of the serious health cases are to be referred to the main District Hospital in Lashio City in the southwest.

Mitigation (out line)

The project proponent will take the following mitigation measures:

First of all, effectively train workers for good working practice, good safety practice, good hygiene practices, good engineering practice and working practice. Since accidents used to occur due to unskilled and carless workers train them until these good practices are ingrained into their minds. Train them until these good practices become good habits for them.

Careful planning of emergency procedures shall be formulated and implemented. Train at least five workers for first aid training while another ten workers for firefighting.

Provide adequate First Aid Kits, Fire extinguishers (cylinder) and water jet pumps. Most of all provide Personnel Protection Equipment (PPE) to workers exposed to dust, smokes, heat, vibration etc.

Always try to prevent or reduce incidence and injuries during operation. Try to respond immediately and adequately in case of a serious accident.

For emergency response, organize regular mock drills for first aid works and also mock drills for firefighting.

Display phone numbers and addresses of nearest Red Cross Society, Ambulance Srevice, Fire Brigade, Police Station, Mong Yai Township Hospital and Lashio City District Hospital on the wall so that every worker can see easily.

Measures for major accident and emergency

- Basic first aid and basic Firefighting trainings for workers
- Draw detail plan for prevention of fire and emergency plan for fire out break. (The company has already done this.)
- Training and drill work on emergency procedures including contingency measures.
- Effective emergency response plan (including displaying of phone number and address of nearest Fire Brigade, Ambulance Service, Hospital and Police Station).
- Draw up a plan for zero accident.
- Take out insurance for the sugar factory and Insurance for fire.

9) Potential social impacts and mitigation measure to be taken

As the project site is near Hsen Taw village and Na Long village potential social impacts can occur from time to time.

Theoretically, the potential impacts include:

- Physical displacement (of land, property, people etc).
- Loss of livelihood, mental agony, changes in social structure.
- People can be affected due to pollution (air, water, land) as a result of the project.

In this sugar project the practical impacts are:

- Potential damage to existing road caused by movement of heavy trucks and machinery (that is prior to the construction of the 7 miles access road, gravel road, by the company).
- Continual uses of vehicles moving to and from the site impacting the safety of people and domestic animals.
- Generation of dust, noise and vibration causing potential disturbance or nuisance to the locals.
- Potential contamination of water; particularly during the rainy season.
- Frictions can occur between construction workers and local people.
- Serious social issue can occur due to ill-social behaviour of workers or locals. Construction workers working during the short Construction Phase are usually not as well-disciplined as permanent workers during the long Operation Phase.
- Quarrels and brawls, misappropriation of money and materials, vandalism, theft, unethical sexual practices or sexual offensives, and spread of Sexually Transmitted Diseases (STD) can happen during the Construction Phase.
- All these have the potential to hinder or even jeopardize the smooth progress of the project.

Mitigation (out line)

The project proponent will take the following mitigation measures:

Education and disciplinary action are necessary. Ask the building contractor to discipline his construction workers and to take responsibility for the conducts of his workers. Take and apply punitive measures such as suspension or sacking of the wrongdoer.

Keep separate dormitory (housing) for male and females construction workers; the two housings must be appropriately far apart.(the two dormitories in factory are far apart). Provide adequate sanitation for workers eg- latrine, bath, small septic tank and adjoined soak pit for treatment of waste water.

Prohibit the drinking of alcohol and the use of narcotics in the site.

Educate the workers for dealing with the locals; educate them to respect the local culture, etiquette and custom. Do not let the construction workers mingle freely with the locals.

Prevent all kinds of quarrels and brawls taking place between the workers and the local community. Draw up a plan and manage misbehaviour and social illness among workers.

Plan to avoid the potential negative impacts on the socio-economic life of the locals as well as workers.

Try to build and maintain good relation with the locals; conduct public consultation from time to time so that the locals will have a positive perception of the project; consider and plan for more CSR activities.

Do not get involve in land and property speculation activities with the locals.

Community should be able to file complaints regarding any grievances.

As for dealing with the locals the company will educate the workers regarding local culture tradition and customs to achieve healthy community interactions.

The company will deal with the workers on a fair and square basis. The company will avoid the situation of worker protests and unrests as a result of underpaid, over worked, unfair dealing and unhealthy relation between the employer and employees.

10) Potential security issue and mitigation measure to be taken

The Construction Phase is the period when it is usually difficult to maintain security. The working atmosphere is rather fluid and dynamic in nature. The in (entering the jobs) and out (quitting the jobs) of workers tend to happen almost all the time. This is the period when cases of thefts, misappropriations and vandalisms happen most.

Unlike the permanent employees during the Operation Phase who are well-disciplined, the temporary workers during the Construction Phase are usually quite difficult to discipline. The building contractor usually has no chance to hand pick them but to select them in haste due to the nature of construction work.

There is always the potential security issue for the factory compound. If left unchecked the construction workers can pose a potential for security issue.

The site is within the village area. So the site is not so isolate some of the locals may pose a potential security issue for the project.

Mitigation (out line)

The project proponent will take the following mitigation measures:

Draw up a plan and implement security management.

The fencing or walling of the whole compounds will be undertaken to keep the intruder at bay.

Access control will be implemented. Security gates will be set up; set up watch towers if necessary; no unauthorized access is permitted. The company and the building contractor must prohibit the workers from entering the neighboring village without preauthorization from the company or the elders of the villages. All entering and leaving of the site should be checked. Do not let the construction workers mingle freely with the locals.

Identity Card (ID) for construction workers may not be necessary.

Heavy building materials (which cannot be lifted easily) such as iron bars, iron rod, big timber etc. and materials of less value, for example, bricks, sand, gravel etc. can be piled up in the open. Materials of certain value, for instance, iron work, timber work, frame, iron nails, and associates, corrugated iron sheets, glass panels, bags of cement etc. will be kept in store or ware house under lock and key.

Ask the contractor to discipline his construction workers.

The condition should include punitive measures if found to be in contravention of the requirement, for instance, suspension or termination of the employment.

11) Positive (beneficial) impacts during the Construction Phase

The positive or beneficial impacts during the Construction Phase are in socio-economic aspects. The economic benefits to the region were substantial.

The proposed project will invigorate and boost the local economy and brought economic benefits to people who are involved in extraction/production and sale of building materials of all sorts, both raw materials and manufactured goods.

Contractors of raw materials such as sand, gravel and bricks will get the chance for doing lucrative and brisk business in providing these raw materials for sales. The extraction or production of these raw materials shall also provide jobs for many locals.

Timber merchants and merchants of soft wood and as well as merchants of construction merchandize such as iron rods, bars, iron works and nails, roofing, aluminum sheet, glass panels, cement and so on will promote their sales. At the same time more jobs for the locals will be provided by these merchants; small business men and small sub-contractors will be also benefited by the production, extraction and sale of these building merchandize.

The proposed project will provide jobs for about 370 construction workers for three years. Many workers including engineers and technicians will get technology and skill transfer from foreign engineers and technicians.

The access hard top road built by the company has greatly contributed to community's transportation and development.

The local sugar cane farmers will have the opportunities to sell their produces. The project will lead to the provision of market for food vendors and owners of nearby business premises. The food vendors will have the chance to increase their sales and income as a result of selling food to the company's workers. The owners of the nearby business premises will benefit as a result of the company's workers purchasing the items from their shops.

On the national level the benefits will accrue to the country in the form of direct investment of Ks 88,124.98 million; an increase in Gross Domestic Product (GDP) of the nation and also in the form of increase tax, duty and revenue for the national economy.

Than Daung Oo Co., Ltd will bear in mind that while negative impacts will be mitigated or minimized positive impacts will be promoted or enhanced.

6.2.1.3 During the Operation Phase

1) Impact on air quality environment and mitigation measure to be taken

Air emission includes dust, smoke and other gaseous emission.

Air emissions in sugar manufacturing are primarily related to particulate matter (PM) generated from bagasse-fired steam boiler. These are in the form of down ash and fly ash.

Exhaust gas emission produced by the combustion of organic materials in boiler for power and heat generation is the most significant source of air emissions in sugar processing activities.

Dust and PM are generated in sugar drying and packing activities. Dust and PM are also generated due to vehicular movements especially on unpaved road and open ground. The erosion of ground surface due to strong wind also generates dust. Dust is mainly in the form of suspended particulate matter SPM or particulate matter PM.

Emission from a sugar factory stack includes mainly SO₂, NO, NO_x, CO₂, CO, CH₄, VOCs, hydrocarbons and PM (PM₂₅, PM₁₀, PM_{2.5}, PM_{1.0}). It is easy to protect PM of larger particles (PM₂₅, PM₁₀) but not easy to protect PM of smaller particles (PM_{2.5}, PM_{1.0}), which pose more risks.

Emission (smoke) also comes from exhausts of vehicles and a variety of machinery such as pumps and generators etc.

Gases such as Fe₂, CO₂, CO, SO₂ and O₃ some of which are toxic are generated from workshop during welding works.

Excessive production of gas emission can lead to excessive concentration of CO₂ in the atmosphere which can lead to global warming and eventually to climate change. This is of international concern today.

As a general rule for every one ton of sugar produced 241kg of CO₂ is generated. In this proposed sugar factory context $241 \times 500 = 120500$ kg (120 tons) of CO₂ is emitted.

Smoke and dust are health hazards for the employees as well as neighbours. Their impact is not only in the foot print of the factory but beyond. Strong wind can spread smoke and dust to the neighbourhood and onto agricultural land.

Increase level of smoke and dust has serious impact on health such as diseases associated with respiratory duct and lung e.g. bronchitis, asthma to lung cancer.

Mitigation (out line)

The project proponent will take the following mitigation measures:

- Try to control and mitigate air emission as practical as possible.
- Comply with the National Environmental Quality (NEQ) guidelines for emission prescribed by ECD. (eg. SO₂ 20µg/m³, NO₂ 200 µg/m³, PM₁₀ 50 µg/m³ etc)
- Consider and procure equipment and vehicles with air emission specification in the first place. In other word procure eco-friendly equipment/vehicles that minimize emission and generate less smoke.
- Ensure that the height of the stack is suitable for a sugar mill. (The stack height is 50 m according to Chinese experts).
- Ensure for complete combustion of bagasse fuel to reduce smoke and ash and harmful substance such as toxic organic gase e.g. flurin, dioxin etc.
- Apply smoke and fly ash reduction equipment or device eg. filter bag, fabric filter, wet scrubber, electrostatic precipitator (ESP), activated carbon absorption filter, dust collector etc. (The company will apply wet scrubber method. Regular water dozing (spraying) and occasional chemical water (lime water) dozing will be applied to mitigate smoke/emission.
- Dozing with lime water is an effective desulphurization, it can also mitigate organic gases such as furan and dioxin. Water and/or lime water dozing (sprinkling) also suppress fly ash. Since ash (bagasse ash) will be generated in large quantity ash tank and ash pond is constructed to collect ash as wet ash. Installation of ESP is not considered yet, the burner is not coal but bagasse. In addition dust collector system is installed and also induced fan unit installed to enhance air flow into the stack and beyond.
- Minimize gas emission (smoke) by proper training, operation and maintenance of machinery and vehicles.
- Regularly check all machinery and vehicles--- well-maintained and well-operated machinery and vehicles reduce smoke emission.
- If possible, use fuel oil with low sulphur content.
- Always avoid open burning of trash and debris; dispose debris at a landfill.
- Regularly spray water for dust suppression (wet suppression can reduce dust emission up to 75%).
- Restrict vehicular movement; set up speed limit for truck to minimize emission of dust (a speed reduction from 30km/hr to 15km/hr will reduce 50% of dust emission).
- Prevent spillage of lime and sulphur during transportation.
- Regular cleaning of road surface by cleaning.

- Try to control smoke and dust biologically. Plant trees and create a green belt around the factory premise. Trees are efficient dust trappers and controllers. Trees sequester CO₂ in smoke and produce O₂.
- Provide adequate personnel protective equipment (PPEs) eg face masks, nose and mouth covers for workers exposed to long hours of smoke and dust.
- The local community should be able to file complaint regarding smoke and dust; heed to the complaint.

2) Impact: noise and vibration and mitigation measures to be taken

Noise and vibrations result from a variety of sources inside a sugar factory e.g. rotating machinery, cane milling, lime milling, ventilators, turbines, compressors, generators, motors, flow in pipe lines and internal and external transportation etc. On the whole the noise level inside a sugar factory is quite high.

The movements of heavy vehicles and heavy machinery also generate high level noises especially if the road surface is not smooth.

Vibration is associated with high noise level. Noisy machinery generates vibration which can damage the machine if its foundation is not stable. Prolonged vibration can damage buildings and structures.

Increase of ambient noise level will cause disturbance or nuisance for the employees but working in noisy workplace for long hours can impair hearing; in severe case can lead to deafness.

Violent vibration can cause body vibration to employees which are a health hazards. Even small device such as lawn mowing equipment can cause hand, arm and body vibration to the employee. A drilling device can cause hand vibration if use for long hours.

Mitigation (out line)

The project proponent will take the following mitigation measures:

- Try to manage and mitigate noise vibration.
- Comply with the National Environment Quality Emission (NEQEG) guideline values for noise and vibration prescribed by ECD (eg. 70dBA for noise level; noise level at 85dBA and above can impair hearing).
- When procuring machinery and vehicles consider for noise specification. Procure machinery and vehicles that are eco-friendly, that is, generate lower noise level, in the first place.
- Procure only brand new machinery/equipment and vehicles, this will emit low noise level
- Modified old machinery/equipment and vehicles by incorporating small design change to reduce noise.

- Implement effective maintenance of machinery/equipment and vehicles (well-maintained and well-operated machinery/equipment/vehicle can reduce noise level by more than 50%).
- Install mufflers or silencers at air inlets/outlets of the fans and air compressors to reduce noise.
- Install noise barrier/noise containment/sound insulation for noisy machinery/equipment, if necessary.
- Will also install sound insulator on the walls in milling plant and processing plant.
- Limit the speed of heavy trucks/heavy machinery to reduce noise and vibration.
- Ensure that the road surface is smooth to reduce vibration.
- Install insulator or absorber (shock absorber), if necessary, on machinery/equipment that vibrate violently (prolonged vibration can damage the machine).
- Design for stable foundation in the first place for machinery/equipment that vibrates.
- Plant trees and create green belt around the factory compound to abate noise for the environment. Green belt absorbs noise and effectively acts as noise pollution sink.
- Provide adequate PPEs, ear muffs and ear protectors for employees exposed to long hours of high noise level. (Shall wear ear muffs when noise level is higher than 70dBA.)
- The local community should be able to file complaint regarding noise and vibration heard to the complaint.

3) Impact of solid wastes and mitigation measure to be taken

Huge quantity of solid waste is produced from a sugar factory. Sugar cane leaves (if not trimmed before transportation to the factory), mud and soil arriving at the factory with the raw material cane are serious waste issue. (The sugar cane plants are trimmed at the field prior to transportation to the factory.)

During the various steps in processing and manufacturing of sugar huge quantity of solid wastes and by-products that are generated are: bagasse, molasse, mud (Sugar press mud or cachaza), lime solid (dry lime), and ash (fly ash and down ash).

- Bagasse fibre is generated in large quantity, after cane milling (pressing). As a general rule one ton of sugar cane generates 280 kg of bagasse. (In this proposed factory context which can mill 5,000 tons of cane per day 1400 tons of bagasse will be produced per day.)
- Molasse is produced from final crystallization of sugar. Generally for every one ton of sugar produced 450 kg of molasses will be generated as a waste/by product. (In this proposed sugar factory context 225 tons of molasses will be produced per day.)

- Sugar press mud (cachaza) is generated as filtrate from clarification of juice after filtration. (Generally for every one ton of sugar produced 34 kg of cachaza will be generated. In this proposed sugar factory context the daily production of cachaza will be 17 tons/day.)
- Bagasse ash – is produced from the burning of bagasse which is used as burner. It is estimated that 60 tons of bagasse ash is generated per day.
- Solid lime (dry lime) is also generated in the clarification process for cane juice. Less than 5 tons of lime powder is to be used per day and the waste generated is at most 2 tons/day.

Other solid wastes generated in small quantity during sugar manufacturing are:

- Spent filter materials, active carbon, resins from the ion exchange process, acid from chemical cleaning of equipment etc (If molasse-sugar juice is fermented for the production of ethanol then a spent wash known as vanasse is generated. The company is so far not producing ethanol yet.).

These huge quantities of solid wastes or by-products mentioned above can pose a serious environmental issue if not environmentally well-managed. However all, or almost all, of these wastes can be used as fuel, as construction material, made into fertilizers or reprocessed into a commercially viable products e.g. ethanol, alcohol, biogases etc.

Domestic wastes

Other solid wastes (domestic wastes) generated within a sugar factory premise are quite significant in quantity e.g. office waste, kitchen waste (food waste), other domestic wastes from the dormitory, trash and debris (dried leaves, grass etc). There will be up to 254 workers when the factory is in full operation. Based on formula, 76.2 kg of domestic wastes will be produced per day (formula $0.3 \text{ kg/capacity/day}$).

Mitigation (out line)

The project proponent will take the following mitigation measures:

- Plan and implement wastes management and waste mitigation, waste minimization and utilization.
- Environmental management for solid waste will be started at the origin, that is, sugar cane fields. Avoid the burning of leaves cut or trimmed for sugar cane plant after harvest. The trimmings from the sugar cane will be spread in the field to biodegrade and convert to natural organic fertilizer.

For bagasse

- Use bagasse (waste fibre or pulp) from the cane as fuel for steam and power generation. (This is exactly what Than Daung Oo Co., Ltd will do. And this is a very good practice from environmental point of view. The bagasse waste issue is effectively tackled.) Using bagasse as a fuel can meet the factory energy demand and may even

generate excess electrical energy for other uses, e.g. electrification for the vicinity and 2 nearby villages. (The company has done this when the factory is in operation; electricity will be generated for 5 months; operation months.)

- If there is still surplus bagasse fibre it can be used for paper making and particle board manufacturing.
- Ensure that no dusts are generated during handling and conveying of bagasse and no spill over of bagasse. (apply cover on conveyor line of necessary; tubular conveyor)
- Systematically stored in bagasse yard, bagasse store house and bagasse corridor.

For molasse

- Systematically collect the molasse and reused (recycled) for the production of other grade molasse eg. "A" class molasse to "B" class molasse and than to "C" class molasse. (This is exactly what the company will do. Most of the molasse will be sold to business men who distill alcohols.)
- Molasse is stored in 2 molass storage tank Ø 112' x 40' each and all is reused.
- In the near future consider for using molasse beneficially as feedback for:
 - Fermentation and organic chemical manufacturing.
 - Production of citric acid and yeast.
 - Organic chemical manufacturing (eg. ethanol, alcohol).
- Ensure that no bad odor is emitted from molasse, regularly wash the containous and working place floor.

For sugar press "mud" or cachaza

- Mud or cachaza can be composted into high quality organic fertilizer for agricultural production.
- Sugar press mud (cachaza) will be composted into high quality organic fertilizer; it will be made into EM in Bokashi organic fertilizer, press mud based gypsum fertilizer, press mud based dolomite fertilizer; also for the production of Triple sugar phosphate fertilizer, Potash (potassium chloride) fertilizer and ash etc. (actually all are used up as fertilizer and sold to cane farmers)
- Most organic materials in the wastes of the sugar factory can be also used for the production of biogases.

For dry lime (solid lime)

- Dry lime from the juice clarification process can be made into soil conditioning product for agriculture.
- Dry lime will be also used for suppression odour in the final discharge pond.

For ash (bagasse ash)

- Systematically collect ash (especially down ash) and bagasse ash and mix it with cement for use as basic construction material. The ash is rich in potassium and can be partially used as fertilizer in small quantity. (The company has 4 ash pools where the ash is stored. The ash is weekly removed with over head crane and later used as fertilizer/bio compost/soil conditioner.)
- Ensure that ash pools are sealed (concrete pond) to prevent the gradual percolation of ash into underground soil and impact underground water. (The company will plan and implement for systematic discharge of water from ash pools.) After treatment with lime powder iteration of the ponds may not be necessary.
- If not regularly remove the ash pond will be overloaded and bad odour can occur. Apply lime powder from time to mitigate occur.

For general domestic wastes

- Avoid open burning of solid waste (or any surplus bagasse, if any); dispose the solid waste at the landfill or dump site.
- Collect all domestic wastes (office waste, kitchen or food waste, and wastes from dormitory etc) regularly and dispose them at the landfill or dumping site.
- Follow the 5 Rs principles for waste: reduce, reuse, recover, recycle and redesign, wherever possible.
- Keep separate waste bins for recycleable and non-recycleable waste (kitchen waste can be composted).
- Educate and train workers for good working practice and good house-keeping practice.
- Also train them for proper handling of waste.
- Always avoid discharge of solid waste on land and into water body, the Nant Laung stream.
- Dispose waste only after waste prevention and recycling strategies have been undertaken as practical as possible.
- The local community should be able to file complaint regarding waste, if any, in their neighbourhood; heed to the complaint.

4) Impact of liquid waste and mitigation measure to be taken

The main waste water from the sugar factory is the industrial waste water. Industrial waste water can be categorized into--process waste water, waste water from utility operations, runoff from process and materials (cane) staging areas, miscellaneous waste water from laboratory, and from equipment maintenance shop.

Another form of waste water inside a sugar factory compound is the domestic waste water e.g. from kitchen, and from living quarter and sanitary waste water (toilet, baths). Most of the workers will be camped in the work housing inside that factory compound. Therefore domestic waste water will be substantial.

Storm water (influx of rainwater), if contaminated, can be also termed waste water. The buildings roofs and pavement in the factory compound lead to the increase volume and velocity of storm water runoff flowing across the area.

Sugar processing waste water has a high content of organic material and subsequently a high content of organic material and subsequently a high biochemical oxygen demand (BOD), particularly because of the presence of sugars and organic material arriving with the cane. Waste water resulting from washing of cane may also contain crop pests, pesticides residual, and pathogens.

The sugar manufacturing activities require large quantity of quality water for: raw materials (cane) cleaning; sugar extraction; final sugar washing and cooling and cleaning equipment. Steam is essential to the evaporation and heating of various process steps in sugar processing.

Daily consumption is estimated at 10000 tons/day (5000 tons for industrial uses and 2000 tons for domestic uses). It is estimated that 3000 tons gallons will end up as industrial effluent which 1000 tons will end up as domestic effluent, if no recirculation is applied. However used water will be recirculated through cooling tower and cooling ponds.

The conservation of water and the effective management of waste water is necessary.

Mitigation (out line)

The project proponent will take the following mitigation measures:

- Plan and execute the management of waste water, and also plan and execute for the reduction of waste water.
- Promote awareness on the efficient use of water and conservation of water.
- Comply with the NEQEG effluent guideline values prescribed by ECD (Already mentioned in **Chapter-3**).
- Recirculate used water through cooling tower and a series of cooling ponds. (The company will do this); reuse the water for processing and other purposes. There will be a cooling tower, series of cooling ponds and storage ponds.
- Water used for handling ash water flow through 4 sedimentation tanks; the sediments will be removed with the aid of over head crane.
- Lime powder for lime mud will be used for controlling odour and the remaining small quantity of waste water will dry up in the final waste water pond. (The company will do this)
- Segregate non-contaminated waste water stream from contaminated waste water stream; reuse the former cooling process.

- Reduce the organic load of waste water by preventing the entry of solid waste (and concentrated liquid waste) into the waste water stream; apply screen and filter.
- Fit and use floor drains and collection channels with grids and screen to trap and reduce the amount of solid entering the waste stream.
- Ash sediment in ash pond, and sediment (sludge) in waste water pond will be mechanically removed weekly to reduce or eliminate organic loads in the tanks.
- Prevent direct runoff to water course, the small Nant Laung stream nearby.
- Duly undertake the waste water treatment task applying the conventional method which includes the following main steps:
 - Physical treatment: preliminary filtration for separation of filterable solid (use of screen or filter) (The company will install screen to remove organic load)
 - Flow and load equalization (sedimentation tank). (The company will do this.)
 - Chemical treatment: application of lime powder in waste water pond. (Chlorination not necessary yet)
 - Construct a network of drainage system for management of used water, rain water, influx and storm water. (The company will do this.)
 - Ensure that used water and storm water are well-managed by drainage system.
 - Final discharge (into surface water or onto approved land; no public sewer system in the area). (Small quantity of final discharge will be into the large waste water pond)
- Ensure that industrial used/waste water is duly treated by means of recirculation or at least applying basic physical treatment. (The main issue for a sugar factory is ash water and the company will take effort to tackle this issue.)
- It is expected that the above-mentioned treatment will be effective. After the factory is in operation for some years and if become deem necessary for implementation of full conventional treatment that involve: screening, sedimentation (and removal) aeration and chlorination and final discharge. Then one aeration tank and one chlorination tank will be added to the system and the method, applied.
- Recycle the used water as practical as possible. (The company will recycle the used water as far as possible, including the building of one cooling tower together with a series of cooling ponds and the recirculate water.)
- Also treat the domestic waste water of lesser quantity or, build septic tank and soak tank for sanitary waste water (no sewer system in the area; septic tank is the only option); the used water/washed water will flow into the drain; no special treatment for domestic used/washed water.

- Educate and train the workers for good house-keeping practice and the proper handling of waste water. As sugar factory requires a large amount of water the efficient use and conservation of water is necessary.
- Educate and train workers for the efficient use and conservation of water.
- Implement dry precleaning of raw material (cane), equipment and production area (work place) before wet cleaning to reduce the use of water. (Sweep with a broom and pan where possible rather than hose down the place.)
- Check and monitor the daily or weekly consumption of water.
- Regularly check the water tanks, pipes, taps etc for water leakage and fix them immediately.

5) Impact: odour and mitigation measure to be taken

Odour is a kind of air pollution and in a sugar factory there are many sources of odour. Mild odours (bearable odours or tolerable odours) are generated from certain spots inside milling plant and processing plant. e.g. molasses, cachaza. Mild odour does not have serious impact on health but it can be a nuisance.

Generation of odour from the raw material sugar cane not envisaged. Bad odour (malodorous odour) can be generated from waste water pond and ash water pond if these ponds are not well-managed and well-maintained. The cause of odour is the large quantities of organic loads in the waste water and ash water, particularly the former. Sugar processing waste water has a high concentration of organic materials subsequently a high biochemical demand (BOD). This is due to the presence of sugar and organic materials in the cane.

High concentration of organic material in water, if not manages properly, can lead to excessive increase in BOD and COD and generation of bad odour, which is not only intolerable but also can have health impact.

Mitigation (outline)

- Comply with NEQEG guidelines value for odour: (odourant level should be between 5-10)
- Systematically store raw material sugar cane near weighting unit area, systematically store bagasse in yard and corridor, and molasses in molasse tank to mitigate odour.
- Avoid and prevent organic over loading of the waste water pond by all means, **install screen or trap to retain and remove particulate organic matter before entry into the sedimentation pond and waste water pond.**
- Mechanically remove sediment or sludge at the waste water pond monthly and dispose at landfill.
- It is not practical to retain the ash water as large quantity of ash are in the water. Therefore, regularly remove the ash sediment by mechanical means (The company will deploy overhead crane for removal of ash sediment weekly)

- As regard chemical treatment apply lime powder at waste water pond to mitigate bad odour regularly, preferable once a week or once a fortnight. Lime powder is an effective desulphurization agent and prevent occurrence of H₂S.
- Large quantity of ash removed from the ash pond will be used as fertilizer or soil conditioner; some will be given away to local sugar cane planters.
- Avoid dumping of solid waste into ash pond or waste water pond.
- Mild odours are generated from milling plant and especially processing plants in clarification work. eg. sulphitation; ensure that working rooms are well-ventilated.
- Wash down milling area and processing area daily to reduce odour, wash down all working floors daily.
- Provide PPE, face masks, noise and mouth covers to workers exposed to long hours of odour (any category of odour, both tolerable and non-tolerable).
- Plant fast growing trees around the factory, particularly around the mill plant and process plant; trees with abundance leaves can partially control the spread of odour outwards.
- Inspect and check ash pool and waste water pool weekly to ensure that malodorous odour is mitigated or minimized.
- Check the waste water quality semi-annually with the help of hired technicians.

6) Impact on water environment and mitigation measure to be put in place

The water environment here refers to the surface water environment, the small stream nearby, (the Nant Laung stream).

The impact on water can be on the quality (contamination, pollution) and on the quantity (reduction, lowering of water level) of water resource. The water from Nant Laung Chaung, a large perennial stream will be used by both factories.

If solid waste and liquid waste are not well-managed these wastes can get into the stream and contaminate the stream water. Both the solid and liquid wastes can eventually percolate into the ground water and contaminate the water.

There will be no dumping of solid waste and/or liquid waste into the stream.

There can be accidental spillage of fuel oil and chemicals or chemical substances (sulphur, lime powder, washing soda, sodium chloride etc.) into the stream, if not well-managed. Fuel spills from fuel depot and parking area can one way or another find their ways into the stream, especially during the rainy season.

Mitigation (out line)

The project proponent will take the following mitigation measures:

- Plan and manage for water environment protection and water conservation.
- Avoid by all means the pollution of the nearby stream Nant Laung stream; manage so that no activity will impact the stream.
- Check the network of drainage system weekly to ensure that waste water flows in a proper way.
- Ensure that all ponds (ash pond, waste water pond, cool water pond, etc) are built with good quality concrete. So that there is no percolation or leaking of water that will affect groundwater or the water of Nant Laung stream.
- Educate and train workers for good house-keeping practice (do not litter, do not dump anything into the stream).
- Follow rules and regulations (eg. conservation of water Resources and Rivers Law, 2006; comply with NEQEG guideline by ECD).
- Avoid disposing of solid and liquid waste of any kind into the stream; Nant Laung also ensures that all waste water will end up in the large waste water pond, no waste water entering Nant Laung Stream.
- Fuel oil depot should be away from the stream; the depot should be bunded to protect surface water from oil spill.
- Avoid accidental spillage of fuel oil into the Nant Laung stream.
- Adequately maintain vehicles and machinery to prevent spillage resulting in groundwater contamination.
- Ensure that the ash in the ash pools does not percolate into underground water; seal the floors of the pools. (build with quality concrete)
- Promote awareness of efficient use of water and water conservation; educate and train workers for this until water conservation is ingrained in their mind sets.
- Ensure that the consumption of water is in the work frame stated earlier; 1,200,000 tons/year of 120 working days (120 tons/day).
- Monitor the daily, weekly and monthly consumption of water.
- Ensure that the amount of water needed is sustainable for all seasons and also does not affect the neighbourhood.
- Conserve water; minimize the use of water in house-keeping, cooking, machinery and vehicle maintenance and washing, ground maintenance for greens and lawns, and personal uses by employees.

- Recirculate water, recirculated water will be mainly used for milling and processing plants; some will be used for washing machinery, dust suppression and watering lawns and plants. (The company will recycle the used water for reuse.)
- Apply appropriate plumbing, and ensure there is no leaking of water, check the condition daily or weekly.
- Build water tanks and ponds and harvest rainwater from the eaves of the roofing; rainwater can be used in washing of machinery and vehicles, suppression of dust, watering plants and for firefighting etc, if necessary. (The company has an initial plan for **rain water pond (20m x 10m x 3m) east of sugar store house**. But this may not be necessary given the fact that the water from the large Nant Laung stream is readily available through out the year for the two factories.)
- Select plants and grass species that need little water and design the landscape (garden) to reduce the use of water.
- Use water saving equipment including flush toilets, spray nozzles, urinals, faucets, low-flow shower heads, water spigots and pressure control valves.
- Check the water quality at least twice a year (hire technicians to do this).
- The local community should be able to file complaint regarding pollution in the nearby small stream, if any; heed to their complaint.

7) Impact on traffic and mitigation measure to be put in place

The Hsi-paw-Mong Yai High way has normal traffic (not heavy traffic) with vehicles of various sizes and motorcycles. However, the 7 miles access road to the high way constructed by Than Daung Oo Co., Ltd has on the whole very light traffic. But during the period when the sugar factory is in operation there are several dozens (may be even hundreds) of heavy trucks loaded with sugar cane coming to and leaving the factory. It is quite a common sight to see dozens of heavy trucks loaded with sugar cane queuing at the entrance of the sugar factory waiting for their turn to deliver sugar canes to the factory.

The existing factory has also a few vehicles e.g. trucks, office cars while many locals have their own motorcycles. These heavy trucks, small vehicles and motorcycles can become a traffic issue if not well-managed. Road accidents that involve people and domestic animals can sometimes happen.

There can be a traffic issue at the intersection of the Hsi-paw- Mong Yai Highway and the access road to the sugar factory. Heavy trucks leaving or entering the highway can cause traffic congestion or traffic issue.

When the proposed Than Daung Oo Sugar factory (No.2) is in operation there will be a considerable increase in traffic. More effective traffic management is necessary.

As the heavy trucks of sugar cane contractors or merchants are not under the control of Than Daung Oo Co., Ltd the mitigation measures on the impact on traffic on the highway are; of course, not practical. However the company wills take responsibility on the traffic on its 7 miles access road to the existing factory and the new factory to be materialized.

Mitigation (out line)

The project proponent will take the following mitigation measures:

- Try to achieve zero road accident on the access road.
- Set up signage or small sign board at the road intersection (of access road and highway) to direct heavy truck drivers to reduce speed at this intersection.
- Also set up speed limit signages at appropriate locations.
- If possible, schedule vehicular movement to avoid peak hours.
- Educate and train the factory drivers for defensive driving; to slow down speed when passing through or near villages.
- Heavy trucks with big load to be travelled at reduced speed.
- Avoid overloading the trucks.
- Deploy one or two factory employees to direct truck drivers at the entrance of the factory.
- Check and record the arrival and departure of all trucks; also all company's vehicles.
- The local community should be able to file complaint regarding traffic issue; heed to the complaint.

8) Occupation health and safety (OHS) issue and mitigation measure to be put in place

Common serious safety hazards in the work place of a sugar factory are:

- Falls, slips, trips (due to spillage of water or oil on floor; uneven floor).
- Machinery/equipment hazards (due to carelessness or lack of good training).
- Chemical hazards (due to inhalation and demal contact of lime, sulphur etc).
- Fire hazard (from engine, welding equipment, electrical equipment)
- Heat hazards (from boiler, heaters, hot equipment --- etc) and
- Working at height (fall) and/or working in confined space (O₂ depletion).

As regards occupational health and hazards most of the industrial disease in factories are caused by dust, chemical and fumes. Common industrial diseases are: occupational ashma, occupational dermatitis, industrial deafness, asbestos related disease, hand-arm-vibration syndrone, allergies and legionnaires disease.

Working in a sugar factory seems to be safe but when working for long hours over a long period unexpected occupational hazards and accident can happen. Shared dining, shared hygiene facility (eg. toilet, bath) and crowded condition can contribute to spreading of diseases. Monotonous nature of work at a work place can lead to psychological disorder eg. outbreak of hysteria.

Workers who are working standing up for long hours can suffer from stress and strain, sore feet, swelling of legs, general muscular fatigue, lower back pain etc. Minor injuries known as

repetitive strain injuries can happen when a worker is doing the same movement over and over wearing out bones, ligaments, cartilages, nervous system and muscles. Working repetitive work for long hours can lead to carelessness and slackness of attention resulting in accidents.

Occupational health and safety issues specifically associated with sugar manufacturing operations are:

- Physical hazards.
- Exposure to dust and biological hazards.
- Exposure to chemical (including gases and vapours).
- Exposure to heat.
- Exposure to noise and vibration.

Physical hazards

The most common risks are trips and falls caused by slippery floor, stairs and platforms (eg. packing and transport equipment); contact with process equipment (eg. milling machine); accidents involving conveyor belts and explosion. (eg. Sugar drying and storing, and from fuel oil storage, and boiler)

Repetitive work injuries

Sugar manufacturing activities include a variety of situation in which workers can be exposed to lifting, carrying, and repetitive work and work posture injuries.

Dust and biological hazards

Workers are exposed to dust (including microbiological agents) during sugar drying and packing processes.

Heat

Workers can be exposed to heat such as from boiler or hot equipment.

Noise and vibration

Noise and vibration from internal and external transportation, flow in pipelines, lime milling, rotating machinery, turbines and compressor.

The occupational health and safety (OHS) impact can be two ways. OHS can impact the workers while the impacted workers (in the form of sick leave, worker turnover) can have negative impact on the project (decline in productivity).

Mitigation (out line)

The project proponent will take the following mitigation measures:

- Plan and manage for a safe and healthy atmosphere inside the factory.
- Create a safety work place and try to achieve zero accidents at the work place.

- Comply with Factories Act 1951; The Boiler Law, 2015; The Labour Organization Law, 2011; the Social Security Law, 2012 and Workmen's Compensation Act, 1923.
- Comply with NEQEG guideline for emission and noise level, by ECD (Already mentioned in Chapter-3).
- Educate train and supervize workers for good working practice, good safety practice, good house-keeping practice and good health and hygiene practice until all these practices are ingrained in their mindsets and become good habits.
- Especially educate, train and supervize them for skill, for handling and operation of equipment, handling and application of chemicals.
- Educate and train them for environmental awareness and OHS hazards.
- Keep all machinery and equipment well-maintained, well-operated and well-lubricated (regular check necessary).
- Provide adequate PPEs e.g. outfit boots, helmet, gloves, face mask, goggles, ear muff etc where necessary.
- Beware of all the common accidents that used to happen and implement prevention, protection and mitigation measures.
- Also Beware of the common diseases that occur in the area (cholera, T.B, dysentery, HIV) and plan in advance to tackle the issue.
- Carefully plan for emergency procedure including live saving and rescue operations.
- Organize first aid training and firefighting training for some workers.
- Provide adequate First Aid Kits well-stocked with medicines and drugs.
- Provide adequate Fire Extinguisher, firefighting equipment and other associated device; keep water tank always full for firefighting.
- For emergency response organize mock drill and rehearsal from time to time.
- Phone numbers and addresses of Red Cross Society, Ambulance Service, Fire Brigade, Police Station, Mong Yai Hospital must be displayed so that everyone can see easily.
- Take out insurance for the sugar factory; and also take out fire insurance; also life insurance for workers

9) Potential social impacts and mitigation measure to be taken

These are already mentioned in the Construction Phase. Such cases are unlikely to occur during the Operation Phase as all workers are handpicked by the executive members of the factory. Unlike the blue collar construction workers who are employed for short term (three years) the workers in the Operation Phase are permanent workers. It is expected that they are better well-disciplined than the construction workers.

Any way the authority of the factory has to deal with these workers on a long term basis. Measures for creating a peaceful and productive atmosphere should be taken into account.

Impacts on the socio-economic component of the area can be in the form of:

- Continual uses of vehicles moving to and from the sites can impact the safety of people and domestic animals.
- Generation of dust, and noise causing potential disturbance or nuisance to the local people.
- Friction can happen between workers and locals.
- Ill-social behavior of workers or locals can lead to quarrels and brawls among themselves or with locals; theft, misappropriation of materials and money, vandalism, unethical sexual practice or sexual offences, spread of Sexually Transmitted Diseases (STD) and so on (as the site is near a village). These can have also certain negative impact on the project.

Mitigation (out line)

The project proponent will take the following mitigation measures:

Educate employees to be good workers who are dutiful, well-disciplined and diligent. Give them proper training on factory and work place regulation, and code of conducts.

Apply punitive measures such as termination of job or demotion to wrongdoer. Also apply incentives to boost production.

As for dealing with local community educate them regarding local cultural behavior and awareness to achieve responsible and healthy community interactions.

The company should deal with the employees on a fair and square basis. The company should be aware of widespread cases of workers unrest in Yangon as a result of overworked, underpaid, and unhealthy relation between the employees and the factory authority.

Conduct regular medical checkup.

- Consider hiring locals in the future when there are vacant posts, especially unskilled jobs
- Try to reduce the potential impact to quality of existing life style of the local community in the area
- Implement CSR programme for the community (certain CSR actions had been already taken by Than Daung Oo Co., Ltd)
- Maintain cordial relation with the local community
- Listen to the views, thoughts and opinion of the local people, heed to their concerns
- The local community should be able to file complaint regarding social issues; heed to their complaints.

10) Potential security issue and mitigation measure to be put in place

Security issue can be in the form of theft, vandalism and sabotage. This is already mentioned in the Construction Phase. Unlike the hectic nature of works during the Construction the working atmosphere during the Operation Phase is stable.

However, security tends to slacken when sugar plant operation is going on for several years. So for the long term Operation Phase the plan for security should be more practical. It is expected that the permanent employees hand-picked by the company's authority will not pose any security threat to the mining site. But outsiders, the locals, can at one time or another can cause security issues such as theft and vandalism.

Sugar factory can become soft target for sabotage by terrorists.

Mitigation (out line)

The project proponent will take the following mitigation measures:

- Draw up a security management plan.
- Undertake effective walling of the whole factory compound.
- Effectively control all accesses; set up security gates, deploy adequate guards.
- Do not let the workers enter the neighbouring village without preauthorization.
- Do not let workers mingle freely with locals.
- Store certain valuable materials under lock and key as far as possible.
- Apply punitive measures, such as suspension or termination of employment, if necessary.
- Provide ID cards for all workers for easy identification.
- Also provide uniforms for all workers.
- Regularly monitor the security system; check wall or fence and gate and security guards to ensure effective security.

11) Potential visual impact and mitigation measure to be put in place

The operation of the sugar factory will change the landscape permanently and irreversibly. The usual rural landscape will alter into a semi-industrial landscape comprising the sugar factory complex and facility and the access road. When the proposed project is materialized there will be two sugar factories in the area.

Of course these sugar factories and facilities may not be in harmony with the rural and backward surrounding background. But this will have to be accepted as a symbol of national industrial development. Moreover the site will be hidden from view; that is not near a high way road.

The visual impact during night time will be in the form of bright light. In this era of environmental awareness bright light at night is considered light pollution.

Conditions are dark at night in the surrounding area as there is no access to electricity. The local community can have the so-called lighting offensive (visual impact) at night from the sugar factories and facilities. Bright white light at night has the potential to attract hundreds of insects from the vicinity and kill them. Radical environmentalists consider this as committing an environmental crime.

Mitigation (out line)

The project proponent will take the following mitigation measures:

- Plan and execute for a sugar project that which is focused on visual appeal as practical as possible. Consider for long term aesthetic when planning and designing for the project in the first place.
- Plant fast growing shade trees along both side of access road; plant shade trees and fruit trees in and around the site; plan and execute for creation of green zone, green belt and aesthetic landscaping and conserve green area as far as possible. Also prioritize the planting of fast growing trees on the western border of the premise to act as a green buffer zone between the factory and the village monastery.
- Use aesthetically pleasing paints and colours for the buildings and structures, if possible.
- Reserve green belt along the Nant Laung Chaung as far as possible; also other green areas, if any.
- Provide appropriate lighting only for security reason; avoid excessive use of light at night. Conserve electricity at this plant to show good example for all. Follow the good example of Singapore (Dim City) rather than Hongkong (Bright City).
- Use yellow light instead of white light not to attract insect; if so many insect aggregate turn off the light for a while.
- To mitigate offensive light for surrounding, keep the lamps at the lamp post slanting downward slightly rather than projecting out wards.

12) Positive (beneficial) impacts during the Operation Phase

During the Construction Phase of the major project 370 workers were employed. The project has boosted the local economy and brings economic benefit to the locals who are involved in extraction/production of building materials – e.g. sand, gravel, bricks. Timber merchants and merchant of construction merchandize – e.g. iron rod, bar, roofing, aluminium sheet, glass panel, cement etc. were able to promote their sales. Many jobs associated with construction sector were created.

The food, goods and services needed during the project activities (both Construction and Operation Phase) are purchased from the local markets. Therefore trade in the area has increased; there is a significant increase in the economy of the area. In addition, transportation infrastructure for project activities within the area has improved and this has allowed the locals to reach easily to towns and cities. The access road already built by the company has additionally given rise to a more dynamic social structure; within and across region interaction has been increased; improved social relation has been positively influenced the region.

The agricultural land loss due to project activities constitutes a very small percentage of the agricultural lands (just a few small unproductive farms). All land property damaged or loss has been compensated. There was no case of land grabbing, forced eviction and relocation. No one living in the area has lost his/her house, job and social networks because of project activities.

During the Operation Phase of the project 254 permanent jobs for nationals and 35 for foreigner workers will be provided. More workers will be employed when the project progress smoothly. The Than Daung Oo Co., Ltd commits 2% of its net profit for the effective implementation of CSR programme. (The company, Than Daung Oo Co., Ltd has so far spent Kyats 1,002,148,615 for CSR and community assistance and development in this wide area.

The Than Daung Oo Co., Ltd on its part has so far constructed the 7 miles access road from the project site to Hsi-paw-Mong Yai Highway. Moreover, renovation of village road to Hsen Taw and Na Long villages have been done. This has greatly benefited the local people for transportation. The company has electrified Hsen Taw village, with electricity generated from burning of bagasse; has constructed a primary school for Hsen Taw village and sourcing water for both villages and construction of community water tanks, spending millions of kyats for execution of CSR programme.

On national level this project has contributed to national earing in the form of direct investment of Ks 88124.98 millions.

These investments will contribute to the increase in GDP of the nation. The country will benefit from increase in investment, increase in employment, increase in earning, increase in taxes, duties and revenue etc.

While Than Daung Oo Co., Ltd will try to mitigate or minimize negative impacts it shall, on the other hand, enhance and maximize the positive impacts to their optimum.

6.2.1.4 During the Decommissioning/Rehabilitation Phase

At the end of the long Operation Phase (30 plus years) the project will be terminated and decommissioning task will have to be undertaken. The decommissioning task, in brief, includes:

- Isolation of the site and shutdown.
- Dismantling and demolition of the buildings and structures.
- Put up machinery and equipment that is still useable for sale or send to smelting mill as iron scrape.
- Put up old construction materials for sale or disposed of at appropriate dump site.
- Restoration of the ecology of the site.

(In this project context the sugar factory can probably be still operational after 30 plus years of operation. Than Daung Oo Co., Ltd will then decide if the plant will be redeployed or decommissioned.)

The two impacts envisage and identify during the Decommissioning Phase are:

1) Occupational health and safety issue and mitigation measures to be taken

As in the case during the Construction Phase the impact such as accidents in work place, due to lack of management and training, can occur. This can be prevented and/or mitigated.

Mitigation (out line)

The project proponent will take the following mitigation measures:

- Plan and manage for safe and effective decommissioning work.
- Hire decommissioning contractor for the demolition of buildings and structures and dismantling of equipment; and also tidying up the site.
- Dispose those that are no longer useable at an approved land fill.
- Machinery and equipment that are obsolete must be made into iron scrap and sent to smelting mill.
- Remove all soil contaminated by oil spill and dispose off at an approved land fill or dump site.
- Put up for sale or reuse certain equipment that are still usable.
- Level the ground; plant trees and commence rehabilitation work and restore the site to its original condition.

2) Potential residual impacts and mitigation measures to be taken

After 30 plus years of operation the soil can be contaminated by fuel spills or residual chemicals including those that are hazardous. The contaminated soil has to be removed and disposed off to an approved landfill. The last chemical testing may be required. The soil structure/profile has to be restored to its quasi-original condition as practical as possible.

Mitigation (out line)

The project proponent will take the following mitigation measures:

- Plan and manage for effective removal and clearing of all residuals.
- Test the soil for any contamination by fuel oils or hydrocarbons; hire technicians
- Also test the air and water in the vicinity for pollutants; hire technicians.
- Remove soils contaminated by fuel oils and chemical-; dispose at an approved land fill.
- Ensure that all contaminates are removed; conduct final chemical testing.
- Also remove all other residuals, if any, resulting from 3 plus decades of activities.
- Test the air, water and soil for the last time to ensure that none are contaminated; no trace of pollution left.
- Restore the soil to its natural condition as far as possible and commence rehabilitation task; continue the work until a green zone is created (or) put up the plot for sale (or) redeploy the plot for any business.

6.2.1.5 Risks and impact assessment and outcome

The Experts Consensus Method or Ad hoc method is applied in risk and impact assessment. This method may not be so accurate but it will never go wrong as common sense and simple logic are applied. It is a pragmatic way of thinking and pragmatic way of doing things method. In addition Experts Consensus Method/Ad hoc Method the risk/impact matrix rating table by IFC is also applied which is based on likelihood multiply by consequences (likelihood x consumes = outcome).

Risk rating matrix

Actual risk outcome					
Low (1-3)	Moderate (4-6)	High (8-12)		Extreme (15-25)	
Consequence	Likelihood				
	Rare 1	Unlikely 2	Possible (moderate) 3	Likely 4	Almost certain 5
Catastrophic (Extreme) 5	5	10	15	20	25
Major (High) 4	4	8	12	16	20
Moderate (Medium) 3	3	6	9	12	15
Minor (Low) 2	2	4	6	8	10
Negligible 1	1	2	3	4	5

Note: - Consequence x Likelihood=actual outcome

- Red: avoid, control, mitigate;
- Yellow and orange: control, mitigate;
- Green: accept/assume

Actual risk outcomes are categorized into 4 levels:

- Low - (Scoring 1-3)
- Moderate - (Scoring 4-6)
- High - (Scoring 8-12)
- Extreme - (Scoring 15-25)

Note: - This simple, pragmatic and straight forward matrix method is selected for assessment of impact and risk. Moderation is undertaken applying Experts Consequences Method (Ad hoc method).

Based from Experts Consensus method/Ad hoc method and IFC risk/impact table (matrix rating) the qualitative assessment of negative impact during the Construction Phase, Operation Phase and Decommissioning Phase are show in tabulated forms below:

Table – 20: During the Construction Phase

Sr.	Risk / Impact	Likelihood	Consequences	Actual outcome	Expected outcome after mitigation measures taken	Remarks
1	Impact on air environment (emission)	5	1	5 low	Low	Mitigation measures All can be mitigated
2	Noise and vibration	5	1	5 low	Low	
3	Impact on water environment	4	1	4 low	Low	
4	Impact on soil	5	2	10 medium (moderate)	Low	
5	Impact of waste	4	3	12 medium (moderate)	Low	
6	Impact on biodiversity	2	2	4 low	Low	
7	Impact on traffic	2	2	4 low	Low	
8	Occupational health and safety issue (accidents at construction site)	1	4	4 low	Low	
9	Potential social issue	1	2	2 low	Low	
10	Potential security issue	1	2	2 low	Low	

Note – Positive impacts are simply narrated in the report. All impacts are short during Construction Phase. Extent of impact will be within the foot print of the project site and near vicinity, except traffic impact which will be beyond the vicinity.

Table – 21: During the Operation Phase

Sr.	Risk / Impact	Likelihood	Consequences	Actual outcome	Expected outcome after mitigation measures taken	Remarks
1	Impact on air environment (emission)	5	5	25 extreme	Low	Mitigation measures All can be mitigated
2	Noise and vibration	4	4	16 high	Low	
3	Impact: solid waste	5	4	20 extreme	Low	
4	Impact: liquid waste	5	4	20 extreme	Low	
5	Impact: odour	3	2	6 low	low	
6	Impact on water environment	3	2	6 low	Insignificant (negligible)	
7	Impact on traffic	3	2	6 low	Low	
8	Occupational health and safety issue	2	3	6 low	Insignificant (negligible)	
9	Potential social issue	1	2	2 low	Insignificant (negligible)	
10	Potential security issue	1	2	2 low	Insignificant (negligible)	
11	Potential visual impact	3	2	6 low	Low	

Note – Positive impacts are simply narrated in the report. All impacts are long duration; during the long Operation Phase. Extent of impact will be within the foot print of the project site and near vicinity, except traffic impact which will be beyond the vicinity.

Table – 22: During the Decommissioning Phase

Sr.	Risk / Impact	Likelihood	Consequences	Actual outcome	Expected outcome after mitigation measures taken	Remarks
1	Occupational health and safety issue (potential accidents during decommissioning works)	1	2	2 Low	Low (negligible)	Mitigation measures All can be mitigated
2	Potential residual impact	3	2	6 low	Low (negligible)	

Table-23: Overall qualitative assessment of impacts during the Construction Phase in tabulated form.

Sr	Impacts	Extent	Duration	Likelihood	Intensity	Significance	Reversibility	Remark
1	Impact on air environment	Foot print and beyond	St	De	L	In-sg	NR	Beyond foot print when wind blowing/Mitigable
2	Noise and Vibration	Foot print	St	De	L	In-sg	NR	Mitigable
3	Impact on water environment	Foot print and beyond	St	Li	L	In-sg	NR	Mitigable
4	Impact on soil	Foot print	St	De	M	Sg	NR	Mitigable
5	Impact: waste	Foot print	St	De	M	Sg	NR	Mitigable
6	Potential impact on bio-diversity	Foot print and beyond	St	Li	L	In-sg	R	Mitigable
7	Potential impact on traffic	Beyond/ access road	St	Li	L	In-sg	NR	Mitigable
8	Occupational health and safety issue	Foot print and beyond	St	UL	L	In-sg	NR	Mitigable
9	Potential social issue	Foot print and beyond	St	UL	L	In-sg	NR	Mitigable
10	Potential security issue	Foot print	St	UL	L	In-sg	R	Mitigable

Note - Situation if mitigation measures are not taken, if taken intensity will be low and impact can become insignificant.

- All impacts are mitigable.

Table-24: Overall qualitative assessment of impacts during the Operation Phase in tabulated form.

Sr	Impacts	Extent	Duration	Likelihood	Intensity	Significance	Reversibility	Remark
1	Impact on air environment	Foot print and beyond	Lt	De	H	Sg	NR	Mitigable
2	Noise and Vibration	Foot print	Lt	De	M	Sg	NR	Mitigable
3	Impact: solid waste	Foot print	Lt	De	H	Sg	NR	Mitigable
4	Impact: liquid waste	Foot print	Lt	De	H	Sg	NR	Mitigable
5	Impact: odour	Foot print and beyond	Lt	Li	M	Insg - Sg	NR	Mitigable
6	Impact on water environment	Foot print and beyond	Lt	Li	L	Insg	NR	Mitigable
7	Impact on traffic	Beyond on access road	Lt	De	M - H	Insg – Sg	NR	Mitigable
8	Occupational health and safety issue	Foot print and beyond	Lt	UL	L	Insg	NR	Mitigable
9	Potential social issue	Foot print and beyond	Lt	UL	L	Insg	NR	Mitigable
10	Potential security issue	Foot print	Lt	UL	L	Insg	NR	Mitigable
11	Potential visual issue	Foot print and beyond	Lt	Li	L	Insg	NR	Mitigable

Note - Situation if mitigation measures are not taken, if taken intensity will become low and impact can become insignificant.

- All impacts are mitigable

Explanation

Foot print	-	Factory premise, project area
St	-	Short term (during the short construction phase only)
De	-	Definite or very likely
Li	-	Likely
UL	-	Unlikely
L	-	Low
M	-	Medium
In-sg	-	Insignificant
Sg	-	Significant
R	-	Reversible
NR	-	Non-reversible

6.2.2 Identification and assessment of the likelihood and severity of natural and industrial hazards relevant to the project

(A) During the Preconstruction Phase

There is no likelihood of natural and industrial hazards during this phase.

(B) During the Construction Phase

Ten negative/potential negative impacts are anticipated and identified for this phase (Already mentioned earlier in 6.2.1.2). All these impacts, except "Impact of waste disposal" in the form of construction failing and debris will be of any significant, if not well-managed and well-mitigated. However none of these 10 impacts will not constitute any likelihood of natural and industrial hazards.

(C) During the Operation Phase

Ten negative/potential negative impacts are anticipated and identified for this phase (Already mentioned earlier in 6.2.1.3).

Of these 10 impacts, three, namely:

- Impact on the air environment
- Impact of solid waste and
- Impact of liquid waste are significant and high intensity and can pose any likelihood and severity of natural and industrial hazards unless these 3 impacts are not well-managed and well-mitigated.

As regards these three impacts a sugar factory generates large quantity of smoke and ash. The factory also generates huge quantity of waste (bagasse) and also liquid waste. However none of these emission, solid waste and liquid waste, can be termed hazardous (no toxic or harmful emission, effluent and solid waste). Moreover virtually all bagasse waste is used as fuel for the boiler thus tackling the issue of waste pollution. The ash is also collected in ash pools and this can be mixed with cement and use as basic construction material. It can be also used partially as fertilizer and will give away to sugar cane planters. There can be no issue as regards the disposal of ash. The ash water is still remained an issue to be tackle later and so too is the waste water. The supernatant ash water in the pond is recycled for uses in suppression of dust and watering of plants. The sediment is mechanically removed and disposed at the landfill. The waste water in the waste water pond is treated with lime powder to mitigate odour. The sludge (sediment) is mechanically removed and disposed.

The impact on traffic can be quite significant if not well-managed. Several dozens heavy trucks loaded with sugar cane are involved in the transportation of sugar cane from the fields to the factory. There can be issue of traffic congestion during sugar season of 3 months only. Many trucks are also involved in the transportation of finished sugar product from the factory to elsewhere. There can be traffic congestion and and even road accidents. This issue can be mitigated if the mitigation measures described earlier are followed. So far, there is no known road accident both on human and animals this access road.

The remaining impact anticipated for the Operation Phase, namely, noise and vibration, impact on water environment (the stream), OHS, potential social impact, potential security issue and potential visual impacts can be termed insignificant. Of course, social issue and security issue can sometimes become significant but they have nothing to do with industrial hazards.

(D) During the Decommissioning/Rehabilitation Phase

Two impacts are anticipated for this phase (See 6.2.1.4); but both of them cannot pose any likelihood for industrial or natural hazards.

The potential residuals in this project context refer to the soil that can be likely contaminated by accidental spills of lubricating oils and fuel oils during the long Operation Phase of the project. There are no really hazardous materials such as residual of toxic substances and radioactive residuals (All the chemicals used, namely, sulphur, lime powder, washing powder, phosphoric acids, sodium chloride etc are not toxic or hazardous). The soil, if contaminated by fuel oils and the said chemicals, will be effectively removed and mitigated.

6.2.3 The design, layout, functioning, management and implementation of appropriate impact and risk mitigation measures

The option of mitigation measures to be taken for each and every impact is already described together with each and every impact.

The main waste is bagasse; all bagasse are reused as fuel burner and the issue is tackled (no need for coal or fire wood).

Other major waste such as molasses, sugar press mud, etc. is also all reused in various wastes as already described earlier.

Main emission from stack is mitigated by wet scrubbing method and installation of dust collection system and induced fan system.

Water is mostly recycled through the application cooling tower a series of 4 cooling pools. Waste water is physically treated (screening, filtration and sedimentation); supernatant water is reused.

The main issue remains is ash (bagasse ash). It will be used as compost and soil conditioner and will give away to sugar cane planter.

Management and Implementation of appropriate impact/risk mitigation in brief

Sr. No.	Source of impacts	impacts/issues	Mitigation measures
1	From milling plant	bagasse (generated in huge quantity)	- use up all bagasse as burner for boiler (production of steam for process works and for generation of electricity)
2	From Processing plant	- molasses	- reuse and reprocess in sugar manufacturing - can be used for making alcohol, ethanol, sweetener, vinegar, animal feeds etc. (actually not waste).
		- sugar press mud (cachaza)	- composted into quality organic fertilizer; put up for sale (actually not waste).
		- solid lime (dry lime)	- can be made into soil conditioning product - suppression of odour in waste water
		- ash (bagasse ash)	- collect in ash pools; manually removed and discarded; - used as mixture fertilizer and give away to local sugar cane planters.

		<ul style="list-style-type: none"> - noise and vibration 	<ul style="list-style-type: none"> - use only brand new machinery/equipment. - well-operated, well-maintained and well-lubricated machinery/equipment. - install silencers, if possible. - install vibration abator, if possible. - plant fast growing tree, to abate noise. - provision of PPEs for workers.
		<ul style="list-style-type: none"> - effluent (industrial waste water) 	<ul style="list-style-type: none"> - construction of systematic network of drainage and water tanks/ponds. - recirculate water as far as possible and reuse (cooling towers, cooling ponds). - apply lime powder in waste water pond; suppress odour, if any. - regular removal and disposal of sediment.
3	From boiler unit	<ul style="list-style-type: none"> - air pollutants: PM, NO₂, SO₂, CO₂ etc. (point source/stationary emission) 	<ul style="list-style-type: none"> - apply complete combustion. - wet scrubber (dozing with lime water; desulphurization). - dust collectors, - induced fan - stack (50 m high) - use machinery/equipment that emit less smoke. - well-operated, well-maintained, well-lubricated machinery/equipment.
4	Activities that cause emission	<ul style="list-style-type: none"> - air pollutants: fugitive emission 	<ul style="list-style-type: none"> - avoid open burning of solid waste/trash/debris. - spray water for dust suppression. - restrict vehicular movement inside the compound. - plant fast growing trees to mitigate dust.
5	From workers housings	<ul style="list-style-type: none"> - domestic solid waste 	<ul style="list-style-type: none"> - set up 2 types of garbage bins (recyclable and non-recyclable); regularly collect and dispose at landfill.

		- domestic liquid waste	- septic tanks for sanitary (black water). - effective drainage system for brown water, collecting pools; application of lime powder.
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6.2.4 Characterization and assessment of any residual impacts and risks

6.2.4.1 Assessments of residual impacts

A sugar factory generates large quantity of industrial wastes especially bagasse, ash and solid lime and by-product (waste) such as molasse, and cachaza. There can be serious residual impact if these wastes are not well-managed. However as these wastes are reused, recycled or removed no residual impact will remain.

During the construction large quantity of construction tailings and debris will be generated but there can be no issue of residual impacts as all the debris will be removed and cleared after completion of construction.

There can be certain small oil spills at the car park, at pump house, compress house, engine house etc but these will be remediated immediately (the use of absorbent rather than washing down with water to prevent the small spills percolating into underground water). Accidental oil spills on the whole will be minor ones.

During the long operation phase, large quantities of wastes and byproducts, namely bagasse, ash, solid lime, molasses, and cachaza, will be generated. But all bagasse will be reused as burner or fuel for boiler; ash will be systematically collected and disposed of; solid lime, molasses and cachaza will be reused or reprocessed in various ways. Most, if not all, waste issues can be effectively tackled. The factory will be operational only during the sugar cane season (the dry months) and the operational day will be 120 days/year. The company has more than enough time 8 months for cleaning up of the work places, tidying up of all facilities of the factory and maintenance of the factory. Therefore, there will be no chance of accumulation of residuals. At the end of the operation phase there will be no chance of residuals left to impact the area.

After the long Operation Phase the decommissioning process will have to be effectively implemented. Everything that remained of the sugar factory has to be cleared; the soil if contaminated by fuel oils or chemicals will have to be removed and disposed at an approved landfill. After that subsequent rehabilitation work will follow. Trees will be planted and green zone created at the former site. In this way the site will be rehabilitated to its original condition or even to a better condition. The ecology of the site will be effectively restored.

Both the company authority and the EIA team (third party) really believe that there is no residual impact (s) to remain during or after the project. They also believe that if all the mitigation measures prescribed earlier are duly applied they can mitigate or remediate all the negative impacts mentioned earlier; and there will be no chance of residuals to remain.

Therefore, no substantial residual impacts are anticipated during the whole life of the project, from the Preconstruction Phase to the Decommissioning Phase.

However, in case there is any residual left and soil is contaminated the soil will be removed and disposed of at an approved landfill. After that the soil will be tested for the last time to ensure that there is no residual left. In the same way water and air will be tested for the last time to ensure that no residual impact is left remain. The general guidelines for the removal of residuals and the hence the guideline for decommissioning are: systematic decommissioning, rehabilitation and restoration of the ecology as practical as possible.

The company will look into the nature of all those impacts and assess the risks and follow the preventive, corrective and mitigation measures prescribed in this EIA report.

6.2.5 Comprehensive monitoring plan

Monitoring of physical, biological and social environments is of paramount importance for the successful implementation of a project.

First of all the working environment shall be monitored for occupational hazards. But virtually all activities taken places at a project site need to be monitored for effective and successful implementation of the project.

Monitoring Plan (MP) is an essential tool for ensureing that mitigation measures for each and every negative impact is undertaken effectively throughout the life of the project. It is also an essential tool for ensuring that the positive (beneficial) impacts are enhanced, or CSR programme are effectively and meaningfully implemented. Monitoring will be planned, designed and implemented by professionals or specially trained personals eg. EMP cell members.

Monitoring Plan (MP) is actually an integral part of Environmental Management Plan (EMP); these two are the different sides of the same coin.

Monitoring Plans for Construction, Operation and Decommissioning Phases of the project are shown in tabulated forms.

Table – 25: Overall monitoring plan during the Construction Phase

Sr. No	Component to be monitored	Frequency	Responsible persons
1.	Monitor the clearing of vegetation	Daily	EMP cell members
2.	Monitor the clearing of land and earth works	Daily	EMP cell members
3.	Monitor the construction works	Daily	EMP cell members
4.	Monitor the operation of machinery, equipment and vehicle (through log book)	Weekly	EMP cell members
5.	Monitor the consumption of fuel	Weekly	EMP cell members
6.	Monitor the quality of air (SO ₂ , NO ₂ , PM and others)	Once during Construction Phase	Hired Technicians
7.	Monitor the quality of water	Once during Construction Phase	Hired Technicians

8.	Monitor noise level and vibration	Once during Construction Phase	Hired Technicians
9.	Monitor the quality of soil	Once during Construction Phase	Hired Technicians
10.	Monitor the use of water and spraying of water for dust suppression	From time to time	EMP cell members
11.	Monitor the procurement of fuel oils	Weekly	EMP cell members
12.	Monitor the procurement of other materials (food, commodity)	Weekly	EMP cell members
13.	Monitor the conducts of workers	From time to time	EMP cell members
14.	Monitor, where possible, mitigation efforts	Weekly	EMP cell members
15.	Monitor effectiveness of mitigation activities	Weekly	EMP cell members
16.	Monitor the performance of security staffs	Weekly	EMP cell members

Table – 26: Overall monitoring plan during the Operation Phase

Sr. No	Component to be monitored	Frequency	Responsible persons
1.	Monitor weather, listen to weather forecast	Daily	EMP cell members
2.	Monitor the quality of air as well as emission (Re: NEQ emission guideline values, by ECD)	Bi-annually	Hired Technicians
3.	Monitor the quality of water as well as effluent (Re: NEQ effluent guideline values, by ECD)	Bi-annually	Hired Technicians
4.	Monitor the noise and vibration level (Re: NEQ guideline values, by ECD)	Bi-annually	Hired Technicians
5.	Monitor the soil condition	Bi-annually	Hired Technicians
6.	Monitor the water level and flow condition of Nant Laung Chaung (stream)	Weekly	EMP cell members
7.	Monitor the arrival of sugar cane trucks	Daily	EMP cell members
8.	Monitor quantity of cane arrived	Daily	EMP cell members
9.	Monitor cane preparation	Daily	EMP cell members
10.	Monitor milling and extraction work	Daily	EMP cell members
11.	Monitor juice clarification and evaporation	Daily	EMP cell members
12.	Monitor crystalization process	Daily	EMP cell members
13.	Monitor the final manufacturing process	Daily	EMP cell members
14.	Monitor the finished products and packing activity.	Daily	EMP cell members
15.	Monitor storage and transportation of sugar	Weekly (or every transport)	EMP cell members
16.	Monitor the generation of bagasse	Daily	EMP cell members

17.	Monitor the use of bagasse as well and the condition of the boiler	Daily	EMP cell members
18.	Monitor "mud" cachaza generation	Daily	EMP cell members
19.	Monitor waste water generated	Daily	EMP cell members
20.	Monitor generation, collection and storage of ash (ash pools)	Daily	EMP cell members
21.	Monitor the operation of machinery/equipment	Daily	EMP cell members
22.	Monitor the operation of vehicles	Daily	EMP cell members
23.	Monitor the procurement of fuel oil	Weekly or monthly	EMP cell members
24.	Monitor the procurement of other commodities	Weekly	EMP cell members
25.	Monitor the consumption fuel oil, and the storage and dump of used oil	Weekly or monthly	EMP cell members
26.	Monitor the consumption of water	Daily/weekly	EMP cell members
27.	Monitor the consumption of electricity	Weekly or monthly	EMP cell members
28.	Monitor the efficiency of workers, and the effectiveness of capacity building	From time to time	EMP cell members
29.	Monitor the conducts of workers	From time to time	EMP cell members
30.	Monitor the efficiency of workers, and the effectiveness of training and emergency procedures eg. drills, rehearsals	From time to time	EMP cell members
31.	Monitor the effectiveness of mitigation measures	From time to time	EMP cell members
32.	Monitor the creation of green belt/zone (planting of trees, landscaping)	Monthly	EMP cell members

Table – 27: Overall monitoring plan during the Decommissioning Phase

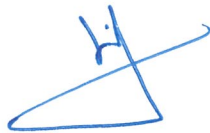
Sr. No	Component to be monitor	Frequency	Responsible persons
1.	Monitor the decommissioning works; dismantling, demolishing works	Daily or weekly	EMP cell members
2.	Monitor the clearing and tidying work, leveling of ground, restoration of soil	Weekly	EMP cell members
3.	Monitor the removal of contaminated soil, if any	Once	EMP cell members
4.	Monitor the testing of soil and water	For the last time	EMP cell members
5.	Monitor the rehabilitation works; planting of trees, restoration of the ecology	Weekly or monthly	EMP cell members

All monitoring works will be carried out by members of EMP cells. However there are three exceptions, namely, the monitors of air quality, water quality and soil which need sophisticated equipment and chemicals will be carried out by hired technicians from the Health Department.

Specific environmental quality monitoring will be conducted semi-annual and reported to the authority, the Environmental Conservation Department. There are described letter in Chapter 8, 8.6.

Commitment

Than Daung Oo Co., Ltd has made a commitment to duly take all the mitigation measures and implement environmental management plan. The company is also committed to tackle the residual issue, if any, so that at the end of running the factory each year. There will no residuals left at the project site. And finally, at the end of the project the project site will remain clean without any residuals.

A handwritten signature in blue ink, consisting of a stylized, abstract shape that resembles a triangle with a vertical line through it and a horizontal line at the top.

U Sein Myo Aung
Executive Director
Than Daung Oo Co., Ltd

7. CUMULATIVE IMPACTS ASSESSMENT

The term cumulative impact refers to either

- The addition of impacts from many/several sources (combined impacts) at the same time (simultaneous impacts) or
- Successive addition of impacts (from one source or many sources) over a long period or both.

Green House Effect that leads to global warming is the result of the accumulation of CO₂ (in other word cumulative impacts of CO₂) in the atmosphere from different sources all over the world.

It is necessary to understand and minimize cumulative environmental impacts in order to prevent "death by a thousand cuts".

Cumulative impact assessment for the proposed Than Daung Oo Sugar Factory (1) can be best done if there are two or more sugar factories in the area. The combined impact at the same time and the addition of successive impact over along period can be appropriately and efficiently assessed. As the proposed Factory (2) is nearby when this proposed Factory (2) is in operation then a real cumulative impacts (simultaneous cumulative impact) can be assessed.

7.1 Methodology and approach

Usually cumulative effects are not considered if a factory or mill is a small one. But both the existing Factory (1) and the proposed Factory (2) are large factories. Therefore cumulative effects have to be considered and addressed. But applying Cumulative Impacts Assessment (CIA) to only two sugar factories cannot properly account for the whole regional context. CIA is best conducted in special industrial zone where a variety of factories, mills and other industrial activities are taking place simultaneously over a long period.

However, to uphold the standard of an EIA report an attempt is made to predict the general cumulative impacts due to this proposed project and the nearby project in operation and summarize the findings.

As the term "cumulative" implies the appropriate time to conduct CIA should be at least 5-10 years after the commencement of the Operation Phase. (This is due to the fact that there are no other projects in this area that have been in operation for several years. So it can be stated that at the moment there is no cumulative impacts of any kind in this area.)

Cumulative Impact Assessment (CIA) is more or less similar to EIA but only for the long term impact assessment and/or combined impact assessment.

The process of CIA can be put in this way:

- It is a process of analyzing the potential impacts and risks of the project in the context of potential effects of human activities and natural environmental and social external drivers on the chosen Valued Environmental and Social Component (VESC).
- It is a process of proposing concrete measures to avoid, reduce or mitigate such CIs and risks to the extent possible.

General process or steps for implementing CIA involves 5 steps:

Step – 1 : Scoping Phase

Step – 2 : Establish information or base line status of Valued Environmental and Social Components (VESC)

Step – 3 : Assess Cumulative Impacts (CI) on VESC

Step – 4 : Assess significance of predicted CI

Step – 5 : Management of CI; plan design and information

CIA and CIM (Cumulative Impact Management) are necessary whenever there is concern that a project may contribute to cumulative impact on one or more VESC. (For example-when more than one sugar factory occur within this area or when more than one project of any kinds occur within this area and impact the same VESC.)

Several methods/approaches are available for the CIA but there is no one method that could always be used.

For generalized CIA for all kinds of projects the methods include: specialists opinions; undertake specific consultation and questionnaires with relevant stake holders; use checklist as a systematic way for ensuring; utilization of risk matrices; undertake computational and numerical modeling; the use of spatial Analysis/Geographic Information System (GIS); visual analysis and stimulation; undertake a review of available planning documents; develop indicators of VESCs and their functions and undertaken assessment of mitigation for incremental impact using past experience, BAT, good/best practices and expert opinions.

For CIA specifically for sugar factory project the following factors have to be considered:

- Site location, condition
- Capacity of sugar factory
- Wastes (solid and liquid) to be generated
- Land or water environment (surface and ground water) to be impacted

- Effective prevention/mitigation/remediation measures
- Any social economic impact and mitigation measures
- The predicted or anticipated environmental (physical, biological, socio-economic) situation at least 10 years from now (also 20 and 30 years from now).

In developed and industrialized the subjects of CIA and CIM have developed to an advanced phase. But actually these are the works of scholars or pure academicians that involve the application of computer programming, complex mathematical models, mathematical formulae, statistical calculations and manipulations. In short, CIA is a multi-disciplinaries task that involves scientists and social scientists and is beyond the scope of this EIA report.

7.2 Cumulative Impact Assessment (CIA) (Simplified version for the proposed sugar factory)

7.2.1 During the Construction Phase

Since the factory is a large factory the main construction task was a major one. Various construction works have been carried out for the construction of this factory complex with various facilities. All these activities, both big and small, can be termed simultaneous cumulative impact. These simultaneous cumulative impacts have continued for three years till the end of the Construction Phase. When compared with the long life of the project, three years is just a temporary phase. After the completion of construction works virtually all impacts are ceased and the environment on the whole return to normal situation. So the simultaneous cumulative impact during the short Construction Phase was temporary.

However, it should be noted that all kinds of construction tailings and debris were temporarily accumulated at the site. Certain domestic wastes from office, kitchen and dormitory/housing for workers were also accumulating during this phase.

The accumulation of construction tailing, debris and other wastes during the Construction Phase can be termed "incremental" or "successive cumulative impact", which can be last for 3 years and, therefore, transient or temporary in nature. But all these tailings and wastes have been removed after the Construction Phase is completed. Therefore there is no accumulation of wastes (cumulative impact) after completion of construction work or end of the Construction Phase.

7.2.2 During the Operation Phase

As the Factory No (1) can consume 5,000 ton/day of sugar cane the successive (incremental) accumulative impact on sugar cane resources in the areas, Mong Yai, can be high indeed. However, the factory is operational for only 120 days. The depleted sugar cane plants can be replenished (regrown) effectively by the sugar cane farmers. (Afterall the objective of sugar cane growers is to sell all their produces.)

The generation of the bagasse fibre waste is huge. As mentioned earlier 1,400 tons of bagasse will be produced per day. Multiply these 1,400 by 120 days (the operational days per year) and the result is 168,000 tons/year. Multiply this result again by 30 years (the general duration for the Operation Phase) and the bagasse generated over 30 years will be 5,040,000 tons. The sugar factory No.2 will have a capacity of milling 1,200 tons of sugar cane and producing 3,360 bagasse per day or 403,200 tons/year or 12,096,000 per 30 years. The final result for two factories is 17,136,000 tons of bagasse. The bagasse wastes from the two factories will become a very serious environmental issue if not managed. This is the resultant cumulative impact if no mitigation measures are regularly taken over the years, during the operation phase. However, the authorities of the two factories have effectively reused all the bagasse as efficient fuel for the boilers.

Therefore the issue of bagasse is effectively/will be effectively tackled. The use of bagasse waste as fuel is a very environmental friendly practice and should be appreciated by all environmentalists.

Otherwise the generation of bagasse over the years will result in huge mounds of bagasse in the area and causing severe land pollution, that is, if no mitigation is duly taken.

Ash (bagasse ash) is also generated in large quantity and if not well-managed can become a serious cumulative impact over a long period. As already mentioned earlier the proposed sugar factory will generate 60 tons of ash (bagasse ash) per day. Multiply this by 120 days (operational days per year) and again by 30 years (Operation Phase of project) the result is 216,000 tons of ash. The proposed sugar factory No.2 has a capacity of producing 1200 tons of sugar and 144 tons of ash per day or 17,280 tons/year or 518,400 tons per 30 years. (When two factories are considered the result is 734,000 tons). The resultant cumulative impact, that is, if no mitigation measures are regularly taken over the years, during the operation phase. Ash will be routinely removed with the aid of overhead crane and stored in ash pools. Most of the ash can be used for conditioning soil or as partial fertilizer. So the cumulative impact of ash, if any, will be on the whole insignificant. Dust collectors will be also installed for trapping fly ash.

"Mud" or cachaza and molasse can be termed by-products rather than waste; both are of economic value. Cachaza is a good organic fertilizer while molasse can be fermented for the production of ethanol and various food products. As mentioned earlier 17 tons of cachaza (mud) and 225 tons of molasses will be generated from this proposed factory per day. From factory No.(2) 41 tons of cachaza (mud) and 540 tons of molasses were generated. As mentioned above, when 120 days of operation per year and 30 years of the Operation Phase are taken into consideration the results are: 61,200 tons for cachaza and 810,000 tons for molasses are produced over a period of 30 years. (That is if no mitigation measures are taken regularly over the years).

Theoretically the cumulative impact (that is incremental/or successive cumulative impact) of the above-mentioned waste can be huge indeed and the potential impact can be very serious indeed if not well-managed and if no mitigation measures are taken. But as already mentioned above of the wastes generated some will be used as fuel (burner), some will be

reused, reapplied and/or reprocessed. The used water will be effectively recirculated, the waste accumulated at ash ponds and waste water pond will be mechanically removed regularly and disposed. In this way the issue of industrial wastes can be effectively tackled. It can be simply stated that in the real world there can be no serious or substantial cumulative impact regarding sugar manufacturing after mitigation measures are taken.

Moreover the company has more than enough time per year for maintenance of the factory, cleaning and tidying up the factory and systematic removal of solid and liquid waste. (The sugar cane season are only 3 months and the factory will be operational for 4 months (120 days). Therefore there remain 8 months for tidying up the factory and premise. No accumulation of waste envisaged.

The smoke spewing out of the stack of the factory is of international concern. The accumulation of smoke (carbon emission or GHG) in the atmosphere in the long run can lead to global warming and eventually to climate change. This is at least from theoretical point of view. But unlike other industrialized countries (Europe, North America, China, Japan, Australia etc) where dozens of smoke stacks can be found in one limited area there will be only two stacks in this area. From pragmatic and realistic perspective the cumulative impact cannot be a serious one.

As a general rule for every one ton of sugar produced 241 kg of CO₂ is emitted. In this factory context which can produce 500 tons of sugar a day the quantity of CO₂ emission per day will be 120 tons. Multiply this with 120 operational days per year and then again with 30 years of Operation Phase the result will be 432,000 tons of CO₂ per 30 years. For sugar factory No.2 which can produce 1200 tons of sugar a day the quantity of CO₂ emission per day is 289 tons, 34,680 tons/year and 1,040,400 per 30 years. (When two factories are considered then the emission of CO₂ over a period of 30 years will be 1,472,400 tons. That is if mitigation measures are not regularly taken over the period of 30 years).

Theoretically CO₂ in the smoke coming from the factory stack will accumulate in the upper stratum of the atmosphere. But one has to remember that Myanmar, being an LCD, is among the least emitters of CO₂ in international community. It is China, USA, India, Russia, Japan, Korea and Germany who are among the top CO₂ emitters. (CO₂ emitted from these two factories can be just a very small fraction of a million when compared with these top CO₂ emitters.)

Unlike solid waste and liquid waste which can be managed (control, mitigate, remediate, minimize) CO₂ emission cannot be effectively mitigated yet in the present context. The Best Available Technology, BAT, is not yet very effective for this impact. The planting of fast growing trees and the creation of green belts in the factory compound and vicinity can sequester CO₂ to some extent (can partially mitigate CO₂).

Finally there are no other sources of impacts in the area besides these two factories that will contribute to additional or simultaneous cumulative impact on the surrounding environment. And this project is not in competition with irrigation or any agricultural project that uses the water of the stream and the source of CI is only from these two sugar factories.

8. ENVIRONMENTAL MANAGEMENT PLAN (EMP)

Environmental Management Plan (EMP) is the key to ensure that the environmental quality of the area does not deteriorate due to the implementation of a project. EMP involves the management of the overall environmental issue including the physical, biological, socio-economic, cultural and visual issues. EMP is a long term systematic approach from planning, development, implementation, monitoring and feedback. EMP also involves management for quality of the project.

The overall EMP includes planning and design of an environmentally friendly sugar factory that fully utilized eco-friendly machinery, equipment and vehicles that emit less smoke, lower noise level, and those that are fuel and energy efficient; and also the conservation of water and recycling of water and waste as far as possible. EMP covers so many aspects of the project it is difficult to consider all the aspects of EMP.

8.1 Project description by project phase

This has been already described in details earlier in Chapter 4 and will be very briefly summarized as follows.

The project is for the operation of Than Daung Oo Sugar Factory No.1, by Than Daung Oo Co., Ltd near Hsen Taw village, Mong Yai Township, Shan State.

The area of the sugar factory compound is 148 acres. The factory can produce 500 tons of sugar per day (the sugar factory can mill 5000 tons of sugar cane per day). The technology is the conventional "squeeze" or "press" technology.

The estimated budget is Ks 88124.98 millions. The Preconstruction, Construction, Operation and Decommissioning Phase are 1, 3, 30 and 1 years, respectively.

Water is sourced from Nant Laung stream. Annual water requirement is estimated at 1,200,000 tons (120 days of operation days) and 10,000 tons/day.

Electricity is sourced from national grid line electricity from Kone Nyo sub-station 33 KV line, 7 miles in the south. Electricity is also generated from the burning of bagasse.

The annual raw materials (sugar cane) requirement is 630,000 tons. These are procured from the various sugar cane fields in the near and far vicinity in Mong Yai Township.

370 workers have been employed during the Construction Phase; during the Operation Phase 289 staffs (including 35 Chinese experts) are employed. In addition there are 98 daily wages mostly from the local community.

Working hours is 8 hrs/day, 40 hrs/week (120 working days a year).

60% of the sugar produced will be export while 40% will be for local markets.

Mitigation measures to be considered for Cumulative Impact (CI)

It is not wise or realistic to directly mitigate the cumulative impact of 30 years. Mitigation measures have to be duly taken in a timely manner during the long duration of the operation. If there is no timely mitigation during the course of operation phase then the accumulated wastes (solid, liquid) over the years will be very huge and no longer mitigable in an effective way.

Therefore taking mitigation measures in a timely manner and on a regular basis is imperative. They can effectively avoid or prevent the incremental cumulative impacts.

As mentioned earlier the company has 7 months per year for maintenance, cleaning and tidying up works. Therefore no accumulative impact is envisaged.

Commitment

Than Daung Oo Co. Ltd has made a commitment to taking effective mitigation measures and management measures for solid wastes and liquid wastes in a timely manner so that there will be no incremental (successive) cumulative impact over the years.



U Sein Myo Aung
Executive Director
Than Daung Oo Co., Ltd

1. The Preconstruction Phase/Planning phase/Design phase

The work, involve planning, designing and also a variety of official paper works, that is, bureaucratic procedures.

The planning involves hiring Chinese experts and technicians for drawing the design of the sugar factory and for the procurement of all machinery and equipment which are eco-friendly ones. (Those that emit less smoke, lower noise level and consume less fuel and energy). The foreigner experts will be required for the smooth operation of the sugar factory, maintenance and providing training for Myanmar nationals.

Two construction companies, namely, Soe Tint Industry Company and Lin Zaw Aung Company are contracted for the construction of the factory according to the designs given by Chinese Experts. Also the selection of eco-friendly building materials as far as possible.

A variety of official paper works involving many ministries and departments are to be undertaken for the official approval of the proposed project, for the approval of importing machinery and equipment. From environmental perspective the preparation and writing of Scoping Report and EIA report and submitting the reports to the authority. Meeting and discussion with local sugar cane farmers for procurement of sugar cane.

The Preconstruction Phase has lasted for 1 year.

2. The Construction Phase

The said two construction companies are hired for the construction and works are supervised by the Chinese expert.

All the buildings and structures including, main mill plant, 3 main precess plants, turbines house, boiler house, cooling tower, cooling pools and various ponds, etc. as well as office building , central control room and various stores and warehouses etc. (In fact all the buildings, and structure required are built by the two contracted construction companies. All construction works can be categorized into: preparation works, earth work and foundation works, structural construction works (major construction works), installation works (machinery, electricity and plumbing), and finishing works.

3. The Operation Phase

After completion of all construction works the Chinese experts has test run the factory. Then the routine operation of the factory and production of sugar commenced and will continue on a long term basis, (up to 30 years).

The Chinese experts and technicians have educated and supervize Myanmar workers for good working practice and good safety practice in the daily routine operation of the factory for a certain period. Training in maintenance works is also provided.

The daily routine operation works involve: regular procurement of sugar cane, and milling sugar cane involving a series of processes and steps for production of sugar (the final product); also involving the packing, storage and marketing. The daily or weekly consumption of the raw materials (sugar canes) and consumption of water, energy are recorded. The daily production rate will be also recorded. The quality of sugar are tested regularly for quality control.

It is expected that the long Operation Phase last for at least 30 years.

4. The Decommissioning Phase

A decommissioning contractor will be hired to do the works. The main works involve factory shutdown and isolation, demolishing of all buildings and structures, and dismantling of all machinery and equipment.

Old machinery and equipment as well as old building materials that are still useable or saleable will be put up for sale; those that are no longer useable will be discarded at the landfill.

The site will be cleaned and tidied up; soil contaminated, if any, will be removed.

The air, water and soil qualities will be tested for the last time to ensure that the ecology of the site is not severely deteriorated.

Afterwards, rehabilitation (reforestation) will be undertaken. A rehabilitation (reforestation) contractor and party will be hired for the final rehabilitation works.

The decommissioning and Rehabilitation Phase will last for at least one year, if rehabilitation is successful. If not the company will continue the rehabilitation until the situation is satisfactory. It is expected that after 2 years the project site will be rehabilitated to its quasi original situation.

8.2 Project environmental, socio-economic and health policies and commitments, legal requirement and institutional arrangement

The project environmental and socio-economic policies are already described in detail in Chapter 3 and will not be repeated here. (This is not a standalone EMP separate report). Only Health Policy, legal requirement and institutional arrangement are described below:

8.2.1 Health policy

The health policy of the Nation is "Health for All".

The policy guidelines for health service provision and development have been provided in the constitution. **Article-28** of the constitution of the Republic of Union of Myanmar (2008) States that:

The Union shall:

- i) earnestly strive to improve education and health of the people

Article 367:

Every citizen shall, in accord with the health policy laid down by the Union, have the right to health care.

National Health Policy (1993)

The National Health Policy was developed with the guidance of the National Health Committee in 1993.

The National Health Policy has placed "Health for All" goal as a prime objective. There are 15 main points regarding the National Health Policy (1993). The first main point No.1 is:

- to raise the level of health of the country and promote the physical and mental well-being of the people with the objective of achieving "Health for All"

The main point, No.9 concerns environment which states:

- to intensify and expand environmental health activities including prevention and control of air and water pollution

Health Legislation

Certain portion of health legislation also addresses environmental sanitation and communicable disease prevention, as far as environmental affair is concerned. That includes the control of disposal of human and other wastes, concerns for water purity and hygiene of housing and food sanitation.

Certain health legislation that are relating in one way or another, to environmental affairs are:

- The Public Health Law (1972)

Which includes environmental sanitation and cleanliness of food, among others

- Prevention and control of communicable Diseases Law (1995) (Revised 2011)

This law describes measures to be taken in relation to environmental sanitation, among others.

- The control of smoking and consumption of Tobacco Product Law (2006)

This law describes the creation of tobacco smoke free environment, among other. This is of relevant at the work place and project site where many employees are working.

Health Development Plan and Myanmar Health Vision 2030

This long term plan has been drawn up to meet any future health challenge. This plan has 9 main objectives and one of them is:

- to develop a health system in keeping with the changing political, socio-economic and environmental situations

8.2.1.1 National Environmental Health Agenda

Environmental Health is actually one of the intergral parts of Environmental Protection and Conservation aspect. EIA, IEE and EMP works normally encompass the physical, biological, socio-economic, cultural and visual components of the surrounding environment. The third component, that is, socio-economic, includes public health component, (mortality and morbidity, diseases, accident and injuries etc.).

The Occupational and Environmental Health Division under the Department of Public Health is the focal point agency concerning Occupational and Environmental Health aspects.

This Department (Division) is involved in:

- environmental monitoring eg- air quality, water quality
- work place assessment eg- air quality, waste and water quality, heat stress, light, noise level

Health Impacts Assessment (HIA) and Social Impacts Assessment (SIA) are actually important parts of environmental protection and conservation works.

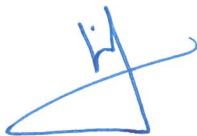
Commitments

The project proponent, Than Daung Oo Co., Ltd has made a sincere commitment to operate the proposed sugar factory in an ecofriendly manner as practical as possible.

The company will comply with the NEQEG guidelines (2015) as prescribed by ECD.

The company will duly implement the Environmental Management Plan (EMP) and Monitoring Plan (MP) as far as possible.

The company will do its best to take all pragmatic mitigation measures prescribed in this EIA report.



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Than Daung Oo Co., Ltd

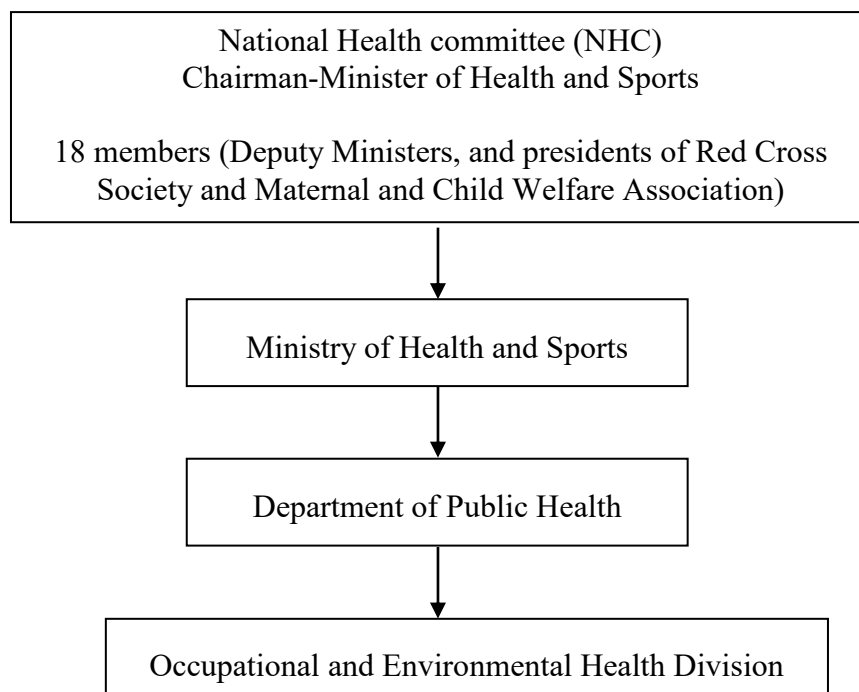
8.2.2 Legal requirements

These are already described in detail in **Chapter-3** and will not be repeated here. This is briefly summarized as below:

46 laws, rules, regulation are listed together with excerpts from relevant articles/sections are reproduced; national environmental quality (emission) guideline, 2015 are reproduced in Chapter 3. In addition corporate environmental and social policies are enumerated including environmental social standards as prescribed by IFC are reproduced.

8.2.3 Institutional Arrangement (Occupational and Environmental Health aspects)

Institutional Arrangement (organization)



The National Health Committee (NHC) is an umbrella organization comprising 18 members from 9 ministries and one member of Nay Pyi Taw Council, and presidents of Red Cross Society and Maternal and Child Welfare Association.

The Chairman of NHC is the Union Minister of Health and Sports while the Vice Chairman is the Union Minister of Labour. 9 deputy ministers under 9 ministries, a member of Nay Pyi Taw Council, the president of Red Cross Society, and the presidents of Maternal and Child Welfare Association are also members of NHC.

The Deputy Minister of Health and Sports is the secretary while the Director General of Department of Health Planning, is the Joint secretary.

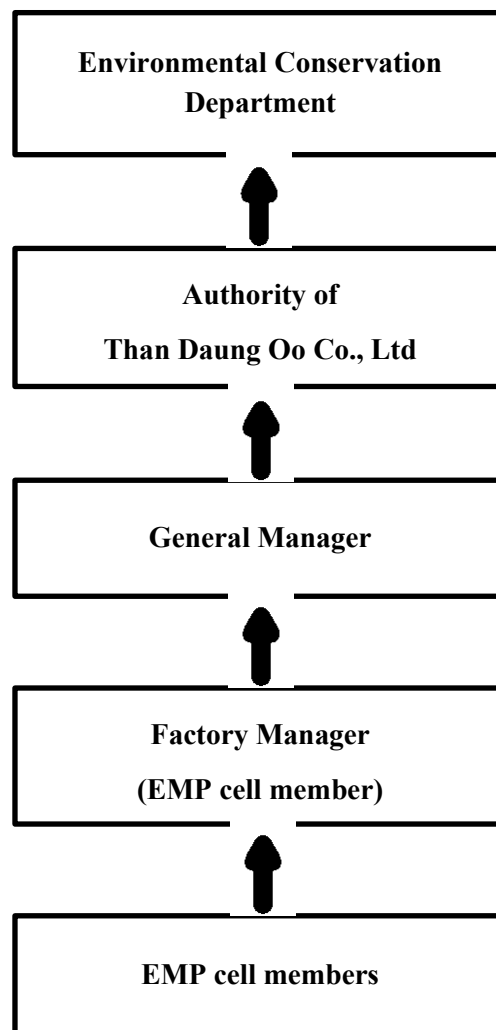
The Occupational and Environmental Health Division (OEHD) under the Department of Public Health is the focal agency involves in environmental and health affairs.

The occupational and Environmental Health Division is involved in implementing Environmental Health Programme in the country.

At the moment it is involved in:

- Environmental monitoring: on air quality and water quality
- Medical monitoring: health assessment on workers (periodic medical examination, performing physical examination, chest X-ray, biomarker survey on workers)
- Work place assessment: eg- on air quality, waste (solid) and waste water, heat stress and light, noise level, soil quality, water sanitation and hygiene etc. in certain factories.
- Assessment of environmental health probably related to climate change and general health impact assessment.

Institutional arrangement of the company for implement of EMP



The execute EMP and nucleus organization (EMP cell) is organized as follows:

The EMP cell members include the manager, who is the EMP cell lead and other staff members. To assist in community monitoring two villagers are added into the list of EMP cells which is tentatively setup.

Than Daung Oo Co., Ltd has tentatively formed the EMP cell as follow:

Sr no.	Name	Designation	Responsibility
1.	U Tun Lwin	Factory Manager	EMP cell leader
2.	U Myint Maung Maung	Engineer	Cell member
3.	U Moe Thu Aung	Engineer	Cell member
4.	U Win Swe	Technician	Cell member
5.	U Soe Nyunt	Technician	Cell member
6.	U Lone Sone	Village administrator (Hsen Taw)	Cell member
7.	U Sai Tun	Village administrator (Na Long)	Cell member

As project progress, more staffs will be added to the list of EMP cell.

The EMP cell leader and members are responsible for the implementation of EMP and MP. They will be specially trained for this task. They will also take part in training and supervision of other staffs for execution of monitoring plan and implementation of mitigation measures. Most, if not all, staffs will be made familiar with mitigation activities. While the effective operation of the sugar factory, that is, the production works will be the main task many staffs will have also to participate in mitigation, EMP and MP activities.

Management action by these EMP cell members will have to be taken on regular or routine basis, daily, weekly, monthly, bi-monthly and from time to time, depending on situation.

The responsibilities for each EMP cell member are shown later at the end of this chapter.

From time to time, or semi-annually or annually, experts and technicians will have to be hired for testing and monitoring works – eg- testing of air, water, soil qualities etc. Since they not staff members of the company. They will have to be hired only.

EMP and environmental monitoring is a new subject even in developed countries. EMP cell leader and members shall try to be aware of the latest information regarding environmental activities carried out in developed countries. As work progresses the small nucleus EMP cell organization will be reorganized into a bigger and probably more efficient organization.

The present approach is a pragmatic one based on the availability of qualified personal and materials and equipment. Capacity building and training for EMP cell members mentioned earlier will be an integral part of execution of EMP and MP.

Responsibility

The duties and responsibilities of EMP cell members are as follow: -

1. U Tun Lwin (Factory Manager)

- (i) He will doubles as EMP cell leader.
- (ii) Overall environmental officers; responsible for all social and environmental issues arising from the activities at the assembly plant.
- (iii) Monthly meeting with all EMP cell members and 20 specially trained workers.
- (iv) Gather monthly information/data from 4 full time EMP cell members.
- (v) Writing monthly report and submit the report to the company's authority.
- (vi) Submit a special quarterly report to the company's authority.

2. U Myint Maung Maung (Engineer) and EMP cell member

- (i) Designated as environmental security officer.
- (ii) Responsible for all environmental issues arising from the activities at the assembly plant.
- (iii) Supervision of EMP activities including monitoring works and execution of mitigation measures.
- (iv) Also participate (personally involve) regularly in EMP, MP and mitigation works.
- (v) Provide monthly data/information to EMP leader (Myanmar).

3. U Moe Thu Aung (Engineer) and EMP cell member

- (i) Designated as work place security officer.
- (ii) Responsible for all social issues arising from the activities at the assembly plant.
- (iii) Co-supervision of EMP activities including monitoring works and execution of mitigation measures.
- (iv) Regularly supervize activities at work places.
- (v) Also participate regularly in EMP, MP and mitigation works.
- (vi) Provide monthly data/information to EMP cell leader.

4. U Win Swe (Technician)/EMP cell member

- (i) Designated as liaison officer for dealing with locals
- (ii) Responsible for social issues, if any, coming from the local community.
- (iii) Co-supervision of EMP, monitoring works undertaken by 10 trained workers.
- (iv) Also participate in EMP, and MP works.
- (v) Provide monthly data/information to EMP cell leader.

5. U Soe Nyunt (Technician)/EMP cell member

- (i) Co-supervision of EMP, especially mitigation works undertaken by 10 trained workers.
- (ii) Also participate in EMP especially all mitigation measures taken.
- (iii) Supervize and participate in monitoring of water, fuel and electric energy consumption; regulate consumption.
- (iv) Provide monthly data/information of EMP cell leader.

6. U Lone Sone (Hsen Taw Village Administrator)/EMP cell member

- (i) Appoint to monitor the transparency regarding the activities at the assembly plant
- (ii) Work as part-time in environmental monitoring works with EMP cell member (no fixed working days or hours).
- (iii) Monthly regular visual inspection of activities.
- (iv) Provide information about the assembly plant to follow locals on a regular basis every 2 or 3 months.

7. U Sai Tun (Na Long Village Administrator)/EMP cell member, part time

- (i) Appoint to monitor the transparency regarding the activities at the assembly plant
- (ii) Work as part-time in environmental monitoring works (no fixed working days or hours).
- (iii) Monthly regular visual inspection of activities.
- (iv) Provide information about the assembly plant to follow locals on a regular basis every 2 or 3 months.

8. 20 specially trained workers:

10 to be fully involved in monitoring work

10 to be fully involved in taking mitigation work.

The EMP cell members and 20 specially trained workers will also involve in regular works (production works) as practical as possible.

8.3 Summary of impacts and mitigation measures

Different options of mitigation measures have been already described in technical detail earlier in Chapter-6. These are again summarized as follows:

Table – 28: During the Construction Phase

Sr. No.	Impact	Mitigation
1.	Impact on air environment	<ul style="list-style-type: none"> - Manage dust and smoke - Avoid open burning of debris - Suppress dust with water spray - Restrict vehicular movements, reduce the speed - Stop earth work or loading and unloading of earth, sand when strong wind is blowing - Limit open stockpiles of earth, sand, lime powder - Minimize drop height when loading and unloading earth and other loose materials - Plant fast growing trees to trap dust - Procure equipment and vehicles that are eco-friendly eg. those that emit less smoke - Keep equipment and vehicle well-maintained and well-operated - Use fuel with low sulphur content - Provide adequate PPEs - Heed to complaint of the local concerning dust and smoke - Monitor the mitigation works
2.	Noise and vibration	<ul style="list-style-type: none"> - Comply with NEQ guideline of ECD - Procure eco-friendly equipment and vehicles that generate low noise level - Restrict noise to working hours only (no work at night) - Install silencers on certain machinery - Switch off or throttle down equipment during idle hours - Limit/restrict the movement and speed of vehicles - Keep equipment and vehicles well maintained and well-operated - Manage vibration (of machinery, vehicles); provide suitable foundation - Plant fast growing trees to absorb noise

		<ul style="list-style-type: none"> - Provide PPEs - Heed to the complaint of the local regarding noise - Monitor the mitigation effort
3.	Impact on water environment	<ul style="list-style-type: none"> - Avoid accidental sliding or erosion of stockpile of earth or sand into the water of Nant Laung rivulet - Avoid accidental dumping or spill of earth and newly mixed concrete into water - Avoid or minimize siltation and sedimentation - Avoid accidental spillage of oil and chemical into water - Manage domestic waste (solid and liquid); no disposal into rivulet - Manage the water level, flow and volume as practical as possible; also consider for seasonal change in hydrology - Heed to the complaint of locals regarding the quality of rivulet water, if any - Try to meet NEQEG values by ECD - Monitor the mitigation works
4.	Impact on soil	<ul style="list-style-type: none"> - Avoid unnecessarily earth work, earth moving, earth cuts - Avoid discriminate dumping of soil and wastes - Manage the soil - Avoid unnecessary destruction of soil profile - Separate top soil from sub-soil (separate stockpiles); top soil for revegetation; sub-soil for construction - Prevent soil erosion and siltation - Prevent wash water from carrying earth and materials into the stream - After construction work resurface and stabilize exposed ground - Do not keep the ground bare for long period during wet season - Rake and restore soil compacted by vehicles or machinery - Avoid fuel oil spill on soil; remove the spill immediately; do not wash down with water but use absorbent - Train workers for handling of fuel and cleanup of spills - Monitor the mitigation activities.
5.	Impact: waste	<ul style="list-style-type: none"> - Manage solid waste - Comply with rules and regulations - Avoid open burning of debris - Dump waste at approved landfills - Educate and train workers for goodhouse-keeping - Put up left over construction materials for sale

		<ul style="list-style-type: none"> - Hire a contractor for tidying up the site after completion of construction work - Monitor the mitigation works
6.	Potential impact on biodiversity	<ul style="list-style-type: none"> - Protect and conserve flora and fauna - Execute minimum disturbance on the biodiversity and habitat - Comply with The Environmental Conservation Law, 2012 and Rules, 2014 - Restrict the clearing of vegetation - Keep big trees as contact as far as possible - Avoid open burning of debris - Plant trees, create green belt and green zone - Monitor the mitigation works
7.	Potential impact on traffic	<ul style="list-style-type: none"> - Plan and manage traffic - Schedule the timing for vehicular movement, - Educate the drivers for defensive driving - Try to maintain zero road accident - Keep vehicle well-operated and well-maintained - Educate heavy truck driver for driving with reduced speed - Do not overload the truck; comply with regulation - Avoid spilling of earth or other materials from truck during transportation - Reduce the speed when driving near or through a village - Set up speed limit at appropriate spot along access road - Monitor the mitigation effort
8.	Occupational health and safety issue	<ul style="list-style-type: none"> - Educate, train and supervise workers for good working practice and good safety practice - Plan for emergency procedure; provide First Aid Kits, fire extinguisher etc. - Try to achieve zero accident - Display phone number and address of Red Cross Society, Ambulance Service, Mong Yai Hosiptal, Fire Brigade etc so that everyone can see - Train some staff for First Aid and Firefighting Trainings - Take out insurance for the company and Insurance for Fire - Monitor the mitigation works
9.	Potential social issue	<ul style="list-style-type: none"> - Avoid the potential negative impacts on the socio-economic life of the locals - Maintain good relation with the locals - Conduct public consultations from time to time; heed to their opinions

		<ul style="list-style-type: none"> - Educate workers for appropriate behaviours when dealing with locals - Manage misbehaviour and social illness of workers - Keep separate dormitories for male and female workers - Ask the construction contractor to discipline his workers - Apply punitive actions for wrong doer - Prohibit the drinking of alcohol during working hours; ban the use of narcotics - Train workers for good housekeeping - Heed to the voice of the locals - Monitor the mitigation works
10.	Potential security issue	<ul style="list-style-type: none"> - Manage for the security of site - Wall or fence the site - Control all accesses; set up gates and deploy security guards - Do not let workers enter the neighbouring village without pre-authorization; - Do not let them mingle freely with locals (Construction Phase only) - Keep certain materials under lock and key - Ask the building contractor to discipline his workers (construction phase only) - Take punitive actions for wrong doer - Monitor the mitigation works

Table – 29: During the Operation Phase

Sr. No.	Impact	Mitigations
1.	Impact on air environment	<ul style="list-style-type: none"> - Comply with NEQ emission guideline by ECD - Try to control and mitigate air emission as practical as possible - Procure eco-friendly equipment/machinery/vehicles that generate less smoke - Ensure for complete combustion of bagasse waste - Apply ash reduction equipment, eg. dust collector, filter bag - Apply wet scrubber system (water dozing) or lime water dozing - Proper training, operation and maintenance of machinery/equipment

		<ul style="list-style-type: none"> - Avoid open burning of solid waste - Restrict vehicular movements - Prevent spillage of lime powder, - Plant trees around the compound to mitigate dust and smoke - Spray water for dust suppression. - Provide adequate PPEs to workers - Monitor the mitigation works
2.	Noise and vibration	<ul style="list-style-type: none"> - Comply with NEQEG guideline by ECD - Try to manage and mitigate noise and vibration - Procure machinery/equipment/vehicle that are eco-friendly; emitting lower noise level - Maintain and operate machinery/vehicle well - Install silencer - Install noise barrier/sound insulation - Limit the speed of truck - Install absorber on machine that vibrate violently - Implement stable foundation - Create green belt to absorb noise - Provide PPEs - Monitor the mitigation actions
3.	Impact of solid waste	<ul style="list-style-type: none"> - Plan and execute waste management, waste minimization and utilization - Use bagasse waste for fuel - Recycle molasse or put up for sale - Compost "mud" (cachaza) into high quality organic fertilizar - Use dry lime (solid lime) for soil conditioning and also suppression of odour - Systematically collect ash and store in ash pools; process ash into making fertilizer - Educate workers for proper handling of waste - Avoid open burning of solid waste - Follow the 5Rs principles for waste, if the is possible - dispose waste only at approved landfill or dumping site - Monitor the mitigation work

4.	Impact of liquid waste	<ul style="list-style-type: none"> - Comply with NEQ effluent guideline by ECD - Plan and execute the management of waste water and reduction of waste water - Promote awareness on the efficient use of water and conservation of water - Segregate non-contaminated waste water stream from contaminated stream; reuse - Reduce the organic load of waste water by preventing the entry of solid waste into the waste water stream - Prevent direct run off to water course - Recycle process water and reuse - Duly treat waste water applying conventional method (physical treatment) - Ensure that industrial waste water is duly treated (physical treatment) - Educate and train workers for good housekeeping practice and proper handling of waste water - Check and monitor daily use of water - Regularly check the tanks, pipes, taps for water leakage and fix them immediately - Monitor the mitigation works
5.	Odour	<ul style="list-style-type: none"> - Comply with NEQEG guideline for odour - Ensure that organic wastes are not accumulated in the ash ponds and waste water pond. - Reduce the load of organic in the water as practical as possible: install screen / filter to retain organic waste and manually remove the waste - Large quantity of bagasse ash will be accumulated in the ash ponds; install an over head crane to mechanically remove the ash sediment - Relatively small quantity of sediment (sludge) will be settled at the waste water pond; mechanically removed the sediment and discarded - Give away the ash waste to the local sugar cane planters; used some as fertilizer and soil conditioner in greening - Regularly apply lime powder in waste water pond to mitigate odour - Wash down work floors at milling and process plants daily - Plant fast growing tree around the premise; tree will abate odour to some extent.

		<ul style="list-style-type: none"> - Check waste water pond, ash pond, molasse tank weekly for any smell or odour (Olfactory testing by smelling)
6.	Impact on water environment	<ul style="list-style-type: none"> - Plan and manage for water environment protection and water conservation - Follow rules and regulation (The Conservation of Water Resources and Rivers Law, 2006) - Comply with NEQ emission guideline by ECD - Avoid by all means the pollution of Doe Gon rivulet - Avoid disposing of solid and liquid waste into the rivulet (stream) - Avoid spillage of fuel oil into the rivulet - Promote awareness of efficient use of water and water conservation - Ensure that the consumption of water is in the workframe stated earlier (30,000 tons/day) - Recycle water, through cooling tower and series of cooling tanks - Apply appropriate plumbing and ensure that there is no leakage of water - Harvest rain water, if necessary - Monitor the mitigation works
7.	Impact on traffic	<ul style="list-style-type: none"> - Try to achieve zero road accident - Comply with Highways Law, 2000 - Set up signage for speed limit at appropriate places - Educate and train the drivers for defensive driving - Avoid over loading of truck - Conduct public education campaign for road safety - Keep a log book for each vehicle - Schedule vehicular movements - Monitor the mitigation actions
8.	Occupational health and safety issue	<ul style="list-style-type: none"> - Plan and manage for a safe and healthy atmosphere inside the factory - Try to achieve zero accidents - Comply with Factories Act, 1951; The Boiler Law, 2015; Workmen Compensation Act, 1923 - Also comply with NEQ guideline for emission and noise by ECD - Educate, train and supervise workers for good working practice, good safety practice and good health and hygiene practice

		<ul style="list-style-type: none"> - Educate, train and supervise them for skill, for operation of equipment, for handling for chemicals (eg. lime, sulphur) - Keep all machinery/equipment well-maintained and well-operated - Provide adequate PPEs - Carefully plan for emergency procedure - Provide First Aid and Firefighting training - Display addresses and phone numbers of Red Cross Society, Ambulance Service, Fire brigade etc. so that every one can easily see - take out insurance for the factory, also take out fire insurance - Monitor the mitigation actions
9.	Potential social issue	<ul style="list-style-type: none"> - Prevent or minimize negative impact on socio-economic life of the local - Build and maintain good relation with locals - Hold public consultation from time to time - Educate the workers for etiquette, and respect the custom and tradition of the locals - Manage misbehaviours and social illness of workers - Keep separate housing for male and female workers - Provide proper training on work place regulation and code of conducts - Provide welfare programme - Educate and discipline workers - Deal with workers on a fair and square basis - Take punitive action to wrong doer - Prohibit the drinking of alcohol during working hours; ban the use of narcotics - Provide adequate sanitation eg-toilet, baths etc. - Heed to the voice of the locals - Plan and implement CSR as practical as possible - Monitor the mitigation actions
10.	Potential security issue	<ul style="list-style-type: none"> - Manage security of the site - undertake effective fencing/walling of the site - Control all accesses; set up security gates; deploys guards - Do not let workers mingle freely with locals - Do not let the workers enter the neighbouring village without pre-authorization;

		<ul style="list-style-type: none"> - Put certain materials under lock and key - Apply punitive measures to wrong doer - Provide ID cards for all for easy identification - Provide uniform for all - Monitor the mitigation works
11.	Potential visual impact	<ul style="list-style-type: none"> - Plan and execute for a sugar factory project which is focused on visual appeal - Enhance the splendor and beauty of the factory - Plant shade trees along both sides of access road; plant shade trees, fruit trees and ornamental trees in and around the site; create green zones and belts - Conserve natural vegetation in the vicinity - Use eyes pleasing paints and colours for buildings and structure - Provide appropriate lighting at night only for security reason; avoid the use of excessive light - Use yellow light instead of white light to mitigate insect aggregation; if insect aggregate turn off the light for a while - Monitor the mitigation works

Table-30: During the Decommissioning/Rehabilitation Phase

Sr. No.	Impact	Mitigation
1.	Occupational health and safety issue	<ul style="list-style-type: none"> - Manage for effective decommissioning of site. - Hire decommissioning contractor to do the work. - Dispose materials that are no longer useable; redeploy or put up for sale those that are useable - Restore the ground and soil profile. - Revegetate and rehabilitate the ground, select a variety of plant species. - Backfill pits, dents and depressions, if any remain after decommissioning; backfill first with overburden and then put top soil on top to facilitate revegetation. - Monitor the mitigation works
2.	Potential residual impacts	<ul style="list-style-type: none"> - Hired a decommissioning contractor to do the work - Clean and tidy up the site - Remove contaminated soil, if any - Test the quality of air, water and soil for the last time - Continue rehabilitation (reforestation) work - Hired a rehabilitation contractor and party for effective reforestation

8.4 Overall budget for implementation of the EMP

EMP is the key to ensure that the environmental quality of the area does not deteriorate due to the implement of a project. EMP involves the management of the overall environmental issues including the physical, biological, socio-economic, cultural and visual issues.

EMP encompasses the whole life of the project starting from the Preconstruction/Planning Phase, through Construction and Operation Phase to the end of Decommissioning Phase.

In the very early planning stage (Preconstruction Phase) EMP principles shall be followed for the application of environmentally sound idea and technology. EMP principle shall be also followed for the procurement of all ecologically friendly materials (building materials, equipment, machinery, vehicles, chemicals etc and a variety of environmental control equipment, instruments, firefighting and first aid facility, environment control Personal Protective Equipment (PPEs) etc.

The actual implementation of EMP will cover the Construction, Operation and Decommissioning/Rehabilitation Phases of the project life.

Since EMP involves the management of all environmental issues during the three phases of the project there has to be adequate budget of the implementation of EMP. This is particularly true for the long operation phase, the most important phase of the project life.

This budget will be only for the implementation of EMP but it will cover the procurement of certain equipment and devices for uses in monitoring, and certain materials for uses in emergency e.g. PPEs, firefighting and first aid facilities etc.

In order to effectively execute EMP and MP the company has set a side 0.5% of the budget, equivalent to Ks 440,624,900 for the EMP fund which will cover the initial cost and recurring expense for the implementation of the EMP.

8.4.1 Allotment of EMP fund

Of the Ks 440,624,900 allotted as EMP fund, sub-budget allotted for each programme under EMP and MP are as follows:

The EMP fund is then allotted for each programme, namely, cost of organizing EMP, cost for capacity building and training, cost for partial procurement of small equipment and device, cost for execution of mitigation, cost for monitoring, for emergency and miscellaneous. The detailed costs are as follows:

- Cost of organizing EMP	2% of EMP fund	(Ks 8,812,498)
- Cost for actual execution and dissemination of EMP in the forms of:		
(a) Taking mitigation measure	25% of EMP fund	(Ks 110,156,225)
(b) Monitoring actions	25% of EMP fund	(Ks 110,156,225)
- Cost for partial procurement of equipment and materials	20% of EMP fund	(Ks 88,124,980)
- Cost for capacity building and training	7% of EMP fund	(Ks 30,843,743)
- Cost for emergency/contingency (for probable emergency cases)	10% of EMP fund	(Ks 44,062,490)
- Cost for reporting, documentation work	8% of EMP fund	(Ks 35,249,992)
- Miscellaneous (including casual fees for	3% of EMP fund	(Ks 13,218,747)

It is expected that the EMP fund can cover the whole life of the project of 30 plus years. If necessary, more will be added to the fund. Labour cost will be kept at a minimum. Only staff will be involved in the implementation of EMP and MP. Staff will be first trained for the purpose.

Procurement for equipment and materials that are essential for the execution EMP such as firefighting equipment and accessories, Personal Protection Equipment (PPEs), First Aid Kit and medicine and drugs etc will be from the main projects budget, not the EMP budget.

Most of the EMP fund will be used for the implementation of mitigation measures (which are integral part of EMP) and implementation of MP (which is also integral part of EMP).

The above-mentioned cost estimation for EMP fund is based on the current unit price. Because the project will be implemented over many years (even decades) price fluctuation and inflation will be unavoidable. A contingency amount shall be prepared for any unavoidable event in the future. Unfortunately, if a major accident happens the EMP fund has to be greatly increases.

8.5 Management and monitoring Sub-plan by project phase (EIA procedure, Notification No.616/2015, by Section 63, 8 (8.5))

Both management plans monitoring plan are of paramount important for the successful implementation of EMP.

The objectives are:

- To measure impacts that occur during the operation the project
- To ensure compliance with statutory requirements
- To determine the effectiveness of mitigation measures and other measures, and
- To assist in the implementation of EMP

Issues or components

Management and monitoring sub-plan encompasses the following issues or components to be managed and monitored are:

- Noise and vibration, waste; hazardous waste; waste water and storm water; air quality; odour, chemicals; water quality; erosion and sedimentation; biodiversity; occupational health and safety; community health and safety; cultural heritage; employment and training; emergency response, traffic safety and aesthetics.

(From EIA procedure, Notification No.616/2015, Section 63, 8 (8.5))

Management and monitoring sub-plan for the Operation Phase and Decommissioning Phase are summarized.

8.6 Contents for each sub-plan (Management and Monitoring sub-plan, MMSP)

In section (8.6) the content and description of each sub-plan that addresses the above-mentioned issues such as noise and vibration, waste, hazardous waste, waste water and storm water, air quality, odour, and so on are given. The content for each sun-plan include: objective, legal requirement, overview map and layout implementation schedule, management actions, monitoring plan and project's budget and responsibilities.

As the project is already in operation Sub-plans for Preconstruction and Construction Phase are omitted.

For pragmatic purpose Sub-plans for Operation and Decommissioning Phase are outlined as follow.

I. During the Operation phase

The project is still in the Construction Phase. The 17 sub-plans described below will be executed when the factory is in full operation with full staff strength.

The 17 sub-plans are summarized as follow:

1. Sub-plan for Noise and vibration

Objectives

- To mitigate/reduce noise and vibration levels; to create a safety work place; not to cause nuisance to the local.

Legal requirement

- Comply with NEQEG (emission) guideline, 2015; code No.1.3

Overview maps, layout maps, images, aerial photos, satellite images

- These are already shown earlier in chapter 4, fig. 5, 6, 8, 9, 10; chapter 5 fig. 34, 35, 47, 48; chapter 8, fig. 80, 81 and will not be repeated here.

Implementation schedule

This sub-plan will be implemented during the Operation Phase.

Management action

- Procure eco-friendly machinery that emits low noise level in the first place.
- Restrict vehicular movement to reduce noise and vibration.
- Implement mitigation measures for noise and vibrate (already described earlier in chapter 6 (6.2.1.3).
- Keep machinery and vehicles well-maintained and well-lubricated to reduce noise level.
- Develop green belt as noise pollution sink (abate noise).
- Ensure that foundations for machinery are stable to reduce vibration.
- Create smooth road surface to mitigation vibration by trucks movements.
- Provide PPE, ear muffs, where necessary.
- Conduct daily inspection of noise condition.
- Implement GRM, so that locals can file complaints regarding noise and vibration.
- Regularly monitor effectiveness of mitigation measures taken.

Monitoring plan

Parameter to be monitor : dBA during day and night time.

monitoring points

- Factory: the coordinates: N. Lat. 22° 20' 19.7" and E. Long. 97° 54' 41.5"
- Na Long village: the coordinates: N. Lat. 22° 18' 03.8" and E. Long. 97° 55' 39.0";
- Hsen Taw village: the coordinates: N. Lat. 22° 19' 34.9" and E. Long. 97° 54' 46.9"

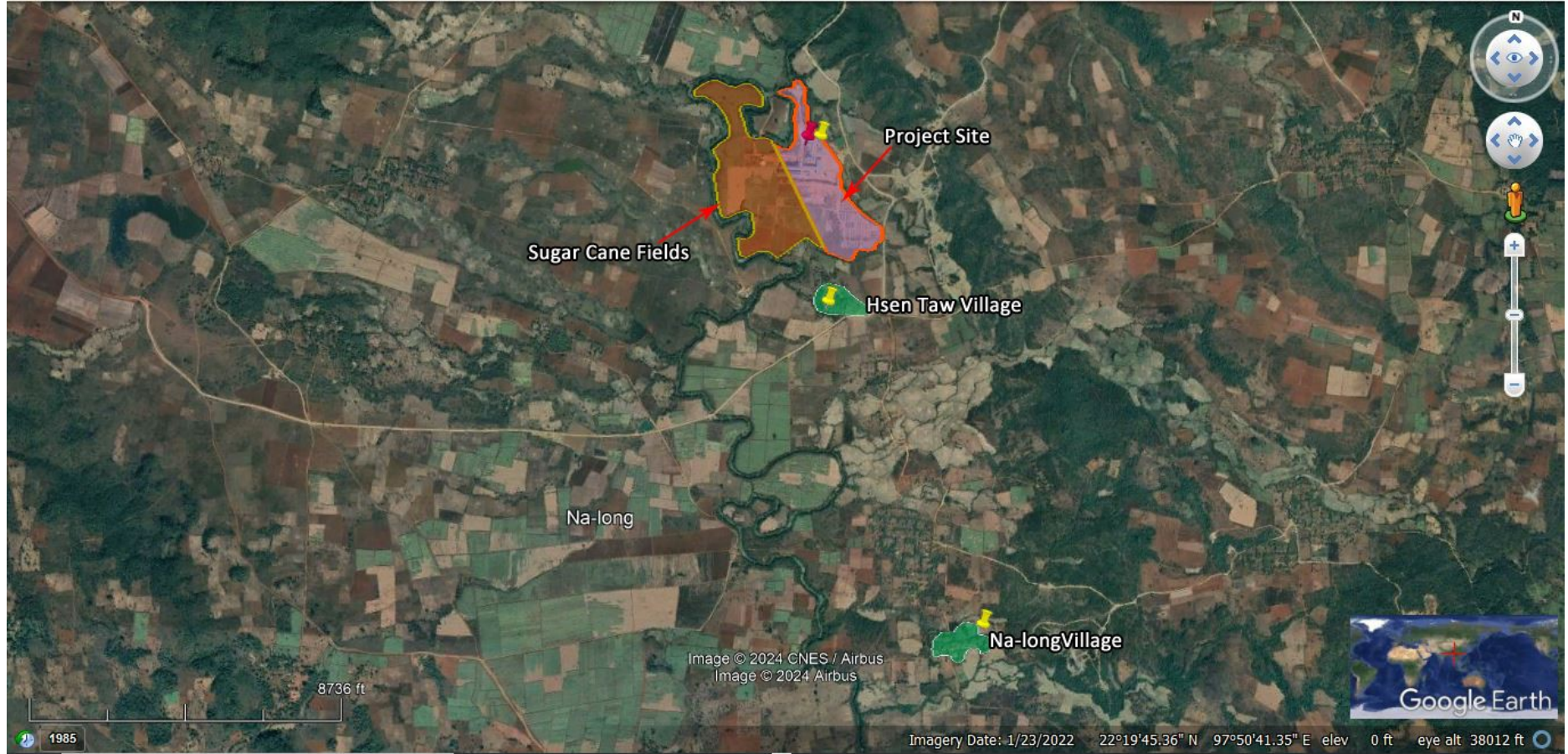
Frequency

- Semi-annual (have to hire technicians).
- Also monitor effectiveness of mitigation measures taken.

Budget and responsibilities

Ks 300,000 (once off cost)

Responsibilities – Hired technicians and EMP cell members.



LEGEND

-  Measuring points of noise level
-  Measuring point of vibration

Figure – 116: Satellite image showing points of noise and vibration for monitoring sub-plan (Operation Phase)

2. Sub-plan for Waste

Objective

- To mitigate/reduce industrial and domestic waste; not to pollute the environment; to create a healthy environment.

Legal requirement

- Comply with Environmental Conservation Law, 2012 (Section 14, 15, 31); Environmental Conservation Rules, 2014 (Rule 69), (to discharge wastes in accord with environmental sound method).

Overview maps, layout maps, images, aerial photos, satellite images

- These are already shown earlier in chapter 4, fig. 5, 6, 8, 9, 10; chapter 5 fig. 34, 35, 47, 48; chapter 8, fig. 80,81 and will not be repeated here.

Implementation schedule

This sub-plan will be implemented during the Operation Phase

Management action

- Educate and train workers for the proper handling of wastes; educate them for good housekeeping and minimization of waste as practical as possible.
- Reuse all bagasse.
- collect ash in ash pond; use ash as fertilizer and give away to cane planters.
- reuse molasses, cachaza and lime mud.
- Separate wastes into the recyclable and non-recyclable ones; dispose only those that are non-recyclable.
- Landfill wastes that cannot be recycled or reused.
- Avoid open burning of solid wastes.
- Monitor waste management monthly.
- Monitor effectiveness of mitigation measures taken.
- Implement GRM (locals can file complaint regarding solid wastes).

Monitoring plan

- Monitor (visual inspection) of waste regularly.
- Monitor record book or log book of solid wastes (industrial and domestic) generated weekly or monthly; quantity and mode of collection; tackle issue, if any promptly.

Monitoring point

- At final waste water pond coordinates: N. Lat: 22°20'18.41"N, E. Long. 97°54'20.54"
- At landfill (inside factory compound) coordinates N. Lat. 22° 20' 18.42", E. Long. 97° 54' 33.76"

Frequency

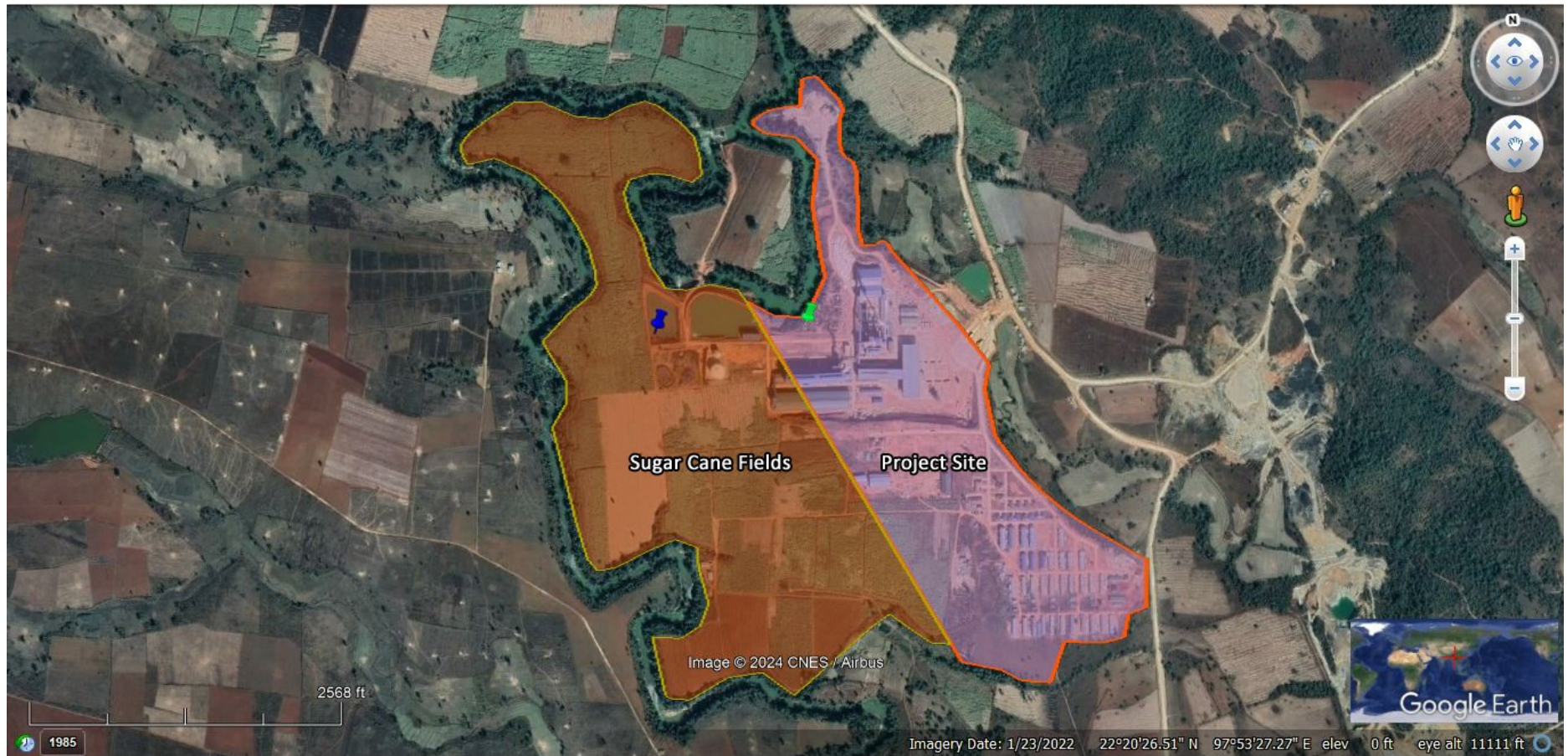
- weekly, monthly.
- Also monitor effectiveness of mitigation measures taken.

Budget and responsibilities

Free for charge. (All EMP cell leader and EMP cell members are well-paid employees of the factory; no extra fees for them; no EMP contractor exist in Myanmar yet for hire).

Responsible

EMP cell leader and EMP cell members.



LEGEND



Waste water pond (final)



Landfill

Figure – 117: Satellite image showing points of waste for monitoring sub-plan (Operation Phase)

3. Sub-plan for Hazardous waste

Objectives

- To control, and manage hazardous wastes, if any, to operate an ecofriendly business.

Legal requirement

- Comply with the Environmental Conservation Law, 2012 and the Environmental Conservation Rules, 2014.

Overview maps, layout maps, images, aerial photos, satellite images

- These are already shown earlier in chapter 4, fig. 5, 6, 8, 9, 10; chapter 5 fig. 34, 35, 47, 48; chapter 8, fig. 80, 81 and will not be repeated here.

Implementation schedule

This sub-plan will be implemented during the Operation Phase

Management action

Used fuel oils, engine oil, used fuel bags, old lamps and batteries are considered hazardous.

- Collect used oil and engine oil in old drums and giveaway to recyclers.
- Discard used filters, old lamps; old batteries at the approved landfill of the company.

Monitoring point:

- Near fuel depot coordinates: N. Lat. 22° 20' 9.90", E. Long. 97° 54' 47.54"
- At landfill (inside factory compound) coordinates N. Lat. 22° 20' 18.42", E. Long. 97° 54' 33.76"

Frequency

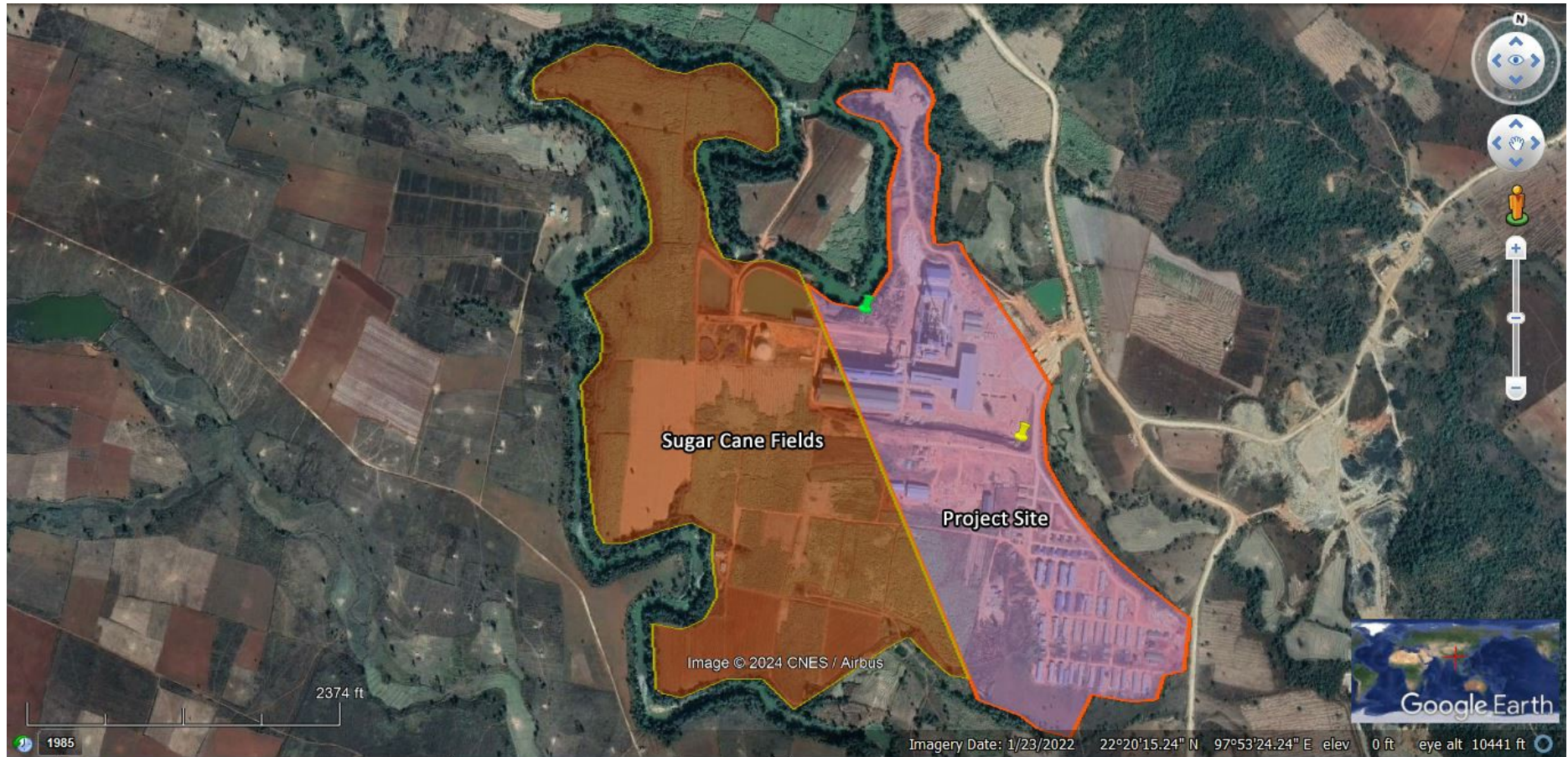
- weekly, monthly.
- Also monitor effectiveness of mitigation measures taken.

Budget and responsibilities

Free for charge. (All EMP cell leader and EMP cell members are well-paid employees of the factory; no extra fees for them; no EMP contractor exist in Myanmar yet for hire).

Responsible

EMP cell leader and EMP cell members.



LEGEND

-  Fuel depot (Hazardous waste)
-  Landfill (Hazardous waste)

Figure – 118: Satellite image showing points of Hazardous waste for monitoring sub-plan (Operation Phase)

4. Sub-plan for Waste water and storm water

Objectives

- To control, manage and mitigation waste water and storm water; to create a healthy environment.

Legal requirement

- Comply with NEQEG guideline (2015), Code No.1.2

Overview maps, layout maps, images, aerial photos, satellite images

- These are already shown earlier in chapter 4, fig. 5, 6, 8, 9, 10; chapter 5 fig. 34, 35, 47, 48; chapter 8, fig. 80, 81 and will not be repeated here.

Implementation schedule

This sub plan will be implemented during the Operation Phase.

Management action

- Educate and train workers in the handling and treatment and recirculation of waste water.
- Industrial/production waste water will be recirculated through cooling tower and series of cooling pond and reuse.
- Set up drainage system for domestic waste water and storm water.
- Construct a large waste water collection pond to ensure that there is no overflow.
- Domestic waste water (used water) from office, dormitory, kitchen, baths, etc will end up in waste water pond and dry up (no special treatment requirement).
- Avoid accidental spillage of waste water on ground or into the stream.
- Domestic waste water (black water) from toilets will end up in septic tanks and soak pits.
- Avoid disposing of liquid waste into opening ground or into the stream by all means.
- Monitor waste water every six months (hire technicians)
- Conduct weekly visual inspection of waste water condition.
- Monitor effectiveness of mitigation measures taken, monthly.

Parameter to be monitored: 5-day Biochemical oxygen demand, COD, Oil and grease, pH, Temperature increase, Total coliform, Total nitrogen, Total phosphorus, TSS.

Monitoring Point:

- Discharge water : N. Lat. 22° 20' 22.0"; E. Long. 97° 54' 23.0"
- Waste water pond (final) : N. Lat. 22° 20' 18.42"; E. Long. 97° 54' 20.54"

Frequency

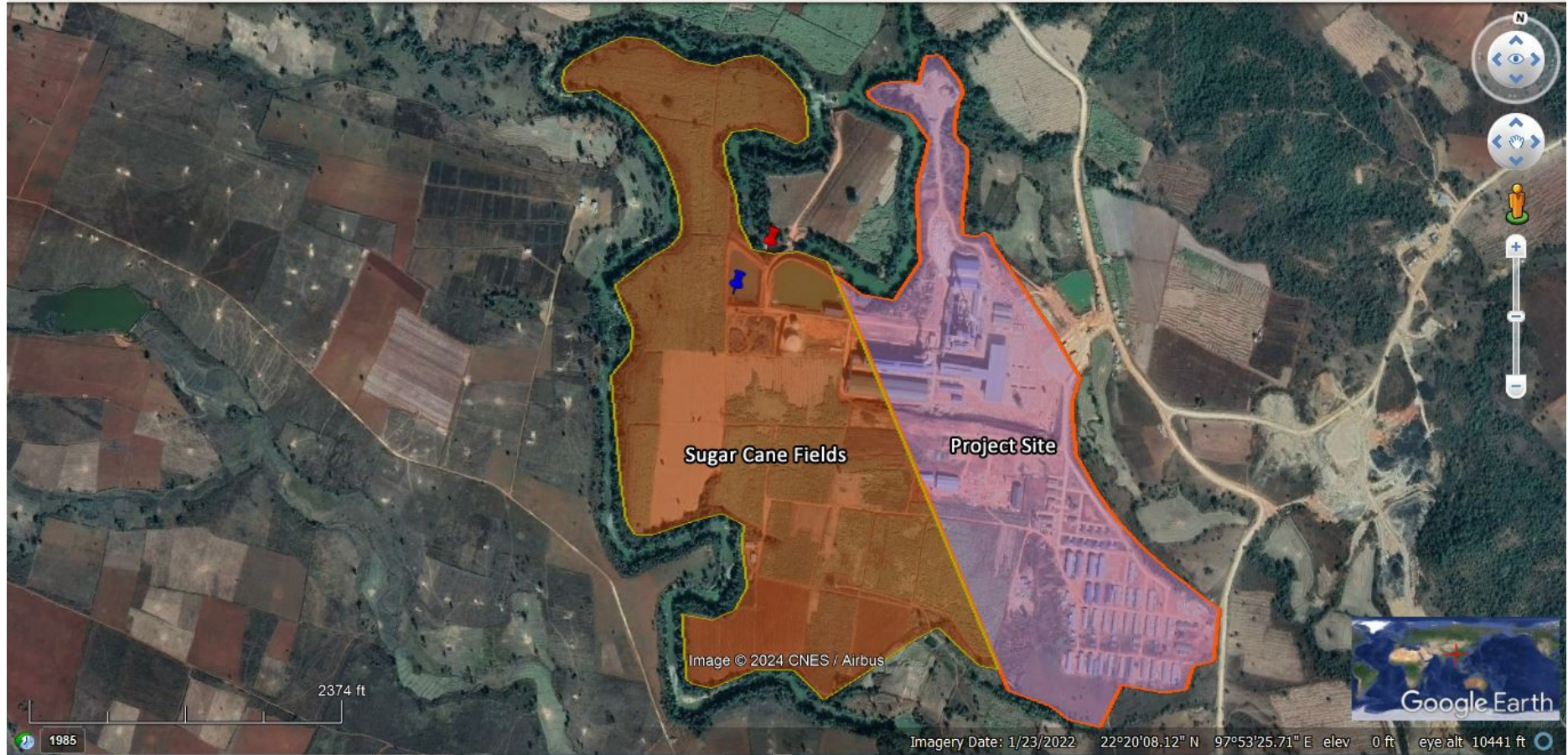
- Semi-annual (have to hire technicians for analysis.)
- Also monitor effectiveness of mitigation measures taken.

Budget and responsibilities

Budget : Ks 400,000 (once off cost)

Responsibilities

Hired technicians and EMP cell members.



LEGEND

 Waste water pond (final)

 Discharge water

Figure – 119: Satellite image showing points of waste water and storm water for monitoring sub-plan (Operation Phase)

5. Sub-plan for Air quality

Objectives

- To prevent pollution of air environment.
- To mitigate/reduce air emission and air pollution and control air quality as practical as possible to create a healthy environment for all in the area.

Legal requirement

- Comply with NEQEG (emission) guideline 2015; Code No.1.1 prescribed by ECD.

Overview maps, layout maps, images, aerial photos, satellite images

- These are already shown earlier in chapter 4, fig. 5, 6, 8, 9, 10; chapter 5 fig. 34, 35, 47, 48; chapter 8, fig. 80, 81 and will not be repeated here.

Implementation schedule

This sub plan will be implemented during the Operation Phase

Management action

- Apply wet scrubber method; water dozing and lime water dozing.
- Install bag filters system; also install induced fan unit.
- Ensure complete combustion of bagasse.
- Avoid open burning of any trash, debris.
- Keep equipment, vehicles well-operated, well-maintained and well-lubricated to reduce smoke.
- Spray water for suppression of dust.
- Provide PPE, face mask where necessary.
- Plants fast growing trees to sequesterate CO₂ and trap dust.
- Conduct regular monitoring; hire technicians.
- Daily overall visual inspection of smoke and dust.
- Implement GRM so that locals can file complaint about smoke and dust.

Monitoring plan

- Parameter to be monitored: for air quality, NO₂, SO₂, PM₁₀, PM_{2.5}, O₃ for emission, cadmium thallium, total organic compound (compare with NEQEG guideline).

Monitoring point:

- Factory: the coordinates: N. Lat. 22° 20' 19.7" and E. Long. 97° 54' 41.5"
- Na Long village: the coordinates: N. Lat. 22° 18' 03.8" and E. Long. 97° 55' 39.0"
- Hsen Taw village: the coordinates: N. Lat. 22° 19' 34.9" and E. Long. 97° 54' 46.9"

Frequency

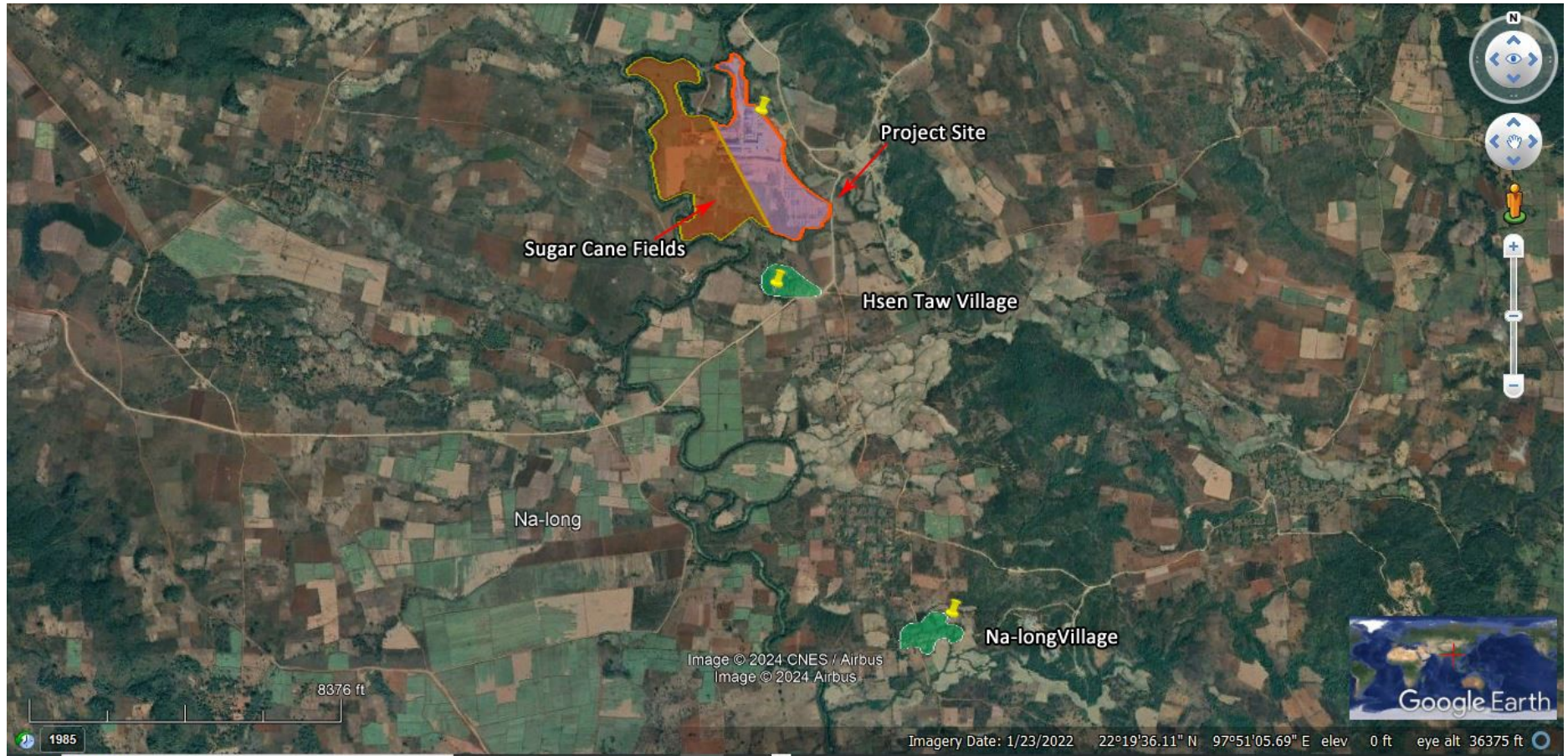
- Semi-annually (have to hired technicians).
- Visual inspection of condition; weekly.
- Also monitor effectiveness of mitigation measures taken.

Budget and responsibilities

Budget : Ks 5,100,000 (once off cost)

Responsibilities

Hired technicians and EMP cell members.



LEGEND

 **Measuring points of air quality**

Figure – 120: Satellite image showing points of air quality for monitoring sub-plan (Operation Phase)

6. Sub-plan for Odour

Objectives

- To prevent pollution of air environment.
- To mitigate and minimize bad odour and create a healthy environment for workers and locals.

Legal requirement

- Comply with NEQEG (emission) guideline 2015; Code No.1.4 prescribed by ECD.

Overview maps, layout maps, images, aerial photos, satellite images

- These are already shown earlier in chapter 4, fig. 5, 6, 8, 9, 10; chapter 5 fig. 34, 35, 47, 48; chapter 8, fig. 80, 81 and will not be repeated here.

Implementation schedule

This sub plan will be implemented during the Operation Phase

Management action

- Manage malodorous odour by all means.
- Avoid and prevent organic overloading of waste water pond.
- Install screen or trap to retain and remove particulate organic matter before entry into the sedimentation pond and waste water pond.
- Mechanically remove sediment or sludge at waste water pond monthly and deposited at landfill.
- Mechanically remove large quantity of ash in ash pond and use as fertilizer or give away to local sugar cane planters.
- Apply lime powder at waste water pond weekly (chemical treatment).
- Avoid dumping of any other wastes into waste water pond and ash pond.
- Ensure that work places e.g. at processing plant are well-ventilated (mild odour is emitted from such work place).
- Provides adequate PPE, nose and mouth covers to workers exposed to long hours of odour regardless of tolerable odour or non-tolerable (malodorous odour).

- Plant fast growing trees around the factory to control spread of odour.
- Weekly inspect waste water pond and ash pond to ensure that there is no intolerable smell and malodorous odour is mitigated.
- Wash down milling area and processing area daily.
- Check the waste water and ash water daily for any smell or intolerable smell (olfactory testing by smelling).

Monitoring plan

- Monitor works inside the milling plant.
- Monitor works inside the processing plant.
- Monitor the storage pond of molasses, ash pond and waste water pond.
- Monitor the mitigation measures taken and their effectiveness.

Monitoring point:

- Waste water pond (final) : N. Lat. 22° 20' 18.42"; E. Long. 97° 54' 20.54"

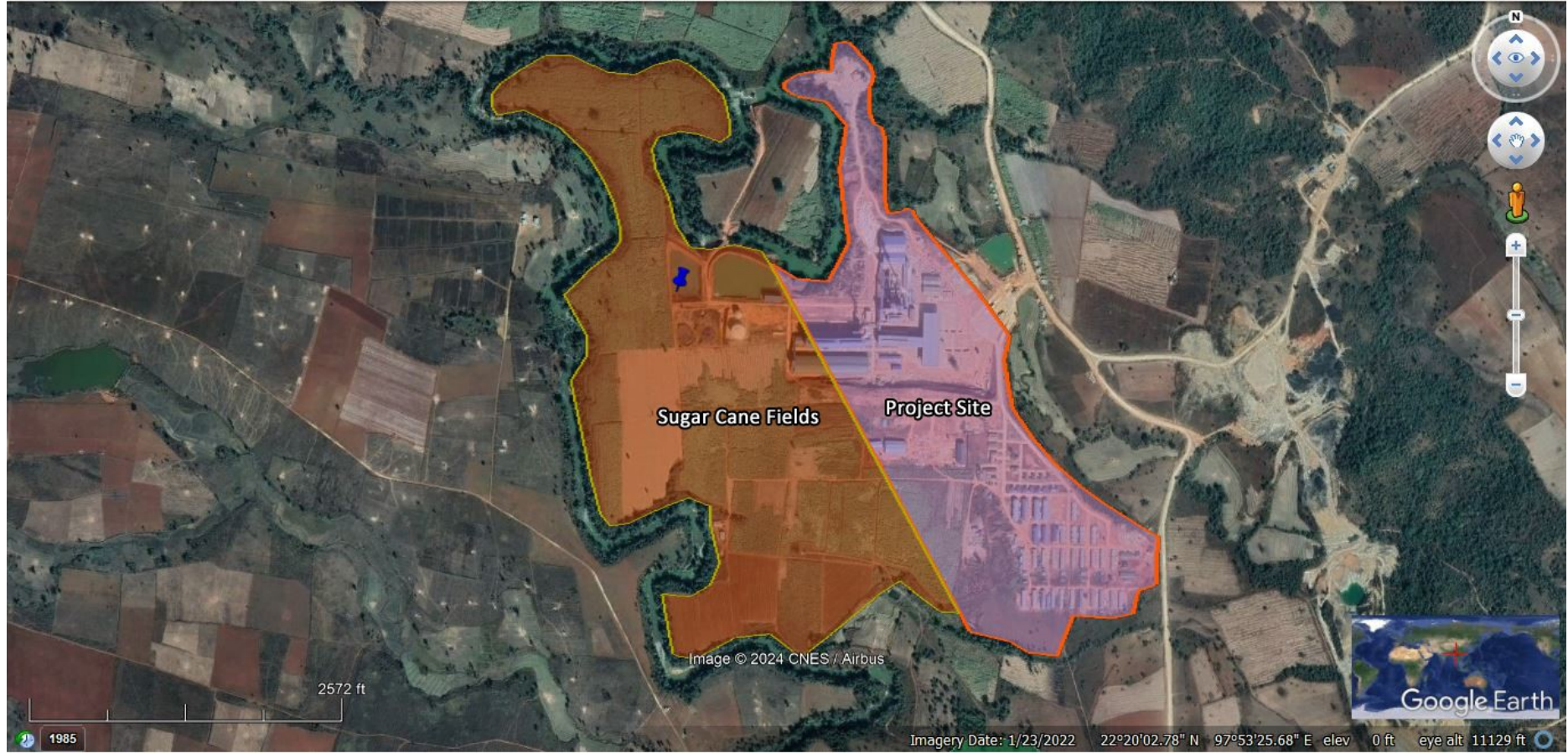
Frequency – Daily and weekly as required.

Budget and responsibilities

Budget: Ks 300,000

Responsibilities

Hired technicians and EMP cell members.



LEGEND

-  Waste water pond (Odour)

Figure – 121: Satellite image showing points of odour for monitoring sub-plan (Operation Phase)

7. Sub-plan for Chemical

Objectives

- To manage the storage, handling and uses of chemical in eco-friendly way, to avoid or prevent any chemical hazards.

Legal requirement

- Comply with Prevention of Hazards from chemical Substances Law, 2013; abide strictly to safety transportation, storage, handling and uses of chemicals, safety equipment and PPE, uses of MSDS and Pictogram.

Overview maps, layout maps, images, aerial photos, satellite images

- These are already shown earlier in chapter 4, fig. 5,6,8,9,10; chapter 5 fig. 34,35,47,48; chapter 8, fig. 80,81 and will not be repeated here.

Implementation schedule

This sub plan will be implemented during the Operation Phase

Management action

- Manage for safety transportation and storage of chemical.
- Keep a separate chemical store (concrete floor, brick walling, iron roofing, structural integrity suitable as chemical store). The chemical store is inside the sugar factory 2 compound as chemicals will be shared.
- Kept MSDS for some e.g. sulphur powder, phosphoric acid, tri-sodium phosphate, provide pictogram.
- Manage for safety handling and use of chemicals.
- Used chemical bottles and containers to be regularly deposited at the landfill.

Monitoring plan

- Monitor the chemical store monthly; ensure that both and containers are kept systematically; (MSDS sheets, pictogram).
- Monitor the handling and use of chemicals.

Monitoring points :

- At chemical store coordinate: N. Lat. 22° 20' 19.28"; E. Long 97° 54' 43.03"
- At processing plant, coordinate: N. Lat. 22° 20' 14.43"; E. Long 97° 54' 33.73"

Frequency

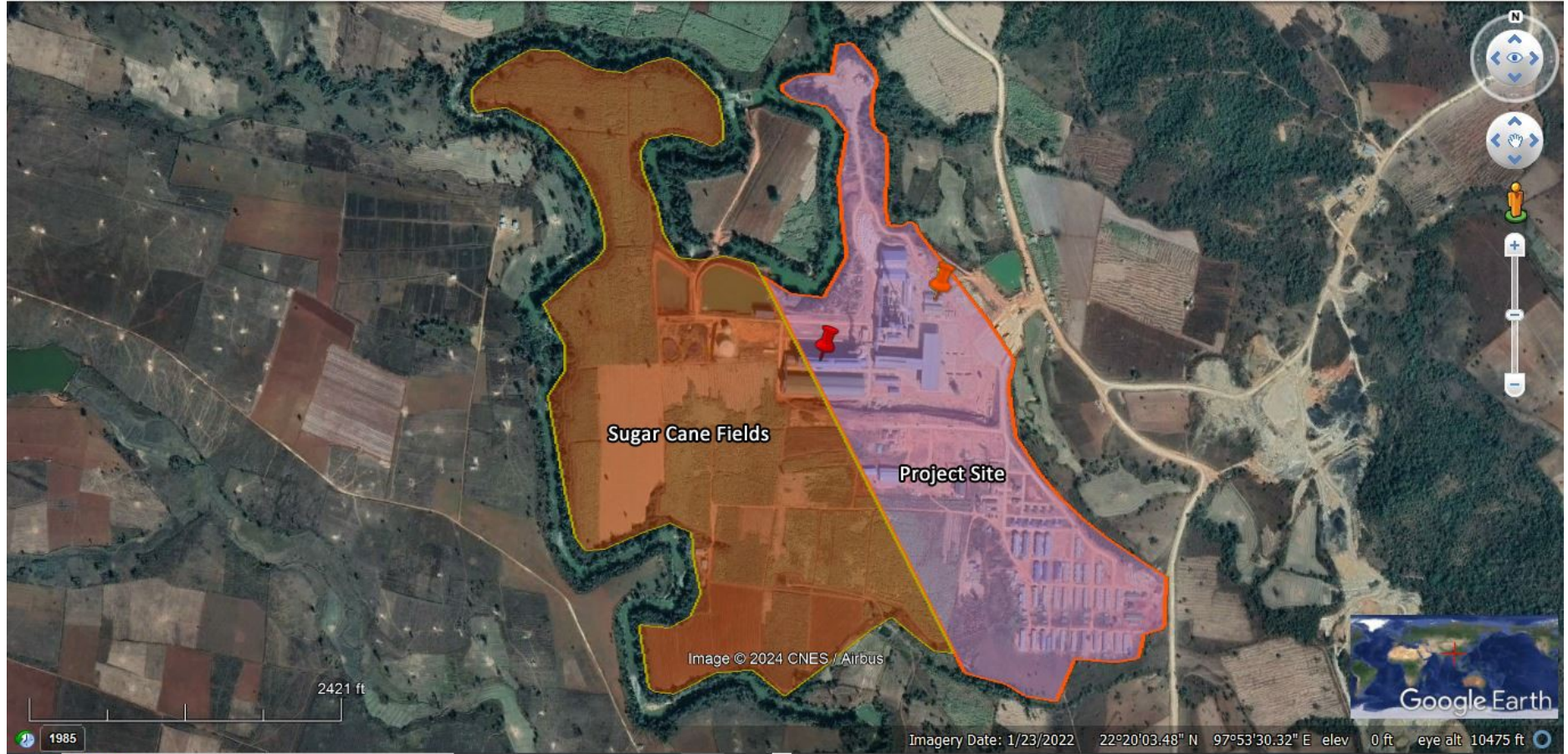
- weekly, monthly.
- Also monitor effectiveness of mitigation measures taken.

Budget and responsibilities

No separate budget for procuring chemicals for EMP purpose; all are borne by the main budget.

Responsible

EMP cell members.



LEGEND

 processing plant

 chemical store

Figure – 122: Satellite image showing points of chemical for monitoring sub-plan (Operation Phase)

8. Sub-plan for Water quality

Objectives

- To prevent pollution of surface water (ground water is not sourced; no tube well).
- To control/manage water quality and quantity, not to pollute the water environment.
- Not to cause any negative impact on water resources of the local community.

Legal requirement

- Comply with National Drinking Water Quality Standard guidelines, 2019.

Overview maps, layout maps, images, aerial photos, satellite images

- These are already shown earlier in chapter 4, fig. 5,6,8,9,10; chapter 5 fig. 34,35,47,48; chapter 8, fig. 80,81 and will not be repeated here.

Implementation schedule

This sub plan will be implemented during the Operation Phase.

Management action

- Ensure that no waste (solid, liquid) are disposed/dischARGE into the Nant Laung stream.
- Apply recirculation water system (cooling tower and series of cooling ponds systems).
- Create systematic drainage system in the first place.
- Wash equipment and vehicle in designated areas.
- Avoid disposal of any waste into stream.
- Avoid accidental spills of fuel oil into the stream by all means. (Also avoid spills on ground; should spill occur do not wash down with water but use absorbents)
- Set up fuel drip trays and bund at fuel depot to protect soil and hence water.
- Maintain machinery and vehicles to prevent spills or leaks.
- Manage water conservation; reduce water consumption, educated workers for this; ensure that the daily/weekly uses are within the work frame.
- Test water quality semi-annually. (hired technicians)
- Conduct weekly visual inspection of water condition.

Monitoring plan

Parameter to be monitored: Total coliforms, Fecal coliforms, Turbidity, Arsenic, Lead, Nitrate, Manganese, Chloride, Hardness, Iron, P^H, Sulphate, Total Dissolved Solids.

Also monitor quantity of water used and quantity of recycled daily and weekly.

Monitoring point:

Na Long village, coordinate : N. Lat. 22° 18' 02.7"; E. Long. 97° 55' 38.1"

Hsen Taw village, coordinate : N. Lat. 22° 19' 39.5"; E. Long. 97° 54' 50.2"

Four points along the Nant Laung Chaung, Coordinates:

Point St.1 : N. Lat. 22° 20' 37.72"; E. Long. 97° 54' 32.50"

Point St.2 : N. Lat. 22° 20' 10.1"; E. Long. 97° 54' 11.0"

Point St.3 : N. Lat. 22° 20' 00.0"; E. Long. 97° 54' 22.4"

Point St.4 : N. Lat. 22° 19' 46.53"; E. Long. 97° 54' 39.37"

Frequency

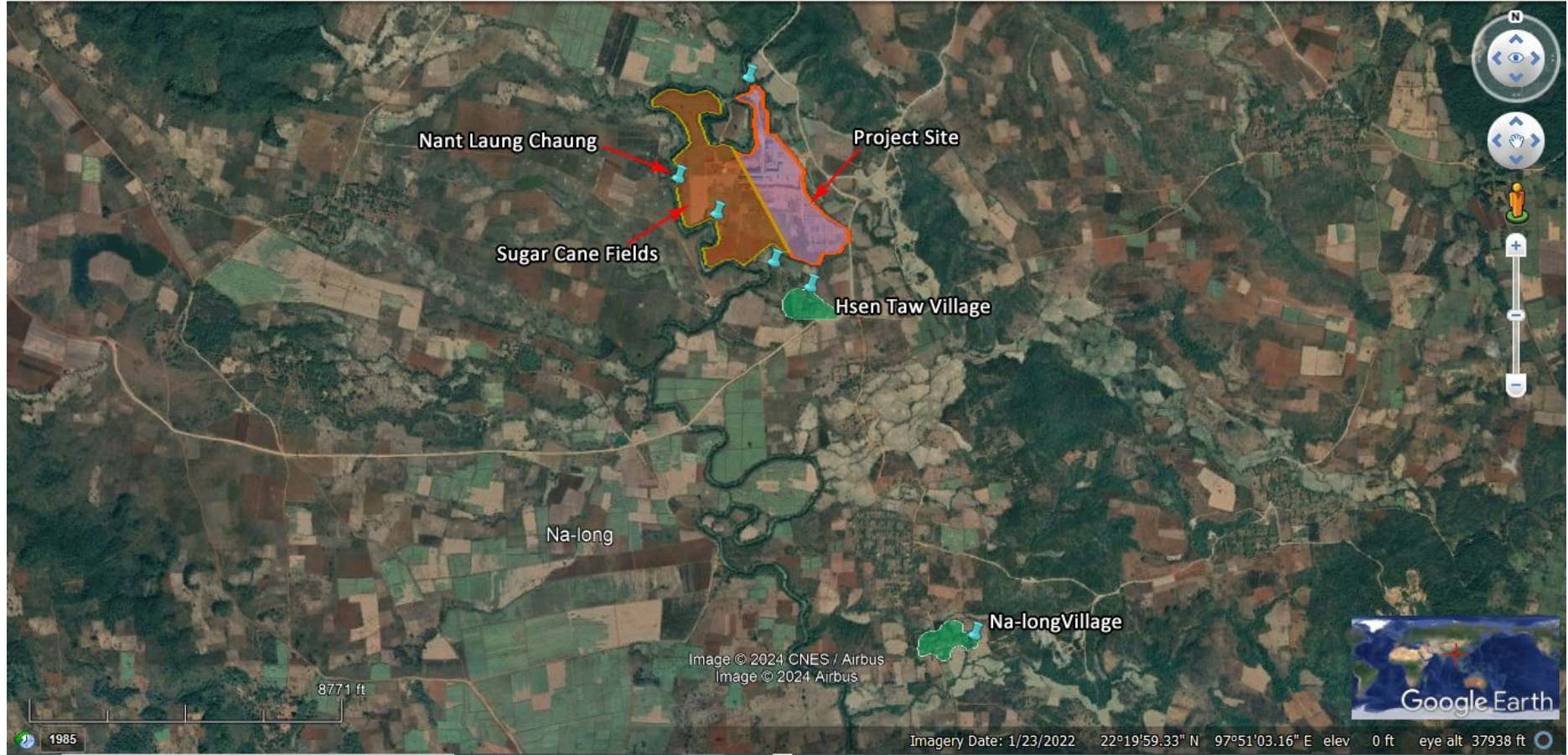
- Semi-annually (have to hired technicians).
- Visual inspection of water condition; weekly.
- Also monitor effectiveness of mitigation measures taken.

Budget and responsibilities

Budget : Ks 800,000 (once off cost)

Responsibilities

Hired technicians and EMP cell members.



LEGEND

 **Water Quality**

Figure – 123: Satellite image showing points of water quality for monitoring sub-plan (Operation Phase)

9. Sub-plan for Erosion and sedimentation

Objectives

- To avoid, prevent, manage and mitigate potential erosion and sedimentation.
- To maintain natural ecology as far as possible.

Legal requirements

- Comply with Environmental Conservation Law (2012) and Environmental Conservation Rules (2014); not to cause destruction of soil structures and profile, and conservation of soil ecology.

Overview maps, layout maps, images, aerial photos, satellite images

- These are already shown earlier in chapter 4, fig. 5,6,8,9,10; chapter 5 fig. 34,35,47,48; chapter 8, fig. 80,81 and will not be repeated here.

Implementation schedule

This sub plan will be implemented during the Operation Phase.

Management action

- Implement erosion control/management when the natural slope is more than 20°. (actually not necessary in this context)
- Ensure that activities do not impact soil structure.
- Minimize the area of bare soil exposed as practical as possible (do not clear the vegetation more than necessary leaving large area of bare land).
- Create sound drainage system; the factory compound has a network of drainage.
- Run-off from areas adjacent to the site will be diverted (construction of small diversion canal/drainage).
- Control sediment if necessary, inside the compound.
- Ensure that run-off from the site is discharged at non-erosive velocities; discharge will be to location that do not adversely impact the natural flow of the stream.
- Ensure that the soil profile of the site is stable and not easily eroded.
- Regularly monitor erosion. (rainy season)

Monitoring plan

- Regular visual inspection of ground and soil condition.

Monitoring point:

- inside the factory premise, coordinate: N. Lat. 22° 20' 19.14"; E. Long 97° 54' 23.42"

Frequency

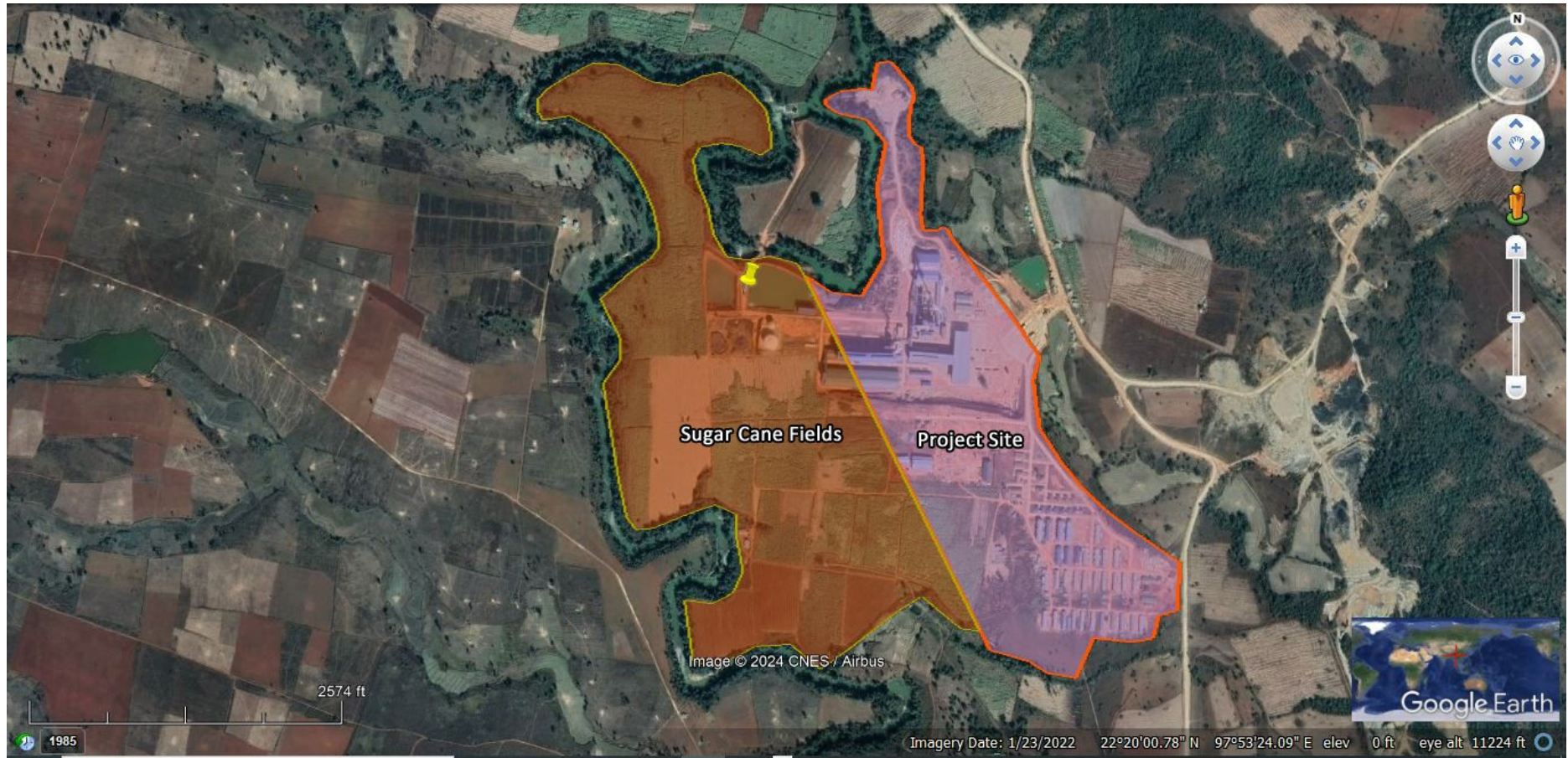
- weekly during the rainy season (wet months) and monthly during the dry months.
- Also monitored effectiveness of mitigation measures taken.

Budget and responsibilities

Budget: Free for charge. (All EMP cell leader and EMP cell members are well-paid employees of the factory; no extra fees for them; no EMP contractor exist in Myanmar yet for hire).

Responsible

EMP cell leader and EMP cell members.



LEGEND

-  Erosion and sedimentation (Waste water pond)

Figure – 124: Satellite image showing points of erosion and sedimentation for monitoring sub-plan (Operation Phase)

10. Sub-plan for Biodiversity

Objectives

- To protect and conserve the biodiversity of the area as far as possible.

Legal requirement

- Comply with Conservation of Biodiversity and Protected Areas Law, 2018; not to impact or destroy natural habitats and biological ecosystem.

Overview maps, layout maps, images, aerial photos, satellite images

- These are already shown earlier in chapter 4, fig. 5,6,8,9,10; chapter 5 fig. 34,35,47,48; chapter 8, fig. 80,81 and will not be repeated here.

Implementation schedule

This sub plan will be implemented during the Operation Phase.

Management action

- (There is no forest but only fields and farms in the area).
- Plan for minimum disturbance to the small flora and fauna.
- Do not clear vegetation such as grass and herbs more than necessary.
- Avoid open burning of debris.
- Educate workers for fire awareness and protection; get rid of all debris that can cause fire.
- Restrict vehicular movement to the access road to prevent habitat disturbance of birds and small animals.
- Prevent the potential injury or death of small wild life due to vehicular movements especially during night time.
- Avoid the use of excessive bright light for long hours at night to prevent the aggregation and eventual death of large number of insects.
- Plant trees, create green belt; establish a plant nursery near the end of the Operation Phase for major rehabilitation of the site; implement rehabilitation to promote natural vegetation establishment and greening of the area.
- As regard aquatic biodiversity, the company is not in a position to undertake the conservation of the aquatic biodiversity in Nant Laung stream. Fish is almost non-existence in this stream. (The company will provide fund for any one who is interested in the conservation of aquatic organisms of this stream.)
- The company will ensure that the stream is polluted by the activities of the factory. (No dumping of solid and liquid waste, no spilling of fuel oils.

Monitoring plan

- Monitoring the situation of flora and fauna in the surrounding area (both natural and artificial flora and fauna).
- Monitor the planting of trees and greening of the area.

Monitoring point: the whole surrounding area where flora, fauna exist.

Frequency

- Quarterly (during dry season, wet season, cool season)
- Also monitor the effectiveness of mitigation taken for biodiversity.

Budget and responsibilities

Budget: Free for charge. (All EMP cell leader and EMP cell members are well-paid employees of the factory; no extra fees for them; no EMP contractor exist in Myanmar yet for hire).

Responsible

EMP cell leader and EMP cell members.

11. Sub-plan for Occupational Health and Safety (OHS)

Objectives

- To prevent workers from any occupational health risks and accidents; to create a safety working atmosphere for workers.
- To provide free Medicare for workers.

Legal requirement

- Comply with Occupational Health and Safety Law, 2019; Prevention and Control of Communicable Diseases Law, 1995; to ensure for a healthy and productive workforce for successful implementation of the project.

Overview maps, layout maps, images, aerial photos, satellite images

- These are already shown earlier in chapter 4, fig. 5,6,8,9,10; chapter 5 fig. 34,35,47,48; chapter 8, fig. 80,81 and will not be repeated here.

Implementation schedule

This sub plan will be implemented during the Operation Phase.

Management action

- All staff/workers must pass a medical examination prior to employment.
- Plan and manage for creation of a safe working environment, (safe working place and working condition for all staff,
- Provide adequate portable drinking water lavatory facilities.
- Provide healthy living space (housing) and clean eating areas.
- Provide sufficient natural light or artificial illumination and good ventilation system.
- Create emergency exist.
- Workers are providing with PPE, where necessary, to ensure basic health protection and safety.
- Set up a factory clinic. (The company has one.)
- The sick and injured workers will be treated at the factory's clinic; seriously sick and injured workers will be promptly given First Aid treatment and immediately admit to the nearest hospital, Mong Yai hospital.
- Provide First Aid training for some workers with the assistance of the Township Fire Brigade.

- Provide Occupational Health and Safety training; training for good safety practice (preventing accidents, injuries), basic hazard, awareness and site specific hazards training for safety handling and operation of machines, chemicals and fuel oil.
- Conduct annual medical checkup for all workers.
- Conduct vaccination for COVID-19 pandemic with the assistance of Township Health authority or hire personal form a Private Health Organization/Private Hospital to do this. (for all workers as well as their families)
- Implement immunization programme for all workers children (polio, tetanus, diphtheria, whooping cough, etc.) with the assistance of Township Health Authority.
- Take out life insurance for all staff and workers; also insurance for factory and for fire.
- Will liaise with the Township Health Authority regularly for their instructions and advices. (All these will be implemented when the factory is in operation.)

Training

- Induction training (new task employee training) for workers covering: knowledge of materials, equipment, equipment, tools, known hazards int the operation and control; potential to risk and precaution; hygiene requirement; wearing of PP; appropriate/emergency response to accident, to natural disaster.
- Education and training for safety handling and operation of machinery, equipment; safety storage, handling and uses of chemical, fuels, etc.
- Provide OHS training for all staff; educate and train them for good working practice, good safety practice, good housekeeping practice, good health and hygiene practice, until these good practices ingrained into their mindsets and become good habits.
- Provide fire fighting training and First Aid training. (Already done)

Physical Hazards

- Design all machine to eliminate trap hazards; extremities (hands, fingers) are kept out of harm way during operation; avoid machinery accidents by all mean.
- Ensure that no worker is exposed to noise level greater than 85-90 dBA. (Provide ear muffs, ear plugs)
- Avoid, prevent whole body vibration and hand-arm vibration. Reduce working hours for high level noise and vibration works.

Electrical

- Use new electric cords, cables, devise and equipment; regularly check them for faults.
- Make all electrical devise and lines with warning signs.

Hot work

- Provide PPE, e.g. protective suits including insulation gloves and boots to workers working near kiln.

Air quality

- Ensure that not worker is exposed to dust for long hours; check and improve air quality; ensure that working places are well-ventilated; install fans.

Eyes hazards

- Provide goggle or face mask where necessary, provide eye wash station sink for emergency washing of eyes.

Industrial driving and site traffic and outward traffic

- Train operator in the safe operation of excavators, dozers, cranes and forklifts, etc.

Ergonomics, repetitive motions and manual handling

- Ensure that workers are not subjected to excessive repetitive movement, over extortion and excessive manual handling to prevent strain, sprain and injuries.
- Use mechanical labour rather than manual labour; apply automation system as far as possible.

Potential chemical hazards

- Large quantity of chemicals has to be used in mass production of sugar.
- Educate train and supervise staff for safety storage, handling and application of chemicals.
- Label all chemicals (pictogram); keep MSDS for hazardous ones.

Fire and explosion

- Fuel and flammable storage in secured spots. (safety fuel depot)
- Store flammable away from ignition sources and oxidizing materials.
- Store explosive in maximum security magazine.
- Specialized training for storage, handling and uses of explosive.
- Keep fire fighting trucks (the company has two), adequate fire extinguishers, equipment, (fire fighting pond to be always full of water).
- Define and label warning signs for all fire hazards and explosion hazards area.

PPEs

- Provide adequate PPEs; e.g. face masks, mouth and noise covers to workers to dust; ear muffs/ear plugs to workers to high noise level; provide helmets, out fits, gloves, goggles, boots, etc. where necessary.

Monitoring plan

- Regular monitoring and of work places and working condition.
- Regular inspection of factory's clinic; monitor log book on accident, injuries sickness; number of patients treatment at clinic and admitted to hospital.
- Inspection of medicines and drugs; refill where necessary.
- Monitor First Aid training.

Parameter to be monitored: working conditions, overall occupation health and safety condition.

Monitoring point

- At all time work places, inside the factory; N. Lat. 22° 20' 14.21"; E. Long. 97° 54' 34.71"

Frequency

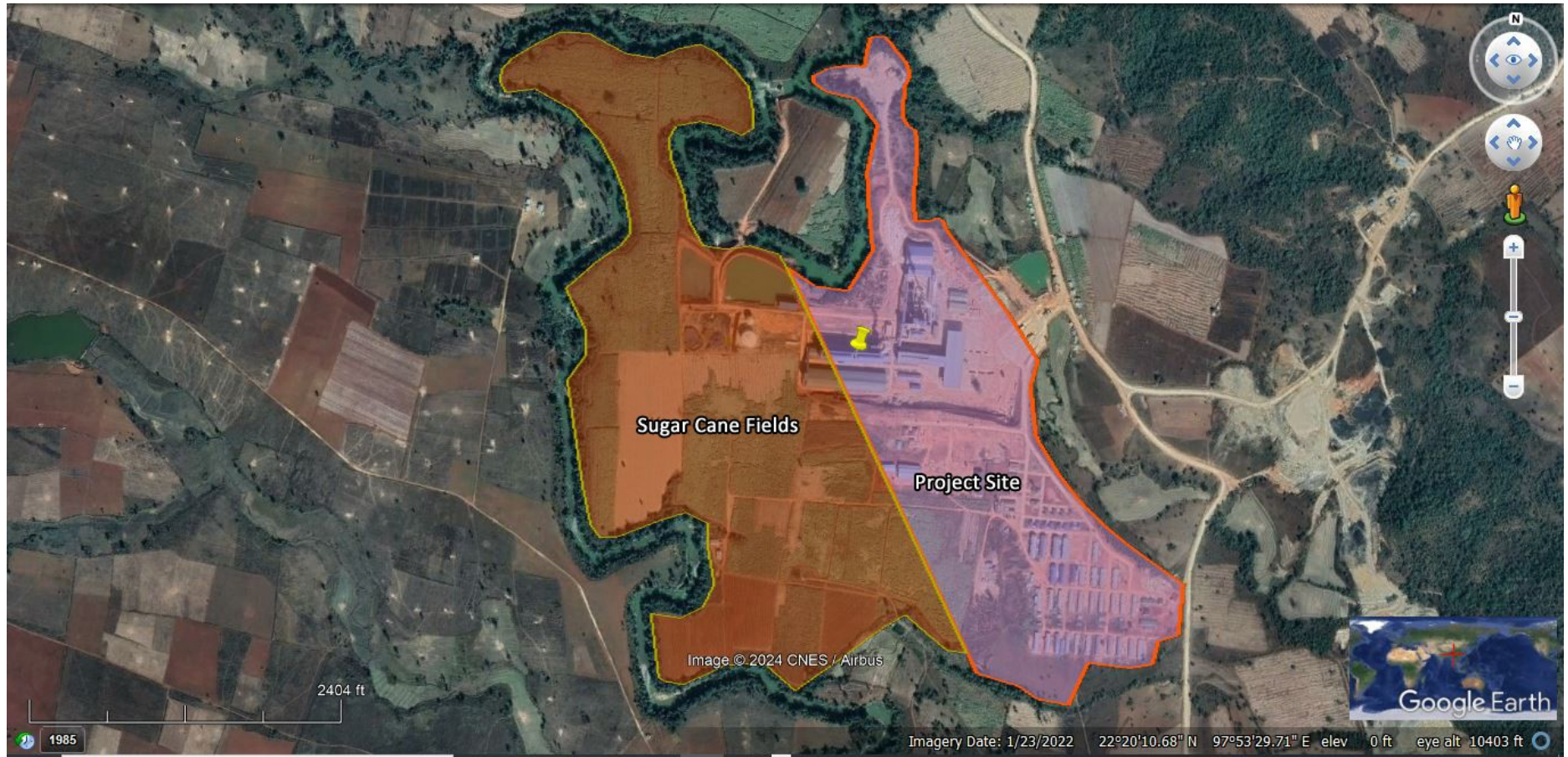
- Daily and weekly.
- Also monitor effectiveness of mitigation/coorrective measures taken.

Budget and responsibilities

Budget: Ks 10,000,000 costs for provision of medicines and drugs and First Aid Facility at factory clinic for one year. (This will be from the allotted EMP fund where 10% of the fund under emergency programme).

Responsibilities

The two nurses and EMP cell members.



LEGEND

 Occupational Health and Safety

Figure – 125: Satellite image showing points of occupational health and safety for monitoring sub-plan (Operation Phase)

12. Sub-plan for Community Health and Safety

Objectives

- To ensure that the activities of the project do not have any adverse effect on the health and safety as well as social well-being of the local community.

Legal requirement

- Comply with Myanmar Public Health Law, 1972; and Prevention and Control of Communicable Diseases Law, 1995, the Environmental Conservation Law, 2012 and the Environmental Conservation Rules, 2014.

Overview maps, layout maps, images, aerial photos, satellite images

- These are already shown earlier in chapter 4, fig. 5,6,8,9,10; chapter 5 fig. 34,35,47,48; chapter 8, fig. 80,81 and will not be repeated here.

Implementation schedule

This sub plan will be implemented during the Operation Phase.

Management action

- Control smoke and dust as practical as possible; avoid open burning of debris and trash so that smoke will not reach the village; educate the driver to lower speed when passing near or through the village (the reduction of speed from 40 km to 35 km can reduce dust to 50%, it is learnt).
- Local should be able to file complaints regarding dust, noise and vibration (through GRM system).
- Ensure that the water ponds do not become breeding ground for mosquitoes; regularly changing of water; application of mild chlorination; annihilation of mosquito larvae by all means; educate workers to use mosquito's nets at night and provision of mosquito nets.
- Also ensure that domestic solid wastes, liquid waste water and drainage do not become breeding ground for flies, mosquitoes and insect for prevention of vector borne diseases and water borne or waste related disease.
- Prevent the occurrence and spread of infectious and communicable diseases by all means; undertake health awareness and educations initiative (health education campaign) in local community as far as possible. The clinic at the site also provides health care for locals as practical as possible.
- Avoid/minimize by all means, vector borne, water borne (water based, water related) disease and communicable diseases that would result from project activities. Liaise with Township Health Authority regularly.

- Avoid/minimize by all mean spread of diseases from workers. Educate long distance truck driver regarding sex education; example for use of prophylactic condom; prevent spread of STD, HIV/AIDS.
- Educate workers regarding code of conducts, social conducts, etiquette and local culture and tradition.
- Educate drivers for safe driving and defensive driving and to comply with rules and regulation regarding traffic; also conduct road safety education campaign for the local community, if possible; locals should be able to file complaint regarding traffic (through GRM system).
- Comply with law and regulation relevant to transportation of hazardous materials such as fuel oils; also plan for measures for preventing and/or mitigation the consequence of accidental release/spill of (fuel oil); avoid/minimize community exposure to hazardous materials.
- Develop emergency preparedness and emergency response plan and contingency plan (action plan) for effective implementation when necessary; provide operation manuals for external emergency plan and internal emergency plan for all workers and if necessary also to local community and government inspector. Conduct rehearsals or drills for such plan. Cooperation with local community and authority in preparation of emergency plan.

Monitoring plan

- Monitor the overall health condition of the two nearby villages; (Hsen Taw and Na Long) occasional inquiry of the health issues of the villagers at two villages, providing health education, giving health education lectures.

Parameter to be monitored: overall health situation of the locals.

Frequency – Annually (with the help of personnel from Mong Yai Township Health Department).

Budget and responsibilities

Budget: Ks 20,000,000 – cost for fees or courtesy gifts to the Township Health Department personals who will be give health educative speeches and lectures (The expense will be from the allotted EMP fund, where 7% of the fund under capacity building and training).

Responsibilities

EMP cell members and personals from Township Health Department (who will be requested to help execution of Community Health and Safety programme).

13. Sub-plan for Cultural heritage

Objectives

- Not to have any adverse impact on the cultural/religious heritage (monasteries and pagodas and churches) in the area due to activities of the project.

Legal requirement

- Comply with "The protection and preservation of Cultural Heritage Region Law", 2019; "the Protection and Preservation of Ancient Monument Law", 2015; protect the religious component of the surrounding area.

Overview maps, layout maps, images, aerial photos, satellite images

- These are already shown earlier in chapter 4, fig. 5,6,8,9,10; chapter 5 fig. 34,35,47,48; chapter 8, fig. 80,81 and will not be repeated here.

Implementation schedule

This sub plan will be implemented during the Operation Phase.

Management action

- Ensure that factory activities have no negative impact on nearby village, village monastery. (Na Long village)
- Monitor the situation bi-monthly; conduct visual inspection of the said monastery.
- Pay courtesy visit (obeisance visit) occasionally the abbot monks of that one monastery and offer cash and kinds.
- Try to build good and cordial relation with locals communities.
- Get involve in religious festivals; provide donation.

Monitoring plan

- The Buddhist monastery (Na Long village).

Frequency – Occasionally, especially during religious festival days.

Budget and responsibilities

Budget: appropriate Ks 2,500,000 per year for donations and charities for the above mentioned monasteries. The money will be from CSR programme fund, not EMP fund.

Responsibilities

The factory manager and EMP cell members.

14. Sub-plan for Employment and Training

Objectives

- To prioritize employment of the locals as practical as possible; to organize induction training and long term professional training.

Legal requirement

- Comply with Employment and Skill Development Law, 2013.

Overview maps, layout maps, images, aerial photos, satellite images

- These are already shown earlier in chapter 4, fig. 5,6,8,9,10; chapter 5 fig. 34,35,47,48; chapter 8, fig. 80,81 and will not be repeated here.

Implementation schedule

This sub plan will be implemented during the Operation Phase.

Management action

- Plan for human resource development.
- Prioritize employing locals as far as possible.
- Organize new task employees for job training.
- Also provide systematic induction training; skill training for efficiency and mandatory training relating to health and safety (e.g. safety operation of machinery and handling of hazardous materials such as fuel.
- Educate and train them for good working practice, good safety practice, good health and hygiene practice and good environmental awareness practice until all these practices are ingrained in their mindsets and become good habits.
- Educate and train them for basic eco-friendly behaviors e.g. good housekeeping practice, do not litter, do not dirty your place, minimize the use of water, fuel.
- More specific training for operation of heavy machinery and specific machinery and equipment and heavy trucks will be organized.
- Review on the effectiveness of training will be done for improvement,
- Overall regular monitoring of activities at the site will be conducted.

Monitoring plan

Monitoring sites: all main work places (inspect/monitor training programme, training course, training in process, work efficiency of workers).

Also monitor the effectiveness of training programme : monthly or every training session.

Budget and responsibilities

- Free of charge (the company's senior staff members, senior technicians and experienced staff will educate train and supervise new workers).
- However, appropriate Ks 2,000,000 (fees and courtesy gifts for trainers and educators from relevant governmental department).

Responsibilities

The factory managers, senior staffs and EMP cell members.

15. Sub-plan for Emergency response

Objectives

- To maintain emergency preparedness and response to any emergency in a systematic and effective way.
- To execute emergency response plan, emergency procedure plan, rescue operation plan, contingency plan and aftermath plan, all in a systematic manner.

Legal requirement

- Comply with the Myanmar Fire Brigade Law, 2015; Factories Act 1951; Occupational Health and Safety Law, 2019.

Overview maps, layout maps, images, aerial photos, satellite images

- These are already shown earlier in chapter 4, fig. 5,6,8,9,10; chapter 5 fig. 34,35,47,48; chapter 8, fig. 80,81 and will not be repeated here.

Implementation schedule

This sub plan will be implemented during the Operation Phase.

Management action

- Prepare Emergency Response Plan (ERP) and team to prevent fatalities and injuries, to reduce damage and to protect environment and community.
- Prepare emergency preparedness plan and execute the plan.
- (Emergency Response Plan will cover emergency resources, emergency preparedness and training, emergency response procedures, administration of the plan, first aid work, rescue operation works, communication and procedures and debriefing and post-traumatic stress procedures.)
- Provide facilities (e.g. fire fighting trucks, time extinguishers, equipment, suit, first aid kits, emergency vehicle).
- The emergency vehicle will be also for timely admission of the seriously injured or sick workers to the nearest Mong Yai Township Hospital. The company will regularly liaise with the health authority of the Northern Shan State, health authority of Mong Yai Township.
- Display phone numbers of Fire fighting Department, Ambulance Services, Red Cross Society, Hospital and Police Station.
- Take out insurance for the factory, fire insurance and also life insurance for workers.
- Review on the effectiveness of training will be done for improvement.
- Regular monitoring of all activities at the project site will be conducted.
- Mock drill for ERP will be conducted, on a regular basic; bi-annually.

For natural disasters (Earthquake, Storm, Flood, etc.)

- Draw up emergency prepared plan and emergency response plan for natural disasters. (The plan will include resources for emergency, training, emergency procedures in rescue operation and first aid treatment, etc.)
- Ensure that all the buildings and structures of the site will be constructed with structural integrity principle in the first place. (That in the buildings/structures are strong and firm and will stand storms, heavy rains, moderate earthquakes and tremors.)
- Educate and train staff/workers including their families and children for basic emergency response for example – (a) for earthquake: duck for cover underneath tables, beds or when the earthquake is too strong rush out of the building and stay in the open; (b) for storm: take shelter in strong and firm building (milling plants, process plants); (c) for flood: move to the higher ground.
- Organize rehearsals or mock drills for emergency response for natural disasters to avoid panic confusion, chaos and disorder. Staff/workers will be systematically assigned their respective duty and delegate duty in case of natural disasters and will perform their duty in a systematic way without confusion and disorder.
- Select a suitable spot to be designated as a reliable shelter in case of natural disasters.
- Provide food, water, medicines and basic necessities at the shelter.
- Excavate important items e.g. office document, cash to shelter.
- Inform the local authority and ask for help from the Township Red Cross Society and Fire Brigade.
- Provide first aid treatment if there is any injured or sick worker and promptly admitted to Mong Yai Township Hospital for serious injuries.
- Undertake rescue operation only when the earthquake really case (follow up quakes can occur, listen to the news); rescue operation for storm can be carry out once. The storm is over; rescue operation for flood may have to be waited until flood water has receded.
- In case of severe earthquake ensure that all injured or dead workers underneath the collapsed buildings are rescued or discovered.
- Conduct debriefing meeting so that all possible lessons are learned from the event; try to improve emergency preparedness and emergency response plan.

Monitoring plan

- Monitor fire fighting training activities during training session.
- Monitor First Aid training activities during training session.
- Also monitor rehearsal or mock drill session for emergency response.

- Monitor activities at main work places such as quarry site, crusher site, in and around the factory especially at kiln site on daily and weekly basis.
- Inspect facilities for emergency preparedness.

Frequency

- Daily or at least weekly at all main work sites, monitoring training only during training session; monitor mock drill only during drill session

Budget and responsibilities

Budget: Ks 14,000,000 set aside for execution of emergency response plan. In case of major accident like major fire budget for emergency will be used mainly for compensation for injured, sick and dead employees; and also for rehabilitation of injured and disabled employees.

No other fees or charges as emergency response plan will be executed by EMP cell members who are all well-paid employees.

Responsibilities

EMP cell leaders, EMP cell members and staff trained for emergency response.

16. Sub-plan for Traffic safety

Objectives

- To ensure for the safety of traffic in the area, especially along the 7 miles access road constructed by the company.
- To avoid traffic congestion along the access road and particularly at the intersection where the access road meets the high way.
- To aim for zero road/traffic accident.

Legal requirement

- Comply with "Vehicle Safety and Motor Vehicle Management Law," 2020; Highways Law, 2000; and all regulation road traffic.

Overview maps, layout maps, images, aerial photos, satellite images

- These are already shown earlier in chapter 4, fig. 5,6,8,9,10; chapter 5 fig. 34,35,47,48; chapter 8, fig. 80,81 and will not be repeated here.

Implementation schedule

This sub plan will be implemented during the Operation Phase. Most are already implemented and on going.

Management action

- Plan for traffic safety; try to achieve zero traffic accident.
- Draw up a traffic management plan (even through the traffic is light in this 10 miles access road).
- Set up signage's for speed limits on access road and public places.
- Schedule the logistic, especially for trucks.
- Avoid over loading trucks; comply with regulation.
- Cover haulage (cement, bags, coal, gypsum etc.) with tarpaulin to prevent spills.
- Educate drivers (heavy truck drivers) for driving at reduced speed and adhere to the principle of defensive driving.
- Educate drivers for complying with traffic and road regulations.
- Provide traffic education, not only for drivers but also for motorcyclists.
- Keep a log book for each vehicle.
- Check the arrival and departure of all vehicles at the site.
- If possible, conduct education campaign for traffic to local communities.

Monitoring plan

- Inspect the condition of the vehicles fortnightly.
- Monitor traffic on the access road on a weekly basis.
- Monitor the daily arrival and departure of vehicle at the factory premise.
- Monitor the log book for each vehicle on a weekly basis. Monitoring point: at the point on the access road outside the factory.

Frequency – Daily, weekly, fortnightly as mentioned above.

Budget and responsibilities

Free of charge. The EMP cell members who are well-paid employees will do this work free of charge.

The costs for vehicular repairs or maintenance will be borne by the main budget, not by the EMP fund.

Responsibilities

EMP cell leaders and cell members.

17. Sub-plan for Aesthetics, potential visual issue

Objectives

- To ensure that the implementation of sugar project does not have any negative impact on the visual component of the area.
- To make sugar factory complex in harmony with the surrounding environs as practical as possible.
- To prevent sight pollution/visual pollution.

Legal Requirement

- Comply with Environmental Conservation Law, 2012 and Environmental Conservation Rules, 2014; not to destroy the environment preserve the natural beauty of the area as practical as possible.

Overview maps, layout maps, images, aerial photos, satellite images

- These are already shown earlier in chapter 4, fig. 5,6,8,9,10; chapter 5 fig. 34,35,47,48; chapter 8, fig. 80,81 and will not be repeated here.

Implementation schedule

This sub plan will be implemented during the Operation Phase. Most are already implemented and on-going.

Management action

- Plan and manage for the operation of the sugar factory which focus on aesthetics appeal.
- Create green lawn, green zone and green belt when Construction Phase is over; plant fast growing trees, shade trees along the periphery of the factory's compound; create green lawn in available space, landscaping for aesthetic beauty purpose, also plant trees outside the compound, along both side of main access roads and other roads.
- Maintain the buildings and structures; repaint annually or bi-annually (do not let the building turning into drab or dull colour).
- Try to keep the site in harmony with its surrounding: (planting of trees will tackle the issue); reserve green area in the vicinity as far as possible.
- Avoid excessive use of bright light at night (sight pollution); white light attracts insects to aggregate and get killed; use yellow light.
- Ensure that the light is not offensive to local community; use light only for security for purpose, not for show.
- Do not direct the lamps/bulbs at the lamp posts outwards (offensive to neighbour and also to wildlife); keep the lamps/bulbs in slanting position.
- Install a bulb at the top the stack to prevent hazards for air planes.

Monitoring plan

- Monitor the maintenance of green belt, green lawn, green landscaping on a fortnightly or monthly basis.
- Monitor the annually or biannually painting of buildings and structures of the factory compound (ensure that offensive paint colour is not used).
- Monitor the situation of lighting the factory compound weekly and monthly (ensure that offensive bright white lights are not used).

Budget and responsibilities

Free of charge. The costs of sitting up plant hatchery, establishment of green belt, green lawn, teak plantation were all support by the main budget (not from EMP fund).

Gardeners who maintain green lawn, green landscape are all well-paid employees, therefore, no more fees expense required.

Responsibilities

EMP cell members who supervise gardeners.

II. During Decommissioning Phase

These issue or component to be managed and monitored during the Decommissioning Phase is much lesser in numbers and smaller in magnitudes. After Operation Phase virtually all activities come to an end.

Management and monitoring sub-plans during decommissioning/Rehabilitation phase

1. Sub-plan for Air quality

Objectives

- To prevent pollution of air.
- To ensure that air quality is not deteriorated after the end of the operation of the project.
- To ensure that ecology of the area is not degraded at the end of the project.
- Ensure that the site remain an environmentally healthy site for the local people.

Legal requirement

- Comply with NEQEG (emission) guideline 2015; Code No.1.1, the Environmental Conservation Law, 2012.

Overview maps, layout maps, images, aerial photos, satellite images

- These are already shown earlier in chapter 4, fig. 5,6,8,9,10; chapter 5 fig. 34,35,47,48; chapter 8, fig. 80,81 and will not be repeated here.

Implementation schedule

This sub plan will be implemented during the decommissioning/rehabilitation phase

Management action

- Try to manage and control all decommissioning works.
- Test the air quality once at the early stage of Decommissioning Phase and test another one for the last time at the end of Decommissioning Phase.
- Ensure that the air quality remain in good condition after the end of the project.
- Monitor decommissioning activities daily and weekly.
- Monitor air quality testing during early phase and monitor for the last time at the end of Decommissioning Phase.

Monitoring plan

- Parameter to be monitored: NO₂, SO₂, PM₁₀, PM_{2.5} and O₃.

Monitoring point:

Factory: the coordinates: N. Lat. 22° 20' 19.7" and E. Long. 97° 54' 41.5"; date: 7-6-2023

Na Long village: the coordinates: N. Lat. 22° 18' 03.8" and E. Long. 97° 55' 39.0"

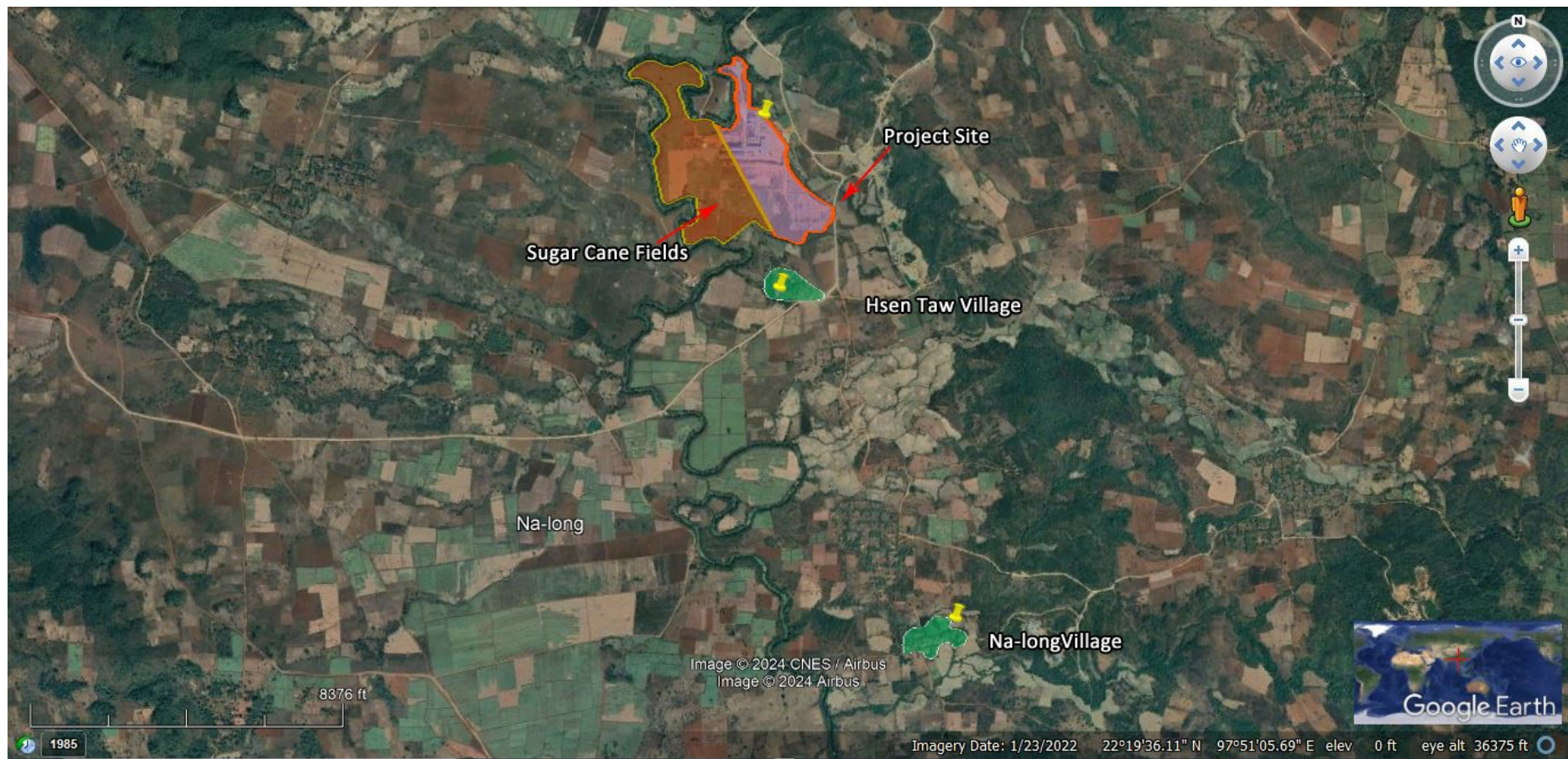
Hsen Taw village: the coordinates: N. Lat. 22° 19' 34.9" and E. Long. 97° 54' 46.9"

Budget and responsibilities

Budget : Ks 5,100,000 (once off cost)

Responsibilities

Hired technicians and EMP cell members.



LEGEND

 **Measuring points of air quality**

Figure – 126: Satellite image showing points of air quality for monitoring sub-plan (Decommissioning Phase)

2. Sub-plan for Water quality

Objectives

- To prevent pollution of water.
- To ensure that water quality at the weir and stream is not deteriorated after the end of the Operation Phase.
- To ensure that the aquatic ecology of the stream is not degraded after the end of the Operation Phase.

Legal requirement

- Comply with National Drinking Water Quality Standard Guideline, 2019.

Overview maps, layout maps, images, aerial photos, satellite images

- These are already shown earlier in chapter 4, fig. 5,6,8,9,10; chapter 5 fig. 34,35,47,48; chapter 8, fig. 80,81 and will not be repeated here.

Implementation schedule

This sub plan will be implemented during the Decommissioning Phase.

Management action

- Test water quality at the beginning of the Decommissioning Phase.
- Test water quality for the last time near the end of the Decommissioning Phase.
- Maintain good housekeeping habit; discarding solid and liquid wastes into the stream by all means.
- Avoid accidental spills of fuel oil into the stream.
- Maintain machinery and vehicles to prevent leaks.

Monitoring plan

- Monitor all decommissioning activities.
- Monitor water quality of the stream.

Parameter to be monitored: Total coliforms, Fecal coliforms, Turbidity, Arsenic, Lead, Nitrate, Manganese, Chloride, Hardness, Iron, P^H, Sulphate, Total Dissolved Solids.

Also monitor quantity of water used and quantity of recycled daily and weekly.

Monitoring point:

Na Long village, coordinate : N. Lat. 22° 18' 02.7"; E. Long. 97° 55' 38.1"

Hsen Taw village, coordinate : N. Lat. 22° 19' 39.5"; E. Long. 97° 54' 50.2"

Four points along the Nant Laung Chaung, Coordinates:

Point St.1	: N. Lat. 22° 20' 37.72"; E. Long. 97° 54' 32.50"
Point St.2	: N. Lat. 22° 20' 10.1"; E. Long. 97° 54' 11.0"
Point St.3	: N. Lat. 22° 20' 00.0"; E. Long. 97° 54' 22.4"
Point St.4	: N. Lat. 22° 19' 46.53"; E. Long. 97° 54' 39.37""

Frequency

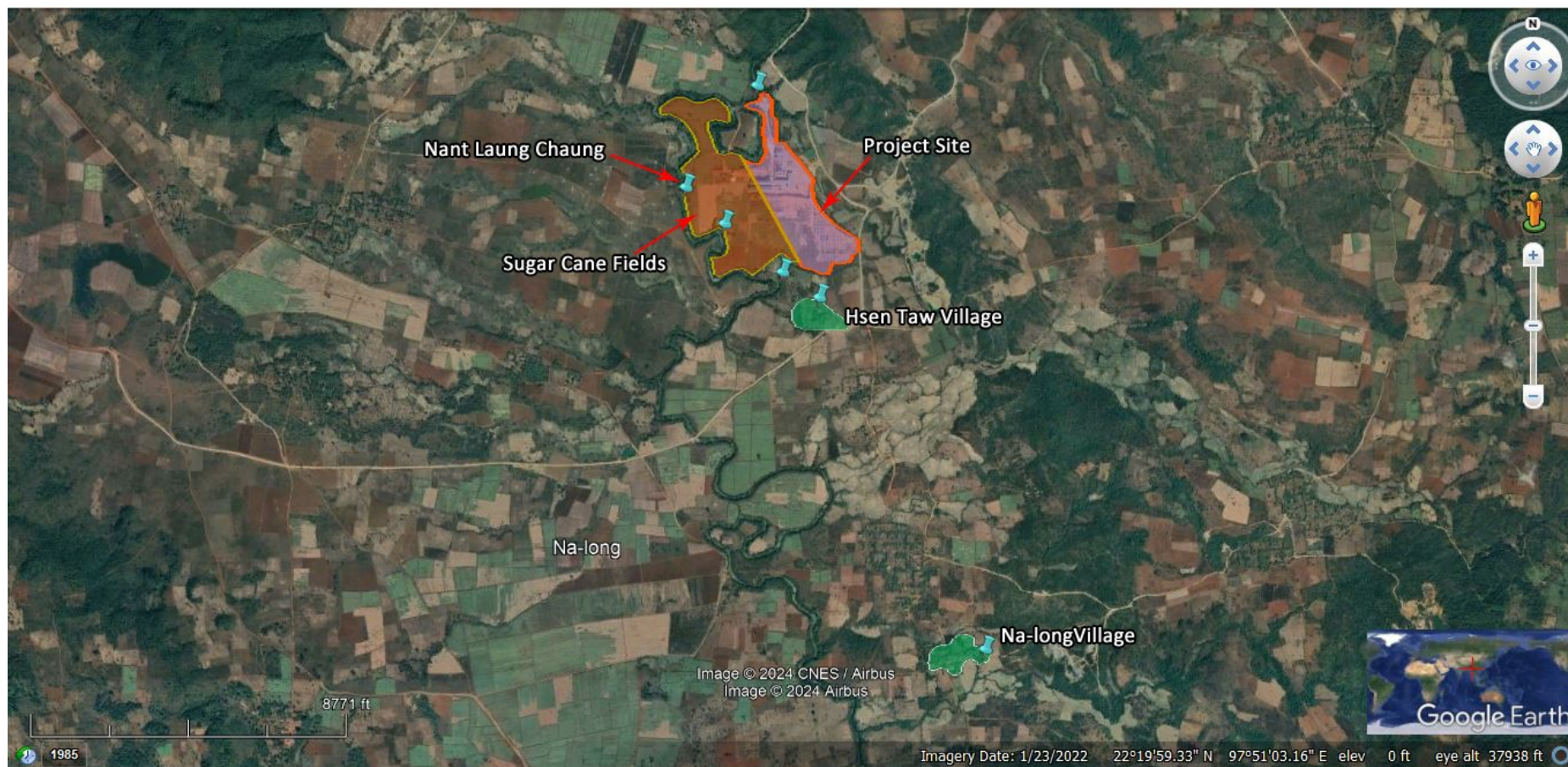
- Once during early Decommissioning Phase.
- Once during the end of Decommissioning Phase.

Budget and responsibilities

Budget : Ks 800,000 (once off cost)

Responsibilities

Hired technicians and EMP cell members.



LEGEND

 Water Quality

Figure – 127: Satellite image showing points of air quality for monitoring sub-plan (Decommissioning Phase)

3. Sub-plan for Soil quality

Objectives

- To prevent contamination of soil.
- To ensure that soil quality is not degraded after Operation Phase of the project.

Legal requirements

- Comply with Environmental Conservation Law (2012) and Environmental Conservation Rules (2014); protect and conserve land environment.

Overview maps, layout maps, images, aerial photos, satellite images

- These are already shown earlier in chapter 4, fig. 5,6,8,9,10; chapter 5 fig. 34,35,47,48; chapter 8, fig. 80,81 and will not be repeated here.

Implementation schedule

This sub plan will be implemented during the Decommissioning Phase.

Management action

- Conduct regular visual inspection of ground and soil.
- Prevent destruction of soil structure during this phase.
- Also prevent contamination of soil such as oil spills or leak; remove spill immediately, if any.
- Level the ground, refill and rake the soil to maintain soil profile and solid condition.
- Ensure that the soil ecology remain intact after the end of the project.
- Test soil quality for the last time; ensure that the site is ecologically restored.

Monitoring plan

- Monitor the decommissioning activities daily or regularly.
- Monitor soil restoration activities weekly or regularly.

Parameter to be monitored : soil quality (with the aid of hired technicians).

Monitoring point:

- The coordinate for Factory: N. Lat. 22° 20' 19.7" and E. Long. 97° 54' 41.5";
- The coordinate for Na Long village: N. Lat. 22° 18' 03.5" and E. Long. 97° 55' 38.7";
- The coordinate for Hsen Taw village: N. Lat. 22° 19' 34.5" and E. Long. 97° 54' 46.6"

Frequency

- Monitor decommissioning activities : daily
- Monitor soil restoration, reclamation – weekly test soil quality for the last time.

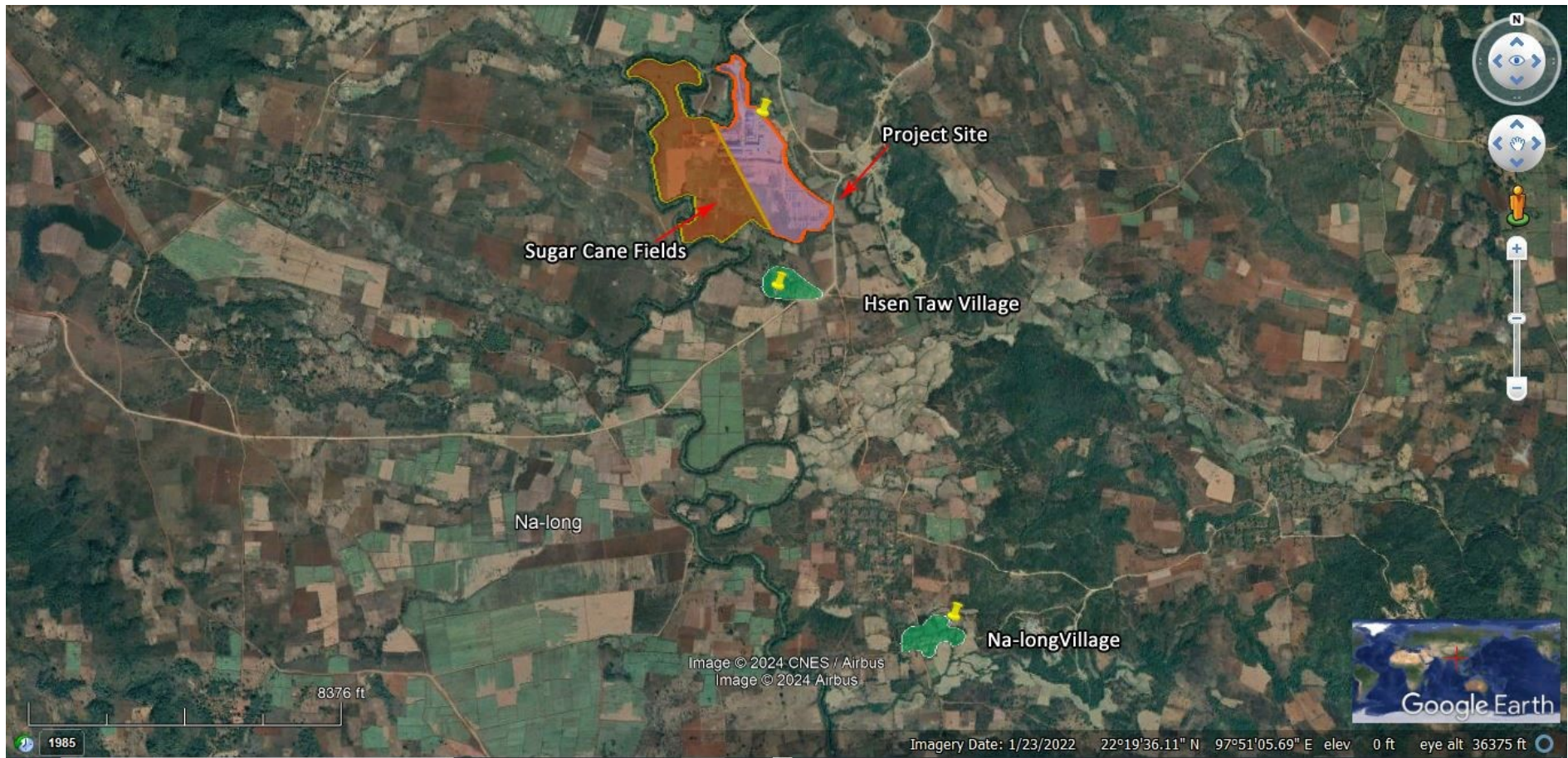
Budget and responsibilities

Budget: Ks 420,000 (once off cost)

- Soil quality to be analysed by hired technicians.

Responsible

Hired technicians and EMP cell members.



LEGEND

 Soil quality

Figure – 128: Satellite image showing points of soil quality for monitoring sub-plan (Decommissioning Phase)

4. Sub-plan for Erosion and sedimentation

Objectives

- To avoid, prevent, manage and mitigate soil potential erosion and sedimentation.
- To maintain natural ecology as practical as possible.

Legal requirements

- Comply with Environmental Conservation Law (2012) and Environmental Conservation Rules (2014); not to cause destruction of soil structures and profile, and conservation of soil ecology.

Overview maps, layout maps, images, aerial photos, satellite images

- These are already shown earlier in chapter 4, fig. 5,6,8,9,10; chapter 5 fig. 34,35,47,48; chapter 8, fig. 80,81 and will not be repeated here.

Implementation schedule

This sub plan will be implemented during the Decommissioning Phase.

Management action

- Continue erosion control management applied till the end of the Operation Phase and then the Decommissioning Phase.
- Keep drainage system inside the factory intact also keep natural drainage system in the vicinity intact.
- Ensure that decommissioning activities do not impact soil structure and soil profile.
- Ensure that the soil profile is stable and not easily eroded.
- Conduct visual inspection of the land and soil especially during the rainy season, to tackle any issue of erosion.

Monitoring plan

- Monitor decommissioning activities daily or weekly.
- Monitor the drainage system on a regular basis – weekly or monthly especially during rainy season.
- Conduct regular visual inspection of the site and environ.

Parameter to be monitored: soil structure, soil profile; any potential erosion phenomenon.

Monitoring point: inside the factory premise compound

Frequency

- From time to time; weekly or monthly during wet months.

Budget and responsibilities

Budget: Free for charge. (All EMP cell members are well-paid staff will manage this issue).

Responsible

EMP cell leader and EMP cell members.

5. Sub-plan for Biodiversity

Objectives

- To protect and conserve the biodiversity (biological component) of the area as practical as possible.

Legal requirement

- Comply with Conservation of Biodiversity and Protected Areas Law, 2018; not to destroy or impact natural habitats and biological ecosystem.

Overview maps, layout maps, images, aerial photos, satellite images

- These are already shown earlier in chapter 4, fig. 5,6,8,9,10; chapter 5 fig. 34,35,47,48; chapter 8, fig. 80,81 and will not be repeated here.

Implementation schedule

This sub plan will be implemented during the Decommissioning Phase.

Management action

- Undertake effective rehabilitation (reforestation) during Decommissioning Phase.
- Ensure that decommissioning activities have no impact on the biological component of the area.
- Ensure that replanted trees are all well-reestablished; replant more new sapling if necessary.
- Continue regular tending (watering, weeding, application of fertilizer where necessary) for at least two years.
- Ensure that the biodiversity (biological component) of the area remain intact and that the ecological is restored to its quasi-original condition.

Monitoring plan

- Monitor all decommissioning activities on a regular basis, daily or weekly.
- Monitor planting activities; to ensure that the green belt is successful.
- Monitor the maintenance of replanted trees regularly till the last day of rehabilitation phase.

Parameter to be monitored: the biological component (flora, fauna) of the area in the form of regular visual inspection of the habitats.

Monitoring point: both inside and outside of the project site.

Frequency

- Weekly and monthly and from time to time.

Budget and responsibilities

Budget: Free for charge. (Management and monitoring of biodiversity will be undertake by well-paid employees; no experts or technicians need to be hired.)

Responsible

EMP cell leaders and EMP cell members.

6. Sub-plan for Community Health and Safety

Objectives

- To ensure that the community health and safety are not compromised during decommissioning/rehabilitation phase.
- To ensure is the site is safe for local community after the completion of the project. (no soil contamination, no water pollution, no air pollution and no hazardous substance remain.)

Legal requirement

- Comply with Environmental Conservation Law, 2012 and the Environmental Conservation Rules, 2014 and Myanmar Public Health Law, 1972.

Overview maps, layout maps, images, aerial photos, satellite images

- These are already shown earlier in chapter 4, fig. 5,6,8,9,10; chapter 5 fig. 34,35,47,48; chapter 8, fig. 80,81 and will not be repeated here.

Implementation schedule

This sub plan will be implemented during the Decommissioning Phase.

Management action

- Continue the implementation of community Health and Safety sub-plan implemented during the Operation Phase.
- Continue the management and monitoring of CHS component/issue executed during the operation.
- Ensure that decommissioning/rehabilitation activities have no negative impact on the local community.
- Ensure that the air, water and land are not polluted in the aftermath of the project life (that the project site is environmentally and socially safe for all the local people).
- Conduct all visual inspection and enquiry for overall health situation of the nearby two villages with the aid of Health authority.

Monitoring plan

- Monitor the decommissioning/rehabilitation activities daily or weekly.
- Monitor any potential impacts such as emission, effluent, noise, etc. That will impact the local community.
- Monitor the potential or condition for water related disease that will effect the local community.

- Monitor the possibility of occurrence and spread of infectious and communicable disease.
- Avoid/prevent the spread of disease from company workers.
- Monitor implementation of emergency response plan implement during the long Operation Phase.

Monitoring points

- The two villages nearby; visual inspection of the overall health situation with the aid Township Health Personals at least once during the Decommissioning Phase.

Frequency

- Monitor decommissioning/rehabilitation activities; weekly.
- Monitor hygiene and sanitation condition of project site and employee semi-annually,
- Visual inspection of overall health situation of two villages with help of Health Authority; at least once during the Decommissioning Phase.

Budget and responsibilities

Budget: Ks 2,000,000 set aside and to be allotted as fees and courtesy gifts for Township Health personals during overall health survey on the two villages nearby. Medicine and drugs to be provided from the factory clinic.

Responsibilities

Factory manager and EMP cell leader (with the help of Township Health Department personal).

8.7 Monitoring Plan (Specific monitoring plan for physical component of the surrounding environment)

Table – 31: Summary of monitoring plan during the Construction Phase

Sr.	Components/ issue	Parameters to be monitored	NEQEG guideline values	Monitoring spot/site	Frequency	Responsible person	Cost (once off)	Remark
1	Noise and vibration level	dB(A) day and night	70 dB(A)	<u>Noise</u> At the factory Coordinate: 22°20'19.7"N, 97°54'41.5"E	semi-annually	EMP cell members and hired technicians	Ks 100,000	Technicians have to be hired
			55 dB(A) and 45 dB(A)	At Na Long village Coordinate: 22°18'03.8"N, 97°55'39.0"E	semi-annually	EMP cell members and hired technicians	Ks 100,000	Technicians have to be hired
				At Hsen Taw village Coordinate: 22°19'34.9"N, 97°54'46.9"E	semi-annually	EMP cell members and hired technicians	Ks 100,000	Technicians have to be hired
				<u>Vibration</u> At the factory Coordinate: 22°20'13.9"N, 97°54'36.2"E	semi-annually	EMP cell members and hired technicians	Ks 100,000	Technicians have to be hired

2	Waste	- monitor industrial wastes especially ash collection and storage and reuse	-	At final waste water pond Coordinate: 22°20'18.41"N, 97°45'33.76"E	weekly	EMP cell members	Free of charges	
		- monitor domestic wastes, collection and disposal	-	At landfill (inside factory compound) 22°20'18.41"N, 97°54'33.76"E	weekly	EMP cell members	Free of charges	
3	hazardous waste	- monitor collection of used oil and engine oil and disposals	-	near fuel depot 22°20'9.90"N, 97°54'47.54"E	monthly	EMP cell members	Free of charge	
		- monitor generation of old lamps, bulbs, old filters, old batteries etc and disposals	-	At landfill (inside factory compound) 22°20'18.41"N, 97°54'33.76"E	monthly	EMP cell members	Free of charge	
4	Water quality/ effluent	<u>Water quality</u> Total coliforms Fecal coliforms Turbidity Arsenic Lead Nitrate Manganese Chloride Hardness Iron pH	3(0-100ml) 0(0-100ml) 5 NTU 0.01 mg/l 0.01 mg/l 50 mg/l 0.4 mg/l 250 mg/l 500 mg/l 1 mg/l 6.5-8.5 SU	At Nant Laung chaung (St-1) Coordinate: 22°20'37.72"N, 97°54'32.50"E At Nant Laung chaung (St-2) Coordinate: 22°20'10.1"N, 97°54'11.0"E	semi-annually semi-annually	EMP cell members and hired technicians EMP cell members and hired technicians	Ks 200,000 Ks 200,000	Technicians have to be hired Technicians have to be hired

		Sulphate Total Dissolved Solids	250 mg/l 1000 mg/l	At Nant Laung chaung (St-3) Coordinate: 22°20'00.0"N, 97°54'22.4"E	semi-annually	EMP cell members and hired technicians	Ks 200,000	Technicians have to be hired
				At Nant Laung chaung (St-4) Coordinate: 22°19'46.53"N, 97°54'39.37"E	semi-annually	EMP cell members and hired technicians	Ks 200,000	Technicians have to be hired
				At Na Long village Coordinate: 22°18'02.7"N, 97°54'32.50"E	semi-annually	EMP cell members and hired technicians	Ks 200,000	Technicians have to be hired
				At Hsen Taw village Coordinate: 22°19'39.5"N, 97°54'50.2"E	semi-annually	EMP cell members and hired technicians	Ks 200,000	Technicians have to be hired
		<u>Effluent</u> 5 days BOD COD Oil and grease pH Temperature increase Total coliform	50 mg/l 250 mg/l 10 mg/l 6-9 S.U <3° 400 CFU	At discharge water, Coordinate: 22°20'22.0"N 97°54'23.0"E	semi-annually	EMP cell members and hired technicians	Ks 200,000	Technicians have to be hired
		Total nitrogen Total phosphorus Total suspended solid	mg/l 10 mg/l 3 mg/l 50 mg/l	At final waste water pond, Coordinate: 22°20'18.42"N 97°54'20.54"E	semi-annually	EMP cell members and hired technicians	Ks 200,000	Technicians have to be hired

5	Air quality and emission	<u>Air quality</u>						
		NO ₂	200 µg/m ³	At the factory	semi-annually	EMP cell members and hired technicians	Ks 1,700,000	Technicians have to be hired
		O ₃	100 µg/m ³	Coordinate: 22°20'19.7"N, 97°54'41.5"E				
		PM ₁₀	50 µg/m ³	At Na Long village	semi-annually	EMP cell members and hired technicians	Ks 1,700,000	Technicians have to be hired
		PM _{2.5}	25 µg/m ³	Coordinate: 22°18'03.8"N, 97°55'39.0"E				
		SO ₂	20 µg/m ³	At Hsen Taw village	semi-annually	EMP cell members and hired technicians	Ks 1,700,000	Technicians have to be hired
		VOC	400 µg/m ³	Coordinate: 22°19'34.9"N, 97°54'46.9"E				
		Ammonia	NG					
		Carbon dioxide	NG					
		Carbon monoxide	NG					
6	Odour	- monitor at waste water pond	-	At final waste water pond, Coordinate: 22°20'18.42"N 97°54'20.54"E	semi-annually	EMP cell members and hired technicians	Ks 300,000	Technicians have to be hired
7	Chemical	- monitor handling and uses of chemicals	-	at chemical store Coordinate: 22°20'19.28"N 97°54'43.03"E	weekly	EMP cell members	Free of charge	

8	Soil (contamination erosion)	- monitor contamination of soil; testing soil quality	-	Inside the factory compound Coordinate: 22°20'19.7"N, 97°45'41.5"E	semi-annually	EMP cell members and hired technicians	Ks 140,000	Technicians have to be hired
				At Na Long village Coordinate: 22°18'03.5"N, 97°55'38.7"E	semi-annually	EMP cell members and hired technicians	Ks 140,000	Technicians have to be hired
				At Hsen Taw village Coordinate: 22°19'34.5"N, 97°54'46.6"E	semi-annually	EMP cell members and hired technicians	Ks 140,000	Technicians have to be hired

Table – 32: Summary of monitoring plan during the Operation Phase

Sr.	Components/ issue	Parameters to be monitored	NEQEG guideline values	Monitoring spot/site	Frequency	Responsible person	Cost (once off)	Remark
1	Noise and vibration	dB(A) day and night	70 dB(A) 55 dB(A) and 45 dB(A)	At old plant site Coordinate: 22°20'19.7"N, 97°54'41.5"E	last time	EMP cell members and hired technicians	Ks 100,000	Technicians have to be hired
				At Na Long village Coordinate: 22°18'03.8"N, 97°55'39.0"E	last time	EMP cell members and hired technicians	Ks 100,000	Technicians have to be hired
				At Hsen Taw village Coordinate: 22°19'34.9"N, 97°54'46.9"E	last time	EMP cell members and hired technicians	Ks 100,000	Technicians have to be hired
				<u>Vibration</u> At the factory Coordinate: 22°20'13.9"N, 97°54'36.2"E	last time	EMP cell members and hired technicians	Ks 100,000	Technicians have to be hired
2	Waste (decommissioning wastes, debris)	- monitor decommissioning works (dismantling, demolition) and generation of huge quantity of debris, and systematic disposal and tidying up of the site	-	At the old plant; Coordinate: 22°20'14.25"N, 97°54'40.04"E	weekly/ monthly	EMP cell members	Free of charges	-

3	Water quality	<u>Water quality</u>						
		Total coliforms	3(0-100ml)	At Nant Laung chaung (St-1)	last time	EMP cell members and hired technicians	Ks 200,000	Technicians have to be hired
		Fecal coliforms	0(0-100ml)	Coordinate: 22°20'37.72"N, 97°54'32.50"E				
		Turbidity	5 NTU	At Nant Laung chaung (St-2)	last time	EMP cell members and hired technicians	Ks 200,000	Technicians have to be hired
		Arsenic	0.01 mg/l	Coordinate: 22°20'10.1"N, 97°54'11.0"E				
		Lead	0.01 mg/l	At Nant Laung chaung (St-3)	last time	EMP cell members and hired technicians	Ks 200,000	Technicians have to be hired
		Nitrate	50 mg/l	Coordinate: 22°20'00.0"N, 97°54'22.4"E				
Manganese	0.4 mg/l	At Nant Laung chaung (St-4)	last time	EMP cell members and hired technicians	Ks 200,000	Technicians have to be hired		
Chloride	250 mg/l	Coordinate: 22°19'46.53"N, 97°54'39.37"E						
Hardness	500 mg/l	At Na Long village	last time	EMP cell members and hired technicians	Ks 200,000	Technicians have to be hired		
Iron	1 mg/l	Coordinate: 22°18'02.7"N, 97°54'32.50"E						
pH	6.5 – 8.9 SU	At Hsen Taw village	last time	EMP cell members and hired technicians	Ks 200,000	Technicians have to be hired		
Sulphate	250 mg/l	Coordinate: 22°19'39.5"N, 97°54'50.2"E						
Total Dissolved Solids	1000 mg/l							

		<u>Effluent</u> 5 days BOD COD Oil and grease pH Temperature increase Total coliform Total nitrogen Total phosphorus Total suspended solid	50 mg/l 250 mg/l 10 mg/l 6-9 S.U <3° 400 CFU mg/l 10 mg/l 3 mg/l 50 mg/l	At discharge water, Coordinate: 22°20'22.0"N 97°54'23.0"E At final waste water pond, Coordinate: 22°20'18.42"N 97°54'20.54"E	last time last time	EMP cell members and hired technicians EMP cell members and hired technicians	Ks 200,000 Ks 200,000	Technicians have to be hired Technicians have to be hired
4	Air quality and emission	NO ₂ O ₃ PM ₁₀ PM _{2.5} SO ₂ VOC	200 µg/m ³ 100 µg/m ³ 50 µg/m ³ 25 µg/m ³ 20 µg/m ³ 400 µg/m ³	At old plant site Coordinate: 22°20'19.7"N, 97°54'41.5"E At Na Long village Coordinate: 22°18'03.8"N, 97°55'39.0"E At Hsen Taw village Coordinate: 22°19'34.9"N, 97°54'46.9"E	last time last time last time	EMP cell members and hired technicians EMP cell members and hired technicians EMP cell members and hired technicians	Ks 1,700,000 Ks 1,700,000 Ks 1,700,000	Technicians have to be hired Technicians have to be hired Technicians have to be hired
5	Soil (contamination erosion)	- test soil quality	-	Inside the factory compound Coordinate: 22°20'19.7"N, 97°45'41.5"E	last time	EMP cell members and hired technicians	Ks 140,000	Technicians have to be hired

				At Na Long village Coordinate: 22°18'03.5"N, 97°55'38.7"E	last time	EMP cell members and hired technicians	Ks 140,000	Technicians have to be hired
				At Hsen Taw village Coordinate: 22°19'34.5"N, 97°54'46.6"E	last time	EMP cell members and hired technicians	Ks 140,000	Technicians have to be hired

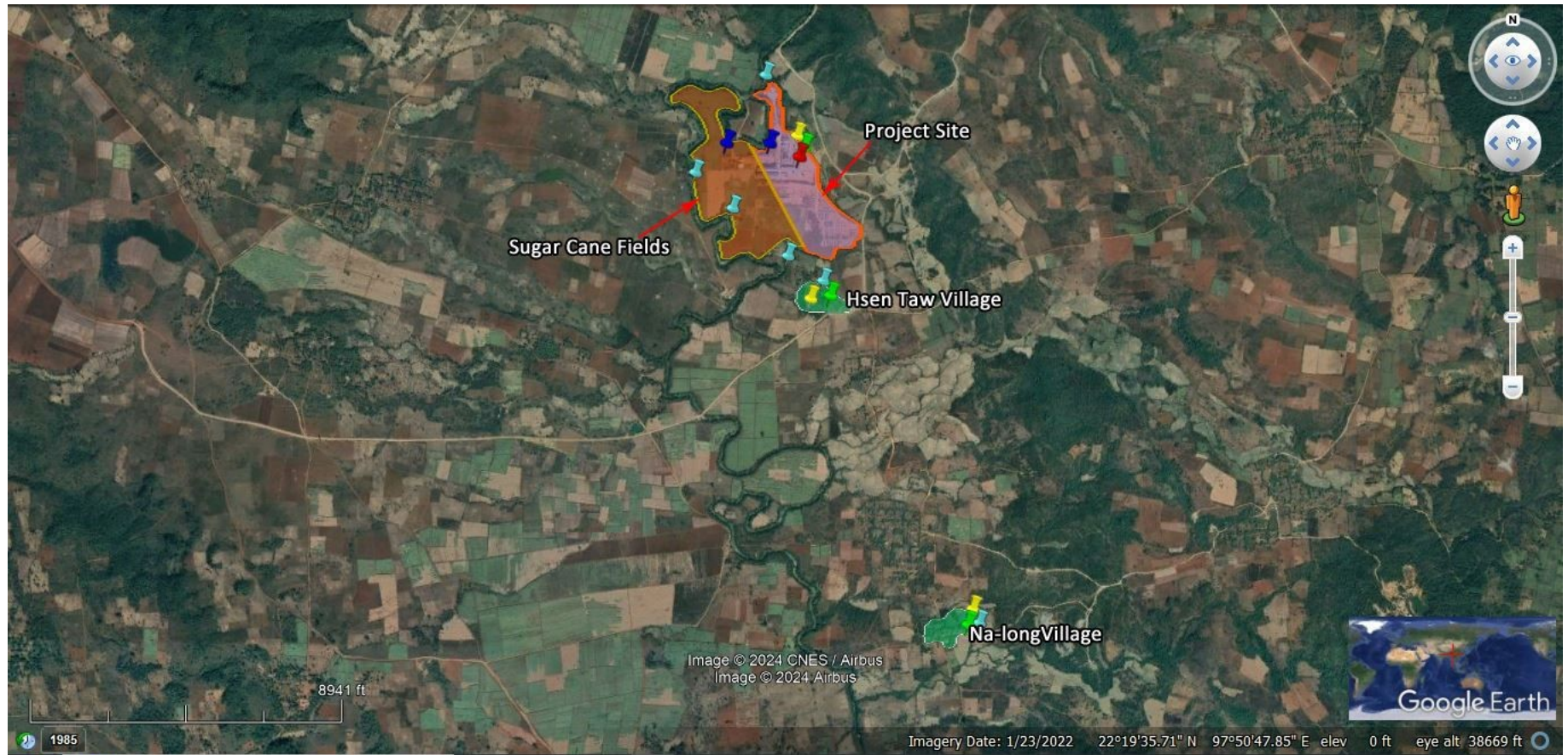
Table – 33: Summary of monitoring plan during the Decommissioning Phase

Sr.	Components/ issue	Parameters to be monitored	NEQEG guideline values	Monitoring spot/site	Frequency	Responsible person	Cost (once off)	Remark
1	Noise and vibration	dB(A) day and night	70 dB(A)	At old plant site Coordinate: 22°20'19.7"N, 97°54'41.5"E	last time	EMP cell members and hired technicians	Ks 100,000	Technicians have to be hired
			55 dB(A) and 45 dB(A)	At Na Long village Coordinate: 22°18'03.8"N, 97°55'39.0"E	last time	EMP cell members and hired technicians	Ks 100,000	Technicians have to be hired
				At Hsen Taw village				

				Coordinate: 22°19'34.9"N, 97°54'46.9"E <u>Vibration</u> At the factory Coordinate: 22°20'13.9"N, 97°54'36.2"E	last time last time	EMP cell members and hired technicians EMP cell members and hired technicians	Ks 100,000 Ks 100,000	Technicians have to be hired Technicians have to be hired
2	Waste (decommissioning wastes, debris)	- monitor decommissioning works (dismantling, demolition) and generation of huge quantity of debris, and systematic disposal and tidying up of the site	-	At the old plant; Coordinate: 22°20'14.25"N, 97°54'40.04"E	weekly/ monthly	EMP cell members	Free of charges	-
3	Water quality	<u>Water quality</u> Total coliforms Fecal coliforms Turbidity Arsenic Lead Nitrate Manganese Chloride Hardness Iron pH	3(0-100ml) 0(0-100ml) 5 NTU 0.01 mg/l 0.01 mg/l 50 mg/l 0.4 mg/l 250 mg/l 500 mg/l 1 mg/l 6.5 – 8.9 SU	At Nant Laung chaung (St-1) Coordinate: 22°20'37.72"N, 97°54'32.50"E At Nant Laung chaung (St-2) Coordinate: 22°20'10.1"N, 97°54'11.0"E	last time last time	EMP cell members and hired technicians EMP cell members and hired technicians	Ks 200,000 Ks 200,000	Technicians have to be hired Technicians have to be hired

		Sulphate	250 mg/l	At Nant Laung chaung (St-3)	last time	EMP cell members and hired technicians	Ks 200,000	Technicians have to be hired
		Total Dissolved Solids	1000 mg/l	Coordinate: 22°20'00.0"N, 97°54'22.4"E				
				At Nant Laung chaung (St-4)	last time	EMP cell members and hired technicians	Ks 200,000	Technicians have to be hired
				Coordinate: 22°19'46.53"N, 97°54'39.37"E				
				At Na Long village	last time	EMP cell members and hired technicians	Ks 200,000	Technicians have to be hired
				Coordinate: 22°18'02.7"N, 97°54'32.50"E				
				At Hsen Taw village	last time	EMP cell members and hired technicians	Ks 200,000	Technicians have to be hired
				Coordinate: 22°19'39.5"N, 97°54'50.2"E				
		<u>Effluent</u>		At discharge water, Coordinate: 22°20'22.0"N, 97°54'23.0"E	last time	EMP cell members and hired technicians	Ks 200,000	Technicians have to be hired
		5 days BOD	50 mg/l					
		COD	250 mg/l					
		Oil and grease	10 mg/l					
		pH	6-9 S.U					
		Temperature increase	<3°					
		Total coliform	400CFU mg/l	At final waste water pond, Coordinate: 22°20'18.42"N, 97°54'20.54"E	last time	EMP cell members and hired technicians	Ks 200,000	Technicians have to be hired
		Total nitrogen	10 mg/l					
		Total phosphorus	3 mg/l					
		Total suspended solid	50 mg/l					

4	Air quality and emission	NO ₂	200 µg/m ³	At old plant site	last time	EMP cell members and hired technicians	Ks 1,700,000	Technicians have to be hired
		O ₃	100 µg/m ³	Coordinate: 22°20'19.7"N, 97°54'41.5"E	last time	EMP cell members and hired technicians	Ks 1,700,000	Technicians have to be hired
		PM ₁₀ PM _{2.5} SO ₂ VOC	50 µg/m ³ 25 µg/m ³ 20 µg/m ³ 400 µg/m ³	At Na Long village Coordinate: 22°18'03.8"N, 97°55'39.0"E At Hsen Taw village Coordinate: 22°19'34.9"N, 97°54'46.9"E	last time	EMP cell members and hired technicians	Ks 1,700,000	Technicians have to be hired
5	Soil (contamination erosion)	- test soil quality	-	Inside the factory compound Coordinate: 22°20'19.7"N, 97°45'41.5"E	last time	EMP cell members and hired technicians	Ks 140,000	Technicians have to be hired
				At Na Long village Coordinate: 22°18'03.5"N, 97°55'38.7"E	last time	EMP cell members and hired technicians	Ks 140,000	Technicians have to be hired
				At Hsen Taw village Coordinate: 22°19'34.5"N, 97°54'46.6"E	last time	EMP cell members and hired technicians	Ks 140,000	Technicians have to be hired



LEGEND

- 📌 air and noise quality
- 📌 vibration
- 📌 soil quality
- 📌 water quality
- 📌 waste

Figure-129: Satellite image showing monitoring spots

9. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

Public consultation is an integral part of EIA/IEE and EMP. Involving the public participation in the EIA/IEE/EMP work is fundamental to increasing the understanding and acceptance of the project.

Public consultation and participation should be started as early as possible in the preparation of EMP. And it has to be a continuous process, especially during the Operation Phase, carry out from time to time.

9.1 Purposes of the consultation during the preparation of the Scoping and EIA report

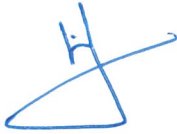
- To enlighten the locals/stakeholders about the project.
- To increase the understanding and acceptance of the project.
- To give the locals/stakeholders the opportunity to present their views, opinions, perception of the project, express their concerns, complaints, grievances etc.
- To identify impacts and issues that are not immediately obvious to project proponent and the EIA/EMP team.
 - To access social assistant and community development needs for the locals/stakeholders.
 - To gain community consent and to interact with the people to further strengthen existing cordial relationship.
 - To tap local knowledge and to negotiate for mutually beneficial future that is sustainable and locally relevant.

Requirements for public consultations:

- Public consultation should be conducted in the early phase of project
- Must ensure the direct involvement of the locals/stakeholders
- Must ensure that all locals/stakeholders who are interested will have the chance to fully participate, especially the vulnerable and marginalized group,
- It should be a continuous process --- throughout the entire phase of the project, especially during the long Operation Phase, and
- There must be an action plan or response programme such as complaints and grievances mechanism (CGM) to tackle any issue.

Commitment

Than Daung Oo Co., Ltd has made a commitment to duly implement the EMP described in this chapter 8 as practical as possible.

A handwritten signature in blue ink, consisting of a stylized, abstract shape that resembles a triangle with a vertical line extending upwards from its top vertex and a horizontal line crossing it near the top.

U Sein Myo Aung
Executive Director
Than Daung Oo Co., Lt

9.2 Methodology and approach

Standard methodology applied here includes:

- (i) **Consensus building:** First of all a pre-sensitizing visits to the local authority (Village Administrator and party, elders) and briefing on the proposed project was carried out, and ask for their approval and assistant for holding the public consultation.
- (ii) **Transect walk:** site visit (visit to the village) and conduct observation and visual inspection.
- (iii) **Actual public consultation meeting:** mainly involves disclosure of the proposed project and giving complete and accurate information; consultation mainly in the form of two-way conversation --- listening and talking; waiting for their response; further discussion.
- (iv) **Interviews and discussions:**
 - In the form of KII/SS, (Key Informant Interview/Secondary Source for the gathering of secondary baseline socio-economical data and community profile with the aid of pre designed questionnaires.
 - In the form of FGD (Focal Group Discussion); interview with few selected people (authority, knowledgeable persons) especially for ranking the pressing need of the locals for prioritizing the needs for community assistance and implementation of CSR.

9.3 Summary of consultation activities undertaken

So far various public consultations meeting with the local communities have been held by the project proponent.

Previously a large public meeting was held between the Than Daung Oo Co., Ltd and locals people, particularly sugar cane planters. That meeting was held on 29-12-2019 from 09:15 hours 12:30 hours at the company compound.

That meeting was attended by U Sai Myint Htoo, Member of Hluttaw for Mong Yai constituent, one representative from Shan State Progressive Party, the company's officers, village administrators and local people totaling 2600 people. The meeting was mainly a meeting with the sugar cane planters for the 2019-2020 sugar cane season cultivation. Other matters were also discussed, including the factory project.



Figure-130: A previous meeting with the local people

Two preliminary public consultation meetings were held during the scoping study, one at Hsen Taw Village on 13-2-2020 and another at Na Long Village on 14-2-2020.

The village administrators and members, village elders, stakeholders and interested persons have attended these meetings.

(a) Public Consultation meeting at Hsen Taw Village

Date : 13-2-2020
Time : 12:30 hrs to 14:00 hrs
Venue : At the village administrator's residence
Attendees : 17 persons

(All heads of households are invited; and there are only 17 households in this small village, which is actually a hamlet.)



Figure-131: Preliminary public consultation meeting at Hsen Taw Village



Figure-132: KII interview

Minutes of the consultation meeting

First of all U Sai Ba Min (Deputy Factory Manager): delivered an address and gave explanation of the project.

U Sai Ba Min (Deputy Factory Manager): Mingalarbar to all. We hold this meeting in order to explain the villagers of Hsen Taw Village about the project implemented by Than Daung Oo Co., Ltd. This is done so that the locals will know more about the proposed project and environmental conservation task to be carried out. We are going to discuss the advantages and disadvantages of the project to you in a candid way.

U Myint Kayw Thura (MESC): Mingalarbar to all. Thank you for giving your time to attend this meeting. My name is Myint Kyaw Thura and my organization is Myanmar Environment Sustainable Conservation, MESC. Our organization is neutral third party. We come to study the advantages and disadvantages of this proposed project.

This is our preliminary meeting. We will come again during the EIA study. We will study the impacts of the project on air environment and test air quality. We will also collect soil and water samples for testing to investigate the impacts, if any. We also have botanist, ornithologists and zoologist for studying flora and fauna. We will conduct our survey day and night on the surrounding environment. We will also conduct study on the socio-economic aspects of the area and we also want to know the perception of the proposed project by the local community. I therefore invite you to ask questions, to give comments and speak up frankly and express your views and opinions.

U Lone Sone (the village administrator): Mingalarbar to all. As for me I appreciate the establishment of a sugar factory near our village. The company on its part has provided skill and knowledge on agriculture and rendered help for long term benefit of our locals. Our locals will have employment opportunities and there will be development in economic, education and health standards of our local people. The company has carried out community assistance for us and we on our part will help the company in appropriate way. We therefore appreciate this project.

Daw Par Lone (a local): We are delighted to see the emergence of a sugar factory. There will surely be progress in our daily lives and our living standards. The company has also provided assistance for the development agricultural sector of the area.

Daw Nan Hla Yone (a local elder): The future for our families is bright. We therefore appreciate and support the project.

U Htun Aung (a local elder): Due to this project our livelihoods are in better shape and jobs are available for our youths. We have now more opportunities for development. I am glad to see this project progressing.

U Lone Kyan (a local): The company has good and cordial relation with our locals. The company has provided interest free loans for us farmers/cultivators. The company has also provided tractors for tilling our fields, and also has provided saplings (sugar cane) and fertilizer for us. We are better now.

Daw Nan Hla Yone (a local): Due to help and assistance provided by the company our lives have become more convenient. The company is always good to us. We thank the company's officers for coming to our village and holding discussion with us. We want village electrification and want the company to help us in this matter.

U Sai Ba Min (Deputy Factory Manager): Now the project is in the Construction Phase and we will do our best for village and community. Later when the factory is in Operation Phase will do our best for village electrification and community assistance and development.

U Lone Sone (the village administrator): Due to the assistance provided by the company our village has now 300 acres of cultivated land. We will cultivate this land up to the times of our off springs and grand-children. We want the company to continue the assistance. I have personally told all our villagers to have good and cordial relation with the company.

I thank you all for attending this meeting. We are glad to have good relation with the company.

U Sai Ba Min (Deputy Factory Manager): Our company will do its best for the assistance and for the good of the villagers.

The meeting was over at 14:00 hours.

(b) Public consultation meeting at Na Long Village

Date : 14-2-2020

Time : 10:30 to 12:00 hours

Venue : At the Village Administrator's Residence

Attendees : 49 persons

(All heads of households were invited; the village has 102 households.)



Figure-133: Preliminary public consultation meeting at Na Long Village



Figure-134: KII interview

Minutes of consultation meeting

First of all U Sai Ba Min (Deputy Factory Manager): delivered an address and gave explanation of the project.

U Sai Ba Min (Deputy Factory Manager): Mingalarbar to all. We hold this meeting in order to explain the villagers of Na Long Village about the project implemented by Than Daung Oo Co., Ltd. This is done so that the locals will know more about the proposed project and environmental conservation task to be carried out. We are going to discuss the advantages and disadvantages of the project to you in a candid way.

U Myint Kayw Thura (MESC): Mingalarbar to all. Thank you for giving your time to attend this meeting. My name is Myint Kyaw Thura and my organization is Myanmar Environment Sustainable Conservation, MESC. Our organization is neutral third party. We come to study the advantages and disadvantages of this proposed project.

This is our preliminary meeting. We will come again during the EIA study. We will study the impacts of the project on air environment and test air quality. We will also collect soil and water samples for testing to investigate the impacts, if any. We also have botanist, ornithologists and zoologist for studying flora and fauna. We will conduct our survey day and night on the surrounding environment. We will also conduct study on the socio-economic aspects of the area and we also want to know the perception of the proposed project by the local community. I therefore invite you to ask questions, to give comments and speak up frankly and express your views and opinions.

U Pe Htun (the village administrator): We are glad that this company is going to establish a sugar factory here. Formerly we did not grow sugar cane. The officers and experts from the company have come here and taught us how to grow sugar cane and also have provided much needed help. We are now going to grow sugar cane in our area.

Daw Nan Yone (a local): The proposed factory is near the village but as the road to the factory is not straight but bend around, it takes more time to reach the factory. What I mean is I want the company a construct a straight road so that we can connect easily with the factory. The village will also develop to a certain extent. We are interested in growing sugar cane but communication is still a bit difficult.

U Sai Ba Min (Deputy Factory Manager): We have plans for improving the communication and transportation system of the nearby villages. As the moment we are tied up with the major construction of the factory and so please be patient wait for our plan to materialize. Yes we have plans for building road.

U Pe Htun (the village administrator): Our village is not electrified yet. So please help us for village electrification. Our village will develop when we have good road and have access to electricity. We have nothing to say against this project.

Daw Nan Pan (a local): The company has provided us with sugar saplings, fertilizer and money. The company has also taught us how to grow sugar cane and also provided us with tractors. Everything is OK. We have good relation with the company. We are not against this project.

U Sai Ba Min (Deputy Factory Manager): The construction of road will be duly undertaken; as regard village electrification I will report this matter to our company's authority. We have provided tractors for many villages; we will also render any help needed.

Daw Nan Ouk (a local): We are OK with the help regarding cultivation of sugar cane. We need other helps such as good road and electricity for the village. We also need help for improvement of the village school. It is very good that the company had provided all the assistances for our community development.

U Sai Ba Min (Deputy Factory Manager): I thank the village administrator and all of you for giving your time and attending this consultation meeting.

The meeting has come to an end at 12:00 hour.

Results of public consultation meetings

At Hsen Taw Village, 13-2-2020

During the meeting the village administrator, U Lone Sone and four villagers, namely, Daw Par Lone, Daw Nan Hla Yone, U Htun Aung and U Lone Kyan gave comments and expressed their gratitude to the company for community assistance. They all spoke in support of the project; none of the participant has spoken against the proposed project. Daw Nan Hla Yone asked for village electrification the responsible officer, U Sai Ba Min replied that when the factory is in operation the company will do its best for this.

At Na Long Village, 14-2-2020

During the meeting the village administrator, U Pe Htun and three villagers, namely, Daw Nan Yone, Daw Nan Pan and Daw Nan Ouk gave comment and all of them thanked the company for giving all necessary assistance to them.

Daw Nan Yone asked for straightening the bend road to shorten the distance between the village and the factory. U Pe Htun and Daw Nan Ouk ask for village electrification, road and school renovation.

The responsible officer, U Sai Ba Min replied that at the moment he and other officers were tied up with the main task of major construction of the factory. So he asked them to be patient and wait for the road and village electrification to be materialized later. He said that the company authority has plan for community infrastructure development.

None of the participants are against the project.

Both meetings have ended in a cordial and friendly manner. The company has good relation with the local communities, who are very familiar with the company.

As a form of community development Than Daung Oo Co., Ltd has constructed a gravel road 7 miles long for the area, has sourced the water from a spring for Hsen Taw Village and has constructed a community concrete water tank of the village. The company has plan for village electrification, renovation of school and construction of a new school building for the communities. For the sake of easy transportation for nearby villages a new bridge, the Hsen Taw bridge (concrete and iron framed 100' x 24') is in the process of construction.

As a TOR for EIA a more comprehensive public consultation meeting will be held during the follow up EIA study trip. The details of that meeting will be documented and reported in the follow up EIA report.

Information Disclosure

Copies of minutes and details of this meeting are made available at the company's office and at the office of MESC. When this scoping report is approved the follow EIA trip will proceed and the information will then be disclosed in the form of press release in the Voice Daily Newspaper.

The information concerning this scoping study is launched at the facebook website of the consultant firm: myanmar.environment.sustainable.conservation.com.

When the follow up EIA commences the information will be launched at the website of the consultant firm as well as the project proponent's www.ngweyipale.com. That will be when the EIA study is conducted.

When the follow up EIA study is completed and the EIA report approved by the authority copies of the approved EIA reports will be kept at the offices of both the project proponent and the consultant firm. Part of the approved EIA report, for instance, the Executive Summary will be launched at the said website of the consultant firm.

The programme for public consultation to be undertaken during the follow up EIA study phase will strictly follow the procedures and, most of all, the format laid down by ECD, MONREC. The format includes such sub-sections and sub-topics such as, purpose, methodology and approach; summary of consultation activities, including dates, venues, attendance, topics; summary of main comments received from stakeholders and interested groups and issues raised; minutes of consultation meeting; identification on how the comment or issues were taken in account; information disclosure; and recommendation for future consultations.

Comprehensives public consultation meeting will be held during the coming EIA study. And as a TOR for EIA all the afore-mentioned agenda or topics (sub-sections and sub-topics) will be addressed and reported in the EIA report.

Information disclosure in the form of press release will be made after the follow up EIA trip.

Public consultation during EIA study

During the EIA study trip two public consultation meetings were held, one at Na Long village and another at Hsen Taw village.

Public consultation meeting at Na Long village, 10-6-2023

Date : 10-6-2023
Time : 10:30 to 11:00 hours
Venue : At the Village Monastery
Attendees : 77 persons (locals)

The responsible officer of the company: First of all delivered an address to the participants and explained in detail about the project to be implemented.

U Myint Kyaw Thura, Leader of MESC: First of all greeted the participants and then briefly explained to them about the consultant firm, MESC, doing EIA work as a Third party. He said that whenever there is a project there can be both advantages and disadvantages; and that EIA will be conducted mainly within 2 miles radius on the physical (air, water, soil), biological (plant, birds, reptiles and amphibian, mammal), the socio-economic, and cultural components of the surrounding environment. The report will cover all the four phases (Preconstruction, Construction, Operation and Decommissioning Phases) of the project life. That the EIA team will collect and document base line data on the said components and impacts predicted, anticipated, identified and assessed will be described in the report.

He then invited the participants to discuss and give comment and express their views and opinions in candid way. From the comment received we will suggest and/or recommend the company to carry out appropriate measures for the mitigation of impacts such as noise, emission, effluent etc. and any socio-economic impacts.

During the meeting the village administrator, U Lone Sone and two villagers gave comments and expressed their opinions.

U Lone Sone said that due to the implementation of this sugar factory project the economic situation of our local people has improved greatly. Formerly sugar cane planters were mostly poor; now many have earned millions of kyats; some even could afford cars now.

U Lone Kaw, one local, said that due to this project roads were upgraded and the local economy has improved greatly.

U Sai Yone Khan, one local, said that agricultural experts of the company provided us with technology for sugar cane cultivation as well as other assistances. We could now increase our sugar cane planting and increase our incomes.

The responsible officer of the company asked whether there were any more questions to ask or more comments to make. As there was no more questions or no more comments the meeting was closed at 11:00 hrs.

The meeting has ended in a friendly cordial manner.

Public consultation meeting at Hsen Taw village, 10-6-2023

Date : 10-6-2023
Time : 13:00 to 14:00 hours
Venue : At the Administrator's residence
Attendees : 13 persons (locals)

The responsible officer of the company: First of all delivered an address to the participants and explained in detail about the project to be implemented.

U Myint Kyaw Thura, Leader of MESC: First of all greeted the participants and then briefly explained to them about the consultant firm, MESC, doing EIA work as a Third party. He said that whenever there is a project there can be both advantages and disadvantages; and that EIA will be conducted mainly within 2 miles radius on the physical (air, water, soil), biological (plant, birds, reptiles and amphibian, mammal), the socio-economic, and cultural components of the surrounding environment. The report will cover all the four phases (Preconstruction, Construction, Operation and Decommissioning Phases) of the project life. That the EIA team will collect and document base line data on the said components and impacts predicted, anticipated, identified and assessed will be described in the report.

He then invited the participants to discuss and give comment and express their views and opinions in candid way. From the comment received we will suggest and/or recommend the company to carry out appropriate measures for the mitigation of impacts such as noise, emission, effluent etc. and any socio-economic impacts.

During the meeting the village administrator, U Pe Htun and three locals gave comments and expressed their views.

U Pe Htun said that due to the emergence of the sugar factory now our locals could plant more sugar cane and increase our income on a steady basis. The roads were also greatly improved.

U Lone Kyar, one local said that now the factory has also electrified our village. A new school has been constructed by the company. We thanked the company very much.

U Sai Lu, one local said that agricultural experts from the company have taught us new technology for sugar cane cultivation and also provided assistance. These were of great assistance to our local sugar cane planters; we thanked the company for this.

U Ohn, one local said that due to the emergence of this sugar factory we could plant more sugar cane resulting in better income. Formerly many of us were jobless and poor; now any of us could earn up to millions of kyats and the local economy has improved a lot.

The responsible officer of the company asked whether there were any more questions to ask or more comments to make. As there was no more questions or no more comments the meeting was closed at 14:00 hrs.

The meeting has ended in a cordial and friendly manner.

Recommendation for future public consultation meetings and setting up of Grievance Redress Mechanism (GRM) programme are also mentioned.

The short information about the public consultation meetings was launched at the Facebook website of the consultant firm, www.myanmarenvironmentalsustainableconservation.com; when this EIA report is approved part of the report will be launched at the said Facebook website and also the website of parent company, www.ngweyipale.com.

9.4 Results of consultation

The first public meeting was held on 29-12-2019 at the factory's compound.

During the scoping study a public consultation meeting was held at Hsen Taw village on 13-2-2020 (from 10:30 hrs to 12:00 hrs).

Another public consultation meeting was held at Na Long village on 14-2-2020 (from 12:30 to 14:00 hrs).

During the EIA study a public consultation meeting was held at Na Long village on 10-6-2023 (from 10:00 hrs to 11:00 hrs); another public consultation meeting was held at Hsen Taw village on that same day (10-6-2023) from 13:00 hrs to 14:00 hrs.

The EIA team has recorded and documented all the questions asked and the comments given, by the stakeholders and the participants.

The responsible officer of the company has replied to all the questions asked and has tried to tackle the issue as far as possible. The EIA team has also incorporated all the minutes of the consultation meeting in its EIA report.

On the whole the local community has a positive view on the project and rate of acceptance of the project is high. This is due to the fact that all the sugar cane produce in the region comprising Mong Yai Township will be purchased by the company. The sugar cane farmers can increase their production of the cane and thus boosting the local economy. Many locals will be also employed at the factory. The company on its part has done a lot for the execution of CSR programme. These two villages are now accessible by cars and one has access to electricity provided by the company. The Than Daung Oo Co., Ltd has so far spent Ks 1,002,148,615 for the implementation of CSR programme for community assistance and community development for the region. Many locals view the Than Daung Oo Company and its parent company Ngwe Yi Pale as their true benefactors and redeemer.

Than Daung Oo Co., Ltd has on its part already have spent millions of kyats for CSR programme e.g. construction of a gravel road, 7 miles long for the area, sourcing water and construction of community water tanks for the villages and provided electricity for one village and construction of a concrete and iron framed bridge (100' x 24') for the local area. (See ANNEX)

9.5 Future ongoing consultations

As mentioned earlier public consultation shall be a continuous process throughout the project period, from the Pre-construction Phase, through the Construction Phase and Operation Phase to the Decommissioning Phase. More public consultation meeting shall be held later. As regards the long Operation Phase (30 years) there shall be regular public consultations annually or bi-annually depending on the situation, or from time to time whenever there is a need for public consultation. This is very important for maintaining the long term cordial relationship with the locals and hence the long term benefit for the business.

The Complaints and Grievances Mechanism (CGM) programme shall be implemented throughout the entire project period. It shall be practical and applicable and effective, not a formality. The public relation officer and EMP cell leader should always give special attention to CGM.

The complaints handling and response shall be effective. The address and phone numbers of the company and the factory will be made available at the Village Administrator Offices of each village. A hotline for complaint shall be set up. The date and time of complaints; detail of complaint; action taken and if no action is required the reason why shall be explained and all recorded and documented. The name, address and phone number of the complainant will be recorded. The log book for CGM/GRM will be kept and all the complainants recorded and all the subsequent actions taken will be documented later. If necessary further meeting with the complainant will be held and the issues, if any remain, will be tackled.

The company will endeavour to tackle all the issue of complaints with good intention and good will. The following is an example of the log book sheet for GRM:

Example of the log book sheet for GRM:

1. Name of complainant (person/organization) -----
2. Date of receipt -----
3. Summary of complaint/grievance -----
4. Date of action taken -----
5. Action taken by who -----
6. If action is not required give the reason why -----
7. Grievance resolved/settled (Yes/No) -----
8. Any post GRM contact (Yes/No) -----
9. Any follow up issue or action (Yes/No) -----
10. Need a legal expert (Yes/No) -----

The company will keep a separate file for each complaint, where details of the complaint/grievance, how the grievance is assessed, and how it is resolved and settled (or not) will be duly recorded.

9.6 Information Disclosure

Public consultations made at the two villages mentioned above involving the local community, responsible persons from the company and EIA team was made public. Copies of minutes of meeting were kept at village administrator office of Hsen Taw and Na Long villages, office of Than Daung Oo Sugar Factory and office of consultation firm, MESC.

When this EIA report is approved the company shall launch part of this report onto its website.

The information concerning this scoping study is launched at the facebook website of the consultant firm: myanmarenviroinmentsustainableconservation.com.

When this EIA report is approved by the authority whole or part of this report (eg. Executive Summary) will be made public by launching at the website of the parent company, the Ngwe Yi Pale, www.ngweyipale.com. Copies of the report will be kept at the office of the company for anyone who is interested in this EIA report for perusal.

CONCLUSION

This EIA study has been carried out in accordance with the rules, regulations, guidelines and most of all, the format, for EIA designated by Environmental Conservation Department (ECD) of MONREC.

The potential impacts (both negative and positive) have been identified and assessed and this report has put in place adequate measures, to eradicate or minimize or mitigate the potential negative impacts. The EMP prescribed will also contribute to the long run effective and successful implementation and operation of the project, the sugar factory.

One can never expect a developmental project devoid of negative impacts. Wherever and whenever a developmental project like this sugar factory is implemented there can surely be a more or less impacts on the physical, biological and socio-economic components of the surrounding environment. This is inevitable and many causes are irreversible.

Environmental protection and conservation is essential for the long term development of a nation. On the other hand and economic development is also essential for the long term development of that nation.

For a Least Developed Country (LDC) like Myanmar, the economic development of the nation is a must. Then a pragmatic way of thinking and a pragmatic way of doing things has to be undertaken. In this way the economic of a country is developed and there is no other way round. Hard decision has to be made based on rationalization or reasoning rather than emotion. In developing the nation are should be realistic rather than idealistic, rational rather than emotional, and pragmatic rather than theoretical in doing things. The main objective here is to do a sugar factory business that is environmentally sound, socially sustainable and economically viable.

In this era of environment awareness there are now many well-established guidelines for the prevention or mitigation measures which can more or less eliminate or minimize all or most of the undesirable impacts resulting from the execution of a project. There are also appropriate measures (mitigation, corrective, remedial) that can limit or minimize the impacts as well as measures for maintaining the long term well-being of the environment.

After taken into consideration of all the pros and cons of this project proponent has come to the conclusion that the advantages outweigh the disadvantages in many aspects. The project proponent will proceed with this proposed project. The project will contribute to the increase in the GDP of the country and also increase in earning for the nation in the form of tax, duty and revenue. It will bring employment opportunities for many locals and, most of all, contribute greatly to national economic development. There is no doubt that this will be economically viable and environmentally sustainable if all the rules, regulation and statutory requirements are complied with and all mitigation measures prescribed are duly taken.

The company will duly and timely implement these mitigation measures in a meaningful way.

The company will:

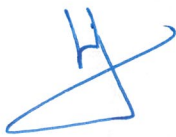
- Duly comply with all the laws, rules and regulations.
- Implement mitigation measures as prescribed in the report, and
- Execute meaningful EMP, especially sub-plans prescribed in the report.

The company really believes that this project can be implemented successfully without significant adverse environmental and social impacts.

The company will do its utmost to achieve the goal.

Commitment

The project proponent has made a commitment to hold future regular public consultation meetings as far as possible.

A handwritten signature in blue ink, consisting of a stylized 'U' and 'A' intertwined.

U Sein Myo Aung

Executive Director

Than Daung Oo Co., Ltd

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ANNEX

List of Machinery and Equipment to be Imported





Process Plant (Sugar Drying and Packing Section)

No	Items	Model & Specification	H.S Code	Unit	Qty	Remark
1	Screw Conveyor	WLS-250.8M	84.3	Set	1	
2	Motor		85	Set	1	
3	Motor	YCT280-50-4A	85	Set	1	
4	Motor	YCT280-4A	85	Set	3	
5	Pump	DJB-10530/200L	84.1	Set	2	
6	Pump	S8-80-265.3	84.1	Set	1	
7	Pump	S8-8-265.3	84.1	Set	3	
8	Blower			Set	2	
9	Pump	TSP240II	84.1	Set	6	
10	Crane	LDA4.5 15	84.3	Set	1	
11	Pressure Reducing Valve	Y10-0.8/170-0.4/17	84.8	Set	1	
12	Temperature Reducing Valve	W160-0.3/170-0.2/1	84.8	Set	1	
13	Compressor	V0.25/8	84.1	Set	1	
14	Crane	CDI 12*5T	84.3	Set	1	
15	Crystallizer	TZL55		Set	12	
16	Air Tank	1200*2000	84.8	Set	7	
17	Screw Conveyor	Ø800*12000MM	84.3	Set	1	
18	Screw Conveyor	Ø 800* 14000MM	84.3	Set	1	
19	Screw Conveyor	Ø 800* 10500MM	84.3	Set	1	
20	Screw Conveyor	LS300 L = 4500MM	84.3	Set	1	
21	Screw Conveyor	LS300 L =3500MM	84.3	Set	1	
22	Digital Weighing Scale	DCS-50-DZ	84.2	Set	6	
23	Magma Tank	TUJ5Ø 1800*4000MM	84.8	Set	1	

24	Remelt Tank	TUJ5Ø1800*4000MM	84.8	Set	1	
25	Air Tank	10M3	84.8	Set	4	
26	Tank	4000*2000*2500	84.8	Set	2	
27	Crane	CDI 24m, 1T	84.3	Set	1	
28	High frequency vibrating conveyor	ZDGPS 2.0 *8.0	84.3	Set	3	
29	Remelt Tank	TUJ5Ø 1800*4000MM	84.8	Set	1	
30	Air Compressor	V-0.6/8,4KW	84.1	Set	1	
31	Air Compressor	KLS-150VG	84.1	Set	2	
32	Conveyor	B800*8m	84.3	Set	3	
33	Conveyor	B1200*16.7m	84.3	Set	1	
34	Conveyor	B1400*54.16m	84.3	Set	1	
35	Centrifugal machine		84.2	Set	2	
36	Sugar cooling system	ZDLH 1.8*8.0	84.2	Set	1	
37	Centrifugal machine	C52M		Set	4	
38	Water Tank	Ø 17200*15000	84.8	Set	1	
39	Weighing Scale		84.2	Set	1	
40	Gear Box	ZQ400	85.8	Set	2	
41	Gear Box	ZQ500	85.8	Set	1	
42	Motor	YCT225-4B	85	Set	1	
43	Gear Box	ZQ40	85.8	Set	1	
44	Centrifugal		84.2	Set	4	
45	Crystallizer			Set	5	
46	Sugar dust collector		85.4	Set	1	
47	Hopper	9m ³	84.2	Set	4	
48	Automatic Packing Machine	900Bag/hr	84.2	Set	6	
49	Iron Separator	1400*770*650	85.2	Set	2	
50	Hopper	74m ³	84.2	Set	2	

Main component of sugar plant

No	Items	Remark
1	Process Plant Boiling Section	
2	Process Plant Sugar Drying & Packing Section	
3	Process Plant Clarification, Heating & Exaporation Section	
4	Process Plant Lime Emulsification Section	
5	Process Plant Clarify and Filtration Section	
6	Mill Plant	
7	Cane self-discharging System	
8	Water Treatment Boiler	
9	Raw Water Treatment	
10	Boiler	
11	Turbine	
12	Steel Plate Materials and Refractory Materials	
13	DCS Automatic Control & Equipment	
14	Electrical Control Equipment and Accessories	
15	Vehicles	
16	Spare Parts	

	<p>ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော် စက်မှုဝန်ကြီးဌာန စက်မှုကြီးကြပ်ရေးနှင့်စစ်ဆေးရေးဦးစီးဌာန ဘွဲ့လ်လာအသုံးပြုခွင့်လက်မှတ်</p>	<p>ဘွဲ့လ်လာဥပဒေ ပုဒ်မ ၃၃၊ ပုဒ်မ ၃၄ ပုဒ်မ ၃၆ (ခ)</p>
စာအမှတ်၊ $\frac{၈၈}{၂၅၂၇-၂၅၂၄}$ / ၈၀၀ / ၀-၆၆		
ဘွဲ့လ်လာမှတ်ပုံတင်အမှတ်၊ မစ - ၆၆၂၈	ဘွဲ့လ်လာအမျိုးအစား - ၀၅ ဣ	
မီးရိုက်ရမည့်အပြင်အချိန် - ၁၃၃၀.၆ န ^၂	ထုတ်လုပ်သည့်နိုင်ငံနှင့် ခုနှစ် - CHINA, 2013	
ပိုင်ရှင်နှင့်လုပ်ငန်းအမည် -	ဦးသိန်း နေ (MO)၊ ဦးစု ဝယ်သ နေ - ၀ နေ	
ဘွဲ့လ်လာတည်နေရာ - ၅၅ ကော်ဗွေ၊ ဦးစု ဝယ်သ နေ၊ ၅၅ ကော်ဗွေ၊ ဦးစု ဝယ်သ နေ		
စစ်ဆေးတွေ့ရှိချက်များ (ဖိအားခံအစိတ်အပိုင်းများ)		
သံပြားအထူအပါး - ၅/၁၆ - ၄၆.၈၈ - ထိပ်ပိတ်ပြား - ၄၆.၈၈ - ဖလူး/မီးသေတ္တာ -	ဘွဲ့လ်လာအခြေအနေ - ၀ နေ ဝယ်သ နေ အနည်းဆုံးတွက်ချက်ရဖိအား - 4.68 MPa	
ဖိအားပြန်စစ်ချိန်ကို စစ်ဆေးခြင်း - ၅၅ ကော်ဗွေ ဝယ်သ နေ		
ပြုပြင်မှုများ - /		
ရေဖိအား 4.8 MPa ဖြင့် ၁၆.၁၁.၂၀၂၂ နေ့တွင် စစ်ဆေးပြီးဖြစ်သည်။		
Spring Loaded အန္တရာယ်ကင်းဖိအားထိန်းအဆိုရင်ကို 3.8 MPa ဖိအားထက်မပိုစေရ။		
စစ်ဆေးခငွေကျပ် ၁၅၀,၀၀၀/- ကို ၁၇.၁၁.၂၀၂၂ နေ့တွင် ပေးသွင်းသည်။		
ခွင့်ပြုဖိအား 3.8 MPa ဖြင့် ၁၆.၁၁.၂၀၂၂ နေ့မှ ၁၆.၁၂.၂၀၂၂ နေ့အထိ အသုံးပြုရန်ခွင့်ပြုသည်။		
၂၀၂၂ ခုနှစ်၊ ဇူလိုင်လ၊ ၁၆ ရက်နေ့တွင် လက်မှတ်ရေးထိုးသည်။		
 (အလှူခံ)၊ ပြည်နယ်/တိုင်းဒေသကြီး ဘွဲ့လ်လာစစ်ဆေးရေးမှူး	 (ထိုး ဝင် ဝင်) ဘွဲ့လ်လာစစ်ဆေးရေးမှူး လက်ထောက်ညွှန်ကြားရေးမှူး (ဘွဲ့လ်လာစစ်ဆေးရေး)	
ဒုတိယညွှန်ကြားရေးမှူး (ဘွဲ့လ်လာစစ်ဆေးရေး) ရုပ်ပြည်နယ်စက်မှုကြီးကြပ်ရေးနှင့် စစ်ဆေးရေးဦးစီးဌာန တောင်ကြီးမြို့။	 ဘွဲ့လ်လာစစ်ဆေးရေးမှူးချုပ် ညွှန်ကြားရေးမှူး ဘွဲ့လ်လာစစ်ဆေးရေး	

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WTL-RE-001
 Issue Date - 01-12-2012
 Effective Date - 01-12-2012
 Issue No - 1.0/Page 1 of 2

WW0623 074

WATER QUALITY TEST RESULTS FORM

Client _____ MESC
 Nature of Water _____ Final Dischard Water
 Location _____ Project Site (မိုင်းရယ်)
 Date and Time of collection _____ 12.6.2023
 Date and Time of arrival at Laboratory _____ 13.6.2023
 Date and Time of commencing examination _____ 14.6.2023
 Date and Time of completing _____ 19.6.2023

Results of Water Analysis

pH	7.6	
Colour (True)		TCU
Turbidity		NTU
Conductivity		micro S/cm
Total Hardness		mg/l as CaCO ₃
Calcium Hardness		mg/l as CaCO ₃
Magnesium Hardness		mg/l as CaCO ₃
Total Alkalinity		mg/l as CaCO ₃
Phenolphthalein Alkalinity		mg/l as CaCO ₃
Carbonate (CaCO ₃)		mg/l as CaCO ₃
Bicarbonate (HCO ₃)		mg/l as CaCO ₃
Iron		mg/l
Chloride (as CL)		mg/l
Sodium Chloride (as NaCL)		mg/l
Sulphate (as SO ₄)		mg/l
Total Solids		mg/l
Total Suspended Solids	22	mg/l
Total Dissolved Solids		mg/l
Manganese		mg/l
Phosphate		mg/l
Phenolphthalein Acidity		mg/l
Methyl Orange Acidity		mg/l
Salinity		ppt

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

Tested by
 Signature: _____
 Name: **Zaw Hein Oo**
B.Sc (Chemistry)
Sr.Chemist

Approved by
 Signature: _____
 Name: **Soe Thit**
B.E (Civil) 1980
Technical Officer
ISO TECH Laboratory

(a division of WEG Co.,Ltd.) **ISO Tech Laboratory**

No.18. Lanthit Road, Nanthargone Quarter, Insein Township, Yangon, Myanmar.
 Ph: 01-640955, 09-880100172, 09-880100173, 01-644506, E-mail: isotechlaboratory@gmail.com, Website: weg-myanmar.com

Laboratory Technical Consultant: U Saw Christopher Maung
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WTL-RE-001
 Issue Date - 01-12-2012
 Effective Date - 01-12-2012
 Issue No - 1.0/Page 2 of 2

WW0623 074

WATER QUALITY TEST RESULTS FORM

Client _____ MESC
 Nature of Water _____ Final Discharge Water
 Location _____ Project Site (ပိုင်ရယ်)
 Date and Time of collection _____ 12.6.2023
 Date and Time of arrival at Laboratory _____ 13.6.2023
 Date and Time of commencing examination _____ 14.6.2023
 Date and Time of completing _____ 19.6.2023

Results of Water Analysis

Temperature (°C)	25.0	°C	
Fluoride (F)		mg/l	
Lead (as Pb)		mg/l	
Arsenic (As)		mg/l	
Nitrate (N.NO ₃)		mg/l	
Chlorine (Residual)		mg/l	
Ammonia Nitrogen (NH ₃)		mg/l	
Ammonium Nitrogen (NH ₄)		mg/l	
Dissolved Oxygen (DO)		mg/l	
Chemical Oxygen Demand (COD)	32	mg/l	
Biochemical Oxygen Demand (BOD) (5 days at 20 °C)	10	mg/l	
Cyanide (CN)		mg/l	
Zinc (Zn)		mg/l	
Copper (Cu)		mg/l	
Silica (SiO ₂)		mg/l	

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

Tested by

Signature: _____

Name: _____

Hein
Zaw Hein Oo
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ISO Tech Laboratory

Approved by

Signature: _____

Name: _____

Soe Thit
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Environmental Services Co., Ltd

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Yangon Region, Myanmar
Tel: 09-897 978 296, 09-5081451 E-mail: gmescompany@gmail.com, info@gmes-mm.com

WASTEWATER QUALITY TEST RESULT FORM

Name of Customer: Myanmar Environment
Sustainable Conservation-MESC Co., Ltd.

Date of Sample Collection: - 9.6.2023

Name of Person:




Date of Sample Arrival to Lab: 10.6.2023

Contact:

Date of Issued of Result: 19.6.2023

WASTEWATER QUALITY ANALYSIS RESULT

Sr. No.	Parameters	Unit	Analysis Values	Minimum Measurement Range of Methods	National Environmental Quality (Emission) Guidelines General Application
			Final Discharge Water		
1.	Oil and Grease	mg/l	<5	5	10

Analyzed By	Checked By	Approved By
		
Ma Hsu Pyae Hla Naing Lab Technician (Laboratory)	U Myo Min Ko Lab Supervisor (Laboratory)	U Tun Lin Kyaw In-Charge (Laboratory)

ALARM Ecological Laboratory

Water Testing Result Report



Report Number: EL-WR-23-01642		Date : June 20, 2023			
Client Information Client Name : M.E.S.C Organization : - Client ID : - Registration Date & Time : 13.6.2023; 3:40 PM Contact : 09-795347148 Email : myanmar.esc@gmail.com Testing Purpose : -		Sample Information Sample ID : 9780 Sample Name : Final Discharge Water Sample Type / Source : Waste Sampling Date & Time : 12.6.23 ; 10:00 AM Sample Location : မိုင်းရယ်, ရှမ်းပြည်နယ် 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	Emission Standards	Remarks
1	Total Phosphorous ³	1	mg/L	≤2 ^d	Normal
2	Total Nitrogen ³	15.6	mg/L	-	-
2"ND" = Not Detected		"LOD" = Lower limit of detection		" - " = No Reference Standard	
Tested by		Checked by		Approved by	
Daw May Myat Thaine 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

WATER QUALITY TEST RESULTS FORM

Client _____ MESC
 Nature of Water _____ Final Wastewater Pond
 Location _____ Project Site (မိုင်းရယ်)
 Date and Time of collection _____ 12.6.2023
 Date and Time of arrival at Laboratory _____ 13.6.2023
 Date and Time of commencing examination _____ 14.6.2023
 Date and Time of completing _____ 19.6.2023

Results of Water Analysis

pH	8.0	
Colour (True)	TCU	
Turbidity	NTU	
Conductivity	micro S/cm	
Total Hardness	mg/l as CaCO ₃	
Calcium Hardness	mg/l as CaCO ₃	
Magnesium Hardness	mg/l as CaCO ₃	
Total Alkalinity	mg/l as CaCO ₃	
Phenolphthalein Alkalinity	mg/l as CaCO ₃	
Carbonate (CaCO ₃)	mg/l as CaCO ₃	
Bicarbonate (HCO ₃)	mg/l as CaCO ₃	
Iron	mg/l	
Chloride (as CL)	mg/l	
Sodium Chloride (as NaCL)	mg/l	
Sulphate (as SO ₄)	mg/l	
Total Solids	mg/l	
Total Suspended Solids	55 mg/l	
Total Dissolved Solids	mg/l	
Manganese	mg/l	
Phosphate	mg/l	
Phenolphthalein Acidity	mg/l	
Methyl Orange Acidity	mg/l	
Salinity	ppt	

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

Tested by
 Signature: Zaw Hein Oo
 Name: B.Sc (Chemistry)
Sr.Chemist

Approved by
 Signature: Soe Thit
 Name: B.E (Civil) 1980
Technical Officer
ISO TECH Laboratory

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WW0623 075

WATER QUALITY TEST RESULTS FORM


Client	MESC
Nature of Water	Final Wastewater Pond
Location	Project Site (မိုင်းရယ်)
Date and Time of collection	12.6.2023
Date and Time of arrival at Laboratory	13.6.2023
Date and Time of commencing examination	14.6.2023
Date and Time of completing	19.6.2023

Results of Water Analysis

Temperature (°C)	25.0	°C	
Fluoride (F)		mg/l	
Lead (as Pb)		mg/l	
Arsenic (As)		mg/l	
Nitrate (N.NO ₃)		mg/l	
Chlorine (Residual)		mg/l	
Ammonia Nitrogen (NH ₃)		mg/l	
Ammonium Nitrogen (NH ₄)		mg/l	
Dissolved Oxygen (DO)		mg/l	
Chemical Oxygen Demand (COD)	96	mg/l	
Biochemical Oxygen Demand (BOD) (5 days at 20 °C)	40	mg/l	
Cyanide (CN)		mg/l	
Zinc (Zn)		mg/l	
Copper (Cu)		mg/l	
Silica (SiO ₂)		mg/l	

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

Tested by

Signature: 

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

Approved by

Signature: 

Name: **Soe Thit**
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 Technical Officer
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Yangon Region, Myanmar

Tel: 09 897 978 296, 09-5081451 E-mail: gmescompany@gmail.com, info@gmes-mm.com

WASTEWATER QUALITY TEST RESULT FORM

Name of Customer: Myanmar Environment Sustainable Conservation-MESC Co., Ltd.

Date of Sample Collection: - 9.6.2023

Name of Person:




Date of Sample Arrival to Lab: 10.6.2023

Contact:

Date of Issued of Result: 19.6.2023

WASTEWATER QUALITY ANALYSIS RESULT

Sr. No.	Parameters	Unit	Analysis Values	Minimum Measurement Range of Methods	National Environmental Quality (Emission) Guidelines General Application
			Final Waste Pond		
1.	Oil and Grease	mg/l	6	5	10

Analyzed By	Checked By	Approved By
		
Ma Hsu Pyae Hla Naing Lab Technician (Laboratory)	U Myo Min Ko Lab Supervisor (Laboratory)	U Tun Lin Kyaw In-Charge (Laboratory)

ALARM Ecological Laboratory

Water Testing Result Report



Report Number: EL-WR-23-01643		Date : June 20, 2023			
Client Information Client Name : M.E.S.C Organization : Client ID : - Registration Date & Time : 13.6.2023; 3:40 PM Contact : 09-795347148 Email : myanmar.esc@gmail.com Testing Purpose : -		Sample Information Sample ID : 9781 Sample Name : Final Waste Water (Pond) Sample Type / Source : Waste Sampling Date & Time : 12.6.23 ; 10:00 AM Sample Location : မိုင်းရယ်ရမ်းပြည်နယ် Latitude : - Longitude : -			
Testing Results <i>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</i>					
Sr.	Quality Parameters	Results	Units	Emission Standards	Remarks
1	Total Phosphorous ³	4.7	mg/L	≤2 ^d	Above the limit
2	Total Nitrogen ³	8.7	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

M0623 024

WATER QUALITY TEST (MICROBIOLOGY) RESULTS FORM

Client _____ MESC
 Nature of Water _____ ရေအားရေ
 Location _____ ST - 1 (မိုင်းရယ်)
 Date and Time of collection _____ 12.6.2023
 Date and Time of arrival at Laboratory _____ 13.6.2023
 Date and Time of commencing examination _____ 13.6.2023
 Date and Time of completing _____ 14.6.2023

Results of Water Analysis

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

Total Coliform Count	30	CFU/100ml	Not detected
Thermotolerant (fecal) Coliform Count	10	CFU/100ml	Not detected
pH	7.2		6.5 - 8.5
Turbidity	26	NTU	5 NTU
Colour (True)	10	TCU	15 TCU
Free Chlorine	Nil	mg/l	
Total Chlorine	Nil	mg/l	

*Date & Time water sample collection error.

Remark : Unsatisfactory for drinking purpose.

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

: < - Less than

Tested by

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

Approved by

Signature: Soe Thit
 Name: B.E (Civil) 1980
Technical Officer
ISO TECH Laboratory

(a division of WEG Co.,Ltd.)

No.18, Lanthit Road, Nanthargone Quarter, Insein Township, Yangon, Myanmar.
 Ph: 01-640955, 09-880100172, 09-880100173, 01-644506, E-mail: isotechlaboratory@gmail.com, Website: weg-myanmar.com

W0623 323

WATER QUALITY TEST RESULTS FORM

Client _____ MESC
 Nature of Water _____ ရေပင်းရေ
 Location _____ ST - 1 (မိုင်းရယ်)
 Date and Time of collection _____ 12.6.2023
 Date and Time of arrival at Laboratory _____ 13.6.2023
 Date and Time of commencing examination _____ 14.6.2023
 Date and Time of completing _____ 16.6.2023

Results of Water Analysis

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

pH	7.2		6.5 - 8.5
Colour (True)	10	TCU	15 TCU
Turbidity	26	NTU	5 NTU
Conductivity		micro S/cm	
Total Hardness	144	mg/l as CaCO ₃	500 mg/l as CaCO ₃
Calcium Hardness		mg/l as CaCO ₃	
Magnesium Hardness		mg/l as CaCO ₃	
Total Alkalinity		mg/l as CaCO ₃	
Phenolphthalein Alkalinity		mg/l as CaCO ₃	
Carbonate (CaCO ₃)		mg/l as CaCO ₃	
Bicarbonate (HCO ₃)		mg/l as CaCO ₃	
Iron	0.62	mg/l	0.3 mg/l
Chloride (as CL)	3	mg/l	250 mg/l
Sodium Chloride (as NaCL)		mg/l	
Sulphate (as SO ₄)	10	mg/l	500 mg/l
Total Solids		mg/l	1500 mg/l
Total Suspended Solids		mg/l	
Total Dissolved Solids	150	mg/l	1000 mg/l
Manganese	Nil	mg/l	0.05 mg/l
Phosphate		mg/l	
Phenolphthalein Acidity		mg/l	
Methyl Orange Acidity		mg/l	
Salinity		ppt	

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

Tested by
 Signature: _____
 Name: **Zaw Hein Oo**
B.Sc (Chemistry)
Sr.Chemist

Approved by
 Signature: _____
 Name: **Soe Thit**
B.E (Civil) 1980
Technical Officer
ISO TECH Laboratory

(a division of WEG Co.,Ltd.) **ISO Tech Laboratory**

No.18. Lanthit Road, Nanthargone Quarter, Insein Township, Yangon, Myanmar.
 Ph: 01-640955, 09-880100172, 09-880100173, 01-644506, E-mail: isotechlaboratory@gmail.com, Website: weg-myanmar.com

W0623 323

WATER QUALITY TEST RESULTS FORM

Client	MESC
Nature of Water	ချောင်းရေ
Location	ST - 1 (မိုင်းရယ်)
Date and Time of collection	12.6.2023
Date and Time of arrival at Laboratory	13.6.2023
Date and Time of commencing examination	14.6.2023
Date and Time of completing	16.6.2023

Results of Water Analysis

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

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

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

Tested by

Signature:

Name:

Hein
Zaw Hein Oo
B.Sc (Chemistry)
Sr. Chemist
ISO Tech Laboratory

Approved by

Signature:

Name:

Soe Thit
Soe Thit
B.E (Civil) 1980
Technical Officer
ISO TECH Laboratory

(a division of WEG Co.,Ltd.)

No.18. Lanthit Road, Nanthargone Quarter, Insein Township, Yangon, Myanmar.
Ph: 01-640955, 09-880100172, 09-880100173, 01-644506, E-mail: isotechlaboratory@gmail.com, Website: weg-myanmar.com

WATER QUALITY TEST (MICROBIOLOGY) RESULTS FORM

Client	MESC
Nature of Water	ချောင်းရေ
Location	ST - 2 (မိုင်းရယ်)
Date and Time of collection	12.6.2023
Date and Time of arrival at Laboratory	13.6.2023
Date and Time of commencing examination	13.6.2023
Date and Time of completing	14.6.2023

Results of Water Analysis

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

Total Coliform Count	30	CFU/100ml	Not detected
Thermotolerant (fecal) Coliform Count	10	CFU/100ml	Not detected
pH	7.3		6.5 - 8.5
Turbidity	38	NTU	5 NTU
Colour (True)	20	TCU	15 TCU
Free Chlorine	Nil	mg/l	
Total Chlorine	Nil	mg/l	

*Date & Time water sample collection error.

Remark : Unsatisfactory for drinking purpose.

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

: < - Less than

Tested by

Signature:

Name:

Hein
Zaw Hein Oo
B.Sc (Chemistry)
Sr.Chemist
ISO Tech Laboratory

Approved by

Signature:

Name:

Soe Thit
Soe Thit
B.E (Civil) 1980
Technical Officer
ISO TECH Laboratory

(a division of WEG Co.,Ltd.)

No.18. Lanthit Road, Nanthargone Quarter, Insein Township, Yangon, Myanmar.
 Ph: 01-640955, 09-880100172, 09-880100173, 01-644506, E-mail: isotechlaboratory@gmail.com, Website: weg-myanmar.com

WATER QUALITY TEST RESULTS FORM

Client _____ MESC
 Nature of Water _____ ရေစိုင်းရေ
 Location _____ ST - 2 (မိုင်းရယ်)
 Date and Time of collection _____ 12.6.2023
 Date and Time of arrival at Laboratory _____ 13.6.2023
 Date and Time of commencing examination _____ 14.6.2023
 Date and Time of completing _____ 16.6.2023

Results of Water Analysis

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

pH	7.3		6.5 - 8.5
Colour (True)	20	TCU	15 TCU
Turbidity	38	NTU	5 NTU
Conductivity		micro S/cm	
Total Hardness	140	mg/l as CaCO ₃	500 mg/l as CaCO ₃
Calcium Hardness		mg/l as CaCO ₃	
Magnesium Hardness		mg/l as CaCO ₃	
Total Alkalinity		mg/l as CaCO ₃	
Phenolphthalein Alkalinity		mg/l as CaCO ₃	
Carbonate (CaCO ₃)		mg/l as CaCO ₃	
Bicarbonate (HCO ₃)		mg/l as CaCO ₃	
Iron	0.77	mg/l	0.3 mg/l
Chloride (as CL)	3	mg/l	250 mg/l
Sodium Chloride (as NaCL)		mg/l	
Sulphate (as SO ₄)	18	mg/l	500 mg/l
Total Solids		mg/l	1500 mg/l
Total Suspended Solids		mg/l	
Total Dissolved Solids	147	mg/l	1000 mg/l
Manganese	Nil	mg/l	0.05 mg/l
Phosphate		mg/l	
Phenolphthalein Acidity		mg/l	
Methyl Orange Acidity		mg/l	
Salinity		ppt	

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

Tested by
 Signature: Zaw Hein Oo
 Name: B.Sc (Chemistry)
Sr.Chemist

Approved by
 Signature: Soe Thit
 Name: B.E (Civil) 1980
Technical Officer
ISO TECH Laboratory

(a division of WEG Co.,Ltd. ISO Tech Laboratory)

No.18. Lanthit Road, Nanthargone Quarter, Insein Township, Yangon, Myanmar.
 Ph: 01-640955, 09-880100172, 09-880100173, 01-644506, E-mail: isotechlaboratory@gmail.com, Website: weg-myanmar.com

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

WTL-RE-001
 Issue Date - 01-12-2012
 Effective Date - 01-12-2012
 Issue No - 1.0/Page 2 of 2

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WATER QUALITY TEST RESULTS FORM

Client _____ MESC
 Nature of Water _____ ချောင်းရေ
 Location _____ ST - 2 (မိုင်းရယ်)
 Date and Time of collection _____ 12.6.2023
 Date and Time of arrival at Laboratory _____ 13.6.2023
 Date and Time of commencing examination _____ 14.6.2023
 Date and Time of completing _____ 16.6.2023

Results of Water Analysis

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

Parameter	Result	Unit	Guideline
Temperature (°C)		°C	
Fluoride (F)		mg/l	1.5 mg/l
Lead (as Pb)		mg/l	0.01 mg/l
Arsenic (As)	Nil	mg/l	0.01 mg/l
Nitrate (N.NO ₃)	0.7	mg/l	50 mg/l
Chlorine (Residual)		mg/l	
Ammonia Nitrogen (NH ₃)		mg/l	
Ammonium Nitrogen (NH ₄)		mg/l	
Dissolved Oxygen (DO)		mg/l	
Chemical Oxygen Demand (COD)		mg/l	
Biochemical Oxygen Demand (BOD) (5 days at 20 °C)		mg/l	
Cyanide (CN)		mg/l	0.07 mg/l
Zinc (Zn)		mg/l	3 mg/l
Copper (Cu)		mg/l	2 mg/l
Silica (SiO ₂)		mg/l	

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

Tested by

Signature: _____

Name: _____

Hein
Zaw Hein Oo
 B.Sc.(Chemistry)
 Sr.Chemist
 ISO Tech Laboratory

Approved by

Signature: _____

Name: _____

Soe Thit
Soe Thit
 B.E (Civil) 1980
 Technical Officer
 ISO TECH Laboratory

(a division of WEG Co.,Ltd.)

No.18. Lanthit Road, Nanthargone Quarter, Insein Township, Yangon, Myanmar.
 Ph: 01-640955, 09-880100172, 09-880100173, 01-644506, E-mail: isotechlaboratory@gmail.com, Website: weg-myanmar.com

M0623 026

WATER QUALITY TEST (MICROBIOLOGY) RESULTS FORM

Client	MESC
Nature of Water	ချောင်းရေ
Location	ST - 3 (မိုင်းရယ်)
Date and Time of collection	12.6.2023
Date and Time of arrival at Laboratory	13.6.2023
Date and Time of commencing examination	13.6.2023
Date and Time of completing	14.6.2023

Results of Water Analysis

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

Total Coliform Count	36	CFU/100ml	Not detected
Thermotolerant (fecal) Coliform Count	12	CFU/100ml	Not detected
pH	7.3		6.5 - 8.5
Turbidity	52	NTU	5 NTU
Colour (True)	30	TCU	15 TCU
Free Chlorine	Nil	mg/l	
Total Chlorine	Nil	mg/l	

*Date & Time water sample collection error.

Remark : Unsatisfactory for drinking purpose.

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

: < - Less than

Tested by

Signature: 

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

Approved by

Signature: 

Name: **Soe Thit**
B.E (Civil) 1980
Technical Officer
ISO TECH Laboratory

(a division of WEG Co.,Ltd.)

No.18. Lanthit Road, Nanthargone Quarter, Insein Township, Yangon, Myanmar.
 Ph: 01-640955, 09-880100172, 09-880100173, 01-644506, E-mail: isotechlaboratory@gmail.com, Website: weg-myanmar.com

W0623 325

WATER QUALITY TEST RESULTS FORM

Client _____ MESC
 Nature of Water _____ ရေပိုင်းရေ
 Location _____ ST - 3 (မိုင်းရယ်)
 Date and Time of collection _____ 12.6.2023
 Date and Time of arrival at Laboratory _____ 13.6.2023
 Date and Time of commencing examination _____ 14.6.2023
 Date and Time of completing _____ 16.6.2023

Results of Water Analysis

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

pH	7.3		6.5 - 8.5
Colour (True)	30	TCU	15 TCU
Turbidity	52	NTU	5 NTU
Conductivity		micro S/cm	
Total Hardness	140	mg/l as CaCO ₃	500 mg/l as CaCO ₃
Calcium Hardness		mg/l as CaCO ₃	
Magnesium Hardness		mg/l as CaCO ₃	
Total Alkalinity		mg/l as CaCO ₃	
Phenolphthalein Alkalinity		mg/l as CaCO ₃	
Carbonate (CaCO ₃)		mg/l as CaCO ₃	
Bicarbonate (HCO ₃)		mg/l as CaCO ₃	
Iron	0.82	mg/l	0.3 mg/l
Chloride (as CL)	3	mg/l	250 mg/l
Sodium Chloride (as NaCL)		mg/l	
Sulphate (as SO ₄)	20	mg/l	500 mg/l
Total Solids		mg/l	1500 mg/l
Total Suspended Solids		mg/l	
Total Dissolved Solids	149	mg/l	1000 mg/l
Manganese	Nil	mg/l	0.05 mg/l
Phosphate		mg/l	
Phenolphthalein Acidity		mg/l	
Methyl Orange Acidity		mg/l	
Salinity		ppt	

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

Tested by
 Signature: _____
 Name: **Zaw Hein Oo**
B.Sc (Chemistry)
Sr.Chemist

Approved by
 Signature: _____
 Name: **Soe Thit**
B.E (Civil) 1980
Technical Officer
ISO TECH Laboratory

(a division of WEG Co.,Ltd.) ISO Tech Laboratory

No.18. Lanthit Road, Nanthargone Quarter, Insein Township, Yangon, Myanmar.
 Ph: 01-640955, 09-880100172, 09-880100173, 01-644506, E-mail: isotechlaboratory@gmail.com, Website: weg-myanmar.com

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

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 Issue Date - 01-12-2012
 Effective Date - 01-12-2012
 Issue No - 1.0/Page 2 of 2

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WATER QUALITY TEST RESULTS FORM

Client MESC
 Nature of Water ချောင်းရေ
 Location ST - 3 (မိုင်းရယ်)
 Date and Time of collection 12.6.2023
 Date and Time of arrival at Laboratory 13.6.2023
 Date and Time of commencing examination 14.6.2023
 Date and Time of completing 16.6.2023

Results of Water Analysis

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

Parameter	Unit	Result	WHO Guideline
Temperature (°C)	°C		
Fluoride (F)	mg/l		1.5 mg/l
Lead (as Pb)	mg/l		0.01 mg/l
Arsenic (As)	mg/l	Nil	0.01 mg/l
Nitrate (N.NO ₃)	mg/l	0.8	50 mg/l
Chlorine (Residual)	mg/l		
Ammonia Nitrogen (NH ₃)	mg/l		
Ammonium Nitrogen (NH ₄)	mg/l		
Dissolved Oxygen (DO)	mg/l		
Chemical Oxygen Demand (COD)	mg/l		
Biochemical Oxygen Demand (BOD) (5 days at 20 °C)	mg/l		
Cyanide (CN)	mg/l		0.07 mg/l
Zinc (Zn)	mg/l		3 mg/l
Copper (Cu)	mg/l		2 mg/l
Silica (SiO ₂)	mg/l		

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

Tested by

Signature: *Hein*

Name: Zaw Hein Oo

**B.Sc (Chemistry)
 Sr.Chemist
 ISO Tech Laboratory**

Approved by

Signature: *Soe Thit*

Name: Soe Thit

**B.E (Civil) 1980
 Technical Officer
 ISO TECH Laboratory**

(a division of WEG Co.,Ltd.)

No.18. Lanthit Road, Nanthargone Quarter, Insein Township, Yangon, Myanmar.
 Ph: 01-640955, 09-880100172, 09-880100173, 01-644506, E-mail: isotechlaboratory@gmail.com, Website: weg-myanmar.com

M0623 027

WATER QUALITY TEST (MICROBIOLOGY) RESULTS FORM

Client	MESC
Nature of Water	ချောင်းရေ
Location	ST - 4 (ပိုင်းရယ်)
Date and Time of collection	12.6.2023
Date and Time of arrival at Laboratory	13.6.2023
Date and Time of commencing examination	13.6.2023
Date and Time of completing	14.6.2023

Results of Water Analysis

WHO Drinking Water Guideline (Geneva - 1993)

Total Coliform Count	10	CFU/100ml	Not detected
Thermotolerant (fecal) Coliform Count	4	CFU/100ml	Not detected
pH	7.3		6.5 - 8.5
Turbidity	10	NTU	5 NTU
Colour (True)	5	TCU	15 TCU
Free Chlorine	Nil	mg/l	
Total Chlorine	Nil	mg/l	

*Date & Time water sample collection error.

Remark : Unsatisfactory for drinking purpose.

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

: < - Less than

Tested by

Signature:

Name:

Hein
Zaw Hein Oo
 B.Sc (Chemistry)
 Sr.Chemist
 ISO Tech Laboratory

Approved by

Signature:

Name:

Soe Thit
Soe Thit
 B.E (Civil) 1980
 Technical Officer
 ISO TECH Laboratory

(a division of WEG Co.,Ltd.)

No.18. Lanthit Road, Nanthargone Quarter, Insein Township, Yangon, Myanmar.
 Ph: 01-640955, 09-880100172, 09-880100173, 01-644506, E-mail: isotechlaboratory@gmail.com, Website: weg-myanmar.com

Laboratory Technical Consultant: U Saw Christopher Maung

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

W0623 326

WTL-RE-001

Issue Date - 01-12-2012

Effective Date - 01-12-2012

Issue No - 1.0/Page 1 of 2

WATER QUALITY TEST RESULTS FORM

Client _____ MESC
 Nature of Water _____ ရေတိုင်းရေ
 Location _____ ST - 4 (မိုင်းရယ်)
 Date and Time of collection _____ 12.6.2023
 Date and Time of arrival at Laboratory _____ 13.6.2023
 Date and Time of commencing examination _____ 14.6.2023
 Date and Time of completing _____ 16.6.2023

Results of Water Analysis

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

pH	7.3		6.5 - 8.5
Colour (True)	5	TCU	15 TCU
Turbidity	10	NTU	5 NTU
Conductivity		micro S/cm	
Total Hardness	142	mg/l as CaCO ₃	500 mg/l as CaCO ₃
Calcium Hardness		mg/l as CaCO ₃	
Magnesium Hardness		mg/l as CaCO ₃	
Total Alkalinity		mg/l as CaCO ₃	
Phenolphthalein Alkalinity		mg/l as CaCO ₃	
Carbonate (CaCO ₃)		mg/l as CaCO ₃	
Bicarbonate (HCO ₃)		mg/l as CaCO ₃	
Iron	0.38	mg/l	0.3 mg/l
Chloride (as CL)	3	mg/l	250 mg/l
Sodium Chloride (as NaCL)		mg/l	
Sulphate (as SO ₄)	13	mg/l	500 mg/l
Total Solids		mg/l	1500 mg/l
Total Suspended Solids		mg/l	
Total Dissolved Solids	149	mg/l	1000 mg/l
Manganese	Nil	mg/l	0.05 mg/l
Phosphate		mg/l	
Phenolphthalein Acidity		mg/l	
Methyl Orange Acidity		mg/l	
Salinity		ppt	

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

Tested by
 Signature: Hein
 Name: Zaw Hein Oo
B.Sc (Chemistry)
Sr.Chemist

Approved by
 Signature: Soe Thit
 Name: B.E (Civil) 1980
Technical Officer
ISO TECH Laboratory

(a division of WEG Co.,Ltd.) ISO Tech Laboratory

No. 18, Lanthit Road, Nanthargone Quarter, Insein Township, Yangon, Myanmar.

Ph: 01-640955, 09-880100172, 09-880100173, 01-644506, E-mail: isotechlaboratory@gmail.com, Website: weg-myanmar.com

W0623 326

WATER QUALITY TEST RESULTS FORM

Client _____ MESC
 Nature of Water _____ ရေပိုင်းရေ
 Location _____ ST - 4 (မိုင်းရယ်)
 Date and Time of collection _____ 12.6.2023
 Date and Time of arrival at Laboratory _____ 13.6.2023
 Date and Time of commencing examination _____ 14.6.2023
 Date and Time of completing _____ 16.6.2023

Results of Water Analysis

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

Parameter	Unit	Value	Guideline (mg/l)
Temperature (°C)	°C		
Fluoride (F)	mg/l		1.5 mg/l
Lead (as Pb)	mg/l		0.01 mg/l
Arsenic (As)	mg/l	Nil	0.01 mg/l
Nitrate (N.NO ₃)	mg/l	0.7	50 mg/l
Chlorine (Residual)	mg/l		
Ammonia Nitrogen (NH ₃)	mg/l		
Ammonium Nitrogen (NH ₄)	mg/l		
Dissolved Oxygen (DO)	mg/l		
Chemical Oxygen Demand (COD)	mg/l		
Biochemical Oxygen Demand (BOD) (5 days at 20 °C)	mg/l		
Cyanide (CN)	mg/l		0.07 mg/l
Zinc (Zn)	mg/l		3 mg/l
Copper (Cu)	mg/l		2 mg/l
Silica (SiO ₂)	mg/l		

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

Tested by

Signature: _____

Name: _____

Hein
Zaw Hein Oo
 B.Sc.(Chemistry)
 Sr.Chemist
 ISO Tech Laboratory

Approved by

Signature: _____

Name: _____

Soe Thit
Soe Thit
 B.E (Civil) 1980
 Technical Officer
 ISO TECH Laboratory

(a division of WEG Co.,Ltd.)

No.18. Lanthit Road, Nanthargone Quarter, Insein Township, Yangon, Myanmar.
 Ph: 01-640955, 09-880100172, 09-880100173, 01-644506, E-mail: isotechlaboratory@gmail.com, Website: weg-myanmar.com

WATER QUALITY TEST (MICROBIOLOGY) RESULTS FORM

Client	MESC
Nature of Water	ချောင်းရေ
Location	နားလုံ (မိုင်းရယ်)
Date and Time of collection	12.6.2023
Date and Time of arrival at Laboratory	13.6.2023
Date and Time of commencing examination	13.6.2023
Date and Time of completing	14.6.2023

Results of Water Analysis

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

Total Coliform Count	40	CFU/100ml	Not detected
Thermotolerant (fecal) Coliform Count	12	CFU/100ml	Not detected
pH	7.4		6.5 - 8.5
Turbidity	62	NTU	5 NTU
Colour (True)	40	TCU	15 TCU
Free Chlorine	Nil	mg/l	
Total Chlorine	Nil	mg/l	

*Date & Time water sample collection error.

Remark : Unsatisfactory for drinking purpose.

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

: < - Less than

Tested by

Signature:

Name:

Heiny
Zaw Hein Oo
 B.Sc (Chemistry)
 Sr.Chemist
 ISO Tech Laboratory

Approved by

Signature:

Name:

Soe Thit
Soe Thit
 B.E (Civil) 1980
 Technical Officer
 ISO TECH Laboratory

(a division of WEG Co.,Ltd.)

No.18. Lanthit Road, Nanthargone Quarter, Insein Township, Yangon, Myanmar.
 Ph: 01-640955, 09-880100172, 09-880100173, 01-644506, E-mail: isotechlaboratory@gmail.com, Website: weg-myanmar.com

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

WTL-RE-001
 Issue Date - 01-12-2012
 Effective Date - 01-12-2012
 Issue No - 1.0/Page 1 of 2

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WATER QUALITY TEST RESULTS FORM

Client _____ MESC
 Nature of Water _____ ရေကန်:ရေ
 Location _____ နားလုံ (မိုင်းရယ်)
 Date and Time of collection _____ 12.6.2023
 Date and Time of arrival at Laboratory _____ 13.6.2023
 Date and Time of commencing examination _____ 14.6.2023
 Date and Time of completing _____ 16.6.2023

Results of Water Analysis

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

pH	7.4		6.5 - 8.5
Colour (True)	40	TCU	15 TCU
Turbidity	62	NTU	5 NTU
Conductivity		micro S/cm	
Total Hardness	142	mg/l as CaCO ₃	500 mg/l as CaCO ₃
Calcium Hardness		mg/l as CaCO ₃	
Magnesium Hardness		mg/l as CaCO ₃	
Total Alkalinity		mg/l as CaCO ₃	
Phenolphthalein Alkalinity		mg/l as CaCO ₃	
Carbonate (CaCO ₃)		mg/l as CaCO ₃	
Bicarbonate (HCO ₃)		mg/l as CaCO ₃	
Iron	0.89	mg/l	0.3 mg/l
Chloride (as CL)	2	mg/l	250 mg/l
Sodium Chloride (as NaCL)		mg/l	
Sulphate (as SO ₄)	25	mg/l	500 mg/l
Total Solids		mg/l	1500 mg/l
Total Suspended Solids		mg/l	
Total Dissolved Solids	213	mg/l	1000 mg/l
Manganese	Nil	mg/l	0.05 mg/l
Phosphate		mg/l	
Phenolphthalein Acidity		mg/l	
Methyl Orange Acidity		mg/l	
Salinity		ppt	

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

Tested by
 Signature: Zaw Hein Oo
 Name: B.Sc (Chemistry)
 Sr.Chemist

Approved by
 Signature: Soe Thit
 Name: B.E (Civil) 1980
 Technical Officer
 ISO TECH Laboratory

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W0623 328

WATER QUALITY TEST RESULTS FORM

Client	MESC
Nature of Water	ချောင်းရေ
Location	နားလုံ (မိုင်းရယ်)
Date and Time of collection	12.6.2023
Date and Time of arrival at Laboratory	13.6.2023
Date and Time of commencing examination	14.6.2023
Date and Time of completing	16.6.2023


Results of Water Analysis

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

Parameter	Unit	Value	Guideline (mg/l)
Temperature (°C)	°C		
Fluoride (F)	mg/l		1.5 mg/l
Lead (as Pb)	mg/l		0.01 mg/l
Arsenic (As)	mg/l	Nil	0.01 mg/l
Nitrate (N.NO ₃)	mg/l	1.0	50 mg/l
Chlorine (Residual)	mg/l		
Ammonia Nitrogen (NH ₃)	mg/l		
Ammonium Nitrogen (NH ₄)	mg/l		
Dissolved Oxygen (DO)	mg/l		
Chemical Oxygen Demand (COD)	mg/l		
Biochemical Oxygen Demand (BOD) (5 days at 20 °C)	mg/l		
Cyanide (CN)	mg/l		0.07 mg/l
Zinc (Zn)	mg/l		3 mg/l
Copper (Cu)	mg/l		2 mg/l
Silica (SiO ₂)	mg/l		

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


Tested by

Signature: 

Name:

Zaw Hein Oo
 B.Sc (Chemistry)
 Sr.Chemist
 ISO Tech Laboratory

Approved by

Signature: 

Name:

Soe Thit
 B.E (Civil) 1980
 Technical Officer
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WATER QUALITY TEST (MICROBIOLOGY) RESULTS FORM

Client _____ MESC
 Nature of Water _____ ချောင်းရေ
 Location _____ ရန်တော်ကျေးရွာ (မိုင်းရယ်)
 Date and Time of collection _____ 12.6.2023
 Date and Time of arrival at Laboratory _____ 13.6.2023
 Date and Time of commencing examination _____ 13.6.2023
 Date and Time of completing _____ 14.6.2023

Results of Water Analysis

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

Total Coliform Count	8	CFU/100ml	Not detected
Thermotolerant (fecal) Coliform Count	2	CFU/100ml	Not detected
pH	7.3		6.5 - 8.5
Turbidity	7	NTU	5 NTU
Colour (True)	5	TCU	15 TCU
Free Chlorine	Nil	mg/l	
Total Chlorine	Nil	mg/l	

*Date & Time water sample collection error.

Remark : Unsatisfactory for drinking purpose.

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

: < - Less than

Tested by

Signature: _____

Name: _____

Hein
Zaw Hein Oo
 B.Sc (Chemistry)
 Sr.Chemist
 ISO Tech Laboratory

Approved by

Signature: _____

Name: _____

Soe Thit
Soe Thit
 B.E (Civil) 1980
 Technical Officer
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W0623 327

WATER QUALITY TEST RESULTS FORM

Client _____ MESC
 Nature of Water _____ ချောင်းရေ
 Location _____ ရှန်တော်ကျေးရွာ (မိုင်းရယ်)
 Date and Time of collection _____ 12.6.2023
 Date and Time of arrival at Laboratory _____ 13.6.2023
 Date and Time of commencing examination _____ 14.6.2023
 Date and Time of completing _____ 16.6.2023

Results of Water Analysis

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

pH	7.3		6.5 - 8.5
Colour (True)	5	TCU	15 TCU
Turbidity	7	NTU	5 NTU
Conductivity		micro S/cm	
Total Hardness	154	mg/l as CaCO ₃	500 mg/l as CaCO ₃
Calcium Hardness		mg/l as CaCO ₃	
Magnesium Hardness		mg/l as CaCO ₃	
Total Alkalinity		mg/l as CaCO ₃	
Phenolphthalein Alkalinity		mg/l as CaCO ₃	
Carbonate (CaCO ₃)		mg/l as CaCO ₃	
Bicarbonate (HCO ₃)		mg/l as CaCO ₃	
Iron	0.35	mg/l	0.3 mg/l
Chloride (as CL)	4	mg/l	250 mg/l
Sodium Chloride (as NaCL)		mg/l	
Sulphate (as SO ₄)	15	mg/l	500 mg/l
Total Solids		mg/l	1500 mg/l
Total Suspended Solids		mg/l	
Total Dissolved Solids	170	mg/l	1000 mg/l
Manganese	Nil	mg/l	0.05 mg/l
Phosphate		mg/l	
Phenolphthalein Acidity		mg/l	
Methyl Orange Acidity		mg/l	
Salinity		ppt	

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

Tested by
 Signature: Hein
 Name: Zaw Hein Oo
B.Sc (Chemistry)
Sr.Chemist

Approved by
 Signature: Soe Thit
 Name: B.E (Civil) 1980
Technical Officer
ISO TECH Laboratory

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W0623 327

WATER QUALITY TEST RESULTS FORM

Client	MESC
Nature of Water	ချောင်းရေ
Location	ရှန်တော်ကျေးရွာ (မိုင်းရယ်)
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Date and Time of arrival at Laboratory	13.6.2023
Date and Time of commencing examination	14.6.2023
Date and Time of completing	16.6.2023

Results of Water Analysis

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

Parameter	Result	Unit	Guideline
Temperature (°C)		°C	
Fluoride (F)		mg/l	1.5 mg/l
Lead (as Pb)		mg/l	0.01 mg/l
Arsenic (As)	Nil	mg/l	0.01 mg/l
Nitrate (N.NO ₃)	0.5	mg/l	50 mg/l
Chlorine (Residual)		mg/l	
Ammonia Nitrogen (NH ₃)		mg/l	
Ammonium Nitrogen (NH ₄)		mg/l	
Dissolved Oxygen (DO)		mg/l	
Chemical Oxygen Demand (COD)		mg/l	
Biochemical Oxygen Demand (BOD) (5 days at 20 °C)		mg/l	
Cyanide (CN)		mg/l	0.07 mg/l
Zinc (Zn)		mg/l	3 mg/l
Copper (Cu)		mg/l	2 mg/l
Silica (SiO ₂)		mg/l	

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

Tested by

Signature:

Name:

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1. Sulphur

2. PHYSICAL AND CHEMICAL PROPERTIES

Physical State : Solid / Liquid	Boiling Point in Degree C.: 444.6 °C	Vapour Pressure at 35 degree C : 1mm Hg
Appearance(Colour) : Yellow Powder or Rhombic Powder (Crystals)	Melting Point in degree C : 119 °C	Evaporation rate at 30 degree C: ----
Odour : No	Vapour Density (Air-1) : ---	Solubility in water at 30 degree C Insoluble
Others (Corrosivity, Etc) : Corrosive	Specific Gravity (Water-1): 2.07	PH: Acidic to Neutral.

3. FIRE AND EXPLOSIVE HAZARDS DATA

Explosion / Flammability : Combustible.(Dust can be explosive.)	Flash Point ° C: 207.2 ° C	Explosive range (dust suspended in air): 35–1400 g/m³	Autoignition Temperature ° C: 232° C
---	--------------------------------------	--	---

4. REACTIVE HAZARDS

	Impact : Stable.	Hazardous Combustion Production) : SO₂, H₂S
Stability	Static Discharge : Yes.	(Hazardous Decomposition Production) : No

2. Lime Powder

Section 1 - IDENTIFICATION

Supplier/Manufacturer

OLDCASTLE INDUSTRIAL MINERALS
110 Marble Street
Lee, MA 01238

Emergency Contact Information

(413) 243-0053

Product name

Quick Lime

Chemical family

Autoclave Lime - (CAS #1317-65-3)

Formula

CaO – 57%
MgO – 33%

Section 2 - COMPONENTS

Hazardous Ingredients

Respirable quartz (CAS# 14808-60-7) – greater than - 0.1% by weight
ACGIH TLV-TWA (1997) = 0.10 mg respirable quartz dust/m³
OSHA PEL (8-hour TWA) = (10 mg respirable dust/m³)/(percent silica + 2)
NIOSH REL (8-hour TWA) = 0.05 mg respirable dust/m³

Section 3 - HAZARD IDENTIFICATION

Emergency Overview

Exposure of sufficient duration to wet quick lime can cause serious, potentially irreversible tissue (skin or eye) destruction in the form of chemical (caustic) burns. The same type of tissue destruction can occur if wet or moist areas of the body are exposed for sufficient duration to dry quick lime.

Potential Health Effects

Relevant Routes of Exposure:

Eye contact, skin contact, inhalation, and ingestion.

Effects Resulting from Eye Contact:

Exposure to airborne dust may cause immediate or delayed irritation or inflammation. Eye contact by large amounts of dry powder or splashes of wet quick lime may cause effects ranging from moderate eye irritation to chemical burns or blindness. Such exposures require immediate first aid (see Section 4) and medical attention to prevent significant damage to the eye.

Effects Resulting from Skin Contact:

Discomfort or pain cannot be relied upon to alert a person to hazardous skin exposure. Consequently, the only effective means of avoiding skin injury or illness involves minimizing skin contact, particularly with wet quick lime. Exposed persons may not feel discomfort until hours after the exposure has ended and significant injury has occurred.

Dry quick lime contacting wet skin or exposure to moist or wet quick lime may cause more severe skin effects including thickening, cracking or fissuring of the skin. Prolonged exposure can cause severe skin damage in the form of (alkali) chemical burns.

Effects Resulting from Inhalation:

Exposure to quick lime may cause irritation or caustic burns to the moist mucous membranes of the nose, throat, and upper respiratory system. It may also leave unpleasant deposits in the nose.

QuickLime MSDS (2).doc

Effects Resulting from Ingestion:

Although small quantities of dust are not known to be harmful, ill effects are possible if larger quantities are consumed.

Carcinogenic potential:

Quick lime is **not** listed as a carcinogen by NTP, OSHA, or IARC. It may however, contain trace amounts of substances listed as carcinogens by these organizations.

Crystalline silica, a contaminate in quick lime, is now classified by IARC as known human carcinogen (Group I). NTP has characterized respirable silica as "reasonably anticipated to be [a] carcinogen".

Medical conditions which may be aggravated by, inhalation or dermal exposure:

Pre-existing upper respiratory and lung diseases.

Section 4 - FIRST AID

Eyes

Immediately flush eyes thoroughly with water. Continue flushing eye for at least 15 minutes, including under lids, to remove all particles. Call physician immediately.

Skin

Wash skin with cool water and pH-neutral soap or a mild detergent. Seek medical treatment in all cases of prolonged exposure to quick lime/lime mixtures, liquids from fresh lime products, or prolonged wet skin exposure to dry quick lime.

Inhalation of Airborne Dust

Remove to fresh air. Seek medical help if coughing and other symptoms do not subside.

Ingestion

Do not induce vomiting. If conscious, have the victim drink plenty of water and call a physician immediately.

Section 5 - FIRE AND EXPLOSION DATA

Flash point	None	Lower Explosive Limit.....	None
Upper Explosive Limit.....	None	Auto ignition temperature.....	Not Combustible
Extinguishing media.....	Not Combustible	Special fire fighting Procedures.....	None
Hazardous combustion products.....	None	Unusual fire and explosion hazards...	None

Section 6 - ACCIDENTAL RELEASE MEASURES

Collect dry material using a scoop. Avoid actions that cause dust to become airborne. Avoid inhalation of dust and contact with skin.

Wear appropriate personal protective equipment as described in Section 8.

Scrape up wet material and place in an appropriate container. Allow the material to "dry" before disposal. Do not attempt to wash quick lime down drains.

Dispose of waste material according to local, state and federal regulations.

Section 7 - HANDLING AND STORAGE

Keep quick lime dry until used. Normal temperatures and pressures do not affect the material.

Promptly remove dusty clothing or clothing which is wet with cement fluids and launder before reuse. Wash thoroughly after exposure to dust or quick lime mixtures or fluids.

Section 8 - EXPOSURE CONTROLS/PERSONAL PROTECTION

Skin Protection

Prevention is essential to avoiding potentially severe skin injury. Avoid contact with quick lime cement. If contact occurs, promptly wash affected area with soap and water. Where prolonged exposure to quick lime products might occur, wear

QuickLime MSDS (2).doc

3. Phosphoric acids

Safety Data Sheet

according to 29CFR1910/1200 and GHS Rev. 3

Effective date : 12.07.2014

Page 1 of 8

Phosphoric Acid,ACS

SECTION 1 : Identification of the substance/mixture and of the supplier

Product name : Phosphoric Acid,ACS

Manufacturer/Supplier Trade name:

Manufacturer/Supplier Article number: S25470B

Recommended uses of the product and uses restrictions on use:

Manufacturer Details:

AquaPhoenix Scientific
9 Barnhart Drive, Hanover, PA 17331

Supplier Details:

Fisher Science Education
15 Jet View Drive, Rochester, NY 14624

Emergency telephone number:

Fisher Science Education Emergency Telephone No.: 800-535-5053

SECTION 2 : Hazards identification

Classification of the substance or mixture:



Corrosive

Skin corrosion, category 1B
Corrosive to metals, category 1

Corrosive to Metals 1
Skin Corrosion 1B

Signal word :Danger

Hazard statements:

May be corrosive to metals
Causes severe skin burns and eye damage

Precautionary statements:

If medical advice is needed, have product container or label at hand

Keep out of reach of children

Read label before use

Do not breathe dust/fume/gas/mist/vapours/spray

Wash ... thoroughly after handling

Wear protective gloves/protective clothing/eye protection/face protection

Keep only in original container

Do not eat, drink or smoke when using this product

Immediately call a POISON CENTER or doctor/physician

Specific treatment (see ... on this label)

Wash contaminated clothing before reuse

IF SWALLOWED: Rinse mouth. Do NOT induce vomiting

IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower

IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do.
Continue rinsing

Created by Global Safety Management, Inc. -Tel: 1-813-435-5161 - www.gsmsds.com

Safety Data Sheet

according to 29CFR1910/1200 and GHS Rev. 3

Effective date : 12.07.2014

Page 2 of 8

Phosphoric Acid,ACS

Store locked up
 Store in a corrosive resistant/... container with a resistant inner liner
 Dispose of contents/container to ...

Conc 10% to <25%:

Eye Irritation 2, Skin Irritation 2

Conc <10%:

Not classified for physical or health hazards under GHS.

Other Non-GHS Classification:



NFPA SCALE (0-4)

Health	0
Flammability	0
Physical Hazard	0
Personal Protection	X

HMIS RATINGS (0-4)

SECTION 3 : Composition/information on ingredients

Ingredients:		
CAS 7664-38-2	Phosphoric Acid	>85 %
CAS 7732-18-5	Deionized Water	<15 %
Percentages are by weight		

SECTION 4 : First aid measures

Description of first aid measures

After inhalation: Seek medical attention immediately. Move exposed individual to fresh air. Loosen clothing as necessary and position individual in a comfortable position.

After skin contact: Remove contaminated clothing and wash before reuse or discard. Rinse skin with for 30 minutes with deluge of water or under a shower. Seek immediate medical attention. Wash affected area with soap and water.

After eye contact: Rinse immediately with plenty of water, also under the eyelids, for at least 30 minutes. Remove contact lens(es) if able to do so during rinsing. Seek medical attention immediately. Protect unexposed eye.

After swallowing: Seek medical attention immediately. Rinse mouth thoroughly. Do not induce vomiting. Have exposed individual drink sips of water.

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Effective date : 12.07.2014

Page 3 of 8

Phosphoric Acid,ACS

Most important symptoms and effects, both acute and delayed:

Irritation, Nausea,Headache, Shortness of breath.May cause severe burns and ulcerations. May cause severe burn and irreversible eye injury. May cause gastrointestinal tract burns, corrosion and permanent tissue damage of the digestive tract and esophagus;

Indication of any immediate medical attention and special treatment needed:

If seeking medical attention, provide SDS document to physician.Wipe off contact areas with a dry cloth if possible, before flushing with water. Dispose of cloth by soaking in water. Neutralize the soaking solution with sodium hydroxide solution.

SECTION 5 : Firefighting measures

Extinguishing media

Suitable extinguishing agents: If in laboratory setting, follow laboratory fire suppression procedures. Use appropriate fire suppression agents for adjacent combustible materials or sources of ignition

For safety reasons unsuitable extinguishing agents:

Special hazards arising from the substance or mixture:

Hydrogen gas is released in contact with most metals. Combustion products may include carbon oxides or other toxic vapors.Combustion products may include phosphine, oxides of phosphorus, and hydrogen gas.

Advice for firefighters:

Protective equipment: Wear protective equipment Use respiratory protective device against the effects of fumes/dust/aerosol/vapor . Use NIOSH-approved respiratory protection/breathing apparatus.

Additional information (precautions): Move product containers away from fire or keep cool with water spray as a protective measure, where feasible.

SECTION 6 : Accidental release measures

Personal precautions, protective equipment and emergency procedures:

Wear protective equipment. Avoid contact with eyes, skin, and clothing. Use respiratory protective device against the effects of fumes/dust/aerosol. Keep unprotected persons away. Ensure adequate ventilation.Keep away from ignition sources. Protect from heat.Stop the spill, if possible. Contain spilled material by diking or using inert absorbent. Transfer to a disposal or recovery container.

Environmental precautions:

Prevent from reaching drains, sewer or waterway. Collect contaminated soil for characterization per Section 13

Methods and material for containment and cleaning up:

Absorb spillage to prevent material damage due to corrosiveness to metal. If in a laboratory setting, follow Chemical Hygiene Plan procedures.Place into properly labeled containers for recovery or disposal. If necessary, use trained response staff/contractor.Collect liquids using inert absorbent material.

Reference to other sections:

SECTION 7 : Handling and storage

Precautions for safe handling:

Wash hands after handling. Do not mix with bases. Use in a chemical fume hood.Follow good hygiene procedures when handling chemical materials. Do not eat, drink, smoke, or use personal products when handling chemical substances. If in a laboratory setting, follow Chemical Hygiene Plan.Use only in well ventilated areas.Prevent contact with eyes, skin, and clothing

Conditions for safe storage, including any incompatibilities:

Store away from oxidizing agents.Store in cool, dry conditions in well sealed containers. Keep container tightly sealed.Do not store under direct sun light. Do not pile up the containers. Do not store at temperatures close to freezing point.Container materials should be made of stainless steel 316-L, high-density polyethylene, or

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Effective date : 12.07.2014

Page 4 of 8

Phosphoric Acid, ACS

glass. Provide ventilation for containers. Avoid storage near extreme heat, ignition sources or open flame. Store away from foodstuffs.

SECTION 8 : Exposure controls/personal protection



Control Parameters:	7664-38-2, Phosphoric Acid, ACGIH TLV: 1 mg/m ³ as TWA 7664-38-2, Phosphoric Acid, ACGIH TLV 3 mg/m ³ as STEL 7664-38-2, Phosphoric Acid, OSHA PEL: TWA 1 mg/m ³ (See 29 CFR 1910.1000 Appendix G) 7664-38-2, Phosphoric Acid, NIOSH REL: TWA 1 mg/m ³ 7664-38-2, Phosphoric Acid, NIOSH REL ST: 3 mg/m ³ 7664-38-2, Phosphoric Acid, NIOSH IDLH: 1000 mg/m ³
Appropriate Engineering controls:	Emergency eye wash fountains and safety showers should be available in the immediate vicinity of use/handling. Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapor or dusts (total/respirable) below the applicable workplace exposure limits (Occupational Exposure Limits-OELs) indicated above.
Respiratory protection:	Use suitable respiratory protective device when high concentrations are present. Use suitable respiratory protective device when aerosol or mist is formed. For spills, respiratory protection may be advisable.
Protection of skin:	The glove material has to be impermeable and resistant to the product/ the substance/ the preparation being used/handled. Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation.
Eye protection:	Safety glasses with side shields or goggles.
General hygienic measures:	The usual precautionary measures are to be adhered to when handling chemicals. Keep away from food, beverages and feed sources. Immediately remove all soiled and contaminated clothing. Wash hands before breaks and at the end of work. Do not inhale gases/fumes/dust/mist/vapor/aerosols. Avoid contact with the eyes and skin.

SECTION 9 : Physical and chemical properties

Appearance (physical state,color):	Clear, colorless liquid	Explosion limit lower: Explosion limit upper:	Not determined Not determined
Odor:	Odorless	Vapor pressure:	Not determined
Odor threshold:	Not determined	Vapor density:	3.4
pH-value:	Not determined	Relative density:	1.680
Melting/Freezing point:	21°C	Solubilities:	Soluble in water
Boiling point/Boiling range:	158°C	Partition coefficient (n-octanol/water):	Not determined
Flash point (closed cup):	Not determined	Auto/Self-ignition temperature:	Not determined

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4. Kurifloc

1.1 Chemical characterization : Formulation based on acryl amide polymer.			
1.2 Form : at 20 °C solid	1.3 Colour : White powder	1.4 Odour :	
2. Physical data and safety data		Tested in accordance with :	
2.1 Change in physical state			
Point of decomposition			°C
			°C
			°C
2.2 Density	(20 °C)		g/cm ³
Bulk density	(°C)		kg/m ³
2.3 Vapour pressure	(20 °C)	no applicable	mbar
			mbar
2.4 Viscosity	(25 °C) (0.1% soln.)	160 ± 50	cps
2.5 Solubility in water	(20 °C)		g/l
	in most of the usual organic solvents not miscible		
2.6 pH value (at 0.1% SOLN.)	(25 °C)	7.5 ± 1.0	
2.7 Flash point		not applicable	°C
2.8 Ignition temperature		not applicable	°C
2.9 Explosion limits	Lower : -	Upper : -	
2.10 Thermal decomposition	by release of harmful vapours		
2.11 Hazardous decomposition:	products none if used as indicated.		
2.12 Hazardous reaction :	Not hazard		
2.13 Further information	the product is used for waste water treatment, sewage treatment mining.		
3. Transport			
	GGVSee/IMDG - Code : -	UN-No : -	ICAO/IATA-DGR : -
	GGVE/GGVS: -		RID/ADR : - ADNR : -
Other information :			
The product itself is not limited by transport regulations.			
4. Regulations			
CAS No. : 9003-05-8			

5. Protective measure , storage and handling .
- 5.1 Technical protective measures.
Store product in tightly closed containers in a cool , dark and ventilated area. Install spillage containers. Exhaust vapours directly at origin of formation. Provide eye bath at the working place.
- 5.2 Personal protective equipment
Respiratory dust mask*
Eye protection : chem. -safe. goggles
Hand protection : gloves
Other :
- * In case of detectable airborne concentrations.
- 5.3 Indus. Hygiene : Do not eat, drink or smoke at the working place. Avoid any direct contact with the product.
Never breathe dusts. Change contaminated clothing immediately.
- 5.4 Fire / Explosion protection
Cool drums exposed to the fire with water spray. The product itself is not inflammable. Coordinate personal protective equipment and fire-fighting measure to the case of fire wear. Collect all contaminated water in containers and dispose according to local regulations.
- 5.5 Disposal : Dispose product according to local regulations. Empty used containers completely, rinse with water, dispose containers excluding possible reuse.
-
6. Measures in case of accidents and fires
- 6.1 After spillage / leakage : swept the leakage product. The product itself is very slippery.
- 6.2 Extinguishing media suitable : Water spray.
Not to be used :
- 6.3 First aid
Eye contact : After separating the eyelids flush with copious amounts of water

5. Washing Soda

SECTION II - Hazardous Ingredients / Identity Information

Hazardous Components:

<i>Specific Chemical Identity:</i>	<i>Common Names:</i>	<i>CAS No.</i>	<i>OSHA PEL</i>	<i>ACGIH TLV</i>
Sodium Carbonate, anhydrous	Soda Ash	497-19-8	10mg/m ³	15 mg/m ³

SECTION III - Physical / Chemical Characteristics

pH (1% water Solution) 11.3	Specific Gravity (H ₂ O=1) 2.532
pH (10% water solution) 11.6	Bulk Density: 48-65 lbs/ft ³
	Melting Point (°F) 1564
	Decomposition Point (°F) 752

Solubility in Water (@ 32 °F): 7g/100g water

Appearance and Odor: White granular solid. Odorless

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

<i>Flash Point (Method Used):</i>	<i>Flammable Limits</i>	<i>LEL</i>	<i>UEL</i>
NONCOMBUSTIBLE	N/A		

Extinguishing Media:

NONCOMBUSTIBLE

Special Fire fighting procedures: Wear a NIOSH/MSHA approved self-contained breathing apparatus and full protective clothing. Dike area to prevent runoff and contamination of water sources.

Unusual Fire & Explosion Hazards: None, but does decompose at high temperature releasing carbon dioxide.

SECTION V - REACTIVITY DATA

Stability: STABLE

Conditions to avoid: Protect from moisture. Mixing a solution of Washing Soda with acid may result in carbon dioxide evolution and severe splattering.

Incompatibility (Materials to avoid): Strong acids, aluminum, iron, lithium and 2,4,6 - trinitrotoluene. Washing Soda upon contact with certain food products containing reducing sugars, may react to form carbon monoxide gas.

Hazardous Decomposition or Byproducts: Carbon dioxide is evolved at high temperatures (1832 °F) or when mixed with acids.

Hazardous Polymerization: Will not occur.

Conditions to avoid: n/a

MATERIAL SAFETY DATA SHEET
PAGE 2
WASHING SODA

SECTION VI - HEALTH HAZARD DATA

Routes of Entry: EYES? YES INHALATION? YES SKIN? YES INGESTION? YES

Health Hazards (Acute and Chronic): Acute eye and skin irritation upon limited exposure and more severe irritation upon repeated or prolonged exposure that may result in chronic skin sensitivity. Concentrated solutions in contact with eyes and skin may cause chemical burns. Inhalation of product particulates or solution mist may irritate nose, throat and respiratory tract. Swallowing may cause burns of mouth, throat, esophagus and stomach. If large quantity is ingested, it may cause nausea, vomiting and diarrhea.

Carcinogenicity: NPT? NO IARC MONOGRAPHS? NO OSHA REGULATED? NO

Product does not contain any ingredient designated by the above agencies as a probable human carcinogen.

Signs & Symptoms of Exposure: Redness and burning of eyes. Redness and swelling of skin. Nose and/or throat irritation. Nausea and/or vomiting.

Medical Conditions Generally Aggravated by Exposure: Skin irritation in persons with existing skin lesions. Chronic asthma other chronic pulmonary disease upon breathing Washing Soda dust.

Emergency and First Aid Procedures:

EYES: flush with water for 15 minutes. Lift upper and lower lids and rinse well under them. GET MEDICAL ATTENTION; preferably an ophthalmologist.

SKIN: remove contaminated clothing and shoes and clean thoroughly before reuse. Wash affected skin with soap and water. If irritation persists, get medical attention.

INHALATION: remove to fresh air. If not breathing administer cardiopulmonary resuscitation or artificial respiration. GET MEDICAL ATTENTION.

INGESTION: give two or more glasses of water or milk to drink. DO NOT INDUCE VOMITING. If it occurs, give fluids again. GET IMMEDIATE MEDICAL ATTENTION.

SECTION VII - PRECAUTIONS FOR SAFE HANDLING AND USE

Steps To Be Taken In Case Material is Released or Spilled: Avoid Dust Generation in cleaning up spilled product solids using shovels, brooms or vacuum. Place recovered material in drum(s) equipped with tightly fitted covers. Flush any small residue from floor with large amount of water

Waste Disposal Method: Dispose of sealed drums of recovered product in an approved waste management facility in accordance with Local, State and Federal regulations.

Precautions to be taken in Handling and Storing: Do not ingest. Minimize dust generation and avoid inhaling any that occurs. Take care to prevent product contact with eyes or skin. Store product in a cool, dry, well ventilated area away from flammable materials and sources of heat or flame.

SECTION VIII - CONTROL MEASURES

Respiratory Protection (Specify Type): In dusty conditions, use a NIOSH/MSHA approved dust mask. Where higher level of protection is required, use positive pressure supplied air or self-contained breathing apparatus.

Ventilation Local Exhaust: Natural cross-ventilation is adequate for normal usage.

Mechanical (General): When working in a confined area or under dusty conditions, the use of an

6. Tri-sodium Phosphate

Safety Data Sheet

according to 29CFR1910/1200 and GHS Rev. 3

Effective date : 12.19.2014

Page 1 of 7

Trisodium Phosphate,

SECTION 1 : Identification of the substance/mixture and of the supplier

Product name : Trisodium Phosphate,

Manufacturer/Supplier Trade name:

Manufacturer/Supplier Article number: S25564

Recommended uses of the product and uses restrictions on use:

Manufacturer Details:

AquaPhoenix Scientific
9 Barnhart Drive, Hanover, PA 17331

Supplier Details:

Fisher Science Education
15 Jet View Drive, Rochester, NY 14624

Emergency telephone number:

Fisher Science Education Emergency Telephone No.: 800-535-5053

SECTION 2 : Hazards identification

Classification of the substance or mixture:



Irritant

Skin Corr. 1B
Eye Damage. 1

Signal word :Warning

Hazard statements:

Causes skin irritation
Causes serious eye irritation
May cause respiratory irritation

Precautionary statements:

If medical advice is needed, have product container or label at hand
Keep out of reach of children
Read label before use
Wear protective gloves/protective clothing/eye protection/face protection
Wash ... thoroughly after handling
Avoid breathing dust/fume/gas/mist/vapours/spray
Use only outdoors or in a well-ventilated area
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do.
Continue rinsing
Specific treatment (see ... on this label)
IF ON SKIN: Wash with soap and water
Call a POISON CENTER or doctor/physician if you feel unwell
If skin irritation occurs: Get medical advice/attention
If eye irritation persists get medical advice/attention
Take off contaminated clothing and wash before reuse

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Safety Data Sheet

according to 29CFR1910/1200 and GHS Rev. 3

Effective date : 12.19.2014

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Trisodium Phosphate,

IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Store locked up
Store in a well ventilated place. Keep container tightly closed
Dispose of contents/container to ...

Combustible Dust Hazard: :

May form combustible dust concentrations in air (during processing).

Other Non-GHS Classification:

WHMIS



NFPA/HMIS



NFPA SCALE (0-4)

Health	3
Flammability	0
Physical Hazard	0
Personal Protection	X

HMIS RATINGS (0-4)

SECTION 3 : Composition/information on ingredients

Ingredients:		
CAS 10101-89-0	Trisodium Phosphate	100 %
Percentages are by weight		

SECTION 4 : First aid measures

Description of first aid measures

After inhalation: Loosen clothing as necessary and position individual in a comfortable position. Remove to fresh air. Give artificial respiration if necessary. If breathing is difficult give oxygen. Do not perform mouth-to-mouth to resuscitate. Immediately get medical assistance.

After skin contact: Wash affected area with soap and water. Seek medical advice if discomfort or irritation persists.

After eye contact: Protect unexposed eye. Rinse or flush exposed eye gently using water for 15-20 minutes. Remove contact lenses while rinsing. Occasionally lift the upper and lower eyelids while rinsing. Go to the hospital. Continue rinsing eyes during transport to hospital.

After swallowing: Rinse mouth thoroughly. Do not induce vomiting. Get medical assistance.

Most important symptoms and effects, both acute and delayed:

Irritation. Nausea. Headache. Shortness of breath.;

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Trisodium Phosphate,

Indication of any immediate medical attention and special treatment needed:

If seeking medical attention provide SDS document to physician.

SECTION 5 : Firefighting measures

Extinguishing media

Suitable extinguishing agents: Use water, dry chemical, chemical foam, or alcohol-resistant foam.

For safety reasons unsuitable extinguishing agents:

Special hazards arising from the substance or mixture:

Advice for firefighters:

Protective equipment: Wear protective eyewear, gloves, and clothing.

Additional information (precautions): Ensure adequate ventilation. Avoid contact with skin, eyes, and clothing.

SECTION 6 : Accidental release measures

Personal precautions, protective equipment and emergency procedures:

Emergency eye wash fountains and safety showers should be available in the immediate vicinity of use or handling. Use spark-proof tools and explosion-proof equipment.

Environmental precautions:

Should not be released into environment. Collect contaminated soil for characterization per Section 13 .

Methods and material for containment and cleaning up:

Sweep up and containerize for disposal. Avoid generating dust. Always obey local regulations. Collect liquids using vacuum or by use of absorbents. Place into properly labeled containers for recovery or disposal. Dust deposits should not be allowed to accumulate on surfaces, as these may form an explosive mixture if they are released into the atmosphere in sufficient concentration. Prevent further leakage or spillage if safe to do so. If necessary use trained response staff or contractor.

Reference to other sections:

SECTION 7 : Handling and storage

Precautions for safe handling:

Wash hands before breaks and immediately after handling the product. Wash hands and exposed skin with soap and plenty of water. Do not eat, drink, smoke, or use personal products when handling chemical substances. Avoid contact with eyes, skin, and clothing.

Conditions for safe storage, including any incompatibilities:

Keep away from food, beverages, and feed sources. Protect from freezing and physical damage. Do not store near strong acids. Keep product and empty container away from heat and sources of ignition. Store with like hazards. Keep container tightly closed in a cool, dry, and well-ventilated area. Store in inert atmosphere. Store away from acids.

SECTION 8 : Exposure controls/personal protection



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according to 29CFR1910/1200 and GHS Rev. 3

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Trisodium Phosphate,

Control Parameters:	10101-89-0, Sodium phosphate tribasic dodecahydrate, USA Workplace Environmental Exposure Levels (WEEL)
Appropriate Engineering controls:	It is recommended that all dust control equipment such as local exhaust ventilation and material transport systems involved in handling of this product contain explosion relief vents or an explosion suppression system or an oxygen deficient environment. Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapor and mists below the applicable workplace exposure limits (Occupational Exposure Limits-OELs) indicated above.
Respiratory protection:	Not required under normal conditions of use. Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. Use NIOSH-approved respiratory protection or breathing apparatus.
Protection of skin:	Select glove material impermeable and resistant to the substance. Select glove material based on rates of diffusion and degradation.
Eye protection:	Safety glasses or goggles.
General hygienic measures:	Avoid contact with skin, eyes, and clothing. Wash hands and exposed skin with soap and plenty of water. Wash hands before breaks and immediately after handling the product. Remove contaminated clothing and shoes. Before wearing wash contaminated clothing.

SECTION 9 : Physical and chemical properties

Appearance (physical state,color):	White solid	Explosion limit lower: Explosion limit upper:	No Information No Information
Odor:	Odorless	Vapor pressure:	Not Applicable
Odor threshold:	Not Applicable	Vapor density:	Not Applicable
pH-value:	11.8-12 1% aqueous solution	Relative density:	1.62 g/cm ³ at 25 °C
Melting/Freezing point:	75°C	Solubilities:	Soluble in water: 190.1 g/l at 20 °C
Boiling point/Boiling range:	Not Applicable	Partition coefficient (n-octanol/water):	Not Applicable
Flash point (closed cup):	Not Applicable	Auto/Self-ignition temperature:	No Information
Evaporation rate:	Not Applicable	Decomposition temperature:	75°C
Flammability (solid,gaseous):	No Information	Viscosity:	a. Kinematic: Not Applicable b. Dynamic: Not Applicable
Density: Not Applicable			

SECTION 10 : Stability and reactivity

Reactivity:
Chemical stability: Stable under normal conditions.
Possible hazardous reactions:
Conditions to avoid: High temperatures. Dust generation.

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7. Sodium Chloride

2. Hazard(s) identification

Classification

Classification under 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

This chemical is not considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Label Elements

None required

Hazards not otherwise classified (HNOC)

None identified

Sodium chloride

Revision Date 24-Dec-2021

3. Composition/Information on Ingredients

Component	CAS No	Weight %
Sodium chloride	7647-14-5	>95

4. First-aid measures

Eye Contact	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Get medical attention.
Skin Contact	Wash off immediately with plenty of water for at least 15 minutes. Get medical attention immediately if symptoms occur.
Inhalation	Remove to fresh air. Get medical attention immediately if symptoms occur.
Ingestion	Get medical attention if symptoms occur. Clean mouth with water and drink afterwards plenty of water.
Most important symptoms and effects	None reasonably foreseeable.
Notes to Physician	Treat symptomatically

5. Fire-fighting measures

Unsuitable Extinguishing Media	No information available
Flash Point	No information available
Method -	No information available
Autoignition Temperature	No information available
Explosion Limits	
Upper	No data available
Lower	No data available
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical

Thermal decomposition can lead to release of irritating gases and vapors. Keep product and empty container away from heat and sources of ignition.

Hazardous Combustion Products

Hydrogen chloride gas. Sodium oxides.

Protective Equipment and Precautions for Firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
1	0	1	N/A

6. Accidental release measures

Personal Precautions	Ensure adequate ventilation. Use personal protective equipment as required. Avoid dust formation.
Environmental Precautions	Should not be released into the environment.
Methods for Containment and Clean Up	Sweep up and shovel into suitable containers for disposal. Avoid dust formation.

ငွေရည်ပုံလဲကုမ္ပဏီအုပ်စု
သံတောင်ဦးကုမ္ပဏီလီမိတက်
ဒေသဖွံ့ဖြိုးရေး လှူဒါန်းဆောင်ရွက်ချက်များ

စဉ်	လှူဒါန်းသည့် နေ့ / လ / ရက်	လှူဒါန်းငွေ (ကျပ်)
1	ပညာရေး	138,709,500
2	လူမှုရေး	330,361,500
3	လမ်းနှင့်တံတား	533,077,615
	စုစုပေါင်း	1,002,148,615

ငွေရည်ပုံလဲကုမ္ပဏီအုပ်စု
သံတောင်ဦးကုမ္ပဏီလီမိတက်
(၁၅ . ၅ . ၂၀၂၂) မှ (၂၄ . ၆ . ၂၀၂၂) ထိ
ဒေသဖွံ့ဖြိုးရေး လှူဒါန်းဆောင်ရွက်ချက်များ

ပညာရေး

စဉ်	အကြောင်းအရာ	လှူဒါန်းငွေ(ကျပ်)
၁	ဆင်တော် စာသင်ကျောင်း ၁၈၀' ၃၀' (၆ ခန်းတွဲ)ဆောက်လုပ်လှူဒါန်းခြင်း (ဆောက်လုပ်ဆဲ)	135,000,000
၂	ပါလန် (ပန်ဟိုက်) အ . လ . က နှင့် အ . မ . က ကျောင်းတို့အတွက် ဆရာ / ဆရာမ (၅) ဦး ဖြည့်ဆည်းခန့်အပ်ထားခြင်း(June'2022)	1,709,500
၃	ပါလန် (ပန်ဟိုက်) စာသင်ကျောင်းအတွက် 6' x 3' whiteboard (၃) ချပ် နှင့် ဆင်တော် စာသင်ကျောင်းတွက် 8' x 4 'whiteboard (၅)ချပ် လှူဒါန်းပေးခြင်း	700,000
၄	ဆင်တော်ရွာစာသင်ကျောင်းအတွက် စာသင်စားပွဲ အစုံ (၃၀) လုံးနှင့် ဆရာ / ဆရာမ စားပွဲ (၅) လုံး လှူဒါန်းခြင်း	1,300,000
	စုစုပေါင်းလှူဒါန်းငွေ	138,709,500

ငွေရည်ပုံလဲကုမ္ပဏီအုပ်စု
သံတောင်ဦးကုမ္ပဏီလီမိတက်
(၂၀ . ၈ . ၂၀၂၁) မှ (၂၄ . ၆ . ၂၀၂၂) ထိ
ဒေသဖွံ့ဖြိုးရေး လှူဒါန်းဆောင်ရွက်ချက်များ

လူမှုရေး

စဉ်	အကြောင်းအရာ	လှူဒါန်းငွေ(ကျပ်)
၁	မိုင်းရယ်မြို့လယ်ဘုရားကြွေပြားခင်းရန်အတွက်ဘိလပ်မြေ (၈၀)အိတ်လှူဒါန်းခြင်း	624,000
၂	ပန်လန်းအုပ်စု နမ့်လင်းကျေးရွာ ဘုန်းကြီးကျောင်းအတွက် အုတ် (၁၆၀၀၀) လုံး နှင့် ဘိလပ်မြေ (၅၀၀)အိတ်လှူဒါန်းခြင်း (ဆောက်လုပ်လှူဒါန်းဆဲ)	6,300,000
၃	ကောင်းလန်းဘုန်းကြီးကျောင်းအတွက် ထီးတော် (၁)လက် / ကြေးဆင်းတုတော် (၁) ဆူလှူဒါန်းခြင်း	8,200,000
၄	ကောင်းလန်းဘုန်းကြီးကျောင်းဆောက်လုပ် လှူဒါန်းခြင်း	280,391,200
၅	မိုင်းရယ်မြို့နယ် မီးသတ်ဦးစီးဌာနရုံး အသုံးပြုရန် ရေမြုပ်မော်တာ (၁) လုံးလှူဒါန်းခြင်း	157,800
၆	ဆင်တော်ရွာ သို့ စက်ရုံမှ မီးသွယ်ပေးခြင်း	9,661,000
၇	ဆင်တော်ရွာ သို့ စက်ရုံမှ ရေပိုက်လိုင်းသွယ်တန်းပေးခြင်း	3,850,000
၈	မိုင်းရယ်မြို့ပြည်သူ့ဆေးရုံသို့ ဆေးဝါးနှင့်အသုံးအဆောင်များအပူတိုင်းကိရိယာ (၁,၂၅၀,၀၀၀)ကျပ်နှင့်ငွေသား (၁,၀၀၀,၀၀၀)ကျပ် စုစုပေါင်းတန်ဖိုး (၂,၂၅၀,၀၀၀) ကျပ် လှူဒါန်းခြင်း	2,250,000
၉	မိုင်းရယ်မြို့နယ် အုပ်ချုပ်ရေးမှူးရုံးသို့ Hand Gel (၉၉) ဗူး လှူဒါန်းခဲ့ခြင်း	247,500
၁၀	မိုင်းရယ်မြို့နယ်အုပ်ချုပ်ရေးသို့ Covide လူနာ ကုတင် (55) လုံးဒါန်းခြင်း	5,500,000
၁၁	မိုင်းရယ်ပြည်သူ့ဆေးရုံ အထွေထွေအသုံးပြုရန် အလှူငွေ(၅၀၀,၀၀၀)လှူဒါန်းခြင်း	500,000
၁၂	မိုင်းရယ်ပြည်သူ့ဆေးရုံလူနာများအတွက် ခေါက်ဆွဲခြောက် (၃၈၀) ထုပ် ကော်ဖီမစ် အထုပ်ကြီး (၃၈) ထုပ် လှူဒါန်းခြင်း	216,600
၁၃	မိုင်းရယ်မြို့နယ် Covide 19 ကော်မတီသို့ အလှူငွေ (၂,၅၀၀,၀၀၀) လှူဒါန်းခြင်း	2,500,000
၁၄	မိုင်းရယ်မြို့နယ် ပြည်သူ့ဆေးရုံအတွက် အထွေထွေ အသုံးပြုရန် အလှူငွေ (၃၀၀,၀၀၀) လှူဒါန်းခြင်း	300,000
၁၅	ဟိတရေ ပရဟိတ မှ တဆင့် မိုင်းရယ်ဆေးရုံသို့ Oxygen အလုံးရေ (၂၂၉၄) လုံးလှူဒါန်းခြင်း	8,717,200
၁၆	ကမ်းမယ့်လက် ပရဟိတ မှ တဆင့် မိုင်းရယ်ဆေးရုံသို့ Oxygen အလုံးရေ (၂၄၉) လုံးလှူဒါန်းခြင်း	946,200
	စုစုပေါင်းလှူဒါန်းငွေ	330,361,500

ငွေရည်ပုလဲကုမ္ပဏီအုပ်စု

သံတောင်ဦးကုမ္ပဏီလီမိတက်

(28.5.2019) မှ (24.6.2022) ထိ

ဒေသဖွံ့ဖြိုးရေး လှူဒါန်းဆောင်ရွက်ချက်များ

လမ်းနှင့်တံတား

စဉ်	အကြောင်းအရာ		လှူဒါန်းငွေ (ကျပ်)
၁	တံတားနံပါတ် - (၁) ခိုဆိုင်း - စက်ရုံလမ်း	22' x 5'	7,714,500
၂	တံတားနံပါတ် - (၂) စက်ရုံအဝင်	24' x 5'	7,443,700
၃	တံတားနံပါတ် - (၃) စက်ရုံ - ဆင်တော် - ဆင်ကျော့	24' x 5'	8,095,216
၄	တံတားနံပါတ် - (၄) ဆင်တော် - ဆင်ကျော့	20' x 2'	2,895,000
၅	တံတားနံပါတ် - (၁) ကုန်းညှု - စက်ရုံလမ်း	40' x 4'	5,797,558
၆	တံတားနံပါတ် - (၂) ကုန်းညှု - စက်ရုံလမ်း	40' x 3'	2,606,900
၇	တံတားနံပါတ် - (၃) ကုန်းညှု - စက်ရုံလမ်း	40' x 6'	11,105,892
၈	တံတားနံပါတ် - (၄) ကုန်းညှု - စက်ရုံလမ်း	40' x 5'	9,260,808
၉	တံတားနံပါတ် - (၅) ကုန်းညှု - စက်ရုံလမ်း	40' x 5'	11,460,892
၁၀	တံတားနံပါတ် - (၃) ဆင်တော် - ဆင်ကျော့ လမ်း	40' x 4'	8,061,540
၁၁	စက်ရုံမှ ရှန်တော် လမ်းပေါ်ရှိ တံတား	74' x 4.75'	4,710,875
၁၂	စက်ရုံမှ ကုန်းညှု လမ်းပေါ်ရှိ တံတား (၁)	50' x 7.25'	4,963,740
၁၃	စက်ရုံမှ ကုန်းညှု လမ်းပေါ်ရှိ တံတား (၃)	50' x 7.25'	5,394,990
၁၄	ရှန်တော်ကုန်ထုတ်တံတား	80' x 24'	337,052,620
၁၅	စက်ရုံ - ရှန်တော် လမ်းပေါ် တံတား No - 1 (တိုးချဲ့)	38' x 10.5'	5,963,455
၁၆	စက်ရုံ - ရှန်တော် လမ်းပေါ် တံတား No - 2 (တိုးချဲ့)	24' x 6'	1,985,510
၁၇	စက်ရုံ - ကုန်းညှု လမ်းပေါ် တံတား No - 2	49' x 7'	4,539,975
၁၈	ကုန်ထုတ်တံတားငယ် (၁) (ဆင်ကျော့ - စက်ရုံ)	28' x 10' x 5'	4,367,835
၁၉	ကုန်ထုတ်တံတားငယ် (၂) (ဆင်ကျော့ - စက်ရုံ)	28' x 8' x 4'	2,713,930
၂၀	ကုန်ထုတ်တံတားငယ် (၃) (ဆင်ကျော့ - စက်ရုံ)	28' x 8' x 4'	2,713,930
၂၁	ကုန်ထုတ်တံတားငယ် (၄) (ဆင်ကျော့ - စက်ရုံ)	30' x 10' x 5'	4,120,000
၂၂	ကုန်ထုတ်တံတားငယ် (၁) (ဆင်ကျော့ - စက်ရုံ)	26' x 8'	3,091,207
၂၃	ကုန်ထုတ်တံတားငယ် (၂) (ဆင်ကျော့ - စက်ရုံ)	37' x 8'	3,606,607
၂၄	ကုန်ထုတ်တံတားငယ် (၃) (ဆင်ကျော့ - စက်ရုံ)	26' x 8'	3,091,207
၂၅	ကုန်ထုတ်တံတားငယ် (၄) (ဆင်ကျော့ - စက်ရုံ)	26' x 8'	3,091,207
၂၆	ကုန်ထုတ်တံတားငယ် (၅) (ဆင်ကျော့ - စက်ရုံ)	26' x 8'	3,517,207
၂၇	ကုန်ထုတ်တံတားငယ် (၆) (ဆင်ကျော့ - စက်ရုံ)	26' x 8'	3,306,307
၂၈	ကုန်ထုတ်တံတားငယ် (၇) (ဆင်ကျော့ - စက်ရုံ)	26' x 8'	3,070,607

စဉ်	အကြောင်းအရာ	လျှင်ဒါန်းငွေ (ကျပ်)	
၂၉	ပြန်ဖြင့် ပြုလုပ်သော ကုန်ထုတ်တံတား (၁) (ဆင်ကျော့ - စက်ရုံ)	32' - 1" x 2' - 4"	880,000
၃၀	ပြန်ဖြင့် ပြုလုပ်သော ကုန်ထုတ်တံတား (၂) (ဆင်ကျော့ - စက်ရုံ)	32' - 1" x 2' - 4"	930,000
၃၁	ပြန်ဖြင့် ပြုလုပ်သော ကုန်ထုတ်တံတား (၃) (ဆင်ကျော့ - စက်ရုံ)	32' - 1" x 2' - 4"	950,000
၃၂	ပြန်ဖြင့် ပြုလုပ်သော ကုန်ထုတ်တံတား (၁) (ကုန်းညါ - စက်ရုံ)	36' - 8" x 2' - 4"	320,000
၃၃	ပြန်ဖြင့် ပြုလုပ်သော ကုန်ထုတ်တံတား (၂) (ကုန်းညါ - စက်ရုံ)	41' - 3" x 2' - 4"	800,000
၃၄	ပြန်ဖြင့် ပြုလုပ်သော ကုန်ထုတ်တံတား (၃) (ကုန်းညါ - စက်ရုံ)	18' - 4" x 2' - 4"	650,000
၃၅	ရေပူစမ်း	102' x 28'	22,670,400
၃၆	မိုင်းရယ်မြို့နယ် နားခိုကျေးရွာဆည်ပြုပြင်ရန်အတွက် အလှူငွေ (၅၀) သိန်းကျပ် လှူဒါန်းခြင်း		5,000,000
၃၇	ဆင်တော်ရွာဈေးတည်ဆောက်ရန် (၃၀) သိန်းကျပ် လှူဒါန်းခြင်းနှင့် ဈေးမြေ (၃) ဧက အား RC တိုင်စိုက်ခြင်း/ သွပ်ဆူးကြိုး ကာရံပေးခြင်း		3,000,000 18,000,000
၃၈	တိစန့်ကျေးရွာ နမ့်လန်ချောင်းကူးတံတားတည်ဆောက်ရေး အတွက် ဘီလပ်မြေ (၃၀၀) အိတ်လှူဒါန်းခြင်း		2,340,000
၃၉	နားလန်ကျေးရွာ တံတားပြုပြင်ရန်အတွက် ဘီလပ်မြေ (၈၀) အိတ်လှူဒါန်းခြင်း		624,000
၄၀	မိုင်းခေး နမ့်အွမ်ကျေးရွာ တံတားပြုလုပ်ရန်တွက် ဘီလပ်မြေ (၁၅၀) အိတ် လှူဒါန်းခြင်း		1,170,000
စုစုပေါင်း လှူဒါန်းငွေ		533,077,615	



ခပ်ချိုနှင့်ဆင်ကြော့ရွာ ကတ္တရာလမ်းပိုင်းရှိ တံတားအမှတ် (၃)



ခပ်ချိုနှင့်ဆင်ကြော့ရွာ ကတ္တရာလမ်းပိုင်းရှိ တံတားအမှတ် (၄)



ခပ်ချိုနှင့်ဆင်ကြော့ရွာ ကတ္တရာလမ်းပိုင်းရှိ ရေဖြန်လိုင်းအမှတ် (၁)



ခပ်ချိုနှင့်ဆင်ကြော့ရွာ ကတ္တရာလမ်းပိုင်းရှိ ရေဖြန်လိုင်းအမှတ် (၂)



ဆင်တော် - နမ့်လောင်းချောင်းကူး ကုန်ထုတ်တံတား ဆောက်လုပ်လှူဒါန်းခြင်း



ဆင်တော် - နမ့်လောင်းချောင်းကူး ကုန်ထုတ်တံတား ဆောက်လုပ်လှူဒါန်းခြင်း



ကောင်းလန်းဘုန်းကြီးကျောင်း ဆောက်လုပ်လှူဒါန်းခြင်း



ကောင်းလန်းဘုန်းကြီးကျောင်း ဆောက်လုပ်လှူဒါန်းခြင်း



ဆင်တော်ရွာ စာသင်ကျောင်းဆောင်နှင့် အိမ်သာ ဆောက်လုပ်လှူဒါန်းခြင်း



ဆင်တော်ရွာ စာသင်ကျောင်းဆောင်နှင့် အိမ်သာ ဆောက်လုပ်လှူဒါန်းခြင်း



ဆင်တော်ကျေးရွာ မီးလင်းရေး ဆောက်ရွက်ထားရှိခြင်း



ဆင်တော်ကျေးရွာ မီးလင်းရေး ဆောက်ရွက်ထားရှိခြင်း



**ကျန်းမာရေးနှင့်အားကစားဝန်ကြီးဌာန
မြို့နယ်ကုသရေးဦးစီးဌာန**

ဂုဏ်ပြုမှတ်တမ်းလွှာ

မိုင်းရယ်မြို့နယ် ၊ ကုသရေးဦးစီးဌာန ၊ မြို့နယ်ပြည်သူ့ ဆေးရုံအတွက်
အလှူငွေ ကျပ်(၁၀၀၀၀၀၀/-)(တစ်ဆယ်သိန်း)နှင့်
ဆေးရုံသုံးပစ္စည်း(၈)မျိုး တန်ဖိုးကျပ်(၉၁၅၉၀၀/-)
(ကိုးသိန်းတစ်သောင်းငါးထောင်ကိုးရာတိတိ)

လှူဒါန်းပေးသော

“ငွေရည်ပူလဲအုတ်စု ၊ သံတောင်ဦးကုမ္ပဏီလီမိတက်” အား
ဂုဏ်ပြုမှတ်တမ်းတင်အပ်ပါသည်။

(ဒေါက်တာသီရိထွန်း)
မြို့နယ်ကုသရေးဦးစီးဌာနမှူး
မိုင်းရယ်မြို့

ရက်စွဲ ၊ ၂၀၂၀-ပြည့်နှစ်၊မတ်လ(၅)ရက်

ရှမ်းသက္ကရာဇ်(၂၀၁၄)ခုနှစ်

မုန်မြေမှတ်တမ်းဇယား



အမှတ်(၁) ရှမ်းစာပေနှင့်ယဉ်ကျေးမှုအသင်း၊ မိုင်းရယ်မြို့

အမည် _____

နေရပ် _____

ထည့်ဝင်လှူဒါန်းသောရန်ပုံငွေ _____

မိုင်းရယ်မြို့၊ အမှတ်(၁) ရှမ်းစာပေနှင့်ယဉ်ကျေးမှုအသင်းမှ ကြီးပျား၍ ရှမ်းသက္ကရာဇ်(၂၀၁၄)ခုနှစ်ကို ကြိုဆိုရန်နှင့် ဆောက်လုပ်ဆံ့ပြီးစီးမှု(၈၀%)ရှိသော ရှမ်းစာပေနှင့်ယဉ်ကျေးမှုအသင်း၏ စာသင်ကျောင်းအဆောက်အအုံအတွက် ရန်ပုံငွေထည့်ဝင်ပေးသော လူကြီးမင်းတို့၏ ကုမ္ပဏီအား အထူးကျေးဇူးတင်ရှိကြောင်း အမှတ်(၁) ရှမ်းစာပေနှင့်ယဉ်ကျေးမှုအသင်းမှ မှတ်တမ်းတင်ဂုဏ်ပြုအပ်ပါသည်။



ဥက္ကဋ္ဌ
အမှတ်(၁)ရှမ်းစာပေနှင့်ယဉ်ကျေးမှုအသင်း
မိုင်းရယ်မြို့

ဗုဒ္ဓဘာသာ ပိရမိဒရယ်
မြတ်ဗုဒ္ဓကုမ္ပဏီလီမိတက်ပြုပြု

ကောင်းမွန်လုံခြုံရေး၊ ပါကနီးကျေးရွာအုပ်စု၊ မိုင်းရယ် ဩဇာ



ကုသိုလ်ပန်းမျိုးတစ်ကြိမ်မျိုးက ပွားတိုးစဉ်ဆက် မူးဝံ့ထွတ်
 မပျက်စွန့်စွာ အနုဝါဓိက ဖြတ်ဒါနတည်း။

သာသနာတော်သက္ကရာဇ် ၂၅၆၆ နှစ်၊ ကောဇာသက္ကရာဇ် ၁၃၈၄ ခု၊
 တန်ဆောင်မုန်းလဆန်း(၁၀)ရက်၊ (၂ - ၁၁ - ၂၀၂၂) ဝုဒ္ဓဟူးနေ့။

အလှူရှင်အမည် ----- “ သံတောင် ဦးကုမ္ပဏီလီမိတက် ”
 ရှန်တော်သကြားစက်ရုံ၊ မိုင်းရယ်မြို့နယ်၊
 လှူဒါန်းသည့်အကြောင်းအရာ ----- ကထိန်သင်္ကန်းနှင့် ရေစက်ချပွဲအတွက်
 ----- အလှူတော်ငွေ - ၅,၀၀၀,၀၀၀ / (ကျပ်သိန်းငါးဆယ်)။ -----

သဒ္ဓမ္မသုံးဖြာ သာသနာအကျိုးရည်မျှော်ကိုး၍ ပွားတိုးသဒ္ဓါထက်သန်စွာဖြင့်
 လှူဒါန်းညွတ်နူးကုသိုလ်ထူးကို ကြည်နူးနမော သာဓုခေါ်ကာ ဤဂုဏ်ပြုလွှာကိုပေးအပ်သည်။
အလှူရှင်ပိသားစုအပေါင်းတို့သည်
ခန္ဓာဇာတ်သိမ်းကင်းငြိမ်းစုပန် ပြတ်နိဗ္ဗာန် ကေနိမုချ မျက်မှောက်ပြုနိုင်စေသော်။

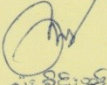
အရှင်ဒါယမ
 (ကောင်းမွန်လုံခြုံရေး၊ ပါကနီးကျေးရွာအုပ်စု၊ မိုင်းရယ်မြို့နယ်)

အလှူရှင်ဂုဏ်ပြုလွှာ




၁၅.၃.၂၀၂၃

သျှမ်းပြည်မြောက်ပိုင်း - မိုင်းရယ်မြို့နယ်
နားခိုကျေးရွာအုပ်စု နားခိုကျေးရွာတွင် တိန်းတီးဆည်နှင့် မိုင်ခေါ်
ဆည်ဧရိယာပေးမြောင်း ပြုပြင်ရန် သံတောင်ဦးကုမ္ပဏီ
မိုင်းရယ်သကြားစက်ရုံ (ကိုယ်စား) ဦးကျော်ခိုင်မှ
အလှူငွေ သိန်း - ၅၀ နှင့် ၊ ဘိလပ်ငွေ ၂၀၀ - အိတ်
ပံ့ပိုးကူညီခြင်းအတွက်
ဤဂုဏ်ပြုမှတ်တမ်းလွှာဖြင့် မှတ်တမ်းတင်ဂုဏ်ပြုအပ်ပါသည်။
အလှူရှင်များ ဆည်ဧရိယာလား စီးပွားချမ်းသာ
ငွေဖြာတိုးတက်ပါစေသော်။

()
 ဦးခိုင်အောင်
ဥက္ကဋ္ဌ

ဆည်ထိမ်းသိမ်းရေးကော်မတီ

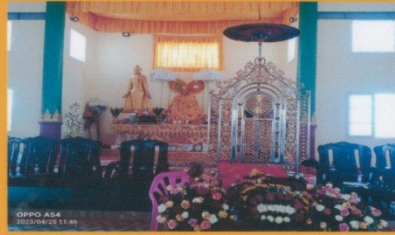
()
 ဦးခိုင်အောင်

ကျေးရွာအုပ်စုအုပ်ချုပ်ရေးမှူး
 နားခိုကျေးရွာအုပ်စု
 မိုင်းရယ်မြို့နယ်

ဂုဏ်ပြုမှတ်တမ်းလွှာ

ကျောင်းဆောင်သစ်ရေစက်ချပွဲ ၊ ထီးတော်တင်ပွဲ
ရှင်လောင်းပွဲ

ကောင်းမွဲလန်ကျောင်းတိုက် ၊ ပါကန်းကျေးရွာအုပ်စု
မိုင်းရယ်မြို့နယ်။



သာသနာတော်နှစ် - ၂၅၆၆ ဝါ ၊ ကောဇာသက္ကရာဇ် - ၁၃၈၅ ခု ၊
ကဆုန်လဆန်း(၇)ရက်နေ့ ၊ အင်္ဂါနေ့ ၊ (၂၅.၄.၂၀၂၃)

ဘုရားကျောင်းထီးတော်အလှူရှင်

ဒါနအလှူရှင် တံတောင်ဦး ငွေရှည်ပုလဲကုမ္ပဏီ လီမိတက်

နေရပ်လိပ်စာ ရှန်တော်သကြားစက်ရုံ တို့မှ လှူဒါန်းပါသည်။

စေသနာသဒ္ဓါထက်သန်စွာ ပေးအပ်လှူဒါန်းပါသဖြင့်
သာဓု ခေါ်ဆိုပြီး ဤဂုဏ်ပြု မှတ်တမ်းလွှာကို
ချီးမြှင့်ပါသည်။



ဘဒ္ဒန္တ ဦးဝါယမ

ကောင်းမွဲလန်ကျောင်းတိုက် ၊ ပါကန်းကျေးရွာအုပ်စု ၊ မိုင်းရယ်မြို့နယ်။

သံတောင်ဦးကုမ္ပဏီလီမိတက်မှ တစ်ရက်ကြံ့တန်ချိန် (၅၀၀၀) ကြိတ်ဝါးမည့်
 သကြားစက်ရုံတည်ဆောက်ရေးအတွက် နယ်ပယ်တိုင်းတာသတ်မှတ်ခြင်း (Scoping) လေ့လာရန်
 အစည်းအဝေးတက်ရောက်သူများစာရင်း

ကျေးရွာအမည် *အင်းလှ*-----

နေ့စွဲ *14.2.2020*

စဉ်	အမည်	လက်မှတ်	မှတ်ချက်
1	<i>ပိတ္တန်</i>		အုပ်ချုပ်ရေးမှူး
2	<i>လုံးကော</i>	<i>လှင်းကျော်</i>	
3	<i>ခွင်လောင် မွန်</i>	0	
4	<i>လုံးဖွန်</i>	<i>လှိုင်ကျော်</i>	
5	<i>လုံးဝေါင်</i>	<i>လှိုင်ဝင်း</i>	
6	<i>ခွင်လောင်</i>	<i>လေးမွန်</i>	
7	<i>ပိတ္တန်</i>	<i>လေး</i>	
8	<i>လုံးခဲ</i>	<i>လှိုင်သန့်သူ</i>	
9	<i>ခွင်လောင်</i>	<i>ထွန်းကျော်</i>	
10	<i>ခွင်လောင်</i>	<i>လေးကပ်</i>	
11	<i>ပိတ္တန်</i>	0	
12	<i>ပူစိန်</i>		

သံတောင်ဦးကုမ္ပဏီလီမိတက်မှ တစ်ရက်ကြံတန်ချိန် (၅၀၀၀) ကြိတ်ဝါးမည့်
 သကြားစက်ရုံတည်ဆောက်ရေးအတွက် နယ်ပယ်တိုင်းတာသတ်မှတ်ခြင်း (Scoping) လေ့လာရန်
 အစည်းအဝေးတက်ရောက်သူများစာရင်း

ကျေးရွာအမည် -~~အလုံ~~-----

နေ့စွဲ 24.7.2020

စဉ်	အမည်	လက်မှတ်	မှတ်ချက်
13	ဒုန်း ဦ	၇	
14	ဒုန်း စောဇော်	၀	
15	ဒုန်း ဆာ	၀	
16	ဒုန်း မတ်	၀	
17	ဒုန်း စွယ်	၀	
18	ဒုန်းစုဇော်	၀	
19	ဒုန်း စောဇော်	၀	
20	ဒုန်း ပွင့်	၀	
21	ဒုန်း မြင့်	၀	
22	ဒုန်း ယိဇော်	၁၆:၀၀	
23	ဒုန်း မြတ်	ဒုန်း မြတ်	
24	ဒုန်း မြတ်	၁၆:၀၀	

သံတောင်ဦးကုမ္ပဏီလီမိတက်မှ တစ်ရက်ကြံ့တန်ချိန် (၅၀၀၀) ကြိတ်ဝါးမည့်
သကြားစက်ရုံတည်ဆောက်ရေးအတွက် နယ်ပယ်တိုင်းတာသတ်မှတ်ခြင်း (Scoping) လေ့လာရန်
အစည်းအဝေးတက်ရောက်သူများစာရင်း

ကျေးရွာအမည် ဒီဂလဲ-----

နေ့စွဲ 14.7.2020

စဉ်	အမည်	လက်မှတ်	မှတ်ချက်
25	ပါ ဃီ၊ ဖ်	လ ကို ငွေ	
26	ပါ ဃီ၊ ဖ်	၀	
27	နုန်း ဝံ	၀	
28	ပါ ဒိန်း	၀	
29	နုန်း ဝံ	၀	
30	နုန်း လင်း	အင်းလှိုင်၊ သူဌာ	
31	ပါ ၃	ပါ ၃	
32	ပါ ၃	၀	
33	နုန်း ဖြစ်စဉ်	၀	
34	နုန်း လောင်စွန်း	အင်းလှိုင်၊ သူဌာ	
35	နုန်း မို	နုန်း မို	
36	နုန်း လီ	နုန်း လီ	

သံတောင်ဦးကုမ္ပဏီလီမိတက်မှ တစ်ရက်ကြိုတန်ချိန် (၅၀၀၀) ကြိတ်ဝါးမည့်
 သကြားစက်ရုံတည်ဆောက်ရေးအတွက် နယ်ပယ်တိုင်းတာသတ်မှတ်ခြင်း (Scoping) လေ့လာရန်
 အစည်းအဝေးတက်ရောက်သူများစာရင်း

ကျေးရွာအမည် - နိုင်းလုံ-----

နေ့စွဲ - 14.7.2020

စဉ်	အမည်	လက်မှတ်	မှတ်ချက်
37	နုန်း ဝိဇ္ဇာ	၀	
38	ပါနောင်	ဖွဲ့စည်း	
39	ပါဆာ	၀၉၁၂၇	
40	နုန်း ဖန်	၀	
41	နုန်း မောင်လန်	အင်းလည်	
42	နုန်း ဟွမ်	၀၉၆၆	
43	ပါမွန်	၀	
44	နုန်း ဟို	၀	
45	နုန်း ဝိဇ္ဇာ	၀	
46	စိုင်းဘန်၊ ဓမ္မာ	သန်း၊ သုလ်	
47	စိုင်းလျှော်	အင်းလည်	
48	ပါနွဲ့	၀၃၇ ဇွယ်	

Than Daung Oo Co., Ltd မှ တစ်ရက်ကြိုတန်ချိန် (၅၀၀၀) ကြိတ်ဂါးသည် သကြားစက်ရုံ
 စီမံကိန်းလည်ပတ်ခြင်းလုပ်ငန်းအတွက် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းအစီရင်ခံစာ (EIA)
 ဆောင်ရွက်ရန် အစည်းအဝေးတက်ရောက်သူများစာရင်း

ကျေးရွာအမည် ~~နားလုံကျေးရွာ~~

နေ့စွဲ 10.6.2023

စဉ်	အမည်	လက်မှတ်	မှတ်ချက်
၀။	ဦးစိုင်းထွန်း		အုပ်ချုပ်ရေးမှူး
၂။	ဦးစိန်	လှိုင်လိင်	
၃။	ဦးလုံးဖိုး	ဇော်မိုး	
၄။	ဦးလုံးကျော်	လှိုင်ကျော်	
၅။	ဦးအောင်စိန်	လှိုင်ကျော်လှိုင်	
၆။	ဦးစိုင်းထွန်း	ကျော်ထွန်း	
၇။	ဦးစိုင်းကျော်	ကျော်မိုး	
၈။	ဦးစိုင်းပ	စောပ	
၉။	ဦးစိုင်းသန်း	စောသန်း	
၁၀။	ဦးစိုင်းရွှေထွန်း	သုတေသန	
၁၁။	ဦးလုံးရွှေ	ကျော်	
၁၂။	ဒေါ်ပါပွင့်	ပွင့်	
၁၃။	ဦးစိုင်းရွှေလှ	စံသုတေသန	

Than Daung Oo Co., Ltd မှ တစ်ရက်ကြံ့တန်ချိန် (၅၀၀၀) ကြိတ်ဝါးသည် သကြားစက်ရုံ
စီမံကိန်းလည်ပတ်ခြင်းလုပ်ငန်းအတွက် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းအစီရင်ခံစာ (EIA)
ဆောင်ရွက်ရန် အစည်းအဝေးတက်ရောက်သူများစာရင်း

ကျေးရွာအမည် ~~အကျယ်ကျယ်~~

နေ့စွဲ ၂၀၁၆.၆.၂၀.၂၀

စဉ်	အမည်	လက်မှတ်	မှတ်ချက်
၂၇။	ဒေါ်ပါ ဇွေ	သူ ညို	
၂၈။	ဒေါ်ပါ မိုး	ဟူးမူဇီ	
၂၉။	ဒေါ်အေး-တင်	ဂါး	
၃၀။	ဒေါ်ပါ မိုး	မူမူ	
၃၁။	ဦးလှိုင်	လှိုင်	
၃၂။	ဦးခိုင်ယုတ်	ယုတ်	
၃၃။	ဒေါ်နုနု ယုတ်	ဟိုင်	
၃၄။	ဒေါ်နုနု စင်	အေး	
၃၅။	ဒေါ်နုနု ဆင်	အေးလမ်း	
၃၆။	ဒေါ်ပါဂျော်	ဟူးမူဇီ	
၃၇။	ဒေါ်ဇွေ	အေး-ယုတ်	
၃၈။	ဒေါ်ခိုင်ယုတ်	အေး-ယုတ်	
၃၉။	ဦး ခိုင်ကွမ်	✓	

Than Daung Oo Co., Ltd မှ တစ်ရက်ကြိတ်ချိန် (၅၀၀၀) ကြိတ်ပါးသည် သကြားစက်ရုံ
 စီမံကိန်းလည်ပတ်ခြင်းလုပ်ငန်းအတွက် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းအစီရင်ခံစာ (EIA)
 ဆောင်ရွက်ရန် အစည်းအဝေးတက်ရောက်သူများစာရင်း

ကျေးရွာအမည် ~~နားလုံကျေးရွာ~~

နေ့စွဲ 10.6.2023

စဉ်	အမည်	လက်မှတ်	မှတ်ချက်
၄၀။	ဒေါ်ပါအွန်	အွန်	
၄၁။	ဒေါ်ပါနော်	ပါနော်	
၄၂။	ဒေါ်ပါအွန်	ပါအွန်	
၄၃။	ဒေါ်ပါမွန်စိန်	ပါမွန်စိန်	
၄၄။	ဒေါ်ပါပံ	ပါပံ	
၄၅။	ဒေါ်ပါမေတ်	ပါမေတ်	
၄၆။	ဒေါ်နုနီကန်	နုနီကန်	
၄၇။	ဒေါ်ပါမိမိ	ပါမိမိ	
၄၈။	ဒေါ်နုနီခဲ	နုနီခဲ	
၄၉။	ဒေါ်နုနီခင်ခင်	နုနီခင်ခင်	
၅၀။	ဒေါ်ပါအွန်	ပါအွန်	
၅၁။	ဒေါ်နုနီပွင့်	နုနီပွင့်	

Than Daung Oo Co., Ltd မှ တစ်ရက်ကြိတ်တန်ချိန် (၅၀၀၀) ကြိတ်ပါးသည် သကြားစက်ရုံ
 စီမံကိန်းလည်ပတ်ခြင်းလုပ်ငန်းအတွက် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းအစီရင်ခံစာ (EIA)
 ဆောင်ရွက်ရန် အစည်းအဝေးတက်ရောက်သူများစာရင်း

ကျေးရွာအမည် - နားယုကျေးရွာ

နေ့စွဲ - ၂၀.၆.၇၀၂၃

စဉ်	အမည်	လက်မှတ်	မှတ်ချက်
၅၂။	ဒေါ်နန်းဆီ		အုပ်ချုပ်ရေးမှူး
၅၃။	ဒေါ်ပါစိ		
၅၄။	ဒေါ်ပါအိမ်		
၅၅။	ဒေါ်နန်းယု		
၅၆။	ဒေါ်နန်းဖွယ်		
၅၇။	ဒေါ်နန်းဟန်		
၅၈။	ဒေါ်ပါဖွယ်		
၅၉။	ဒေါ်ပါစိန်		
၆၀။	ဦးစိုင်းနွယ်		
၆၁။	ဦးလုံးဝါး		
၆၂။	ဒေါ်နန်းမောင်		
၆၃။	ဒေါ်နန်းစိန်		
၆၄။	ဦးယုဟိန်		

Than Daung Oo Co., Ltd မှ တစ်ရက်ကြိုတန်ချိန် (၅၀၀၀) ကြိတ်ဝါးသည် သကြားစက်ရုံ
 စီမံကိန်းလည်ပတ်ခြင်းလုပ်ငန်းအတွက် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းအစီရင်ခံစာ (EIA)
 ဆောင်ရွက်ရန် အစည်းအဝေးတက်ရောက်သူများစာရင်း

ကျေးရွာအမည် နန်းလှကျေးရွာ

နေ့စွဲ 10.6.2023

စဉ်	အမည်	လက်မှတ်	မှတ်ချက်
၅၅။	ဒေါ်စိန်	စိန်	
၅၆။	ဒေါ်နန်းစိန်ညို	ညို	
၅၇။	ဒေါ်နန်းမေ	မေ	
၅၈။	ဒေါ်မာလတ်	လတ်	
၅၉။	ဒေါ်နန်းလှ	နန်းလှ	
၆၀။	ဒေါ်နန်းအောင်	အောင်	
၆၁။	ဒေါ်နန်းစိန်	စိန်	
၆၂။	ဒေါ်မာမေ	မေ	
၆၃။	ဒေါ်မာအောင်	အောင်	
၆၄။	ဒေါ်မာလှ	လှ	
၆၅။	ဒေါ်နန်းမာ	နန်းမာ	
၆၆။	ဒေါ်နန်းအေး	အေး	

Than Daung Oo Co., Ltd မှ တစ်ရက်ကြိတ်တန်ချိန် (၅၀၀၀) ကြိတ်ပါးသည် သကြားစက်ရုံ
 စီမံကိန်းလည်ပတ်ခြင်းလုပ်ငန်းအတွက် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းအစီရင်ခံစာ (EIA)
 ဆောင်ရွက်ရန် အစည်းအဝေးတက်ရောက်သူများစာရင်း

ကျေးရွာအမည် နားအိုင်ကျေးရွာ

နေ့စွဲ ၂၀.၉.၂၀၂၁

စဉ်	အမည်	လက်မှတ်	မှတ်ချက်
၇၇	ဒေါ်ဖုန်းစိန်ဇော်	ဆိန်လှိုင်	

Than Daung Oo Co., Ltd မှ တစ်ရက်ကြိုတန်ချိန် (၅၀၀၀) ကြိတ်ဝါးသည် သကြားစက်ရုံ
 စီမံကိန်းလည်ပတ်ခြင်းလုပ်ငန်းအတွက် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းအစီရင်ခံစာ (EIA)
 ဆောင်ရွက်ရန် အစည်းအဝေးတက်ရောက်သူများစာရင်း

ကျေးရွာအမည် ရှုမောက်ကျေးရွာ

နေ့စွဲ 10.6.2023

စဉ်	အမည်	လက်မှတ်	မှတ်ချက်
၁။	ဦးလုံးစုမ်	လုနီးဟဲ့	ဒုတိယအဖွဲ့ဝင်
၂။	ဦးထွန်းအောင်	လျှပ်စက်	
၃။	ဦးအုံး	မောင်မောင်	
၄။	ဦးလုံးဇွန်	မ	
၅။	ဒေါ်ပါလှ	မ	
၆။	ဒေါ်ပါလှ	✓	
၇။	ဒေါ်ပါစိန်	—	
၈။	ဒေါ်နန်းနန်းနန်း	နန်း	
၉။	ဒေါ်နန်းနန်း	နန်း	
၁၀။	ဒေါ်အေးနန်း	အေး	
၁၁။	ဦးလုံးစော	စော	
၁၂။	ဒေါ်နန်းနန်း	နန်း	
၁၃။	ဦးစိုင်းလှ	လှ	



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