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Appendix D	Public Feedbacks	

Abbreviation

°C	Degree Celsius
°F	Degree Ferinheight
AOI	Area of Influence
AQ	Air Quality
ASEAN	Association of Southeast Nations
BOD	Biochemical oxygen demand
BODs	Board of Directors
BOT	Build, Operate and Transfer
CBOs	Community Based Organizations
CITES	Convention on International Trade in Endangered Species
CO	Carbon monoxide
COD	Commercial Operation Date
COD	Chemical Oxygen Demand
CSR	Cooperate Social Responsibility
dBA.	A-weighted Decibels
DEPP	Department of Electric Power and Planning
DHPI	Department of Hydropower Implementation
DMS	Detailed Measurement Survey
DO	Dissolved Oxygen
DPTSC	Department of Power Transmission and System Control
EC	Electrical Conductivity
ECC	Environmental Compliance Certificate
ECD	Environmental Conservation Department
EE	Executive Engineer
EIA	Environmental Impact Assessment
EMF	Electromagnetic fields
EMoP	Environmental Monitoring Plan
EMP	Environmental Management Plan
EMP	Environmental Management Plan
EO	Environmental Officer
EPC	Electricity Supply Corporation
EPGE	Electric Power Generation Enterprise
ERC	Electricity Regulatory Commission
ESAP	Environmental and Social Action Plan
ESMMPs	Environmental and Social Mitigation and Management Plans
FD	Forest Department
ft	feet
GAD	General Administration Department
GFP	Grievance Focal Person
GIS	Geographic Information System
GM	General Manager
GPS	Global Positioning System
GRM	Grievance Redress Mechanism
HPP	Hydropower Project
IEE	Initial Environmental Examination
ISO	International Organization for Standardization
IUCN	International Union for Conservation of Nature
km	Kilometer
kV	Kilovolt
LC	Least Concerned
m	meter
MD	Managing Director
Mg/l	Miligram per litre

mm	Millimeter
MOECAF	Ministry of Environmental Conservation and Forestry
MOEE	Ministry of Energy and Electricity
MONREC	Ministry of Natural Resources and Environmental Conservation
MOPFI	Ministry of Planning and Finance
MW	Megawatt
NCEH	Natural Current Energy Hydropower Co., Ltd.
ND	No Data
NE	Not Evaluated
NEQEG	National Environmental Quality (Emission) Guidelines
NO	Nitrogen monoxide
NO ₂	Nitrogen dioxide
Nos	Numbers
NT	Near Threatened
ORP	Oxidation Reduction Potential
PAPs	Project Affected Persons
PCM	Public Consultation Meeting
PD	Public Disclosure
PM ₁₀	Particulate matter with a diameter of 10 microns or less
PM _{2.5}	Particulate matter with a diameter of 2.5 microns or less
PMU	Project Management Unit
REM	Resource and Environment Myanmar
RFs	Reserved Forests
ROW	Right-of-Way
S.U	Standard Unit
sec	Seconds
SEM	Sustainable Environment Myanmar
SO ₂	Sulphur dioxide
SW	Surface Water
TCR	Transitional Consultant Registration
TDS	Total Dissolved Solids
TL	Transmission Line
TL	Transmission Line
TSS	Total suspended solids
UAE	United Analyst and Engineering
UNFCCC	United Nations Framework Convention on Climate Change
WDPA	World Database on Protected Areas
WHO	World Health Organization

အစီရင်ခံစာအကျဉ်းချုပ်

၁။ နိဒါန်း

အဆိုပြုစီမံကိန်းသည် နမ္မတူ (သီပေါ) ရေအားလျှပ်စစ်စီမံကိန်းမှထွက်ရှိသော လျှပ်စစ်ဓာတ်အားကို ၂၃၀ ကေဗွီလိုင်းဖြင့် အထက်ရဲရွာ ရေအားလျှပ်စစ်စီမံကိန်းဝန်းအတွင်းရှိ ခွဲရုံအသစ်သို့ လျှပ်စစ်ဓာတ်အား သွယ်တန်းရန်ရည်ရွယ်ပါသည်။ အဆိုပြုဓာတ်အားလိုင်းသည် အထက်ရဲရွာ ရွှေစာရံခွဲရုံမှတစ်ဆင့် နိုင်ငံတော်ဓာတ်အားလိုင်းကွန်ယက်နှင့် ချိတ်ဆက်မည် ဖြစ်ပါသည်။ အဆိုပြုဓာတ်အားလိုင်းသည် နမ္မတူမြစ်ဖျားပိုင်းတွင်တည်ရှိသော နမ္မတူ (သီပေါ) ရေအားလျှပ်စစ်ရုံ (၂၁၀ မဂ္ဂါဝပ်) မှ အစပြုမည်ဖြစ်ပြီး သီပေါမြို့နယ်သို့ ဖြတ်သန်း၍ ကျောက်မဲမြို့နယ်အတွင်းရှိ အထက်ရဲရွာရေအားလျှပ်စစ် စီမံကိန်းတွင် အဆုံးသတ်မည်ဖြစ်ပါသည်။

ဓာတ်အားလိုင်းသည် ၇၅.၆၇ ကီလိုမီတာ (၄၇.၀၂ မိုင်) ခန့် ရှည်လျားမည်ဖြစ်ပါသည်။ စီမံကိန်းဖြစ်မြောက်နိုင်ခြေ လေ့လာခြင်းဆိုင်ရာ ကွင်းဆင်းလုပ်ငန်းများကို ဆောင်ရွက်ပြီးခဲ့ပြီဖြစ်ပြီး၊ ဓာတ်အားလိုင်းအလမ်းကြောင်းကိုလည်း လျှပ်စစ်ဓာတ်အားပို့လွှတ်ရေး နှင့် ကွပ်ကဲရေးဦးစီးဌာန (DPTSC)၊ လျှပ်စစ်နှင့်စွမ်းအင်ဝန်ကြီးဌာန (MOEE) မှ ၂၀၁၈ နှောင်းပိုင်းတွင် အတည်ပြုခဲ့ပြီးဖြစ်ပါသည်။ စီမံကိန်းဆိုင်ရာ တည်ဆောက်ရေးလုပ်ငန်းများကို NCEH ကုမ္ပဏီ (Natural Current Energy Hydropower Co., Ltd.) မှ BOT စနစ်ဖြင့် လျှပ်စစ်ဓာတ်အားပို့လွှတ်ရေးနှင့် ကွပ်ကဲရေးဦးစီးဌာန (DPTSC)၏ လမ်းညွှန်ချက်များအတိုင်း ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။

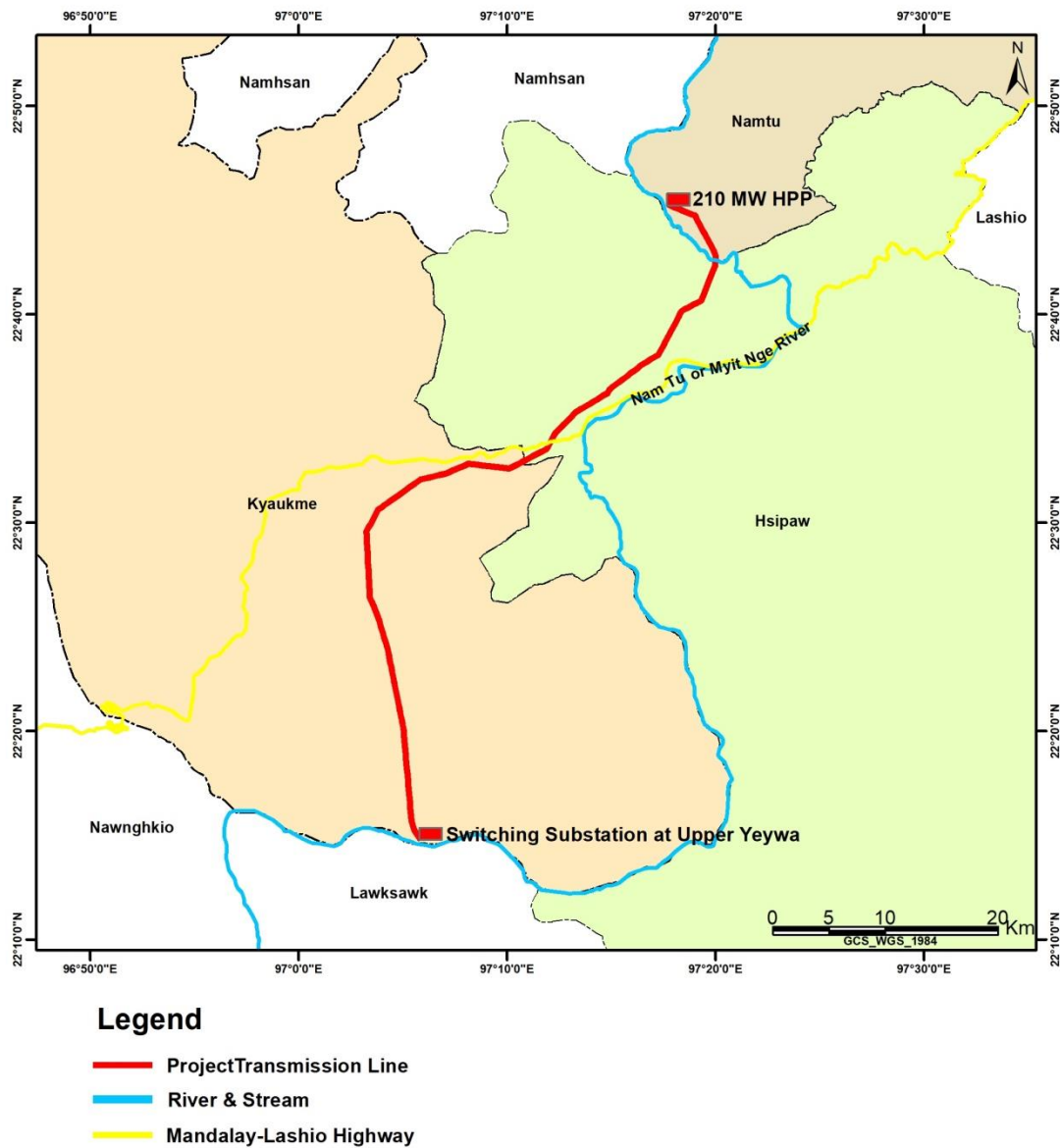
၂။ စီမံကိန်းအကြောင်းအရာဖော်ပြချက်

စီမံကိန်းသည် ရှမ်းပြည်နယ်မြောက်ပိုင်း တောင်ကုန်းတောင်တန်းထူထပ်သောနေရာတွင်တည်ရှိပြီး၊ ဓာတ်အားလိုင်း ဖြတ်သန်းရာ မြေမျက်နှာသွင်ပြင်များအခြေအနေအထား မြို့နယ်အလိုက် အနည်းငယ်ကွာခြားမှု ရှိပါသည်။ နမ္မတူမြို့သည် ပင်လယ်ရေမျက်နှာပြင် အထက် ၁၇၆၀ ပေ၊ သီပေါမြို့သည် ၁၃၉၀ ပေ နှင့် ကျောက်မဲမြို့သည် ၂၅၀၆ ပေ အသီးသီးတွင် တည်ရှိကြပါသည်။ ၎င်းမြို့များတွင် နှစ်အလိုက်ပျမ်းမျှအပူချိန်သည် ၄၈ နှင့် ၉၂ ဒီဂရီ ဖာရင်ဟိုက် ကြားတွင်ရှိပါသည်။ နှစ်အလိုက် ပျမ်းမျှမိုးရေချိန်များမှာ မိုးရာသီတွင် ၂.၇ လက်မ ဖြစ်ပြီး ခြောက်သွေ့ရာသီတွင် ၀.၁ လက်မ အဖြစ် တွေ့ရလေ့ရှိပါသည်။ ဓာတ်အားလိုင်းလမ်းအကြောင်း တစ်လျှောက်တွင် လယ်ယာ နှင့် ရာသီပေါ်သီးနှံစိုက်ခင်းများ၊ သစ်တောမြေများ၊ ခြံနွယ်များ၊ မြစ်၊ ချောင်းများ နှင့် လူနေဧရိယာများ တွေ့ရပါသည်။ ရှမ်းပြည်နယ် မြောက်ပိုင်း နှင့် အရှေ့ပိုင်းဒေသများ၏ အဓိကစီးပွားရေးလုပ်ငန်းမှာ အိမ်နီးချင်းနိုင်ငံများ နှင့် ကုန်သွယ်ခြင်းဖြစ်ပြီး၊ စိုက်ပျိုးရေးလုပ်ငန်း များလည်း လုပ်ကိုင်ပါသည်။ အဆိုပြုဓာတ်အားလိုင်းစီမံကိန်းတွင်ပါဝင်သော အစိတ်အပိုင်းများကို အောက်ပါ ဇယား (၁) တွင် ဖော်ပြထားပါသည်။

ဇယား ၁။ ၂၃၀ ကေဗွီဓာတ်အားလိုင်းအကျဉ်းချုပ်အချက်အလက်များ

အကြောင်းအရာ	ဖော်ပြချက်
ဓာတ်အားလိုင်းစီမံကိန်းစတင်မည့်အမှတ်	နမ္မတူရေအားလျှပ်စစ်ရုံ (၂၁၀ မဂ္ဂါဝပ်)
ဓာတ်အားလိုင်းစီမံကိန်းအဆုံးသတ်မည့်အမှတ်	ခွဲရုံ၊ အထက်ရဲရွာရေအားလျှပ်စစ်စီမံကိန်း
ဓာတ်အားလိုင်းအလျား	၇၅.၆ ကီလိုမီတာ (၄၇.၀၂ မိုင်)
ဓာတ်အားလိုင်းအပိုင်း (Section) အရေအတွက်	၄၁ ပိုင်း
အရှည်လျားဆုံးအပိုင်း၏ အလျား	၇.၃၉ ကီလိုမီတာ (၄.၆ မိုင်)

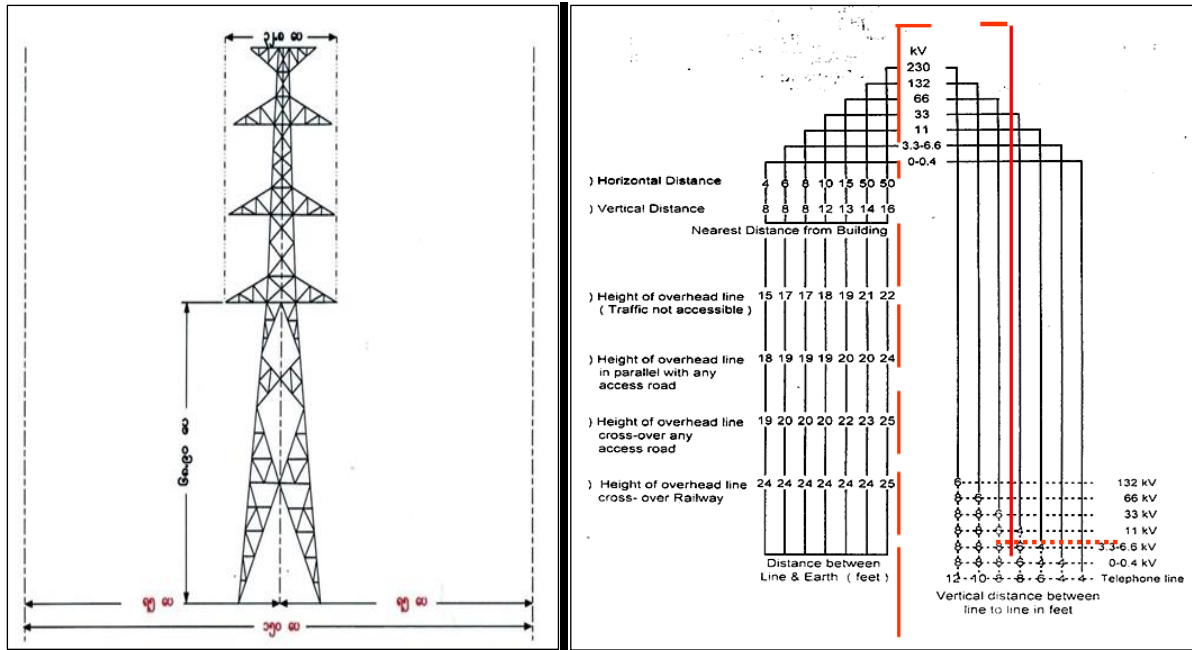
တာဝါတိုင်အသုံးပြုမှု	၁ ကီလိုမီတာလျှင် ၂.၆ တိုင်နှုန်း (၁ မိုင်လျှင် ၄.၁ တိုင်နှုန်း)
Tension တာဝါတိုင် အသုံးပြုမှု	၄၂ တိုင် (၂၁.၅ ရာခိုင်နှုန်း)



ပုံ ၁။ ၂၃၀ ကေဗီဓါတ်အားလိုင်း စီမံကိန်း တည်နေပြမြေပုံ

၂.၁။ ဓါတ်အားလိုင်း ROW

လျှပ်စစ်ဓါတ်အားပို့လွှတ်ရေးနှင့်ကွပ်ကဲရေးဦးစီးဌာန (DPTSC)၊ လျှပ်စစ်နှင့်စွမ်းအင်ဝန်ကြီးဌာန (MOEE) မှ ပြဌာန်းထားသော ၂၃၀ကေဗီလိုင်း၏ အနည်းဆုံးအကွားအဝေး (ROW) ကို ပုံ (၂) နှင့် ဇယား (၂) တွင်ဖော်ပြထားပါသည်။



Source: DPTSC of MOEE

ပုံ ၂။ ၂၃၀ကေးစီ Double Circuit တာဝါတိုင်ဒီဇိုင်း၊ ROW နှင့် မြေပြင်အကွာအဝေး

၂.၂။ ၂၃၀ကေးစီခါတ်အားလိုင်းတာဝါတိုင်၏အထွေထွေဒီဇိုင်းအယူအဆ

၂၃၀ကေးစီခါတ်အားလိုင်းတာဝါတိုင်၏ အထွေထွေဒီဇိုင်းအယူအဆ ကို ဇယား (၂) တွင် ဖော်ပြထားပါသည်။

ဇယား ၂။ ၂၃၀ကေးစီလိုင်းတာဝါတိုင်၏အထွေထွေဒီဇိုင်းအယူအဆ

စဉ်	အကြောင်းအရာ	အမျိုးအစား
၁	Conductor Type	DUCK; ACSR (605 MCM)
၂	No. of Conductor per Phase	2
၃	No. of Circuit	Double
၄	Earth wire	-
၅	OPGW wire	-
၆	Swing Angle	60 Degree
၇	Normal Span	400 m
၈	Everyday Temperature	28°C
၉	Maximum Temperature	75°C
၁၀	Minimum Temperature	10°C
၁၁	Wind Temperature	15°C
၁၂	Maximum Wind Speed	35 m/s
၁၃	Cable Tension	
	Everyday Temperature (28°C) (Creep)	23% of Ultimate
	Everyday Temperature (28°C) (Construction) (Initial)	33% of Ultimate
	Wind Temperature (15°C+ Max wind)(Load)	40% of Ultimate
၁၄	Clearance	

	-Normal ground	9 m (30 ft)
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၂.၃။ ၂၃၀ကေဗီဓါတ်အားလိုင်းဖြတ်သန်းရာအမှတ်များ

(က) မြို့နယ်များ

အဆိုပြုဓါတ်အားလိုင်းသည် နမ္မတူ၊ သီပေါ နှင့် ကျောက်မဲ မြို့နယ်များကို ဖြတ်၍ သွယ်တန်းမည်ဖြစ်ပါသည်။ အသေးစိတ်အားဖြင့် နမ္မတူမြို့နယ်တွင် တာဝါတိုင် ၂၀၊ သီပေါမြို့နယ်တွင် ၆၅ တိုင် နှင့် ကျောက်မဲမြို့နယ် တွင် ၁၁၀ တိုင် အသီးသီးဖြတ်သန်းမည်ဖြစ်ပြီး၊ တာဝါတိုင်စုစုပေါင်းအရေအတွက် ၁၉၅ တိုင် ရှိပါသည်။ မြို့နယ်အလိုက် တာဝါတိုင် ဖြတ်သန်းမှု အမှတ်စဉ် နှင့် ခန့်မှန်း အကွာအဝေးများကို ဇယား (၃) တွင် ဖော်ပြထားပါသည်။

ဇယား ၃။ ဓါတ်အားလိုင်းဖြတ်သန်းခြင်းဆိုင်ရာအချက်အလက်များ

စဉ်	ပြည်နယ်	ခရိုင်	မြို့နယ်	တာဝါတိုင် အမှတ်စဉ်	တာဝါတိုင် အရေအတွက်	ခန့်မှန်းအကွာအဝေး	
						ကီလိုမီတာ	မိုင်
၁	ရှမ်း	ကျောက်မဲခရိုင်	နမ္မတူ	၁ - ၂၀	၂၀	၇.၆၄	၄.၇၅
၂			သီပေါ	၂၁ - ၈၅	၆၅	၂၄.၄၁	၁၅.၁၇
၃			ကျောက်မဲ	၈၆-၁၉၂	၁၀၇	၄၃.၅၅	၂၇.၀၆
၄	စုစုပေါင်းတာဝါတိုင်အရေအတွက်				၁၉၂	၇၅.၆၀	၄၆.၉၈
၅	အထက်ရဲရွာစီမံကိန်းအတွင်းရှိသောတိုင်အရေအတွက်			၁-၃	၃	၀.၆၈	၀.၄၂
၆	စုစုပေါင်း			-	၁၉၅	၇၅.၆	၄၇.၀၂

(ခ) ဓါတ်အားလိုင်းလမ်းအူကြောင်း နှင့် ၁ကီလိုမီတာအကွာအဝေးအတွင်းရှိ ကျေးရွာများ

ဓါတ်အားလိုင်းသည် ကျေးရွာများအား တိုက်ရိုက်ဖြတ်ကျော်သွားခြင်းမရှိသော်လည်း ကျေးရွာအနီးတဝိုက်မှဖြတ်သန်း သွား၍သော်လည်းကောင်း၊ ကျေးရွာအစွန်အဖျားရှိလူနေအိမ်များအပေါ်တွင်ဖြတ်သန်းသွားသည်ကို တွေ့ရပါသည်။ လေ့လာတွေ့ရှိချက်များအရ ဓါတ်အားလိုင်းလမ်းအူကြောင်းနှင့် အကွာအဝေး ၁ ကီလိုမီတာအတွင်းရှိသော ကျေးရွာ အရေအတွက်မှာ သီပေါမြို့နယ်တွင် ၂၁ ရွာ ရှိပြီး ကျောက်မဲမြို့နယ်တွင် ၁၃ ရွာဖြစ်ပါသည်။

(ဂ) ဓါတ်အားလိုင်း ROW အတွင်းရှိအဆောက်အအုံများ

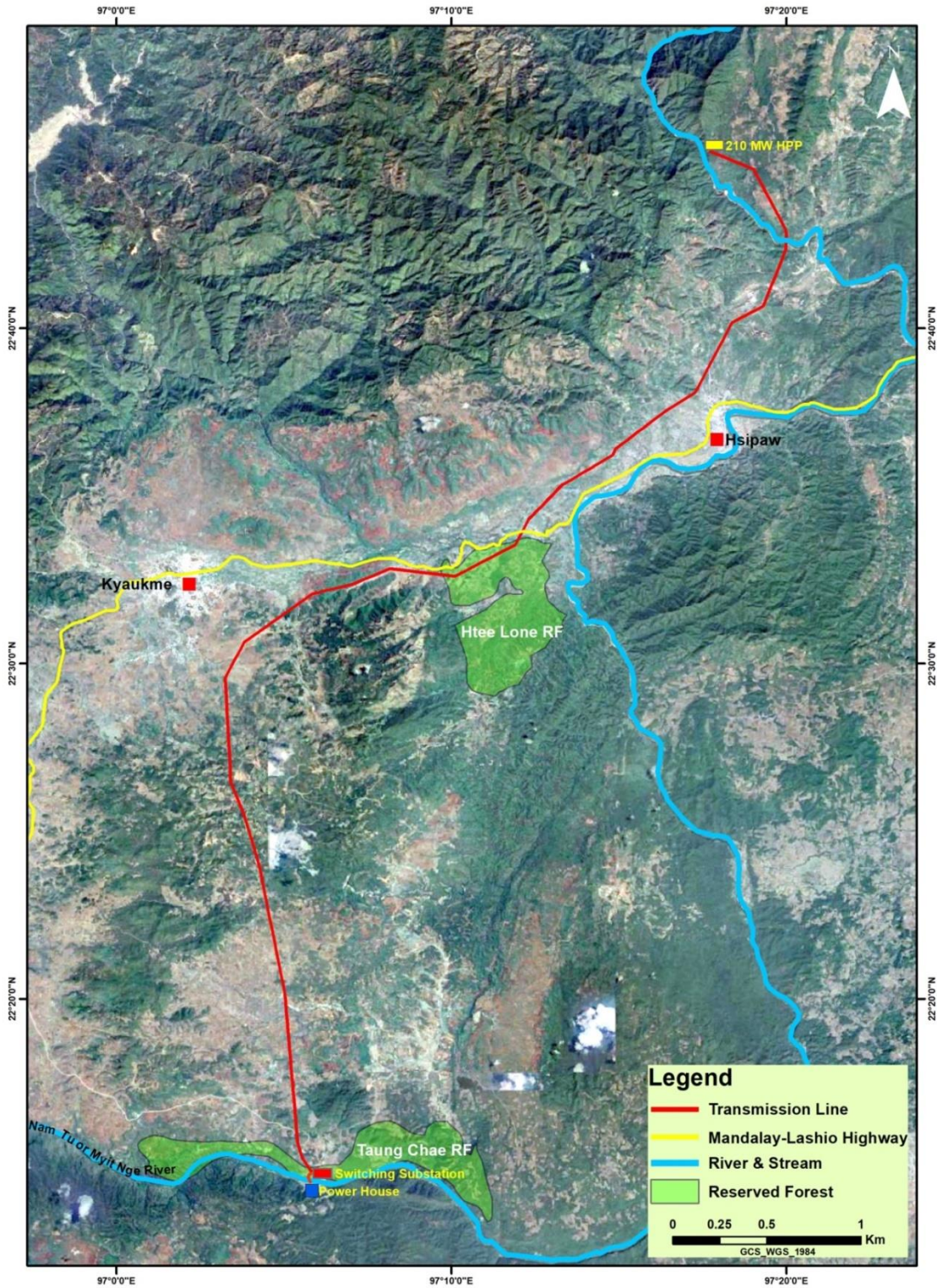
ဓါတ်အားလိုင်း ROW ပေ ၁၅၀ (တစ်ဖက် ၇၅ ပေ) အတွင်း တည်ရှိသော အဆောက်အအုံ နှင့် လူနေအိမ်များကို ကွင်းဆင်းလုပ်ငန်းများ ဆောင်ရွက်စဉ်မှတ်တမ်းများနှင့် ကောင်းကင်ဓါတ်ပုံများအပေါ်အခြေခံ၍ ရေတွက်ထားခြင်း ဖြစ်ပါသည်။ လေ့လာတွေ့ရှိချက်များအရ ဓါတ်အားလိုင်းလမ်းအူကြောင်းတစ်လျှောက် ROW ပေ ၁၅၀ အတွင်း လူနေအိမ် နှင့် အခြားသော အသေးစားအဆောက်အအုံ စုစုပေါင်း ၂၅ ခု ရှိပါသည်။

(ဃ) မြစ် နှင့် ချောင်း များ

ဓါတ်အားလိုင်းလမ်းအူကြောင်းတစ်လျှောက် မြစ်ဖြတ်ကျော်မှု ၂ ကြိမ်ရှိပါသည်။ ပထမတစ်ကြိမ်မှာ မြစ်ငယ်မြစ် (နမ္မတူမြစ် ဟု နမ္မတူတွင် ခေါ်ပြီး၊ ဒုဌာဝတီမြစ် ဟု သီပေါ နှင့် ကျောက်မဲမြို့တို့တွင်ခေါ်ပါသည်) ဖြစ်ပြီး တာဝါတိုင်အမှတ် ၂၀ နှင့် ၂၁ ကြားတွင် ဖြတ်ကျော်ပါသည်။ ဒုတိယတစ်ကြိမ်မှာ မြစ်ငယ်မြစ်၏ မြစ်လက်တက်ဖြစ်ပြီး တာဝါတိုင်အမှတ် ၇၃ နှင့် ၇၄ ကြားတွင် ဖြတ်ကျော်ပါသည်။ ထို့အပြင် ဓါတ်အားလိုင်းသည် အခြားသောချောင်းငယ်၊ မြောင်းငယ်များကိုလည်း စုစုပေါင်း ၈ ကြိမ်ဖြတ်ကျော် ကြောင်း တွေ့ရှိရပါသည်။

(င) သစ်တောကြိုးဝိုင်းများ

ဓါတ်အားလိုင်းသည် သစ်တောကြိုးဝိုင်းများကို ၂ ကြိမ်ဖြတ်ကျော်ကြောင်းတွေ့ရှိရပါသည်။ တစ်ခုမှာ သီပေါ နှင့် ကျောက်မဲ မြို့နယ်ကြားရှိ ထီးလုံ(တိန်းလုံ)ကြိုးဝိုင်းဖြစ်ပြီး တာဝါတိုင်အမှတ် ၇၉ မှ ၉၀ အထိဖြတ်ကျော် ပါသည်။ ကျန်တစ်ခုမှာ ကျောက်မဲမြို့နယ်အတွင်းရှိ တောင်ခြေကြိုးဝိုင်း ဖြစ်ပြီး တာဝါတိုင်အမှတ် ၁၉၂ မှ ၁၉၅ အထိဖြတ်ကျော် ပါသည်။



ပုံ ၃။ သစ်တောကြိုးဝိုင်းဖြတ်ကျော်မှုပြမြေပုံ

(စ) လမ်းများ

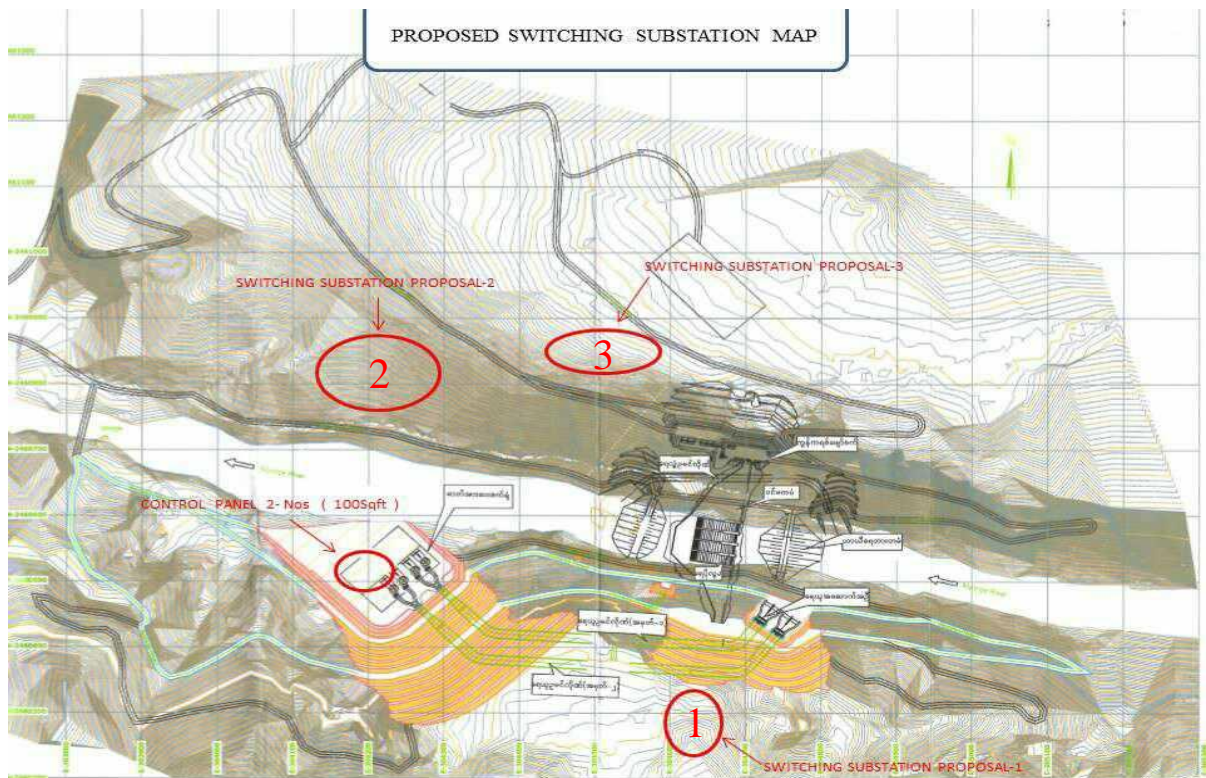
ယေဘုယျအားဖြင့် ဓါတ်အားလိုင်းသည် ကျေးရွာသုံးလမ်း၊ ကားလမ်း စသည်တို့ဖြင့်အပြိုင်သွားသည်ကို တွေ့ရှိရပြီး၊ အဆိုပါလမ်းများ ကို ၄၄ ကြိမ် ဖြတ်ကျော်သွားသည်ကိုလည်း လေ့လာတွေ့ရှိရပါသည်။

(ဆ) ၂၃၀ကေဗီလိုင်း

ဓါတ်အားလိုင်းသည် သီပေါမြို့နယ်၊ ကျင်သီကျေးရွာအုပ်စု၊ ရေပူကျေးရွာအနီးတွင် လက်ရှိအသုံးပြုလျက်ရှိနေသော ၂၃၀ကေဗီလိုင်း ကို ဖြတ်ကျော်သွားကြောင်းတွေ့ရှိရပါသည်။ ဓါတ်အားလိုင်း အချင်းချင်း ဖြတ်ကျော်ရာတွင် သတ်မှတ် အကွာအဝေးများကို လျှပ်စစ်ဓါတ်အားပို့လွှတ်ရေးနှင့်ကွပ်ကဲရေးဦးစီးဌာန (DPTSC) မှ ပြဌာန်းထားသော လမ်းညွှန်ချက် များအတိုင်း လိုက်နာဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။

၂.၄။ ဓါတ်အားခွဲရုံ

အဆိုပြုစီမံကိန်းအတွက် ဓါတ်အားခွဲရုံအသစ်ကို အထက်ရဲရွာရေအားလျှပ်စစ်စီမံကိန်းဝန်းအတွင်းရှိ တည်ဆောက်ရေး ယူနစ် (၃) ဧရိယာအတွင်း တည်ဆောက်ရန် လျာထားပါသည်။ ဓါတ်အားခွဲရုံအသစ် တည်ဆောက်ရန် မြေနေရာ (၃) ခု အဆိုပြု တင်ပြခဲ့ပါသည်။ ၎င်းတို့ထဲမှ အဆိုပြုတည်နေရာ (၂) အား လျှပ်စစ်ဓါတ်အားပို့လွှတ်ရေးနှင့်ကွပ်ကဲရေးဦးစီးဌာန (DPTSC) နှင့် ရေအားလျှပ်စစ်အကောင်အထည်ဖော်ရေးဦးစီးဌာန (DHPI) တို့၏ ထောက်ခံချက်ဖြင့် လျှပ်စစ်စွမ်းအား စီမံရေးဦးစီးဌာန (DEPP) မှ ဓါတ်အားခွဲရုံ အသစ်တည်ဆောက်ရန် မြေနေရာရွေးချယ်အတည်ပြုခဲ့ပါသည်။

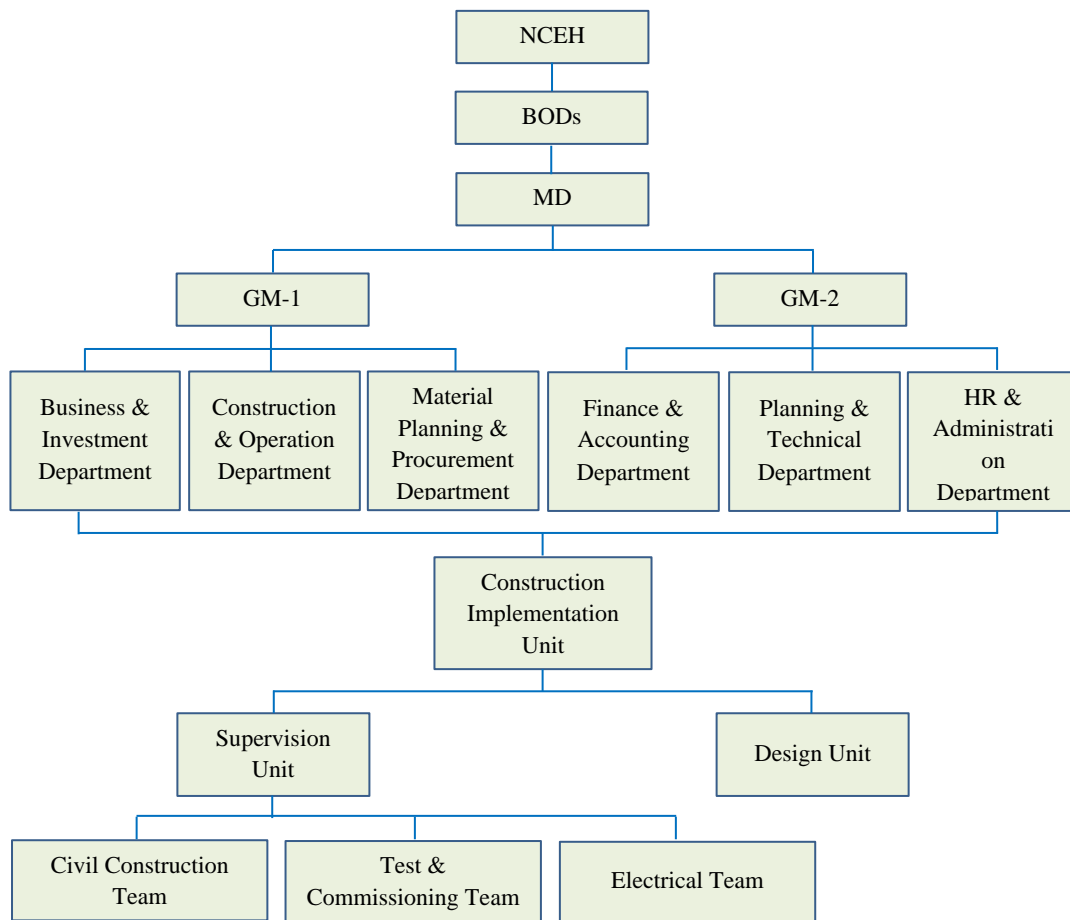


ပုံ ၄။ ဓါတ်အားခွဲရုံအသစ်တည်ဆောက်ရန် အဆိုပြုနေရာများနှင့် ရွေးချယ်အတည်ပြုခဲ့သောနေရာ

၂.၅ တည်ဆောက်ရေးလုပ်ငန်းများအကောင်အထည်ဖော်ခြင်း

၂.၅.၁ တည်ဆောက်ရေးလုပ်ငန်းများအားအကောင်အထည်ဖော်မည့်အဖွဲ့အစည်း

အဆိုပြုဓါတ်အားလိုင်းသွယ်တန်းခြင်းဆိုင်ရာ တည်ဆောက်ရေးလုပ်ငန်းများကို NCEH ကုမ္ပဏီမှ အကောင်အထည်ဖော် ဆောင်ရွက်မည်ဖြစ်ပြီး ၎င်းကုမ္ပဏီ၏ ဖွဲ့စည်းပုံနှင့် စီမံကိန်းအကောင်အထည်ဖော်မည့်ယူနစ်ကို ပုံ (၅) တွင် ဖော်ပြထား ပါသည်။



ပုံ ၅။ ကုမ္ပဏီ၏ ဖွဲ့စည်းပုံနှင့် စီမံကိန်းအကောင်အထည်ဖော်မည့်ယူနစ်

၂.၅.၂ တည်ဆောက်ရေးလုပ်ငန်းအကောင်အထည်ဖော်ခြင်းဆိုင်ရာခန့်မှန်းအချိန်ဇယား

တည်ဆောက်ရေးလုပ်ငန်းများကို ၃ နှစ်အတွင်း အပြီးသတ်ဆောင်ရွက်ရန်လျာထားပြီး တည်ဆောက်ရေးလုပ်ငန်းအကောင်အထည်ဖော်ခြင်းလုပ်ငန်းစဉ်၏ ခန့်မှန်းခြေအချိန်ဇယားကို ဇယား (၄) တွင် ဖော်ပြထားပါသည်။

Phase	Activities	2020				2021				2022			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Preconstruction	Recruitment of consultants												
	Appoint implementation consultants												
	Finalize design												
	Contract with IEE implementation consultant												
	Resettlement implementation												
Construction	Contract with raw material suppliers												
	Recruitment of construction workers												
	Construction of temporary worker camp												
	Construction of substation												
	ROW clearance												
	Access road construction												
	Tower foundation works												
	Tower erection												
	Stringing work												
	Test/commissioning												
	Completion of installation												

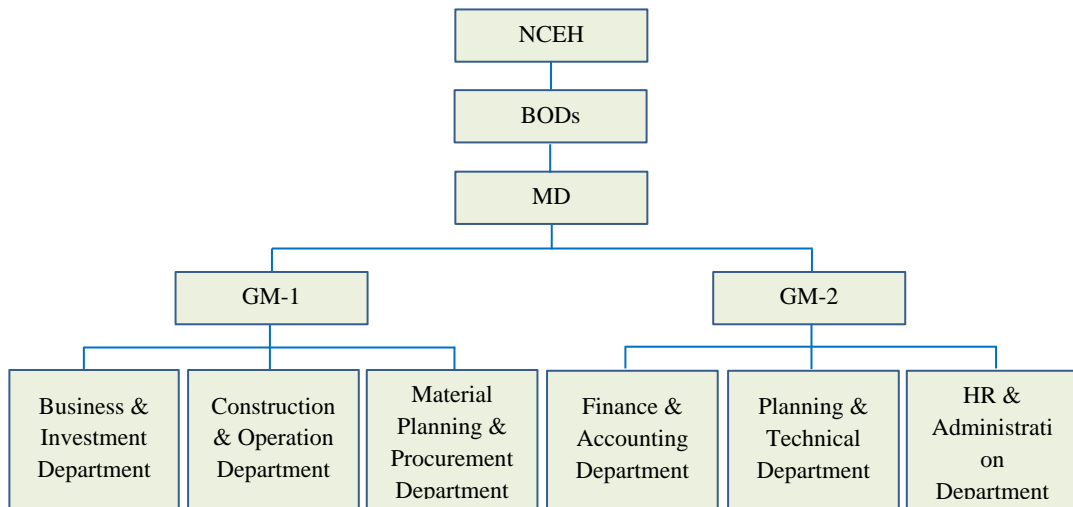
Q= Quarter of a year

၃။ စီမံကိန်းအဆိုပြုသူ

၃.၁။ စီမံကိန်းအဆိုပြုသူ၏အချက်အလက်များ

NCEH သည် ပုဂ္ဂလိက ကုမ္ပဏီတစ်ခုဖြစ်ပြီး မြန်မာနိုင်ငံအတွင်း ရေအားလျှပ်စစ်ဆိုင်ရာဓါတ်အားပေးရုံစီမံကိန်းများကို လေ့လာခြင်း၊ ဒီဇိုင်းရေးဆွဲခြင်း၊ ရင်းနှီးမြှုပ်နှံခြင်း၊ အကောင်အထည်ဖော်ဆောင်ရွက်ခြင်း နှင့် စက်ရုံစီမံခန့်ခွဲခြင်းဆိုင်ရာ လုပ်ငန်းများကိုလုပ်ကိုင်လျက်ရှိပါသည်။ NCEH သည် ကာလရှည်ကြာစွာ ဖော်ပြပါစီမံကိန်းကြီးများတွင် ဦးဆောင်ပါဝင် ခဲ့ခြင်းကြောင့် နည်းပညာ၊ ဒီဇိုင်း နှင့် အင်ဂျင်နီယာဆိုင်ရာ လုပ်ငန်းအတွေ့အကြုံများ တိုးပွားလျက်ရှိပါသည်။ NCEH သည် အရည်အသွေးပြည့်ဝ၍ ဈေးနှုန်းသင့်တင့်ပြီး ပတ်ဝန်းကျင်ထိခိုက်မှုနည်းသော စွမ်းအင်အရင်းအမြစ် နှင့် အခြားသောအခြေခံအဆောက်အအုံစီမံကိန်းများကို ၎င်းတို့၏လုပ်ငန်းအပ်သူများစိတ်တိုင်းကျဝန်ဆောင်မှုပေးနိုင်ရန် အထူးအလေးထားလျက်ရှိပါသည်။ ထို့အပြင် ကုမ္ပဏီ၏သည် “NCEH သည် ယုံကြည်စိတ်ချရသောစွမ်းအင်ထောက်ပံ့သူ ဖြစ်သည်” ဟု ယုံကြည်လျက်ရှိပြီး စွမ်းအင်စီမံကိန်းများ၌ ၎င်းတို့ရွေးချယ်ခံရပါက ထိုယုံကြည်ချက် နှင့် ကိုက်ညီအောင် ဆောင်ရွက်သွားမည်ဖြစ်ပါသည်။

၃.၂။ ကုမ္ပဏီဖွဲ့စည်းပုံ



ပုံ ၆။ NCEH ကုမ္ပဏီဖွဲ့စည်းပုံ

၃.၃။ ကုမ္ပဏီရုံးများ

ကုမ္ပဏီရုံးများ၏ ဆက်သွယ်ရန်လိပ်စာများကို ဇယား (၅) တွင် ဖော်ပြထားပါသည်။

ဇယား ၅။ ကုမ္ပဏီသို့ဆက်သွယ်ရန်အချက်အလက်များ

ကုမ္ပဏီရုံးချုပ် (မန္တလေး)
<ul style="list-style-type: none"> အမှတ် (E-1-11)၊ ငှက်ခွေလမ်း၊ ၆၄-၆၅ ကြား၊ ချမ်းမြသာစည်မြို့နယ်၊ မန္တလေး ၀၉-၂၅၈၂၄၃၃၃၉ ၀၉-၄၂၀၀၁၁၁၅၉
ကုမ္ပဏီရုံးခွဲ (နေပြည်တော်)
<ul style="list-style-type: none"> အမှတ် (A-051)၊ ပုဒဲမ္မာလမ်း၊ ရွှေကြာပင်ရပ်ကွက်၊ ဇေယျသီရိမြို့နယ်၊ နေပြည်တော်။ ၀၉-၈၉၅၂၂၈၈၅၂



၄။ ကနဦးပတ်ဝန်းကျင်လေ့လာဆန်းစစ်ရန်ကျွမ်းကျင်သူများရွေးချယ်ခြင်း

၄.၁။ ကနဦးပတ်ဝန်းကျင်လေ့လာဆန်းစစ်မည့်အဖွဲ့အစည်း

ကနဦးပတ်ဝန်းကျင်လေ့လာဆန်းစစ်ခြင်းဆိုင်ရာ ကွင်းဆင်းလုပ်ငန်းများကို Resource and Environment Myanmar (REM) နှင့် Sustainable Environmental Myanmar (SEM) မှ ပညာရှင်များပူးပေါင်းဆောင်ရွက်ခဲ့ပါသည်။

ဇယား ၆။

ကနဦးပတ်ဝန်းကျင်လေ့လာဆန်းစစ်မည့်အဖွဲ့အစည်း

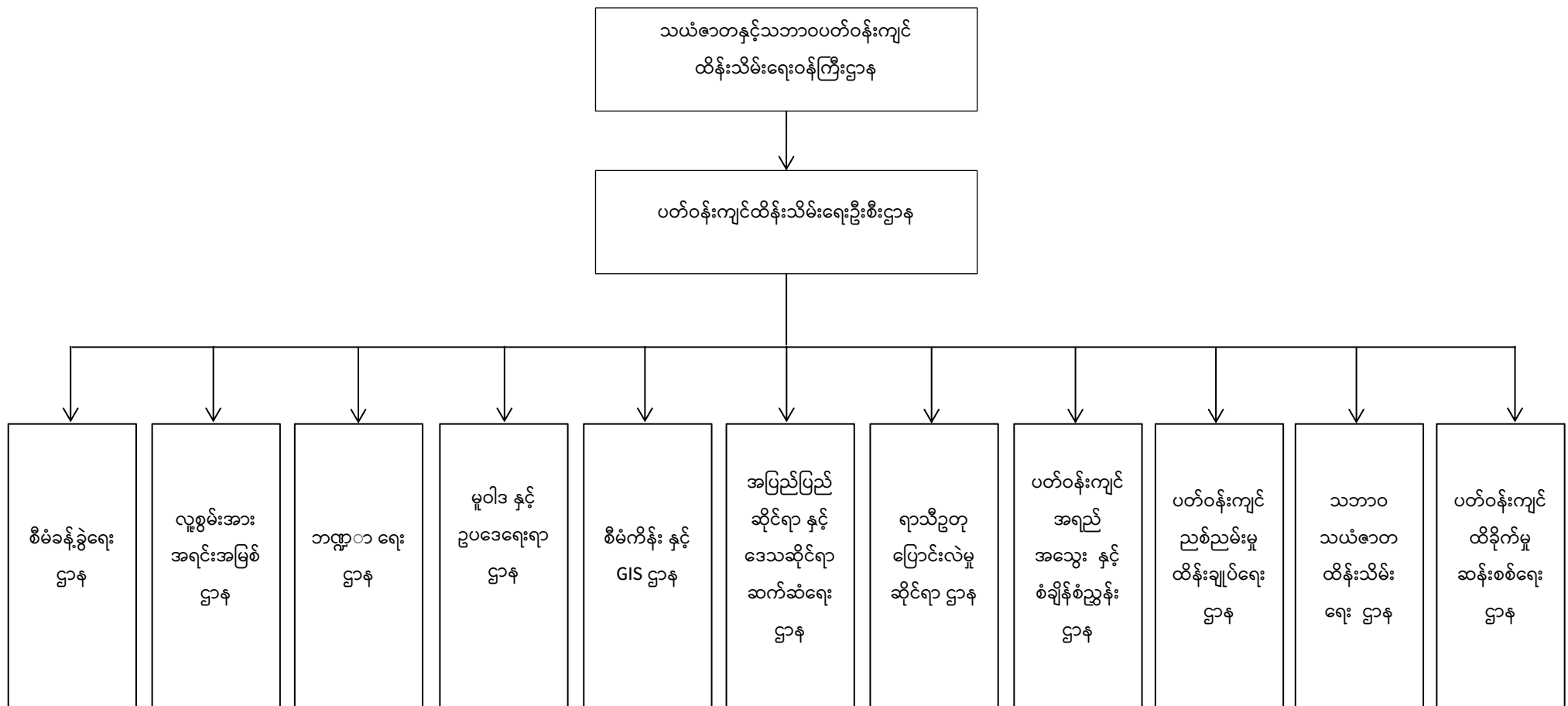
အဖွဲ့အစည်း	လုပ်ငန်းတာဝန်များ
<p>Resource and Environment Myanmar (REM)</p> 	<ul style="list-style-type: none"> • ဇီဝပတ်ဝန်းကျင်လေ့လာခြင်း • လူမှုပတ်ဝန်းကျင်လေ့လာခြင်း • ကွင်းဆင်းလေ့လာတွေ့ရှိချက်များအစီရင်ခံစာပြုစုခြင်း • IEE အစီရင်ခံစာ ပြုစုခြင်း
<p>Sustainable Environment Myanmar (SEM)</p> 	<ul style="list-style-type: none"> • ဇီဝမျိုးစုံမျိုးကွဲ (အပင်နှင့် တိရစ္ဆာန်)လေ့လာခြင်း • ကွင်းဆင်းလေ့လာတွေ့ရှိချက်များအစီရင်ခံစာပြုစုခြင်း • GIS နည်းပညာအသုံးပြု၍မြေပုံထုတ်ခြင်း

၄.၂။ ကနဦးပတ်ဝန်းကျင်လေ့လာဆန်းစစ်ခြင်းဆိုင်ရာအချိန်ဇယား

ကနဦးပတ်ဝန်းကျင်လေ့လာဆန်းစစ်ခြင်းဆိုင်ရာ ခန့်မှန်းအချိန်ဇယားကို ဇယား (၇) တွင် ဖော်ပြထားပါသည်။

ဇယား ၇။ ကနဦးပတ်ဝန်းကျင်လေ့လာဆန်းစစ်ခြင်းဆိုင်ရာခန့်မှန်းအချိန်ဇယား

Task	Timeline														
	2019			2020											
	October	November	December	January	February	March	April	May	June	July	August	September	October	November	December
Organizing IEE Experts															
Desktop study															
Meeting with Proponent															
Preparation for Environmental & Social Baseline Survey															
Conduct Stakeholder Engagement Meetings															
Preparation of IEE Draft Report															
Submission of IEE Draft															



ပုံ ၇။ သယံဇာတနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာန၏ ဖွဲ့စည်းပုံ

၅.၂။ ကနဦးပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းလိုအပ်ချက်

လျှပ်စစ်နှင့်စွမ်းအင်ဝန်ကြီးဌာန (MOEE) သည် ၂၀၁၉ ခုနှစ်၊ ဩဂုတ်လ ၂၂ ရက်နေ့တွင် ဤစီမံကိန်း အဆိုပြု အစီရင်ခံစာကို သယံဇာတနှင့်သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာန (MONREC) ထံတင်ပြခဲ့ပါသည်။ အဆိုပြု အစီရင်ခံစာတွင် ဖော်ဆောင်မည့်စီမံကိန်း၏အရွယ်အစား၊ အတည်ပြုခဲ့ပြီးသော ဓါတ်အားလိုင်းလမ်းအကြောင်း၊ ဖြစ်နိုင်ခြေရှိသော ပတ်ဝန်းကျင်နှင့်လူမှုဝန်းကျင်သက်ရောက်မှု နှင့် လျော့ပါးသက်သာစေရေးနည်းလမ်းများ စသည်တို့ပါဝင်ပါသည်။

သယံဇာတနှင့်သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာန မှ ပြည်ထောင်စုဝန်ကြီးသည် ဤစီမံကိန်းအတွက် ၂၀၁၅ ခုနှစ် ပတ်ဝန်းကျင်ထိခိုက်မှုလေ့လာဆန်းစစ်ခြင်းလုပ်ထုံးလုပ်နည်း (EIA Procedure) နှင့်အညီ ကနဦးပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်းအစီရင်ခံစာ တင်သွင်းရန် လိုအပ်ကြောင်း လျှပ်စစ်နှင့်စွမ်းအင်ဝန်ကြီးဌာန ထံလိပ်မူ၍ ၂၀၁၉ ခုနှစ်၊ နိုဝင်ဘာလ ၁၆ ရက်နေ့တွင် ပြန်ကြားလာခဲ့ပါသည်။

၂၀၁၅ ခုနှစ် ပတ်ဝန်းကျင်ထိခိုက်မှုလေ့လာဆန်းစစ်ခြင်းလုပ်ထုံးလုပ်နည်း (EIA Procedure) အရ ကနဦးပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်းအစီရင်ခံစာတွင် စီမံကိန်းအကြောင်းအရာဖော်ပြချက် နှင့် အခြားသောနည်းလမ်းထည့်သွင်း စဉ်းစားမှု၊ လက်ရှိအနီးပတ်ဝန်းကျင်အခြေအနေများဖော်ပြချက် နှင့် မြေပုံများ၊ အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးခြင်း ရလဒ်များ၊ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်၊ ပတ်ဝန်းကျင်စောင့်ကြပ်ကြည့်ရှုခြင်းအစီအစဉ် နှင့် အသုံးပြုရမည့် ငွေပမာဏ စသည်တို့ ထည့်သွင်းဖော်ပြရန် လိုအပ်ပါသည်။

ဇယား ၈။ ဆန်းစစ်လေ့လာရန်အမျိုးအစားခွဲခြားခြင်း

Type of economic activity	Criteria for IEE Type Economic Activities	Criteria for EIA Type Economic Activities
Electrical Power Transmission Lines \geq 230 kV	All	All activities where the Ministry requires that the Project shall undergo EIA

မူရင်း - ပတ်ဝန်းကျင်ထိခိုက်မှုလေ့လာဆန်းစစ်ခြင်းလုပ်ထုံးလုပ်နည်း

(က) ကနဦးပတ်ဝန်းကျင်ထိခိုက်မှုလေ့လာဆန်းစစ်ခြင်း (IEE) သို့မဟုတ် ပတ်ဝန်းကျင်ထိခိုက်မှုလေ့လာဆန်းစစ် ခြင်း (EIA) နှင့်ဆက်စပ်သော ဥပဒေနှင့် စည်းမျဉ်းစည်းကမ်းများ

- ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဥပဒေ (၂၀၁၂)
- ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးနည်းဥပဒေ(၂၀၁၄)
- ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းလုပ်ထုံး လုပ်နည်း(၂၀၁၅)
- လျှပ်စစ်ဥပဒေ (၂၀၁၂)
- လျှပ်စစ်နည်းဥပဒေများ (၂၀၁၄)
- လျှပ်စစ်နည်းဥပဒေကိုအခြေခံ၍ဓါတ်အားလိုင်းဘေးအန္တရာယ်ကင်းရှင်းမှုဆိုင်ရာအနည်းဆုံးအကွာအဝေး (၁၉၈၅)
- အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာအရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များ (၂၀၁၅)
- တိုင်းရင်းသားလူမျိုးများ၏အခွင့်အရေးကာကွယ်စောင့်ရှောက်သည့်ဥပဒေ (၂၀၁၅)

- ၁၉၂၃ ခုနှစ်၊ အလုပ်သမားလျော်ကြေးအက်ဥပဒေကိုပြင်ဆင်သည့်ဥပဒေ (၂၀၀၅)
- အနည်းဆုံး အခကြေးငွေ နည်းဥပဒေများ (၂၀၁၃)
- မော်တော်ယာဉ်ဥပဒေ (၂၀၁၅)
- ယဉ်ကျေးမှုအမွေအနှစ်ဒေသများထိန်းသိမ်းရေးဥပဒေ (၂၀၁၉)
- ရှေးဟောင်းဝတ္ထုပစ္စည်းများကာကွယ်ထိန်းသိမ်းရေးဥပဒေ (၂၀၁၅)
- ရေအရင်းအမြစ်နှင့်မြစ်ချောင်းများထိန်းသိမ်းရေး ဥပဒေ (၂၀၀၆)
- သစ်တောဥပဒေ (၂၀၁၈)
- ဇီဝမျိုးစုံမျိုးကွဲနှင့်သဘာဝထိန်းသိမ်းရေးနယ်မြေများကာကွယ်စောင့်ရှောက်ခြင်းဆိုင်ရာဥပဒေ (၂၀၁၈)
- လယ်ယာမြေဥပဒေ (၂၀၁၂)
- လယ်ယာမြေနည်းဥပဒေများ (၂၀၁၂)
- ပြည်သူ့ကျန်းမာရေးဆိုင်ရာဥပဒေ (၁၉၇၂)
- လုပ်ငန်းခွင်ဘေးအန္တရာယ်ကင်းရှင်းရေးနှင့် ကျန်းမာရေးဆိုင်ရာ ဥပဒေ (၂၀၁၉)
- ကူးစက်ရောဂါများကာကွယ်နှိမ်နင်းရေးဥပဒေ (၁၉၉၅)

(ခ) အပြည်ပြည်ဆိုင်ရာစာချုပ်များနှင့် သဘောတူညီချက်များကိုလည်း လိုက်နာသွားမည်ဖြစ်ပါသည်။

အဆိုပြုစီမံကိန်းနှင့်သက်ဆိုင်သော အပြည်ပြည်ဆိုင်ရာစာချုပ်များ နှင့် သဘောတူညီချက်များမှာ

- အပင်များကာကွယ်ထိန်းသိမ်းခြင်းခြင်းဆိုင်ရာ အရှေ့တောင်အာရှနှင့် ပစိဖိတ်ဒေသ သဘောတူညီမှု
- ကမ္ဘာ့ယဉ်ကျေးမှုနှင့် သဘာဝအမွေအနှစ်များ ကာကွယ်ခြင်း ညီလာခံ၊
- အိုဇုန်းလွှာပျက်စီးစေမည့် ပစ္စည်းများဆိုင်ရာ မွန်ထရီရယ် သဘော တူညီမှု
- ဇီဝမျိုးကွဲများဆိုင်ရာ ညီလာခံ၊
- အပြည်ပြည်ဆိုင်ရာအပူပိုင်းကျွန်းသစ်များသဘောတူညီမှု
- ရေတိမ်ဒေသများဆိုင်ရာ ရမ်ဆာ သဘောတူညီမှု
- မျိုးသုဉ်းရန်အန္တရာယ်ရှိသည့် တောရိုင်းတိရစ္ဆာန်များ နှင့် အပင်များ အပြည်ပြည်ဆိုင်ရာရောင်းဝယ် ဖောက်ကားမှုဆိုင်ရာ ညီလာခံ
- သဘာဝနှင့် သဘာဝသယံဇာတများထိန်းသိမ်းရန်အာစီယံ သဘောတူညီမှု
- ကုလသမဂ္ဂ သဲကန္တာရများတိုက်ဖျက်ရေးဆိုင်ရာသဘောတူညီမှု
- ကုလသမဂ္ဂ ရာသီဥတုပြောင်းလဲခြင်းဆိုင်ရာ ညီလာခံ (UNFCCC) နှင့် ကျိုတိုသဘောတူညီမှု
- နယ်စပ်စည်းခြား မီးခိုးမြူ ညစ်ညမ်းမှု အာဆီယံသဘောတူညီချက်

၆။ ပတ်ဝန်းကျင်နှင့်လူမှုဝန်းကျင်ဆိုင်ရာ အခြေအနေဖော်ပြချက်များ

ပတ်ဝန်းကျင်ဆိုင်ရာအချက်အလက်ကောက်ယူခြင်းတွင်ပါဝင်သော လေအရည်အသွေး၊ ရေအရည်အသွေး၊ မြေအရည်အသွေး၊ ဆူညံသံနှင့်တုန်ခါမှု စသည့် တိုင်းတာခြင်းများ နှင့် ဂေဟဗေဒဆိုင်ရာအချက်အလက် ကောက်ယူခြင်းတို့ကို ဓါတ်အားလိုင်းလမ်းအူကြောင်းတစ်လျှောက် ထိခိုက်နိုင်ခြေရှိသောနေရာများတွင် ဆောင်ရွက်ခဲ့ပါသည်။ မြေမျက်နှာသွင်ပြင်အမျိုးအစား၊ ဇလဗေဒ နှင့် ဘူမိဗေဒ ဆိုင်ရာအချက်အလက်များကို ကွင်းဆင်းဆောင်ရွက်ရာမှ လေ့လာတွေ့ရှိချက်များ၊ မြေမျက်နှာသွင်ပြင်အမျိုးအစားပြမြေပုံများ၊ ကောင်းကင်ဓါတ်ပုံများ နှင့် သက်ဆိုင်ရာမြို့နယ်အထွေထွေအုပ်ချုပ်ရေးဦးစီးဌာနမှ အချက်အလက်များအားကိုးကားထားပါသည်။ ပတ်ဝန်းကျင်ဆိုင်ရာထိခိုက်မှုလေ့လာခြင်း သည် ဤ ၂၃၀ကေစီလိုင်း ၏ လမ်းအူကြောင်းတစ်လျှောက်ရှိ မြို့နယ်များဖြစ်သော နမ္မတူ၊ သီပေါ နှင့် ကျောက်မဲမြို့များအတွက်ပါ ထည့်သွင်းစဉ်းစားခဲ့ခြင်းဖြစ်ပါသည်။

၆.၁။ သဘာဝပတ်ဝန်းကျင်

(က) မြေမျက်နှာသွင်ပြင်

စီမံကိန်းဖြစ်မြောက်နိုင်စွမ်းလေ့လာခြင်းအစီရင်ခံစာဖော်ပြချက်အရ ဤ၂၃၀ကေစီဓါတ်အားလိုင်း၏ လမ်းအူကြောင်းတစ်လျှောက်တွင် မြေမျက်နှာသွင်ပြင်အမျိုးအစားမှာ လွင်ပြင်အမျိုးအစားဖြစ်ပြီး အချို့သောနေရာများ တွင် မြစ်ချောင်းများ နှင့် တောင်ကုန်းတောင်တန်းများအား တွေ့ရပါသည်။

အဆိုပြုဓါတ်အားလိုင်းသည် နမ္မတူ၊ သီပေါနှင့် ကျောက်မဲ မြို့နယ်များကိုဖြတ်သန်းသွားပါသည်။ လမ်းအူကြောင်းတစ်လျှောက် နမ္မတူ နှင့် သီပေါကြားရှိ ပင်လယ်ရေမျက်နှာပြင်အမြင့်မှာ မီတာ ၄၅၀ မှ ၈၀၀ ကြားရှိပြီး၊ သီပေါ နှင့် ကျောက်မဲကြားရှိ ပင်လယ်ရေမျက်နှာပြင်အမြင့်မှာ မီတာ ၃၀၀ မှ ၉၀၀ ကြားရှိ၍ ကျောက်မဲ နှင့် ရဲရွာကြားတွင် မီတာ ၅၀၀ မှ ၁၀၀၀ ကြား ရှိပါသည်။ လျှောစောက်များသည် နေရာတစ်ချို့တွင် အတော်အသင့် မတ်စောက်သောအနေအထားတွင် တွေ့ရပြီး အချို့သောနေရာများတွင် အလွန်မတ်စောက်သည်ကို တွေ့ရပါသည်။

(ခ) ဘူမိဗေဒ

ဓါတ်အားလိုင်းစီမံကိန်းတည်နေရာသည် မြန်မာနိုင်ငံ၏အရှေ့ဘက်ကုန်းပြင်မြင့်အပိုင်းတွင်တည်ရှိပါသည်။ ထိုဧရိယာအတွင်း အဓိကပေါ်ထွက်နေသောကျောက်လွှာများမှာ ဘော်ကြိုကျောက်လွှာအုပ်စု (Bawgyo Group)၊ ထုံးကျောက်ကုန်းပြင်မြင့်ကျောက်လွှာအုပ်စု (Plateau Limestone Group) နှင့် ညောင်ဘောကျောက်လွှာစု (Nyaungbaw Formation) တို့ဖြစ်သည်။ ဘော်ကြိုကျောက်လွှာအုပ်စု (Bawgyo Group) တွင် ပန်ညိုငွေ့ပြန်ကြွင်း (Pangno Evaporites) နှင့် နပန်ကျောက်လွှာစု (Napeng Formation) တို့ပါဝင်ပါသည်။ ထိုကျောက်လွှာစုတွင် အဓိကတွေ့ရှိရသော ကျောက်များမှာ အပန်းရောင်ဒိုလိုမိုက်ကျောက် (Pink Dolomite)၊ ထုံးကျောက် (Limestone)၊ အနီရောင်သဲကျောက် (Red Sandstone)၊ ကာဗွန်နိတ်ကြွယ်သောအနီရောင်စရစ်ဖြုန်းကျောက် (Red Carbonate Conglomerate)၊ ချတ်အနည်းငယ်ပါသောရှို့ကျောက် (Rare Cherty Mudstone) နှင့် ယေလကျောက် (Shale) တို့ဖြစ်သည်။ ၎င်းဧရိယာအနီးတစ်ဝိုက်တွင် ထုံးကျောက်ကုန်းပြင်မြင့်ကျောက်လွှာစု (Plateau Limestone Group) တွင် ဒိုလိုမိုက်ကျောက် (Dolomite) နှင့် ထုံးကျောက် (Limestone) များကို တွေ့ရပါသည်။ ထို့အပြင် ရွယ်သေးစေ့မှ ရွယ်လတ်စေ့ (Fine to medium grained) အနေအထားရှိပြီး ကြက်ခြေနက်ပုံစံ အက်ဖြိုင် (Criss cross joints) များပါဝင်သော မီးခိုးရောင်နှင့်အညိုရောင်ဒိုလိုမိုက်ထုံးကျောက် (Grey to brown Dolomitic limestone) များကိုလည်း ထုထည်လိုက် (Massive) ပေါ်ထွက်နေကြောင်းတွေ့ရှိရသည်။ ထုံးကျောက်ကုန်းပြင်မြင့်ဒေသရှိ မြေမျက်နှာသွင်ပြင်သည် အချွန်အတတ် (Karst topography) ပုံစံများဖြစ်ပေါ်နေပြီး မြေစေးများပါဝင်သော တယ်ရာ-ရိုစာ (terra-rosa

soil) မြေဆီလွှာကိုတွေ့ရှိရသည်။ ထိုကျောက်လွှာ၏ သက်တမ်းမှာ ပါမီယန် ယုဂ် မှ ထရက်စစ် ယုဂ်လယ် (Permian to Middle Trassic) အထိဖြစ်သည်။ ညောင်ဘောကျောက်လွှာစု (Nyaungbaw Formation) တွင် အဓိကတွေ့ရှိရသော ကျောက်များမှာ အလယ်အလတ်မှအထူဆုံးလွှာထပ် (Medium to thick bedded) ရှိပြီး မြေစေးပါဝင်သည့် ခရမ်းရောင်နှင့် အစိမ်းရောင်အာဂျီလေးယုဂ်ထုံးကျောက် (Argillaceous Limestone) များဖြစ်သည်။ ထိုထုံးကျောက် များတွင် မိကျောင်းအရေခွံ (Phacodal) ပုံစံကျောက်သားများရှိပြီး ကယ်လ်စီယံကြွယ်သောယေလုကျောက် (Calcareous Shale) များ နှင့် အပြန်အလှန် (Interbedded) လွှာထပ်စွာဖြစ်ပေါ်နေသည်။ ဓါတ်အားလှိုင်းစီမံကိန်း သည် ကျောက်မဲပြတ်ရွှေ့ (Kyaukme Active Fault) နှင့် မိုးမိတ်ပြတ်ရွှေ့ (Moemeik Active Fault) ပေါ်ကိုဖြတ်ပြီး အရှေ့မြောက်ဘက်တွင်တည်ရှိနေသည်။ ထို့အပြင်စီမံကိန်းဧရိယာ နှင့် အနီးဝန်းကျင်သည် အားပြင်းလျင်မြန်စွာ တည်ရှိ နေသည်။ ဖြစ်နိုင်ခြေရှိသော မြေပြင်လှုပ်ရှားနိုင်မှု အရှိန်သည် ၀.၂-၀.၃ g ဖြစ်ပြီး သတ်မှတ်ထားသော မာကာလီ စကေး အမျိုးအစား (Modified Mercalli Scale Classes) တွင် စကေး ၈ (VIII) ဖြစ်ကြောင်းတွေ့ရှိရသည်။

(ဂ) မြေအမျိုးအစား

စီမံကိန်းဧရိယာတစ်လျှောက်တွင်သည် ရှမ်းပြည်နယ်မြောက်ပိုင်းတွင်ကျရောက်ပြီး အဓိကအားဖြင့် မြေအမျိုးအစား ၃ မျိုးတွေ့ရပါသည်။ ၎င်းတို့မှာ

- ၁။ မြေနီ နှင့် မြေဝါ (Red earth and Yellow earth)
- ၂။ တောင်ပေါ်သစ်တောမြေညို (Mountainous brown forest soil) နှင့်
- ၃။ တောင်ပေါ်သစ်တောမြေနီ (Mountainous red forest) တို့ဖြစ်ပါသည်။

(ဃ) ဥတု

မြန်မာနိုင်ငံတွင် အဓိကအားဖြင့် ရာသီဥတု ၃ မျိုးတွေ့ရပါသည်။ ၎င်းတို့မှာ မိုးရာသီ (မေ လ မှ အောက်တိုဘာလ အထိ)၊ ဆောင်းရာသီ (နိုဝင်ဘာလ မှ ဇန်နဝါရီလ အထိ) နှင့် နွေရာသီ (ဖေဖော်ဝါရီလ မှ မေလ အထိ) တို့ဖြစ်ပါသည်။

၂၀၁၉ ခုနှစ် မိုးဇလအချက်အလက်များအရ လားရှိုးမြို့တွင် နှစ်စဉ်ပျမ်းမျှမိုးရေချိန်သည် ၁၂၉၇ မီလီမီတာရှိ၍ တောင်ကြီးနှင့် ကျိုင်းတုံမြို့တို့တွင် ၁၃၉၇ မီလီမီတာ နှင့် ၁၂၅၉ မီလီမီတာ တို့ရှိကြပါသည်။ ၎င်းမြို့နယ်မိုးဇလ စခန်းများ၏ တိုင်းတာချက်များအရ နှစ်အလိုက် ပျမ်းမျှအမြင့်ဆုံးအပူချိန်မှာ လားရှိုးမြို့တွင် ၂၉.၆ ဒီဂရီစင်တီဂရိတ်၊ တောင်ကြီးနှင့် ကျိုင်းတုံမြို့တို့တွင် ၂၅.၈ ဒီဂရီစင်တီဂရိတ် နှင့် ၂၉.၈ ဒီဂရီစင်တီဂရိတ် အသီးသီးရှိကြပြီး၊ နှစ်အလိုက် အနိမ့်ဆုံးအပူချိန်များမှာ ၁၆.၀ ဒီဂရီစင်တီဂရိတ်၊ ၁၅.၂ ဒီဂရီစင်တီဂရိတ် နှင့် ၁၇.၅ ဒီဂရီစင်တီဂရိတ် အသီးသီးရှိကြပါသည်။

၆.၂။ ရူပပတ်ဝန်းကျင်

(က) လေအရည်အသွေး

လေအရည်အသွေးဆိုင်ရာတိုင်းတာခြင်းလုပ်ငန်းများကို နမ္မတူမြို့နယ်၊ ချောင်းဆာကျေးရွာအနီးရှိ နမ္မတူရေအား လျှပ်စစ်ရုံဝန်းအတွင်းတွင် တစ်ပွိုင့် (AQ-1)၊ သီပေါမြို့နယ်၊ ပန်းနေကျေးရွာအနီးတွင်တစ်ပွိုင့် (AQ-2) နှင့် ကျောက်မဲမြို့နယ်၊ အထက်ရဲရွာရေအားလျှပ်စစ်စီမံကိန်းဝန်းအတွင်းတွင် တစ်ပွိုင့် (AQ-3) စုစုပေါင်း သုံးပွိုင့် တိုင်းတာခဲ့ပါသည်။

တိုင်းတာမှုရလဒ်များအရ PM2.5၊ PM10 နှင့် ဆာလဖာဒိုင်အောက်ဆိုဒ် (SO₂) တို့၏ တန်ဖိုးများသည် အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာအရည်အသွေး(ထုတ်လွှတ်မှု)လမ်းညွှန်ချက်များ (၂၀၁၅) တန်ဖိုးထက် လျော့နည်းနေသည်ကိုတွေ့ရပါသည်။ ထို့အပြင် နိုက်ထရိုဂျင်ဒိုင်အောက်ဆိုဒ် (NO₂) တန်ဖိုးသည်လည်း လမ်းညွှန်ချက်များ တန်ဖိုးထက် လျော့နည်းနေသည်ကိုတွေ့ရပါသည်။ အခြားဓါတ်ငွေ့များဖြစ်သော ကာဗွန်မိုနောက်ဆိုဒ် (CO) နှင့် နိုင်ထရိုဂျင်အောက်ဆိုဒ် (NO) တို့အား လမ်းညွှန်ချက်များတွင် ထည့်သွင်းဖော်ပြထားခြင်းမရှိသော်လည်း တိုင်းတာမှုရလဒ်များအရ ၎င်းတို့၏တန်ဖိုးများသည် ညစ်ညမ်းအဆင့်မရောက်ဘဲ ပုံမှန်အနေအထားတွင်သာ တွေ့ရပါသည်။

(ခ) ဆူညံသံ

ဆူညံသံတိုင်းတာခြင်းလုပ်ငန်းများကို ဓါတ်အားလိုင်းဖြတ်သန်းရာ လမ်းအကြောင်းအနီးရှိနေရာ (၅) ခုတွင် ဆောင်ရွက်ခဲ့ပါသည်။ တိုင်းတာခြင်းလုပ်ငန်းများကို တစ်နေရာလျှင် (၂၄) နာရီကြာ ဆောင်ရွက်ခဲ့ပြီး ပါဝင်သော နေရာများမှာ နမ္မတူရေအားလျှပ်စစ်စီမံကိန်းတည်နေရာ (N-1)၊ သီပေါမြို့နယ် ပန်းနေကျေးရွာ (N-2)၊ သီပေါမြို့နယ် နောင်တကျားကျေးရွာ (N-3)၊ ကျောက်မဲမြို့နယ် အထက်ရဲရွာရေအားလျှပ်စစ်စီမံကိန်း တည်နေရာ (N-4) နှင့် ကျောက်မဲမြို့နယ် ပန်လေးကျေးရွာ (N-5) တို့ဖြစ်ပါသည်။

တိုင်းတာမှုရလဒ်များအရ နေရာ (၅) ခု၌ နေ့ဆူညံသံအညွှန်းကိန်းသည် 50-54 dBA အတွင်းရှိပြီး ညဆူညံသံအညွှန်းကိန်းသည် 43-53 dBA ကြားရှိပါသည်။

(ဂ) တုန်ခါမှု

တုန်ခါမှုတိုင်းတာခြင်းလုပ်ငန်းများကို နေရာ (၂) ခုတွင်ဆောင်ရွက်ခဲ့ပါသည်။ ၎င်းနေရာများမှာ နမ္မတူရေအားလျှပ်စစ် စီမံကိန်းတည်နေရာ (V-1) နှင့် အထက်ရဲရွာရေအားလျှပ်စစ်စီမံကိန်း တည်နေရာ (V-2) တို့ဖြစ်ပါသည်။

တိုင်းတာတွေ့ရှိသော ရလဒ်များအား ဖော်ပြပါ ဖော်မြူလာနှင့် $10 \cdot \log_{10} (AVERGAE (10^{((RANGE)/10)}))$ တွက်ချက်ရာ သတ်မှတ်ထားသောလမ်းညွှန်မှုတန်ဖိုးများ အတွင်း ရှိသည်ကို တွေ့ရှိရပါသည်။

(ဃ) ရေအရည်အသွေး

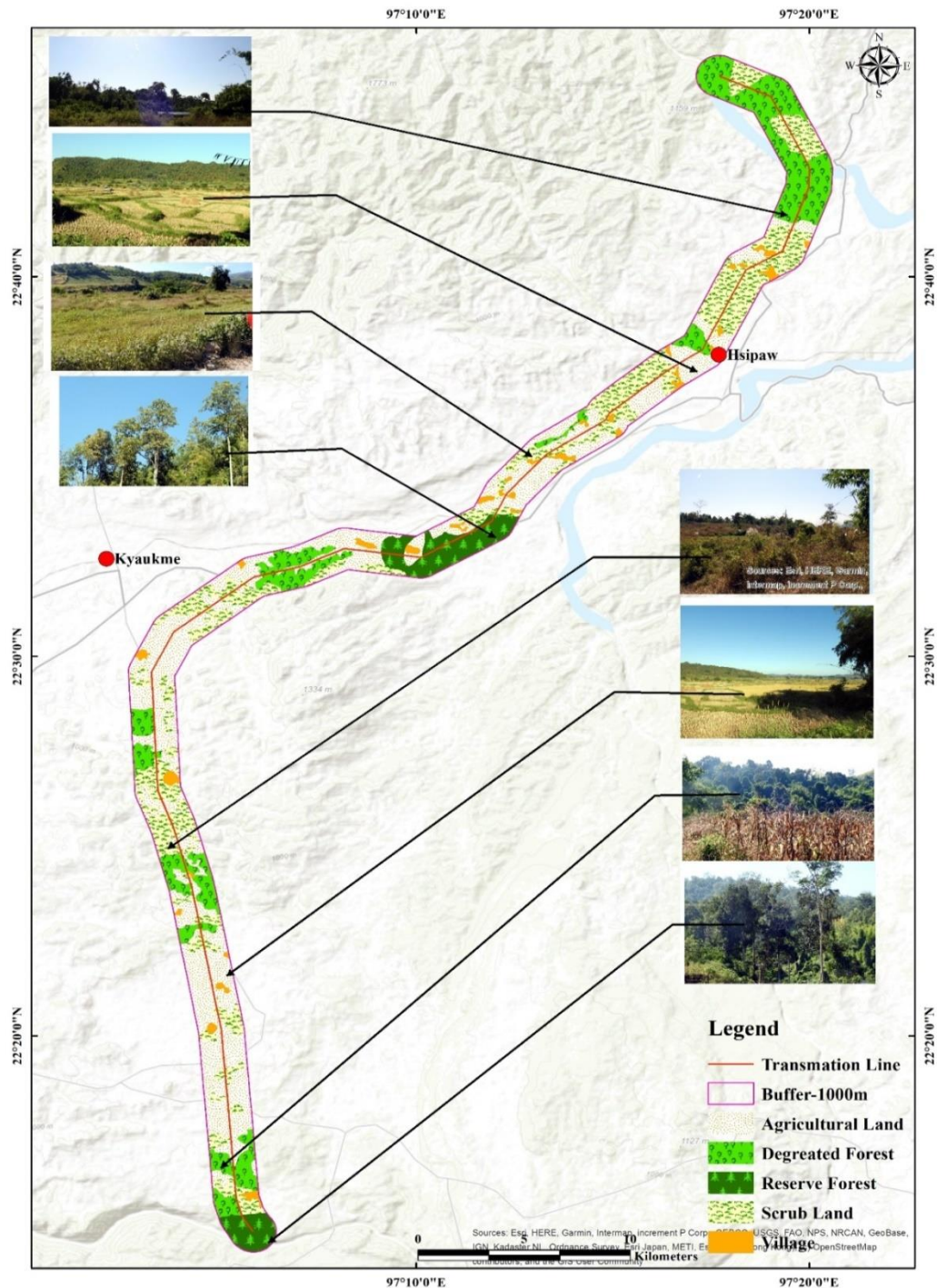
ရေအရည်အသွေးဆိုင်ရာလေ့လာခြင်းများဖြစ်သော ရေနမူနာယူခြင်း နှင့် မြေပြင်တိုင်းတာခြင်း လုပ်ငန်းများကို မြစ်ငယ်မြစ်အနီး တိုင်အမှတ် ၂၀ နှင့် ၂၁ ကြားတွင် တစ်နေရာ (SW-1)၊ လွယ်ကော်ကျေးရွာအနီး တိုင်အမှတ် ၇၆ တွင် တစ်နေရာ (SW-2) နှင့် အထက်ရဲရွာရေအားလျှပ်စစ်စီမံကိန်း တည်နေရာအနီးတွင် တစ်နေရာ (SW-3) စုစုပေါင်း (၃) နေရာ လေ့လာခဲ့ပါသည်။

နမူနာကောက်ယူထားသောရေများကို ဓါတုဓါတ်ခွဲမှုများပြုလုပ်ရန် REM-UAE ဓါတ်ခွဲခန်းသို့ပေးပို့ခဲ့ပါသည်။ မြေပြင်တိုင်းတာခြင်း နှင့် ဓါတ်ခွဲရရှိသောရလဒ်များမှာ အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာအရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များ (၂၀၁၅) သောအခါ ညစ်ညမ်းမှုအဆင့်မရှိကြောင်း တွေ့ရှိရပါသည်။

၆.၃။ ဂေဟဗေဒပတ်ဝန်းကျင်

(က) အပင်မျိုးစိတ်များ

စီမံကိန်းတည်နေရာအနီးတစ်ဝိုက်တွင် ရွက်ပြတ်တော၊ ရာသီပေါ်သီနှံစိုက်ခင်းများ၊ မြေလွတ်မြေရိုင်းများ၊ ခြံများ နှင့် သစ်မာစိုက်ခင်းများတွေ့ရပါသည်။ ဓါတ်အားလိုင်းလမ်းအကြောင်းတစ်လျှောက် ကွင်းဆင်းလေ့လာဆောင်ရွက်မှု မှတ်တမ်းများအရ အပင်မျိုးစိတ် (၈၂) မျိုးတွေ့ရှိခဲ့ပြီး ၎င်းတို့အထဲမှ IUCN Red List မျိုးသုဉ်းပျောက်ကွယ်နီးပါး မျိုးစိတ် (Near Threatened species) စာရင်းဝင် “အင်”အပင်အား တွေ့ရှိခဲ့ပါသည်။



ပုံ ၈။ ကွင်းဆင်းလေ့လာခြင်းတည်နေရာများပြမြေပုံ

(ခ) သတ္တဝါမျိုးစိတ်များ

ခါတ်အားလှိုင်းလမ်းအကြောင်းတစ်လျှောက် ကွင်းဆင်းလေ့လာဆောင်ရွက်မှု မှတ်တမ်းများအရ ငှက်မျိုးစိတ် (၅၉)မျိုး၊ နို့တိုက်သတ္တဝါမျိုးစိတ် (၁၁)မျိုး၊ တွားသွားသတ္တဝါမျိုးစိတ် (၄)မျိုး နှင့် လိပ်ပြာမျိုးစိတ် (၃၅) မျိုး တို့တွေ့ရှိခဲ့ပါသည်။ ၎င်းမျိုးစိတ်များအထဲမှ ငှက်မျိုးစိတ်တစ်မျိုးဖြစ်သော Grey-headed Parakeet သည် IUCH red list မျိုးသုဉ်းပျောက်ကွယ်နီးပါးမျိုးစိတ် (Near Threatened species) စာရင်းတွင် ပါဝင်ပါသည်။

၆.၄။ လူမှုပတ်ဝန်းကျင်

လူမှုပတ်ဝန်းကျင်ဆိုင်ရာလေ့လာခြင်းတွင် ခါတ်အားလှိုင်းဖြတ်သန်းရာမြို့နယ် (၃) ခုရှိ လူဦးရေ ဆိုင်ရာအချက်အလက်များ၊ ဒေသတွင်းစီးပွားရေးဆိုင်ရာအချက်အလက်များ၊ ဒေသခံတို့၏ဝင်ငွေ နှင့် စာတတ်မြောက်မှုဆိုင်ရာအချက်အလက်များ နှင့် အခြားသောဆက်စပ်အကြောင်းအရာများ ပါဝင်ပါသည်။

(က) လူဦးရေ ဆိုင်ရာအချက်အလက်များ

နမူတူ၊ သီပေါ နှင့် ကျောက်မဲ မြို့နယ်တို့၏ လူဦးရေ ဆိုင်ရာအချက်အလက်များ ကို ဇယား (၉) တွင် ဖော်ပြထားပါသည်။

ဇယား ၉။ နမူတူ၊ သီပေါ နှင့် ကျောက်မဲ မြို့နယ်တို့၏ လူဦးရေ ဆိုင်ရာအချက်အလက်များ

စဉ်	မြို့နယ်	ဧရိယာ	ပင်လယ်ရေမျက်နှာပြင်အထက်	လူဦးရေစုစုပေါင်း (စက်တင်ဘာ ၂၀၁၈)	အိမ်ခြေ		လူဦးရေစုစုပေါင်း	
		စက္ကယား ကီလိုမီတာ	ပေ		အိမ်	အိမ်ထောင်စု	ကျား	မ
၁	နမူတူ	၆၅၂.၁၁	၁၇၆၀	၅၀၇၂၀	၉၅၉၇	၁၀၃၂၀	၂၄၄၄၂	၂၆၂၇၈
၂	ကျောက်မဲ	၁၆၆၂.၄	၂၅၀၆	၁၇၉၅၃၉	၃၅၆၇	၃၄၀၈၇	၈၅၈၄၁	၉၃၆၉၈
၃	သီပေါ	၂၀၄၅.၃၄	၁၃၉၈	၁၆၂၉၉၇	၃၃၅၆၀	၃၄၂၆၄	၇၈၆၀၂	၈၄၃၉၅

မူရင်း - အထွေထွေအုပ်ချုပ်ရေးဦးစီးဌာန

(ခ) လူမျိုးနှင့်ကိုးကွယ်သည့်ဘာသာ

စီမံကိန်းဧရိယာအနီးတစ်ဝိုက်တွင် အများစုသည် ရှမ်းလူမျိုးများဖြစ်ကြပြီး ပလောင် နှင့် ဗမာ လူမျိုးများလည်း နေထိုင်ကြပါသည်။ ၎င်းမြို့နယ်များတွင် ၉၀ ရာခိုင်နှုန်းခန့်သည် ဗုဒ္ဓဘာသာကိုးကွယ်ကြပြီး အခြားကိုးကွယ်သောဘာသာများကို ဇယား (၁၀) တွင် ဖော်ပြထားပါသည်။

ဇယား ၁၀။ မြို့နယ်အလိုက်ကိုးကွယ်သည့်ဘာသာ

မြို့နယ်	ဗုဒ္ဓ	ခရစ်ယာန်	ဟိန္ဒူ	အစ္စလာမ်	အခြား	စုစုပေါင်း
ကျောက်မဲ	၁၆၆၂၀၃	၇၇၄၃	၁၇၆၃	၂၀၂၅	-	၁၇၇၇၃၄
နမူတူ	၄၃၁၄၇	၅၇၇၁	၁၂၁၁	၉၀၂	၉၇	၅၁၁၂၈
သီပေါ	၁၅၉၂၃၅	၃၂၁၁	၂၇၆	၁၇၇၂	-	၁၆၄၄၉၄

မူရင်း- အထွေထွေအုပ်ချုပ်ရေးဦးစီးဌာန

(ဂ) မြေအသုံးချမှု

သက်ဆိုင်ရာမြို့နယ်အလိုက် မြေအသုံးချမှုဆိုင်ရာအချက်အလက်များကို ဇယား (၁၁) တွင် ဖော်ပြထားပါသည်။

ဇယား ၁၁။ မြေအသုံးချမှု

စဉ်	မြေအမျိုးအစား	ကျောက်မဲ	သီပေါ	နမူတူ
၁	အသားတင်စိုက်ပျိုးမြေဧရိယာစုစုပေါင်း	၇၉၁၂၅	၁၂၃၅၆၁	၂၅၂၂၇
၂	လုပ်ထားသောမြေဧရိယာပေါင်း	၄၅၀၄	၉၈၄	၉၁၈၆
၃	စားကျက်မြေ	-	-	-
၄	စက်မှုလုပ်ငန်းသုံးမြေ	-	၃၀၇	၄၅၇
၅	မြို့မြေ	၂၃၀၅	၁၀၀၄	၂၆၃၂
၆	ရွာမြေ	၂၆၆၂	၄၀၅၂	၁၇၀၈
၇	အခြားမြေ	-	၂၃၁၉၉	-
၈	ကြိုးဝိုင်း/ကြိုးပြင်ကာကွယ်တောဧရိယာ	၂၁၆၃၅	၁၁၀၇၀၉	၁၀၉၈၇၃
၉	တောရိုင်းမြေ	၄၃၇၃၂၀	၉၆၉၇၈၆	၁၅၉၄၇၄
၁၀	မြေရိုင်း	၉၇၃	၆၀၂၇၁	၇၈၅၁
၁၁	စိုက်ပျိုးခြင်းမပြုနိုင်သောဧရိယာ	၁၃၁၈၀	၁၅၁၄၂	၁၀၀၉၄၄
စုစုပေါင်း		၅၆၁၇၀၄	၁၃၀၉၀၁၅	၄၁၇၃၅၂

မူရင်း - မြို့နယ်အထွေထွေအုပ်ချုပ်ရေးဦးစီးဌာန

(ဃ) စီးပွားရေးဆိုင်ရာအချက်အလက်များ

နမူတူ၊ သီပေါ နှင့် ကျောက်မဲ မြို့နယ်တို့၏ အဓိကစီးပွားရေးလုပ်ငန်းများမှာ စိုက်ပျိုးရေး လုပ်ငန်းဖြစ်ပြီး အဓိကထွက်ကုန်များဖြစ်သော လက်ဖက်၊ ပြောင်း၊ လိမ္မော်၊ ရှောက်ချို နှင့် နာနတ် တို့ကို အခြားမြို့နယ်များ သို့ တင်ပို့ရောင်းချ ကြပါသည်။

(င) စက်မှုလက်မှုလုပ်ငန်းများ

နမူတူ၊ သီပေါ နှင့် ကျောက်မဲ မြို့နယ်တို့၏ စက်မှုလက်မှုလုပ်ငန်းများ ဆောင်ရွက်နိုင်မှုအခြေအနေမှာ အောက်ပါအတိုင်းဖြစ်ပါသည်။

ဇယား ၁၂။ စက်မှုလက်မှုလုပ်ငန်းများ

စဉ်	မြို့နယ်	စက်ရုံအရေအတွက်	အလုပ်ရုံအရေအတွက်	အိမ်တွင်းစက်မှုလက်မှုလုပ်ငန်း	စုစုပေါင်း
၁	နမူတူ	၂	၃	၂၄	၂၉
၂	သီပေါ	၄	မရှိပါ	၆၈	၇၂
၃	ကျောက်မဲ	၅၆	၆၅	၈၈	၂၀၉

မူရင်း - မြို့နယ်အထွေထွေအုပ်ချုပ်ရေးဦးစီးဌာန

(စ) အလုပ်လုပ် နိုင်သူဦးရေ နှင့် အလုပ်လက်မဲ့ဦးရေ

နမူတူ၊ သီပေါ နှင့် ကျောက်မဲ မြို့နယ်တို့၏ အလုပ်လုပ် နိုင်သူဦးရေ နှင့် အလုပ်လက်မဲ့နှုန်းမှာ အောက်ပါအတိုင်း ဖြစ်ပါသည်။

ဇယား ၁၃။ အလုပ်လုပ် နိုင်သူဦးရေ နှင့် အလုပ်လက်မဲ့ဦးရေ

စဉ်	မြို့နယ်	အလုပ် လုပ် နိုင်သူဦးရေ	လုပ်ငန်းခွင်ရှိ လုပ်သားဦးရေ	အလုပ် လက်မဲ့ဦးရေ	အလုပ်လက်မဲ့နှုန်း
၁	နမူတူ	၃၃၃၂၀	၁၉၈၂၀	၃၅၀၀	၁၀.၅၀
၂	သီပေါ	၈၈၉၄၀	၈၇၉၆၁	၉၇၉	၁.၁
၃	ကျောက်မဲ	၇၅၂၆၁	၇၅၇၀၈	၁၀၉၁	၁.၄၄

မူရင်း - မြို့နယ်အထွေထွေအုပ်ချုပ်ရေးဦးစီးဌာန

(ဆ) လူတစ်ဦးချင်းဝင်ငွေ

နမူတူ၊ သီပေါ နှင့် ကျောက်မဲ မြို့နယ်တို့၏ ခန့်မှန်း တစ်ဦးချင်းဝင်ငွေမှာ အောက်ပါအတိုင်း ဖြစ်ပါသည်။

ဇယား ၁၄။ နမူတူ၊ သီပေါ နှင့် ကျောက်မဲ မြို့နယ်အလိုက် လူတစ်ဦးချင်းဝင်ငွေ

စဉ်	မြို့နယ်	၂၀၁၆-၂၀၁၇	၂၀၁၇-၂၀၁၈	၂၀၁၈-၂၀၁၉
၁	နမူတူ	၆၆၂၆၄၂	၇၁၂၄၇၀ (ခန့်မှန်း)	၈၄၂၀၀၀ (ခန့်မှန်း)
၂	သီပေါ	၇၁၆၁၇၈	၇၈၆၆၄၂	၁၀၁၈၈၅၅
၃	ကျောက်မဲ	၁၀၅၇၉၉၇	၁၀၇၈၁၄၀	၁၀၉၅၄၆၀

မူရင်း - မြို့နယ်အထွေထွေအုပ်ချုပ်ရေးဦးစီးဌာန

(ဇ) ကျန်းမာရေး

နမူတူ၊ သီပေါ နှင့် ကျောက်မဲ မြို့နယ်တို့၏ ကျန်းမာရေးဆိုင်ရာအချက်အလက်များမှာ အောက်ပါအတိုင်းဖြစ်ပါသည်။

ဇယား ၁၅။ ဆေးရုံ၊ ဆေးပေးခန်းနှင့် ကျန်းမာရေးဌာန/ဌာနခွဲများ

စဉ်	မြို့နယ်	ဆေးရုံ	ဆေးပေးခန်း	ကျေးလက် ကျန်းမာရေးဌာန/ ဌာနခွဲ
၁	နမူတူ	၃ (၂၅၀ ကုတင်)	မရှိပါ	၂
၂	သီပေါ	၃ (၁၄၁ ကုတင်)	၂	၃၀
၃	ကျောက်မဲ	၅ (၂၁၄ ကုတင်)	၁၈	၃

မူရင်း - မြို့နယ်အထွေထွေအုပ်ချုပ်ရေးဦးစီးဌာန

နမူတူ၊ သီပေါ နှင့် ကျောက်မဲ မြို့နယ်တို့၏ ကျန်းမာရေးစောင့်ရှောက်မှုမှာ အောက်ပါအတိုင်းဖြစ်ပါသည်။

ဇယား ၁၆။ ကျန်းမာရေးစောင့်ရှောက်မှု

စဉ်	မြို့နယ်	လူဦးရေ	ဆရာဝန်မှ ကျန်းမာရေး စောင့်ရှောက်မှုနှုန်း		သူနာပြုမှ ကျန်းမာရေး စောင့်ရှောက်မှုနှုန်း		လ/ထ ကျန်းမာရေးမှူးမှ ကျန်းမာရေး စောင့်ရှောက်မှုနှုန်း	
			ဆရာဝန် ဦးရေ	ဆရာဝန် နှင့် လူဦးရေ အချိုး	သူနာပြု ဦးရေ	သူနာပြု နှင့် လူဦးရေ အချိုး	လ/ထ ကျန်းမာရေးမှူး ဦးရေ	လ/ထ ကျန်းမာရေးမှူး နှင့် လူဦးရေ အချိုး
၁	နမူတူ	၅၀၇၂၀	၅	၁:၁၀၁၄၄	၃၇	၁:၁၃၇၀	၁	၁:၅၀၇၂၀
၂	သီပေါ	၁၆၉၄၃၄	၂၃	၁:၇၃၆၆	၅၇	၁:၂၉၇၂	၈	၁:၂၁၁၈
၃	ကျောက်မဲ	၁၇၁၉၃၀	၂၁	၁:၈၁၈၇	၅၉	၁:၂၉၁၄	၆	၁:၂၈၆၅၅

မူရင်း - မြို့နယ်အထွေထွေအုပ်ချုပ်ရေးဦးစီးဌာန

(ဈ) ပညာရေး

နမူတူ၊ သီပေါ နှင့် ကျောက်မဲ မြို့နယ်တို့၏ ပညာရေးဆိုင်ရာအချက်အလက်များမှာ အောက်ပါအတိုင်းဖြစ်ပါသည်။

ဇယား ၁၇။ အဆင့်မြင့်နှင့် အခြေခံပညာကျောင်းများ

စဉ်	မြို့နယ်	အဆင့်မြင့်ပညာ	အခြေခံပညာ							
		တက္ကသိုလ်/ကောလိပ်	အထကကျောင်း	အထကကျောင်းခွဲ	အလကကျောင်း	အလကကျောင်းခွဲ	မူ/လွန်ကျောင်း	အမကကျောင်း	မူလတန်းကြိုကျောင်း	ဘုန်းတော်ကြီးသင် ပညာရေးကျောင်း
၁	နမူတူ	မရှိပါ	၆	၁	၃	မရှိပါ	၁၀	၅၉	၇	မရှိပါ
၂	သီပေါ	မရှိပါ	၆	၆	၁	၁၆	၂၇	၁၅၀	၁၁	၉
၃	ကျောက်မဲ	မရှိပါ	၇	၄	၅	၉	၃၃	၂၀၀	၁	၆

မူရင်း - မြို့နယ်အထွေထွေအုပ်ချုပ်ရေးဦးစီးဌာန

ဇယား ၁၈။ စာပေတတ်မြောက်မှုရာခိုင်နှုန်း

စဉ်	မြို့နယ်	မြို့နယ်လူဦးရေ	(၁၅) နှစ် အထက် လူဦးရေ	စာတတ်မြောက်သူ ဦးရေ	စာတတ်မြောက်မှု နှုန်း
၁	နမူတူ	၅၀၇၂၀	၃၃၂၂၇	၃၀၀၈၄	၉၀.၅၄
၂	သီပေါ	၁၆၉၄၃၄	၉၉၉၅၄	၉၉၇၀၀	၅၈.၈၄
၃	ကျောက်မဲ	၁၇၁၉၃၀	၁၃၃၉၈၇	၁၂၅၄၀၇	၇၂.၉၄

မူရင်း - မြို့နယ်အထွေထွေအုပ်ချုပ်ရေးဦးစီးဌာန

(ည) ဘာသာရေးဆိုင်ရာအချက်အလက်များ

နမူတူ၊ သီပေါ နှင့် ကျောက်မဲ မြို့နယ်တို့၏ ဘာသာရေးဆိုင်ရာအချက်အလက်များမှာ အောက်ပါအတိုင်း ဖြစ်ပါသည်။

ဇယား ၁၉။ သာသနိကအဆောက်အအုံများ

စဉ်	မြို့နယ်	ဘုရား	စေတီ	ပုထိုး	ဘုန်းကြီးကျောင်း	သီလရှင်ကျောင်း	ဓမ္မာရုံ
၁	နမူတူ	၂၅	၁၅	၂၅	၇၀	၁	၂
၂	သီပေါ	၁၀	၁၈	-	၂၀၆	၂	၁
၃	ကျောက်မဲ	၅	၈၉	-	၃၃၀	၃	၃

မူရင်း - မြို့နယ်အထွေထွေအုပ်ချုပ်ရေးဦးစီးဌာန

ဇယား ၂၀။ အခြားဘာသာရေးအဆောက်အအုံများ

စဉ်	မြို့နယ်	ခရစ်ယာန်		အစ္စလာမ်		ဟိန္ဒူဘုရားကျောင်း		တရုတ် ဘုရားကျောင်း	
		မြို့	ကျေးလက်	မြို့	ကျေးလက်	မြို့	ကျေးလက်	မြို့	ကျေးလက်
၁	နမူတူ	၅	၁၈	၄	၁	၉	၉	၂	-
၂	သီပေါ	၇	၈	၁	၃	၂	၃	၃	၂
၃	ကျောက်မဲ	၈	၁	၁	၂	၄	၇	၉	-

မူရင်း - မြို့နယ်အထွေထွေအုပ်ချုပ်ရေးဦးစီးဌာန

(ဋ) ပို့ဆောင်ရေးနှင့်လမ်းပန်းဆက်သွယ်ရေး

စီမံကိန်းဖြတ်သန်းရာနေရာများတွင် ပို့ဆောင်ဆက်သွယ်ရေးအတွက် ကုန်းလမ်း နှင့် ရေကြောင်းလမ်း ရှိပါသည်။ ယခင်က နမူတူရဟတ်ယာဉ်ကွင်းရှိခဲ့သော်လည်း ယခုအချိန်တွင် အသုံးပြုနိုင်ခြင်းမရှိတော့ပါ။ ဒေသခံများသည် ပို့ဆောင်ဆက်သွယ်ရေးအတွက် ကားလမ်းနှင့် ရထားလမ်းကို အဓိကထား အသုံးပြုကြပြီး သက်ဆိုင်ရာမြို့နယ်အလိုက် ပို့ဆောင်ဆက်သွယ်ရေးဆိုင်ရာအချက်အလက်များမှာ အောက်ပါအတိုင်း ဖြစ်ပါသည်။

ဇယား ၂၁။ ပို့ဆောင်ဆက်သွယ်ရေးဆိုင်ရာလမ်းကြောင်းများ

ပို့ဆောင်ဆက်သွယ်ရေးဆိုင်ရာလမ်းကြောင်း နှင့် ခရီးစဉ်	နမူတူ	သီပေါ	ကျောက်မဲ
လေကြောင်းလမ်း	ရဟတ်ယာဉ်ကွင်း (အသုံးမပြုနိုင်တော့ပါ)	မရှိပါ	မရှိပါ
ရေကြောင်းလမ်း	မရှိပါ	မရှိပါ	မရှိပါ
ရထားလမ်း	နမူတူ-ဘော်တွင်း-နမ့်မျှော် (၁၄မိုင်)	မန္တလေး - လားရှိုး (ဘော်ကြိုမှ မန်ဆန် ထိ) (၃၃.၂၅ မိုင်)	မန္တလေး - လားရှိုး (၃၅ မိုင်)
ကားလမ်း (ပြေးဆွဲသည့်ခရီးစဉ်)	နမူတူ - လားရှိုး နမူတူ - မန္တလေး နမူတူ - မူဆယ်	သီပေါ - မန္တလေး သီပေါ - ကျောက်မဲ သီပေါ - လားရှိုး သီပေါ - ဆောင်ကြဲ	ကျောက်မဲ - မူဆယ် - မန္တလေး ကျောက်မဲ - တောင်ကြီး ကျောက်မဲ - မန္တလေး

		သီပေါ - နမ့်လန်	ကျောက်မဲ - ရန်ကုန် ကျောက်မဲ - သီပေါ ကျောက်မဲ - သီပေါ - နမ့်လန် ကျောက်မဲ - မိုးကုတ် ကျောက်မဲ - နမ့်လန် ကျောက်မဲ - မိုင်းငေါ ကျောက်မဲ - မိုးကုတ် - လားရှိုး
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မူရင်း - မြို့နယ်အထွေထွေအုပ်ချုပ်ရေးဦးစီးဌာန

၇။ ပတ်ဝန်းကျင် နှင့် လူမှုဝန်းကျင်အပေါ် သက်ရောက်မှုများအား လေ့လာဆန်းစစ်ခြင်း နှင့် လျော့ပါးသက်သာစေရေး နည်းလမ်းများ

၇.၁။ လေ့လာဆန်းစစ်သောနည်းလမ်းများ

ပတ်ဝန်းကျင် နှင့် လူမှုဝန်းကျင်အပေါ်သက်ရောက်မှုများအား လေ့လာဆန်းစစ်ရာတွင် အသုံးပြုသောနည်းလမ်းများမှာ -
သက်ရောက်မှုအားဖော်ထုတ်ခြင်း - စီမံကိန်းလုပ်ငန်းစဉ်ကာလအလိုက် ပတ်ဝန်းကျင် နှင့် လူမှုဝန်းကျင်ဆိုင်ရာ သက်ရောက်မှုများအားဖော်ထုတ်ခြင်း။

သက်ရောက်မှုအားခန့်မှန်းခြင်း - စီမံကိန်းလုပ်ငန်းစဉ်အသီးသီးမှ ဖြစ်ပေါ်လာသော သက်ရောက်မှုများ၏ သဘောသဘာဝ၊ ပြင်းအား နှင့် ကြာချိန် တို့ကို ခန့်မှန်းခြင်း။

သက်ရောက်မှုအားအကဲဖြတ်ခြင်း - စီမံကိန်းလုပ်ငန်းစဉ်အသီးသီးမှဖြစ်ပေါ်လာသော သက်ရောက်မှုများအား လျော့ပါးသက်သာအောင်ပြုလုပ်ဆောင်ရွက်ပြီးလျှင် ကျန်ရှိနိုင်သေးသော သက်ရောက်မှုများ၏ သိသာထင်ရှားမှုအား အကဲဖြတ်ခြင်း။

(က) သက်ရောက်မှုအားဖော်ထုတ်ခြင်း

ကွင်းဆင်းလေ့လာခြင်းလုပ်ငန်းများဆောင်ရွက်ခြင်းမပြုမီ စီမံကိန်းဖော်ဆောင်သူထံမှရရှိထားသော စီမံကိန်းဆိုင်ရာ အချက်အလက်များ၊ အလားတူစီမံကိန်းမျိုးတွင် ယခင်လေ့လာခဲ့ဖူးသောတွေ့ရှိချက်များ နှင့် IEE လေ့လာဆန်းစစ်သော ပညာရှင်အဖွဲ့၏ အတွေ့အကြုံများအပေါ်အခြေခံ၍ ပဏာမသက်ရောက်မှုဖော်ထုတ်ခြင်းလုပ်ငန်းများကို ဆောက်ရွက်ခဲ့ပါသည်။ ထို့နောက် ပတ်ဝန်းကျင် နှင့် လူမှုဝန်းကျင်ဆိုင်ရာ ကွင်းဆင်းလေ့လာခြင်းများကို ဓါတ်အားလိုင်း လမ်းအူကြောင်းတစ်လျှောက်ဆောင်ရွက်ခဲ့ပါသည်။ စီမံကိန်းလုပ်ငန်းစဉ်ကာလ အလိုက် လေ့လာဖော်ထုတ်ခဲ့သော သက်ရောက်မှုများမှာ -

အကြိုတည်ဆောက်ရေးကာလ

- အကြိုတည်ဆောက်ရေးလုပ်ငန်းစဉ်များဖြစ်သော စီမံကိန်းဧရိယာ နှင့် လမ်းဖောက်လုပ်ရန် မြေရှင်းလင်းခြင်း၊ လုပ်ငန်းများကြောင့် အမှိုက်ထွက်ရှိမှုများလာခြင်း၊ အချို့နေရာများတွင် သစ်ပင်များဆုံးရှုံးခြင်း နှင့် တောတွင်းတိရစ္ဆာန်များ၏ စားကျက်မြေများဆုံးရှုံးခြင်း များဖြစ်ပေါ်လာနိုင်ပါသည်။

တည်ဆောက်ရေးကာလ

- တည်ဆောက်ရေးသုံး ယာဉ်နှင့် ယန္တရားများလည်ပတ်မှုကြောင့် လေထုညစ်ညမ်းမှု၊ ဆူညံသံနှင့် တုန်ခါမှုများ ဖြစ်ပေါ်နိုင်ခြင်း။
- တည်ဆောက်ရေးလုပ်ငန်းသုံးစွန့်ပစ်ပစ္စည်းများ၊ ယာယီအလုပ်သမားတန်းလျားမှ အမှိုက်နှင့် မိလ္လာအညစ် အကြေးများ ထွက်ရှိနိုင်ခြင်း။
- ရေအသုံးပြုမှုများလာနိုင်ခြင်း နှင့် ယာယီအလုပ်သမားတန်းလျားမှ မိလ္လာအညစ်အကြေးများ စနစ်တကျ စွန့်ပစ်ခြင်းမရှိလျှင် ရေအရည်အသွေးထိခိုက်နိုင်ခြင်း။
- တည်ဆောက်ရေးသုံး ယာဉ်နှင့် ယန္တရားများမှ အင်ဂျင်ရိုင်း နှင့် ဆီ များယိုစိမ့်ခြင်းကြောင့် မြေဆီလွှာ ညစ်ညမ်းမှု နှင့် ရေထုညစ်ညမ်းမှု ဖြစ်ပေါ်နိုင်ခြင်း။
- မတ်စောက်သောနေရာများ၌ တာဝါတိုင်အုတ်မြစ်တည်ဆောက်ရန် အပင်များရှင်းလင်းခြင်း နှင့်မြေတူဖော် ခြင်းလုပ်ငန်းများကြောင့် မြေပြို၊ မြေတိုက်စားမှုများ ဖြစ်ပေါ်နိုင်ခြင်း။
- တာဝါတိုင်များဖြစ်တည်လာခြင်းကြောင့် အချို့ဒေသများ၌ ရှုခင်းအလှအပများ ဆုံးရှုံးနိုင်ခြင်း။
- ဓါတ်အားလိုင်းလမ်းအကြောင်းတစ်လျှောက် မြေရှင်းလင်းမှုများကြောင့် အပင်များဆုံးရှုံးနိုင်ခြင်း နှင့် တည်ဆောက်ရေးလုပ်ငန်းများကြောင့် တောရိုင်းတိရစ္ဆာန်များနေထိုင်ရာနေရာများ ထိခိုက်နိုင်ခြင်း။
- တည်ဆောက်ရေးလုပ်ငန်းများဖြစ်သော တာဝါတိုင်ထောင်ခြင်း နှင့် ကေဘယ်ကြိုးဆွဲခြင်းလုပ်ငန်းများကြောင့် အလုပ်သမားများ မတော်တဆ ထိခိုက်ဒဏ်ရာ ရနိုင်ခြင်း။

စီမံကိန်းလည်ပတ်ရေးကာလ

- ပြုပြင်ထိန်းသိမ်းရေးလုပ်ငန်းများဆောင်ရွက်ချိန်တွင် လေထုညစ်ညမ်းမှု၊ ဆူညံသံနှင့် တုန်ခါမှုများဖြစ်ပေါ် နိုင်ခြင်း။
- လျှပ်စစ်ဘေးအန္တရာယ်များ ဖြစ်ပေါ်နိုင်ခြင်း။
- ပြုပြင်ထိန်းသိမ်းရေးလုပ်ငန်းများ ဆောင်ရွက်ချိန်တွင် လျှပ်စစ်သံလိုက်စက်ကွင်းသက်ရောက်မှုကြောင့် လျှပ်စစ်ဘေးအန္တရာယ်များ၊ တာဝါတိုင်အမြင့်ပေါ်တက်ခြင်းကြောင့် မတော်တဆ ပြုတ်ကျခြင်းများ ဖြစ်ပေါ်နိုင်ခြင်း။
- ဓါတ်အားလိုင်းမြေပြင်အကာအဝေးလမ်းညွှန်ချက်ပြည့်မီရန်အတွက် အပင်များခုတ်ထွင်ရှင်းလင်းရေး လုပ်ငန်း များကြောင့် အပင်ကြီးထွားမှု အဟန့်အတားဖြစ်ပေါ်နိုင်ခြင်း။
- ပြုပြင်ထိန်းသိမ်းရေးလုပ်ငန်းများဆောင်ရွက်ချိန်တွင် ဒေသခံပြည်သူများ အလုပ်အကိုင် ရရှိနိုင်ခြင်း။

(ခ) သက်ရောက်မှုအား ခန့်မှန်းခြင်း နှင့် အကဲဖြတ်ခြင်း

ကွင်းဆင်းလုပ်ငန်းများမှ ထွက်ပေါ်လာသောရလဒ်များ နှင့် အခြားသောလေ့လာတွေ့ရှိချက်များအပေါ် အခြေခံ၍ သက်ရောက်မှုအား ခန့်မှန်းခြင်း နှင့် အကဲဖြတ်ခြင်းအားဆောင်ရွက်ခဲ့ပါသည်။ ပတ်ဝန်းကျင်နှင့် လူမှုဝန်းကျင်ဆိုင်ရာ သက်ရောက်မှု အကဲဖြတ်ခြင်းဆိုင်ရာနည်းစနစ်များကို အောက်ပါ ဇယား (၂၁) တွင် ဖော်ပြထားပါသည်။

ဇယား ၂၂။ သက်ရောက်မှုအကဲဖြတ်ခြင်းစံသတ်မှတ်ချက်များ

အတိုင်းအတာ	စီမံကိန်းတည်နေရာအတွင်း	သတ်မှတ်ထားသောစီမံကိန်းတည်နေရာအတွင်း (တစ်ဘက်လျှင် ၂၃ မီတာ) ကျော်လွန်ခြင်းမရှိသော သက်ရောက်မှု။
	စီမံကိန်းတည်နေရာကိုကျော်လွန်၍	သတ်မှတ်ထားသောစီမံကိန်းတည်နေရာ (၂၃ မီတာ မှ ၅၀ မီတာ) အား ကျော်လွန်ပြီးဖြစ်ပေါ်နိုင်သော သက်ရောက်မှု။
	ဒေသတွင်း	သတ်မှတ်ထားသောစီမံကိန်းတည်နေရာ (၅၀ မီတာ) အား ကျော်လွန်ပြီး အခြားသောဒေသများတွင် ဖြစ်ပေါ်နိုင်သော သက်ရောက်မှု။
ကြာချိန်	ရေတို	သဘာဝအရင်းအမြစ်များအပေါ်ရေတိုသက်ရောက်မှု (ကြာချိန် ၆ လအောက်)
	အသင့်အတင့်	သဘာဝအရင်းအမြစ်များအပေါ်အချိန်ကာလ အသင့်အတင့်သက်ရောက်မှု (ကြာချိန် ၆ လ မှ ၃ နှစ်အတွင်း)
	ရေရှည်	သဘာဝအရင်းအမြစ်များအပေါ် ရေရှည် သက်ရောက်မှု (ကြာချိန် ၃ နှစ် နှင့် အထက်)
ပြင်းအား	အနည်းငယ်	သဘာဝအရင်းအမြစ်များအပေါ်အနည်းငယ် သက်ရောက်မှု ပတ်ဝန်းကျင်ရှိ မူလအနေအထားအား <ul style="list-style-type: none"> ဒေသတွင်းအဆင့်တွင် ၂၀%အောက် ပြောင်းလဲ စေနိုင်သော သက်ရောက်မှု။ အလယ်အလတ်အဆင့်တွင် ၂၀% မှ ၃၀% အတွင်း ပြောင်းလဲ စေနိုင်သော သက်ရောက်မှု။ စီမံကိန်းတည်နေရာအတွင်းတွင် ရေတို ၃၀% အထိ ပြောင်းလဲ စေနိုင်သော သက်ရောက်မှု။
	အသင့်အတင့်	သဘာဝအရင်းအမြစ်များအပေါ် အသင့်အတင့် သက်ရောက်မှု ပတ်ဝန်းကျင်ရှိ မူလအနေအထားအား <ul style="list-style-type: none"> ဒေသတွင်းအဆင့်တွင် ၃၀%အောက် ပြောင်းလဲ စေနိုင်သော သက်ရောက်မှု။ အလယ်အလတ်အဆင့်တွင် ၃၀% ကျော် ပြောင်းလဲ စေနိုင်သော သက်ရောက်မှု။
	မြင့်မားသော	သဘာဝအရင်းအမြစ်များအပေါ် မြင့်မားသော သက်ရောက်မှု ပတ်ဝန်းကျင်ရှိ မူလအနေအထားအား

		• ဒေသတွင်းအဆင့်တွင် ၃၀% ကျော် ပြောင်းလဲစေနိုင်သော သက်ရောက်မှု။
အမျိုးအစား	ဆိုးကျိုးသက်ရောက်မှု	ပတ်ဝန်းကျင်အပေါ်ဆိုးကျိုးသက်ရောက်မှုများ။
	ကောင်းကျိုးသက်ရောက်မှု	ပတ်ဝန်းကျင်အပေါ် ကောင်းကျိုးသက်ရောက်မှုများ။

ဇယား ၂၃။ ပတ်ဝန်းကျင်နှင့် လူမှုဝန်းကျင်အပေါ်သက်ရောက်မှု သိသာထင်ရှားမှုအကဲဖြတ်ခြင်းစံနှုန်းများ

သိသာထင်ရှားမှု	အတိုင်းအတာ	ကြာချိန်	ပြင်းအား
သိသာထင်ရှားမှုမရှိသော	စီမံကိန်းတည်နေရာအတွင်း	ရေတို	အနည်းငယ်
အနည်းငယ်	စီမံကိန်းတည်နေရာအတွင်း	ရေတို	အသင့်အတင့်
	စီမံကိန်းတည်နေရာအတွင်း	အသင့်အတင့်	အနည်းငယ်
	စီမံကိန်းတည်နေရာအတွင်း	အသင့်အတင့်	အသင့်အတင့်
	စီမံကိန်းတည်နေရာကိုကျော်လွန်၍	ရေတို	အနည်းငယ်
	စီမံကိန်းတည်နေရာအတွင်း	ရေရှည်	အနည်းငယ်
အသင့်အတင့်	စီမံကိန်းတည်နေရာအတွင်း	အသင့်အတင့်	မြင့်မားသော
	စီမံကိန်းတည်နေရာအတွင်း	ရေရှည်	အသင့်အတင့်
	စီမံကိန်းတည်နေရာကိုကျော်လွန်၍	ရေတို	အသင့်အတင့်
	စီမံကိန်းတည်နေရာကိုကျော်လွန်၍	အသင့်အတင့်	အနည်းငယ်
	စီမံကိန်းတည်နေရာကိုကျော်လွန်၍	အသင့်အတင့်	အသင့်အတင့်
	စီမံကိန်းတည်နေရာကိုကျော်လွန်၍	ရေရှည်	အနည်းငယ်
	စီမံကိန်းတည်နေရာကိုကျော်လွန်၍	ရေရှည်	အသင့်အတင့်
	ဒေသတွင်း	ရေတို	အနည်းငယ်
	ဒေသတွင်း	ရေတို	အသင့်အတင့်
	ဒေသတွင်း	အသင့်အတင့်	အနည်းငယ်
	ဒေသတွင်း	အသင့်အတင့်	အသင့်အတင့်
	ဒေသတွင်း	ရေတို	အနည်းငယ်
	ဒေသတွင်း	ရေရှည်	အနည်းငယ်
မြင့်မားသော	စီမံကိန်းတည်နေရာအတွင်း	ရေတို	မြင့်မားသော
	စီမံကိန်းတည်နေရာအတွင်း	ရေရှည်	မြင့်မားသော
	စီမံကိန်းတည်နေရာကိုကျော်လွန်၍	ရေတို	မြင့်မားသော
	စီမံကိန်းတည်နေရာကိုကျော်လွန်၍	အသင့်အတင့်	မြင့်မားသော
	စီမံကိန်းတည်နေရာကိုကျော်လွန်၍	ရေရှည်	မြင့်မားသော

	ဒေသတွင်း	ရေတို	မြင့်မားသော
	ဒေသတွင်း	အသင့်အတင့်	မြင့်မားသော
	ဒေသတွင်း	ရေရှည်	အနည်းငယ်
	ဒေသတွင်း	ရေရှည်	မြင့်မားသော
	ဒေသတွင်း	ရေရှည်	မြင့်မားသော

စဉ်	သက်ရောက်မှု	အမျိုးအစား	သက်ရောက်မှု လျော့ပါးသက်သာစေမ ည့် နည်းလမ်းများ အသုံးပြုချင်း ရှိ/မရှိ	သိသာထင်ရှားမှု	
				တည်ဆောက်ခြင်း/ ပိတ်သိမ်းခြင်းကာလ	လည်ပတ်ခြင်း ကာလ
၁	လေအရည်အသွေး	ဆိုးကျိုး သက်ရောက် မှု	မရှိ	အနည်းငယ်	အနည်းငယ်
			ရှိ	သိသာထင်ရှားမှု မရှိသော	သိသာထင်ရှားမှု မရှိသော
၂	ဆူညံသံနှင့်တုန်ခါမှု	ဆိုးကျိုး သက်ရောက် မှု	မရှိ	အသင့်အတင့်	အနည်းငယ်
			ရှိ	အနည်းငယ်	အနည်းငယ်
၃	အမှိုက်စွန့်ပစ်မှု	ဆိုးကျိုး သက်ရောက် မှု	မရှိ	အသင့်အတင့်	လျစ်လျူရှုနိုင်သော
			ရှိ	အနည်းငယ်	လျစ်လျူရှုနိုင်သော
၄	ရေအရည်အသွေးနှင့် ရေအသုံးပြုမှု	ဆိုးကျိုး သက်ရောက် မှု	မရှိ	အနည်းငယ်	လျစ်လျူရှုနိုင်သော
			ရှိ	သိသာထင်ရှားမှု မရှိသော	လျစ်လျူရှုနိုင်သော
၅	မြေအရည်အသွေးနှင့် မြေတိုက်စားမှု	ဆိုးကျိုး သက်ရောက် မှု	မရှိ	အနည်းငယ်	လျစ်လျူရှုနိုင်သော
			ရှိ	သိသာထင်ရှားမှု မရှိသော	လျစ်လျူရှုနိုင်သော
၆	ရှုခင်းပဒေသ နှင့် မြင်ကွင်း	ဆိုးကျိုး သက်ရောက် မှု	မရှိ	အသင့်အတင့်	လျစ်လျူရှုနိုင်သော
			ရှိ	အနည်းငယ်	လျစ်လျူရှုနိုင်သော
၇	ဇီဝမျိုးစုံမျိုးကွဲ	ဆိုးကျိုး သက်ရောက် မှု	မရှိ	အသင့်အတင့်	အသင့်အတင့်
			ရှိ	အနည်းငယ်	အနည်းငယ်
၈	လူမှုစီးပွားရေးနှင့် အသက်မွေးဝမ်းကျောင်း	Beneficial ကောင်းကျိုး သက်ရောက် မှု	မရှိ	အနည်းငယ်	အနည်းငယ်
			ရှိ	အသင့်အတင့်	အသင့်အတင့်
၉	ဒေသ နှင့် ပုဂ္ဂလိက	ဆိုးကျိုး	မရှိ	အနည်းငယ်	လျစ်လျူရှုနိုင်သော

	ပိုင်ပစ္စည်းများ	သက်ရောက်မှု	ရှိ	သိသာထင်ရှားမှု မရှိသော	လျစ်လျူရှုနိုင်သော
၁၀	ဒေသခံပြည်သူများ ကျန်းမာရေး၊ လုံခြုံရေးနှင့် ဘေးအန္တရာယ် ကင်းရှင်းရေး	ဆိုးကျိုး သက်ရောက်မှု	မရှိ	အနည်းငယ်	အသင့်အတင့်
			ရှိ	သိသာထင်ရှားမှု မရှိသော	အနည်းငယ်
၁၁	အလုပ်သမားများ ကျန်းမာရေး၊ လုံခြုံရေးနှင့် ဘေးအန္တရာယ် ကင်းရှင်းရေး	ဆိုးကျိုး သက်ရောက်မှု	မရှိ	အနည်းငယ်	အနည်းငယ်
			ရှိ	သိသာထင်ရှားမှု မရှိသော	သိသာထင်ရှားမှု မရှိသော

၈။ အများပြည်သူနှင့်တွေ့ဆုံဆွေးနွေးခြင်း နှင့် အများပြည်သူပူးပေါင်းပါဝင်ခြင်း

၈.၁။ အများပြည်သူနှင့်တွေ့ဆုံဆွေးနွေးခြင်းဆိုင်ရာလုပ်ငန်းစဉ်များ

- ဓါတ်အာလိုင်ဒ်ဖြတ်သန်းရာမြို့များဖြစ်သော နမ္မတူ၊ သီပေါ နှင့် ကျောက်မဲ တို့ရှိ သက်ဆိုင်ရာမြို့နယ် အထွေထွေအုပ်ချုပ်ရေးဦးစီးဌာနမှ တာဝန်ရှိသူများနှင့်တွေ့ဆုံပြီး စီမံကိန်းအကြောင်းအရာ ဖော်ပြချက်များအား ရှင်းလင်းတင်ပြခြင်းနှင့် ၎င်းတို့၏ သဘောထားမှတ်ချက် များအား ရယူခြင်း။
- လျှပ်စစ်ဓါတ်အားပို့လွှတ်ရေးနှင့်ကွပ်ကဲရေးဦးစီးဌာန (DPTSC)၊ မြို့နယ် EPC၊ မြို့နယ်စီမံကိန်းဦးစီးဌာန နှင့် သစ်တောဦးစီးဌာနတို့မှ တာဝန်ရှိသူများနှင့်တွေ့ဆုံပြီး စီမံကိန်းအကြောင်းအရာဖော်ပြချက်များအား ရှင်းလင်းတင်ပြ ခြင်းနှင့် ၎င်းတို့၏ သဘောထားမှတ်ချက် များအား ရယူခြင်း။
- စီမံကိန်းဖော်ဆောင်သူ၏ နေပြည်တော် နှင့် သီပေါရုံးများတွင် တွေ့ဆုံ၍ IEE ဆိုင်ရာအခြေအနေများ တွေ့ဆုံဆွေးနွေးခြင်း။
- စီမံကိန်းကြောင့် သက်ရောက်မှုဖြစ်ပေါ်နိုင်သော ကျေးရွာများတွင် ဒေသခံများနှင့် Focus Group Meetings ပြုလုပ်ခြင်း။

၈.၂။ အများပြည်သူနှင့်တွေ့ဆုံဆွေးနွေးခြင်းရလဒ်များ

ဇယား ၂၅။ အများပြည်သူနှင့်ကနဦးတွေ့ဆုံဆွေးနွေးခြင်းရလဒ်များ

တွေ့ဆုံသည့် နေရာ နှင့် ရက်စွဲ	တွေ့ဆုံဆွေးနွေးသူ	သဘောထားမှတ်ချက်များ
၂၂-၁၁-၂၀၁၉ နမ္မတူမြို့နယ်၊ စီမံကိန်းဦးစီးဌာနရုံး။	ဒေါ်စမ်းစမ်းအေး လက်ထောက်ညွှန်ကြားရေးမှူး။	-ဒေသဖွံ့ဖြိုးရေးအတွက် အကျိုးရှိ ပြီး ကောင်းမွန်တဲ့ စီမံကိန်းဖြစ်ပါတယ်။ -ကျွန်ုပ်တို့စာရင်းဇယားများအရ နမ္မတူဒေသဟာ လျှပ်စစ်ကဏ္ဍမှာ ဖွံ့ဖြိုးမှုနည်းတဲ့အတွက် ဤစီမံကိန်း သည် ဒေသဖွံ့ဖြိုးတိုးတက်မှု ဖြစ်စေနိုင်ပါသည်။
၂၂-၁၁-၂၀၁၉ နမ္မတူမြို့နယ် သစ်တောဦးစီးဌာနရုံး။	ဦးချမ်းမြေ့အောင် မြို့နယ်သစ်တောဦးစီးမှူး။	စီမံကိန်းဖော်ဆောင်သူသည် သစ်တောဦးစီးဌာန နှင့် စီမံကိန်းမစတင်မီ ကာလမှာ ပူးပေါင်းဆောင်ရွက် သင့်သည်။

၂၂-၁၁-၂၀၁၉ မန်လီကျေးရွာအုပ်စု၊ အုပ်ချုပ်ရေးမှူးနေအိမ်။	ဦးအတ္တာဦး အုပ်ချုပ်ရေးမှူး၊ မန်လီကျေးရွာအုပ်စု။	<ul style="list-style-type: none"> - ကျွန်တော်က စီမံကိန်းနဲ့ပတ်သက်ပြီး အကောင်းမြင်ပါတယ်။ စီမံကိန်းကြောင့် သိသာထင်ရှားသော ဆိုးကျိုးသက်ရောက်မှု မရှိနိုင်ဘူးထင်ပါတယ်။ - စီမံကိန်းကြောင့် ကောင်းကျိုးထက် ဆိုးကျိုးသက်ရောက်မှုပိုဖြစ်နေမယ်ဆိုလျှင် ဂရုတစိုက် စဉ်းစားဖို့ လိုပါလိမ့်မယ်။ - ဤစီမံကိန်းကို ကန့်ကွက်စရာမရှိပါဘူး။ ဒါပေမယ့် ကျွန်တော့် လယ်တွေ ထိခိုက်ရင်တော့ ပြောရပါလိမ့်မယ်။ - အကယ်၍ စီမံကိန်းအတွက် လမ်းအသစ်ဖောက်မည်ဆိုလျှင် လမ်းဧရိယာထဲပါမည့် မြေပိုင်ရှင်တွေနဲ့ ညှိနှိုင်းဆွေးနွေးဖို့လိုပါလိမ့်မယ်။
၂၃-၁၁-၂၀၁၉ သီပေါမြို့နယ်၊ သစ်တောဦးစီးဌာနရုံး။	ဦးဇော်ဇော်ဦး မြို့နယ်သစ်တောဦးစီးမှူး။	<ul style="list-style-type: none"> - စီမံကိန်းဖော်ဆောင်သူသည် သစ်တောဦးစီးဌာန နှင့် ပူးပေါင်းဆောင်ရွက်သင့်သည်။ - သစ်တောဦးစီးဌာနထံခွင့်ပြုချက်တောင်းခံသင့်သည်။
၂၃-၁၁-၂၀၁၉ မိုးတေကျေးရွာအုပ်စုမှူး နေအိမ်၊ သီပေါမြို့နယ်။	ဦးစိုင်းမြင့်အောင် အုပ်ချုပ်ရေးမှူး၊ မိုးတေကျေးရွာအုပ်စု။	- စီမံကိန်းသည် ကျေးရွာရှိအိမ်တိုင်းကို မီးပေးနိုင်ပြီး ဒေသဖွံ့ဖြိုးတိုးတက်မှု ဖော်ဆောင်နိုင်လျှင် ကောင်းပါသည်။ လူ့ဘဝမှာ ရေနဲ့ လျှပ်စစ်မီးက အရေးကြီးဆုံးဆိုတော့ လျှပ်စစ်မီးရလျှင် ပိုပြီးပြည့်စုံပါသည်။
၂၃-၁၁-၂၀၁၉ အုပ်ချုပ်ရေးမှူးရုံး၊ ရွာသစ်ကျေးရွာအုပ်စု၊ သီပေါမြို့နယ်။	ဦးစန်းကျော်၊ အုပ်ချုပ်ရေးမှူး၊ ရွာသစ်ကျေးရွာအုပ်စု။	စီမံကိန်းဖော်ဆောင်သူ နှင့် မြေပိုင်ရှင်တွေအကြား ညှိနှိုင်းဖို့ လိုအပ်သည်။ မြေပိုင်ရှင်တွေသည် စီမံကိန်းအကြောင်းအရာများ ကို ကောင်းကောင်းသိထားဖို့လိုသည်။
၂၃-၁၁-၂၀၁၉ အုပ်ချုပ်ရေးမှူးနေအိမ်၊ ဆန်ဖိတ်ကျေးရွာအုပ်စု၊ သီပေါမြို့နယ်။	ဦးစန်စိုင်း အုပ်ချုပ်ရေးမှူး၊ ဆန်ဖိတ်ကျေးရွာအုပ်စု။	<ul style="list-style-type: none"> - ၂၄ နာရီဆက်တိုက် မီးရလျှင် ပိုကောင်းသည်။ - မီးရလျှင် ဒေသဖွံ့ဖြိုးတိုးတက်နိုင်သည်။
၂၃-၁၁-၂၀၁၉ အုပ်ချုပ်ရေးမှူးနေအိမ်၊ မန်ဟဲကျေးရွာအုပ်စု၊ သီပေါမြို့နယ်။	ဦးထွန်းကြည်၊ အုပ်ချုပ်ရေးမှူး၊ မန်ဟဲ ကျေးရွာအုပ်စု။	-စီမံကိန်းနှင့်ပတ်သက်လို့ ထွေထွေထူးထူးပြောစရာ မရှိပါဘူး။ တစ်ခုပြောချင်တာက စီမံကိန်းဖော်ဆောင်သူ သည် မြေပိုင်ရှင်တွေနှင့် တွေ့ဆုံဆွေးနွေးသင့်သည်။
၂၃-၁၁-၂၀၁၉ အုပ်ချုပ်ရေးမှူးရုံး၊ ဘော်ကြိုကျေးရွာအုပ်စု၊ သီပေါမြို့နယ်။	ဦးအောင်ရွှေ၊ အုပ်ချုပ်ရေးမှူး၊ ဘော်ကြိုကျေးရွာအုပ်စု။	<ul style="list-style-type: none"> - မြေပိုင်ရှင်များကို သင့်တင့်မျှတတဲ့ လျှော့ကြေးပေးသင့်သည်။ - သီးနှံလျော်ကြေးကို သီးနှံပေါ်ချိန်တွင် ပေးသင့်သည်။ - စိုက်ပျိုးရေးဦးစီးဌာန နှင့် ပူးပေါင်းဆောင်ရွက်ရန် လိုအပ်ပါသည်။ - စီမံကိန်းအတွက် ဆောက်လုပ်ရေးသုံးပစ္စည်းများ သယ်ယူရန် လမ်းဖောက်လုပ်ရာတွင် သက်ရောက်မှုများ ဖြစ်ပေါ်နိုင်သည်။

၂၃-၁၁-၂၀၁၉ အုပ်ချုပ်ရေးမှူးနေအိမ်၊ လောင်ခွန်ကျေးရွာအုပ်စု၊ သီပေါမြို့နယ်။	ဦးကျော်ထွန်း အုပ်ချုပ်ရေးမှူး၊ လောင်ခွန်ကျေးရွာအုပ်စု။	<ul style="list-style-type: none"> - ကောင်းမွန်တဲ့ စီမံကိန်းဖြစ်တဲ့အတွက် ငြင်းစရာ မရှိပါဘူး။ - ဒေသခံပြည်သူလူထုအပေါ် ဆိုးကျိုးသက်ရောက်မှုများ မရှိသင့်ပါ။ - ကျွန်တော်က တရုတ် ဂတ်(စ်)ပိုက်လိုင်းတုန်းက မြေယာ လျော်ကြေးနဲ့ ပတ်သက်ပြီး အတွေ့အကြုံရှိဖူး တယ်။ သူတို့က အရင်ဆုံး မြေအမျိုးအစားခွဲခြားတယ်၊ ပြီးတော့ မြေယာတန်ဖိုး တွက်ချက်တယ်။ ပြီးတော့မှ မြေအမျိုးအစားခွဲခြားထားတဲ့အတိုင်း မြေယာလျော်ကြေး ပေးတယ်။ - တာဝါတိုင်အမှတ် ၇၅ နဲ့ ၇၅ က တရုတ် ဂတ်(စ်)ပိုက်လိုင်းအပေါ်က ဖြတ်သွားမည့်ပုံပေါ်သည်၊ ဆောက်လုပ်ရေး အကောင်အထည်ဖော်တဲ့အခါ သတိထားသင့်ပါသည်။
၂၃-၁၁-၂၀၁၉ အုပ်ချုပ်ရေးမှူးနေအိမ်၊ ကျင်သီကျေးရွာအုပ်စု၊ သီပေါမြို့နယ်။	ဦးကျော်ဇော၊ အုပ်ချုပ်ရေးမှူး၊ ကျင်သီကျေးရွာအုပ်စု။	<ul style="list-style-type: none"> - ကောင်းသောစီမံကိန်းဖြစ်ပါသည်။ - ထိခိုက်နိုင်တဲ့ ကျေးရွာတွေကို အထူးအလေးထား ဆောင်ရွက်သင့်ပါသည်။ - သင့်တင့်မျှတသော လျော်ကြေးပေးသင့်ပါသည်။
၂၅-၁၁-၂၀၁၉ EE နေအိမ်၊ EPC ရုံး၊ ကျောက်မဲမြို့နယ်။	ဦးဝင်းလွင်ရှိန်၊ EE လျှပ်စစ်နှင့်စွမ်းအင်ဝန်ကြီးဌာန။	<ul style="list-style-type: none"> - ကျွန်တော့် အတွေ့အကြုံအရ ၂၃၀ကေစီလိုင်းက ပတ်ဝန်းကျင်ထိခိုက်မှုသိပ်မရှိနိုင်ဘူး။ - စီမံကိန်းဖော်ဆောင်သူသည် မဟာဓါတ်အားလိုင်း ဆိုင်ရာ ညွှန်ကြားချက်တွေကို လိုက်နာရမည်။ - မြေယာလျော်ကြေးနဲ့ပတ်သက်ပြီး ကျွန်တော့် အတွေ့အကြုံတွေကတော့ - သီးနှံလျော်ကြေးသည် ၂ နှစ်စာ ပေးသင့်သည်။ - အစိုးရဖော်ဆောင်တဲ့စီမံကိန်းတွေကျ မြေယာ လျော်ကြေးမပေးဘူး။ ဘာလို့လဲဆိုတော့ အစိုးရမှာ မြေယာလျော်ကြေးအပြည့်ပေးဖို့ အတွက် လုံလောက်တဲ့ Budget မရှိဘူး။ - နှစ်ရှည်သီးနှံတွေဖြစ်တယ်ဆိုလျှင် သီးနှံတန်ဖိုးကို အရင်တွက်ချက်ပြီးမှ လျော်ကြေးကိုညှိနှိုင်းတယ်။ - မြေယာ တန်ဖိုးဖြတ်ဖို့ ကော်မတီဖွဲ့တယ်။ ကော်မတီမှာ စီမံကိန်းဖော်ဆောင်သူ၊ ဆည်မြောင်း၊ သစ်တော၊ စိုက်ပျိုးရေး၊ လယ်ယာမြေစီမံခန့်ခွဲရေး နှင့်စာရင်းအင်း ဦးစီးဌာန စသည်တို့ပါဝင်တယ်။
၂၅-၁၁-၂၀၁၉ သစ်တောဦးစီးဌာနရုံး၊ ကျောက်မဲမြို့နယ်။	ဦးသူရကျော်၊ မြို့နယ်သစ်တောဦးစီးမှူး	<ul style="list-style-type: none"> - ဓါတ်အားလိုင်းလမ်းအကြောင်းသည် သစ်တော ကြိုးဝိုင်းထဲကျရောက်ပုံပေါ်သည်။ သစ်တောဦးစီးဌာန ရုံးချုပ်သို့ ခွင့်ပြုချက်တောင်းခံ ဖို့လိုအပ်သည်။

		<ul style="list-style-type: none"> - တာဝါတိုင်အမှတ် ၇၈ မှ ၉၀ သည် ထီးလုံကြိုးဝိုင်းအတွင်း ကျရောက်၍ တိုင်အမှတ် ၁၉၁ မှ ၁၉၂ သည် တောင်ခြေကြိုးဝိုင်းအတွင်း ကျရောက် သည်။
၂၇-၁၁-၂၀၁၉ ဘုန်းကြီးကျောင်း၊ နားကော်ကျေးရွာ၊ ကျောက်မဲမြို့နယ်။	ဦးဝိလိယ အုပ်ချုပ်ရေးမှူး၊ နားကော်ကျေးရွာအုပ်စု။	<ul style="list-style-type: none"> - ဓါတ်အားလိုင်းသည် ကြီးမားသော ထိခိုက်မှု မရှိနိုင်ပါ။ - ပြီးခဲ့တဲ့ကျွန်တော့်အတွေ့အကြုံအရ အစိုးရက ဓါတ်အားလိုင်းစီမံကိန်းတစ်ခုကို အတင်းအကြပ် ဖော်ဆောင်သွားဖူးတယ်။ ကျွန်တော်တို့ ဒေသခံတွေ အနေနဲ့ ထိခိုက်နစ်နာမှုတွေကို တင်ပြ တောင်းဆိုခွင့် မရှိခဲ့သလို လျော်ကြေးလည်းမရခဲ့ဘူး။ - ဒေသခံတွေ ဘေးအန္တရာယ် ကင်းရှင်းရေးအတွက် တာဝါတိုင်တွေပြုလဲခြင်း၊ လျှပ်စစ်အန္တရာယ် ကင်းရှင်း ရေးစသည်တို့ကို အထူးသတိထား စဉ်းစားသင့်သည်။ - ဓါတ်အားလိုင်းကြိုးများသည် လျော့ယံပြီး မြေပြင်နှင့် ကပ်မနေသင့်ပါ။
၂၇-၁၁-၂၀၁၉ အုပ်ချုပ်ရေးမှူးနေအိမ်၊ ဟဲကွီကျေးရွာအုပ်စု၊ ကျောက်မဲမြို့နယ်။	ဦးစိုင်းသန်းမောင် အုပ်ချုပ်ရေးမှူး၊ ဟဲကွီကျေးရွာအုပ်စု။	<ul style="list-style-type: none"> - ထိခိုက်ခံမြေရှင်များနှင့် ဆွေးနွေးညှိနှိုင်းမှုများ ပြုလုပ်သင့်ပါသည်။ - ဓါတ်အားလိုင်းဖြတ်ကျော်မည့်လယ်မြေများအား လျော်ကြေးပေးသင့်ပါသည်။ - လျှပ်စစ်ဘေးအန္တရာယ်ကင်းရှင်းရေး အသိပညာပေးမှု များ ပြုလုပ်သင့်ပါသည်။ နားကော်ကျေးရွာသား တစ်ဦး လျှပ်စစ်အန္တရာယ်ကျရောက်ပြီး သေဆုံးခဲ့ဖူး။
၂၇-၁၁-၂၀၁၉ အုပ်ချုပ်ရေးမှူးနေအိမ်၊ လွယ်စောက်ကျေးရွာအုပ်စု၊ ကျောက်မဲမြို့နယ်။	ဦးဒေါန အုပ်ချုပ်ရေးမှူး၊ လွယ်စောက်ကျေးရွာအုပ်စု။	<ul style="list-style-type: none"> - စီမံကိန်းအကောင်အထည်ဖော်စဉ်ကာလတွေမှာ ထိခိုက်နိုင်ခြေရှိတဲ့ ကျေးရွာသူ၊ ကျေးရွာသားများအား စီမံကိန်းအကြောင်းအရာများကို ရှင်းပြပြီး တိုင်ပင် ဆွေးနွေးသင့်ပါသည်။ - ပြီးခဲ့တဲ့ဓါတ်အားလိုင်းစီမံကိန်းတစ်ခု အကောင်အထည် ဖော်တုန်းက ဒေသခံတွေက စီမံကိန်းအကြောင်းအရာ တွေ ဘာတစ်ခုမှ မသိခဲ့ဘူး။ - ထိခိုက်နစ်နာမှုတွေကို မြေယာလျော်ကြေးတွေ၊ သီးနှံလျော်ကြေးတွေပေးမယ်ပြောခဲ့သော်လည်း ယခုအချိန်ထိ ဘာလျော်ကြေးမှ မရသေးဘူး။ - ဒါကြောင့် ဒေသခံတွေနှင့် သေချာပူးပေါင်းဆောင်ရွက် သင့်ပါသည်။
၂၇-၁၁-၂၀၁၉ အုပ်ချုပ်ရေးမှူးနေအိမ်၊ ကျွဲကုန်းကျေးရွာအုပ်စု၊ ကျောက်မဲမြို့နယ်။	ဦးစိုင်းလှမြင့် အုပ်ချုပ်ရေးမှူး၊ ကျွဲကုန်းကျေးရွာအုပ်စု။	<ul style="list-style-type: none"> - ဒီဒေသမှာက စီမံကိန်းတွေဖော်ဆောင်ကြတယ်၊ ဥပမာ - တရုတ်ဂတ်(စ်)ပိုက်လိုင်းစီမံကိန်းတွေ၊ မန္တလေး- မူဆယ် မီးရထားလမ်းစီမံကိန်း။ - အကြံပြုချင်တာကတော့ ထိခိုက်နိုင်ခြေရှိတဲ့ ကျေးရွာက ဒေသခံတွေနဲ့ ညှိနှိုင်းတိုင်ပင်သင့်သည်။

		<ul style="list-style-type: none"> - ကန့်ကွက်စရာမရှိပါဘူး။ - ထိခိုက်သူတွေကို သင့်တင့်မျှတတဲ့ လျော်ကြေးပေးသင့်ပါသည်။ - ထိခိုက်ခံရတဲ့ မြေပိုင်ရှင်တွေနှင့် ညှိနှိုင်းဆွေးနွေးမှု လုပ်ရမည်။ - တကယ်လို့ စီမံကိန်းက နေရာသီ (မတ် မှ မေ လအတွင်း) ဖော်ဆောင်မယ်ဆိုလျှင် သီးနှံတွေအပေါ် ထိခိုက်နိုင်မှုနည်းပြီး မြေယာလျော်ကြေးလည်း ပေးရတာ သက်သာမယ်။
၂၇-၁၁-၂၀၁၉ အုပ်ချုပ်ရေးမှူးနေအိမ်၊ ပန်လော့ကျေးရွာအုပ်စု၊ ကျောက်မဲမြို့နယ်။	ဦးစိုင်းလှဝင်း အုပ်ချုပ်ရေးမှူး၊ ပန်လော့ကျေးရွာအုပ်စု။	<ul style="list-style-type: none"> - ကျွန်တော်တို့က လျှပ်စစ်မီးလိုအပ်တယ်။ တကယ်လို့ ဒီစီမံကိန်းက ကျေးရွာကို မီးရအောင် လုပ်ပေးနိုင်လျှင် ကောင်းပါမည်။ - စီမံကိန်းဖော်ဆောင်သူသည် ဒေသခံတွေနှင့် ညှိနှိုင်းဆွေးနွေးပြီး၊ ဒေသလိုအပ်ချက်တွေကို ဖြည့်ဆည်း ပေးသင့်သည်။

၈.၃။ အများပြည်သူသို့အသိပေးခြင်း

(က) အများပြည်သူသို့အသိပေးခြင်းနည်းလမ်း

မြန်မာဘာသာဖြင့်ရေးသားထားသော ကနဦးလေ့လာဆန်းစစ်ခြင်းအစီရင်ခံစာအကျဉ်းချုပ်(မူကြမ်း)ကို သက်ဆိုင်ရာ ကျေးရွာအုပ်ချုပ်ရေးမှူးများ၊ အုပ်စုမှူးများမှ တစ်ဆင့် ဓါတ်အားလှိုင်းလမ်းအကြောင်းအနီးရှိ ကျေးရွာများသို့

စီမံကိန်းဆိုင်ရာအကြောင်းအရာများ၊ ကွင်းဆင်းလေ့လာထားသော ပကတိပတ်ဝန်းကျင် နှင့် လူမှုဝန်းကျင်ဆိုင်ရာ အခြေအနေများ၊ ပတ်ဝန်းကျင် နှင့် လူမှုဝန်းကျင်ဆိုင်ရာ ထိခိုက်နိုင်ခြေများကို ဒေသခံများသိရှိစေနိုင်ရန် ဖြန့်ဝေထားခဲ့ပါသည်။ ထို့အပြင် ဒေသခံများအနေဖြင့် ၎င်းတို့၏ သဘောထားမှတ်ချက်များအား ထပ်မံတင်ပြနိုင်ရန် အကြံပြုလွှာများကိုပါ တစ်ပါတည်း ဖြန့်ဝေခဲ့ပါသည်။

(ခ) ဒေသခံပြည်သူများ၏အကြံပြုချက်

သက်ဆိုင်ရာကျေးရွာများထံမှ ဖြည့်စွက်ထားသောအကြံပြုလွှာစုစုပေါင်း ၁၀၉ စောင် လက်ခံရရှိပါသည်။ ၎င်း အကြံပြုလွှာများကို အနှစ်ချုပ်ဖော်ပြထားပါသည်။

ဇယား ၂၆။ ဒေသခံများ၏အကြံပြုချက် (အကျဉ်းချုပ်) နှင့် စီမံကိန်းဖော်ဆောင်သူ၏ပြန်ကြားချက်

ဒေသခံများ၏အကြံပြုချက် (အကျဉ်းချုပ်)	စီမံကိန်းဖော်ဆောင်သူ၏ပြန်ကြားချက်
ပတ်ဝန်းကျင်ထိခိုက်မှုများ	
<ul style="list-style-type: none"> • ပတ်ဝန်းကျင်ထိခိုက်မှုများကို တတ်နိုင်သမျှလျော့ချသင့်သည်။ • ဓါတ်အားလှိုင်းလမ်းအကြောင်းတစ်လျှောက် ဆူညံသံ လျော့ချ သင့်ပါသည်။ • စီမံကိန်းဖော်ဆောင်သည့်အခါ ရေဦး၊ ရေထွက် နှင့် သစ်တောများကို ရှောင်ရှားသင့်ပါသည်။ 	<ul style="list-style-type: none"> • စီမံကိန်းလုပ်ငန်းများဆောင်ရွက်ရာတွင် သဘာဝပတ်ဝန်းကျင်ထိခိုက်ပျက်စီးမှုမရှိစေရန် အလေးထားဆောင်ရွက် လျှက်ရှိပြီး ECD ၏ ညွှန်ကြားချက်၊ လုပ်ထုံးလုပ်နည်း များနှင့်အညီ လိုက်နာဆောင်ရွက်သွားမည်ဖြစ်ပါသည်။ • အထက်ပါအတိုင်း။ • ထိခိုက်ပျက်စီးမှု မရှိစေရေး ဆောင်ရွက်သွားမည်ဖြစ်ပါ သည်။

<ul style="list-style-type: none"> • တာဝါတိုင်များကို ရေဝပ်ဧရိယာများတွင် တည်ဆောက်ခြင်း မပြုသင့်ပါ။ 	<ul style="list-style-type: none"> • အထက်ပါအတိုင်း။
လူမှုဝန်းကျင်ထိခိုက်မှု	
<ul style="list-style-type: none"> • လယ်ယာမြေ၊ ဥယျာဉ်ခြံမြေများ ထိခိုက်မှု လျော့ချသင့်ပါသည်။ • လူနေအိမ် ထိခိုက်မှု လျော့ချသင့်ပါသည်။ • သီးနှံစိုက်ပျိုးချိန်ကို ရှောင်ရှား၍ စီမံကိန်းအကောင်အထည်ဖော်သင့်ပါသည်။ • စီမံကိန်းကြောင့် ထိခိုက်ခံရသူများကို သင့်တင့်မျှတသော လျော်ကြေးပေးသင့်ပါသည်။ • ဒေသခံများရဲ့ အသက်မွေးဝမ်းကြောင်းထိခိုက်မှုကို လျော့ချသင့်ပါသည်။ • ဒေသခံများ ကျန်းမာရေးနှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေး ဦးစားပေးဆောင်ရွက်သင့်ပါသည်။ • ဒေသခံများ လျှပ်စစ်ဘေးအန္တရာယ် ကင်းရှင်းရေး ဆောင်ရွက် သင့်ပါသည်။ • စီမံကိန်းအလုပ်သမားများအနေဖြင့် ကျေးရွာအနီး စီမံကိန်း တည်နေရာများ၌ နေထိုင်စဉ်အတွင်း သက်ဆိုင်ရာ အုပ်ချုပ်ရေးမှူးများ၏ လမ်းညွှန်ချက်များအတိုင်း နေထိုင်သင့်ပါသည်။ • ဤစီမံကိန်း ပတ်ဝန်းကျင်တွင် လျှပ်စစ်မီးရအောင် ဆောင်ရွက်ပေးရန်။ 	<ul style="list-style-type: none"> • ဥယျာဉ်ခြံ၊ လယ်၊ ယာမြေများ ထိခိုက်မှုမရှိစေရန်နှင့် ပါဝင်မှု နည်းပါးစေရန်အတတ်နိုင်ဆုံး စီစဉ်ဆောင်ရွက်သွားမည် ဖြစ်ပါ သည်။ • ဓာတ်အားလိုင်းလုပ်ငန်းများဆောင်ရွက်ရာတွင် လူနေအိမ် ခြေများအပေါ်မှရှောင်ကွင်း၍ ဆောင်ရွက်နိုင်ရန် စီစဉ်ထားရှိ ပါသည်။ ရှိခဲ့ပါက သက်ဆိုင်သူ၊ တာဝန်ရှိသူများနှင့် ညှိနှိုင်း ၍ ဆောင်ရွက်သွားမည်ဖြစ်ပါသည်။ • ဓာတ်အားလိုင်းလုပ်ငန်းများဆောင်ရွက်သည့်အခါ တွေ့ကြုံရမည့် အခြေအနေနှင့်အချိန်အခါပေါ်မူတည်၍ သီးနှံစိုက်ပျိုးချိန်ကို ရှောင်ရှားနိုင်ရန် ချိန်ဆရမည်ဖြစ်ပြီး ရှောင်ရှားနိုင်သည့် အခြေအနေတွင်မရှိပါက သက်ဆိုင်သူ၊ တာဝန်ရှိသူများနှင့် ညှိနှိုင်း၍ မြို့နယ်မြေယာ နှင့် သီးနှံလျော်ကြေးတွက်ချက်အဆိုပြုတင်ပြရေးကော်မတီ နှင့် မြို့နယ်မြေယာလျော်ကြေးဆိုင်ရာ စိစစ်ရေးကော်မတီ တို့မှ တွက်ချက်တင်ပြ အတည်ပြုသည့် နှုန်းထားများ အတိုင်း လျော်ကြေးငွေများပေးအပ်သွားမည်ဖြစ်ပါသည်။ • လယ်ယာမြေများပါဝင်ခဲ့မည်ဆိုပါက သက်ဆိုင်သူ၊ တာဝန်ရှိသူများနှင့်ညှိနှိုင်း၍ မြို့နယ် မြေယာနှင့် သီးနှံ လျော်ကြေး တွက်ချက် အဆိုပြုတင်ပြရေးကော်မတီ နှင့် မြို့နယ်မြေယာ လျော်ကြေးဆိုင်ရာစိစစ်ရေး ကော်မတီ တို့မှ တွက်ချက်တင်ပြ အတည်ပြုသည့်နှုန်းထား များအတိုင်း လျော်ကြေးငွေများ ပေးအပ်သွားမည်ဖြစ်ပါ သည်။ • ထိခိုက်ပျက်စီးမှုမရှိစေရေးဆောင်ရွက်သွားမည်ဖြစ်ပါသည်။ • ဓာတ်အားလိုင်းလုပ်ငန်းများဆောင်ရွက်ရာတွင် ဒေသခံ ပြည်သူများ၊ တိရစ္ဆာန်များနှင့် လုပ်ငန်းခွင်အန္တရာယ် ကင်းရှင်းရေးတို့အတွက် ဦးတည်၍ စနစ်တကျစီမံ ဆောင်ရွက်သွား မည်ဖြစ်ပါသည်။ • အထက်ပါအတိုင်း။ • သက်ဆိုင်ရာကျေးရွာအုပ်ချုပ်ရေးမှူးများနှင့် ညှိနှိုင်း၍ ဆောင်ရွက်သွားမည်ဖြစ်ပါသည်။ • စီမံကိန်းနှင့်ပတ်သက်၍ လူမှုရေးတာဝန်သိမှု (CSR) အစီအစဉ်များဆောင်ရွက်နိုင်မည့်အခြေအနေပေါ်တွင်မူတည်၍ သက်ဆိုင်ရာတာဝန်ရှိသူများနှင့် ညှိနှိုင်းဆောင်ရွက် သွား မည်ဖြစ်ပါသည်။

အထွေထွေအကြံပြုချက်များ

<ul style="list-style-type: none"> • တာဝါတိုင်အုတ်မြစ် တည်ဆောက်ရာတွင် စံချိန်စံညွှန်း ပြည့်မီအောင် သတ်မှတ်ထားသောအရည်အသွေးမီပစ္စည်းများ အသုံးပြုပါသည်။ • စီမံကိန်းဆောင်ရွက်ရာတွင် အလုပ်သမားလိုအပ်ပါက ဒေသခံ ပြည်သူများသို့ အလုပ်အကိုင်အခွင့်အလမ်း ဖန်တီးပေးသင့် ပါသည်။ • စီမံကိန်းလုပ်ငန်းများကို သီးနှံစိုက်ပျိုးရိပ်သိမ်းခြင်း မရှိသည့် နွေရာသီ၌သာ ဆောင်ရွက်သင့်ပါသည်။ • လျှပ်စစ်ဘေးအန္တရာယ် ကင်းရှင်းရေး အသိပညာ ဝေမျှစေလိုပါသည်။ • စီမံကိန်းဖော်ဆောင်ရာ ဒေသဝန်းကျင်အားလုံး လျှပ်စစ်မီး ရရှိအောင် ပံ့ပိုးကူညီပေးသင့်ပါသည်။ • စီမံကိန်းဖော်ဆောင်ရာ အနီးပတ်ဝန်းကျင်တွင် လမ်းပမ်း ဆက်သွယ်ရေး ကောင်းမွန်စေရန် ဆောင်ရွက်ပေးသင့် ပါသည်။ • စီမံကိန်းမစတင်မီ သက်ဆိုင်ရာကျေးရွာနေပြည်သူများသို့ အသိပေးချပြသင့်ပါသည်။ 	<ul style="list-style-type: none"> • စီမံကိန်းလုပ်ငန်းများဆောင်ရွက်ရာတွင် သက်ဆိုင်ရာနယ်ပယ် အသီးသီးမှ ကျွမ်းကျင်ပညာရှင်များ ဦးစီး၍ လုပ်ငန်းကဏ္ဍ အလိုက် စံချိန်စံညွှန်းပြည့်မီစွာဖြင့် အကောင်အထည်ဖော် ဆောင်ရွက်သွားမည်ဖြစ်ပါသည်။ • ဒေသခံပြည်သူများ၏ လုပ်ငန်းကျွမ်းကျင်မှုများအပေါ်တွင် မူတည်၍ ၎င်းတို့နှင့်သင့်လျော်သည့် အလုပ်အကိုင်အခွင့် အလမ်းများ ရရှိနိုင်ရေးအတွက် စီစဉ်ဆောင်ရွက် ပေးသွားမည် ဖြစ်ပါသည်။ • ဓာတ်အားလိုင်းလုပ်ငန်းများဆောင်ရွက်သည့်အခါ တွေ့ကြုံရမည့် အခြေအနေနှင့်အချိန်အခါပေါ်မူတည်၍ သီးနှံစိုက်ပျိုးချိန်ကို ရှောင်ရှားနိုင်ရန် ချိန်ဆရမည်ဖြစ်ပြီး ရှောင်ရှားနိုင်သည့် အခြေအနေတွင်မရှိပါက သက်ဆိုင်သူ၊ တာဝန်ရှိသူများနှင့် ညှိနှိုင်း၍ မြို့နယ်မြေယာ နှင့် သီးနှံလျော်ကြေးတွက်ချက်အဆိုပြုတင်ပြရေးကော်မတီနှင့် မြို့နယ်မြေယာလျော်ကြေးဆိုင်ရာ စိစစ်ရေးကော်မတီ တို့မှ တွက်ချက်တင်ပြ အတည်ပြုသည့် နှုန်းထားများ အတိုင်း လျော်ကြေးငွေများပေးအပ်သွားမည်ဖြစ်ပါသည်။ • ဒေသခံပြည်သူများ၏ သဘောဆန္ဒအရ လိုအပ်ပါက အသိပညာပေးနိုင်ရေးဆောင်ရွက် သွားမည်ဖြစ်ပါသည်။ • စီမံကိန်းနှင့်ပတ်သက်၍ လူမှုရေးတာဝန်သိမှု (CSR) အစီအစဉ်များဆောင်ရွက်နိုင်မည့်အခြေအနေပေါ်တွင်မူတည်၍ သက်ဆိုင်ရာတာဝန်ရှိသူများနှင့် ညှိနှိုင်းဆောင်ရွက် သွား မည်ဖြစ်ပါသည်။ • အထက်ပါတိုင်း။ • ဓာတ်အားလိုင်းဖြတ်သန်းမည့် လမ်းကြောင်းရှိ ကျေးရွာများတွင် Public Hearing Meeting များ ပြုလုပ်၍ ချပြဆွေးနွေးသွားမည်ဖြစ်ပါသည်။
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၉။ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု နှင့် စောင့်ကြပ်ကြည့်ရှုခြင်း အစီအစဉ်

၉.၁။ ပတ်ဝန်းကျင်ထိခိုက်မှုလျော့ပါးသက်သာစေရေးနှင့် စီမံခန့်ခွဲမှုအစီအစဉ်

စီမံကိန်းဖော်ဆောင်မည့်ကာလအပိုင်းအခြားအလိုက် ပတ်ဝန်းကျင်ထိခိုက်မှုလျော့ပါးသက်သာစေရေးနည်းလမ်းများ အကောင်အထည်ဖော်ဆောင်ရွက်မှုအား စောင့်ကြပ်ကြည့်ရှုရန် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးအရာရှိ (Environmental Officer) တစ်ဦး ခန့်အပ်ရန် လိုအပ်ပါသည်။

စီမံကိန်းတည်ဆောက်ရေးကာလအတွင်း ပတ်ဝန်းကျင်နှင့် လူမှုဝန်းကျင်ထိခိုက်မှုများ သက်သာစေရန် သက်ဆိုင်ရာလုပ်ငန်းစဉ်အလိုက် လျော့ပါးသက်သာစေရေး နည်းလမ်းများ ကို ဇယား (၂၃) တွင်ဖော်ပြထားပါသည်။

ဇယား ၂၇။ ပတ်ဝန်းကျင်ထိခိုက်မှုလျော့ပါးသက်သာစေရေးနှင့် စီမံခန့်ခွဲမှုအစီအစဉ်

အကြောင်းအရာ	ပတ်ဝန်းကျင်ထိခိုက်မှု	လျော့ပါးသက်သာစေရေးနည်းလမ်းများ	ဖော်ဆောင်မည့်နေရာ	အချိန်ကာလ	ဖော်ဆောင်ရန်တာဝန်ရှိသူ	
					ဖော်ဆောင်ခြင်း	စောင့်ကြပ်ကြည့်ရှုခြင်း
အကြိုတည်ဆောက်ရေးကာလ						
မြေအသုံးချမှု	သိန္နီထွက်ရှိသော လယ်ယာမြေများထိခိုက်နိုင်ခြင်း။	<ul style="list-style-type: none">- သက်ရောက်မှုကြောင့် မွေးမြူရေးလုပ်ငန်းနေရာများအား ပြန်လည်နေရာချထားရန်။- စီမံကိန်းအတွက် မြေနေရာများ ရယူခြင်းနှင့် သိန္နီလျော်ကြေး ဆိုင်ရာ ကိစ္စရပ်များကို တည်ဆောက်ရေး မစတင်မီ MOEE ထံမှ အကဲဖြတ်အတည် ပြုခြင်းရယူရန်။- သီးနှံ နှင့် မြေယာ လျော်ကြေးများ ညှိနှိုင်းဆောင်ရွက်မှုတွင် အစိုးရ နှင့် ဒေသဆိုင်ရာ အဖွဲ့အစည်းများမှ ပါဝင်သင့်သူများအား ပါဝင်စေရန်။	လယ်ယာမြေ နှင့် ခြံမြေများ	အကြိုတည်ဆောက်ရေးကာလ	NCEH	ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးအရာရှိ (EO)

		<ul style="list-style-type: none"> - လျော်ကြေးနှုန်းထားများသည် သင့်တင့်မျှတသော ဒေသဆိုင်ရာ ပေါက်ဈေးနှုန်းထားအတွင်း ရှိစေရန်။ - လျော်ကြေးနှုန်းထားများသတ်မှတ်သည့်အခါ မြေအသုံးမပြုခြင်းကြောင့် ဆုံးရှုံးသွားသော သီးနှံ သို့မဟုတ် အခြားသော ဝင်ငွေရ လုပ်ငန်းများ ထိခိုက်မှုမာဏ တန်ဖိုးများအား ထည့်သွင်းစဉ်းစားရန်။ 				
တည်ဆောက်ရေးကာလ						
လေအရည်အသွေး	တည်ဆောက်ရေးသုံး ပစ္စည်းများ သယ်ယူပို့ဆောင်ရန် ယာဉ်နှင့် ယန္တရားများ သွားလာမှုကြောင့် ဖုန်ထနိုင်ခြင်း။	<ul style="list-style-type: none"> - ဖုန်ထနိုင်သော နေရာများတွင် ရေလောင်းရန်။ - ကွန်ကရစ်၊ ကတ္တရာ ခင်းထားခြင်းမရှိသော လမ်းများပေါ်၌ ယာဉ်သွားလာရာတွင် အမြန်နှုန်း ကန့်သန့်ရန်။ - ယာဉ်ဖြင့် မြေကြီး၊ သဲနှင့် အခြားသော ဖုန် / အမှုန်ထ စေနိုင်သော ပစ္စည်းများ သယ်ယူပို့ဆောင်ရာတွင် အဖုံးအုပ်စေရန်။ - ယာဉ်နှင့်တည်ဆောက်ရေးသုံး ကိရိယာများအား ကောင်းမွန်စွာလည်ပတ်နိုင်သော အခြေအနေတွင် ထားရှိရန်။ - ယာဉ်နှင့်တည်ဆောက်ရေးသုံး ကိရိယာများအား အသုံးမပြုဘဲ စက်မနှိုးထားရန်။ - လေတိုက်ကြမ်းသော အချိန်တွင် ဖုန်ထသော လုပ်ငန်းများအား ခေတ္တရပ်နားထားရန်။ 	စီမံကိန်းတည်နေရာ တစ်လျှောက်	တည်ဆောက်ရေး ကာလ တစ်လျှောက်	NCEH	En ပတ်ဝန်းကျင် ထိန်းသိမ်းရေးအ ရာရှိ (EO)

ဆူညံသံနှင့်တုန်ခါမှု	ဆူညံသံနှင့်တုန်ခါမှုများကြောင့် အနီးပတ်ဝန်းကျင်ရှိ လူနေအိမ် နှင့် တောတွင်းတိရစ္ဆာန်များအပေါ် သက်ရောက်နိုင်ခြင်း။	<ul style="list-style-type: none"> - ဆူညံသံ နှင့် တုန်ခါမှု ဖြစ်ပေါ်စေနိုင်သော တည်ဆောက်ရေးသုံး ယာဉ် နှင့် ယန္တရားများကို ပုံမှန်စစ်ဆေးရန်။ - စာသင်ကျောင်း၊ ဘုန်းကြီးကျောင်း၊ ဆေးရုံ၊ ဘိုးဘွားရိပ်သာ အစရှိသဖြင့် ထိခိုက်လွယ် နေရာများနှင့်နီးသော နေရာများတွင် သင့်လျော်သော ဆူညံသံ နှင့် တုန်ခါမှု ထိန်းချုပ်ရေး အစီအမံများ ဆောင်ရွက်ရန်။ - ဆူညံသံ နှင့် တုန်ခါမှု ဖြစ်ပေါ်စေသော ကိရိယာများကို လူနေအိမ်များနှင့် ဝေးနိုင်သမျှထားရှိရန်။ - ဆူညံသံ နှင့် တုန်ခါမှု ဖြစ်ပေါ်စေသော တည်ဆောက်ရေးလုပ်ငန်းများကို အချိန်ကန့်သတ် ဆောင်ရွက်ရန်၊ လိုအပ်လျှင် ယာယီ အသံတားဆီးရေးဘုတ်များ တပ်ဆင်ရန်။ - ဆူညံသံထွက်သော လုပ်ငန်းများ၌ အလုပ်သမားများအား အသံလိုက်ကိရိယာ (နားကြပ်)များ ထောက်ပံ့ရန်။ - ဖောက်ခွဲခြင်းလုပ်ငန်းများ ဆောင်ရွက်ရန် လိုအပ်ပါက နံနက် ၇ နာရီ မှ ညနေ ၅ နာရီ အတွင်း ဆောင်ရွက်ခြင်း၊ အကြိမ်အရေ အတွက်လျော့၍ ဆောင်ရွက်ရန် နှင့် ဒေသခံ ပြည်သူများနှင့် ညှိနှိုင်းဆောင်ရွက်ရန်။ 	စီမံကိန်းတည်နေရာ တစ်လျှောက်	တည်ဆောက်ရေး ကာလ တစ်လျှောက်	NCEH	ပတ်ဝန်းကျင် ထိန်းသိမ်းရေးအ ရာရှိ (EO)
အမှိုက်စွန့်ပစ်မှု	- တည်ဆောက်ရေးလုပ်ငန်းစဉ်များမှ	- တည်ဆောက်ရေးလုပ်ငန်းစဉ်များမှ	စီမံကိန်းတည်နေရာ	တည်ဆောက်ရေး	NCEH	ပတ်ဝန်းကျင်

	<p>ထွက်ရှိလာသော အမှိုက်များသည် နီးစပ်ရာ မြောင်း၊ ချောင်း နှင့် မြစ်များ အတွင်းသို့ ကျရောက်နိုင်ခြင်း။</p> <ul style="list-style-type: none"> - ၎င်းအမှိုက်များသည် အနီးတစ်ဝိုက်ရှိ ရေတွင်း၊ ရေကန် နှင့် မြောင်း အတွင်းရှိ ရေများအား ညစ်ညမ်းစေပါခြင်း။ - ယာယီအလုပ်သမားတန်းလျားမှ ထွက်သော အမှိုက်များကို စနစ်တကျ စွန့်ပစ်ခြင်းမရှိလျှင် အနီးပတ်ဝန်းကျင်ရှိ ရေမြောင်း နှင့် ချောင်းများ ပိတ်စို့နိုင်ခြင်း။ 	<p>ထွက်ရှိလာသော အမှိုက်များ နှင့် ယာယီ အလုပ်သမားတန်းလျားမှ ထွက်သော အမှိုက်များကို သက်ဆိုင်ရာ ဒေသအုပ်ချုပ်ရေးအဖွဲ့မှ သတ်မှတ်ထားသော နေရာများ တွင်သာ စွန့်ပစ်ရန်။</p> <ul style="list-style-type: none"> - တည်ဆောက်ရေးလုပ်ငန်းပြီးစီးချိန်တွင် ၎င်းနေရာအား မူလပုံစံအတိုင်း ထားရှိရန်။ - တည်ဆောက်ရေးလုပ်ငန်းခွင်၌ 3Rs စနစ် ကျင့်သုံးရန်။ - တည်ဆောက်ရေးလုပ်ငန်းခွင်၌ စနစ်မကျသော အမှိုက်စွန့်ပစ်ခြင်းအား တားမြစ်ရန်။ - အမှိုက်ထွက်ရှိသောနေရာများ၌ အမှိုက်ပုံးများ လုံလောက်စွာထားရှိရန်။ - တူးဖော်ထားသော မြေကြီးများအား ကျင်းဖို့ရာတွင် ပြန်လည်အသုံးပြုရန်။ - သယ်ယူပို့ဆောင်ရင်း လမ်းတစ်လျှောက် ပြုတ်ကျလွင့်စင်သော ပစ္စည်းများအား ပြန်လည်သိမ်းယူရန်။ - ယာယီအလုပ်သမားတန်းလျားတွင် ယင်လုံအိမ်သာများ ဆောက်လုပ်ရန်။ - အမှိုက်မီးရှို့ခြင်းအား တားစီးရန်။ - ဓါတုပစ္စည်းများလုပ်ငန်းခွင်အတွင်း သိမ်းဆည်းရန်လိုအပ်လျှင် အရေးပေါ်တုံ့ပြန် ခြင်းအစီအမံများထားရှိရန် နှင့် ဓါတုပစ္စည်း 	တစ်လျှောက်	ကာလ တစ်လျှောက်		ထိန်းသိမ်းရေးအ ရာရှိ (EO)
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		များဆိုင်ရာ ဘေးအန္တရာယ်ကင်းရှင်းရေး လမ်းညွှန်ချက်များ အတိုင်း ဆောင်ရွက်ရန်။				
ရေအသုံးပြုခြင်း နှင့် ရေအရည်အသွေး	<ul style="list-style-type: none"> - တည်ဆောက်ရေးလုပ်ငန်းအတွက် မြေအောက်ရေ၊ စမ်းရေ နှင့် ချောင်းရေများ အလွန်အကျွံသုံးစွဲခြင်းသည် နွေရာသီတွင် အနီးပတ်ဝန်းကျင်ရှိ ကျေးရွာများ ရေရှားပါမှုဖြစ်ပေါ်နိုင်ခြင်း။ - မြေတူးဖော်ခြင်းမှ ထွက်ရှိလာသော မြေများအား နီးစပ်ရာ ချောင်းအတွင်းသို့ စွန့်ပစ်ခြင်းသည် ရေထုညစ်ညမ်းမှု ဖြစ်ပေါ်နိုင်ခြင်း။ - ယာဉ်နှင့် ယန္တရားများ ပြုပြင်ထိန်းသိမ်းမှု ဆောင်ရွက်ရာတွင် အင်ဂျင်နီယာ နှင့် ဆီများ ယိုဖိတ်မှုကြောင့် အနီးပတ်ဝန်းကျင် ထိခိုက်မှု ဖြစ်ပေါ်နိုင်ခြင်း။ 	<ul style="list-style-type: none"> - လိုအပ်သလောက်သာ ရေအသုံးပြုရန်။ - မြစ် နှင့် ချောင်းအနီးဝန်းကျင်တွင် မြေတိုက်စားမှုမဖြစ်အောင် ကာကွယ်ရန်။ - မြစ် နှင့် ချောင်း ဖြတ်ကူးသော နေရာများ၌ တာဝါတိုင် (၂) ခုကြား အကွာအဝေးသည် ထိုမြစ်/ချောင်း၏ ရေတက်ချိန်အမြင့်ဆုံး အမှတ်ထက် ပိုထားရန် နှင့် ကေဘယ်ကြိုး နှင့် မြေကြီး အကွာအဝေးသည် သက်ဆိုင်ရာ လမ်းညွှန်ချက်များအတိုင်း လိုက်နာရန်။ - မြေတိုက်စားမှုမှ နီးစပ်ရာချောင်းအတွင်း ရေညစ်ညမ်းမှု နှင့် နုန်းပိုမှု မဖြစ်ပေါ်စေရန် နှင့် မြေညှိခြင်းလုပ်ငန်းများကို နွေရာသီ၌သာ ဆောင်ရွက်ရန်။ - သဲပုံများ၊ မြေစာပုံများကို မတ်စောက်သော နေရာများ၊ မြစ်၊ ချောင်း များနှင့် အနည်ဆုံး မီတာ ၃၀ အကွာတွင်ထားရန်။ - ဓါတုပစ္စည်းနှင့် ဆီများကို အောက်ခံကွန်ကရစ်ခင်းထားပြီး အမိုးရှိသော သိုလှောင်ရုံများတွင်သာ သိုလှောင်ရန်။ - ချောင်း၊ မြောင်း၊ ရေကန် များအတွင်းသို့ ဆီအကြွင်းအကျန်များ နှင့် အမှိုက်များ မပစ်ရန်။ - ဆီယိုစိမ့်မှုများ မဖြစ်ပေါ်စေရန် ယာဉ်နှင့် 	စီမံကိန်းတည်နေရာ တစ်လျှောက်	တည်ဆောက်ရေး ကာလ တစ်လျှောက်	NCEH	ပတ်ဝန်းကျင် ထိန်းသိမ်းရေးအ ရာရှိ (EO)

		<p>ယန္တရားများအား ပြုပြင်ထိန်းသိမ်းမှု ပုံမှန်ဆောင်ရွက်ရန်။</p> <ul style="list-style-type: none"> - ဆီနှင့် အခြားသောအန္တရာယ်ရှိပစ္စည်းများ ယိုဖိတ်လျှင် အရေးပေါ်စီမံဆောင်ရွက်ချက်များ ပြင်ဆင်ထားရန် နှင့် အလွယ်အကူ သိမ်းဆည်းနိုင်သော ပစ္စည်းကိရိယာများ ထားရှိရန်။ - ယာယီအလုပ်သမားတန်းလျားတွင် ယင်လုံအိမ်သာများဆောက်လုပ်ပေးရန်။ 				
<p>မြေတိုက်စားခြင်း နှင့် မြေအရည်အသွေး</p>	<ul style="list-style-type: none"> - မြေတူးဖော်ခြင်း နှင့် ဆက်စပ် လုပ်ငန်းများကြောင့် မြေအရည်အသွေး ပြောင်းလဲနိုင်ခြင်း။ - မက်စောက်သောနေရာများ၌ တာဝါတိုင်အုတ်မြစ်တည်ဆောက်ရန် အပင်များခုတ်ခြင်း နှင့် မြေတူးဖော်ခြင်းကြောင့် မြေတိုက်စားခြင်း နှင့် မြေပြိုခြင်း တို့ဖြစ်ပေါ်နိုင်ခြင်း။ - တူးဖော်ထားသော နေရာများအား ဖုံးအုပ်ထားခြင်း မရှိလျှင် မြေတိုက်စားမှု ဖြစ်ပေါ်နိုင်ခြင်း။ - ဆီယိုဖတ်ခြင်း၊ စွန့်ပစ်ခြင်းနှင့် အခြားအန္တရာယ်ရှိ ပစ္စည်းများ စွန့်ပစ်ခြင်းကြောင့် မြေဆီလွှာ ပျက်စီးမှု ဖြစ်ပေါ်နိုင်ခြင်း။ 	<ul style="list-style-type: none"> - ရေတိုက်စား၍ ဆုံးရှုံးမှုများမဖြစ်ပေါ်စေရန် မြေရှင်းခြင်း၊ မြေတူးခြင်း နှင့် မြေညှိခြင်း စသည့်လုပ်ငန်းတို့ကို ခြောက်သွေ့ရာသီ၌ ဆောင်ရွက်ရန်။ - မြစ်ကမ်းပါးအနီးရှိ အပင်များအား ရှင်းလင်းရန်လိုအပ်ပါက အပင်အပေါ်ပိုင်း သာခုတ်ပြီး အမြစ်များအား ချန်ထားရန်။ အပင်အမြစ်များ၏ ကုတ်တွယ်အားကြောင့် မြေဆီလွှာ တည်ငြိမ်စေပြီး မြေတိုက်စားခံရခြင်း အား လျော့ကျစေပါသည်။ - တည်ဆောက်ရေးသုံး ပစ္စည်းများ၊ အင်ဂျင်နီယာ နှင့် ဆီများ မတော်တဆ ယိုဖိတ်ခြင်းကြောင့် အပေါ်ယံမြေဆီလွှာ ညစ်ညမ်းခြင်းမှ ကာကွယ်ရန် ကွန်ကရစ်အခင်းနှင့် အမိုးအကာပါရှိသော သိုလှောင်ရုံ 	စီမံကိန်းတည်နေရာ တစ်လျှောက်	တည်ဆောက်ရေး ကာလ တစ်လျှောက်	NCEH	ပတ်ဝန်းကျင် ထိန်းသိမ်းရေးအရာရှိ (EO)

		<p>တွင်သာ ထားရှိရန်။</p> <ul style="list-style-type: none"> - ဆီနှင့် အခြားသော အန္တရာယ်ရှိပစ္စည်းများ ယိုဖိတ်လျှင် အရေးပေါ်စီမံဆောင်ရွက်ချက်များ ပြင်ဆင်ထားရန် နှင့် အလွယ်အကူ သိမ်းဆည်းနိုင်သော ပစ္စည်းကိရိယာများ ထားရှိရန်။ - မြေသိပ်သည်းမှုကြောင့်လယ်ယာမြေများ ပျက်စီးခြင်း မဖြစ်ပေါ်စေရန် ယာဉ်နှင့် ယန္တရားများအား လယ်ယာမြေများအပေါ် ဖြတ်သန်းသွားလာမှု ကန့်သတ်ရန်။ - မြေတိုက်စားခြင်း နှင့် မြေဆီလွှာထိခိုက်မှု လျော့နည်းစေရန် အမှိုက်စွန့်ပစ်ခြင်း၊ ရေအသုံးပြုခြင်း နှင့် ရေအရည်အသွေး လုပ်ငန်းကဏ္ဍများတွင် ဖော်ပြထားသော လျော့ပါးသက်သာစေရေးနည်းလမ်း များကို အသုံးပြုရန်။ 				
ရှုခင်း နှင့် အမြင်ပဒေသ	<p>လမ်းအကြောင်းမြေနေရာ ရှင်းလင်းခြင်း၊ တာဝါတိုင်အုတ်မြစ် တည်ဆောက်ခြင်း နှင့် စတီးတာဝါတိုင်များ ဖြစ်တည်လာခြင်းကြောင့် သဘာဝမြင်ကွင်းသာယာမှု အပေါ် အနှောက်အရှက်ဖြစ်စေနိုင်ခြင်း။</p> <ul style="list-style-type: none"> - လူသားတို့ဖန်တီးတည်ဆောက်ထားသော တာဝါတိုင်များသည် သဘာဝအတိုင်း တည်ရှိနေသော 	<ul style="list-style-type: none"> - တတ်နိုင်သမျှ သစ်ပင်များခုတ်လှဲခြင်း လျော့ချရန်။ - တာဝါတိုင်ဖွဲ့စည်းတည်ဆောက်ပုံ တည်ရှိမှုကြောင့် အနီးပတ်ဝန်းကျင်ရှိ မြင်ကွင်း အနှောက်အယှက် မဖြစ်စေရန်။ - ကေဘယ်ကြိုးမြေပြင်အကွာအဝေး လမ်းညွှန်ချက်များအရ အပင်အမြင့်ကို ကန့်သတ်ရန် လိုအပ်သော်လည်း အပင်များကို တတ်နိုင်သမျှ ထိန်းသိမ်း 	စီမံကိန်းတည်နေရာ တစ်လျှောက်	တည်ဆောက်ရေး ကာလ တစ်လျှောက်	NCEH	ပတ်ဝန်းကျင် ထိန်းသိမ်းရေးအ ရာရှိ (EO)

	မြင်ကွင်းကို အပြောင်းအလဲ ဖြစ်စေပြီး သာယာသောမြင်ကွင်းများ ပျက်စီးဆုံးရှုံး နိုင်ခြင်း။	ထားရန်။				
ဇီဝမျိုးစုံမျိုးကွဲ (အပင်များ)	တာဝါတိုင်လမ်းအကြောင်း ရှင်းလင်းမှုများကြောင့် အပင်များ ပျက်စီးဆုံးရှုံးနိုင်ခြင်း။	<ul style="list-style-type: none"> - သစ်တောဥပဒေ (၂၀၁၈)၊ ဇီဝမျိုးစုံမျိုးကွဲနှင့်သဘာဝထိန်းသိမ်းရေး နယ်မြေများကာကွယ်စောင့်ရှောက်ခြင်း ဆိုင်ရာဥပဒေ (၂၀၁၈) နှင့် IEE အစီရင်ခံစာ အခန်း (၅) တွင် ကောက်နှုတ်ဖော်ပြ ထားသော ဥပဒေ နှင့် ပြဌာန်းချက်များကို လိုက်နာရန်။ - တည်ဆောက်ရေးလုပ်ငန်းများ ဆောင်ရွက်ခြင်းမပြုမီ အလုပ်သမားများအား ဇီဝမျိုးစုံမျိုးကွဲများ၏ အရေးပါပုံ နှင့် ၎င်းတို့အား ထိန်းသိမ်းရန် လိုအပ်ကြောင်း ဟောပြော ပို့ချမှုများ ဆောင်ရွက်ရန်။ - အပင်များ ခုတ်ရန်လိုအပ်ပါက သစ်တောဦးစီးဌာန နှင့် တိုင်ပင်ဆွေးနွေးရန်။ - ဓါတ်အားလိုင်း လမ်းအကြောင်းအတွင်း ခုတ်လှဲရန် လိုအပ်မည့် အပင်များကို သေချာစွာ (သစ်တောဦးစီးဌာန၏ လမ်းညွှန်ချက်အတိုင်း) အမှတ်အသား ပြုလုပ်ပြီးမှ ခုတ်လှဲရန်။ - အပင်ခုတ်လှဲခြင်းကို တတ်နိုင်သမျှ လျော့ချရန် နှင့် ခုတ်လှဲရန် သတ်မှတ်ထားသော အပင်အရေအတွက် ထက် ကျော်လွန်၍ ခုတ်လှဲခြင်းမပြုရန်။ 	စီမံကိန်းတည်နေရာ တစ်လျှောက်	တည်ဆောက်ရေး ကာလ တစ်လျှောက်	NCEH	ပတ်ဝန်းကျင် ထိန်းသိမ်းရေးအ ရာရှိ (EO)

		<ul style="list-style-type: none"> - ခုတ်လှဲပြီး သစ်ပင်အပိုင်းအစများအား သစ်တောဦးစီးဌာန၏ လမ်းညွှန်ချက်အတိုင်း စွန့်ပစ်ရန်။ - သစ်တောထွက်ပစ္စည်းများအား ထုတ်ယူသုံးစွဲခြင်းမပြုရန်။ - ပေါင်းသတ်ဆေးသုံး၍ အပင်ရှင်းလင်းမှုမပြုလုပ်ရန်။ - စီမံကိန်းတည်နေရာအတွင်း ရှင်းလင်းထားသော၊ ခုတ်လှဲထားသော အပင်အမှိုက်များအား မီးရှို့ခြင်းမပြုရန် နှင့် အမှိုက်စွန့်ပစ်မှုကဏ္ဍတွင် ဖော်ပြထား သော လျော့ပါးသက်သာစေရေး နည်းလမ်းများအားလိုအပ်သလို ဆောက်ရွက်ရန်။ 				
ဇီဝမျိုးစုံမျိုးကွဲ (တိရစ္ဆာန်များ)	တည်ဆောက်ရေး ယာဉ် နှင့် ယန္တရားများ လည်ပတ်မှုကြောင့် တိရစ္ဆာန်များအပေါ် သက်ရောက်မှု ရှိနိုင်ခြင်း။	<ul style="list-style-type: none"> - ဆူညံသံထွက်ရှိမှု လျော့ပါးစေရန် တည်ဆောက်ရေး ယာဉ် နှင့် ယန္တရား များ ပုံမှန်စစ်ဆေးပြီး ပြုပြင်ထိန်းသိမ်းမှုဆောင်ရွက်ရန်။ - တောတွင်း တိရစ္ဆာန်များ ယာဉ်မတော်တဆ ထိခိုက်ခြင်းမှ ရှောင်ရှားရန် တည်ဆောက်ရေးယာဉ်များအား အမြန်နှုန်း တစ်နာရီ ၄၀ ကီလို ကန့်သတ်ရန်။ - တည်ဆောက်ရေးလုပ်ငန်းများ ဆောင်ရွက်ခြင်းမပြုမီ အလုပ်သမားများအား ဇီဝမျိုးစုံမျိုးကွဲများ၏ အရေးပါပုံ နှင့် ၎င်းတို့အား 	စီမံကိန်းတည်နေရာ တစ်လျှောက်	တည်ဆောက်ရေး ကာလ တစ်လျှောက်	NCEH	ပတ်ဝန်းကျင် ထိန်းသိမ်းရေးအရာရှိ (EO)

		ထိန်းသိမ်းရန် လိုအပ်ကြောင်း ဟောပြောပို့ချမှုများ ဆောင်ရွက်ရန်။ - တောတွင်း တိရစ္ဆာန်များအား အမဲလိုက်ခြင်း၊ ငှက်ပစ်ခြင်း နှင့် ငါးဖမ်းခြင်းအား ပိတ်ပင်တားဆီးရန်။				
လူမှုစီးပွားရေးနှင့် အသက်မွေးဝမ်းကျောင်း	ခါတ်အားလှိုင်း နှင့် ဆက်စပ် တည်ဆောက်ရေးလုပ်ငန်းများကြောင့် ဒေသခံများ အလုပ်အကိုင် အခွင့်အလမ်း ရရှိနိုင်ခြင်း။	<ul style="list-style-type: none"> - တည်ဆောက်ရေးလုပ်ငန်းအတွက် အလုပ်သမားလိုအပ်သည့်အခါ ဒေသခံများအား ဦးစားပေးရန်။ - ပြင်ပဒေသမှ အလုပ်သမားများ အလုံးအရင်းလိုက် ရွှေ့ပြောင်းလာမှုအား ရှောင်ရှားရန်။ - လုပ်ငန်းမစတင်မီ လုပ်ငန်းခွင်ဘေးအန္တရာယ်ကင်းရှင်းရေး သင်တန်းများ ပို့ချရန်။ - အလုပ်သမားတန်းလျား၊ စားဖိုဆောင်အတွက် အစားအသောက်များ ဝယ်ယူရာတွင် ဒေသဈေးများမှ အသား၊ ငါး၊ နှင့် ဟင်းသီးဟင်းရွက်များ ဝယ်ယူအားပေးရန်။ 	စီမံကိန်းတည်နေရာ တစ်လျှောက်	တည်ဆောက်ရေးကာလ မစတင်မီ နှင့် တည်ဆောက်ရေးကာလ တစ်လျှောက်	NCEH	ပတ်ဝန်းကျင် ထိန်းသိမ်းရေးအရာရှိ (EO)
တည်ရှိပြီးသား ကျေးရွာပိုင်၊ ပုဂ္ဂလိကပိုင် အဆောက်အဦများထိခိုက်ပျက်စီးခြင်း	တည်ဆောက်ရေးလုပ်ငန်းများကြောင့် တည်ရှိပြီးသား ကျေးရွာပိုင်၊ ပုဂ္ဂလိကပိုင် အဆောက်အဦများထိခိုက်ပျက်စီးနိုင်ခြင်း။	<ul style="list-style-type: none"> - တည်ဆောက်ရေးလုပ်ငန်းစဉ်များကြောင့် တည်ရှိပြီးသား ကျေးရွာပိုင်၊ ပုဂ္ဂလိက ပိုင် အဆောက်အဦ များ ထိခိုက်ပျက်စီးမှု မရှိအောင် စီစဉ်ဆောင်ရွက်ရန်။ - တည်ဆောက်ရေးလုပ်ငန်းစဉ်များကြောင့် ကျေးရွာပိုင်၊ ပုဂ္ဂလိကပိုင် အဆောက်အဦများ 	စီမံကိန်းတည်နေရာ တစ်လျှောက်	လိုအပ်သလို	NCEH	ပတ်ဝန်းကျင် ထိန်းသိမ်းရေးအရာရှိ (EO)

		<p>မတော်တဆ ထိခိုက်ပျက်စီးမှုရှိခဲ့လျှင် ချက်ခြင်း လျော်ကြေးပေးရန်။</p> <ul style="list-style-type: none"> - လိုအပ်ပါက ထိခိုက်ခံနေရသူများမှ မွေးမြူရေးတိရစ္ဆာန်များ ပြန်လည်နေရာ ချထားရန်။ - တည်ဆောက်ရေးလုပ်ငန်းမစတင်မီ မြေယာ နှင့် သိန္နီလျော်ကြေးကိစ္စ များအား MOEE နှင့် ပူးပေါင်း ဆောင်ရွက်၍ ဖြေရှင်းရန်။ - လျော်ကြေးကိစ္စများ ညှိနှိုင်းဆွေးနွေး ရာတွင် ထိခိုက်သူ၊ အစိုးရ နှင့် ဒေသခံ စသည့် ပါဝင်သင့်ပါဝင်ထိုက်သူများအား ထည့်သွင်းဆောင်ရွက်ရန်။ - သတ်မှတ် လျော်ကြေးနှုန်းများသည် လက်ရှိကာလပေါက်ဈေးနှင့် ကိုက်ညီစေ ရန်။ - လျော်ကြေးနှုန်းထားများသတ်မှတ်သည့် အခါ မြေအသုံးပြုခြင်းကြောင့် ဆုံးရှုံး သွားသော သီးနှံ သို့မဟုတ် အခြားသော ဝင်ငွေရလုပ်ငန်းများ ထိခိုက်မှု ပမာဏ တန်ဖိုးများအား ထည့်သွင်းစဉ်းစားခြင်း။ 				
ဒေသခံပြည်သူများ ကျန်းမာရေး နှင့် ဘေးအန္တရာယ်ကင်းရှင်း ရေး (ကူးဆက်ရောဂါ	<ul style="list-style-type: none"> - ကူးဆက်ရောဂါများ တိုးပွား နိုင်ခြင်း။ - တည်ဆောက်ရေးယာဉ်များ ဖြတ်သန်းသွားလာမှု နှင့် 	<ul style="list-style-type: none"> - ပြဋ္ဌာန်းထားသော အလုပ်သမားဆိုင်ရာ ပြည်တွင်း၊ ပြည်ပ ဥပဒေများအား လိုက်နာ ဆောင်ရွက်ရန်။ အထူးသဖြင့် ကလေး လုပ်သားမရှိရေး၊ ဖိအားပေးစေခိုင်းခံရသော 	လူနေအိမ်များနှင့် နီးသော တည်ဆောက်ရေး လုပ်ငန်းခွင်	တည်ဆောက်ရေး ကာလ တစ်လျှောက်	NCEH	ပတ်ဝန်းကျင် ထိန်းသိမ်းရေးအ ရာရှိ (EO)

နှင့် မတော်တဆဖြစ်မှု)	အခြားသော လုပ်ငန်းများကြောင့် မတော်တဆမှုများ ဖြစ်ပေါ်နိုင်ခြင်း။	အလုပ်သမားမရှိရေး၊ ကောင်းမွန်သော လုပ်ငန်းခွင်အခြေအနေပန်တီးရေး၊ ခွဲခြားဆက်ဆံ မှုမရှိခြင်း၊ တန်းတူအခွင့်အရေးပေးရေး၊ အဆင်မပြေမှုများရှိပါက တိုင်ကြားနိုင်ရေးနှင့် ဖြေရှင်းပေးနိုင်သော ယန္တရားရှိခြင်း နှင့် လုပ်ငန်းခွင်ဘေးအန္တရာယ်ကင်းရှင်းစေရေးတို့အား အလေးထား ဆောင်ရွက်ရန်။ - ထိခိုက်လွယ်နေရာများဖြစ်သော စာသင်ကျောင်း၊ ဘုန်းကြီးကျောင်း နှင့် အသက်ကြီးနှင့် နာမကျန်းဖြစ်သူများ နေအိမ် အနီး လုပ်ငန်းဆောင်ရွက်လျှင် လုပ်ငန်းစဉ်အချိန်ဇယားကို ကြိုတင်အသိပေးပြီး ညှိနှိုင်းဆောင်ရွက် ရန်။ - လေအရည်အသွေး၊ ဆူညံသံ နှင့် တုန်ခါမှု ကဏ္ဍများတွင် ဖော်ပြခဲ့သော ထိခိုက်မှု လျော့ပါးသက်သာစေရေးနည်းလမ်းများအား ဆောင်ရွက်ရန်။				
သယ်ယူပို့ဆောင်ရေး	- လုပ်ငန်းခွင်ဧရိယာအနီး ယာဉ်မတော်မှုများကြောင့် လူနေအိမ်အဆောက်အဦများ ပျက်စီးနိုင်ခြင်း နှင့် ဒေသခံပြည်သူ များ ယာဉ်အန္တရာယ် ထိခိုက်နိုင်ခြင်း။	- ကျေးရွာလမ်းအသုံးပြုမှုအား လျော့ချရန်။ အသုံးပြုရန် လိုအပ်ပါက ကျေးရွာအုပ်ချုပ်ရေးအဖွဲ့အစည်းများနှင့် တိုင်ပင်ဆွေးနွေးပြီး ခွင့်ပြုချက်ရယူရန်။ - ယာဉ်ပိတ်ဆို့မှု ရှောင်ရှားနိုင်ရန် ပြောင်းလဲလွယ်သော သယ်ယူပို့ဆောင် ရေးအချိန်ဇယားအား ရေးဆွဲရန်။	တည်ဆောက်ရေးတွင် အသုံးပြုသော လမ်းများအားလုံး	တည်ဆောက်ရေး ကာလ တစ်လျှောက်	NCEH	ပတ်ဝန်းကျင် ထိန်းသိမ်းရေးအရာရှိ (EO)

		<ul style="list-style-type: none"> - လုပ်ငန်းခွင်အတွင်း ယာဉ်အန္တရာယ် သတိပေး ဆိုင်းဘုတ်များ တပ်ဆင်ရန်။ - ကားလမ်း နှင့် မြစ် ဖြတ်ကျော်ပို့ငှားများ၌ ကေဘယ်ကြိုးဆွဲခြင်းလုပ်ငန်းများ ဆောက်ရွက်ပါက ယာယီ အတားအဆီး များ ပြုလုပ်ပြီးမှ ဆောင်ရွက်ရန်။ 				
လုပ်ငန်းခွင် ဘေးအန္တရာယ် ကင်းရှင်းရေး	<ul style="list-style-type: none"> - တည်ဆောက်ရေးကာလအတွင်း မတော်တဆ ထိခိုက်ဒဏ်ရာ ရမှုများ ဖြစ်ပေါ်နိုင်ပါခြင်း။ - အမြင့်တက်အလုပ်လုပ်ရသော အချိန်များ၌ မတော်တဆ ထိခိုက် ဒဏ်ရာ ရမှုများ ဖြစ်ပေါ်နိုင်ခြင်း။ - အလုပ်သမားအချင်းချင်းကူးဆက် ရောဂါများ ပြန့်ပွားနိုင်ခြင်း။ - ယာယီအလုပ်သမားတန်းလျား ၌ သန့်ရှင်းမှုမရှိရှင် ရောဂါပြန့်ပွား မှုများ ဖြစ်ပေါ်နိုင်ခြင်း။ 	<ul style="list-style-type: none"> - လုပ်ငန်းမစတင်မီ လုပ်ငန်းခွင် ဘေးအန္တရာယ်ကင်းရှင်းရေး သင်တန်းများ ပို့ချရန်။ - အလုပ်သမားများအား သန့်ရှင်းသော သောက်သုံးရေ ထောက်ပံ့ရန်။ - အလုပ်သမားတန်းလျား၌ တစ်ကိုယ်ရည် သန့်ရှင်းရေး အစီအမံများ (ရေချိုးကန်၊ ယင်လုံအိမ်သာ) ထားရှိရန်။ - ရှေးဦးသူနာပြု သင်တန်းပို့ချရန် နှင့် ရှေးဦးသူနာပြု ပစ္စည်းများ ထားရှိရန်။ - အလုပ်သမားတန်းလျား၌ ခြင်္သေ့ပေါက်ဖွား အောင် စီမံရန်၊ ခြင်္သေ့အောင် နှင့် အခြားသောအသုံး အဆောင်များ ထောက်ပံ့ ရန်။ - လိုအပ်လျှင် လုပ်ငန်းခွင်၌ PPE (ဦးခေါင်းမျက်လုံး၊ နား၊ လက်၊ ခြေထောက် အစရှိသည်တို့ကို ကာကွယ်နိုင်သော) ပစ္စည်းများ ထောက်ပံ့ရန်။ - ကေဘယ်ကြိုးဆွဲခြင်းလုပ်ငန်းများ 	စီမံကိန်းတည်နေရာ တစ်လျှောက်	တည်ဆောက်ရေး ကာလ တစ်လျှောက်	NCEH	ပတ်ဝန်းကျင် ထိန်းသိမ်းရေးအ ရာရှိ (EO)

		ဆောင်ရွက်ခြင်းမပြုမီ အနီးဝန်းကျင်ရှိ ဓါတ်အားလိုင်းများအား ခေတ္တပိတ်ထား စေရန် ခွင့်ပြုချက် တောင်းခံရန်။				
လည်ပတ်ခြင်းကာလ						
လေအရည်အသွေး	<ul style="list-style-type: none"> - ရာသီဥတုစိုထိုင်းသောအချိန်တွင် ကိုရိုနာထုတ်လွှတ်မှုကြောင့် အိုဇုန်း နှင့် နိုက်ထရိုဂျင် အောက်ဆိုဒ် အနည်းငယ်ထွက်ရှိ နိုင်ခြင်း။ - အပင်များ ခုတ်ထွင်ရှင်းလင်း၍ လမ်းအကြောင်းထိန်းသိမ်းရေး ဆောက်ရွာရာမှ ထွက်ရှိလာသော အမှိုက်များကို မီးရှို့ရာတွင် လေထု ညစ်ညမ်းမှု ဖြစ်ပေါ်နိုင်ခြင်း။ 	<ul style="list-style-type: none"> - အပင်များခုတ်ထွင်ရှင်းလင်း၍ လမ်းအကြောင်းထိန်းသိမ်းရေး ဆောက်ရွက် ရာမှ ထွက်ရှိလာသော အမှိုက်များကို မီးရှို့ခြင်းမပြုရန်။ - ပြုပြင်ထိန်းသိမ်းရေး လုပ်ငန်းများ ဆောင်ရွက်ခြင်းမပြုမီ ယာဉ်နှင့် ယန္တရားများ အား စစ်ဆေးရန်။ - ကတ္တရာ၊ ကွန်ကရီ မခင်းထားသော လမ်းမများပေါ် သွားလာမည့်ယာဉ်များအား အမြန်နှုန်းကန့်သတ်ရန်။ - မလိုအပ်ဘဲ ယာဉ်နှင့် ယန္တရားများ အသုံးပြုခြင်းကို လျော့ချရန်။ - လေတိုက်ကြမ်းချိန်၌ ဖုန်ထသော လုပ်ငန်းများကို ရှောင်ကြည်ရန်။ 	စီမံကိန်းတည်နေရာ တစ်လျှောက်	လည်ပတ်ရေး ကာလ တစ်လျှောက်	NCEH	ပတ်ဝန်းကျင် ထိန်းသိမ်းရေးအ ရာရှိ (EO)
ဆူညံသံနှင့်တုန်ခါမှု	<ul style="list-style-type: none"> - ပြုပြင်ထိန်းသိမ်းရေးလုပ်ငန်းများ နှင့် ကော်ရိုနာထုတ်လွှတ်မှု ကြောင့် ဆူညံသံ အနည်းငယ် ထွက်ပေါ်နိုင် ခြင်း။ - ဓါတ်အားလိုင်းလုပ်ငန်း လည်ပတ် ချိန်တုန်ခါမှု မဖြစ်ပေါ်နိုင်ပါ။ 	<ul style="list-style-type: none"> - ကော်ရိုနာထုတ်လွှတ်မှုနည်းသော Conductors နှင့် ဆက်စပ်ပစ္စည်းများ အသုံးပြုရန်။ 	စီမံကိန်းတည်နေရာ တစ်လျှောက်	လည်ပတ်ရေး ကာလ တစ်လျှောက်	NCEH	ပတ်ဝန်းကျင် ထိန်းသိမ်းရေးအ ရာရှိ (EO)

ဇီဝမျိုးစုံမျိုးကွဲ (အပင် နှင့် တိရစ္ဆာန်)	<ul style="list-style-type: none"> - ဓါတ်အားလှိုင်း လမ်းအကြောင်း ပုံမှန်ရှင်းလင်းမှုများကြောင့် သစ်တောနှင့် သစ်ပင်များ ကြီးထွားမှု အဟန့်အတား ဖြစ်စေနိုင်ခြင်း။ - ရှိရင်းစွဲ တောတွင်းတိရစ္ဆာန်များ လျှပ်စစ် အန္တရာယ် ကျရောက်နိုင်ခြင်း။ - ပြုပြင်ထိန်းသိမ်းရေး လုပ်ငန်းကြောင့် ရှိရင်းစွဲ တောတွင်း တိရစ္ဆာန်များအပေါ် ဆူညံသံ သက်ရောက်နိုင်ခြင်း။ 	<ul style="list-style-type: none"> - အပင်များအား ကေဘယ်ကြိုးမြေပြင် အကွာဝေး သတ်မှတ်ချက်အတိုင်းသာ ခုတ်ထစ်ရန်။ - ချန်ထား၍ရသော မြေပြင်နှင့် ကပ်လျက်ပေါက်နေသော အပင်များ နှင့် ကေဘယ်ကြိုးမြေပြင် အကွာဝေး သတ်မှတ် ချက်အောက်ရှိနေသော အပင်များအား ချန်ထားရန်။ - သင့်လျော်သော နေရာများ၌ အပင်းများ အစားထိုးပြန်စိုက်ရန်။ - သစ်တောထွက်ပစ္စည်းများ ထုတ်ယူခြင်း အားတားမြစ်ရန် နှင့် သစ်ပင်များ စနစ်တကျ ခုတ်လှဲခြင်း ဆောင်ရွက်ပြီး သဘာဝ သစ်တောများ၏ အရေးပါပုံကို အလုပ်သမား များ သိရှိစေရန်။ - အမဲလိုက်ခြင်းအား တားဆီးရန်။ - လျှပ်စစ်ဘေးအန္တရာယ်ကင်းရှင်း စေရန် ဓါတ်အားလှိုင်းအား သေချာစွာ ဒီဇိုင်းပြု လုပ်ရန်။ DPTSC မှ ထုတ်ပြန်ထားသော လမ်းညွှန်ချက်များအား လိုက်နာရန်။ 	ဓါတ်လားလှိုင်း လမ်းအကြောင်း ပြုပြင် ထိန်းသိမ်းသည့်နေရာ များ	လည်ပတ်ရေး ကာလ တစ်လျှောက်	NCEH	ပတ်ဝန်းကျင် ထိန်းသိမ်းရေးအ ရာရှိ (EO)
လူမှုစီးပွားရေးနှင့် အသက်မွေးဝမ်းကြောင်း	ဓါတ်အားလှိုင်း လမ်းအကြောင်း ပြုပြင်ထိန်းသိမ်းရေး လုပ်ငန်းများ ဆောင်ရွက်စဉ် ဒေသခံများ အလုပ်အကိုင် ရရှိနိုင်ခြင်း။	<ul style="list-style-type: none"> - အလုပ်သမားလိုအပ်လျှင် ဒေသခံများအား ဦးစားပေးရန်။ - ပြုပြင်ထိန်းသိမ်းရေး လုပ်ငန်းများ ဆောင်ရွက်ခြင်းမပြုမီ လုပ်ငန်းခွင် ဘေးအန္တရာယ် ကင်းရှင်းရေး ဆိုင်ရာ 	ဓါတ်လားလှိုင်း လမ်းအကြောင်း ပြုပြင် ထိန်းသိမ်းသည့်နေရာ များ	လည်ပတ်ရေး ကာလ တစ်လျှောက်	NCEH	ပတ်ဝန်းကျင် ထိန်းသိမ်းရေးအ ရာရှိ (EO)

		ဟောပြောပို့ချမှုများ ဆောက်ရွက်ရန်။				
ဒေသခံများ ကျန်းမာရေး နှင့် ဘေးအန္တရာယ် ကင်းရှင်းရေး	ဒေသခံပြည်သူများ အနေဖြင့် လျှပ်စစ်ဘေးအန္တရာယ်ဆိုင်ရာ စိုးရိမ်ပူပန်မှုများ ရှိနိုင်ခြင်း။	<ul style="list-style-type: none"> - ဒေသခံများ လျှပ်စစ်ဘေးအန္တရာယ် ကင်းရှင်းစေရေး တတ်နိုင်သမျှ ဆောင်ရွက် ရန်။ - လျှပ်စစ်ဘေးအန္တရာယ် ကင်းရှင်းရေး ဆိုင်ရာ အသိပညာပေး စာရွက်များ ဝေမျှရန်။ - ဓါတ်အားလိုင်းဖြတ်သန်းခြင်းခံရသော မြေပိုင်ရှင်များအား လျှပ်စစ်ဘေး အန္တရာယ် ကင်းရှင်းစေရေးဆိုင်ရာ အသိပညာပေးခြင်း နှင့် အရေးပေါ်တုံ့ပြန်မှုဆိုင်ရာ လမ်းညွှန် ချက်များ ပို့ချရန်။ - စီမံကိန်းဖော်ဆောင်သူနှင့် MOEE တို့မှ လုပ်ငန်းခွင်ဆောင်ရွက်နေသော အလုပ်သမားများ နှင့် ဒေသခံပြည်သူများ ၏ လျှပ်စစ်ဘေးအန္တရာယ်ကင်းရှင်းရေးကို အလေးထားဆောင်ရွက်နေကြောင်း ပြသရန်။ - ဗို့အားမြင့် လျှပ်စစ်အန္တရာယ် ရှိနိုင်သော နေရာများ၌ သတိပေးဆိုင်းဘုတ် နှင့် အတားအဆီး များ တပ်ဆင်ရန်။ - တာဝါတိုင်အနီးတွင် Grounding conducting objects များ တပ်ဆက်ရန်။ - ကျေးရွာအနီး ဆောင်ရွက်နေသော စီမံကိန်းတည်နေရာများတွင် ဒေသခံပြည်သူ 	စီမံကိန်းတည်နေရာ တစ်လျှောက်	လည်ပတ်ရေး ကာလ တစ်လျှောက်	NCEH	ပတ်ဝန်းကျင် ထိန်းသိမ်းရေးအ ရာရှိ (EO)

		များ ဘေးအန္တရာယ်ကင်းရှင်းရေး လုပ်ငန်း စဉ်များအားအလေးထား ဆောင်ရွက်ရန်။				
လုပ်ငန်းခွင် ဘေးအန္တရာယ် ကင်းရှင်းရေး	ဓါတ်အားလိုင်း ပြုပြင်ထိန်းသိမ်းရေး ဆောင်ရွက်ရာတွင် လျှပ်စစ် အန္တရာယ် နှင့် လုပ်ငန်းခွင် ဘေးအန္တရာယ်များ ကျရောက်နိုင်ခြင်း။	<ul style="list-style-type: none"> - လုပ်ငန်းခွင်ဆိုင်ရာ ဘေးအန္တရာယ် ကင်းရှင်းရေး နည်းလမ်းများအား လိုက်နာ ရန်။ - လိုအပ်လျှင် PPE (ဦးခေါင်း၊ မျက်စိ၊ နား၊ လက် နှင့် ခြေထောက် စသည်တို့ကို ကာကွယ်နိုင်သော) ထောက်ပံ့ရန်။ - ဓါတ်အားလိုင်းပြုပြင်ထိန်းသိမ်းရေး လုပ်ငန်းများဆောင်ရွက်ခြင်းမပြုမီ မီးဖျက် ထားရန်။ လိုအပ်သော အကာအကွယ် ပစ္စည်းများ (PPE) အသုံးပြုရန်။ မတော်တဆမှုများ ဖြစ်ပေါ်လာလျှင် အရေးပေါ်တုံ့ပြန်ခြင်းနည်းလမ်းများ ချမှတ်ထားရန်။ - ပြုပြင်ထိန်းသိမ်းရေးမဆောင်ရွက်မီ လုပ်ငန်းခွင် ဘေးအန္တရာယ် ကင်းရှင်းရေး သင်တန်းများ ပို့ချရန်။ - အတွေ့အကြုံရှိ၊ ကျွမ်းကျင် သော အလုပ်သမားများသာ ဓါတ်အားလိုင်း ပြုပြင်ထိန်းသိမ်းရေး လုပ်ငန်းများ ဆောင်ရွက်ရန်။ - တာဝါတိုင်အမြင့်တက်ရာတွင် မတော်တဆ ပြုတ်ကျခြင်းမရှိအောင် 	စီမံကိန်းတည်နေရာ တစ်လျှောက်	လည်ပတ်ရေး ကာလ တစ်လျှောက်	NCEH	ပတ်ဝန်းကျင် ထိန်းသိမ်းရေးအ ရာရှိ (EO)

		ကျွမ်းကျင်သူများသာ ပြုလုပ်စေရန်နှင့် Safety ကိရိယာ များ အသုံးပြုရန်။				
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၉.၂။ ပတ်ဝန်းကျင်စောင့်ကြပ်ကြည့်ရှုရေးအစီအစဉ်

အောင်မြင်သော ပတ်ဝန်းကျင်စောင့်ကြပ်ကြည့်ရှုရေးအစီအစဉ်ဆိုသည်မှာ အကောင်အထည်ဖော်ဆောင်ရွက်လျက်ရှိနေသော လျော့ပါးသက်သာစေရေးနည်းလမ်းများကို ပုံမှန် စောင့်ကြပ်ကြည့်ရှုခြင်း၊ မှတ်တမ်းတင်ခြင်း နှင့် အစီရင်ခံစာတင်သွင်းခြင်း စသည့်တို့အပေါ်မူတည်ပါသည်။ ခန့်အပ်ထားသော ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးအရာရှိ (Environmental Officer) သည် စောင့်ကြပ်ကြည့်ရှုရေးအစီအစဉ် အောင်မြင်စေရန် အထက်ဖော်ပြပါ လုပ်ငန်းများကို ဆောင်ရွက်ရမည်ဖြစ်ပါသည်။ ထို့အပြင် Environmental Compliance Certificate (ECC) သက်တမ်းတိုးရန်အတွက် နှစ်စဉ်စောင့်ကြပ်ကြည့်ရှုခြင်းအစီရင်ခံစာအား ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနသို့ တင်သွင်းရာတွင် သတ်မှတ်အချိန်ကာလအလိုက် မှတ်တမ်းတင်ထားသော အချက်အလက်များကိုပါ ထည့်သွင်းဖော်ပြရန် လိုအပ်ပါသည်။

ပတ်ဝန်းကျင်စောင့်ကြပ်ကြည့်ရှုရေးအစီအစဉ်သည် ပတ်ဝန်းကျင်ထိခိုက်မှုနှင့် လျော့ပါးသက်သာစေရေး နည်းလမ်းများကို အခြေခံ၍ ရေးဆွဲထားပြီး ဇယား (၂၄) တွင် ဖော်ပြထားပါသည်။

ဇယား ၂၈။ ပတ်ဝန်းကျင်စောင့်ကြပ်ကြည့်ရှုရေးအစီအစဉ်

စောင့်ကြပ်ကြည့်ရှုရမည့် အမျိုးအစား	စောင့်ကြပ်ကြည့်ရှုရမည့် နေရာ	စောင့်ကြပ်ကြည့်ရှုရမည့် နည်းလမ်း	စောင့်ကြပ်ကြည့်ရှုရမည့် အကြိမ်ရေ	တာဝန်ရှိပုဂ္ဂိုလ်/ အဖွဲ့အစည်း		ခန့်မှန်း ကုန်ကျစရိတ် (USD)
				ကွပ်ကဲရန်	အကောင်အထည် ဖော်ရန်	
အကြိုတည်ဆောက်ရေးကာလ						
အထွေထွေ	- စီမံကိန်းတည်နေရာအားလုံး	- လိုအပ်လျှင် EMP အခန်းတွင်ဖော်ပြထားသော ပတ်ဝန်းကျင်ထိခိုက်မှု လျော့ပါးသက်သာစေရေး နည်းလမ်းများအား ပြင်ဆင်မှုပြုလုပ်ရန်။	တစ်ကြိမ်	စီမံကိန်း စီမံခန့်ခွဲမှု ယူနစ် (PMU)	ပတ်ဝန်းကျင် ထိန်းသိမ်းရေး အရာရှိ (EO)	ကုန်ကျစရိတ် အတိအကျ မရှိပါ။
ခွဲရုံ နှင့် ဓါတ်အားလိုင်း လမ်းအူကြောင်းတစ်လျှောက် ဒေသပိုင်/ပုဂ္ဂလိကပိုင် ပစ္စည်းများ နှင့် ထိခိုက်လွယ်	- စီမံကိန်းတည်နေရာအားလုံး - ဓါတ်အားလိုင်း လမ်းအူကြောင်းတစ်လျှောက်	- အသေးစိတ် ကွင်းဆင်းလေ့လာမှုများ ဆောင်ရွက်ပြီး ဒေသခံများနှင့် ညှိနှိုင်းဆွေးနွေး ရန်။	တစ်ကြိမ်	စီမံကိန်း စီမံခန့်ခွဲမှု ယူနစ် (PMU)	ပတ်ဝန်းကျင် ထိန်းသိမ်းရေး အရာရှိ (EO)	ကုန်ကျစရိတ် အတိအကျ မရှိပါ။

(ယဉ်ကျေးမှုဆိုင်ရာ အဆောက်အအုံ နှင့် တန်ဖိုးများ၊ စာသင်ကျောင်း၊ ဘုန်းကြီးကျောင်း နှင့် ဆေးရုံ)						
တည်ဆောက်ရေးကာလ						
လေအရည်အသွေး (ဖုန်နှင့် အမှုန်)	- ကွန်ကရစ်၊ ကတ္တရာ ခင်းထားခြင်း မရှိသော (ဖုန်ထ နိုင်သော) လမ်းများ။ - မြေတူးခြင်း၊ မြေဖို့ခြင်း၊ မြေညှိခြင်း လုပ်ငန်းဆောင်ရွက် သော နေရာများ။	- ဖုန်ထလျှင် ရေဖျန်းခြင်း၊ ယာဉ်များ အရှန်လျော့ မောင်းခြင်း ရှိ/ မရှိ စောင့်ကြည့်ရန်။	အပတ်စဉ်	ပတ်ဝန်းကျင် ထိန်းသိမ်းရေး အရာရှိ (EO)	NCEH	ကုန်ကျစရိတ် သည် ပတ်ဝန်း ကျင်ဆန်းစစ် လေ့လာရေးအဖွဲ့ နှင့် ချုပ်ဆိုထား သော စာချုပ် တွင်ပါဝင်ပြီး။
လေအရည်အသွေး (နိုက်ထရိုဂျင်ဒိုင်အောက်ဆိုဒ်၊ PM10 နှင့် PM2.5 ဆာလဖာဒိုင်အောက်ဆိုဒ်၊ စိုထိုင်းစ၊ အပူချိန်၊ လေတိုက်နှုန်း နှင့် လေတိုက်ရာ အရပ်)	IEE အစီရင်ခံစာပါ အခန်း ၉၊ ဇယား ၉.၃-၃ နှင့် ပုံ ၉.၃-၁ ကို ကိုးကားရန်။	သယံဇာတနှင့်ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ဦးစီးဌာနမှ အသိအမှတ်ပြုသော တိုင်းတာရေး ကိရိယာများဖြင့် တိုင်းတာရန်။	နှစ်စဉ်	ပတ်ဝန်းကျင် ထိန်းသိမ်းရေး အရာရှိ (EO) / စီမံကိန်း စီမံခန့်ခွဲမှု ယူနစ် (PMU)	ပတ်ဝန်းကျင် ဆန်းစစ် လေ့လာရေးအဖွဲ့	၃,၅၀၀.၀၀
ဆူညံသံ	ဇယား ၉.၃-၄ နှင့် ပုံ ၉.၃-၁ ကို ကိုးကားရန်။	သယံဇာတနှင့်ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ဦးစီးဌာနမှ အသိအမှတ်ပြုသော တိုင်းတာရေး ကိရိယာများဖြင့် တိုင်းတာရန်။	နှစ်စဉ်	ပတ်ဝန်းကျင် ထိန်းသိမ်းရေး အရာရှိ (EO)/ စီမံကိန်း စီမံခန့်ခွဲမှု ယူနစ် (PMU)	ပတ်ဝန်းကျင် ဆန်းစစ် လေ့လာရေးအဖွဲ့	၁,၆၀၀.၀၀
ရေအရည်အသွေး Biochemical oxygen	ဇယား ၉.၃-၅ နှင့် ပုံ ၉.၃-၁ ကို ကိုးကားရန်။	သယံဇာတနှင့်ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ဦးစီးဌာနမှ အသိအမှတ်ပြုသော တိုင်းတာရေး ကိရိယာများ နှင့် ဓါတ်ခွဲခန်းတို့တွင် တိုင်းတာရန်။	နှစ်စဉ်	ပတ်ဝန်းကျင် ထိန်းသိမ်းရေး အရာရှိ (EO)/	ပတ်ဝန်းကျင် ဆန်းစစ် လေ့လာရေးအဖွဲ့	၃,၀၀၀.၀၀

demand (BOD), Chemical oxygen demand (COD), Oil and grease, pH, Temperature, Total coliform bacteria, Total nitrogen, Total phosphorus, Total Suspended solid (TSS)				စီမံကိန်း စီမံခန့်ခွဲမှု ယူနစ် (PMU)		
အမှိုက်စွန့်ပစ်မှု	- စီမံကိန်းတည်နေရာအားလုံး - ယာယီအလုပ်သမား တန်းလျား	- ထွက်ရှိသော အမှိုက်အမျိုးအစားနှင့် ထွက်ရှိသော ပမာဏ အား မှတ်သားရန်။ - အမှိုက်ပုံးများထားပေးခြင်း ရှိ/ မရှိ နှင့် အမှိုက်စနစ်တကျ စွန့်ပစ်ခြင်း ရှိ/မရှိ စောင့်ကြည့်ရန်။	အပတ်စဉ်	ပတ်ဝန်းကျင် ထိန်းသိမ်းရေး အရာရှိ (EO)/ စီမံကိန်း စီမံခန့်ခွဲမှု ယူနစ် (PMU)	NCEH	ကုန်ကျစရိတ် သည် ပတ်ဝန်း ကျင်ဆန်းစစ် လေ့လာရေးအဖွဲ့ နှင့် ချုပ်ဆို ထားသော စာချုပ်တွင် ပါဝင်ပြီး။
ရေအသုံးပြုခြင်း နှင့် ရေအရည် အသွေး	- မြစ်၊ ချောင်း များနှင့် နီးသော တည်ဆောက်ရေး လုပ်ငန်းခွင်များ။ - ယာယီအလုပ်သမား တန်းလျား	- ရေယူသည့် အရင်းအမြစ် နှင့် လစဉ် ရေအသုံးပြုမှု အား မှတ်တမ်းတင်ရန်။ - လုပ်ငန်းခွင်မှ မြစ်၊ ချောင်းများအတွင်းသို့ ရေစီးဝင်နိုင်သောနေရာများအား စောင့်ကြည့်ရန်။ - ရေအရည်အသွေးတိုင်းတာသောစက်များဖြင့် တိုင်းတာရန်၊ လိုအပ်ပါက ရေနမူနာ ယူပြီး ခါတ်ခွဲခန်းတွင် စမ်းသပ်ရန်။ - မြစ်၊ ချောင်းများ အနီး သဲပုံခြင်း၊ မြေစာပုံခြင်းများ ရှိ/ မရှိ စောင့်ကြည့်ရန် နှင့် မဖြစ်မနေ ပုံရန်လိုအပ်ပါက အတားအဆီးများ ပြုလုပ်ထားခြင်း ရှိ/ မရှိ စောင့်ကြည့်ရန်။	နှစ်စဉ်	ပတ်ဝန်းကျင် ထိန်းသိမ်းရေး အရာရှိ (EO)/ စီမံကိန်း စီမံခန့်ခွဲမှု ယူနစ် (PMU)	NCEH	ကုန်ကျစရိတ် သည် ပတ်ဝန်းကျင် ဆန်းစစ် လေ့လာရေးအဖွဲ့ နှင့် ချုပ်ဆို ထားသော စာချုပ် တွင်ပါဝင်ပြီး။
မြေတိုက်စားခြင်း နှင့်	- မြစ်၊ ချောင်း များနှင့် နီးသော	- ထိခိုက်မှုလျော့ပါးသက်သာစေရေး	နှစ်စဉ်	ပတ်ဝန်းကျင်	NCEH	ကုန်ကျစရိတ်

မြေအရည်အသွေး	တည်ဆောက်ရေး လုပ်ငန်းခွင် နေရာများ။ - တည်ဆောက်ရေးလုပ်ငန်း များကြောင့် မြေဆီလွှာ ညစ်ညမ်းမှု ဖြစ်ပေါ်နိုင်သော နေရာများ။	နည်းလမ်းများ အသုံးပြုခြင်း ရှိ/ မရှိ စောင့်ကြည့်ရန်။		ထိန်းသိမ်းရေး အရာရှိ (EO)/ စီမံကိန်း စီမံခန့်ခွဲမှု ယူနစ် (PMU)		သည် ပတ်ဝန်းကျင် ဆန်းစစ် လေ့လာရေးအဖွဲ့ နှင့် ချုပ်ဆို ထားသော စာချုပ်တွင် ပါဝင်ပြီး။
ဇီဝမျိုးစုံမျိုးကွဲ (အပင် နှင့် တိရစ္ဆာန်)	- သစ်တောကြိုးဝိုင်းအတွင်း ဓါတ်အားလှိုင်း ဖြတ်သန်း သွားသော နေရာများ။ - အပင်များခုတ်လှဲရန် လိုအပ် သော နေရာများ။ - တောတွင်း တိရစ္ဆာန်များ ဖြတ်သန်းသွားရာ နေရာများ။	- သတ်မှတ်ထားသော အပင်များသာ ခုတ်လှဲ ခြင်း ရှိ/ မရှိ စောင့်ကြည့်ရန်။ - အလုပ်သမားများ တရားမဝင် အမဲလိုက်ခြင်း ရှိ/ မရှိ စောင့်ကြည့်ရန်။	နှစ်စဉ်	ပတ်ဝန်းကျင် ထိန်းသိမ်းရေး အရာရှိ (EO)/ စီမံကိန်း စီမံခန့်ခွဲမှု ယူနစ် (PMU)	ပတ်ဝန်းကျင် ဆန်းစစ် လေ့လာရေးအဖွဲ့	၂,၅၀၀.၀၀
ဒေသခံများ ကျန်းမာရေး နှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေး	- ဓါတ်အားလှိုင်း လမ်းအူ ကြောင်းတစ်လျှောက် - စီမံကိန်းတည်နေရာအားလုံး	- ကူးဆက်ရောဂါများ ပြန့်ပွားခြင်း၊ လျှပ်စစ် နှင့် မတော်တဆ ထိခိုက်မှုများ ရှိ/ မရှိ မှတ်တမ်းတင်ရန်။ - ပြဌာန်းထားသော ဥပဒေများအား အလုပ်သမားများ လိုက်နာခြင်း ရှိ/ မရှိ စောင့်ကြည့်ရန်။	- NCEH မှ လစဉ် ဆောင်ရွက်ရန်။ - ပတ်ဝန်းကျင် ထိန်းသိမ်းရေးအရာရှိ (EO) မှ နှစ်စဉ် ဆောင်ရွက်ရန်။	ပတ်ဝန်းကျင် ထိန်းသိမ်းရေး အရာရှိ (EO)/ စီမံကိန်း စီမံခန့်ခွဲမှု ယူနစ် (PMU)	NCEH	ကုန်ကျစရိတ် သည် ပတ်ဝန်းကျင် ဆန်းစစ် လေ့လာရေးအဖွဲ့ နှင့် ချုပ်ဆို ထားသော စာချုပ်တွင် ပါဝင်ပြီး။
ယာဉ် နှင့် သယ်ယူပို့ဆောင်ရေး	- စီမံကိန်းတည်နေရာအားလုံး	- ယာဉ်မောင်းများ အမြန်နှုန်းကန့်သန့်ချက်၊ ယာဉ်စည်းကမ်း၊ လမ်းစည်းကမ်းများအား လိုက်နာခြင်း ရှိ/ မရှိ စောင့်ကြည့်ရန်။	- ကန်ထရိုက်တာ မှ လစဉ်ဆောင်ရွက်ရန်။ - ပတ်ဝန်းကျင် ထိန်းသိမ်းရေး အရာရှိ	ပတ်ဝန်းကျင် ထိန်းသိမ်းရေး အရာရှိ (EO)/ စီမံကိန်း	NCEH	ကုန်ကျစရိတ် သည် ပတ်ဝန်းကျင် ဆန်းစစ်

			(EO) မှ နှစ်စဉ် ဆောက်ရွက်ရန်။	စီမံခန့်ခွဲမှု ယူနစ် (PMU)		လေ့လာရေးအဖွဲ့ နှင့် ချုပ်ဆို ထားသော စာချုပ်တွင် ပါဝင်ပြီး။
လုပ်ငန်းခွင် ဘေးအန္တရာယ် ကင်းရှင်းရေး (မတော်တဆ ထိခိုက်မှု နှင့် ဒဏ်ရာရမှု)	- စီမံကိန်းတည်နေရာအားလုံး	- တစ်ကိုယ်ရည်ကာကွယ်ရေးပစ္စည်းများ (PPE) နှင့် ရှေးဦးသူနာပြုပစ္စည်းများ လုံလောက်စွာ ထောက်ပံ့ထားခြင်း ရှိ/ မရှိ စောင့်ကြည့်ရန်။ - အလုပ်သမားများ PPE ဝတ်/ မဝတ်၊ အမြင့်တက်ကာကွယ်ရေးကြိုးများ အသုံးပြုခြင်း ရှိ/ မရှိ နှင့် လုပ်ငန်းခွင် ဘေးအန္တရာယ် ပြဋ္ဌာန်းချက်များ လိုက်နာခြင်း ရှိ/ မရှိ စောင့်ကြည့်ရန်။	ကန်ထရိုက်တာ မှ လစဉ်ဆောင်ရွက်ရန်။ ပတ်ဝန်းကျင် ထိန်းသိမ်းရေး အရာရှိ (EO) မှ နှစ်စဉ် ဆောင်ရွက်ရန်။	ပတ်ဝန်းကျင် ထိန်းသိမ်းရေး အရာရှိ (EO)/ စီမံကိန်း စီမံခန့်ခွဲမှု ယူနစ် (PMU)	NCEH	ကုန်ကျစရိတ် သည် ပတ်ဝန်းကျင် ဆန်းစစ် လေ့လာရေးအဖွဲ့ နှင့် ချုပ်ဆို ထားသော စာချုပ်တွင် ပါဝင်ပြီး။
Operation						
အမှိုက်စွန့်ပစ်မှု	ဓါတ်အားလိုင်းလမ်းအကြောင်း ပုံမှန် ပြုပြင်ရေးလုပ်ငန်းများ ဆောင်ရွက်သည့်နေရာ။	- ဓါတ်အားလိုင်းလမ်းအကြောင်း ပြုပြင် ထိန်းသိမ်းရေးလုပ်ငန်းများ ဆောင်ရွက်ရာတွင် အမှိုက်များ စနစ်တကျ စွန့်ပစ်ခြင်း ရှိ/ မရှိ စောင့်ကြည့်ရန်။	ပြုပြင်ထိန်းသိမ်းရေး လုပ်ငန်းများ ဆောင်ရွက်စဉ်။	NCEH	ပတ်ဝန်းကျင် ထိန်းသိမ်းရေး အရာရှိ (EO)	ကုန်ကျစရိတ် သည် ပတ်ဝန်းကျင် ဆန်းစစ် လေ့လာရေးအဖွဲ့ နှင့် ချုပ်ဆို ထားသော စာချုပ်တွင် ပါဝင်ပြီး။
ဇီဝမျိုးစုံမျိုးကွဲ (အပင် နှင့် တိရစ္ဆာန်)	- အပင်များ ခုတ်ထွင် ရှင်းလင်းခြင်း ဆောင်ရွက်မည့် နေရာ။	- သတ်မှတ်ထားသော နေရာအတွင်း၌သာ အပင်များ ခုတ်ခြင်း၊ ကိုင်းချိုင်း ခြင်း ရှိ/ မရှိ စောင့်ကြည့်ရန်။	နှစ်စဉ်	ပတ်ဝန်းကျင် ထိန်းသိမ်းရေး အရာရှိ (EO)/ စီမံကိန်း	ပတ်ဝန်းကျင် ဆန်းစစ် လေ့လာရေးအဖွဲ့	၂,၅၀၀.၀၀

				စီမံခန့်ခွဲမှု ယူနစ် (PMU)		
ဒေသခံများ ကျန်းမာရေး နှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေး	<ul style="list-style-type: none"> - ဓါတ်အားလိုင်း လမ်းအကြောင်းတစ်လျှောက်။ - ကျေးရွာလမ်း၊ လူနေအိမ်များနှင့် လယ်မြေများ အပေါ် ဓါတ်အားလိုင်းဖြတ်သန်းသွားမည့်နေရာများ။ 	<ul style="list-style-type: none"> - လျှပ်စစ်အန္တရာယ်ဖြစ်ပေါ်နိုင်သော နေရာများတွင် သတိပေးဆိုင်းဘုတ်၊ အတားအဆီးများ တပ်ဆင်ထားခြင်း၊ လျှပ်စစ် အန္တရာယ်ကင်းရှင်းရေး အစီအမံများ စောင်ရွက်ထားခြင်း ရှိ/ မရှိ စောင့်ကြည့်ရန်။ 	နှစ်စဉ်	ပတ်ဝန်းကျင် ထိန်းသိမ်းရေး အရာရှိ (EO)/ စီမံကိန်း စီမံခန့်ခွဲမှု ယူနစ် (PMU)	ပတ်ဝန်းကျင် ဆန်းစစ် လေ့လာရေးအဖွဲ့	၁,၀၀၀.၀၀
လုပ်ငန်းခွင် ဘေးအန္တရာယ် ကင်းရှင်းရေး	<ul style="list-style-type: none"> - ဓါတ်အားလိုင်း လမ်းအကြောင်းတစ်လျှောက်။ - ပြုပြင်ထိန်းသိမ်းရေးလုပ်ငန်းများ ဆောင်ရွက်ရန် လိုအပ်မည့်နေရာများ။ 	<ul style="list-style-type: none"> - အလုပ်သမားများ PPE ဝတ်/ မဝတ်၊ အမြင့်တက်ကာကွယ်ရေးကြိုးများ အသုံးပြုခြင်း ရှိ/ မရှိ နှင့် လုပ်ငန်းခွင် ဘေးအန္တရာယ် ပြဌာန်းချက်များ လိုက်နာခြင်း ရှိ/ မရှိ စောင့်ကြည့်ရန်။ 	နှစ်စဉ်	ပတ်ဝန်းကျင် ထိန်းသိမ်းရေး အရာရှိ (EO)/ စီမံကိန်း စီမံခန့်ခွဲမှု ယူနစ် (PMU)	ပတ်ဝန်းကျင် ဆန်းစစ် လေ့လာရေးအဖွဲ့	၁,၀၀၀.၀၀
လျှပ်စစ်သံလိုက်စက်ကွင်း	ဓါတ်အားလိုင်းနှင့် ၅ မီတာ အကွာဝေးအတွင်းရှိသော နေရာများ။	လျှပ်စစ်သံလိုက်စက်ကွင်းနှုန်းထားအား တိုင်းတာရန်	နှစ်နှစ် တစ်ကြိမ်	ပတ်ဝန်းကျင် ထိန်းသိမ်းရေး အရာရှိ (EO)/ စီမံကိန်း စီမံခန့်ခွဲမှု ယူနစ် (PMU)	ပတ်ဝန်းကျင် ဆန်းစစ် လေ့လာရေးအဖွဲ့	၁,၂၀၀.၀၀

ဇယား ၂၉။ လေအရည်အသွေးတိုင်းတာရမည့်နေရာများ

လေအရည်အသွေး တိုင်းတာခြင်း အမှတ်စဉ်	တည်နေရာ	အကြောင်းအရာဖော်ပြချက်
AQ-၁	လတ္တီတွဒ် - ၂၂°၄၅'၂၆.၂၉" လောင်ဂျီတွဒ် - ၉၇°၁၇'၄၁.၀၅"	နမူတူ ရေအားလျှပ်စစ်စီမံကိန်းဧရိယာ၊ ချောင်းဆားကျေးရွာအနီး၊ နမူတူမြို့နယ်။
AQ-၂	လတ္တီတွဒ် - ၂၂°၄၀'၅၁.၇၉" လောင်ဂျီတွဒ် - ၉၇°၁၉'၅၇.၉၇"	ပန်းနေကျေးရွာ၊ သီပေါမြို့နယ်။
AQ-၃	လတ္တီတွဒ် - ၂၂°၁၄'၄၈.၉၃" လောင်ဂျီတွဒ် - ၉၇° ၅'၅၁.၆၆"	အထက်ရဲရွာ ရေအားလျှပ်စစ်စီမံကိန်း။

ဇယား ၃၀။ ဆူညံသံတိုင်းတာရမည့်နေရာများ

ဆူညံသံလေ့လာခြင်း အမှတ်စဉ်	တည်နေရာ	အကြောင်းအရာဖော်ပြချက်
N-1	လတ္တီတွဒ် - ၂၂°၄၅'၂၆.၂၉" လောင်ဂျီတွဒ် - ၉၇°၁၇'၄၁.၀၅"	နမူတူ ရေအားလျှပ်စစ်စီမံကိန်းဧရိယာ၊ ချောင်းဆားကျေးရွာအနီး၊ နမူတူမြို့နယ်။
N-2	လတ္တီတွဒ် - ၂၂°၄၀'၅၁.၇၉" လောင်ဂျီတွဒ် - ၉၇°၁၉'၅၇.၉၇"	ပန်းနေကျေးရွာ၊ သီပေါမြို့နယ်။
N-3	လတ္တီတွဒ် - ၂၂°၄၀'၃၆.၉၉" လောင်ဂျီတွဒ် - ၉၇°၁၉'၁၉.၉၅"	နောင်တကျားကျေးရွာ၊ သီပေါမြို့နယ်။
N-4	လတ္တီတွဒ် - ၂၂°၁၄'၄၈.၉၃" လောင်ဂျီတွဒ် - ၉၇° ၅'၅၁.၆၆"	အထက်ရဲရွာ ရေအားလျှပ်စစ်စီမံကိန်း။
N-5	လတ္တီတွဒ် - ၂၂°၂၆'၄၅.၃၀" လောင်ဂျီတွဒ် - ၉၇° ၃'၃၇.၁၀"	ပန်လောကျေးရွာ၊ ကျောက်မဲမြို့နယ်။

ဇယား ၃၁။ ရေအရည်အသွေးတိုင်းတာရမည့်နေရာများ

အမျိုးအစား	ရေနမူနာအမှတ်စဉ်	တည်နေရာ	အကြောင်းအရာဖော်ပြချက်
မြေပေါ်ရေ	SW- 1	လတ္တီတွဒ် - ၂၂°၄၂'၃၇.၂၀" လောင်ဂျီတွဒ် - ၉၇°၁၉'၅၈.၇၃"	တာဝါတိုင်အမှတ် ၂၀ နှင့် ၂၁ကြား၊ မြစ်ငယ်မြစ်အနီး။
မြေပေါ်ရေ	SW -2	လတ္တီတွဒ် - ၂၂°၃၄'၆.၈၅" လောင်ဂျီတွဒ် - ၉၇°၁၂'၁၂.၂၂"	တာဝါတိုင်အမှတ် ၇၆ အနီး၊ လွယ်ကော်ကျေးရွာ၊ သီပေါမြို့နယ်။
မြေပေါ်ရေ	SW-3	လတ္တီတွဒ် - ၂၂°၁၄'၃၄.၃၈"N လောင်ဂျီတွဒ် ၉၇° ၅'၄၁.၄၇"E	ဒုဌသတိတံတားအောက်၊ Dam Site အနီး၊ အထက်ရဲရွာရေအားလျှပ်စစ်စီမံကိန်း။

၁၀။ နိဂုံးချုပ် နှင့် အကြံပြုချက်များ

အဆိုပြုစီမံကိန်းသည် ၂၁၀ မဂ္ဂါဝပ် လျှပ်စစ်ဓာတ်အားထွက်သော နမူတူ ရေအားလျှပ်စစ်ရုံမှ ဓာတ်အားသွယ်တန်းရန် ၂၃၀ ကေဗီဓာတ်အားလိုင်း နှင့် ဓာတ်အားခွဲရုံ တည်ဆောက်ခြင်း ပါဝင်ပါသည်။ ဓာတ်အားလိုင်းသည် နမူတူ ရေအားလျှပ်စစ်ရုံတွင် အစပြုမည်ဖြစ်ပြီး သီပေါ နှင့် ကျောက်မဲ မြို့နယ်တို့ကို ဖြတ်သန်းကာ တည်ဆောက်ရေးယူနစ် (၃)၊ အထက်ရဲရာရေအား လျှပ်စစ်စီမံကိန်းတွင် အဆုံးသတ်မည် ဖြစ်ပါသည်။

ဤ IEE အစီရင်ခံစာသည် အဆိုပြုစီမံကိန်းရေးဆွဲစဉ်ကာလအတွင်း ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန မှ ထုတ်ပြန်ထားသော လမ်းညွှန်ချက်၊ လုပ်ထုံးလုပ်နည်းများ နှင့် အညီ ပြုစုထားခြင်းဖြစ်ပါသည်။ ပတ်ဝန်းကျင်ဆိုင်ရာ ကွင်းဆင်းလေ့လာခြင်း (ရှုပပတ်ဝန်းကျင်၊ ဂေဟစနစ် နှင့် လူမှုဝန်းကျင်) လုပ်ငန်းများကို ဓာတ်အားလိုင်း လမ်းအကြောင်းတစ်လျှောက် ထိခိုက်မှုရှိနိုင်သောနေရာများတွင် ဆောင်ရွက်ထားပါသည်။ ဤ IEE အစီရင်ခံစာတွင် ပတ်ဝန်းကျင် နှင့် လူမှုဝန်းကျင်ထိခိုက်နိုင်မှုများ၊ ထိခိုက်မှုများကို လျော့ပါးသက်သာစေရေးနည်းလမ်းများ ပါဝင်ပြီး ၎င်းဖော်ပြချက်များသည် စီမံကိန်းဖော်ဆောင်သူထံမှ ရရှိသော စီမံကိန်းအကြောင်းအရာဖော်ပြချက်များ နှင့် ထိခိုက်မှု သိသာထင်ရှားခြင်း အပေါ် အခြေခံထားခြင်းဖြစ်ပါသည်။

ဓာတ်အားလိုင်းလမ်းအကြောင်းသည် ထိခိုက်လွယ်သော ဂေဟစနစ်တည်ရှိရာနေရာများ၊ လူနေထူထပ်သော နေရာများ ကို ရှောင်လွှဲထားခြင်းကြောင့် ပတ်ဝန်းကျင် နှင့် လူမှုဝန်းကျင်အပေါ် သိသာသော ထိခိုက်မှုများ မဖြစ်ပေါ်နိုင်ပါ။ သို့သော် တာဝါတိုင်အုတ်မြစ်တည်ဆောက်ရန် မြေနေရာရယူခြင်းကြောင့် လယ်ယာမြေလျော်ကြေးဆိုင်ရာ ကိစ္စများ ရှိနိုင်ပါသည်။ စီမံကိန်းတည်ဆောက်ရေးကာလတွင် ယာဉ်သွားလာမှုကြောင့် ဖုန်၊ အမှုန်ထွက် လေထုညစ်ညမ်းမှု အနည်းငယ်ရှိနိုင်ခြင်း၊ ဆူညံသံထွက်ပေါ်နိုင်ခြင်း၊ တည်ဆောက်ရေးလုပ်ငန်းများကြောင့် အနီးဝန်းကျင်ရှိ ချောင်း၊ မြစ် များတွင် ရေစီးရေလာ ပိတ်စို့နိုင်ခြင်း၊ မြေဆီလွှာညစ်ညမ်းမှု ဖြစ်ပေါ်နိုင်ခြင်း၊ အမှိုက်စွန့်ပစ်မှုများပြားလာခြင်း နှင့် လုပ်ငန်းခွင်ဆိုင်ရာ ထိခိုက်မှုများ ဖြစ်ပေါ်နိုင်ပါသည်။ ဖော်ပြပါ ထိခိုက်မှုများသည် အချိန်တိုအတွင်းသာ ဖြစ်ပေါ်နိုင်ပြီး အစီရင်ခံစာတွင် ဖော်ပြထားသော လျော့ပါးသက်သာစေရေးနည်းလမ်းများဖြင့် ထိခိုက်မှုများကို လျော့ချနိုင်ပါသည်။

ဤ IEE အစီရင်ခံစာတွင်ဖော်ပြထားသော ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်များ နှင့် ပတ်ဝန်းကျင်စောင့်ကြပ် ကြည့်ရှုခြင်းအစီအစဉ်များကို စီမံကိန်းတည်ဆောက်ရေးကာလ၊ ပိတ်သိမ်းရေး ကာလ နှင့် လည်ပတ်ရေးကာလတို့တွင် အကောင်အထည်ဖော်ဆောင်ရွက်ရန် အကြံပြုတိုက်တွန်းပါသည်။

Executive Summary

1 Introduction

The proposed project, 230kV overhead Power Transmission Line (here after called “TL”) is intended to connect output electricity from Namtu (Hsipaw) hydropower station to the new switching sub-station at Upper Yeywa hydropower project. The line will be connected to the national grid through the Upper Yeywa HPP 230 kV Shwesaryan Substation double circuit transmission lines. The transmission line will originate at the 210 MW Namtu (Hsipaw) hydropower plant, located on the upper and middle reaches of Namtu river in Namtu township. The TL will also traverse the Hsipaw township and -terminate at substation of Upper Yeywa hydropower project in Kyaukme township.

The estimated annual power generation of the Namtu (Hsipaw) hydropower plant is about 1,005.48 GWh. The estimate length of the TL will be 75.67 kilometers (47.02 miles). The feasibility study had been conducted and the alignment of the TL was approved by the Department of Electric Power and Planning (DEPP) of Ministry of Energy and Electricity (MOEE) in late 2018. The construction work will be carried out by Natural Current Energy Hydropower Co., Ltd. (NCEH) with BOT (build, operate and transfer) system under the supervision of Department of Power Transmission and System Control (DPTSC) of MOEE Myanmar.

2 Project Description

The project area lies at the hilly region in Shan north where the topography along the transmission line varies from township to township. The elevation of the townships range from 1390 ft to 2506 ft, such as Namtu- 1760 ft, Hsipaw 1390 ft and Kyaukme 2506 ft respectively. Over the year, the temperature typically varies from 48°F to 92°F and is rarely below 44°F or above 98°F¹. The average accumulation of rainfall in is wet season 2.7 in and dry season, 0.1 in¹. Along the TL alignment, the land comprises agricultural areas such as rice fields and seasonal crops, forest, grass and shrub land, water bodies and built-up areas. The main business of eastern and northern Shan state relies on trading with neighboring countries whereas the subsidiary business is dependent on agriculture sector². The component of the 230 kV TL is summarized in table 1.

Table 1 Summary of the 230kV Overhead Transmission Line

Particular	Description
TL starting point	Namtu (210MW) HPP
TL ending point	New sub-station at Upper Yewywa HPP
Total Line Length	75.6 km (47.02 Miles)
Total Number of Section	41 Sec
Longest Section Length	7.39 km (4.6 Miles)
Total Tower Usage	2.6 towers/km (4.1 towers/mile)
Tension Tower Usage	42 Nos (21.5 %)

¹ [https://weatherspark.com/y/112650/Average-Weather-in-Lashio-Myanmar-\(Burma\)-Year-Round](https://weatherspark.com/y/112650/Average-Weather-in-Lashio-Myanmar-(Burma)-Year-Round)

² http://www.thaibizmyanmar.com/th/thai-myanmar/trade-investment/Shan%20State%20Information%20Kit%20for%20Economic%20Trip_June%202016%20.pdf

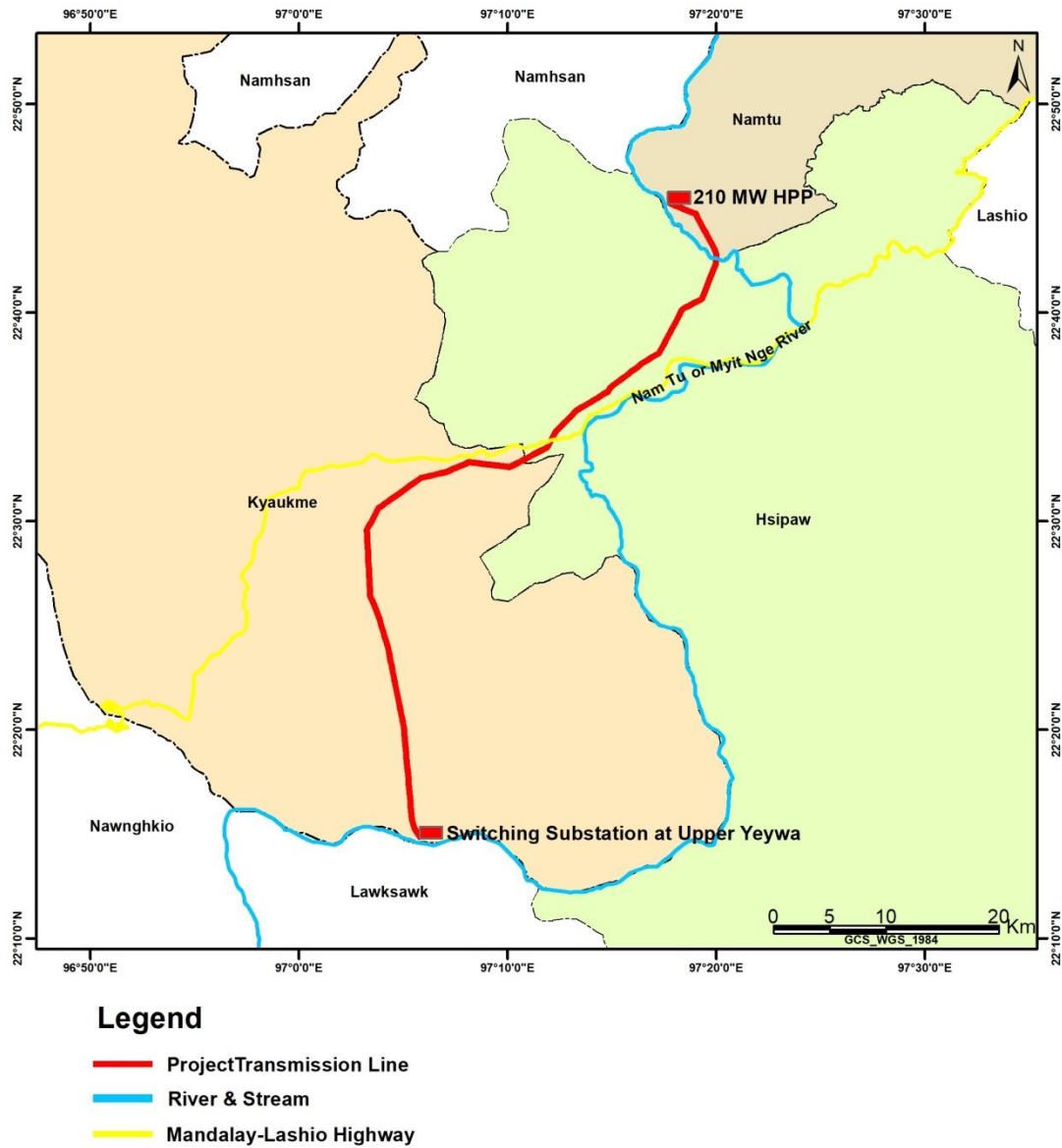
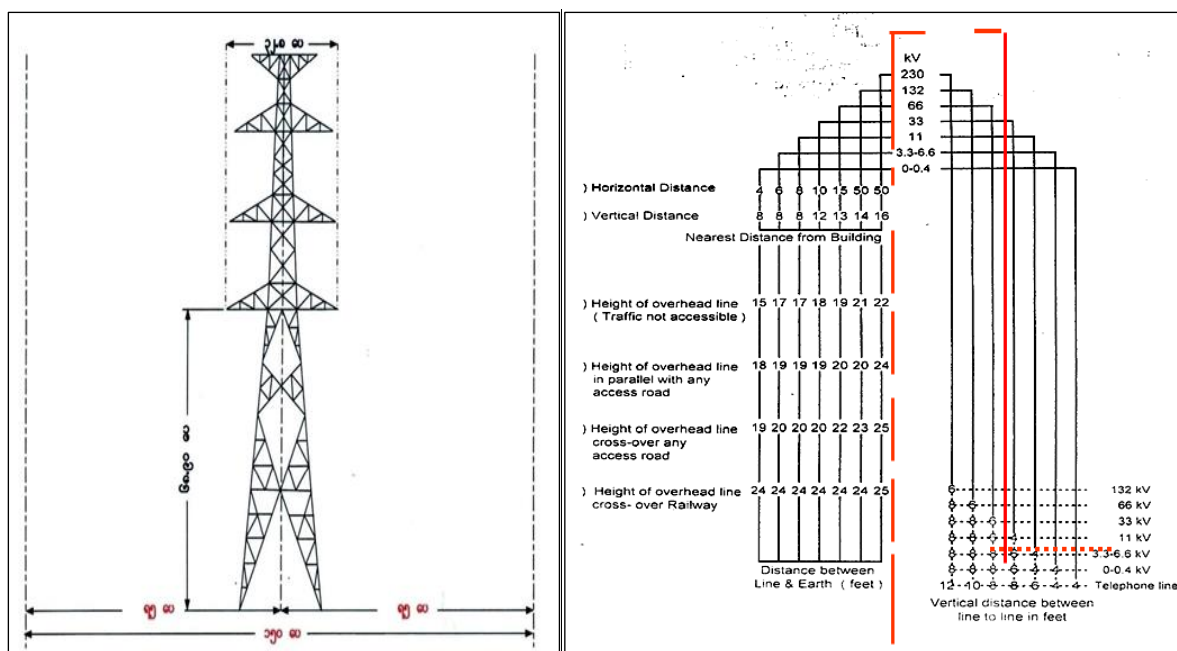


Figure 1 Location Map of 230kV TL Project

2.1 ROW

The ROW requirement of the 230kV Overhead TL prescribed by DPTSC of MOEE is presented in the following figures and tables.



Source: DPTSC of MOEE

Figure 2 Design of 230kV double circuit tower, ROW and clearance chart

2.2 General Design of 230kV Transmission Line Tower

The general design of 230kV TL Towers is described table 2.

Table 2 General Specification of the 230kV Overhead Transmission Line Tower

No.	Particular	Spec.
1	Conductor Type	DUCK; ACSR (605 MCM)
2	No. of Conductor per Phase	2
3	No. of Circuit	Double
4.	Earth wire	-
5	OPGW wire	-
6	Swing Angle	60 Degree
7	Normal Span	400 m
8	Everyday Temperature	28°C
9	Maximum Temperature	75°C
10	Minimum Temperature	10°C
11	Wind Temperature	15°C
12	Maximum Wind Speed	35 m/s
13	Cable Tension	
	Everyday Temperature (28°C) (Creep)	23% of Ultimate
	Everyday Temperature (28°C) (Construction) (Initial)	33% of Ultimate
	Wind Temperature (15°C+ Max wind)(Load)	40% of Ultimate
14	Clearance	

	-Normal ground	9 m (30 ft)
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2.3 230kV Transmission Line Crossing Points

i Townships

As stated above, the transmission line will traverse three townships- Namtu, Hsipaw and Kyaukme. There are 20 towers in Namtu, 65 in Hsipaw and 110 in Kyaukme with the total of 195 towers. The summary of the TL passages to the townships is described in table 3.

Table 3 Transmission Line Information

No.	State	District	Township	TL Tower No.	No. of Towers	Approx. Distance	
						km	mile
1	Shan state	Kyaukme district	Namtu	1 – 20	20	7.64	4.75
2			Hsipaw	21 - 85	65	24.41	15.17
3			Kyaukme	86-192	107	43.55	27.06
4	Total TL numbers				192	75.60	46.98
5	Substation to Upper Yeywa HPP in Kyaukme			1-3	3	0.68	0.42
6	Grand total			-	195	75.6	47.02

ii Villages (≤1km)

The TL will not directly cross over the villages, however, it will run near the village and some households will be being crossed over in some area. The numbers of the nearest villages approximately less than 1km (3280 ft) in distance from the ROW of TL appeared 21 villages in Hsipaw township and 13 villages in Kyaukme township.

ii. Building and Other Structures Existed within the ROW

Household structures counting along the Right-of-Way (75 ft) of the TL were performed based on the field observation and satellite images. There will be total 25 of household structures households and/or other small buildings along the ROW of the TL.

iv River and Creeks

The TL will cross over the river two times along its alignment, one will be Myint Nge river (also known as Namtu river in Namtu township and Dokhtawaddy river in Hsipaw and Kyaukme townships) between TL tower number 20 and 21 in Namtu township, and the another crossing point, which is tributary of Myint Nge river is between TL number 73 and 74 in Hsipaw township. Besides, the TL will cross over other surface water bodies such as small creeks and village drains in total of 8 times through its alignment.

v Reserved Forest

It has been observed that the TL alignment will pass the two Reserved Forests (RFs) namely Htee Lone RF in between Hsipaw and Kyaukme townships and Taung Chae RF in Kyaukme township. The

TL tower number from 79 to 90 will be placed in Htee Lone RF while tower number from 192 to 195 will be in Taung Chae RF.

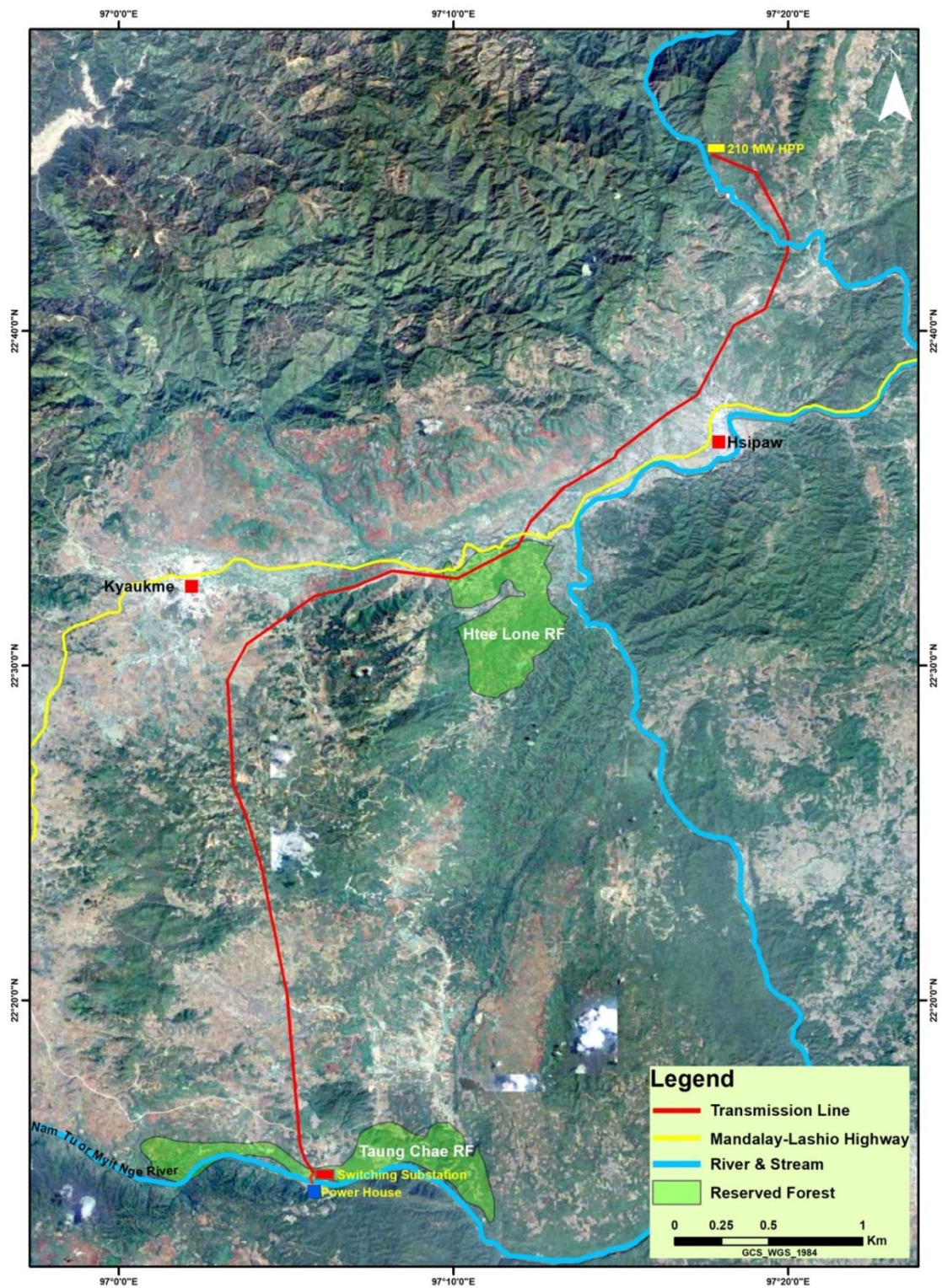


Figure 3 TL alignment traverses the Reserved Forests

vi Roads

The TL will pass and in parallel number of roads from village linked roads (called as jeep tracks) to normal access road (car roads) along its alignment. There will be in total of 44 times that TL cross over the above mentioned types of roads.

vii 230kV Line

The TL will cross over the existing 230kV line near Ye Bu village of Kyin Thi village tract in Hsipaw township. The height of TL for vertical and horizontal clearance will be followed the guideline by DPTSC of MOEE.

2.4 Substation

The new switching substation for 230kV line is planned to construct within the area of Construction Unit-3, Upper Yeywa Hydropower Implementation Project. Regarding the substation location, the NCEH submitted the proposal of substation location in which 3 alternative locations were being proposed. The proposal 2 was selected with the feasibility to construct substation by DEPP based on the recommendations from DPTSC and DHPI.

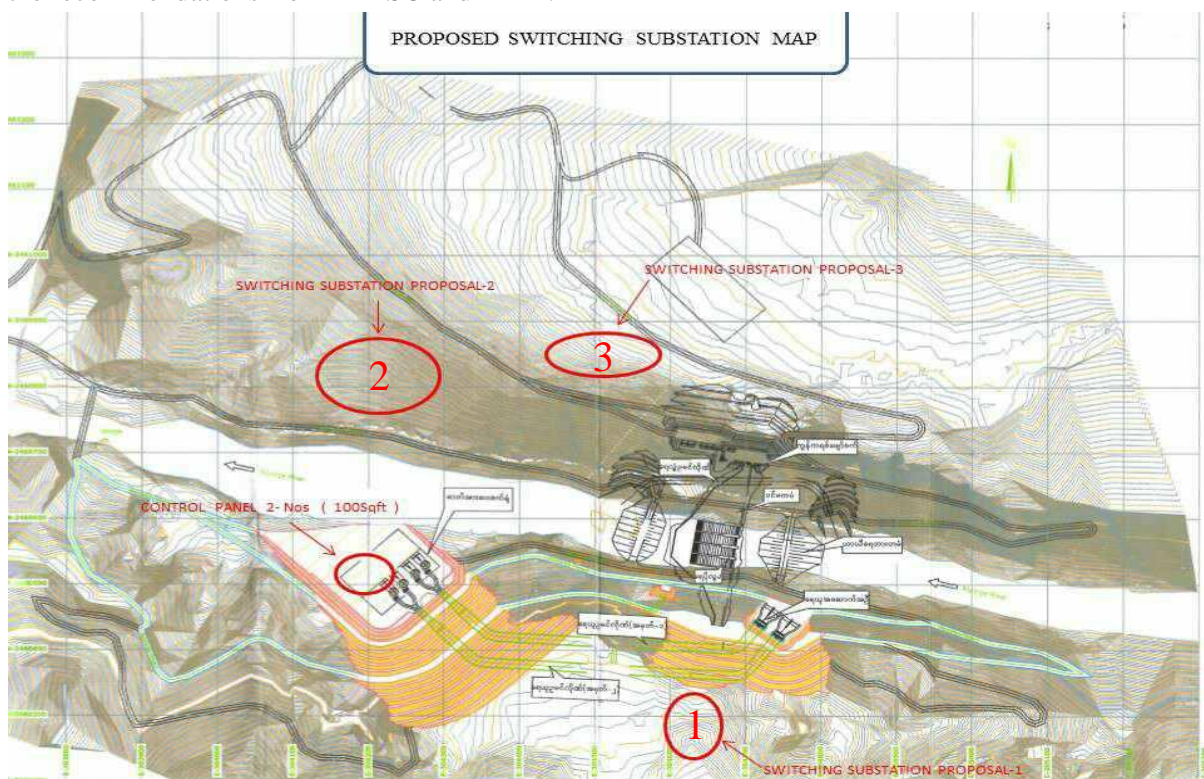


Figure 4 Proposed locations and selected Substation location

2.5 Construction Implementation

2.5.1 Construction Implementing Organization

NCEH will implement the construction of this overhead TL. The organization chart of the NCEH and the construction implementation unit for this TL is expressed in figure 5.

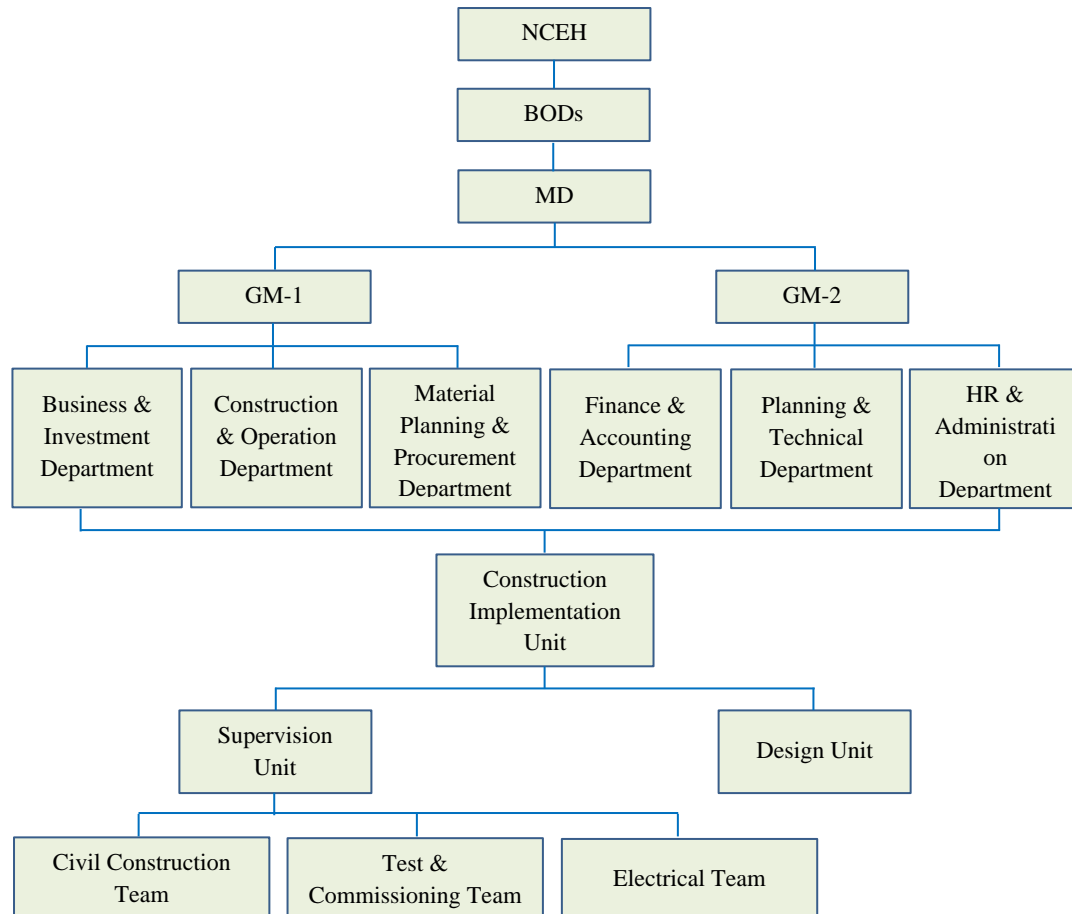


Figure 5 Organization chart for construction implementation unit

2.5.2 Construction Implementing Schedule

The construction aims to complete within 3 years and the appraisal schedule for construction implementation is shown in table 4.

Table 4 Appraisal Schedule for Construction Implementation

Phase	Activities	2020				2021				2022			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Preconstruction	Recruitment of consultants												
	Appoint implementation consultants												
	Familiarize design												
	Contract with IEE implementation consultant												
	Resettlement implementation												
Construction	Contract with raw material suppliers												
	Recruitment of construction workers												
	Construction of temporary worker camp												
	Construction of substation												
	ROW clearance												
	Access road construction												
	Tower foundation works												
	Tower erection												
	Stringing work												
	Test/commissioning												
	Completion of installation												

Q= Quarter of a year

3 Project Proponent

3.1 Profile

The Natural Current Energy Hydropower is a private limited company which develops concept, investigation, design, investment, execute, implementation, facility management (O&M) of the hydropower stations in Myanmar. With over the years, NCEH has undertaken many challenging projects and accumulated skills, technical know-how and experiences in design and implementation solutions, project management services and related engineering works. NCEH specializes in providing our client and customers with qualified, secured and cost-effective services in energy, environment and other infrastructure projects to meet user satisfaction. The company's belief is to provide to the power purchasers with "NCEH is reliable in secured power supply" experience when the NCEH is chosen to execute the projects.

3.2 Organization Structure

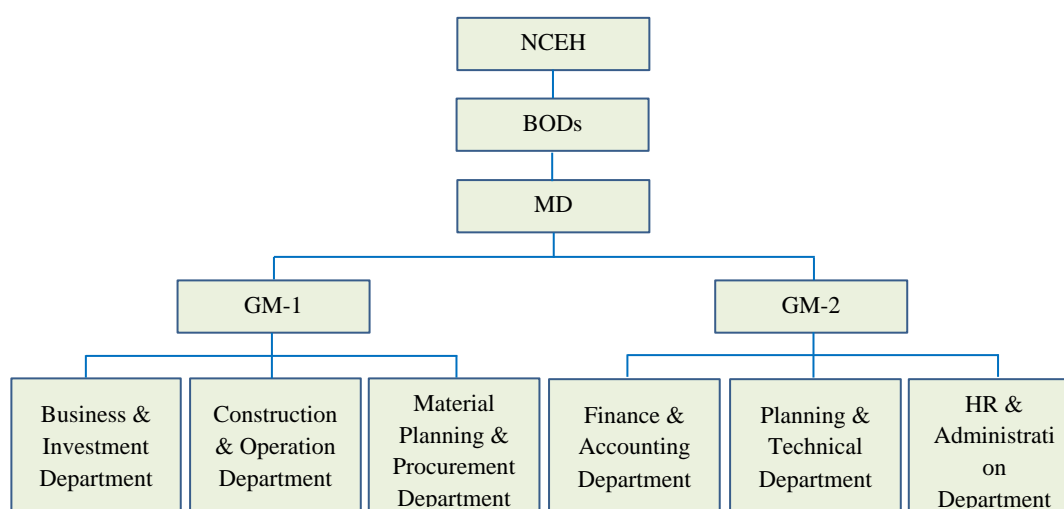


Figure 6 NCEH's organization structure

3.3 Company Offices

The contact information of the company offices are presented in the table 5.

Table 5 Company Contact Information



Company Head Office (Mandalay)
<ul style="list-style-type: none">• No.(E-1-11), Ngu-Shwe-Wah street between 64-65 street, Chan Mya Tharsi township, Mandalay.• 09-258243339• 09-420011159
Company Branch Office (Nay Pyi Taw)
<ul style="list-style-type: none">• No.(A-051), Pa-Don-Mar street, Shwe Kyar Pin Ward, Zabuthiri township, Naypyitaw.• 09-895228852

4 Identification of the IEE Expert

4.1 Implementing Organization

The field studies have been carried out by the experts from Resource and Environment Myanmar (REM) and Sustainable Environmental Myanmar (SEM) organizations with vast experiences in conducting EIA, IEE and EMP projects in Myanmar.

Table 6 IEE Implementing Organization

Organization	Responsibility
<p>Resource and Environment Myanmar (REM)</p> 	<ul style="list-style-type: none">-Physical Environmental Study-Social Environmental Study (Including Stakeholder Engagement Meetings)-Survey Report Preparation- IEE Report Compilation
<p>Sustainable Environment Myanmar (SEM)</p> 	<ul style="list-style-type: none">-Ecological Study (Flora and Fauna)-Survey Report Preparation-GIS works

4.2 Implementation Schedule

The appraisal schedule for the IEE implementation is presented in Table 7.

Table 7 Appraisal Schedule for IEE Implementation

Task	Timeline														
	2019			2020											
	October	November	December	January	February	March	April	May	June	July	August	September	October	November	December
Organizing IEE Experts															
Desktop study															
Meeting with Proponent															
Preparation for Environmental & Social Baseline Survey															
Conduct Stakeholder Engagement Meetings															
Preparation of IEE Draft Report															
Submission of IEE Draft Report															
IEE Report Review Process															
Revise comments from Review Process															
Submission of IEE Final Report															
Disclosure of IEE Final Report															

5 Applicable Laws, Regulations, Standard and Guidelines

5.1 Institutional Framework

The followings are relevant institutions with regard to environmental administration this project.

Ministry of Natural Resources and Environmental Conservation (MONREC)

Ministry of Forestry was reformed as Ministry of Environmental Conservation and Forestry (MOECAF) in 2011 as a national level agency to coordinate and handle environmental related issues and matters including the implementation of international environmental agreements signed by government, law enforcements and information dissemination.

In 2016, MOECAF has been changed to Ministry of Natural Resources and Environmental Conservation (MONREC). Hence, MONREC has been acting as focal coordinating body for country's overall environmental management and environmental matters.

MONREC has also being planned to organize sub divisions under ECD and extend the man power in near future with the aim of effectively implement and manage the environmental regulations and resources in country wide. The organization structure of MONREC and ECD is presented in figure 7.

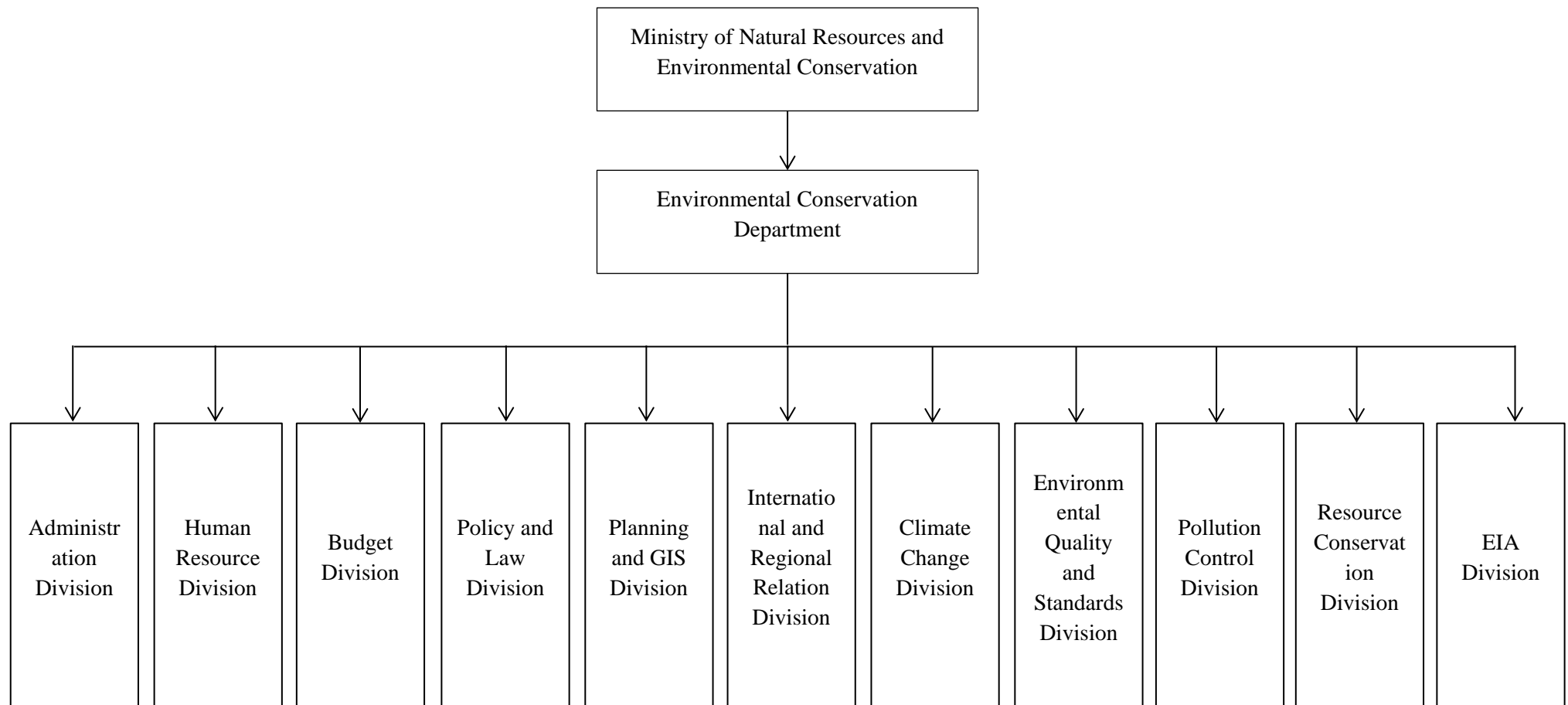


Figure 7 Myanmar National Environmental Conservation Organization Chart

5.2 Requirement for Performing IEE

The MOEE submitted a Project Proposal in compliance with the requirements of the EIA Procedure (2015) to MONREC on August 22, 2019. The Project Proposal outlined the scope of the project and the approved alignment of the transmission lines, anticipated impacts and proposed mitigation measures.

The office of Union minister, MONREC sent a letter to MOEE on 16 November 2019 which requires the project to prepare an IEE for the transmission lines following the outline prescribed in the EIA Procedure (2015).

According to the categorization of economic activities for assessment purposes mentioned in the EIA Procedure (2015), IEE report is determined to be required containing the description of the project and alternatives considered, description of the surrounding environment including maps, impact assessment, results of public consultation processes, and environmental management plan with identified persons/organizations and budgets needed.

Table 8 Categorization of Economic Activities for Assessment Purposes

Type of economic activity	Criteria for IEE Type Economic Activities	Criteria for EIA Type Economic Activities
Electrical Power Transmission Lines \geq 230 kV	All	All activities where the Ministry requires that the Project shall undergo EIA

Source: Environmental Impact Assessment Procedure

i Fundamental Laws and Regulations Related to IEE/EIA

Environmental Conservation Law (2012)

Environmental Conservation Rule (2014)

Environmental Impact Assessment (EIA) Procedure (2015)

Electricity Law (2014)

Transmission Line Minimum Safety Clearance based on Electricity Rules (1985)

National Environmental Quality (Emission) Guidelines (2015)

Protection the Rights of Ethnic Nationalities Law (2015)

The Law Amending the Workmen' Compensation Act, 1923 (2005)

The Minimum Wages Law (2013)

The Motor Vehicles Law (2015) and Rules (1987)

Protection and Preservation of Cultural Heritage Regions Law, 1998

The Conservation of Antique Objects Law (2015)

Conservation of Water Resources and Rivers Law, 2006

The Forestry Law (2018)

The Protection of Wildlife, Wild Plant and Conservation of Natural Area Law, 1994

Farmland Law, 2012

Farmland Rules, 2012

Public Health Law, 1972

Occupational Safety and Health Law, 2012

Prevention and Control of communicable Diseases Law (1995) (Revised in 2011), 1995/2011

ii International Environmental Conventions and Agreements

The main international and regional treaties concerning the environment to which Myanmar is a party (in chronological order) that related to the present transmission line project can be listed as follows:

- Plant Protection Agreement for the Southeast Asia and Pacific Region;
- Convention Concerning the Protection of the World Cultural and Natural Heritage
- Montreal Protocol on Substances that Deplete the Ozone Layer & all amendments
- Convention on Biological Diversity
- International Tropical Timber Agreement
- Ramsar Convention on Wetlands
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
- ASEAN Agreement on the Conservation of Nature and Natural Resources
- United Nations Convention to Combat Desertification
- United Nations Framework Convention on Climate Change (UNFCCC) and Kyoto Protocol
- ASEAN Agreement on Transboundary Haze

6 Description of the Surrounding Environmental and Social Conditions of the Project

The environmental baseline data covering air quality, water quality, soil quality, noise level, vibration level and ecological survey were conducted along the transmission line alignment. The ecological survey was conducted to assess the type of flora and fauna prevailing along the transmission line. The data related to topography, meteorology and geology were collected through literature review and available data from General Administration Department (GAD). Topography, meteorology and geology along the transmission line were studied using available topographic maps and satellite imagery. The baseline study was considered along the ROW of 230kV TL in Namtu, Hsipaw and Kyaukme townships.

6.1 Natural Environment

i. Topography

According the feasibility study report, the landform along the 230kV transmission line, include plains in most parts and river network and low mountains and hills in some parts.

The 230kV line passes through Namtu Township, Kyaukme Township and Thipaw Township in Shan State in Myanmar. Along the line route, the general elevation between Namtu and Thipaw ranges from 450 to 800 meter above mean seal level, the general elevation between Thipaw and Kyaukme ranges from 300 to 900 meter above mean seal level and the general elevation between Yeywa and Kyaukme ranges from 500 to 1000 meter above mean sea level (See in Figure 6.3-1). The slopes are generally moderate and steep slopes are observed in some places.

ii Geology

The transmission line project area is mainly occupied by the Eastern Highlands of Myanmar. The main strata exposed around Bawgyo Group, Plateau Limestone Group and Nyaungbaw Formation. Bawgyo Group composed of Pangno Evaporites and Napeng Formation. It is consists of pink dolomite, limestone, red sandstone, red carbonate conglomerate, rare cherty mudstone and shale.

Plateau Limestone Group consists of the limestone and dolomites are well exposed in this area. It is mainly composed of grey to brown color, fine to medium grain, massive and criss-cross jointed dolomitic limestone. Topography of the Plateau limestone has been found karst topography and terra-rosa soil. The age of the Plateau Limestone Group is Permian to middle Triassic.

Nyaungbaw Formation is mainly composed essentially of purplish to greenish grey, medium to thick bedded argillaceous limestone with phacoidal to subphacoidal structure and inter bedded with thin calcareous shale.

The project transmission line across Kyaukme Active Fault and Moemeik Active Fault is situated North Eastern part. The seismicity of the project area and its environment is Strong Zone. Probable range of Ground Acceleration is 0.2-0.3 g and Modified Mercalli Scale Classes is VIII. (Ref; Seismic Zone map of Myanmar revised by Maung Then and others(2005).

iii Soil

There are three main types of soil are found in the entire project area and northern part of Shan Region. They are:

1. Red earth and Yellow earth
2. Mountainous brown forest soil and
3. Mountainous red forest soil

iv Climate

In most parts of Myanmar, there are 3 well defined seasons; (1) the rainy season (mid-May to October), (2) the cold season (November to January) and (3) the hot season (February to mid-May).

According to the data statistical year book of 2019, the annual rainfall of Lashio, Taunggyi and Keng Tung are 1,297 mm, 1,397 mm and 1,259 mm respectively. The annual mean maximum temperature of three stations are 29.6°C, 25.8°C and 29.8°C while the annual mean minimum temperature are 16.0°C, 15.2 °C and 17.5°C respectively.

6.2 Physical Environment

i Air Quality

Air quality monitoring was conducted in 3 locations such as AQ-1 in Namtu HPP compound near Chaung Sar village of Namtu Township, AQ-2 in Pan Ne Village of Hsipaw Township and AQ-3 in the compound of Upper Yeywa Hydropower project site in Kyaukme township.

It is observed that the concentrations of PM_{2.5}, PM₁₀ and Sulphur dioxide (SO₂) concentration are lower than the National Environmental Quality (Emission) Guidelines (NEQG). A 24-hour concentration of Nitrogen dioxide (NO₂) is not described in the guidelines but concentration of NO₂ was referred by one-hour value. According to the hourly results, concentration of Nitrogen dioxide (NO₂) is lower than the guideline. There are no specific guideline limit for Carbon monoxide (CO) and Nitrogen monoxide (NO). However, the observed concentration of these pollutants ranged in the normal condition.

ii Noise Level

The 24-hour measurement of noise level along the project site was carried out in 5 locations, such as N-1 in Namtu HPP compound near Chaung Sar village, Namtu Township, N-2 in Pan Nea Village, Hsipaw Township, N-3 in Naung Thagyar Village, Hsipaw Township, N-4 in Upper Yeywa Hydropower project site and N-5 in Pan Lock Village, Kyaukme Township.

It is observed that the daytime measurement of all locations appeared between 50 – 54 dBA whereas the nighttime values appeared 43 – 53 dBA.

iii Vibration Level

The locations of vibration level were setup as the same location and same time as air monitoring station such as V-1 in Namtu HPP compound near Chaung Sar village of Namtu Township and V-2 in the compound of Upper Yeywa Hydropower project site in Kyaukme township.

The measured was calculated by using the following array formula in the excel sheet, $10^{\text{LOG10}(\text{AVERAGE}(\text{10}^{(\text{RANGE}/10))})}$. According to the calculated results, all vibration levels (L_{veq}) are lower than the applied standard.

iv Water Quality

Water quality study was conducted in 3 locations namely SW- 1 at Myitnge River near Transmission Line Tower no, 20 and 21, SW -2 near Longkon village, Hsipaw township and Transmission line Tower no. 76 and SW-3 near dam site of Upper Yeywa Hydropower project and Dokehtawaddy Bridge (Yeywa).

Water quality results were compared by general guideline of National Emission Quality in Myanmar. Each of the water samples were tested by both In-situ measurement and chemical analysis. Chemical analysis parameter for water quality was sent to the United Analyst and Engineering Consultant in Thailand (UAE). According to the analysis results, water quality along the transmission line was indicated as there has no water pollution.

6.3 Ecological Environment

i Flora

In and around the proposed project area, five major habitat types were observed namely (1) deciduous forest, (2) crop and vegetation, (3) bare land, (4) shrub land and (5) plantation.

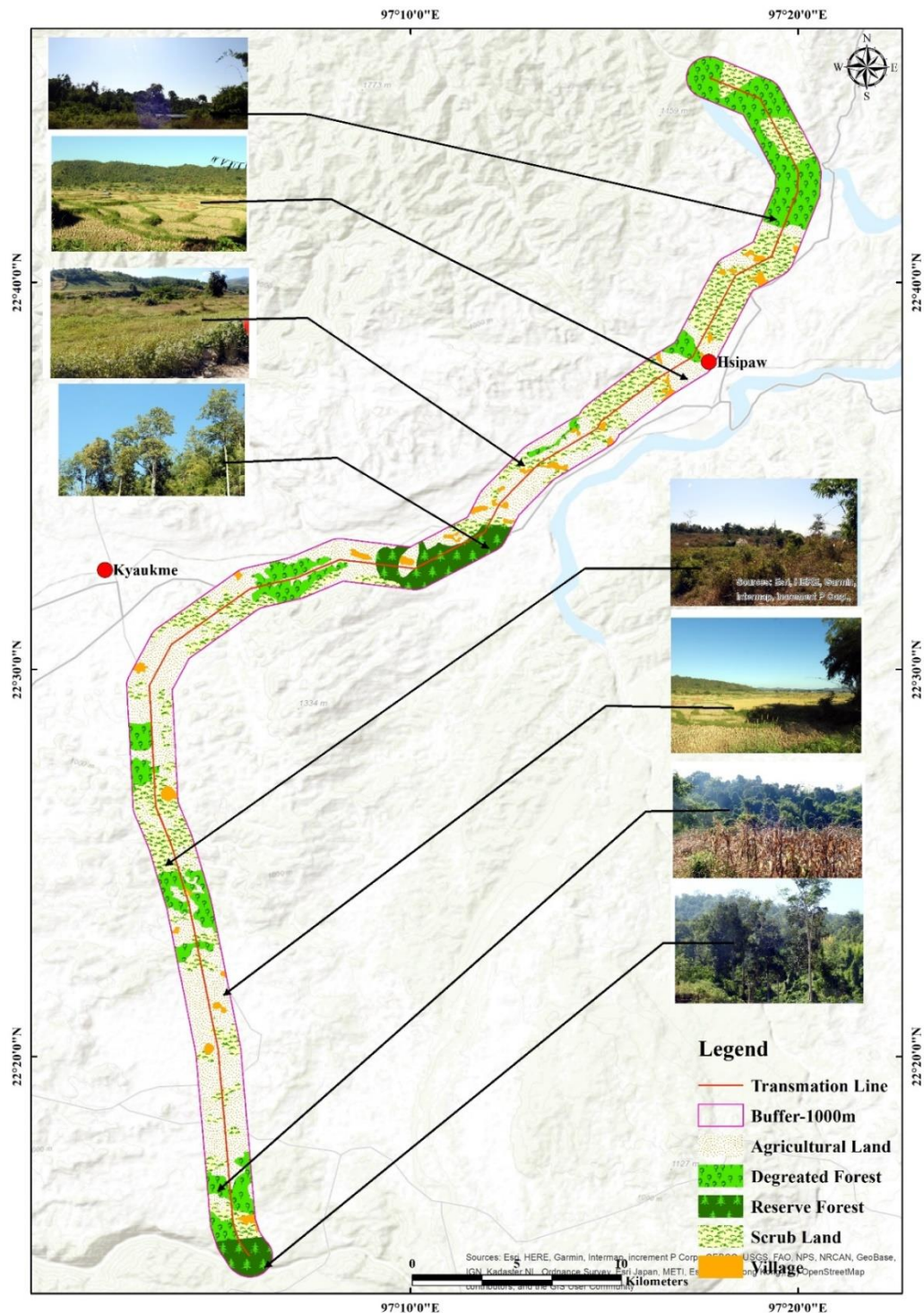


Figure 8 Sceneries of the Survey Area

There were 82 plant species in were identified in the proposed project area. According to the IUCN Red List of threatened species (2019), *Dipterocarpus tuberculatus* (In), one species of near threatened (NT) identified plant species.

ii Fauna

In total, 202 fauna species of 182 genera belonging to 129 families were recorded in survey sites during survey period from 22th to 27th November, 2019. All of them 59 bird species, 11 mammal species, 4 reptile species and 35 butterfly species and other invertebrate species were respectively

collected by fauna survey team. According to the IUCN conservation status, Grey-headed Parakeet (*Psittacula finschii*) are found near the survey site and listed as forested bird's species and Near Threatened (NT).

6.4 Social Environment

The study on socio-economic characteristics focused on demographic structure, local economic activities status, income level and education as well as other related issues of local communities living in respective townships.

i Land and Demographic Structure

Some data about land and demographic structures of Kyaukme, Namtu and Hsipaw Townships are summarized in Table 9.

Table 9 Data about Land and Demographic Conditions of Kyaukme, Namtu and Hsipaw Townships

No	Township	Area	Above Sea Level	Total Population (September 2018) (Person)	Household		Total Population (Person)	
		Square mile	feet		Number of House	Number of Household	Male	Female
1	Namtu	652.11	1760	50720	9597	10320	24442	26278
2	Kyaukme	1662.4	2506	179539	3567	34087	85841	93698
3	Hsipaw	2045.34	1398	162997	33560	34264	78602	84395

Source: GAD of related Townships

ii Ethnicity and Religion

The majority of people in projected areas are Shan followed by Palaung and Burma people in both townships.

The different kinds of religion present in respective townships are shown in Table 10. More than 90% of the people living in the three townships are Buddhists.

Table 10 Religious Status

Township	Buddhist	Christian	Hindu	Islam	Other	Total
Kyaukme	166203	7743	1763	2025	-	177734
Namtu	43147	5771	1211	902	97	51128
Hsipaw	159235	3211	276	1772	-	164494

Source: Township Information of General Administration Department Offices

iii Land Use

Land use of the respective townships is shown in Table 11.

Table 11 Land Use Status

No	Land Category	Kyaukme	Namtu	Hsipaw
1	Agricultural Land	125625	25227	123543
2	Forest and Natural Area	27637	109874	110709

3	Industrial Land	609	457	307
4	Settlement Land	19445	4339	28255
5	Unused Land	879719	265269	1045189
6	Fallow	13051	9186	1012
7	Others (Invasion Land)	2147	-	-
	Total Area	1068233	414352	1309015

Source: Township Information of General Administration Department Offices

iv Local Economy and Livelihood

The main sources of livelihood in the three townships are agriculture, livestock breeding and official employment in the government. In three townships, other sources of earning are fish farming, casual labor and corn plantations as well as small-to-medium size business.

v Industrial Activities and Business Enterprises

Business activities in targeted townships are one aspect of the economic status.

Table 12 Industrial Activities and Business Enterprises

No	Township	Number of Other Factories	Number of Workshops	Number of Small Scale/Domestic Enterprises	Total
1	Namtu	3	18	27	48
2	Kyaukme	60	46	3	109
3	Hsipaw	4	0	68	72

Source: Township Information of General Administration Department Offices

vi Occupational Status

According to the Township General Administration Department Offices, the occupational status of the targeted townships is shown in the Table 13.

Table 13 Occupational Status

No	Township	Total Population	Number of Workable Person	Number of Employed Person	Number of Unemployed Person	% of Unemployed Person
1	Kyaukme	2038	291	1019	728	71.44
2	Namtu	51006	39473	33973	1500	7.35
3	Hsipaw	162997	98999	77714	12558	4.04

vii Income Status

Based on the secondary data received from related GAD offices, the income of the person of a year from 2014 to 2018 could be identified as Table 14.

Table 14 Income Status of People Living in Namtu, Kyaukme and Hsipaw Townships

No	Township	2014-2015 (Kyats)	2015-2016 (Kyats)	2016-2017 (Kyats)	2017-2018 (Kyats)
1	Kyaukme	925547	928428	971708	1057997
2	Namtu	-	659983	675385	768523
3	Hsipaw	-	679338	716178	786642

Source: Township Information of General Administration Department Offices

viii Health Condition

The overall condition of the health including life expectancy (male/female), morbidity/major disease, Infant mortality rates are defined as following table.

Table 15 Hospital, Clinic and Township Health Department

No	Township	Hospital	Clinic	Township Health Department
1	Kyaukme	5 (214 Beds)	18	30
2	Namtu	3 (250 Beds)	-	2
3	Hsipaw	3 (141 Beds)	2	30

Source: Township Information of General Administration Department Offices

Table 16 Health Care

No	Township	Population	Doctor to Patient		Nurse to Patient		Assist Health Officer to Patient	
			No. of Doctor	Doctor to Patient ratio	No. of Nurse	Nurse to Patient ratio	No. of AHO	AHO to Patient ratio
1	Kyaukme	171930	21	1:8187	59	1:2914	6	1:28655
2	Namtu	50720	5	1:10144	37	1:1370	1	1:50720
3	Hsipaw	169434	23	1:7366	57	1:2972	8	1:2118

Source: Township Information of General Administration Department Offices

ix Education Status

The education services of Namtu, Kyaukme and Hsipaw Townships as numbers of schools, colleges and universities are shown in Table 16.

Table 17 Education Services

No	Township	High School	Middle School	Primary School	Pre School	Monastery Education School
1	Kyaukme	9	47	80	1	5
2	Namtu	6	11	65	12	-
3	Hsipaw	11	33	152	10	9

Source: Township Information of General Administration Department Offices

Table 18 **Literacy Rate**

No	Township	Population	Population (>15-year old)	Number of Literacy Rate	Percentage of Literacy Rate
1	Kyaukme	171930	133987	125407	72.94
2	Namtu	50720	33227	30084	90.54
3	Hsipaw	169434	99954	99700	58.84

Source: Township Information of General Administration Department Offices

x **Cultural Buildings**

The cultural and historical buildings are described in the following table.

Table 19 **Lists of Cultural Buildings**

No	Township	Pagoda (ဘုရား)	Zay Te (ဇေတီ)	Pu Htoe (ပုထိုး)	Monestary	Nunnery	Buddhist Religious Temple
1	Kyaukme	5	89	-	330	3	3
2	Namtu	25	15	25	70	1	2
3	Hsipaw	10	18	-	206	2	1

Table 20 **Lists of Other Cultural Buildings**

No	Township	Christian		Islam		Hidi		Chinese	
		Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
1	Kyaukme	8	1	1	2	4	7	9	-
2	Namtu	5	18	4	1	9	9	2	-
3	Hsipaw	7	8	1	3	2	3	3	2

Source: Township Information of General Administration Department Offices

xi **Transportation**

In the area, there is no airline (except there is one Helicopter port in Namtu township but it can no longer be used) and waterway transport system. The communities mainly rely on the road and railway transportation. The summarized mode of transports in the area is presented in the table 18.

Table 21 **Mode of Transport in Selected Townships**

Mode of Transport & Itinerary	Namtu	Hsipaw	Kyaukme
Airway	Helicopter port (It can no longer be used)	Nil	Nil
Waterway	Nil	Nil	Nil
Railway	Namtu – Bawdwin – Nant Myaw (14 miles)	Mandalay – Lashio Railroad (from Bawkyo to Menseng) 33.25 miles	Mandalay – Lashio (35 miles)
Road	Namtu – Larshio Namtu – Mandalay Namtu – Muse	Hsipaw – Mandalay Hsipaw – Kyaukme Hsipaw – Lashio Hsipaw – Hsaung Kye Hsipaw - Nant Leng	Kyaukme – Muse – Mandalay Kyaukme – Taunggyi Kyaukme – Mandalay Kyaukme – Yangon

			Kyaukme – Hsipaw Kyaukme – Hsipaw - Nant Leng Kyaukme – Moegoat Kyaukme - Nant Leng Kyaukme – Mine Ngot Kyaukme – Moegoat - Lashio
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Source: Township data of GAD

7 Identification and assessment of potential Environmental Impacts and Mitigation Measures

7.1 Methodology and Approach

The following methods and approaches are used in the assessment of environmental and social impacts.

Identification: To specify the impacts associated with each phase of the project and the activities undertaken

Prediction: To forecast the nature, magnitude, extent and duration of the main impacts; and

Evaluation: To determine the significance of residual impacts after taking into account how mitigation will reduce a predicted impact.

i Impact Identification

First and foremost, the impact identification is done through desktop study based on the available information from various sources, project description provided by project proponent and the similar project experience of the experts prior to conducting the baseline study. Then the baseline study was carried out by survey teams (Physical Team, Ecological Team and Social Team) to further identify the potential environmental and social impacts along its TL alignment. The identified impacts are described each phase in the following;

Pre-construction

- Loss of vegetation and disturbance to wildlife habitat in some areas and increase the generation of waste, especially vegetation debris from site clearance activities.

Construction

- Air emission, noise and vibration level will be increased due to mobilization of construction vehicles and machineries.
- Construction waste, domestic and sewage from the temporary worker camp will be increased.
- Water demand will be increased and surface water quality will also be affected due to improper discharge of sewage from temporary worker camp.
- Soil contamination and surface water pollution will occur due to accidental spill of engine oil/lubricant and other hazardous chemicals from vehicles and construction machineries.
- Removal of vegetation and trees during construction of foundation, especially on the slopes would render soil vulnerable to erosion.
- Loss of visual amenity due to the presence of man-made transmission line structures.

- Vegetation will be cleared for the ROW and wildlife habitat will also be disturbed due to the mobilization of the project.
- Traffic volume and traffic related accident in the area will be temporarily increased from mobilization of construction vehicles.
- Injury and sickness of workers will be caused due to construction works including tower erection, stringing and line pulling.

Operation

- Air emission, noise and vibration level will temporarily be increased while the maintenance operations are carried out.
- Electrical hazards will be increased due to corona effect.
- Worker exposure to electrical hazards will be increased due to the EMF, Electrocution and working at height when the maintenance operations are being undertaken.
- Growth of vegetation will be limited as regular trimming of vegetation along the ROW have to be done to meet with the designed ground clearance height.
- Employment opportunities will be increased during ROW maintenance work.

ii Impact Prediction and Evaluation

The prediction and evaluation of the environmental impact was done based on the observation and results from baseline surveys of physical, ecological and social environment. The criterion that has been used to evaluate impacts on various environmental and social aspects is as following.

Table 22 Impact Evaluation Criteria

Context	Local	when an impact is restricted within 17.5 m of either side of the project foot print i.e. within the corridor defined for the project
	Medium	when an impact is spread from 17.5 m to 50 m either side of the project foot print i.e. beyond 17.5 m but within 50m either side of the corridor defined for the project
	Regional	when impact is spread beyond 50m either side of the project foot print i.e. beyond 50 m either side from the corridor defined for the project
Duration	Short	when impacting for a duration of six months (other than for ecology); this will result in the recovery of the effected environmental component (other than for ecology) within a year
	Medium	when impacting between six months and three years; this will result in the recovery of the effected environmental component (other than for ecology) within 1 to 10 years
	Long	when impacting beyond three years (other than for ecology); and will result in recovery of prevailing conditions within 10 years or beyond
Intensity	Low	Low intensity when resulting in changes in the environmental baseline of less than 20% in regional context or 20 to 30% in medium context or up to 30% in local context but for short duration
	Moderate	Moderate intensity when resulting in changes in the baseline for up to 30% in regional context or more than 30% in medium context or for ecology changes are expected to be recoverable in terms of medium

		duration
	High	High intensity when resulting change in the baseline beyond 30% in regional context or for ecology changes serious impairment to species, productivity or their habitat
Type	Adverse	Adverse impacts would deplete or negatively alter resources
	Beneficial	Beneficial impacts would improve resource conditions

Table 23 Impact Significance Criteria for Environmental and Social Components (other than for Ecology)

Significance	Context	Duration	Intensity
Insignificant	Local	Short	Low
Minor	Local	Short	Moderate
	Local	Medium	Low
	Local	Medium	Moderate
	Medium	Short	Low
	Local	Long	Low
Moderate	Local	Medium	High
	Local	Long	Moderate
	Medium	Short	Moderate
	Medium	Medium	Low
	Medium	Medium	Moderate
	Medium	Long	Low
	Medium	Long	Moderate
	Regional	Short	Low
	Regional	Short	Moderate
	Regional	Medium	Low
	Regional	Medium	Moderate
Major	Local	Short	High
	Local	Long	High
	Medium	Short	High
	Medium	Medium	High
	Medium	Long	High
	Regional	Short	High
	Regional	Medium	High

	Regional	Long	Low
	Regional	Long	High
	Regional	Long	High

Note: Positive impacts are termed as beneficial while negative ones are adverse
Source: International Association for Impact Assessment

Table 24 Impact Significance

No.	Aspect/Impacts	Type	Scenario	Significance	
				Construction	Operation
1	Air Quality	Adverse	Without mitigation	Minor	Minor
			With mitigation	Insignificant	Insignificant
2	Noise and Vibration	Adverse	Without mitigation	Moderate	Minor
			With mitigation	Minor	Minor
3	Waste Disposal	Adverse	Without mitigation	Moderate	Negligible
			With mitigation	Minor	Negligible
4	Water Usage and Water Quality	Adverse	Without mitigation	Minor	Negligible
			With mitigation	Insignificant	Negligible
5	Erosion and Soil Quality	Adverse	Without mitigation	Minor	Negligible
			With mitigation	Insignificant	Negligible
6	Aesthetics and Visual	Adverse	Without mitigation	Moderate	Negligible
			With mitigation	Minor	Negligible
7	Biodiversity (Flora and Fauna)	Adverse	Without mitigation	Moderate	Moderate
			With mitigation	Minor	Minor
8	Socio Economy and Livelihoods	Beneficial	Without mitigation	Minor	Minor
			With mitigation	Moderate	Moderate
9	Community and Private Property	Adverse	Without mitigation	Minor	Negligible
			With mitigation	Insignificant	Negligible
10	Community Health and Safety	Adverse	Without mitigation	Minor	Moderate
			With mitigation	Insignificant	Minor
11	Occupational Health and Safety	Adverse	Without mitigation	Minor	Minor
			With mitigation	Insignificant	Insignificant

8 Results of the public consultation and public participation

8.1 Public Consultation Process

- Meetings with officials from the General Administrative Departments (GADs) of the selected townships (Namtu, Hsipaw and Kyaukme).

- Meeting with the officials from the Department of Power Transmission and System Control (DPTSC) of MOEE, township EPC, Planning Department of MOPFI, and Forest Department of MONREC.

- Series of meeting with the Project Proponent in Nay Pyi Taw and Hsipaw township.

- Focus Group Meetings in the affected villages along the transmission line route.

8.2 Results of Public Consultation

Table 25 Results of Pre-consultation meeting with stakeholders

Date and Place of Meeting	Stakeholder	Issues and Concerns
22-11-2019 -Planning Department Office, Namtu	Daw Sam Sam Aye, Assistant Director Planning Department	<ul style="list-style-type: none"> - It is a good project and it may benefit to the development of the township. - Our statistics point out that there is less development in electricity sector in Namtu township and this project may bring the development in this sector.
22-11-2019 -Forest Department Office, Namtu	U Chan Myae Aung, Staff Officer, FD	<ul style="list-style-type: none"> - The project proponent is needed to cooperate with FD before the implementation starts.
22-11-2019 -At the house of village tract administrator, Manli village, Namtu	U Atta Oo, Administrator, Chaung Hsa village tract	<ul style="list-style-type: none"> - I am optimistic and there may not be significant negative effects by the project. - It needs to be carefully considered if the project causes negative impacts rather than positives. - I have no objection regarding with this project, however, I have to raise issues if my farmlands are affected. - It may also need negotiation with affected landowners if there is planned to construct the new access roads.
23-11-2019 -Forest Department (FD) Office, Hsipaw	U Zaw Zaw Oo, Staff Officer, FD	<ul style="list-style-type: none"> - The project proponent is needed to cooperate with FD. - Request permission letter from FD
23-11-2019 -At the house of village tract administrator, Moe Tae village, Hsipaw	U Sai Myint Aung, Administrator, Moe Tae village tract	<ul style="list-style-type: none"> - It is good if this project may electrify the every household, and bring the development of the township. Consequently, life can be more convenient since having access to water and electricity are of great asset for human beings.
23-11-2019 -Administrative office, Ywar Thit village tract, Hsipaw	U San Kaw, Administrator, Ywar Thit village tract	<ul style="list-style-type: none"> - It needs negotiations between the project proponent and the landowners. - The landowners are needed to know about the project properly.
23-11-2019 -At the house of village tract administrator, San Hpeik village tract, Hsipaw	U San Sai, Administrator, San Hpeik village tract	<ul style="list-style-type: none"> - It would be better if households can access 24-hr electricity. - It may bring development of the township.

23-11-2019 -At the house of village tract administrator, Man He village tract, Hsipaw	U Tun Kyi, Administrator, Man He village tract	- I have no special comments regarding with this project. One thing that it needs engagement meetings with farmland owners.
23-11-2019 -Administrative office, Baw Gyo village tract, Hsipaw	U Aung Shwe, Administrator, Baw Gyo village tract	- Fair compensation should be paid to the landowners. - Crop compensation should also be made during the flowering seasons. - Need to cooperate with Department of Agriculture. - Impacts may arise from the “construction of new access road for the transport of materials during the construction phase.”
23-11-2019 - At the house of village tract administrator, Long Khun village tract, Hsipaw	U Kyaw Tun, Administrator, Long Khun village tract	- I have no objection to this project. And it is a good project. - The project should not negatively affect to the local communities. - I had one experience regarding with the land compensation in Chinese Gas pipeline project. First of all, they identify and valuate the land price. Then they made compensation as per identified land category. - It seems the Transmission Line No. 75-76 will pass over the Chinese Gas pipeline. It should be taken care when the construction of Transmission Line starts.
23-11-2019 - At the house of village tract administrator, Kyin Thi village tract, Hsipaw	U Kyaw Zaw, Administrator, Kyin Thi village tract	- The project is good. - Special care should be taken to the villages affected. - Fair compensation should be made.
25-11-2019 - At the house of EE, Township Electricity, Kyaukme	U Win Lwin Shein, EE, MOEE	- According to my experience, 230kv transmission lines may not have adverse environmental effects. - The proponent has to follow, the transmission line instructions. - My previous experiences on transmission line project are follows, - Crop compensation was made for two years, - No land compensation was made since the project was run by the government and the government does not have sufficient budget for full compensation. - If the affected trees are perennial, valuation is conducted carefully first and adjust the compensation rate. - The committee was formed including representatives from the Project Proponent, Immigration Department, Forest Department, Agriculture Department, Agriculture Land Management and Statistics Department. This

		committee made valuation of land.
25-11-2019 -Forest Department (FD) Office, Kyaukme	U Thura Kyaw, Staff Officer, FD	<ul style="list-style-type: none"> - The transmission line alignment seems included in the Reserve Forest (RF). It needs to request the permission to the headquarters of MONREC. - The Transmission Line No. 78-90 pass the Thing Long RF and Line No. 191-192 pass the Tawng Kye RF.
27-11-2019 - At the monestary, Nar Khaw village, Kyaukme	U Wi Li Ya Administrator, Nar Khaw village tract	<ul style="list-style-type: none"> - Transmission line project does not have significant effects. - My previous experiences on the transmission line project are that the government implemented the project by force. We did not have rights to raise our issues and receive any kind of compensation. - Community safety should be considered to avoid electrical hazards, fall down of the Transmission Line (TL) towers. - The tension of the cable should not be too loose, not too close to the ground. - During the installing of cables, the farmland may be affected. - During the construction period, the sand pile may destruct the farmland. - After digging the farmland for the foundation of TL tower, top soil should be re-covered on that area so that the crop can be grown.
27-11-2019 - At the house of village tract administrator, He Kwi village tract, Kyaukme	U Sai Than Maung Administrator, He Kwi village tract	<ul style="list-style-type: none"> - It needs consultation meetings with the affected local communities. - The TL is likely to pass over the farmland of the villages. Thus compensation should be made. - Education (including potential electrical hazards near the TL) of local communities should be conducted since one person from Nar Khaw village died due to the electrical hazards.
27-11-2019 - At the village restaurant, Lwal Hsaut village tract, Kyaukme	U Daw Na Administrator, Lwal Hsaut village tract	<ul style="list-style-type: none"> - The local people from the affected villages should be consulted during the development stage of the project. - In the previous TL project implemented by the government, the local people did not know everything about the project. - Although the compensation was planned to be made to the affected landowners, and crop compensation was also said to be made during the cable installation, the compensations of crops and land acquisition are not received yet. - Thus, it should fully cooperate with local people from the effected village group.

27-11-2019 - At the house of village tract administrator, Kywal Kone village tract, Kyaukme	U Sai Hla Myint Administrator, Kywal Kone village tract	<ul style="list-style-type: none"> - There are other development projects in this area. i.e Chinese Gas Pipeline and Mandalay-Muse Railway projects. - The overall comment is that negotiation should be made with local people from the affected villages. - We have no objection. - Fair compensation should be made. - Negotiation with affected landowners is a must. - If the project is implemented during Summer season (March-May), the impacts on crop and farmland will be minimum.
27-11-2019 - At the house of village tract administrator, Pan Lawt village tract, Kyaukme	U Sai Hla Win Administrator, Pan Lawt village tract	<ul style="list-style-type: none"> - We need electricity. It would be good if the project make the village electricity accessed. - The proponent should negotiate with the local communities, and fulfill the needs of local people.

8.3 Information Disclosure

i Approach to Information Disclosure

The draft version of the printed executive summary of this IEE reports in local language are distributed to the heads of villages and village tracts so that the local residents along the TL alignment can know more about the description of the project, baseline environmental and social settings and potential environmental and social impacts of the project. Meanwhile, public feedback forms are also distributed along with the executive summary.

ii Public Feedbacks

The total of 109 filled-in feedback forms are received from the concerned villages. The feedbacks are translated and summarized as follows,

Table 26 Summarized Public Feedbacks and NCEH's Responses

Summarized Feedbacks	Responses of feedbacks by the Proponent (NCEH)
Environmental Impacts	
<ul style="list-style-type: none"> • Minimize the adverse environmental impact as much as possible. • Minimize the noise along the TL alignment. • Avoid springs and forests when undertaking the project. • Avoid the construction of towers within the watershed area. 	<ul style="list-style-type: none"> • We do care about the environmental impacts while implementing the projects and will follow the guidelines and procedures of the ECD. • Same as above. • We will manage to avoid and minimize the impacts. • Same as above.
Social Impacts	
<ul style="list-style-type: none"> • Minimize the impacts on farmland and garden land. • Minimize the destruction of household structures. 	<ul style="list-style-type: none"> • We will manage to avoid the acquisition and impacts on farmlands and garden lands. • We have planned to avoid the household structures while implementing the project. If the households are likely to be affected, we will coordinate and negotiate with PAPs and relevant stakeholders.

<ul style="list-style-type: none"> • Undertake the project activities to avoid the crop growing season. • Provide fair compensation to the farmers who have direct impact by the project activities. • Minimize the impacts on livelihoods of the villagers. • Taking care about the community health and safety issues. • Ensure the electrical safety for the villagers. • Project implementing staffs/workers have to follow the guidance and instructions from the village heads during their stay at project site or within the villages. • Provide electricity and community development plans. 	<ul style="list-style-type: none"> • We will manage to avoid the crop growing season depending on the time and circumstance of the project implementation. If we cannot avoid, we will coordinate with relevant stakeholders and pay the compensation as per rates from Valuation of Land and Crops Compensation Committee and Validation of Compensation Price Committee. • If the project needs acquisition of farmland and garden land, we will coordinate with relevant stakeholders and pay the compensation as per rates from Valuation of Land and Crops Compensation Committee and Validation of Compensation Price Committee. • We will manage so as not to impact on livelihoods of the villagers. • We will manage for the health and safety of community and occupational risks, and wildlife in its vicinity while implementing the project. • Same as above. • We will coordinate with relevant heads of villages while implementing the project. • We will coordinate with relevant stakeholders depending on the feasibility of the CSR program of the project.
Comments/Suggestions	
<ul style="list-style-type: none"> • The construction of the Tower Foundation should follow the required standards and use the qualified ingredients. • Priority should be given to the villagers when the project needs labours. • Undertake the project activities during the dry seasons especially non-harvesting seasons. • Knowledge sharing on electricity hazards and safety should deliver to the nearby villages. • Provide the surrounding communities to have access the grid electricity. • Improve the access roads in close vicinity to the project. • Villagers should be notified about the project before prior to implement the project. 	<ul style="list-style-type: none"> • The experts from diverse sectors will be participated and lead the project implementation to meet with required standards. • We will manage to create job opportunities for the villagers depending on their skills. • If the project implements during the crop growing season, we will coordinate with relevant stakeholders and pay the compensation as per rates from Valuation of Land and Crops Compensation Committee and Validation of Compensation Price Committee. • We will share about knowledge on electrical safety when necessary. • We will coordinate with relevant stakeholders depending on the feasibility of the CSR program of the project. • We will coordinate with relevant stakeholders depending on the feasibility of the CSR program of the project. • We will disclose the project information through Public Hearing Meetings in the villages where the TL alignment likely to be traversed.

9 Environmental Management Plan and Monitoring Plan

9.1 Environmental Mitigation and Management Plan

Environmental Officer (EO) is required to be appointed to monitor the implementation of environmental mitigation measures by contractor during the different phase of the project.

The environmental mitigation measures described in table 23 aims to minimize the negative impacts of the transmission line construction and meanwhile, enhance the positive and beneficial impacts.

Prior to construction, the construction contractor will develop a suite of Site- Specific ESMMPs which address specific segments of the ROW, based on site conditions (e.g. proximity to villages, waterways and natural habitats).

Table 27 Environmental Mitigation and Management Plan

Environmental Aspect	Potential Impact	Mitigation Measures	Location	Time Frame	Responsibility	
					Execution	Monitor
Pre-construction						
Land Use	Removal of productive land (temporary and permanent)	<ul style="list-style-type: none">- Livestock in affected areas will be relocated, where necessary;- Land acquisition and compensation for crops issues will be settled out before construction and will be reviewed by MOEE.- Ensure that negotiations for compensation should include relevant stakeholders from government and communities.- Also ensure that the compensation rates are at par with the market rates.- It also needs to be ensured that the opportunity cost of such land is considered when deciding the	Agricultural land and private land	Pre-construction	Contractor	Environmental Officer

		compensation amount.				
Construction						
Air Quality (Atmospheric emission/dust)	Dust emissions from exposed soils, transport of materials and increased traffic.	<ul style="list-style-type: none"> - Apply water on dust generating areas including unpaved roads and staging areas. - Restrict the speed limits of vehicles while moving on unpaved roads. - Cover of vehicles carrying soil, sand and other loose material. - Keep the vehicle and construction equipment in good working condition. - Minimize the idling time of vehicles and construction equipment. - Suspend dust generating activities while in high wind. 	All construction areas	Throughout the construction phase	Contractor	Environmental Officer
Noise and Vibration	Increased noise and vibration levels may disturb local residents and fauna, and can present a risk to personnel.	<ul style="list-style-type: none"> - Carry out regular inspection on noise and vibration generating equipment (including construction vehicles). - Utilize appropriate noise and vibration control function in close proximity to sensitive receptors (such as school, monastery, hospital, retirement homes). - Install the Stationary equipment generating noise and vibration as much as away from the residence. 	All construction areas	Throughout the construction phase	Contractor	Environmental Officer

		<ul style="list-style-type: none"> - Limit the operating hour of noise generating construction activities and if possible, install temporary noise barriers in close proximity to settlement area. - Provide hearing protection to all construction personnel working in noisy condition (with noise level above 80dB). - Conduct the blasting (only if necessary) within 7am to 17pm, and limit the number of blasts that occur per hour or per day. Coordination with nearby residents is recommended. 				
Waste Disposal	<ul style="list-style-type: none"> - The debris generated from construction activities can be carried along with small springs, rivulets and rivers flowing in proximity of the tower. - Construction debris can also contaminate wells, canals etc. in proximity of the activity. - Random disposal of waste generated from the temporary worker camp can block the drainage, spring and stream. 	<ul style="list-style-type: none"> - Collect all construction wastes generated at the site and domestic waste from the worker camp, transport and dispose at the dump site approved by the local authorities. - Leave the site as original after the completion of construction activities. - Follow 3Rs principle (reduces, reuse and recycle) at the construction site. - Prohibit the random disposal of any waste generated from the construction activity. - Provide adequate number of waste bins in the places where waste 	All construction areas including worker's camps	Throughout the construction phase	Contractor	Environmental Officer

		<p>generated.</p> <ul style="list-style-type: none"> - Reuse the Excavated spoils as backfill material. - Re-collect drop of materials while transporting. - Install the temporary pit latrine for worker camp. - Prohibit burning the solid waste at the site. - managed in accordance with all applicable regulations if chemical are necessary to store at the site, prepare Control and Emergency Response Procedure, follow the MSDS (Material Safety Data Sheets) as applicable. 				
Water Usage and Water Quality	<ul style="list-style-type: none"> - Over exploitation of water from underground, spring or stream can contribute water scarcity to nearby resident during dry season. - Release of sediment laden effluent during construction, for example soil waste from drilling activities can contaminate the nearby water quality. - There is potential for hazardous materials to be released to the environment, particularly during storage and handling and equipment/ 	<ul style="list-style-type: none"> - Optimize the usage of water at the construction site. - Ensure the prevention of runoffs in close proximity to water bodies. - At the river and stream crossing points, manage the horizontal clearance (the distance between the towers) to be greater than the maximum river/stream width at high flood level, and the vertical clearances to be according to the statutory requirements. - Undertake clearing and earthworking operations during dry season to minimize erosion and subsequent release of sediment which 	All construction areas	Throughout the construction phase	Contractor	Environmental Officer

	vehicle maintenance.	<p>lead surface water pollution.</p> <ul style="list-style-type: none"> - Locate the stockpile materials at least 30 meter away from steep slopes, water courses or drainage paths. - Manage chemical and oils to be stored on the hard concrete base, and provide overhead protection to cover rain and severe weather. - Prohibit Discharge/disposal of oil contaminated water and solid wastes into the water body. - Conduct regular maintenance of vehicles and construction equipment to avoid leakage of oil. - Prepare contingency plans for control of spills of oil and other hazardous substances and provide spill collection kits at the site. - Install Temporary pit latrine for worker camp. 				
Erosion and Soil Quality	<ul style="list-style-type: none"> - Potential impacts will be due to change to soil structure and soil quality as a result of excavation or compaction. - Removal of vegetation and trees during construction of foundation, especially on the slopes would render soil 	<ul style="list-style-type: none"> - If possible, carry out the construction activities (especially land clearance and earthworking) in non-monsoon months which will minimize any rainwater run-off or any loss due to infiltration. - If vegetation clearing is required on river banks, vegetation will be cut near ground level to leave root mass 	All construction areas	Throughout the construction phase	Contractor	Environmental Officer

	<p>vulnerable to erosion.</p> <ul style="list-style-type: none"> - The excavated if kept uncovered and unprotected will be rendered vulnerable to loss from erosion. - Discharge or spill of oil and other hazardous substances can contaminate the surface soil 	<p>in the ground. This helps to reinforce soil stability and reduce erosion.</p> <ul style="list-style-type: none"> - Store construction materials within the footprint of the site where hard concrete base and overhead protection are provided so as to avoid any kind of damage or contamination of soil/crop of adjoining fields. - Prepare contingency plans for control of spills of oil and other hazardous substances and provide spill collection kits at the site. - restrict the mobilization of construction vehicles through farmland area so as to avoid rutting and soil compaction. - Adopt the mitigation measures stated under the section of Waste Disposal and, Water Usage and Water Quality. 				
Aesthetics and Visual Impact	<ul style="list-style-type: none"> - ROW clearance, the casting of tower foundation and the presence of steel tower structures will be disturbed visual amenity. - TL structures which may lead to change of landscape resource and character due to introduction of manmade features leading to visual intrusion and loss of visual 	<ul style="list-style-type: none"> - Minimize the clearing of trees wherever possible, and adopt <i>vis-à-vis</i> felling of trees while trimming. - The lattice structure of towers provide sufficient see through effect which diminish the visual impact on the aesthetics of the area. - The area being hilly terrain with undulations restrict the view of many towers in a single view, moreover the 	All construction areas	Throughout the construction phase	Contractor	Environmental Officer

	amenity.	<p>height of tower do not appear to be significant with reference the terrain.</p> <p>-Trees will be preserved on the road easements so long as the vertical safety clearance is complied</p>				
Biodiversity (Flora and Fauna)	Impact on Flora will be due to vegetation clearance	<p>- Follow the Forest Law (2018), Conservation of Biodiversity and Protected Areas Law 2018, especially the sections of laws and regulations highlighted in chapter 5.</p> <p>- Deliver awareness training on conservation of biological diversity to all level of construction unit prior proceeding to any construction works.</p> <p>- Consult and coordinate with Forest Department if trees are needed to be removed.</p> <p>- Identify and demarcate all trees to be removed within the ROW area.</p> <p>- Minimize vegetation clearance as much as possible and ensure that the clearance not beyond designated area.</p> <p>- Dispose the chopped trees in accordance with guidance of Department of Forest.</p> <p>- Prohibit the extraction of forest products by construction workers.</p>	All construction areas	Throughout the construction phase	Contractor	Environmental Officer

		<ul style="list-style-type: none"> - Prohibit utilization of herbicide for clearing vegetation. - Prohibit the burning of vegetation debris at the site and adopt the measures stated in Waste Disposal section. 				
Biodiversity (Flora and Fauna)	Impact on Fauna can be resulted from mobilization of construction vehicles	<ul style="list-style-type: none"> - Carry out regular maintenance of Construction vehicles and machinery to minimize unnecessary noise generation. - Restrict the speed limit of construction vehicles within the project footprint to 40 km/hr to minimize potential for fauna strike. - Deliver awareness training on conservation of biological diversity to all level of construction unit prior proceeding to any construction works. - Prohibit strictly the hunting of wild animals (including birds), and fishing. 	All construction areas	Throughout the construction phase	Contractor	Environmental Officer
Socio Economy and Livelihoods	Construction of the transmission line and associated infrastructure will provide employment opportunities to local people	<ul style="list-style-type: none"> - Give the priority to local people while the project needs construction workers. - Avoid mass migration of workers from outside of project area. - Deliver Health and Safety Trainings before commencement of any construction activities. - Support local/community bazaar by 	All construction areas	Before and during construction phase	Contractor	Environmental Officer

		buying meat, fish and vegetables from local market very often for the kitchen of Worker Camp.				
Damages to community and private/individual property during construction activities.	- Potential disturbance of/damage to property and community facilities.	<ul style="list-style-type: none"> - Ensure that the construction activities are to be well planned/arranged that any use of community and individual property is either avoided or prior permission sought before use. - Immediately compensated if any unforeseen use and/or damage to property or structures etc. - Relocate livestock in affected areas where necessary. - Settle out land acquisition and compensation for crops issues and coordinate with MOEE before commencement of the construction. - Ensure that negotiations for compensation should include relevant stakeholders from government and communities. - Also ensure that the compensation rates are at par with the market rates. - Ensured that the opportunity cost of such land is considered when deciding the compensation amount. 	All construction areas	As necessary	Contractor	Environmental Officer
Community Health and Safety (Infectious Disease,	<ul style="list-style-type: none"> - Possible increase in disease transmission. - Accident caused by 	- Commit to meet Electricity Law and other Myanmar regulation requirements as well as international conventions on labour, especially on	The construction area in close vicinity to residential areas	Throughout the construction phase	Contractor	Environmental Officer

and Accident)	mobilization of construction vehicles and other activities.	<p>issues of child and forced labour, working conditions, collective bargaining, non-discrimination and equal opportunity, complaint and grievance mechanism as well as occupation health and safety.</p> <ul style="list-style-type: none"> - Inform and/or notify the construction schedule and its activities to the sensitive receptors such as school, monastery and affected household structures prior to commence the construction. - Adopt the measures described in mitigation measures subsection of Air Quality, and Noise and Vibration. 				
Traffic and Transport	- Accident associated with the traffic movement in working areas may lead to property/equipment damage and injury to workers or nearby villagers.	<ul style="list-style-type: none"> - Minimize the use of village roads and if it is necessary to use the village roads, coordinate with village authorities to get permission of use and improve the roads before using it. - Arrange the flexible transport schedule for construction vehicles to avoid peak hours of road usage. - Install traffic signs for all roads throughout construction areas. - In the event that stringing conductors present a possible risk to traffic, construct the temporary barriers (such as bamboo scaffolds) across the roads and rivers to protect 	All project roads and public roads	Throughout the construction phase	Contractor	Environmental Officer

		the public and property.				
Occupational Health and Safety (Accident and Injury)	<ul style="list-style-type: none"> - Potential for accident and injury during construction. - Accident and injury while working at height - Spread of transmissible diseases between worker and - Contraction of disease due to poor sanitation and environmental temporary worker camp 	<ul style="list-style-type: none"> - Deliver Occupational Health and Safety awareness trainings to all workers before the construction starts. - Provide facilities to help workers access clean drinking water. - Provide proper sanitation facilities at the worker camp. - Provide first aid kits which can be easily accessible by worker at the site and deliver relevant trainings on first aid and utilization of first aid kits. - Minimize mosquito breeding habitat at the worker camp and provide mosquito nets and other facilities to avoid mosquito-borne diseases. - Provide PPE covering protection of head, eye, hearing, hand, feet and height and access to workers. - Ensure proper shutdown of the line/utilities with prior information and permission if stringing activities are near low tension wires/high tension wires and other electrical utilities. 	All construction areas	Throughout the construction phase	Contractor	Environmental Officer
Operation						
Air Quality	<ul style="list-style-type: none"> - Generation of ozone and nitrogen oxides from the overhead transmission line can occur as a result of corona 	<ul style="list-style-type: none"> - Prohibit the burning of vegetation debris after ROW maintenance trimming. - Check the vehicles and other heavy 	Along the ROW of TL	Throughout the operation phase	Contractor	Environmental Officer

	<p>discharge during the humid weather condition.</p> <ul style="list-style-type: none"> - Potential air pollution due to burning of vegetation debris during ROW maintenance work. 	<p>machineries prior to start the maintenance operations.</p> <ul style="list-style-type: none"> - Restrict the speed limit of vehicles while moving on unpaved roads. - Turn off the engines of vehicles and heavy machineries while not in use. - Avoid dust generating activities while in high wind 				
Noise and Vibration	<ul style="list-style-type: none"> - Potential noise generation from maintenance and repair activities and ‘Corona discharge’ from the overhead lines -No vibration is expected during the operation period. 	<ul style="list-style-type: none"> - Select the Conductors and other facilities to minimize the corona discharge. 	Along the ROW of TL	Throughout the operation phase	Contractor	Environmental Officer
Biodiversity (Flora and Fauna)	<ul style="list-style-type: none"> - The ROW may interrupt the continuity of forest habitat (mostly degraded deciduous forest) - Potential impact to resident fauna due to electrocution - Disturbance of resident fauna due to noise and light from maintenance activities 	<ul style="list-style-type: none"> - Restrict vegetation trimming within the ROW to safely operate the transmission line. - Retain the groundcover and mid-storey vegetation wherever practicable. - Implement landscaping and re-vegetation after completion of construction in suitable areas. - Adopt vegetation management program to raise awareness on the values of natural habitat areas to personnel work force and prohibit the poaching and forest product 	ROW Maintenance area	Throughout the operation phase	Contractor	Environmental Officer

		<p>collection.</p> <ul style="list-style-type: none"> - Strictly prohibit hunting wild animal. - Design the transmission line to minimize risk of electrocution, including maintaining a 1.5 meter spacing (refer to the guidelines or guidance from DPTSC) between energized components and grounded hardware, or covering energized parts. 				
Economy and Livelihoods	<ul style="list-style-type: none"> - Beneficial impacts are predicted during the maintenance of the ROW, particularly vegetation management, can provide employment to local residents 	<ul style="list-style-type: none"> - Give the priority to local people while the project needs during the operation phase. - Deliver Health and Safety Trainings before commencement of any construction activities. - Support local/community bazaar by buying meat, fish and vegetables from local market very often for the kitchen of Worker Camp. 	ROW Maintenance area	Throughout the operation phase	Contractor	Environmental Officer
Community health and safety	<ul style="list-style-type: none"> - Community will have concerns about its safety and possibility of any accidents like electrocution, skin diseases etc. - Electrocution due to contact with high voltage electricity or items in contact with high voltage electricity (such as tools, vehicles or ladders). 	<ul style="list-style-type: none"> - Evaluate possible risks and ensure that these are addressed and minimized. - Communicate about the technical aspects of the transmission line construction and operations, and allay fears about accidents or any other health concerns. - Use simple diagrams and pamphlets 	Along the ROW of TL	Throughout the operation phase	Contractor	Environmental Officer

		<p>in local language for this purpose.</p> <ul style="list-style-type: none"> - Train land owners about safety issues and action to be taken in case of risks. - Demonstrate that MOEE and its contractors are very concerned about health and safety of workers as well as the community. - Signs and barriers will be installed to prevent access to high voltage areas. - Grounding conducting objects will be installed near transmission lines. - Ensure communication of health and safety risks to villagers near to settlements in batches and explain the various health and safety measures being undertaken. 				
Occupational Health and Safety	<ul style="list-style-type: none"> - Exposure to EMF at levels higher than those experienced by the general public. - Electrocution due to contact with high voltage electricity or items in contact with high voltage electricity (such as tools, vehicles or ladders). - Working at height on towers. 	<ul style="list-style-type: none"> - Develop EMF safety program prior to operation which: identifies potential levels of exposure; provides training for all workers; delineates zones appropriate for public access and those restricted to appropriately trained workers; defines measures to limit exposure time, such as through work rotation; and provides personal monitoring equipment for workers. - Ensure compliance of safe practices and implementation of safety manual 	Along the ROW of TL	Throughout the operation phase	Contractor	Environmental Officer

		<ul style="list-style-type: none"> - Provide PPE covering protection of head, eye, hearing, hand, feet and height and access to workers. - Securing the workplace, wherein all lines are shut down prior to maintenance work, use of PPE and procedures for emergencies and compensation procedures in case of accidents. - Prior training of the workers regarding health and safety procedures is essential. - Deactivate transmission lines prior to work on, or near, transmission lines. - Conduct the Live work by trained workers. - Implement fall protection measures including provision of appropriate fall protection equipment, training in use of equipment, training in climbing techniques, and rescue of fall-arrested workers. - Rate and maintain properly all equipment, including hoisting equipment, power tools and tool bags. 				
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9.2 Environmental Monitoring Plan

Successful implementation of Environmental Monitoring Plan depends on regular monitoring, documenting and reporting. The Environmental Officers should monitor the environmental measures and submit a quarterly report to the concerned department. Additionally, another yearly monitoring report with quarterly monitoring data should be submitted to the Environmental Conservation Department for renewing the Environmental Clearance Certificate.

The initial monitoring program based on the impacts and mitigation measures defined in this IEE is provided in Table 24. Monitoring in the construction period can be categorized in the following:

- For the contractor implementing construction, monitoring to ensure on a day to day basis that mitigation measures are fully implemented with construction activities, and that results observed comply with the contractual obligations.
- For the Environmental Officer, carry out routine inspections to ensure that monitoring results provided by the construction contractor are corrected, to provide the necessary environmental coordination and interface with the contractors, and to provide a comprehensive picture of the current environmental situation and efforts at site level.

Table 28 Environmental Monitoring Plan

Environmental Indicator	Monitoring Location	Monitoring Method	Reporting Frequency	Responsibility		Estimated Cost (USD)
				Supervision	Implementation	
Pre-construction						
General	- All construction site	- Check and revise (if necessary) the environmental mitigation measures described in Table 9.2-1.	Once	PMU	Environmental Officer	No marginal cost
Community/private properties and sensitive receptors (e.g., cultural property and values, new schools or hospitals) along TL corridors and at substation sites.	- All construction site - Along the ROW of TL	- Field observation and consultation with local communities.	Once	PMU	Environmental Officer	No marginal cost
Construction						
Air Quality (Dust generation)	- Unpaved roads in close vicinity to the residential areas - The construction site operating earthworks	- Visual observation of whether dust suppression measures are applied or not.	Weekly	Environmental Officer	Contractor	Cost is included in the contract
Air Quality 1) Nitrogen dioxide, 2)	See in Table 9.3-3 and Figure 9.3-1	Using field and analytical methods approved by MONREC	Annual	Environmental Officer/PMU	Environmental Contractor	3,500.00

Particulate Matter PM ₁₀ , 3) Particulate Matter PM _{2.5} , 4) Sulphur Dioxide, 5) Relative Humidity, 6) Temperature, 7) Wind Speed, and Wind Direction						
Noise Level (dBA)	See in Table 9.3-4 and Figure 9.3-1	Using field and analytical methods approved by MONREC (24 hours continuous monitoring)	Annual	Environmental Officer/PMU	Environmental Contractor	1,600.00
Water quality: Biochemical oxygen demand (BOD), Chemical oxygen demand (COD), Oil and grease, pH, Temperature, Total coliform bacteria, Total nitrogen, Total phosphorus, Total Suspended solid (TSS)	See in Table 9.3-5 and Figure 9.3-1	Using field and analytical methods approved by MONREC	Annual	Environmental Officer/PMU	Environmental Contractor	3,000.00
Waste Disposal	- All construction areas - At temporary worker camp	- Monitor the amount and types of generated wastes. - Visual observation of whether wastes are properly disposed and wastes bins are sufficiently provided or not.	Weekly	Environmental Officer/PMU	Contractor	Cost is included in the contract
Water Usage and Water Quality (refer to the Table 6.4-17 for the parameter to be studied)	- The construction site near stream or river - At worker camp	- Record the monthly water usage and sources. - Outflow of construction site to the stream or river. - Use equipment to check water quality or taking water samples and analyzed at the laboratory. - Visual observation of whether stockpiles are close to watercourses and drainage paths and sediment traps are installed or not.	Annual	Environmental Officer/PMU	Contractor	Cost is included in the contract
Erosion and Soil Quality	- The construction site near stream or river - The area of land suspected	- Visual observation of whether mitigation measures are applied or not.	Annual	Environmental Officer/PMU	Contractor	Cost is included in the contract

	to be contaminated by construction works					
Biodiversity (Flora and Fauna)	<ul style="list-style-type: none"> - The construction site where TL traverse the reserved forests - The construction site where vegetation are needed to be cleared - The construction site where wildlife species are observed 	<ul style="list-style-type: none"> - Field visual observation of whether the vegetation is cleared within the defined area or not. - Field visual observation of illegal hunting of wildlife by construction workers. 	Annual	Environmental Officer/PMU	Environmental Contractor	2,500.00
Community Health and Safety (Infectious Disease, and Accident)	<ul style="list-style-type: none"> - Along the ROW of TL - All construction areas 	<ul style="list-style-type: none"> - Record of infectious diseases electrocution and accidents related to the community. - Monitor if construction workers follow laws and regulations related to electricity, traffic, health and safety. 	<ul style="list-style-type: none"> - Monthly by contractor - Annual by Environmental Officer 	Environmental Officer/PMU	Contractor	Cost is included in the contract
Traffic and Transport		<ul style="list-style-type: none"> - Monitor if the driver follows the speed limit, road safety rules or not. 	<ul style="list-style-type: none"> - Monthly by contractor - Annual by Environmental Officer 	Environmental Officer/PMU	Contractor	Cost is included in the contract
Occupational Health and Safety (Accident and Injury)	<ul style="list-style-type: none"> - All construction areas 	<ul style="list-style-type: none"> - Monitor if the first-aid kits and PPE are sufficiently provided. - Monitor if the construction workers wear the provided PPE, fall protection measures are properly applied and follow the health and safety plans. 	<ul style="list-style-type: none"> - Monthly by contractor - Annual by Environmental Officer 	Environmental Officer/PMU	Contractor	Cost is included in the contract
Operation						
Waste Disposal	<ul style="list-style-type: none"> - The area where maintenance operations are periodically conducted 	<ul style="list-style-type: none"> - Visual observation of whether wastes generated from maintenance operation are appropriate disposed or not. 	During maintenance operations	Contractor	Environmental Officer	
Biodiversity (Flora and Fauna)	<ul style="list-style-type: none"> - The area where trimming of vegetation are necessary 	<ul style="list-style-type: none"> - Monitor if trimming of vegetation are carried out within the define limit. 	Annual	Environmental Officer/PMU	Environmental Contractor	2,500.00
Community Health and Safety (electrocution)	<ul style="list-style-type: none"> - Along the ROW of TL - The area where TL cross over the residential households, village access 	<ul style="list-style-type: none"> - Monitor if signs and barriers are properly installed, and conducting objects are grounded. 	Annual	Environmental Officer/PMU	Environmental Contractor	1,000.00

	road and farmland					
Occupational Health and Safety	- Along the ROW of TL - The area where maintenance operations are potentially required	- Visual observation of whether fall protection measures are adopted and PPE are properly worn or not.	Annual	Environmental Officer/PMU	Environmental Contractor	1,000.00
EMF levels	Sites where sensitive receptors are located within 5m from the alignment	Measurement of EMF levels	Bi-annual	Environmental Officer/PMU	Environmental Contractor	1,200.00

Table 29 Environmental Monitoring Location for Air Quality Survey

Sampling Point	Coordinates	Description of Sampling Point
AQ-1	22°45'26.29"N 97°17'41.05"E	Namtu HPP compound near Chaung Sar village, Namtu Township
AQ-2	22°40'51.79"N 97°19'57.97"E	Pan Ne Village, Hsipaw Township
AQ-3	22°14'48.93"N 97° 5'51.66"E	Upper Yeywa Hydropower project site

Table 30 Environmental Monitoring Location for Noise Level Stations

Monitoring ID	Coordinates	Description
N-1	22°45'26.29"N 97°17'41.05"E	Namtu HPP compound near Chaung Sar village, Namtu Township
N-2	22°40'51.79"N 97°19'57.97"E	Pan Nea Village, Hsipaw Township
N-3	22°40'36.99"N 97°19'1.95"E	Naung Thagyar Village, Hsipaw Township
N-4	22°14'48.93"N 97° 5'51.66"E	Upper Yeywa Hydropower project site
N-5	22°26'45.30"N 97° 3'37.10"E	Pan Lock Village, Kyaukme Township

Table 31 Environmental Monitoring Location for Surface Water Quality Survey

Category	Sampling Point	Coordinates	Description of Sampling Point
Surface Water	SW- 1	22°42'37.20"N 97°19'58.73"E	Myitnge River near Transmission Line Tower no, 20 and 21
Surface Water	SW -2	22°34'6.85"N 97°12'12.22"E	Near Longkon village, Hsipaw township and Transmission line Tower no. 76.
Surface Water	SW-3	22°14'34.38"N 97° 5'41.47"E	Near Dam site of Upper Yeywa Hydropower project and Dokehtawaddy Bridge (Yeywa)

10 Conclusion and Recommendation

The proposed project includes construction and operation of the 230kV overhead transmission line originated at the 210 MW hydropower station in Namtu township, traverses the Hsipaw township, and ends at the new switching substation under the construction unit 3 of the Upper Yeywa Hydropower Development project.

This IEE was prepared at the planning stage of the project, following the procedures and any applicable guidelines issued by MONREC. Field surveys (of physical, ecological and social) were carried out based on the sensitivity of the surrounding environment throughout the transmission line alignment to assess the potential environmental and social impacts. This IEE report reveals all potential environmental and social impacts, and proposed mitigation measures which were based on the description of the project information provided by the proponent and significance of the predicted impacts.

Since the alignment of this overhead transmission line avoids ecologically sensitive and large settlement areas, the project will not cause significant adverse environmental and social impacts except the farmland compensation issues due to the land requirement for the tower foundation structure. However, the project associated impacts such as dust and PM pollution, noise pollution, drainage congestion and water logging, soil contamination, increase of solid waste generation, occupational and community health hazards are mostly expected to occur during the construction stage. These impacts are expected to be short term in nature and can be minimized with the proposed mitigation measures.

It is recommended that regular monitoring of the proposed EMPs, EMoP stated in this IEE report and execution of environmental mitigation measures should be carried out during the construction and operation stages of the project.

CHAPTER 1

INTRODUCTION

1.1 Project Background

The proposed project, 230kV overhead Power Transmission Line (here after called “TL”) is intended to connect output electricity from Namtu (Hsipaw) hydropower station to the new switching sub-station at Upper Yeywa hydropower project and then connected to the power grid of Myanmar through the Upper Yeywa HPP 230 kV Shwesaryan Substation double circuit transmission lines. The transmission line will originate at the 210 MW Namtu (Hsipaw) hydropower plant, located on the upper and middle reaches of Namtu river in Namtu township. The TL will also pass the Hsipaw township and -terminate at substation of Upper Yeywa hydropower project in Kyaukme township.

The estimated annual power generation of the Namtu (Hsipaw) hydropower plant is about 1,005.48 GWh. The estimate length of the TL will be 75.67 kilometers (47.02 miles) and the alignment of the TL was approved by the Department of Electric Power and Planning (DEPP). The construction work will be carried out by Natural Current Energy Hydropower Co., Ltd. (NCEH) under the supervision of Department of Power Transmission and System Control (DPTSC), Ministry of Energy and Electricity (MOEE) Myanmar.

In order to meet with growing electricity demand, Ministry of Electricity & Energy (MOEE) has been planning to accelerate the development of power generation, transmission and distribution facilities including exploring additional hydropower sources, construction of new power grid and substation, upgrading existing systems, seeking sustainable and renewable energy and other available means of energy sources in consultation with overseas financial institutions and development partners.

As a result, this project was opted as an essential infrastructure with intention of boosting the capacity of country’s power grid facility which will play significant role to meet the substantial needs of electrical power supply in Myanmar.

This IEE report is prepared according to the EIA Procedure with the notification letter, letter no. 616/2015 that dated on 29th December 2015, issued by the Ministry of Environmental Conservation and Forestry. This report includes the comprehensive assessment of potential environmental impacts by the project intervention along the TL alignment and proposed Environmental Management and Monitoring Plans for the different phases of the project. The goal of this IEE study is to promote environmentally sustainable livelihoods and development of the country. The general objectives for long term are:

- Conservation and sustainable use of natural resources,
- Promotion of public awareness on environmental issues,
- Integration of environmental considerations in development planning process,
- Generation, storage, and dissemination of environmental information, and
- Linking grassroots development strategies to global and international initiatives.

The specific objectives for power transmission line are:

- To assess the nature, intensity and duration of impacts, positive and / or negative, to proposed development projects,

- To assist in decision-making with regard to costs and benefits of proposed development projects,
- To promote local community and public participation in the IEE process, and
- To promote social and cultural considerations in project design

The following activities will be implemented to meet the completion of these objectives.

- Examining the existing baseline data that describe all relevant physical, biological, social, cultural and economic characteristics of the potential project affected area through secondary sources such as reviews and field investigation
- Evaluating the initial existing conditions before the Project started and significances of the positive and negative impacts which can affect to the proposed project area by project activities of transmission line construction and operation
- Understanding the past and current history of lands to be acquired and identify the loss of assets by projects activities
- Adopting and applying the effective mitigation measures that could avoid or mitigate the potential impacts to a level deemed as acceptable
- Defining the appropriate environmental and social management and monitoring plans to be implemented throughout the life of project cycle.

1.2 Scope of Work

The scope of work for IEE included the followings:

- a) Identification of the legal and policy framework applicable to the Project;
- b) Description of the principal project features and technical specifications, including pre construction, testing and commissioning, operation and maintenance (as provided by the project proponent);
- c) Summary of approach adopted by the project proponent for design of the transmission line and assessment of alternatives available for the Project together with an overview of outcome of the key decisions already taken up by the company for the transmission line alignment;
- d) Description of the existing environmental and social baseline of the Project in terms of key sensitivities and potential constraints on the construction and operation and maintenance of the transmission line;
- e) Assessment of the land use, air, noise, water, and the natural (biological) environment including parameters of human interest (social issues) based on primary surveys and available secondary data;
- f) Identification of potential adverse environmental and social impacts during erection and operation of the transmission line and mitigation measures to be adopted by the project proponent; and
- g) Suggestion to develop Environmental and Social Action Plan (ESAP) outlining preventive and control strategies for minimizing negative impacts during construction and operation (including maintenance) phases of the proposed project along with the cost and time schedules for implementation of the ESAP.

CHAPTER 2

PROJECT DESCRIPTION

2.1 Project Background

The proposed project, 230kV overhead Power Transmission Line (here after called “TL”) is intended to connect output electricity from Namtu (Hsipaw) hydropower plant to the new switching sub-station at Upper Yeywa hydropower project. The line will be connected to the national grid through the Upper Yeywa HPP 230 kV Shwesaryan Substation double circuit transmission lines. The transmission line will originate at the 210MW Namtu (Hsipaw) hydropower station, located on the upper and middle reaches of Namtu river in Namtu township. The line will also traverse the Hsipaw township and terminate at Upper Yeywa hydropower plant in Kyaukme township.

The feasibility study had been conducted and the TL alignment was approved by DEPP of MOEE in late 2018. The construction of the project will be carried out by Natural Current Energy Hydropower Co., Ltd. (NCEH) with BOT (build, operate and transfer) system under the supervision of Department of Power Transmission and System Control (DPTSC), Ministry of Energy and Electricity (MOEE) Myanmar.

The NCEH, a private limited company, develops concept, investigation, design, investment, execute, implementation, facility management (O&M) of the hydropower stations in Myanmar. With over the years, the company has undertaken many challenging projects and accumulated skills, technical know-how and experiences in design and implementation solutions, project management services and related engineering works. The company specializes in providing the client and customers with qualified, secured and cost effective services in energy, environment and other infrastructure projects to meet user satisfaction.

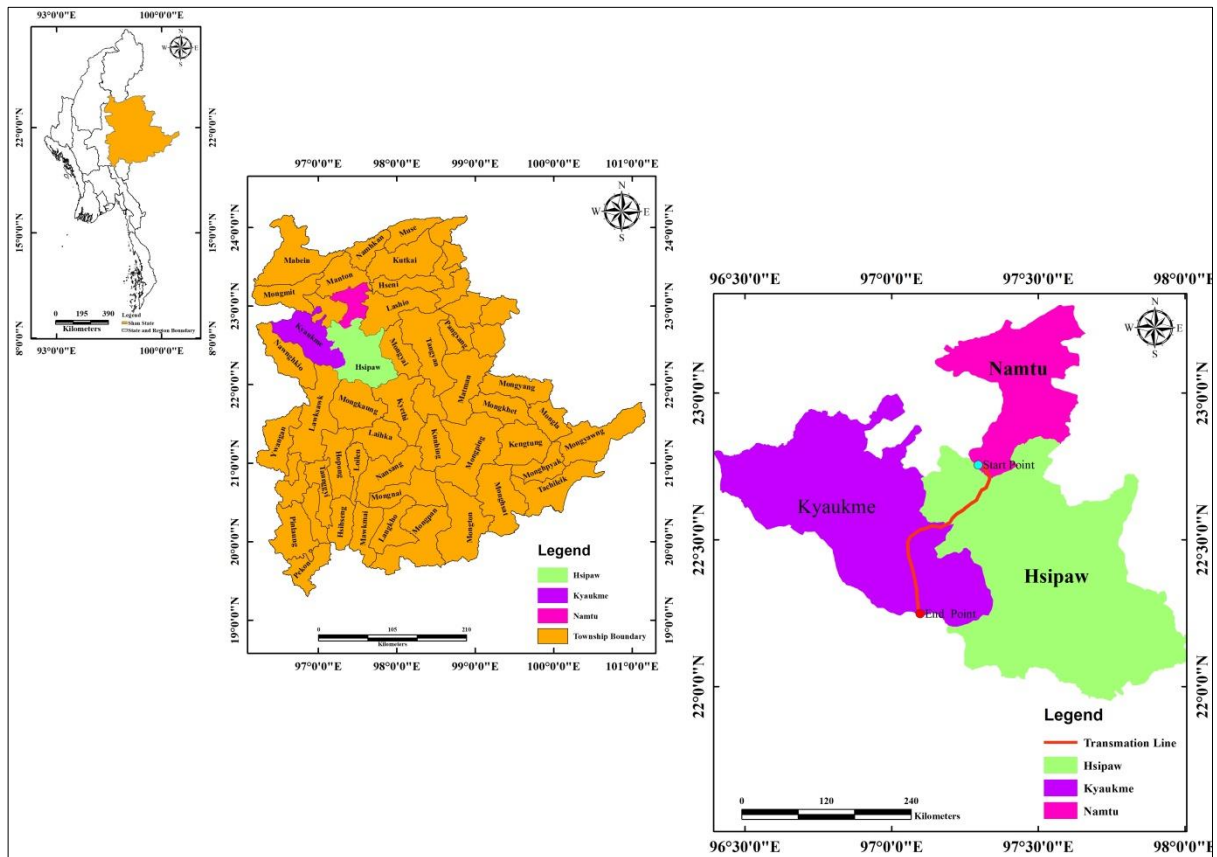
2.2 Project Size and Location

The Namtu (Hsipaw) hydropower plant is located at the coordinates of 22°45'26.29"N and 97°17'41.05"E, southern part of Namtu township in Shan state, Myanmar. The location map of the project area is presented in Figure 2.2-1. The TL will originate at hydropower plant in Namtu township, traverse Hsipaw township and terminate at the new sub-station at Upper Yeywa hydropower project in Kayukme township. The length of transmission line is expected to be 75.67 kilometers (47.02 miles). Steel towers, 195 numbers in total, including suspension, suspension special, and tension towers will be employed. The TL alignment and the new sub-station are illustrated in Figure 2.3-1.

The project area lies at the hilly region in Shan north where the topography along the transmission line varies from township to township. The elevation of the townships ranges from 1390 ft to 2506 ft, such as Namtu- 1760 ft, Hsipaw 1390 ft and Kyaukme 2506 ft respectively. Over the year, the temperature typically varies from 48°F to 92°F and is rarely below 44°F or above 98°F³. The average accumulation of rainfall in is wet season 2.7 in and dry season, 0.1 in¹. Along the TL alignment, the land comprises agricultural areas such as rice fields and seasonal crops, forest, grass and shrub land, , water bodies and built-up areas.. The main business of eastern and northern Shan state relies on

³ [https://weatherspark.com/y/112650/Average-Weather-in-Lashio-Myanmar-\(Burma\)-Year-Round](https://weatherspark.com/y/112650/Average-Weather-in-Lashio-Myanmar-(Burma)-Year-Round)

trading with neighboring countries whereas the subsidiary business is dependent on agriculture sector⁴.



<Figure 2.2-1> Location of Project Area

2.3 Project Components and Infrastructure

The component of the 230 kV Overhead Transmission Line is summarized in table 2.3-1.

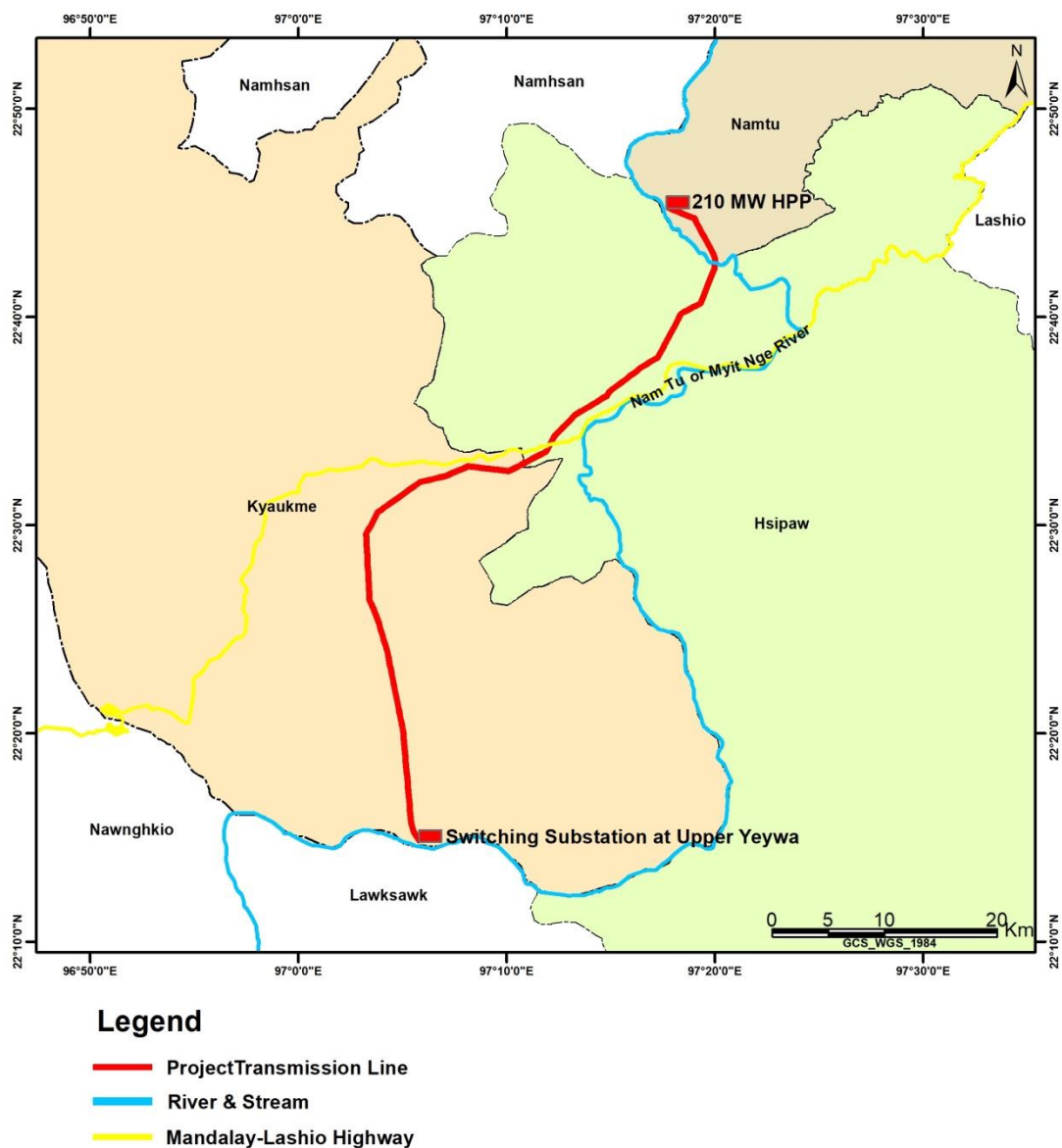
<Table 2.3-1> Summary of the 230kV Overhead Transmission Line

Particular	Description
TL starting point	Namtu (210MW) HPP
TL ending point	New sub-station at Upper Yewywa HPP
Total Line Length	75.6 km (47.02 Miles)
Total Number of Section	41 Sec
Longest Section Length	7.39 km (4.6 Miles)
Total Tower Usage	2.6 towers/km (4.1 towers/mile)
Tension Tower Usage	42 Nos (21.5 %)

⁴ http://www.thaibizmyanmar.com/th/thai-myanmar/trade-investment/Shan%20State%20Information%20Kit%20for%20Economic%20Trip_June%202016%20.pdf

2.3.1 230kV Transmission Line Alignment

The transmission line alignment feasibility study was carried out by Myanmar Tower Engineering Group, a local company having experience in transmission line construction projects, in consideration of less environmental and social impacts, technically feasible and economically viable. The proposed TL alignment from the feasibility stage was examined by expert team from DPTSC, EPGE and DHPI of MOEE and then approved by DEPP of MOEE with the notification letter “925/50(Kha)/Ye-Pyaephyo/project(electric)” on the date of 16th Nov 2018. The letter indicated to negotiate with related landowners so that the land to be required for tower basement is permitted to use and meet with the Commercial Operation Date (COD) of the Power Plant. The approved TL alignment is presented in Figure 2.3-1.

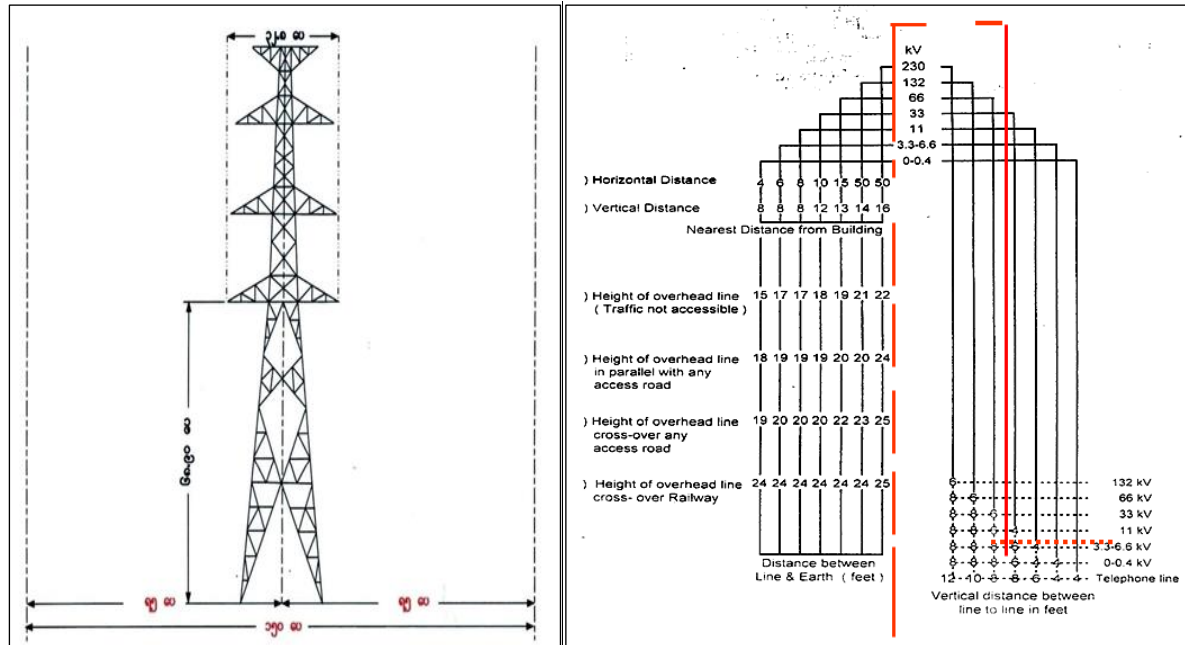


<Figure 2.3-1> 230 kV TL alignment

2.3.2 230kV Overhead Transmission Line Towers Description

2.3.2.1 ROW Requirements

The ROW requirement of the 230kV Overhead TL prescribed by DPTSC of MOEE is presented in the following figures and tables.



Source: DPTSC of MOEE

<Figure 2.3-2> Design of 230kV double circuit tower, ROW and clearance chart

<Table 2.3-2> Vertical distance of Overhead TL from the ground

No	Description	Distance (ft)
1	The height of Overhead TL in the area where vehicles cannot be accessed	22
2	The height of Overhead TL that is parallel to any traffic road, footpath, village access road	24
3	The height of Overhead TL that crosses over any traffic road, footpath, village access road	23
4	The height of Overhead TL that crosses over railway line	25
	The following criteria must be followed in the condition that Overhead TL cross the railway	
	<ul style="list-style-type: none"> The maximum horizontal distance of crossing interval must be 120 ft. The Overhead TL must be perpendicularly crossed over the railway. The Overhead TL to Overhead TL (medium voltage line) crossing point must be on flat ground, not at the railway road. TL tower must be built at 1.5 time of its height away from railway road. 	

Source: DPTSC of MOEE

<Table 2.3-3> Minimum distance of overhead TL from building

No	Description	Distance (ft)
1	Horizontal distance	50
2	Vertical distance	16

Source: DPTSC of MOEE

<Table 2.3-4> Distance between Overhead line crossing

No	Description	Distance (ft)
1	Telephone line	12
2	0.4kV line	8
3	6.6kV or 3.3kV line	8
4	11kV line	8
5	33kV line	8
6	66kV line	8
7	132kV line	6

Source: DPTSC of MOEE

2.3.2.2 General Design of 230kV Transmission Line Tower

The general design of 230kV TL Towers is described Table 2.3-5.

<Table 2.3-5> General Specification of the 230kV Overhead Transmission Line Tower

No.	Particular	Spec.
1	Conductor Type	DUCK; ACSR (605 MCM)
2	No. of Conductor per Phase	2
3	No. of Circuit	Double
4.	Earth wire	-
5	OPGW wire	-
6	Swing Angle	60 Degree
7	Normal Span	400 m
8	Everyday Temperature	28°C
9	Maximum Temperature	75°C
10	Minimum Temperature	10°C
11	Wind Temperature	15°C
12	Maximum Wind Speed	35 m/s
13	Cable Tension	
	Everyday Temperature (28°C) (Creep)	23% of Ultimate
	Everyday Temperature (28°C) (Construction) (Initial)	33% of Ultimate
	Wind Temperature (15°C+ Max wind)(Load)	40% of Ultimate
14	Clearance	
	-Normal ground	9 m (30 ft)

2.3.2.3 Detailed Specification of the 230kV Overhead Transmission Line Tower

The detailed specification of the 230kV Overhead TL towers is presented in table 2.3-6 and 2.3-7.

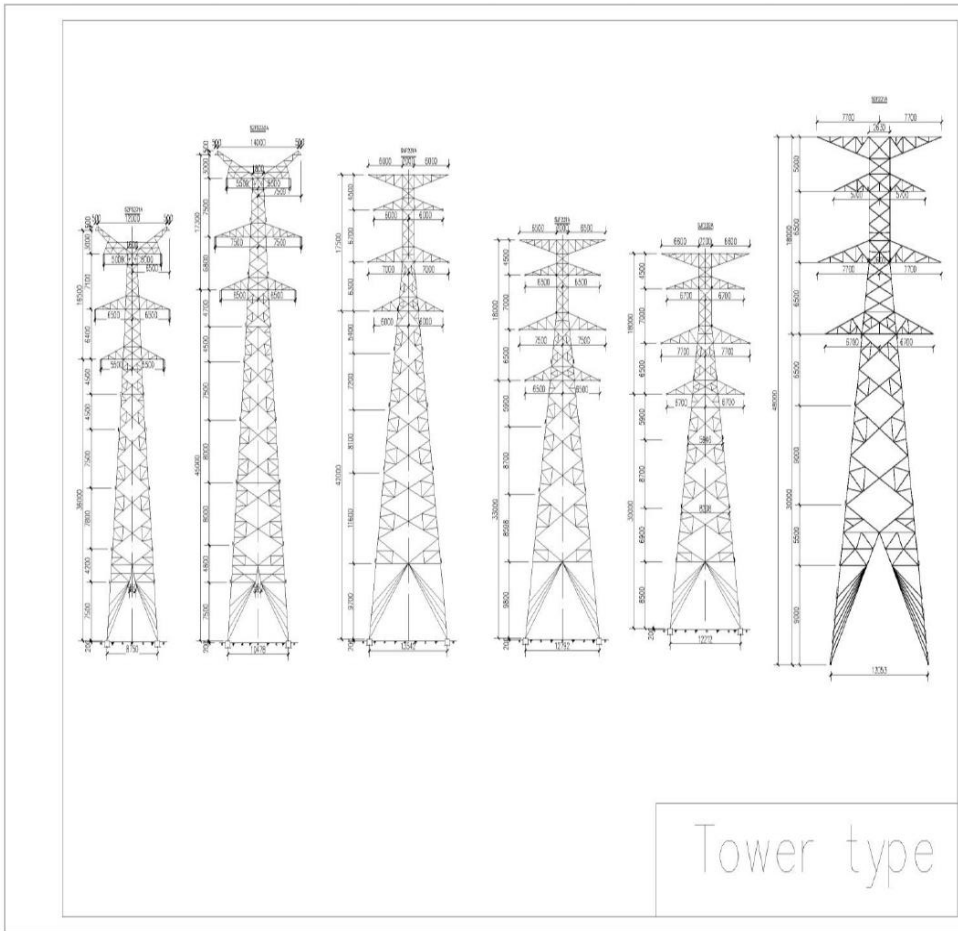
<Table 2.3-6> Detailed Specification of the 230kV Overhead TL Tower (TL No 1-192 (46.6 miles))

No	Name	Type	Height (m)	Qty.	Sub. Total	Sub. Total	Deviation Angle	Specification		
								Wind Span (m)	Weight Span (m)	Uplift Weight Span (m)
1	Suspension	DST.0	22	21	145	153	00° ~ 00°	600	800	
2			25	31						
3			28	37						
4			30	17						
5			33	12						
6			36	12						
7			42	9						
8			45	2						
9			48	4						
10	Suspension (Special)	DST.1	22	4	8		00° ~ 00°	800	1200	
11			25	1						
12			28	2						
13			42	1						
14	Tension	DTT.1	22	15	28	38	00° ~ 30°	600	800	-400
15			25	7						
16			28	6						
17		DTT.2	22	6	8		30° ~ 60°			
18			28	2						
19		DTT.E	25	2	2		00° ~ 40°	400	400	-150
20	Tension	DTT.1 (Special)	28	1	1	1	00° ~ 30°	800	1200	-500
Total				192	192	192	Date -12.Sept.2018			

<Table 2.3-7> Detailed Specification of the 230kV Overhead TL Tower (TL No 193-195 (0.42 mile))

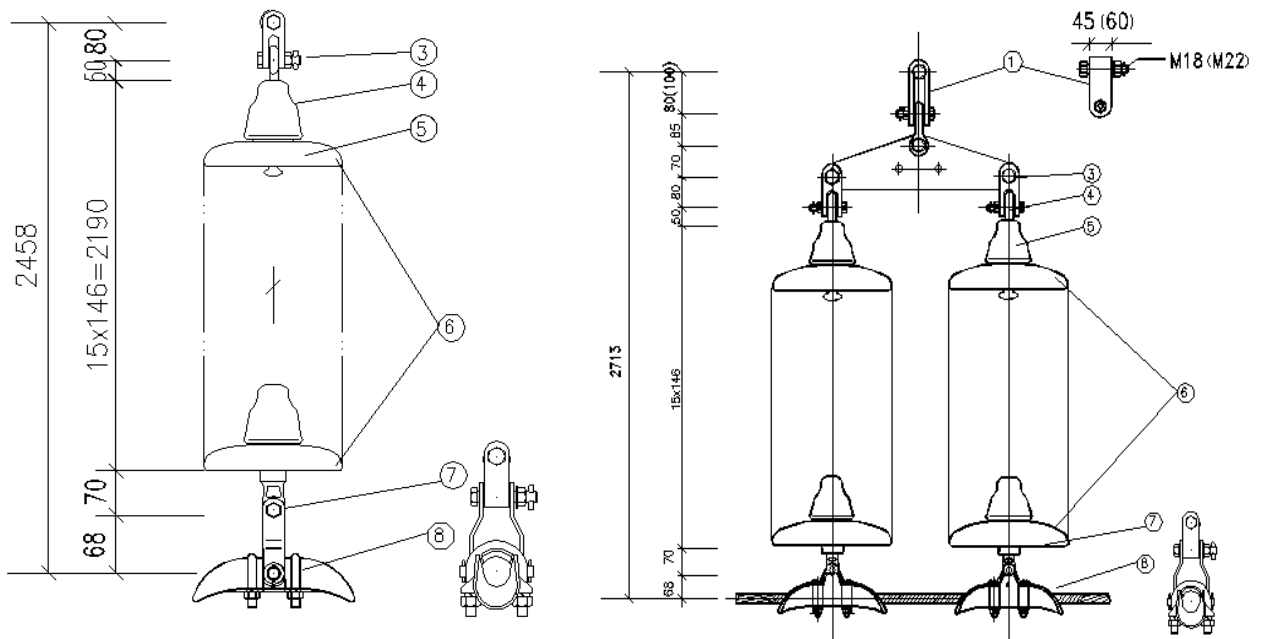
No	Name	Type	Height (m)	Qty.	Sub. Total	Sub. Total	Deviation Angle	Specification		
								Wind Span (m)	Weight Span (m)	Uplift Weight Span (m)
1	Tension	DTT.1 (Special)	22	1	1	3	00° ~ 30°	600	800	-400
2		DTT.E	22	1	2		00° ~ 40°	400	400	-150
3			25	1						
Total				3	3	3	Date -12.Sept.2018			

2.3.2.4 Materials of Towers

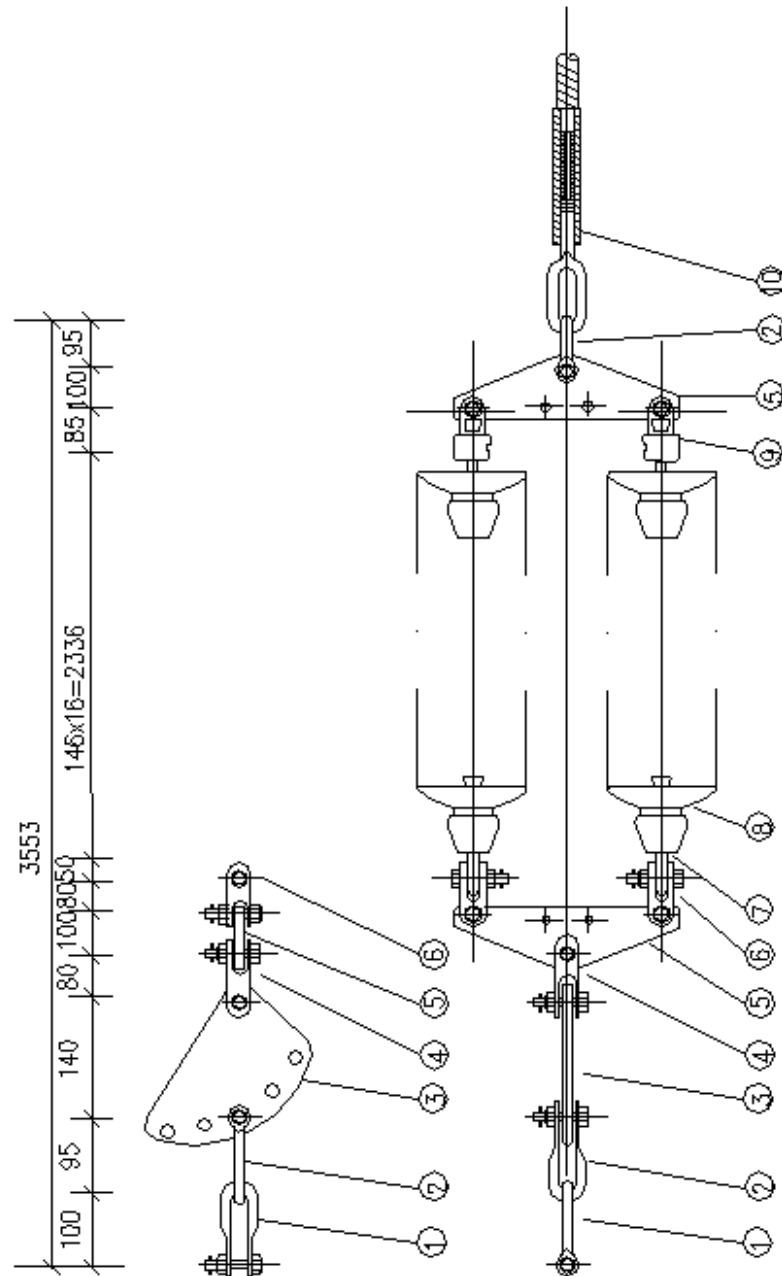


<Figure 2.3-3> Types of Tower

2.3.2.5 Accessories of Tower



<Figure 2.3-4> Suspension Insulator String



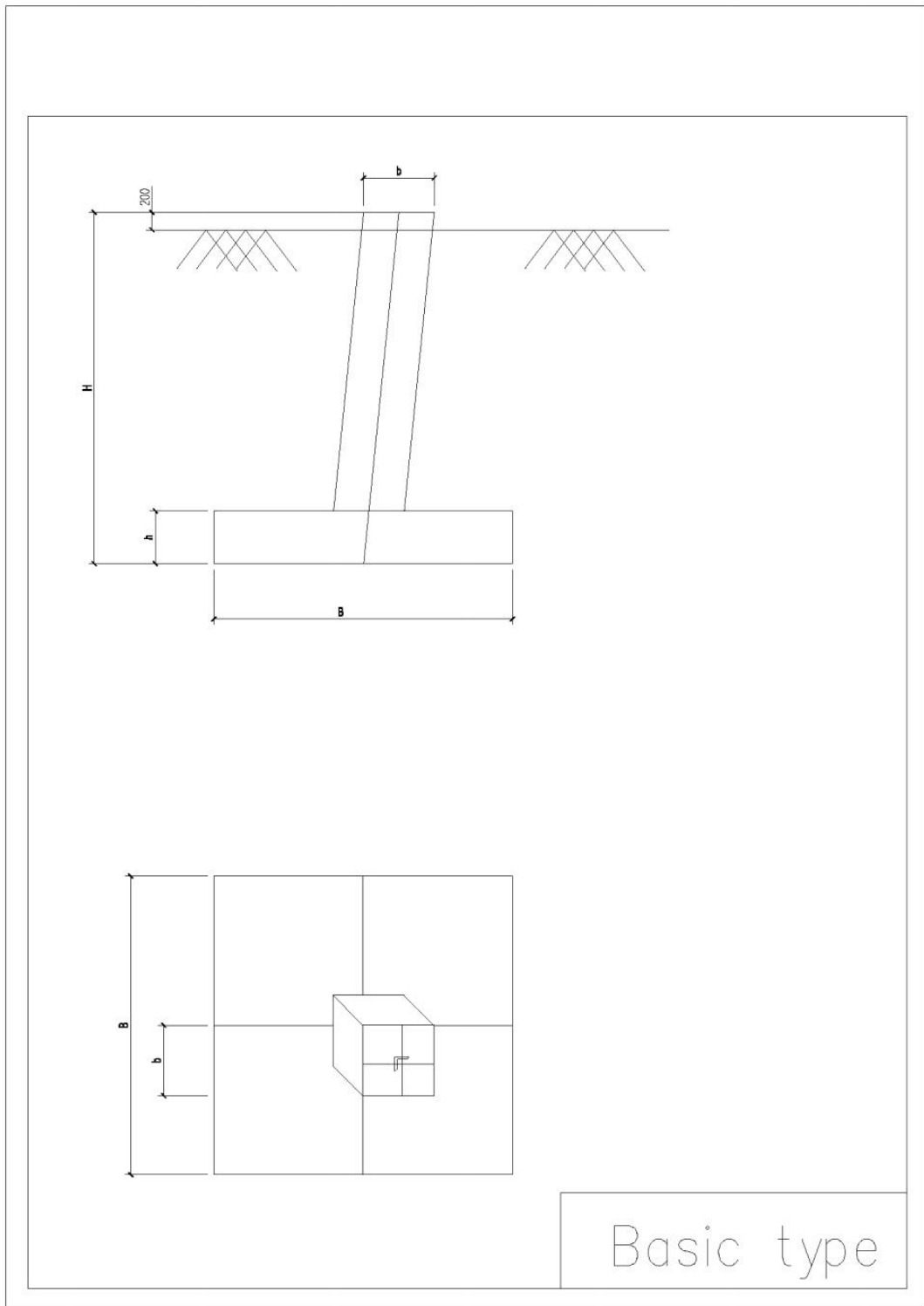
<Figure 2.3-5> Double Suspension Insulator String

2.3.3 Foundation Types

Pad and pier Foundation, Drilled Foundations such as single cast-in-situ piles and multiple cast-in-situ piles shall be selected respectively according to the terrain and geography conditions.

2.3.3.1 Basic Type

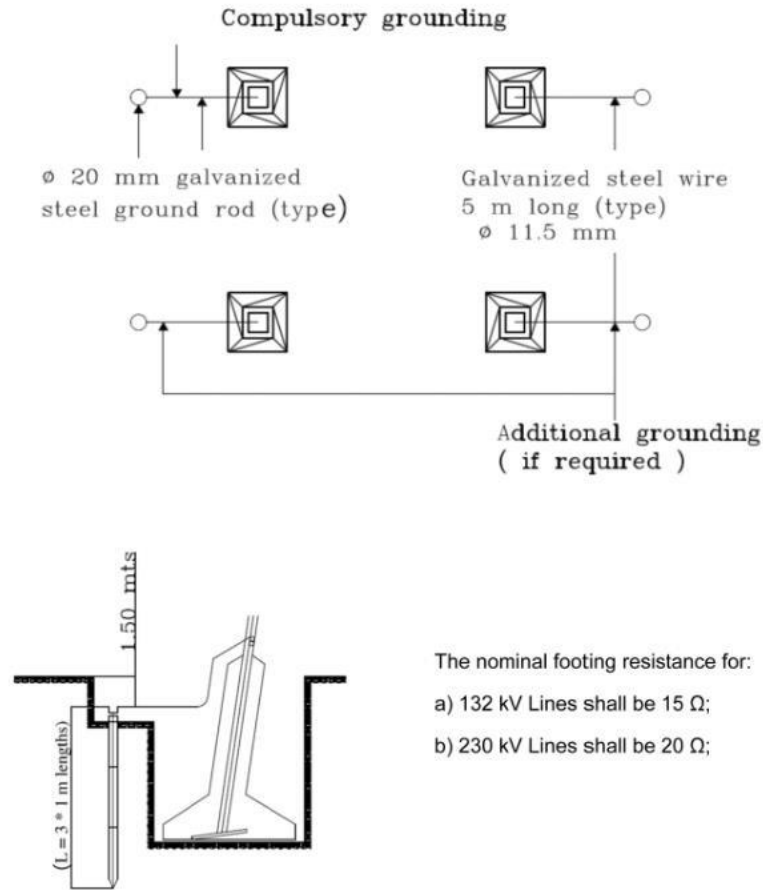
The schematic diagram of the basic type foundation is as follow (Figure 2.3-6).



<Figure 2.3-6> Basic type foundation

2.3.3.2 Grounding Type

The schematic diagram of the grounding type foundation as follow (Figure 2.3-7):



<Figure 2.3-7> Grounding Type

2.3.4 230kV Transmission Line Crossing Points

2.3.6.1 Townships

As stated above, the transmission line will traverse three townships- Namtu, Hsipaw and Kayukme. There are 20 towers in Namtu, 65 in Hsipaw and 110 in Kyaukme with the total of 195 towers. The summary of the TL passages to the townships is described in Table 2.3-8.

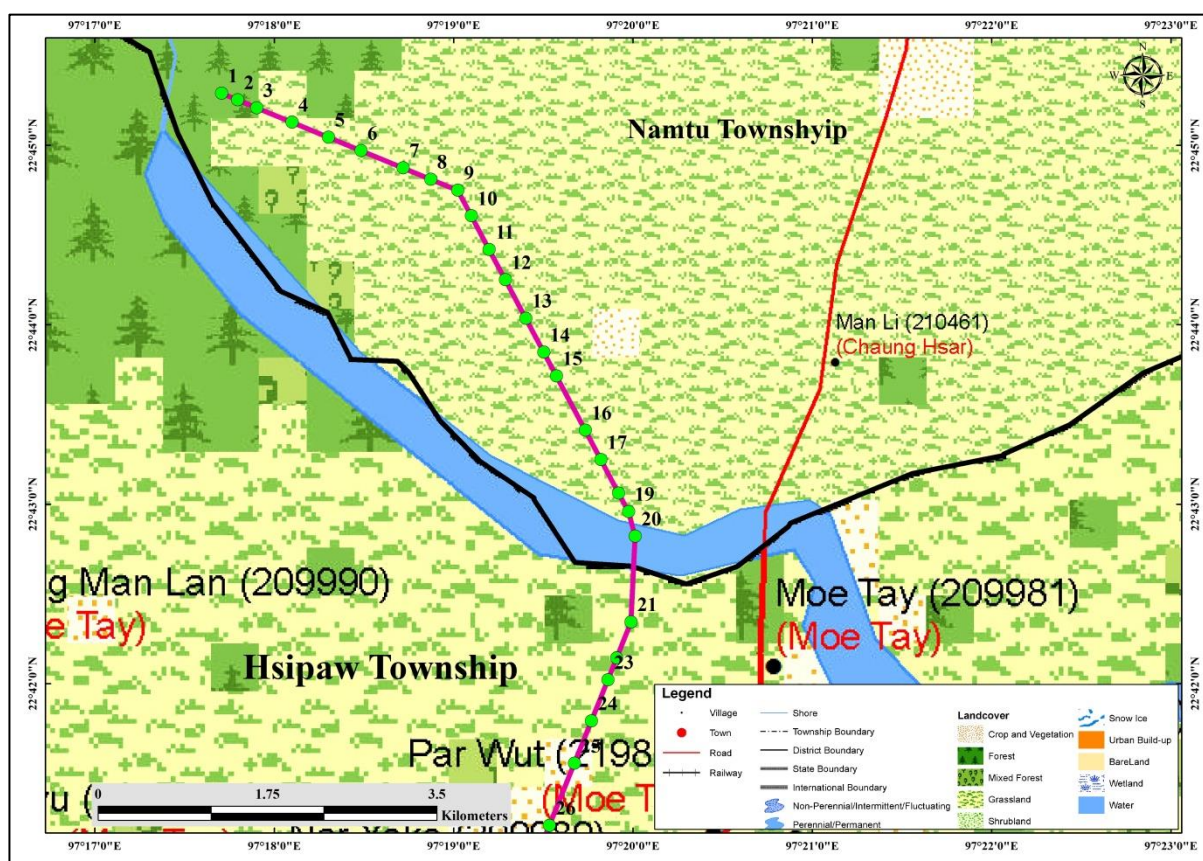
<Table 2.3-8> Transmission Line Information

No.	State	District	Township	TL Tower No.	No. of Towers	Approx. Distance	
						km	mile
1	Shan state	Kyaukme district	Namtu	1 – 20	20	7.64	4.75
2			Hsipaw	21 - 85	65	24.41	15.17
3			Kyaukme	86-192	107	43.55	27.06
4	Total TL numbers				192	75.60	46.98
5	Substation to Upper Yeywa HPP in Kyaukme			1-3	3	0.68	0.42

6	Grand total	-	195	75.6	47.02
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i. Namtu Township

The TL towers from number 1 to number 20 will be installed in the Namtu township boundary. The total length is approximately 7.64 km (4.75 miles). The TL alignment is going parallel with Namtu river. The landcover along the 20 towers comprises some portion of forest and mixed forest area, crop and vegetation, grassland and surface water body (Namtu river). The nearest village, Manli of Chaung Hsa village tract is found more than 2 km away from the tower number 16 and 17.

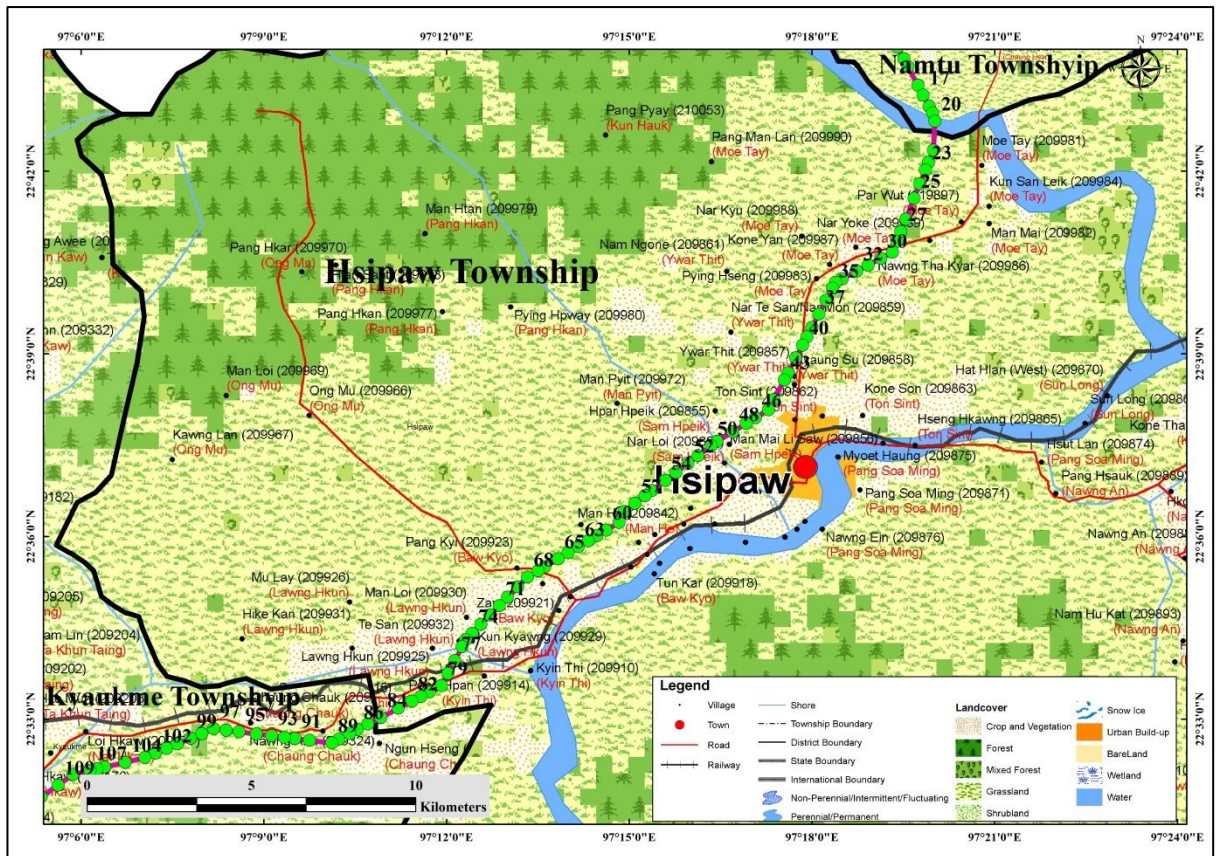


Source: adapted from MIMU

<Figure 2.3-8> Namtu township

ii. Hsipaw Township

The TL tower number from 21 to 85 (with the total of 65 towers) will be installed within the Hsipaw township boundary. The total length is approximately 24.41 km (15.17 miles). The TL alignment is in parallel with the traffic road (Namtu-Hsipaw). The landcover along the towers in Hsipaw township comprises reserve forest (Htee Lone RF), grassland, crop and vegetation, surface water body (Namtu river), villages, and urban built-up area.

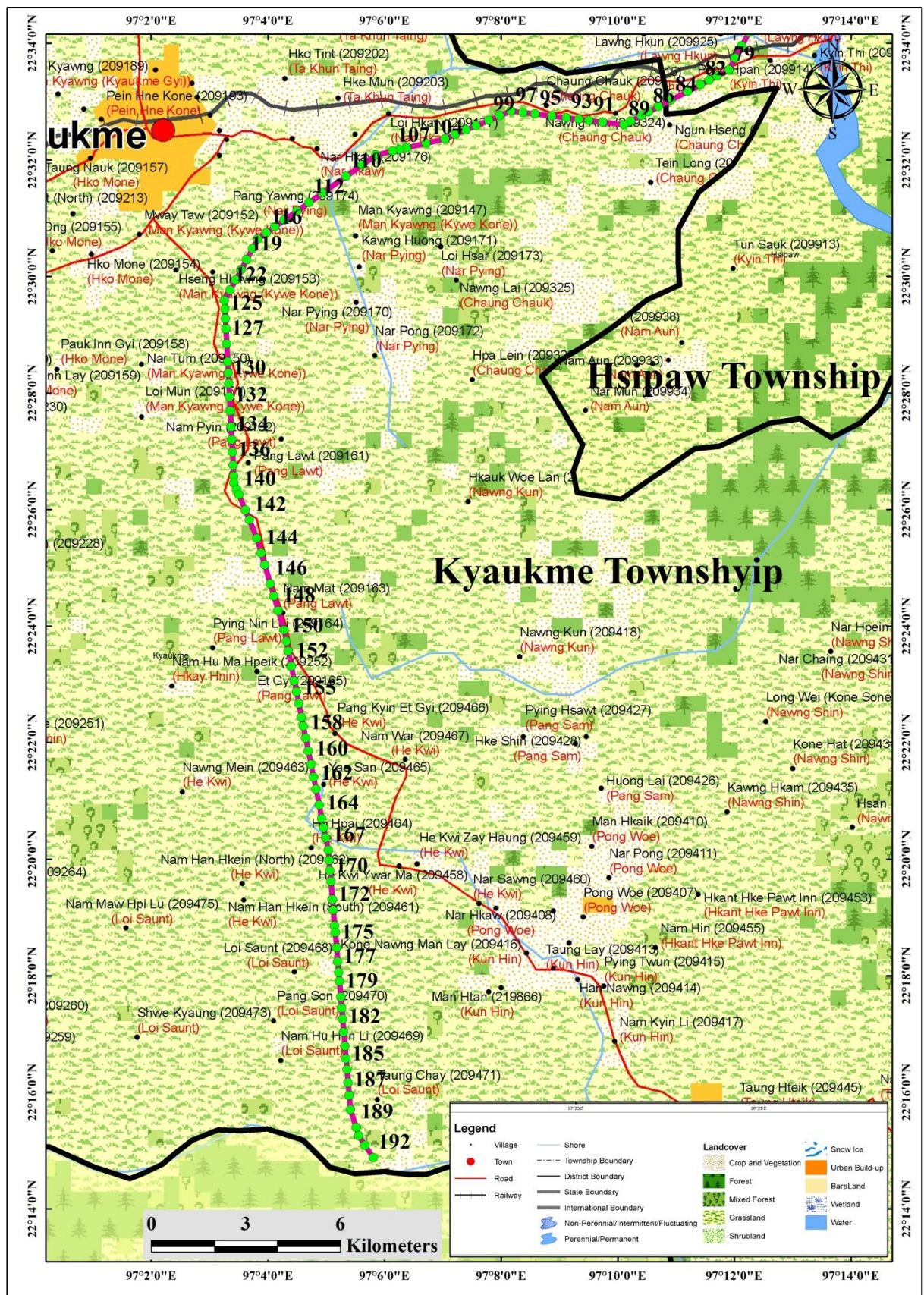


Source: adapted from MIMU

<Figure 2.3-9> Hsipaw Township

iii. Kyaukse Township

In Kyaukse township, there will be 110 TL towers in total, starting from the tower number 86 and ended at 195. The approximate length of TL is 43.55 km (27.06 miles) in the township. The TL will traverse grassland, crop and vegetation, surface water body (Myit Nge river), villages, and the last three towers (from 193 to 195) will traverse the Taung Chae RF where the Upper Yeywa Hydropower construction project is located.



Source: adapted from MIMU

<Figure 2.3-10> Kyaukme township

2.3.6.2 Villages (≤1km)

The TL will not directly cross over the villages, however, it will run near the village and some households will be being crossed over in some area. The nearest villages approximately less than 1km in distance from the ROW of TL are listed in the Table 2.3-9.

<Table 2.3-9> List of Nearest Villages along the TL

Village	Villages’ Households Number	Village Tract	Approx. Distance (m)	Tower No.
Hsipaw Township				
Pan Nay	42	Moe Tae	948	27-28
Naung Ta Kyar	127		118	30
Kong Yang	30		452	34-35
Nar Te Hsan	103	Ywar Thit	255	42
Nar Mone	101		200	44
Kyaung Su	162		954	45-46
Hpa Hpeik	31	San Hpeik	658	47-48
San Hpeik	230		213	49
Khar Lein	102	Nar Khae	905	54-55
Nant Hu Nwet	31		126	58
Kong Pu Yang	48		822	59-60
Kaung Khar	25	Ho Maw	218	61
Ywar Haung	138		1000	65-66
Ho Maw	113		101	68
Pan Kyi	42		105	69
Man Lwal	-	Man Lwal	400	73
Kon Kyaung	-		148	75
Tae Hsan	-		107	75
Law Khun	-		397	76
Ye Pu (Song Owe)	140	Kyin Thi	250	82
Unidentified Village Near Pong Hpang	-		290	89
Kyaukme Townhsip				
Chaung Chauk	140	Chaung Chauk	150	92-95
Lwal Khaw		Nar Khaw	1000	105
Nar Khaw	82		738	108-110
Naung Pein Lay	124	Kywal Kone	496	121

Namt Pyin	125	Pan Lawt	1000	134-135
Pan Lawt	169		375	136
Unidentified Village	-		97	148
Eg Gyi	48		631	152
Pan Kyeng	-	Mwe Daw	186	161-162
Ho Hpai	45		326	166-167
Mwe Daw	-		1000	169
Lwal Hsaut	94	Taung Chae	1000	177-178
Taung Chae	120		228	187-188

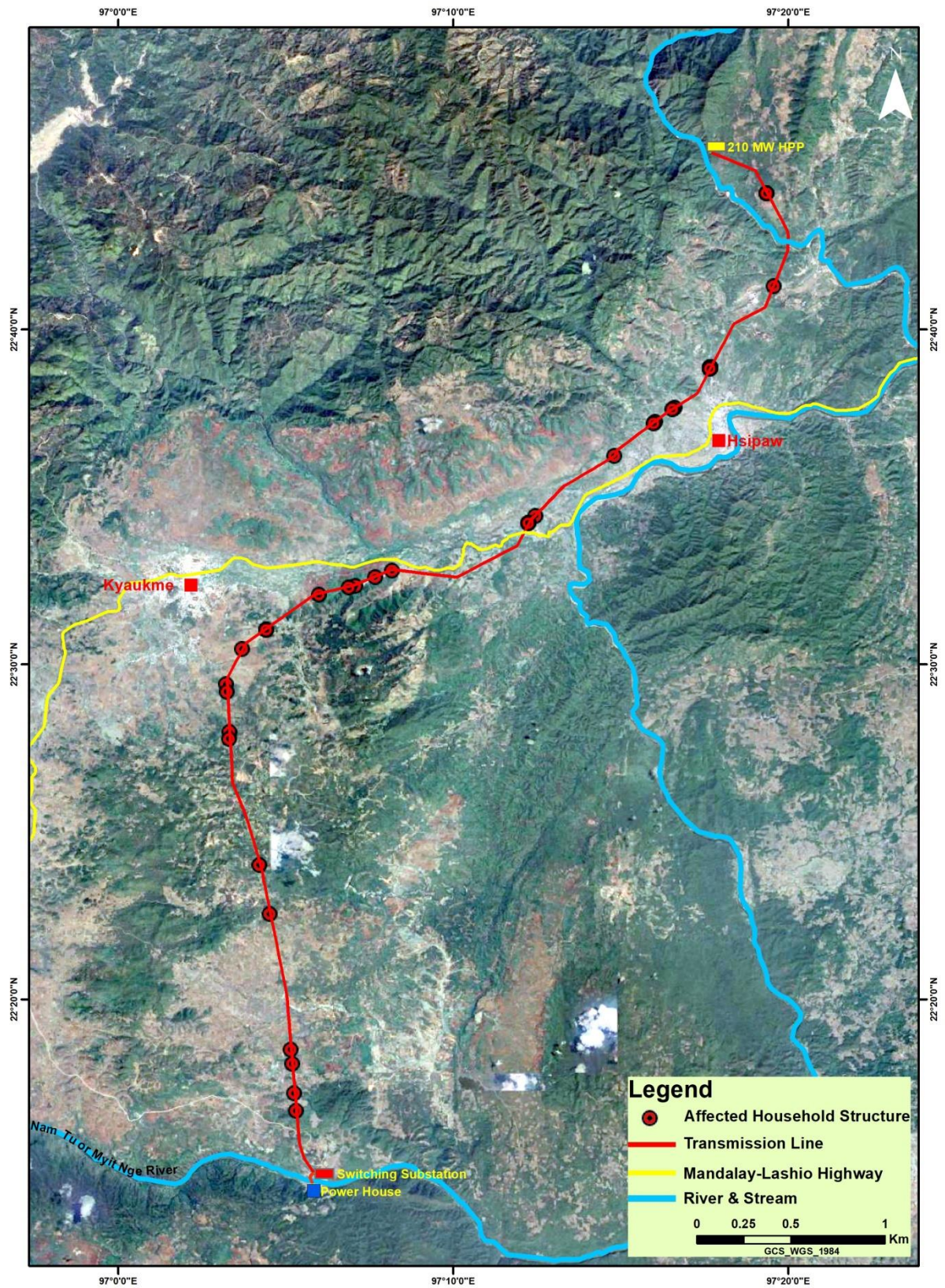
2.3.6.3 Building and Other Structures Existed within the ROW

Household structures counting along the Right-of-Way (75 ft) of the TL were performed based on the field observation and satellite images. The observed numbers of structures including households and/or other small buildings are illustrated in the following Table 2.3-10 and Figure 2.3-9.

<Table 2.3-10> Observed Structures along the ROW of the TL

Township	Village Tract	No. of Affected Structures	TL Tower No.	Remarks
Namtu	Chaung Hsa	2	12-13	West side of Man Li Village
Hsipaw	Moe Tae	1	25-26	Near Pan Nay Village
	Ywar Thit	6	41-42	Northwest of Nar Te Hsan
	San Hpeik	2	48-49	Near the link road between San Hpeik and Hpa Hpeik villages
		2	51-52	In the paddy field, west side of San Hpeik village
	Nar Khae	1	58-59	Southwest of Nant Hu Nwet village
	Man Lwal	1	73-74	In the paddy field, southeast of Man Lwal village
		2	75-76	East side of Te Hsan village
Kyaukme	Chaung Chauk	1	96-97	In the paddy field, southwest of Chaung Chauk village
		1	99-100	In the paddy field, southwest of Chaung Chauk village
	Nar Khaw	1	102-103	In the paddy field, southeast of Lwal Khaw village
		1	103-104	In the paddy field, southeast of Lwal Khaw village
		1	107-108	In the paddy field, south side of Lwal Khaw village
		2	113-114	South side of Nar Khaw village

	Kywal Kone	1	117-118	In the paddy field, northeast of Naung Pein Lay village
		1	123-124	In the paddy field, southeast of Naung Pein Lay village
		1	125-126	In the paddy field, southeast of Naung Pein Lay village
	Pan Lawt	1	130-131	Adjacent to the village access road, northwest of Namt Pyin village
		1	131-132	Adjacent to the village access road, northwest of Namt Pyin village
		1	148-149	Adjacent to the village access road, northeast of Eh Gyi village
		1	155-156	Adjacent to the village access road, southeast of Eh Gyi village
	Taung Chae	1	174-175	In the paddy field, northeast of Lwal Hsaut village
		1	176-177	In the paddy field, east of Lwal Hsaut village
		1	181-182	In the paddy field, east side of Pan Sone village
		1	183-184	East side of Pan Sone village



<Figure 2.3-11>

Observed affected household structures along the TL alignment

2.3.6.4 River and Creeks

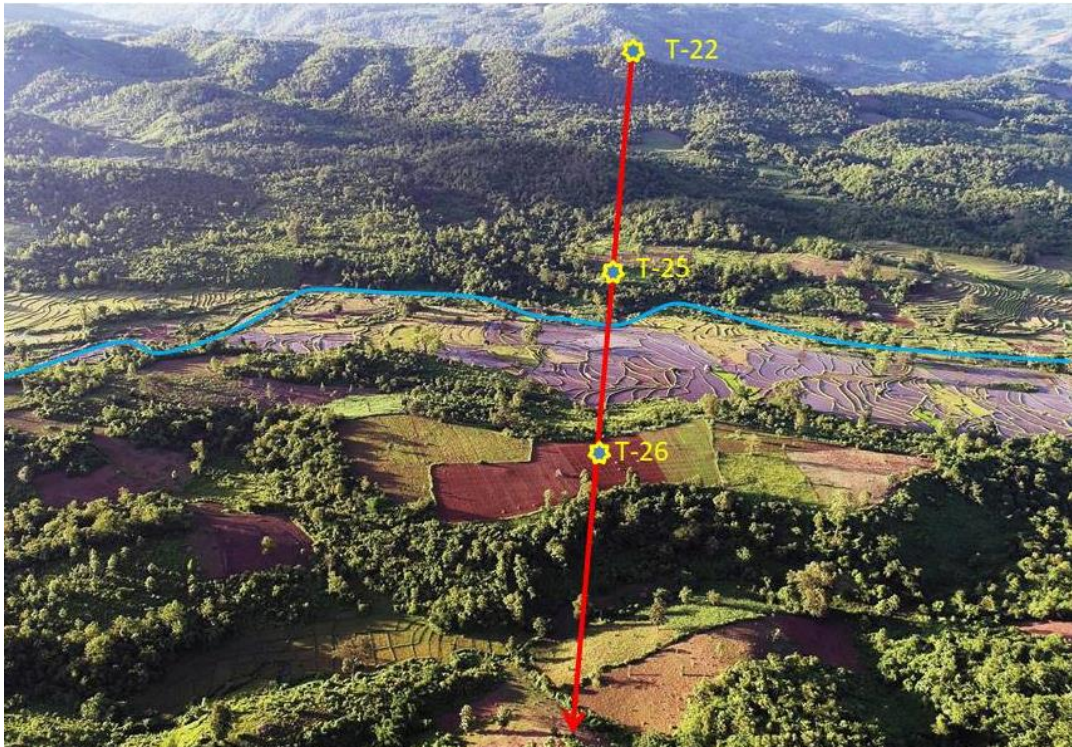
The TL will cross over the river two times along its alignment, one will be Myit Nge river (also known as Namtu river in Namtu township and Dokhtawaddy river in Hsipaw and Kyaukme townships) between TL tower number 20 and 21 in Namtu township, and the another crossing point, which is tributary of Myit Nge river is between TL number 73 and 74 in Hsipaw township. Besides, the TL will cross over other surface water bodies such as small creeks and village drains which are presented in Table 2.3-11. The Figure 2.3-10 and 2.3-15 show the major river crossing points along the TL alignment.

<Table 2.3-11> Overhead TL Crossover Water Body

Sr. No.	TL Number	Water Body	Nearest Village
1	20-21	Myit Nge River	Moe Tae
2	25-26	Creek	Pan Nay
3	44-45	Creek	Nar Te Hsan
4	47-48	Creek	Hpa Hpeik
5	63-64	Creek	Baw Kyo
6	76-77	Myit Nge River	Te Hsan
7	97-98	Drain	Lwal Kaw
8	153-154	Creek	Eh Gyi
9	178-179	Creek	Lwal Hsaut
10	180-182	Creek	Pan Sone



<Figure 2.3-12> Myit Nge river crossing



<Figure 2.3-13> Creek crossing point near Pan Nay village



<Figure 2.3-14> Creek crossing point near Nar Te Hsan village



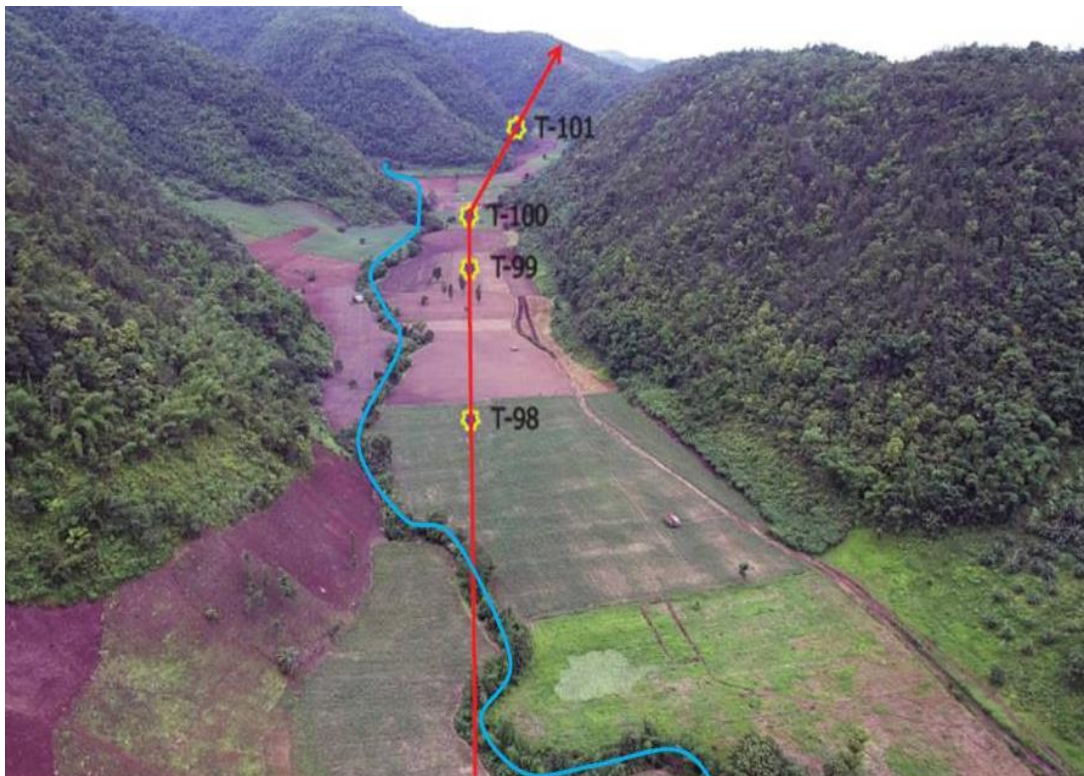
<Figure 2.3-15> Creek crossing point near Hpa Hpeik village



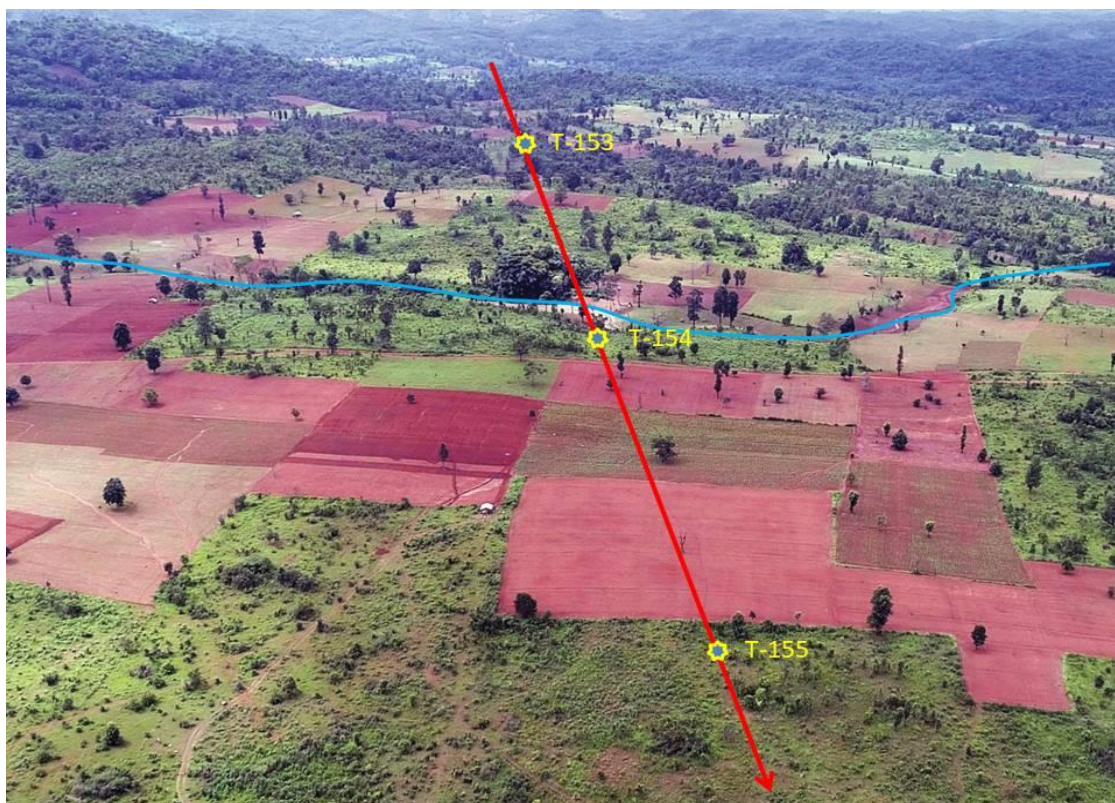
<Figure 2.3-16> Creek crossing point near Baw Gyo village



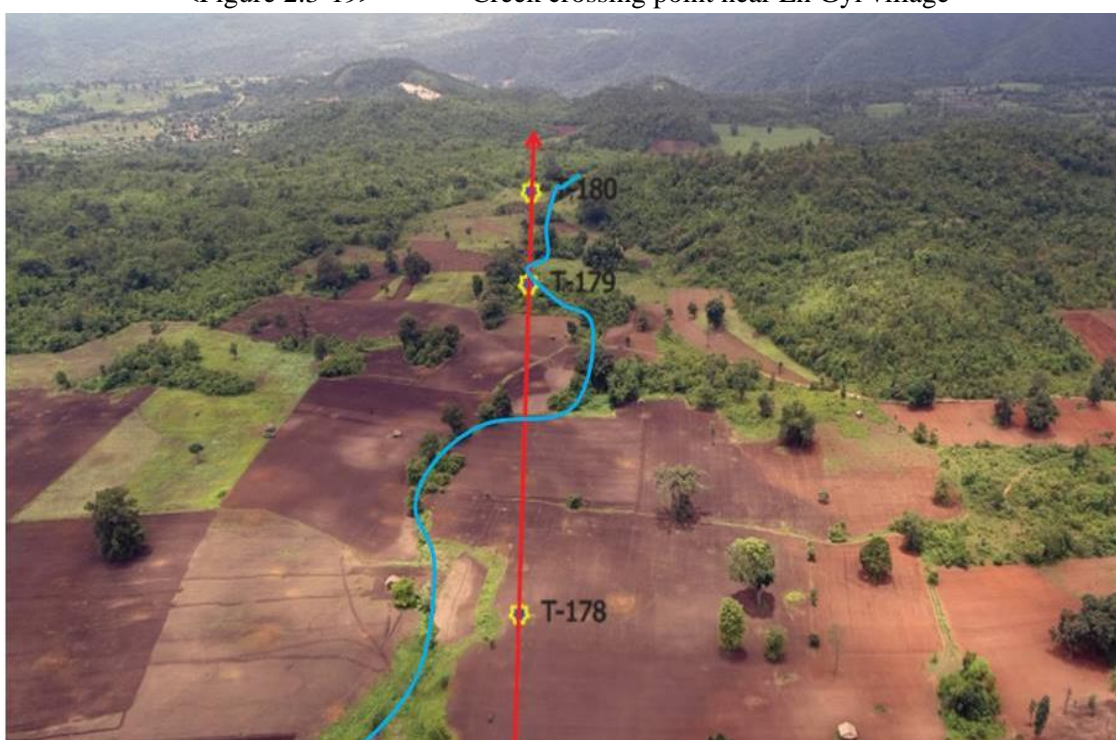
<Figure 2.3-17> Tributary of Myit Nge river crossing



<Figure 2.3-18> Creek crossing point near Lwal Kaw village



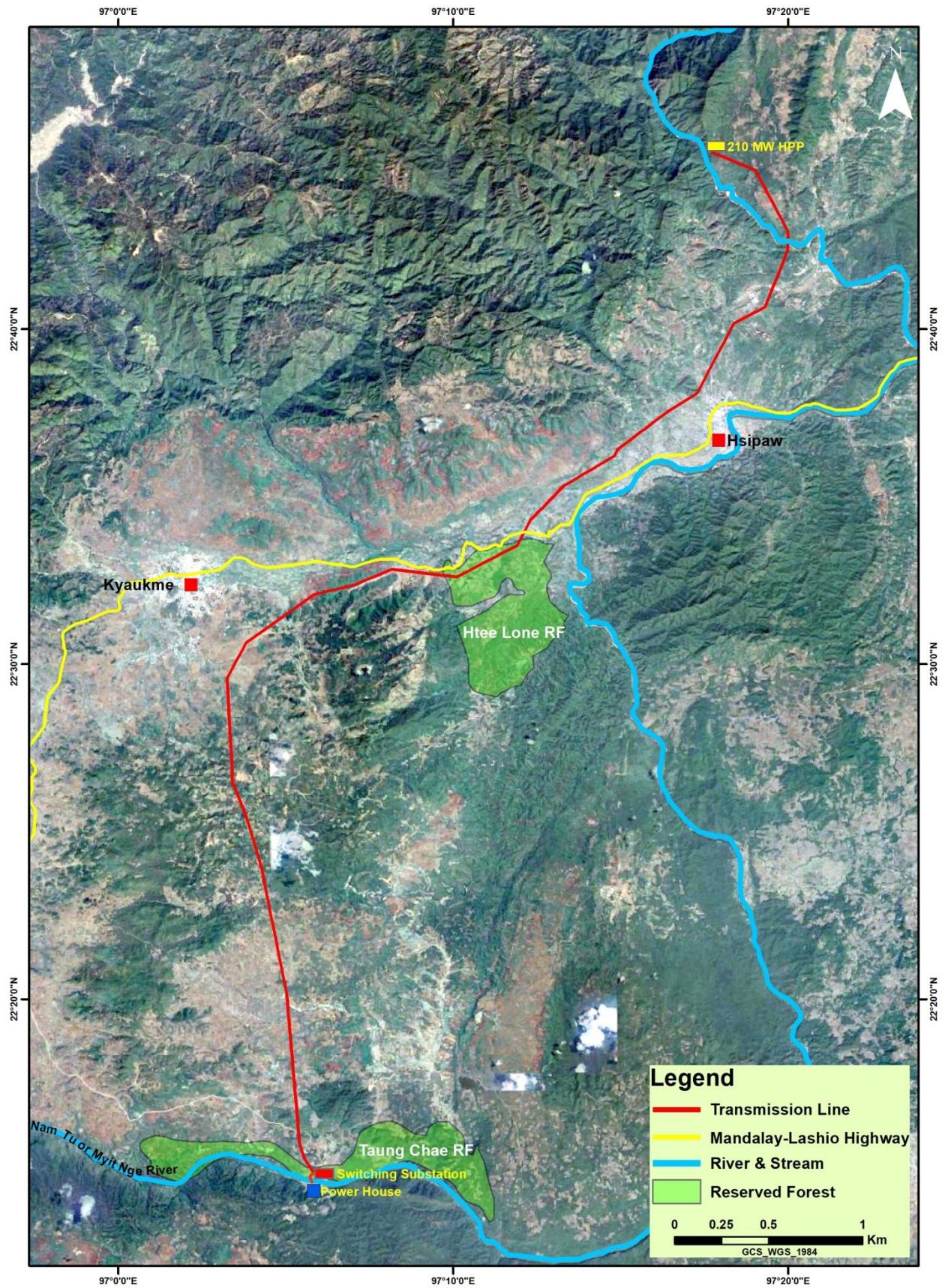
<Figure 2.3-19> Creek crossing point near Eh Gyi village



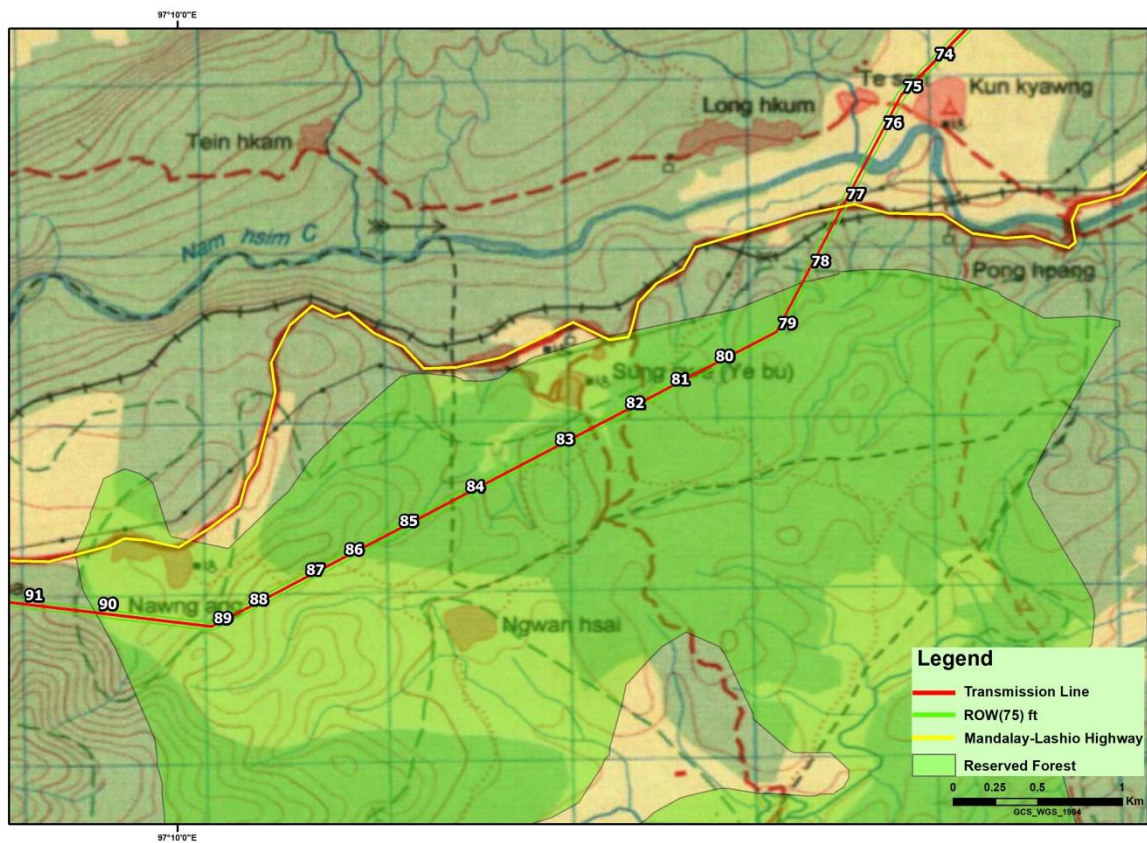
<Figure 2.3-20> Creek crossing point near Lwal Hsauk village

2.3.6.5 Reserved Forest

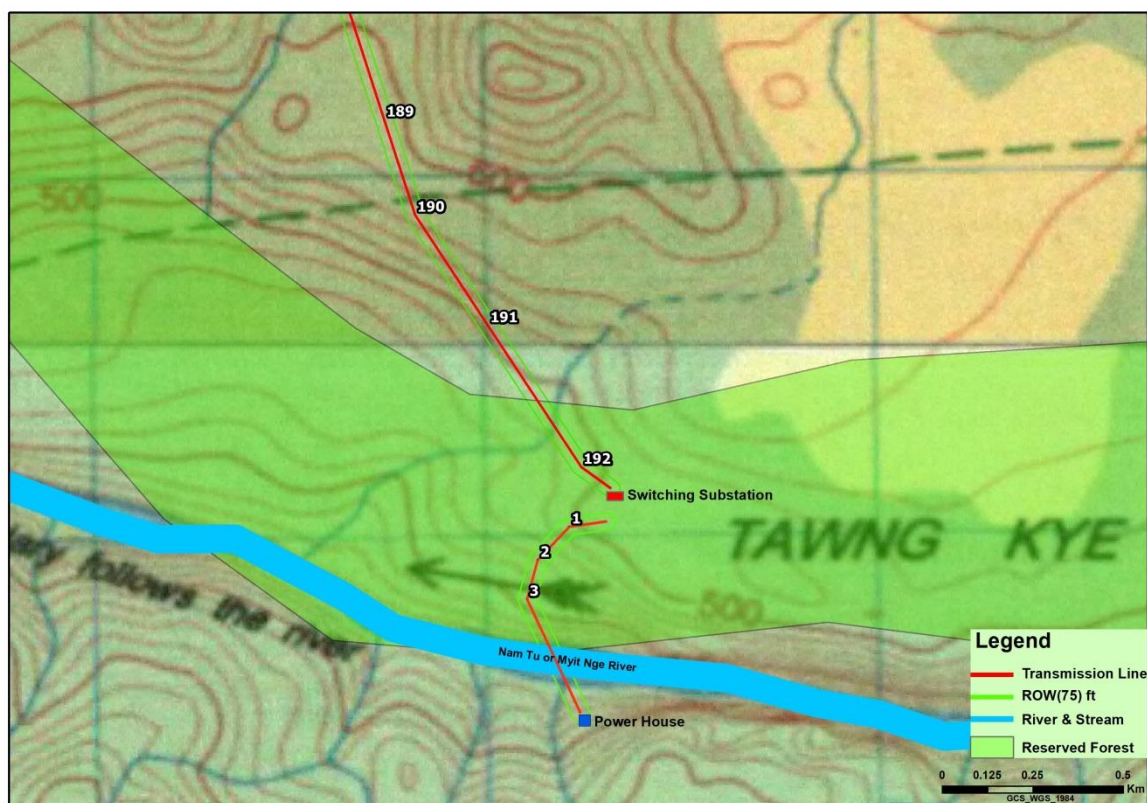
It has been observed that the TL alignment will pass the two Reserved Forests (RFs) namely Htee Lone RF in between Hsipaw and Kyaukme townships and Taung Chae RF in Kyaukme township. The TL tower number from 79 to 90 will be placed in Htee Lone RF while tower number from 192 to 195 will be in Taung Chae RF.



<Figure 2.3-21> TL alignment traverses the Reserved Forests



<Figure 2.3-22> TL towers traverse Htee Lone Reserved Forest



<Figure 2.3-23> TL tower traverse Tuang Chae reserved forest

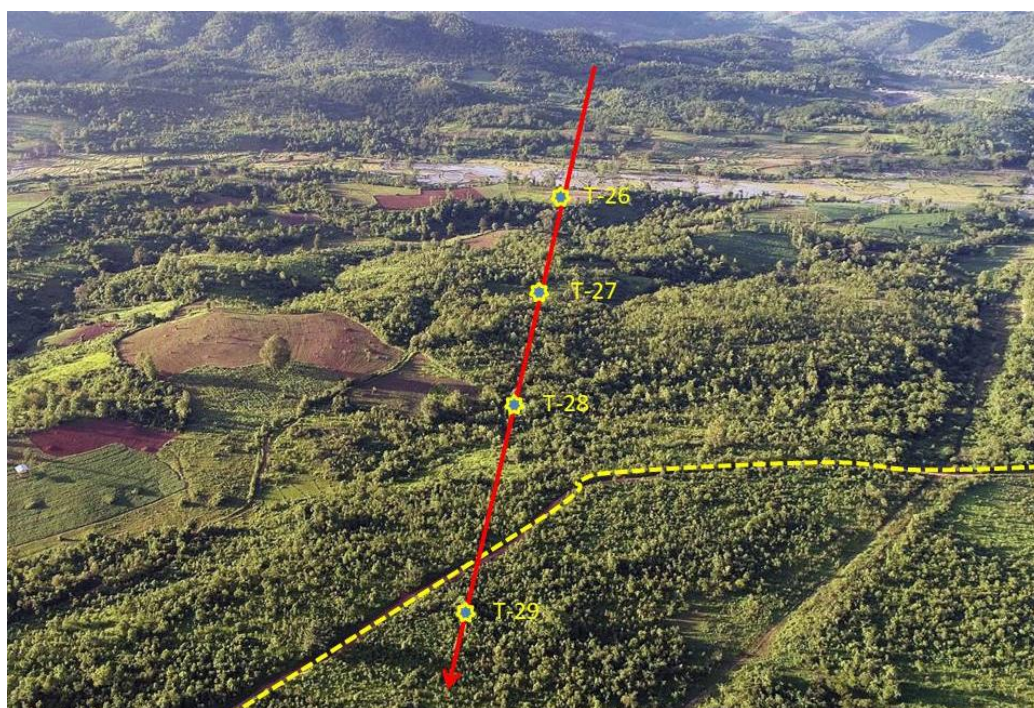
2.3.6.6 Roads

The TL will pass and in parallel number of roads from village linked roads-jeep tracks-to normal access road-car roads-along its alignment. The TL crossing points, types of road and nearest villages are illustrated in Table 2.3-12.

<Table 2.3-12> TL Crossover Roads

Sr. No.	TL Number	Road Type	Nearest Village
1	28-29	Jeep Track	Naung Ta Kyar
2	29-30	Car	Naung Ta Kyar
3	33-34	Jeep Track	Kong Yang
4	34-35	Car	Kong Yang
5	38-39	Jeep Track	Nar Te Hsan
6	41-42	Jeep Track	Nar Te Hsan
7	43-44	Jeep Track	Nar Te Hsan
8	45-46	Jeep Track	Nar Mone
9	48-49	Jeep Track	Hpa Hpeik
10	51-52	Jeep Track	San Hpeik
11	53-53	Jeep Track	Khar Lein
12	57-58	Jeep Track	Nan Hu Nwet
13	58-59	Jeep Track	Nan Hu Nwet
14	61-62	Jeep Track	Kaung Khar
15	67-68	Jeep Track	Ho Maw
16	68-69	Car	Pan Kyi
17	75-76	Car	Te Hsan
18	77-78	Car	Lon Khun
19	81-82	Jeep Track	Ye Bu (Within Htee Lone RF)
20	82-83	Jeep Track	Ye Bu (Within Htee Lone RF)
21	86-87	Jeep Track	Pong Hapng (Within Htee Lone RF)
22	92-93	Jeep Track	Chaung Chauk
23	94-95	Jeep Track	Chaung Chauk
24	113-114	Jeep Track	Nar Kaw
25	115-116	Jeep Track	Naung Pein Lay
26	117-118	Jeep Track	Naung Pein Lay
27	120-121	Jeep Track	Naung Pein Lay
28	124-125	Jeep Track	Naung Pein Lay
29	127-128	Car	Namt Pyin

30	131	jeep Track	Namt Pyin
31	136-137	Jeep Track	Pan Lawt
32	140-141	Jeep Track	Pan Lawt
33	141-142	Jeep Track	Pan Lawt
34	143	Jeep Track	No nearest village
35	147-148	Jeep Track	No nearest village
36	151-152	Jeep Track	Eh Gyi
37	154-155	Jeep Track	Eh Gyi
38	158-159	jeep Track	Pen Kyang
39	162-163	Jeep Track	Pen Kyang
40	166-167	Jeep Track	Ho Hpai
41	170-171	jeep Track	Ho Hpai
42	171-172	jeep Track	Ho Hpai
43	176-177	jeep Track	Lwal Hsaut
44	178-179	Jeep Track	Lwal Hsaut



<Figure 2.3-24> Jeep tract near Naung Ta Kyar village



<Figure 2.3-25> Car road near Naung Ta Kyar village

2.3.6.7 Railway

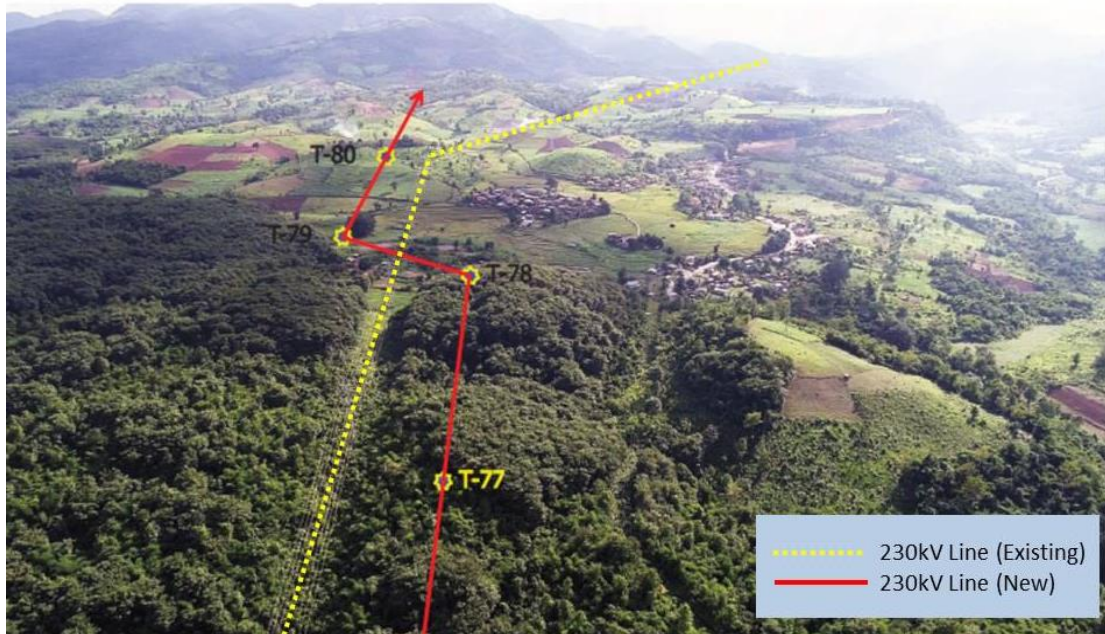
There will be one railway road crossing point between TL numbers 77 and 78 in Hsipaw township. The railroad is Mandalay-Muse railway.



<Figure 2.3-26> TL crossover railway

2.3.6.8 230kV Line

The TL will cross over the existing 230kV line near Ye Bu village of Kyin Thi village tract in Hsipaw township. The crossing point and the existing 230kV line is presented in Figure 2.3-27.

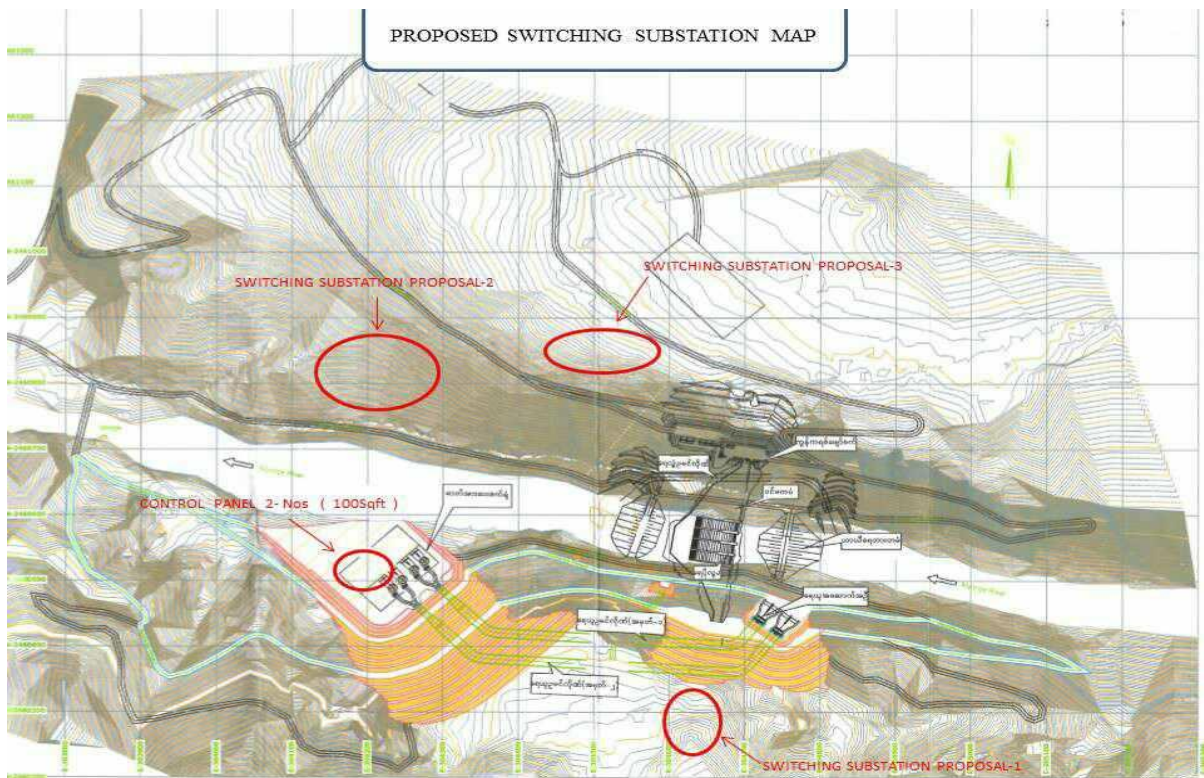


<Figure 2.3-27> TL crossover the existing 230 line

2.3.5 Substation

2.3.7.1 Location selection for substation construction

The new switching substation for 230kV line is planned to construct within the area of Construction Unit-3, Upper Yeywa Hydropower Implementation Project. Regarding the substation location, the NCEH submitted the proposal of substation location in which 3 alternative locations were being proposed. The Figure 2.3-28 presents the proposed locations (proposal 1-3) for substation construction.



<Figure 2.3-28> Proposed locations for substation constructions

2.3.7.2 Selected location for substation construction

The proposal 2 was selected with the feasibility to construct substation by DEPP based on the recommendations from DPTSC and DHPI. The selected locations for substation and power house are presented in figure 2.3-29.

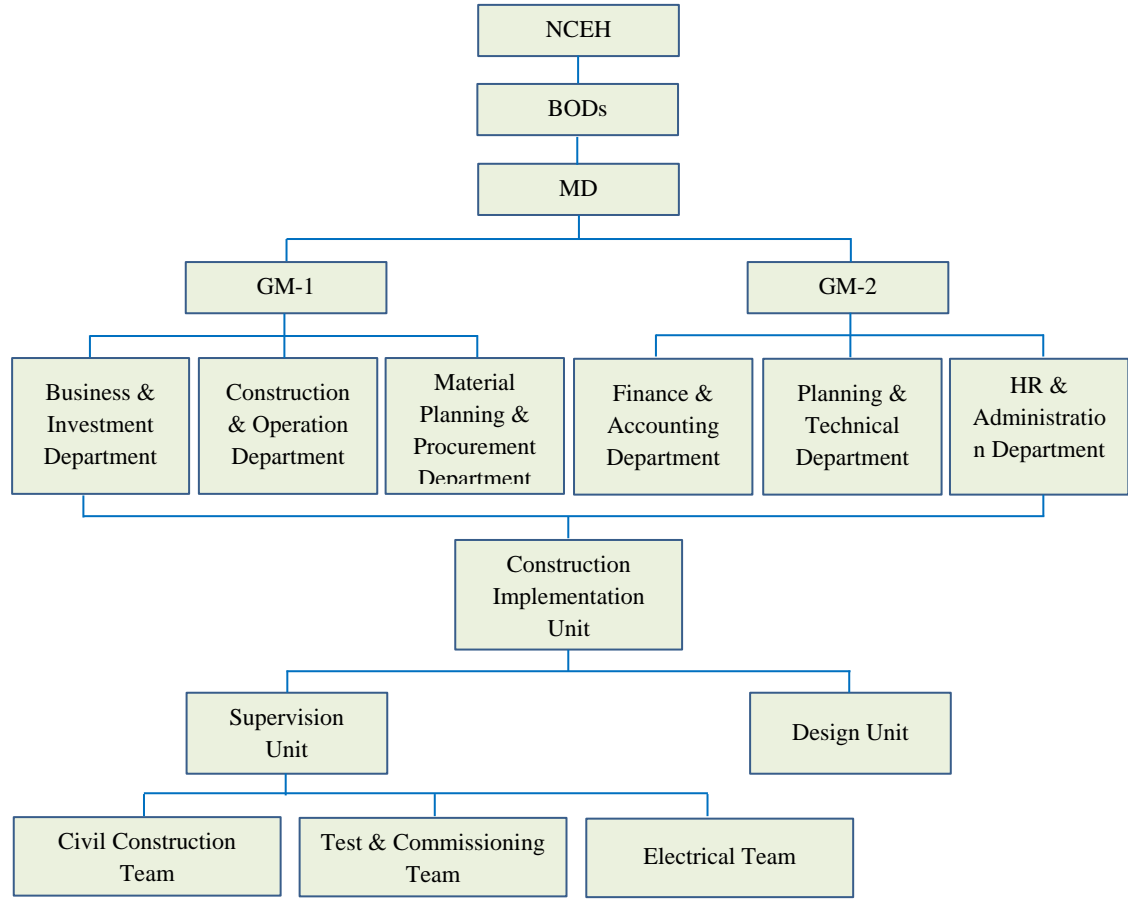


<Figure 2.3-29> Selected location for substation construction

2.4 Construction Implementation

2.4.1 Construction Implementing Organization

NCEH will implement the construction of this overhead TL. The organization chart of the NCEH and the construction implementation unit for this TL is expressed in Figure 2.4-1.



<Figure 2.4-1> Organization chart for construction implementation unit

2.4.2 Construction Implementing Schedule

The construction aims to complete within 3 years and the appraisal schedule for construction implementation is shown in Table 2.4-1.

<Table 2.4-1> Appraisal Schedule for Construction Implementation

Phase	Activities	2020				2021				2022			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Preconstruction	Recruitment of consultants												
	Appoint implementation consultants												
	Familiarize design												
	Contract with IEE implementation consultant												
	Resettlement implementation												
Construction	Contract with raw material suppliers												
	Recruitment of construction workers												
	Construction of temporary worker camp												
	Construction of substation												
	ROW clearance												
	Access road construction												
	Tower foundation works												
	Tower erection												
	Stringing work												
	Test/commissioning												
	Completion of installation												

Q= Quarter of a year

2.4.3 Construction Materials

The following materials will be used in the construction of foundation for 195 towers;

Sand	- 1137 m ³
Conglomerate	- 2618 m ³
Cement	- 851847 kg
Steel rod	- 64736 kg

2.4.4 Construction Vehicles and Other Machineries

The types of vehicles, heavy machines and equipment which will be used in the different steps of construction phase are presented in Table 2.4-2.

<Table 2.4-2> List of Construction Vehicles and Machineries

No	Type	Model	Number
Earth Work/Access Road			
1	Excavator	2.0 m ³	1
2	Bull dozer	88 kw	1
Lifting Transportation Equipment			
1	15-ton Truck	5 t	1
2	20-ton Truck	20 t	1
3	5-tons Truck	15 t	2
4	Lorry-mounted crane	QLD8, 10 t	1
5	Winch machine	15t	2

Concrete Equipment			
1	Engine Concrete mixer	0.3 m3	2
2	Vibrator	-	4
Processing and Maintenance Machine			
3	AC arc welding machine	Bx1-500	2
4	Bit sharpener	-	4
5	Steel Structure processing equipment	-	4
6	Woodwork processing equipment	-	2
Water Boxer			
1	Water Boxer	1000 gals	1
Others			
1	Diesel generator	50 kW	2
2	Measurement equipment	-	2

2.4.5 Human Resources for Construction Works

There will be about 50 workers to be employed throughout the construction period. Among them, the number of skilled workers (including electrical and civil engineers) will be from NCEH and the rest 20 will be from the nearby communities. Regarding the accommodation of the workers, the temporary worker camp will be built before the TL construction commences. The worker camp can reside up to 60 workers, but location of the construction of the camp has not yet confirmed.

CHAPTER 3

PROJECT PROPONENT

3.1 Profile

The Natural Current Energy Hydropower Company is a private limited company which develops concept, investigation, design, investment, execute, implementation, facility management (O&M) of the hydropower stations in Myanmar. With over the years, NCEH has undertaken many challenging projects and accumulated skills, technical know-how and experiences in design and implementation solutions, project management services and related engineering works. NCEH specializes in providing our client and customers with qualified, secured and cost-effective services in energy, environment and other infrastructure projects to meet user satisfaction.

Today, NCEH takes on the role of main investor and developer for medium to large scale hydropower projects and performs project management services coordination with specialist and experts for power projects. The company also provides design inputs and engineering solutions as value-added services.

The company's belief is to provide to the power purchasers with "NCEH is reliable in secured power supply" experience when the NCEH is chosen to execute the projects. The company emphasis on clear communication and follow-through procedures ensures that the client's objectives are top priority in the planning and execution of all processes.

The company's project investing management and execution philosophy are;

- To create a detail schedule and resources plan to meet the client's project goal and objects,
- To communicate clearly with project stakeholders,
- To track project progress and fine-tune deviations,
- To monitor, manage, assign experts and supervise closely on quality of work done,
- To complete and commission the project on time and
- To facilitate the management (Operation and maintenance) of the project.

3.2 Vision

- NCEH Company Limited as a professional, innovative and largest independent power producer in Myanmar, play a significant role in Environment and Social friendly development of high-potential hydropower sector in the country and contribute to reducing power crisis of the nation.

3.3 Mission

- To develop, build, own and operate Hydropower Projects. Promote environmentally sound and appropriate technologies and strengthen the capability of local communities creating better opportunities through the mobilization of local resources to improve their livelihood.
- To harness the hydropower potential of the country for the benefit of the people at large by optimally utilizing the untapped resources and creating synergy with the private sector.
- To ensure attractive and sustainable long term return to our shareholders through prudent and sound investment.
- To create a competitive working environment with long term career prospects to our employees whereby they will nurture a culture to learn, grow and put their best effort to the growth of the company, and

- To maximize public participation and empower them to have a better living.

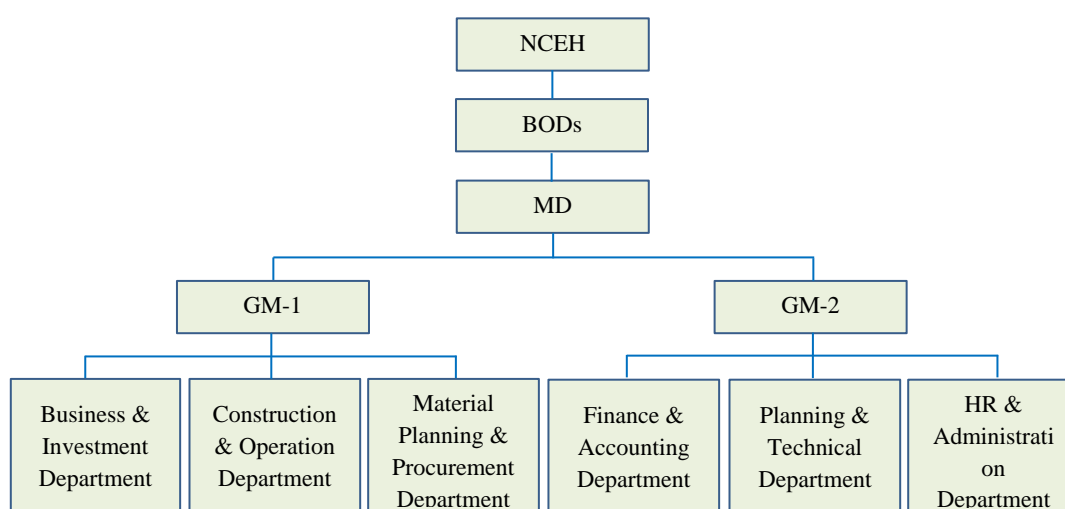
3.4 Quality Management Policy

The company commits to develop and generate electricity from hydropower projects satisfying our stakeholders through continual improvement in its technology, process, human resource management and complying the statutory & regulatory requirement.

3.5 Environmental Management Policy

The company commits to produce our energy in an environment friendly and responsive manner by implementing, maintaining and continually improving our environmental management system.

3.7 Organization Structure



<Figure 3.7-1> NCEH's organization structure

3.8 Company Offices

The contact information of the company offices is presented in the Table 3.8-1.

<Table 3.8-1> Company Contact Information

Company Head Office (Mandalay)
<ul style="list-style-type: none"> • No.(E-1-11), Ngu-Shwe-Wah street between 64-65 street, Chan Mya Tharsi township, Mandalay. • 09-258243339 • 09-420011159
Company Branch Office (Nay Pyi Taw)
<ul style="list-style-type: none"> • No.(A-051), Pa-Don-Mar street, Shwe Kyar Pin Ward, Zabuthiri township, Naypyitaw. • 09-895228852



CHAPTER 4

IMPLEMENTATION ORGANIZATION

4.1 Implementing Organization

The field studies have been carried out by the experts from Resource and Environment Myanmar (REM) and Sustainable Environmental Myanmar (SEM) organizations with vast experiences in conducting EIA, IEE and EMP projects in Myanmar. The project phases have scoped in Pre-construction, Construction, and Operation phases for identification and evaluation of impacts based on their magnitudes, duration, extent and intensity with the required mitigation measures to reduce the impacts to be within the acceptable limits.

<Table 4.1-4> IEE Implementing Organization

Organization	Responsibility
Resource and Environment Myanmar (REM) 	-Physical Environmental Study -Social Environmental Study (Including Stakeholder Engagement Meetings) -Survey Report Preparation - IEE Report Compilation
Sustainable Environment Myanmar (SEM) 	-Ecological Study (Flora and Fauna) -Survey Report Preparation -GIS works

4.1.1 Resource & Environment Myanmar Ltd. (REM)

The REM, located in the city of Yangon, is the leading environmental consulting firm in Myanmar. The company has the current or former faculty members of Yangon University as its experts who specialize in the environment, management society and earth resources and other related subjects. Its predecessor was a research team founded in 1998 within the University of Yangon of which the members were ecologists, social economists, geologists, doctors, economists, and data management staff. In 2003, an environmental impact assessment team was established. After five years of cooperation in several projects with the scientists from various disciplines of the University of Yangon (such as environmental data collection, oilfield development evaluation, construction of offshore oil and gas production base, beach resorts and onshore gas pipelines, etc.), the Resource and Environment Myanmar was registered in 2008 under the current laws and regulations in Myanmar. REM provides systematic services for a variety of major infrastructure projects under the request.

So far, REM has conducted environmental impact assessment, social and health impact evaluation for the private sector or government-led projects. Besides, the company also delivers geotechnical engineering, geological and hydrogeological surveys, and soil investigations, geological hazard assessments (potential landslide risk figure, seismic hazard assessment, and flood risk map).

REM currently has nine research groups, including ecology, plants, soil and water, social investigation, cultural heritage, public health, risk, information management and atmospheric research, a total of 33 experts and has been certified for ISO9001:2008 No. 686750.

4.1.2 Sustainable Environment Myanmar

The SEM, based in Yangon city, is the leading environmental impact assessment consultant and a subsidiary company of Resource & Environment Myanmar Company Ltd. The company was initiated as a consultant group called “Yangon University Team” in 2004 and registered as the first environmental consultant company in Myanmar Government in 2008.

Over the long term, the SEM worked together with the REM and has completed projects on Environmental Impact Assessment and Monitoring of infrastructure development, gold and base metal mining and special economic zone.

The SEM has the resources and capability to handle environmental management issues as per the provisions of the Environmental Conservation Law, 2012. Environmental work includes the following;

1. Environmental Audit (regarding ongoing projects).
2. Environmental Impact Assessments (regarding new projects)
3. Environmental & Social Management Plan
4. Environmental Monitoring

4.1.3 Team Member

<Table 4.1-5> Member of the Team

Name (Surname, Given name)	Registration / License No. by ECD (if applied)	Organization	Contact Details	Area of Expertise
U Zaw Naing Oo	Certificate for Transitional Consultant Registration No. 0025 (See in Appendix)	Sustainable Environment Myanmar Co., Ltd.	No. 503, Building B, Delta Plaza Compound, Shwegondaing Road, Bahan Township. Tel : +959 261328891	ESIA / ESMMP, Risk Assessment and Hazard Management
U Win Naing Tun	Certificate for Transitional Consultant Registration No. 0002 (See in Appendix)	Resource & Environment Myanmar Co., Ltd.	No. 702, Building B, Delta Plaza Compound, Shwegondaing Road, Bahan Township. Tel: +95 9 73013448	Legal and Cultural Heritage

Name (Surname, Given name)	Registration / License No. by ECD (if applied)	Organization	Contact Details	Area of Expertise
Daw Khin Ohnmar Htwe	Certificate for Transitional Consultant Registration No. 0002 (See in Appendix)	Resource & Environment Myanmar Co., Ltd.	No. 702, Building B, Delta Plaza Compound, Shwegondaing Road, Bahan Township. Tel: +95 9 73013448	Stakeholder Engagement and Public Consultation /Land Use/Socio Economy
U Thura Aung	Certificate for Transitional Consultant Registration No. 0002 (See in Appendix)	Resource & Environment Myanmar Co.,Ltd.	No. 702, Building B, Delta Plaza Compound, Shwegondaing Road, Bahan Township. Tel: +95 9 73013448	Geology and Soil, Waste Management
U Myatthu Kyaw	Certificate for Transitional Consultant Registration No. 0002 (See in Appendix)	Resource & Environment Myanmar Co., Ltd.	No. 702, Building B, Delta Plaza Compound, Shwegondaing Road, Bahan Township. Tel: +95 9 73013448	Emission Inventory, Air Pollution Engineering, Management
Daw Phyoe Khaing Zar Wint	Certificate for Transitional Consultant Registration No. 0002 (See in Appendix)	Resource & Environment Myanmar Co., Ltd.	No. 702, Building B, Delta Plaza Compound, Shwegondaing Road, Bahan Township. Tel: +95 9 73013448	Water Pollution Control
U Soe Yu Htun	Certificate for Transitional Consultant Registration No. 0002 (See in Appendix)	Resource & Environment Myanmar Co.,Ltd.	No. 702, Building B, Delta Plaza Compound, Shwegondaing Road, Bahan Township. Tel: +95 9 73013448	Meteorology, Modelling for Air Quality
Daw Naing Naing Win	Certificate for Transitional Consultant Registration No. 0025 (See in Appendix)	Sustainable Environment Myanmar Co., Ltd.	No. 503, Building B, Delta Plaza Compound, Shwegondaing Road, Bahan Township. Tel : +959 261328891	Ecology and Biodiversity
U Myat Ko Ko Hein	Certificate for Transitional Consultant Registration No. 0025 (See in Appendix)	Sustainable Environment Myanmar Co., Ltd.	No. 503, Building B, Delta Plaza Compound, Shwegondaing Road, Bahan Township. Tel: +959 261328891	Ecology and Biodiversity

Name (Surname, Given name)	Registration / License No. by ECD (if applied)	Organization	Contact Details	Area of Expertise
U Chit Myo Lwin	Certificate for Transitional Consultant Registration No. 0025 (See in Appendix)	Sustainable Environment Myanmar Co., Ltd.	No. 702, Building B, Delta Plaza Compound, Shwegondaing Road, Bahan Township. Tel : +95 9 73013448	Groundwater and Hydrology
Daw Lai Lai Win	Certificate for Transitional Consultant Registration No. 0002 (See in Appendix)	Resource & Environment Myanmar Co., Ltd.	No. 702, Building B, Delta Plaza Compound, Shwegondaing Road, Bahan Township. Tel : +95 9 73013448	Environmental Engineering/Waste Management
Daw Than Than Htay	Certificate for Transitional Consultant Registration No. 0025 (See in Appendix)	Sustainable Environment Myanmar Co., Ltd.	No. 503, Building B, Delta Plaza Compound, Shwegondaing Road, Bahan Township. Tel: +959 261328891	Ecology and Biodiversity
Daw Ei Ei Win Myat	NA (TCR will be applied after licensing approval) CV and certificates are attached.	Resource & Environment Myanmar Co., Ltd.	No. 702, Building B, Delta Plaza Compound, Shwegondaing Road, Bahan Township. Tel : +95 9 73013448	Legal Analysis

The approval letter of team member and confirmation of third party by Ministry of Natural Resources and Environmental Conservation are attached in Appendix.

4.1.4 Implementation Schedule

The appraisal schedule for the IEE implementation is presented in Table 4.1-6.

<Table 4.1-6> Appraisal Schedule for IEE Implementation

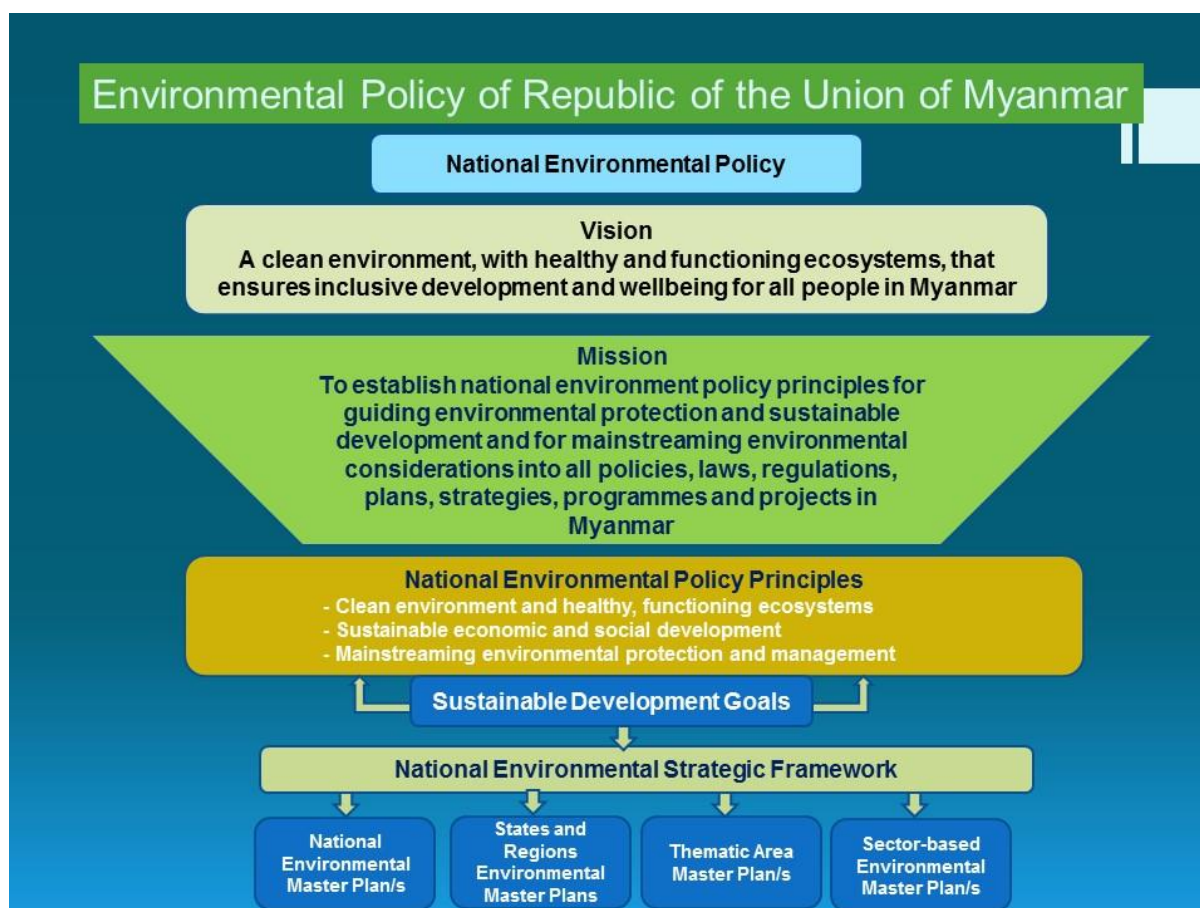
Task	Timeline														
	2019			2020											
	October	November	December	January	February	March	April	May	June	July	August	September	October	November	December
Organizing IEE Experts															
Desktop study															
Meeting with Proponent															
Preparation for Environmental & Social Baseline Survey															
Conduct Stakeholder Engagement Meetings															
Preparation of IEE Draft Report															
Submission of IEE Draft Report															
IEE Report Review Process															
Revise comments from Review Process															
Submission of IEE Final Report															
Disclosure of IEE Final Report															

CHAPTER 5

POLICY, LEGAL AND ADMINISTRATIVE

5.1 National Environmental Policy of Myanmar

On the occasion of the World Environment Day 2019, the Government of Myanmar launched the National Environmental Policy of Myanmar consisting of two new policies that will guide Myanmar's environmental management and climate change strategy. Figure 5.1-1 shows the new Myanmar National Environmental Policy.



<Figure 5.1-1> National Environmental Policy of Myanmar

5.2 Environmental and Social Policy of the Company

NCEH is committed to develop and generate electricity from hydropower projects satisfying the stakeholders through continual improvement in its technology, process, human resource management and complying the statutory & regulatory requirement. NECH is also committed to produce energy in an environment friendly and responsive manner by implementing, maintaining and continually improving our environmental management system.

For CSR activities, NECH is committed to take social initiatives for the development of local areas in particular and the nation in general. Promote the livelihood of people of project affected area and to provide the fund for local schools, social institutions and development of local cultural heritage.

5.3 NCEH's Commitments

Natural Current Energy Hydropower Company Limited as a professional, innovative and largest independent power producer in Myanmar plays a significant role in environment and social friendly development of high-potential hydropower sector in the country. NCEH contributes to reduce power crisis of the nation. The followings are the commitments of NCEH during construction of transmission line and substation.

- NCEH confirms to take responsibility for implementing environmental mitigation measures in accordance with the commitment in the Environmental Management Plan that stated in the IEE report.
- The company will fully comply with existing rules and regulations concerning environment both on social and environmental aspect in Myanmar.
- Operation by NCEH and its contractors will at all times comply fully with the commitments, mitigation measures, and plans in IEE report.
- NCEH will submit the Environmental Monitoring Report during construction and operation of the proposed project to Environmental Conservation Department, Ministry of Natural Resources and Environmental Conservation.

5.4 Institutional Framework

The followings are relevant institutions with regard to environmental administration this project.

5.4.1 Ministry of Natural Resources and Environmental Conservation (MONREC)

Since country had initiated to start moving onto the path of democracy, new civil government was elected in 2010. After the selected government, Ministry of Forestry was reformed as Ministry of Environmental Conservation and Forestry (MOECAF) in 2011 as a national level agency to coordinate and handle environmental related issues and matters including the implementation of international environmental agreements signed by government, law enforcements and information dissemination.

In 2016, MOECAF has been changed to Ministry of Natural Resources and Environmental Conservation (MONREC). Hence, MONREC has been acting as focal coordinating body for country's overall environmental management and environmental matters. Five departments and an enterprise under the MONREC has been organized, namely,

- (1) Planning and Statistics Department
- (2) Forest Department
- (3) Dry zone Greening Department
- (4) Environmental Conservation Department
- (5) Survey Department
- (6) Myanmar Timber Enterprise.

Environmental Conservation Department (ECD) was newly created in October 11, 2012 as one of the institutions of MONREC to take responsibility for the effective implementation of environmental conservation and management in Myanmar. The objectives of forming ECD are,

- To implement the national environment policy

- To develop short, medium- and long-term strategy, policy and planning for the integration of environmental consideration into the sustainable development process
- To manage natural resources conservation and sustainable utilization
- To manage the pollution control on water, air and land for environmental sustainability
- To cooperate with government organization, civil societies, private and international organizations for the environmental affairs.

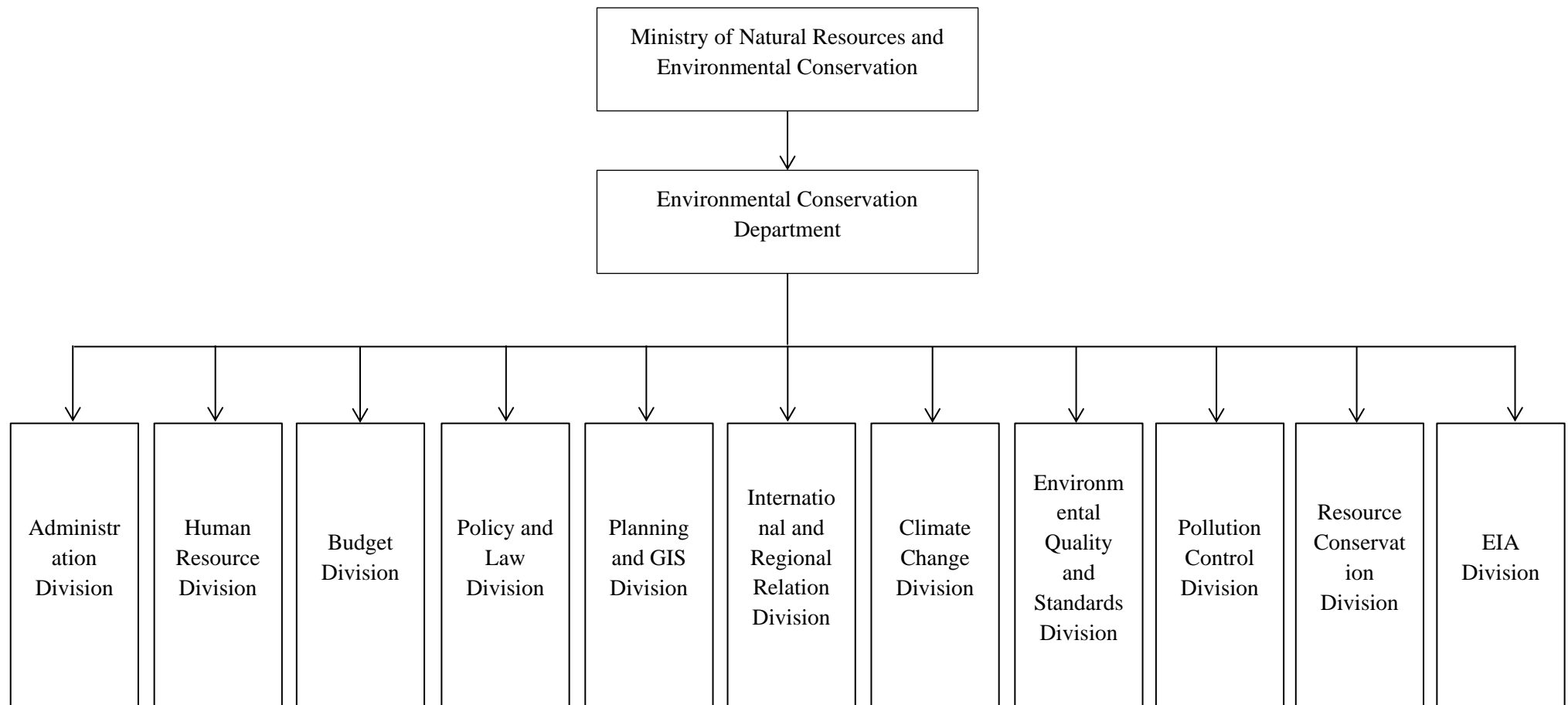
Currently, Environmental Conservation Department has been hosting various environmental and sustainable related workshops and meetings in an effort to fulfill the country's most demanding human resource, knowledge and technical expertise in environmental sector by technical transferring and knowledge sharing from international consultants.

On the other hand, in collaboration with international financial institutions and United Nations organizations, MONREC has also been carrying out the activities of preparing environmental regulations such as EIA rules, environmental quality standards and other environmental related issues.

MONREC has also being planned to organize sub divisions under ECD and extend the man power in near future with the aim of effectively implement and manage the environmental regulations and resources in country wide. This newly organized environmental divisions include;

- Administration
- Planning & Internal relation
- Pollution control
- Natural resource and EIA
- State and Region departments.

The sub divisions are still being organized and not in a fully functional position yet. As the job allocation and staffing within the department are in progress, detailed functions and responsibilities given to individual department remain still unknown in the time of this report. Organization of ECD are shown in Figure 5.4-1.



<Figure 5.4-1> Myanmar National Environmental Conservation Organization Chart

5.4.2 Department of Power Transmission and System Control

Department of Power Transmission and System Control (DPTSC) is one of the institutions under Ministry of Electricity and Energy (MOEE) and responsible for the sectors of power system operation and maintenance, construction and operation of power transmission lines and substations, control of national power grid, generation and maintenance of gas turbines and combined cycle.

Power Transmission Project Office (Northern and Southern) under DPTSC is fully responsible for the development and implementation and maintenance of environmental management plan of proposed project.

Head of Power Transmission Project Office (Northern and Southern) is fully responsible for the effective and efficient implementation of environmental management plan conforming to applicable legal requirements and meet the other requirements described in this plan.

In addition to those, Head of Power Transmission Project Office (Northern and Southern) shall address the specific responsibilities for project entities ensuring construction and operation works for this project being performed in safe and environmental friendly manner in accordance with requirements stipulated in the management plan.

5.4.2.1 Responsibilities of the Office of Power Transmission Project (Northern/Southern)

Responsibilities of the Office of Power Transmission Project (Northern/Southern) are

- Managing standards and performance quality of the companies responsible for the construction of transmission line and substation commissioned by the department
- Engagement with local authorities and communities for land issues, loss of seasonal crops, perennial trees and forest within the project area
- Submitting to the Ministry for environmental and social impacts of the projects and consulting with the public in accordance with the Ministry's guidelines

5.5 Requirement for Performing IEE

The MOEE submitted a Project Proposal in compliance with the requirements of the EIA Procedure (2015) to MONREC on August 22, 2019. The Project Proposal outlined the scope of the project and the approved alignment of the transmission lines, anticipated impacts and proposed mitigation measures.

The office of Union minister, MONREC sent a letter to MOEE on 16 November 2019 which requires the project to prepare an IEE for the transmission lines following the outline prescribed in the EIA Procedure (2015).

According to the categorization of economic activities for assessment purposes mentioned in the EIA Procedure (2015), IEE report is determined to be required containing the description of the project and alternatives considered, description of the surrounding environment including maps, impact assessment, results of public consultation processes, and environmental management plan with identified persons/organizations and budgets needed.

<Table 5.5-2> Categorization of Economic Activities for Assessment Purposes

Type of economic activity	Criteria for IEE Type Economic Activities	Criteria for EIA Type Economic Activities
Electrical Power Transmission Lines \geq 230 kV	All	All activities where the Ministry requires that the Project shall undergo EIA

Source: Environmental Impact Assessment Procedure

5.6 Fundamental Laws and Regulations Related to IEE/EIA

5.6.1 Environmental Conservation Law (2012)

Through the MONREC, Myanmar implements the Environmental Conservation Law which was enacted on March 30, 2012. The law prescribes the implementation of the National Environmental Policy and the setting up of basic principles and guidelines for sustainable development. The law also highlights a systematic integration of environmental conservation, natural and cultural heritage and ensures that policies are in-place to prevent the degradation of natural resources.

5.6.2 Environmental Conservation Rule (2014)

The Ministry shall form the EIA Report Review Body with the experts from the relevant Government departments, organizations and may assign duty to the Department to scrutinize the report of EIA prepared and submitted by any organization or person relating to EIA and report through the EIA Report Review Body, and then may approve and reply on the EIA report or IEE or EMP with the guidance of the Committee.

5.6.3 Environmental Impact Assessment (EIA) Procedure (2015)

The EIA Procedure was issued on 29 December 2015. All projects undertaken by any ministry, government department, organization, corporation, board, development committee, local government or authority, company, cooperative, institution, enterprise, firm, partnership or individual that can cause significant adverse impacts are required to undertake either an IEE or EIA and to obtain an Environmental Compliance Certificate (ECC) from MONREC.

This EIA/IEE Procedures cover the following contents: screening of projects, qualification for conducting the initial environmental examination (IEE)/EIA, categorization of projects for IEE/EIA/ environmental management plan (EMP), preparation of IEE/EIA report and EMP, public involvement, procedure on how to get the approval of IEE/EIA report from the Environmental Conservation Department (ECD) under MONREC, environmental compliance certificate (ECC), and monitoring process after getting the approval of the IEE/EIA report.

5.6.4 Electricity Law (2014)

The new Electricity Law (2014) repeals the 1984 Electricity Law and the Electricity Act of 1948. The new law establishes the Electricity Regulatory Commission (ERC) and grants regulatory responsibilities to the ERC and authorities of MOEE, region and state governments, and leading bodies of self-administered zones and self-administered divisions the power to grant permits to entities to engage in electricity-related works such as generation, transmission, and distribution according to the Section 10 (A). Based on Section 2 (N), the right of way means that the land area along the power transmission line prescribed by the Ministry for safe the distance from the electrical hazards.

Even with the promulgation of the new Electricity Law, the Electricity Rules (1985) is still in effect since the new rules have not yet been issued as of this date. There are specific provisions of the Electricity Rules on impact assessment, environment, health and safety. The conduct of the initial environmental examination for power transmission projects is mentioned in the Electricity Rules (1985). Safety clearances are also prescribed as presented in the following Table.

<Table 5.6-2> Transmission Line Minimum Safety Clearance based on Electricity Rules (1985)

Location	66 kV	230 kV
Paddy field	19 ft. (5.79 m)	22 ft. (5.79 m)
Parallel to road	22 ft. (5.79 m)	25 ft. (5.79 m)
Passing through a road	22 ft. (5.79 m)	25 ft. (5.79 m)
Building		
Horizontal clearance	13 ft. (5.79 m)	16 ft. (5.79 m)
Vertical clearance	15 ft. (5.79 m)	50 ft. (5.79 m)
Passing through a railway	24 ft. (5.79 m)	25 ft. (5.79 m)

5.7 Other Related Environmental Regulations and Policies

Other laws and policies on environmental management and protection in Myanmar that are applicable to the transmission lines and substations are presented in the following Table.

<Table 5.7-2> Other Applicable Related Environmental Laws and Policies in Myanmar

Laws and Regulations	Description
National Environmental Quality (Emission) Guidelines (2015)	MONREC formulated the National Environmental Quality (Emission) Guidelines (NEQG) in coordination with ADB in December 2015. The NEQG determines the guideline values for general emission such as air emissions, wastewater, noise levels, odor, and those for sector-specific emission such as emission from forestry, agribusiness/food production, chemicals, oil and gas, infrastructure, general manufacturing, mining, and power.
Protection the Rights of Ethnic Nationalities Law (2015)	To ensure to disclose to the resident ethnic nationalities about the project fully, moreover, to ensure cooperate with them. Section 5 - The project proponent will disclose to the resident ethnic nationalities about the project fully.
The Law Amending the Workmen' Compensation Act, 1923 (2005)	To ensure the compensations to injured employee while implementing in line with the above law. To abide by the prescribed compensations in various kinds of injury. Section 13 - The project owner will pay the compensation in line with the provisions of said law.
The Minimum Wages Law (2013)	To ensure the project owner pays the wages not less than prescribed wages and notify obviously these wages in work place, moreover to be inspected.

The Motor Vehicles Law (2015) and Rules (1987)	When the construction period and if it is needed in operation and production period for all vehicles the project proponent will promise to abide by the nearly all provisions of said law and rules, especially, the provisions related to air pollution, noise pollution and life safety.
Protection and Preservation of Cultural Heritage Regions Law, 1998	This law was signed on 10 September 1998. It provides for the protection and preservation with respect to perpetuation of cultural heritage that has existed for many years. The law prescribes that protection and preservation of cultural heritage regions should be in conformity with the International Convention approved by the State.
The Conservation of Antique Objects Law (2015)	The antique object is non-valuable for national heritage. So, anybody has to inform if he or she has found any antique object. Section 12 - The project proponent will inform to the village-tract office antique object is found.
Conservation of Water Resources and Rivers Law, 2006	The law was enacted in 2006 to conserve and protect water resources and river systems for the beneficial use of the public. It also aims to protect the environment against abusive use and exploitation of water resources. The law strictly prohibits disposal of engine oil, chemical, poisonous material and other materials which that may cause environmental damage.
The Forestry Law (2018)	The new Forestry Law includes certain objectives to ensure long-lasting forest management and sustainable development. It is directed towards implementation of the forest policy and environmental conservation policy and endeavors to reduce the occurrence of natural disasters in line with international standards.
The Protection of Wildlife, Wild Plant and Conservation of Natural Area Law, 1994	In order to protect and conserve wild life, wild plants and natural area in accordance with international protocol, Union Government Policy. Designates national parks and other protected areas to be: Scientific Reserve; National Park Marine National Park; Nature Reserve; Wildlife Sanctuary; Geo- physically, Significant Reserve; or Other Nature Reserve designated by the Minister.
Farmland Law, 2012	The Township Farmland Management Body shall issue the Land Certificate to the Township Land Record Department Office passing it through the relevant ward or Village Tract Farmland Management Body.
Farmland Rules, 2012	In the farm land is requisitioned under farm land law for the interest of the state or the public the grievance and compensation for improving the farm land without delay farm the concern, the central farm land management committee shall conduct as necessary.
Public Health Law, 1972	It is concerned with protection of people's health by

	controlling the quality and cleanliness of food, drugs, environmental sanitation, epidemic diseases and regulation of private clinics.
Occupational Safety and Health Law, 2012	<ul style="list-style-type: none"> - To support the development of the State's economy through the development of production by causing to enjoy more security in social life and health care by the workers who are major productive force of the State by the collective guaranty of the employer, worker and the State; - To enjoy more security in social life and medical care by the public by effecting their insurance voluntarily. To raise public confidence upon the social security scheme by providing benefits which are commensurate with the realities - To have the right to draw back some of the contributions paid by the employers and the workers as savings, in accord with the stipulations; - To obtain the right to continued medical treatment, family assistance benefit, invalidity benefit, superannuation benefit, survivors' benefit, unemployment benefit, the right to residency and ownership of housing after retirement in addition to health care and pecuniary benefit for sickness, maternity, death, employment injury of the workers.
Prevention and Control of communicable Diseases Law (1995) (Revised in 2011), 1995/2011	Describes functions and responsibilities of health personnel and citizens in relation to prevention and control of communicable diseases. It also describes measures to be taken in relation to environmental sanitation, reporting and control of outbreaks of epidemics and penalties for those failing to comply. The law also authorizes the Ministry of Health to issue rules and procedures when necessary with approval of the government.

5.8 Environmental Quality Standards

The Environmental Conservation Law (2012) provides the basis for the conservation and protection of the natural environment of Myanmar and provides the common principles of environmental conservation and for other environmental laws and policies. The Government established the National Environmental Quality (Emissions) Guidelines (NEQEG) in 2015 that includes guidelines for air emissions, wastewater, noise levels, odor, and sector-specific requirements including those for electric power transmission projects.

5.8.1 Discharge Standards

The wastewater effluent limits for electric power transmission is presented in Table. This standard will apply to wastewater that will be generated from the substations. The same allowable limits of discharges of site runoff and wastewater during construction phase of the project applies.

<Table 5.8-4> NEQEG Effluent Limits Applicable to Electric Power Transmission

Parameter	Unit	Maximum Concentration
Biochemical oxygen demand	mg/l	30
Chemical oxygen demand	mg/l	125

Oil and grease	mg/l	10
pH	Standard unit	6-9
Total coliform bacteria	MPN/100 ml	400
Total nitrogen	mg/l	10
Total phosphorus	mg/l	2
Total suspended solids	mg/l	50

5.8.2 Electric and Magnetic Fields

The NEQEG states that exposure limits for general public to electric and magnetic fields should comply with the International Commission on Non-Ionized Radiation Protection Guidelines for limiting general public exposure to time- varying electric, magnetic and electromagnetic fields (up to 300 Gigahertz). The electric field and magnetic field limits are provided in Table 5.8-5.

<Table 5.8-5> NEQEG Exposure Limits to Electric and Magnetic fields

Frequency	Electric Field (V/m ³)	Magnetic Field (μT)
50 Hz	5000	100
60 Hz	4150	83

Source: NEQEG (2015)

5.8.3 Standard for Noise

The allowable noise levels should not exceed the levels in Table or result to a maximum increase in background noise of 3 dB at the nearest receptor location. The standard for noise is aligned with the IFC Environment, Health and Safety (EHS) guidelines.

<Table 5.8-6> NEQEG Allowable Noise Levels

Receptor	One hour LAeq(dBA)	
	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 areas	55	45
Industrial and commercial areas	70	70

Note: LAeq is the equivalent continuous sound level in decibels

Source: NEQEG (2015)

5.9 International Environmental Conventions and Agreements

The main international and regional treaties concerning the environment to which Myanmar is a party (in chronological order) that related to the present transmission line project can be listed as follows:

- Plant Protection Agreement for the Southeast Asia and Pacific Region;
- Convention Concerning the Protection of the World Cultural and Natural Heritage
- Montreal Protocol on Substances that Deplete the Ozone Layer & all amendments
- Convention on Biological Diversity

- International Tropical Timber Agreement
- Ramsar Convention on Wetlands
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
- ASEAN Agreement on the Conservation of Nature and Natural Resources
- United Nations Convention to Combat Desertification
- United Nations Framework Convention on Climate Change (UNFCCC) and Kyoto Protocol
- ASEAN Agreement on Transboundary Haze

CHAPTER 6

DESCRIPTION OF THE SURROUNDING ENVIRONMENTAL AND SOCIAL CONDITIONS OF THE PROJECT

6.1 Methodology for Data Collection and Analysis

Environmental Consultant team conducted a desktop study and an environmental baseline data collection in order to know environment and social conditions along the transmission line alignment and substation.

The baseline data collection was based on the following methods.

- a) Identification and review of the applicable national and international environmental and social regulatory and institutional framework;
- b) Establishing environmental and social baseline conditions along the stretch by the followings;
 - Reconnaissance survey using satellite imagery to observe environmental and social characteristics along the transmission line alignment;
 - Secondary data collection along the transmission line alignment with respect to air quality, water quality, soil quality, noise level, vibration level, and socio-economic condition;
 - Ecological survey of flora and fauna using desk study prevailing along the transmission line alignment through primary and secondary surveys;
 - Identification of land use of the stretch through satellite imagery of the whole stretch of the transmission line; and
 - Identification, prediction of environmental and social impacts of the project.

6.2 Description of the environment

The baseline study was considered Area of Influence (AOI) including the double circuit 230kV overhead transmission line. The environmental baseline data covering air quality, water quality, soil quality, noise level, vibration level and ecological survey were conducted along the transmission line alignment. The ecological survey was conducted to assess the type of flora and fauna prevailing along the transmission line. The data related to topography, meteorology and geology were collected through literature review and available data from General Administration Department (GAD). Topography, meteorology and geology along the transmission line were studied using available topographic maps and satellite imagery. The baseline study was considered along the ROW of 230kV TL in Namtu, Hsipaw and Kyaukme townships.

6.3 Natural Environment

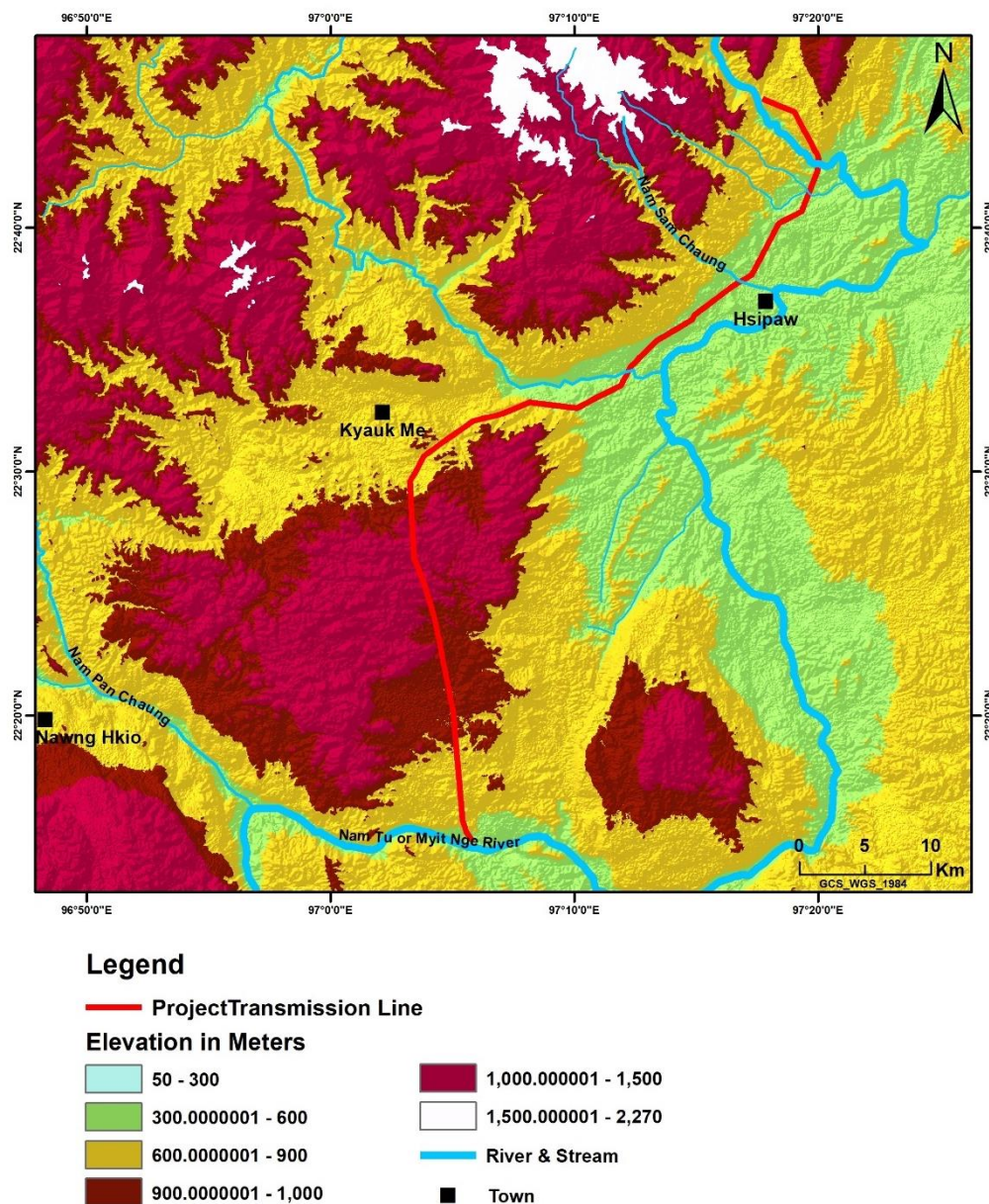
6.3.1 Topography along the Transmission Line Route

Myanmar is located in northwest of Indochina Peninsula. It has bordering Thailand and Laos to the east, China to the north, India and Bangladesh to the west. Myanmar is geopolitically critical as its location, being in the middle of the line between India and China, is a connecting point between Southeast Asia and South Asia as well as the Pacific and the Indian. Myanmar is situated between 10° and 29° N latitude and 92° and 101° E longitude with an area of 676,577 km², extend 936 km from east to west and 2,051 km from north to south. Topographically, Myanmar can be roughly divided

into three parts; the western hills region, the central valley region and the eastern hills region. The general profile of the country rises from the sea level along the southern coasts to the snow-capped mountains towering with a highest elevation of around 6,000 m in the northern tip of the country near the China border.

According the feasibility study report, the landform along the 230kV transmission line, include plains in most parts and river network and low mountains and hills in some parts.

The 230kV line passes through Namtu Township, Kyaukme Township and Thipaw Township in Shan State in Myanmar. Along the line route, the general elevation between Namtu and Thipaw ranges from 450 to 800 meter above mean seal level, the general elevation between Thipaw and Kyaukme ranges from 300 to 900 meter above mean seal level and the general elevation between Yeywa and Kyaukme ranges from 500 to 1000 meter above mean sea level (See in Figure 6.3-1). The slopes are generally moderate and steep slopes are observed in some places.



<Figure 6.3-1> Topography along the 230kV transmission line.

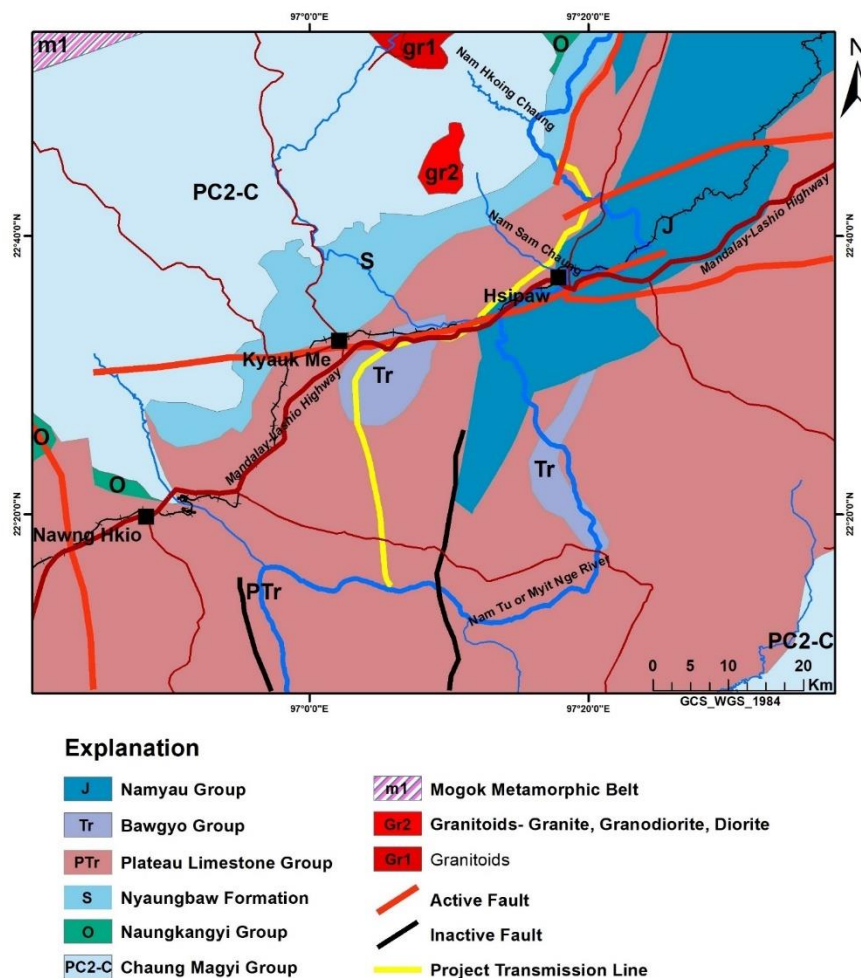
6.3.2 Geology

The present transmission line project area is mainly occupied by the Eastern Highlands of Myanmar. The main strata exposed along the line route are Bawgyo Group, Plateau Limestone Group and Nyaungbaw Formation. Bawgyo Group composed of Pangno Evaporites and Napeng Formation. It consists of pink dolomite, limestone, red sandstone, red carbonate conglomerate, rare cherty mudstone and shale.

Plateau Limestone Group consists of the limestone and dolomites are well exposed in this area. It is mainly composed of grey to brown color, fine to medium grain, massive and criss-cross jointed dolomitic limestone. The Plateau limestone Group reflects its karst topography and terra-rosa soil. The age of the Plateau Limestone Group is Permian to middle Triassic.

Nyaungbaw Formation is mainly composed essentially of purplish to greenish grey, medium to thick bedded argillaceous limestone with phacoidal to sub-phacoidal structure and inter bedded with thin calcareous shale.

The transmission line crosses Kyaukme Active Fault and Moemeik Active Fault which are situated North Eastern part of the area. The seismicity of the project area and its environment is Strong Zone. Probable range of Ground Acceleration is 0.2-0.3 g and Modified Mercalli Scale Classes is VIII. (Ref; *Seismic Zone map of Myanmar revised by Maung Then and others (2005)*).



Source: Geology map, compiled by MGS 2012.

<Figure 6.3-2> Geological map

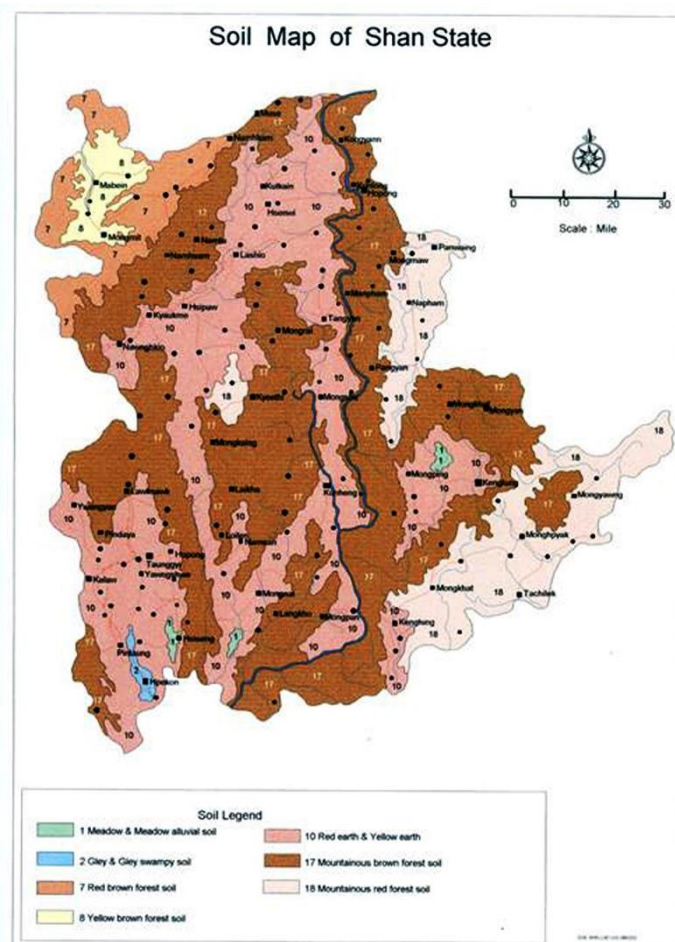
6.3.3 Soil

There are three main types of soil are found in the entire project area and northern part of Shan Region. They are:

4. Red earth and Yellow earth
5. Mountainous brown forest soil and
6. Mountainous red forest soil

1. *Red Earths and Yellow Earths (Acrisol)*

The Red Earths soils are the most dominating soils of Shan Plateau and of the northern mountainous region at the elevation of more than 3000 feet above sea level. The Shan Plateau is about completely covered with these soils. The Yellow Earths occur on the level lower slopes in the Shan Plateau. They occupy a relatively small area, changing the Red Earths down the slopes. The Red Earths have very deep profile having the texture varying sandy and silty to silty clay loam and with good structure. They are well drained and easy to plough. The soil reaction is slightly acid to neutral with pH ranging from 6 to 7. However, the Yellow Earths soils are more acidic and have more clay percentage. Iron and aluminum contents are also very high. The humus contents of Yellow Earths are more than that of the Red Earths. The soils are deficient in nitrogen and phosphorus. The content of potassium is high in the Red Earths. The Red Earths is the typical soils for agriculture in Shan state. They are well drained, having good structure and easy to plough so they are very suitable for cultivation of seasonal and perennial crops. However, due to relief and slopes, erosion control measure is required. The Yellow Earths soils can only be utilized for gardens, flowers and forests.



<Figure 6.3-3> Soil Map of Shan State

Mountainous Yellow Brown and Red Brown soils (Histic Cambisol and Chromic Cambisol)

These soils occur on the mountainous terrain at the elevation from 4000 to 6000 feet in the Shan Plateau. The soils should be under forest. Forest conservation and soil erosion control measures are very important for these soils.

6.3.4 Climate

Myanmar can generally be described as hilly and mountainous because most parts of the country are situated on high lands. Myanmar is drained by many river systems and most are flowing from the north to the south. The main rivers are Ayeyarwaddy, Thanlwin, Chindwin and Sittaung. Myanmar typically features a tropical monsoon climate. The climate in some parts of the country, however, is locally modified by topography. In most parts of Myanmar, there are 3 well defined seasons; (1) the rainy season (mid-May to October), (2) the cold season (November to January) and (3) the hot season (February to mid-May). Nonetheless, the rainfall patterns and temperature distributions are quite diverse throughout the country. The coastal regions receive more than 5000 mm of annual rainfall whereas the central part of Myanmar has an annual rainfall of less than 1000 mm. In addition, the average highest temperature in the central region during the hot season of March and April rises to above 43.3°C while in the northern mountainous parts of the country, it is about 36°C and on the eastern Shan plateau, it is between 29.4°C and 35°C.

According to the data statistical year book of 2019, the annual rainfall of Lashio, Taunggyi and Keng Tung are 1,297 mm, 1,397 mm and 1,259 mm respectively. The annual mean maximum temperature of three stations is 29.6°C, 25.8°C and 29.8°C while the annual mean minimum temperature are 16.0°C, 15.2 °C and 17.5°C respectively see in Table 6.3-1. The monthly average temperature and monthly rainfall (month to month average) recorded in three meteorology stations during 2009-2018 are shown in the followings.

<Table 6.3-1> Mean Annual Rainfall and Mean Temperature of Three Stations (2009 – 2018)

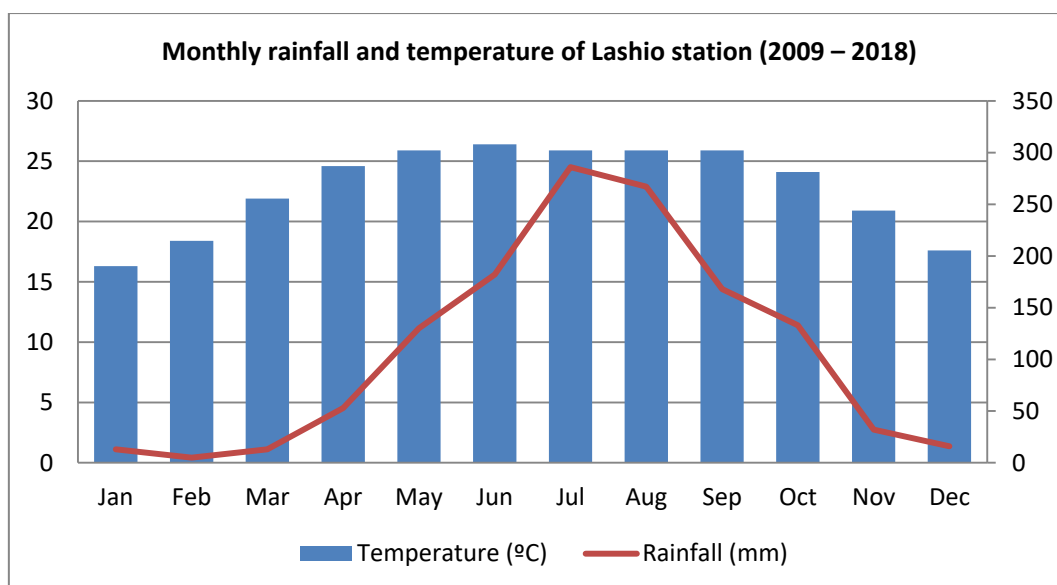
Stations	Annual Rainfall (mm)	Temperature (°C)		Mean Relative Humidity (%)
		Mean maximum	Mean Minimum	
Lashio	1,297	29.6	16.0	74
Taunggyi	1,397	25.8	15.2	70
Keng Tung	1,259	29.8	17.5	70

Source: Department of Meteorology and Hydrology

<Table 6.3-2> Monthly Rainfall and Temperature of Lashio Station (2009 – 2018)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temperature (°C)	16.3	18.4	21.9	24.6	25.9	26.4	25.9	25.9	25.9	24.1	20.9	17.6
Rainfall (mm)	13	5	13	53	130	182	286	267	168	133	32	16

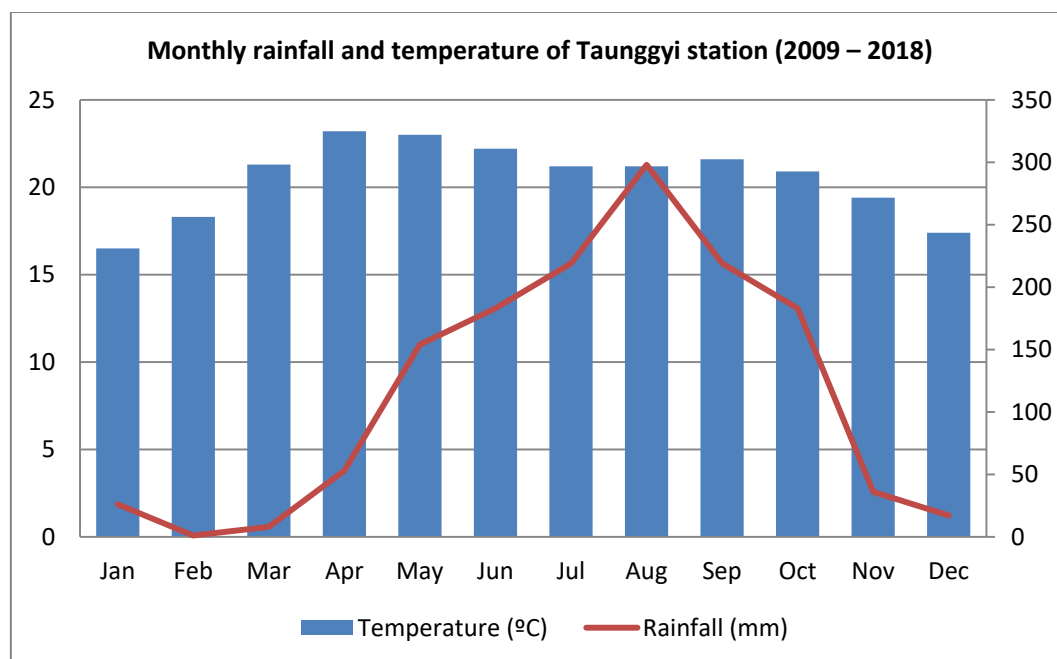
Source: Department of Meteorology and Hydrology



<Figure 6.3-4> Monthly Rainfall and Temperature at Lashio Station

<Table 6.3-3> Monthly Rainfall and Temperature of Taunggyi Station (2009 – 2018)

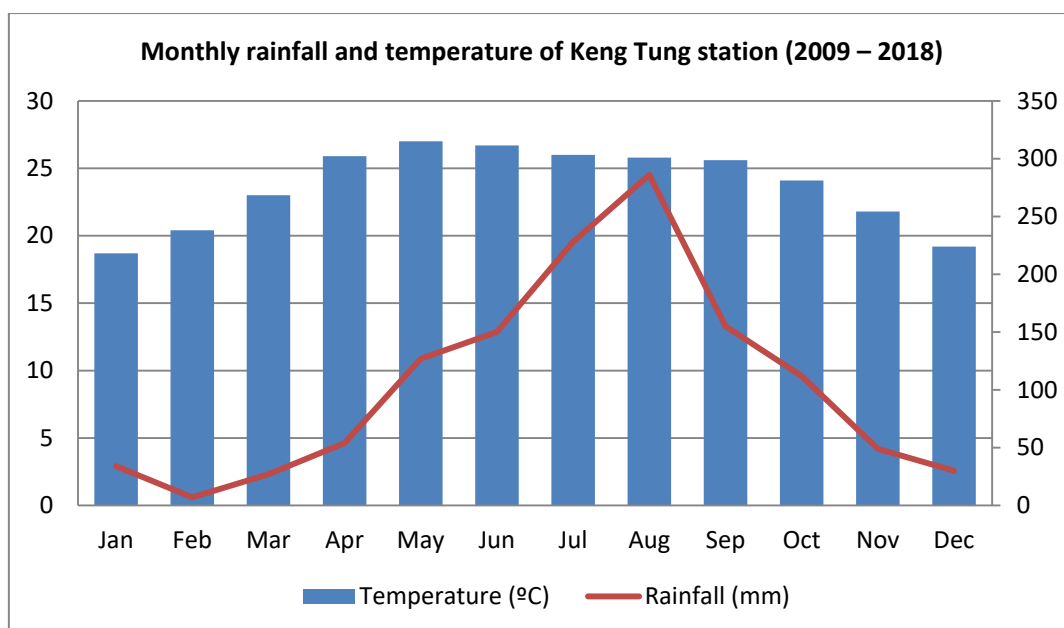
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temperature (°C)	16.5	18.3	21.3	23.2	23.0	22.2	21.2	21.2	21.6	20.9	19.4	17.4
Rainfall (mm)	26	1	8	53	154	183	219	298	219	183	36	17



<Figure 6.3-5> Monthly Rainfall and Temperature at Taunggyi Station

<Table 6.3-4> Monthly Rainfall and Temperature of Keng Tung Station (2009 – 2018)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temperature (°C)	18.7	20.4	23.0	25.9	27.0	26.7	26.0	25.8	25.6	24.1	21.8	19.2
Rainfall (mm)	34	7	27	54	127	150	228	286	155	112	49	30



<Figure 6.3-6> Monthly Rainfall and Temperature at Keng Tung Station

Kyaukme Township has the humid climate and the highest temperature is 27.80 °C and the lowest temperature is 10 °C. The yearly rainfall and temperature are shown in below.

<Table 6.3-5> Yearly Rainfall and Temperature of Kyaukme Township

No	Year	Rainfall		Temperature	
		Rainy Day	Total rainfall	Summer	Winter
				Highest	Lowest
1	2011	93	40.01	30.30	7.7
2	2012	77	32.81	31.21	7.90
3	2013	94	54.11	27.00	6
4	2014	72	44.14	22.50	6
5	2015	86	57.28	37.5	5
6	2016	106	51.86	39	4.2
7	2017	89	48.46	36	4.5
8	2018 (March)	4	2.09	31.5	4.5

Namtu Township has the humid climate and the highest temperature is 39 °C and the lowest temperature is 5 °C. The yearly rainfall and temperature are shown in below.

<Table 6.3-6> Yearly Rainfall and Temperature of Namtu Township

No	Year	Rainfall		Temperature	
		Rainy Day	Total rainfall	Summer	Winter
				Highest	Lowest
1	2016	95	70.88	40 H	8 H
2	2017	90	70.27	39 H	8 H
3	2018	103	68.84	38 H	5 H
4	2019	70	39.59	39 H	8 H

Hsipaw Township has the humid climate and the highest temperature is 42 °C and the lowest temperature is 14 °C. The yearly rainfall and temperature are shown in below.

<Table 6.3-7> Yearly Rainfall and Temperature of Hsipaw Township

No	Year	Rainfall		Temperature	
		Rainy Day	Total rainfall	Summer	Winter
				Highest	Lowest
1	2010	95	55.53	42	04
2	2011	95	48.86	37	06
3	2012	82	41.22	40	06
4	2013	83	55.85	40	00
5	2014	70	47.83	41	05
6	2015	89	56.62	41	06
7	2016	85	51.65	41	06
8	2017	84	53.7	39.4	04
9	2018 (March)	97	60.0	38.0	01.4
10	2019	48	26.38	42	01.0

6.4 Physical Environment

The environmental baseline survey such as air quality, water quality, noise level and vibration level were conducted around the project area. Three air quality locations, five noise monitoring stations, two vibration levels and three water quality sampling points were monitored and collected. The summary of physical environmental survey is shown in Table 6.4-1.

<Table 6.4-1> Summary of Physical Environmental Survey

Air Quality	Parameters	1) Nitrogen dioxide, 2) Particulate Matter PM ₁₀ , 3) Particulate Matter PM _{2.5} , 4) Sulphur Dioxide, 5) Relative Humidity, 6) Temperature, 7) Wind Speed, and Wind Direction
	Period	3 monitoring points (24-hr averaging period for each point)
	Location	Project site and near residential area
Noise Level	Parameter	L _{Aeq} (A-weighted loudness equivalent)
	Period	5 monitoring points (24-hr averaging period for each point)
	Location	Project site and near residential area
Vibration Level	Parameter	L _{veq} (Loudness equivalent vibration level)
	Period	2 monitoring points (24-hr averaging period for each point)
	Location	Substation
Water Quality	Parameter	1) Water temperature, 2) Air temperature, 3) pH, 4) Electrical Conductivity, 5) Dissolved Oxygen, 6) Oxidation reduction potential, 7) Turbidity, 8) Total dissolved solid, 9) Salinity
	Period	One time at 3 locations
	Location	Streams and rivers along the Transmission Line

Source: Field Survey, June 2019

6.4.1 Air Quality

i. Survey Item

Project may have potential impacts on air quality only during construction activities (higher road traffic, heavy machinery activities and dust from excavation works). Therefore, the following

parameters were measured over 24 hours: PM_{2.5}, PM₁₀, Ozone (O₃), Nitrogen dioxide (NO₂), Sulfur dioxide (SO₂), relative humidity, wind speed and wind direction. Myanmar National Environmental Quality (Emission) Guidelines was announced in December 2015.

The ambient air quality guideline is set in General Guidelines. In this General Guideline, it is stated that the projects with significant sources of air emissions, and potential for significant impacts to ambient air quality, should prevent or minimize impacts by ensuring that: (i) emissions do not result in concentrations that reach or exceed national ambient quality guidelines and standards, or in their absence current World Health Organization (WHO) Air Quality Guidelines for the most common pollutants as summarized below; and (ii) emissions do not contribute a significant portion to the attainment of relevant ambient air quality guidelines or standards (i.e. not exceeding 25 percent of the applicable air quality standards) to allow additional, future sustainable development in the same air shed. Industry-specific guidelines summarized hereinafter shall be applied by all projects to ensure that air emissions conform to good industry practice. Reference should be made to WHO's Air Quality Guidelines for Europe 2 for air pollutants not included in the following table.

<Table 6.4-2> Air Emissions (General Guidelines)

Parameters	Averaging Period	Guideline Value (µg/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

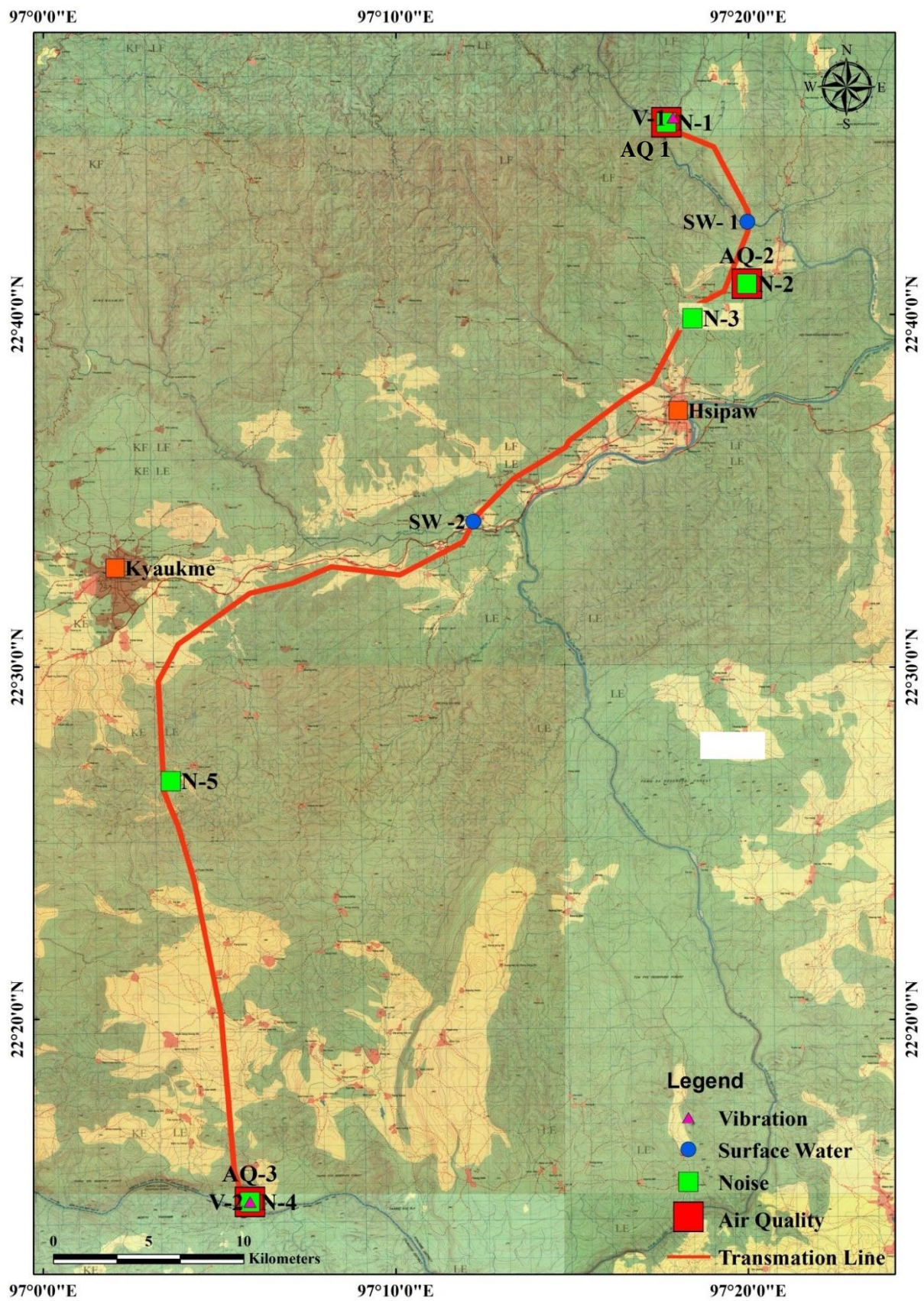
^b Particulate matter 2.5 micrometers or less in diameter

ii. Survey Location

The locations of air quality monitoring survey in detail are shown in Figure 6.4-1 The detail of sampling points is described as Table 6.4-3.

<Table 6.4-3> Sampling Location for Air Quality Survey

Sampling Point	Coordinates	Description of Sampling Point
AQ-1	22°45'26.29"N 97°17'41.05"E	Namtu HPP compound near Chaung Sar village, Namtu Township
AQ-2	22°40'51.79"N 97°19'57.97"E	Pan Ne Village, Hsipaw Township
AQ-3	22°14'48.93"N 97° 5'51.66"E	Upper Yeywa Hydropower project site



<Figure 6.4-1> Location Map of Air, Noise, Surface Water and Vibration Survey

Air Quality Monitoring Station-1 (AQ-1)

Ambient air quality survey was conducted at AQ-1 that was located at the compound of Namtu HPP, near Chaung Sar Village, Namtu Township. Except the HPP facilities, no settlement had been observed at the time of air quality monitoring. Therefore, the emission will be generated from the mobilization of project activities. Survey activities of AQ-1 are shown in Figure 6.4-2.



<Figure 6.4-2> Air Quality Monitoring Survey at AQ-1

Air Quality Monitoring Station-2 (AQ-2)

Ambient air quality survey was conducted at AQ-2 that was located at the Monastery compound of Pan Ne Village, Hsipaw Township. It had been observed that zinc refinery plant is situated in less than 1 km east of the air station. The survey activities of AQ-2 are shown in Figure 6.4-3.



<Figure 6.4-3> Air Quality Monitoring Survey at AQ-2

Air Quality Monitoring Station-3 (AQ-3)

Ambient air quality survey was conducted at AQ-3 that was located at the construction site of Upper Yeywa HPP. The air emission may be generated from the construction activities. The survey activities of AQ-3 are shown in Figure 6.4-4.



<Figure 6.4-4> Air Quality Monitoring Survey at AQ-3

iii. Monitoring Period

Air quality monitoring was conducted for a consecutive 24 hours to get baseline data. The monitoring durations are as shown in Table 6.4-4.

<Table 6.4-4> Sampling Duration for Air Quality Survey

Points	Period
AQ-1	November 22 nd – 23 rd , 2019 (24 hours)
AQ-2	November 23 rd – 24 th , 2019 (24 hours)
AQ-3	November 25 th – 26 th , 2019 (24 hours)

Source: Resource & Environment Myanmar Co., Ltd.

iv. Monitoring Method

Monitoring and analysis of ambient air pollutants were conducted by referring to the recommendation of United States Environmental Protection Agency (U.S. EPA). The Haz-Scanner EPAS Wireless Environmental Perimeter Air Station was used to collect ambient air monitoring data.

<Table 6.4-5> Sampling and Analysis Method for Air Quality

No	Parameter	Analysis Method
1	Nitrogen dioxide (NO ₂)	On site reading
2	Carbon monoxide (CO)	On site reading
3	Particulate matter 10 (PM ₁₀)	On site reading
4	Particulate matter 2.5 (PM _{2.5})	On site reading
5	Sulphur dioxide (SO ₂)	On site reading
6	Temperature	On site reading
7	Relative Humidity	On site reading
8	Wind Speed	On site reading
9	Wind Direction	On site reading

v. Monitoring Result

Average value of ambient gaseous levels for all air quality monitoring stations for one day are presented in following Table 6.4-6. Carbon monoxide (CO) and Nitrogen monoxide (NO) concentration are not described by Myanmar National Emission Quality Guideline. It is obvious that the concentrations of PM_{2.5} and PM₁₀ are lower than the standard whereas Sulphur dioxide (SO₂)

concentration is also lower than the applied standard. A 24-hour concentration of Nitrogen dioxide (NO₂) is not described in applied standard but concentration of Nitrogen dioxide (NO₂) was referred by one-hour standard in National Environmental Quality (Emission) Guidelines (NEQG). According to the hourly results, concentration of Nitrogen dioxide (NO₂) is lower than the applied standard.

Therefore, the ambient air quality along the transmission line were clean as would be expected due to lack of industrial activities and low traffic loads on the nearby roads.

<Table 6.4-6> Daily Ambient Air Quality Results for Air Quality

Sampling No	Time	CO	NO	PM _{2.5}	PM ₁₀	RH	SO ₂	Temperature
	hours	µg/m ³	µg/m ³	µg/m ³	µg/m ³	%	µg/m ³	°C
AQ-1	24	82.43	0.02	5.41	15.41	69.25	11.91	23.07
AQ-2	24	113.74	0.04	16.08	18.24	60.70	10.32	19.32
AQ-3	24	64.18	0.04	23.36	40.65	65.04	10.89	19.36
Guideline	-	-	-	25	50	-	20	-

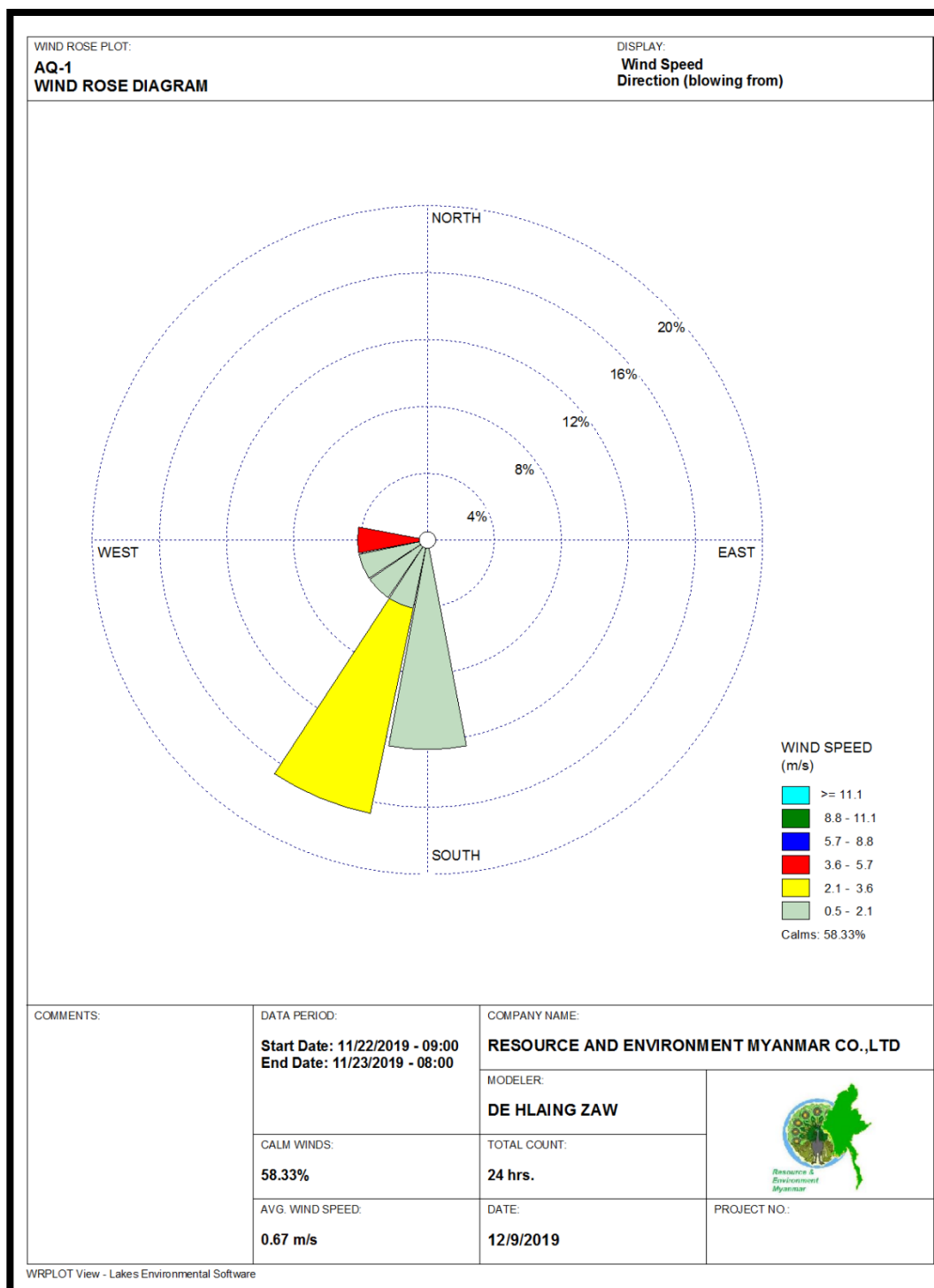
Source: Resource & Environment Myanmar Co., Ltd.

<Table 6.4-7> Hourly Nitrogen Dioxide Concentration from all Air Quality Stations

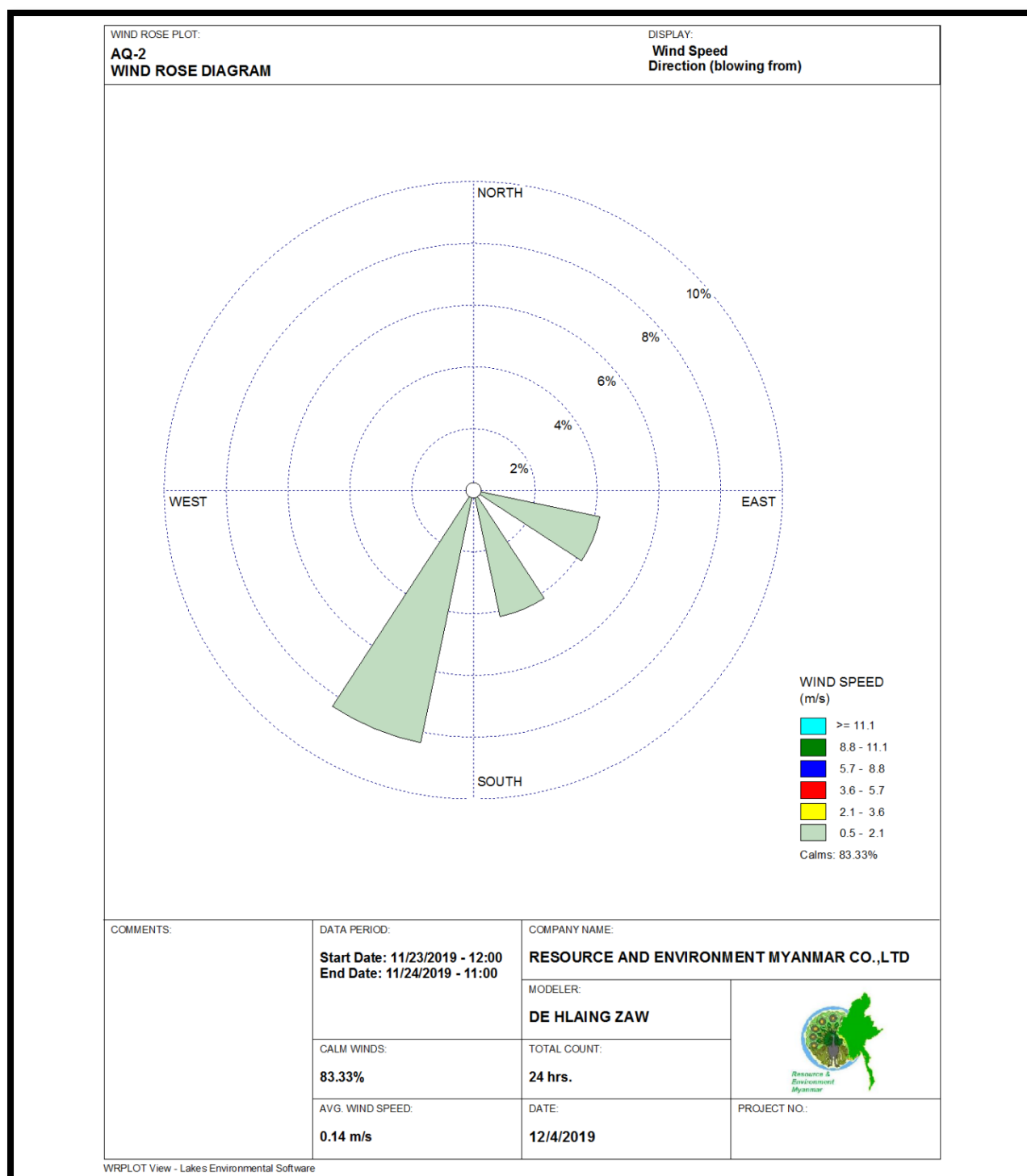
AQ-1	AQ-2	AQ-3	Guideline
16.1800	10.3163	19.0990	200
3.7628	3.7628	3.7628	
3.7628	3.7941	3.7628	
3.7628	13.0443	25.8064	
3.7628	60.6435	80.2100	
87.0143	58.5426	90.2127	
40.3872	40.6380	59.9536	
3.7628	26.6217	42.6762	
5.7382	21.2911	35.8405	
4.1704	18.1241	27.9073	
7.4628	17.5283	25.7751	
4.0136	19.1902	21.8555	
3.7628	19.3156	23.4860	
3.7628	23.1097	22.8275	
3.7628	14.7062	22.1063	
3.7628	17.9673	21.8868	
67.5419	19.5665	20.0682	
77.4192	17.0579	18.3749	
60.1731	13.6714	13.4833	
71.9005	9.6892	5.2052	
67.1029	3.7628	3.8569	
41.3592	3.7628	3.7628	
3.7628	3.7628	3.7628	
3.7628	3.7628	0.0000	

6.4.1.1 Wind Speed and Direction

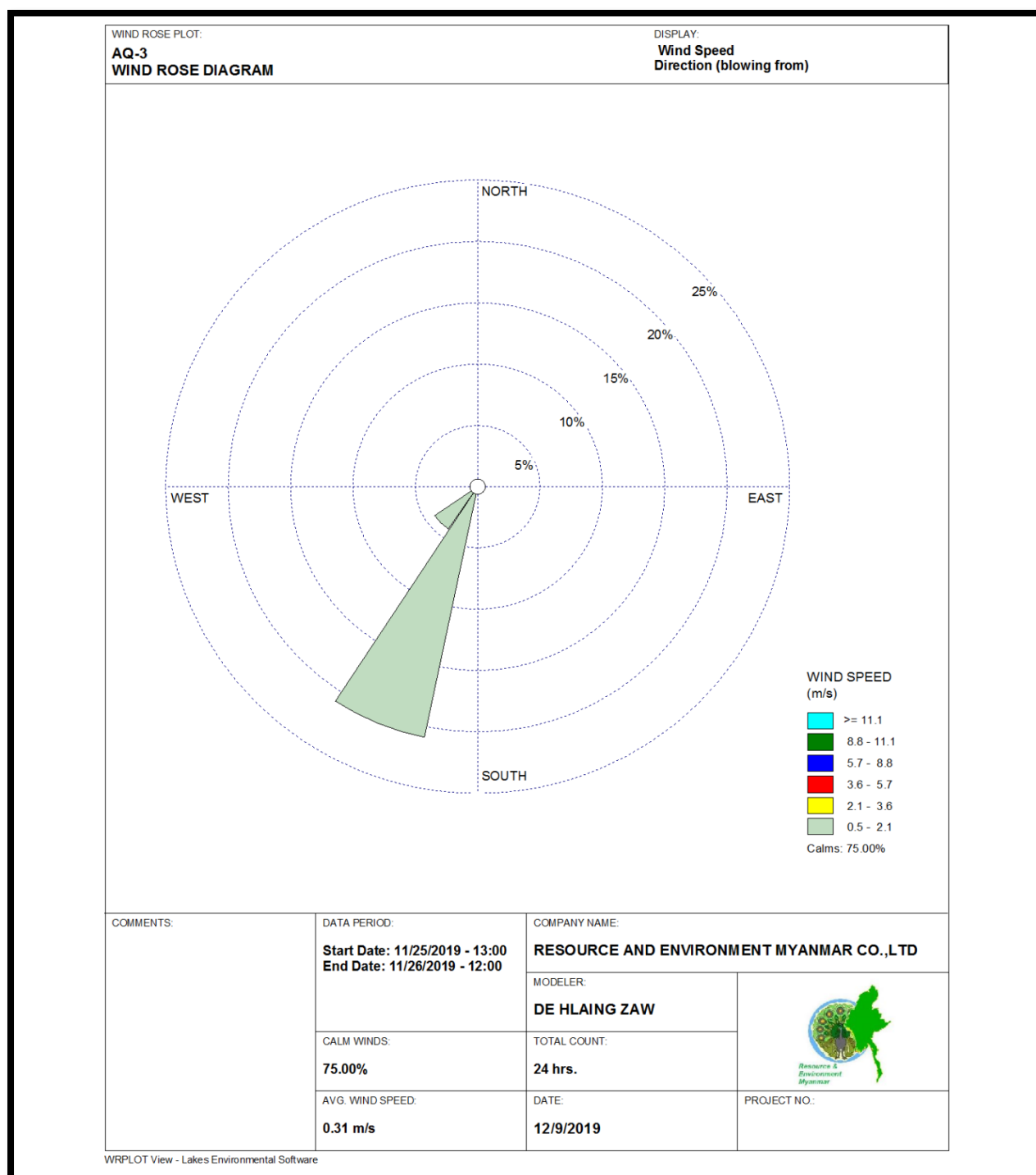
The average wind speed and direction were collected for 24 hours (one day) in each location. According to the wind rose diagram, average wind speed varies from 0.5 to 2.1 m/s in all stations. Prevailing wind direction of AQ-1, AQ-2 and AQ-3 are in SW-NE direction.



<Figure 6.4-5> Wind Rose Diagram at AQ-1



<Figure 6.4-6> Wind Rose Diagram at AQ-2



<Figure 6.4-7> Wind Rose Diagram at AQ-3

6.4.2 Noise Level

i. Survey Item

Noise prevention and mitigation measures should be taken by all projects where predicted or measured noise impacts from a project facility or operation exceed the applicable noise level guideline at the most sensitive point of reception. Noise impacts should not exceed the levels shown below, or result in a maximum increase in background levels of three decibels at the nearest receptor location off-site.

<Table 6.4-8> Applicable Noise Level Guideline

Receptor	One Hour LAeq (dBA) ^a	
	Daytime (07:00 - 22:00) (10:00 - 22:00 for Public Holidays)	Night-time (22:00 - 07:00) (22:00 - 10:00 for Public Holidays)
Residential, Institutional, Educational Environments	55	45
Industrial and Commercial Environments	70	70

^a Equivalent continuous sound level in decibels

ii. Survey Location

The locations of noise level monitoring stations are shown in Table 6.4-9.

<Table 6.4-9> Survey Location for Noise Level Stations

Monitoring ID	Coordinates	Description
N-1	22°45'26.29"N 97°17'41.05"E	Namtu HPP compound near Chaung Sar village, Namtu Township
N-2	22°40'51.79"N 97°19'57.97"E	Pan Nea Village, Hsipaw Township
N-3	22°40'36.99"N 97°19'1.95"E	Naung Thagyar Village, Hsipaw Township
N-4	22°14'48.93"N 97° 5'51.66"E	Upper Yeywa Hydropower project site
N-5	22°26'45.30"N 97° 3'37.10"E	Pan Lock Village, Kyaukme Township

iii. Survey Period

Noise level survey was conducted on 24 hours consecutively. The measurement duration was as shown in Table 6.4-10.

<Table 6.4-10> Sampling Duration for Noise Level Survey

Point	Period
N-1	22 th -23 th November, 2019
N-2	23 th -24 th November, 2019
N-3	24 th -25 th November, 2019
N-4	25 th -26 th November, 2019
N-5	27 th -28 th November, 2019

Source: Resource & Environment Myanmar Co., Ltd.

iv. Survey Method

Measurement of environmental sound level was conducted by referring to the recommendation of International Organization for Standardization (ISO), i.e. ISO 1996-1:2003 and ISO 1996-2:2007. The instrumentation used for noise quality survey is shown in the following Table 6.4-11. Noise meter was set up to record the log as ten minutes intervals during an hour for one consecutive day.

<Table 6.4-11> Instrumentation for Noise Survey

Instrumentation	Description
Sound level meter	Sound level meter with SD Card, Model SL-4023SD



<Figure 6.4-8> Lutron Sound Level Meter

v. Survey Result

Noise level (LAeq) was presented in Table 6.4-12 and Table 6.4-13. One day LAeq was calculated by using the following array formula in the excel sheet. This formula is firstly used for hourly LAeq and then for the 24 hours.

$$L_{eq} = 10 \log \frac{1}{T} \left[\sum_{i=1}^n 10^{L_{eq}/10} \right]$$

L_{eq} = Equivalent continuous noise level (dB)(A)
 i = Time at each hour
 T = Total time over which the L_{eq} is required (Hours)

The background noise level monitoring is conducted for area which is sparsely populated and still largely undeveloped. The major noise sources are road traffic activities and village activities. According to the calculated results, daytime noise level is lower than the applied standard and night-time noises level are fairly higher than the standard. Measurement of environmental sound level was conducted by referring to the recommendation of Myanmar National Emission Guideline.

<Table 6.4-12> A-Weighted Loudness Equivalent Day Time and Night Time (LAeq) Level

	N-1		N-2		N-3		N-4		N-5	
Result	Day time	Night Time	Day time	Night Time	Day time	Night Time	Day time	Night Time	Day time	Night Time
	55	53	51	43	51	46	50	48	54	48
Standard	55	45	55	45	55	45	55	45	55	45

Unit: dBA

<Table 6.4-13> Hourly A-weighted loudness Equivalent (LAeq) Level at all Stations

Time	N-1	N-2	N-3	N-4	N-5
7:00-8:00	43	47	60	54	51
8:00-9:00	39	46	45	49	47
9:00-10:00	46	41	51	52	59
10:00-11:00	43	42	49	48	49
11:00-12:00	43	45	49	46	59
12:00-13:00	43	43	45	48	47
13:00-14:00	43	41	44	52	56
14:00-15:00	39	48	48	48	56
15:00-16:00	40	61	47	49	51
16:00-17:00	40	47	43	50	57
17:00-18:00	56	47	49	50	53
18:00-19:00	61	53	48	50	45
19:00-20:00	60	44	47	52	46
20:00-21:00	60	45	43	47	41
21:00-22:00	58	43	45	52	40
22:00-23:00	48	43	42	44	42
23:00-24:00	47	43	51	46	40
24:00-01:00	48	43	42	44	40
01:00-02:00	47	43	42	47	39
02:00-03:00	42	43	42	47	40
03:00-04:00	40	43	46	46	40
04:00-05:00	61	43	44	51	40
05:00-06:00	41	43	45	50	49
06:00-07:00	43	45	50	47	55

6.4.3 Vibration Level

As there is no vibration standard to receptors in Myanmar, the target vibration level at construction phase shall be set based on the standards in some foreign countries. Accordingly, the target level of vibration is set based on the following policies.

- Monastery and residential house where are necessary to keep quiet and sleep shall comply with the Japanese standard for residential area,
- Offices, commercial facilities, and factories areas shall comply with the Japanese standard for mixed areas including residential and commercial and industrial areas.

<Table 6.4-14> Vibration Standard in Japan

Time Area	Daytime	Night-time	Applicable Areas
I	60 – 65 dB	55 – 60 dB	Areas where maintenance of quiet is particularly needed to preserve a good living environment and where quiet is needed for as they are used for residential purposes.
II	65 – 70 dB	60 – 65 dB	Areas used for commercial and industrial as well as residential purposes where there is a need to preserve the living environment of local residents and areas mainly serving industrial purposes which are in need of measures to prevent the living environment of local residents from deteriorating.

Note: Vibration level shall be measured at the boundary line of the specified factory.

i. Survey Location and Period

The locations of vibration level were setup as the same location and same time as air monitoring station.

ii. Survey Method

The instrumentation for vibration level was used by RION VM-55 vibration meter. This instrument is a 3-Axis (X, Y, Z) vibration meter that can be used in a wide range of applications for measurement and analysis of different parameters. The unit is equipped to measure the instantaneous value for vibration level and vibration acceleration level, as well as the time percentile level, time averaged level, maximum and minimum values in 3-axes simultaneously.

<Table 6.4-15> Instrumentation for Noise Survey

Instrumentation	Description
Vibration meter	Rion VM55 with SD Card



<Figure 6.4-9> Instrumentation for Vibration Meter

iii. Survey Result

Table 6.4-16 presents the day time and night-time vibration level (L_{veq}). Raw vibration data was calculated by using the following array formula in the excel sheet, 10*LOG10 (AVERAGE(10^((RANGE)/10))). According to the calculated results, all vibration levels (L_{veq}) are lower than the applied standard.

<Table 6.4-16> Daily Average Vibration Level Results (dB)

V-1			V-2	
Result	Daytime	Night-time	Daytime	Night-time
	35	45	15	9
Standard	65-60	55-50	65-60	55-50

6.4.4 Water Quality

i. Survey Item

There is no standard for surface water quality guideline in Myanmar except general waste water guideline in National Environmental Quality (Emission) Guidelines (NEQG). For project types where industry-specific guidelines are not set out in these Guidelines, the following general guideline values, or as stipulated on a case-by-case basis, apply during project operations. General wastewater guideline value is determined by Ministry of Natural Resources and Environmental Conservation (MONREC) as shown in the following table.

<Table 6.4-17> Reference Guideline Value of Water Quality

Parameters	Unit	Guideline Value
Biochemical oxygen demand	mg/l	50
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	100ml	400
Total nitrogen	mg/l	10
Total phosphorus	mg/l	2
Total Suspended solid	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 point of discharge.

ii. Survey Locations

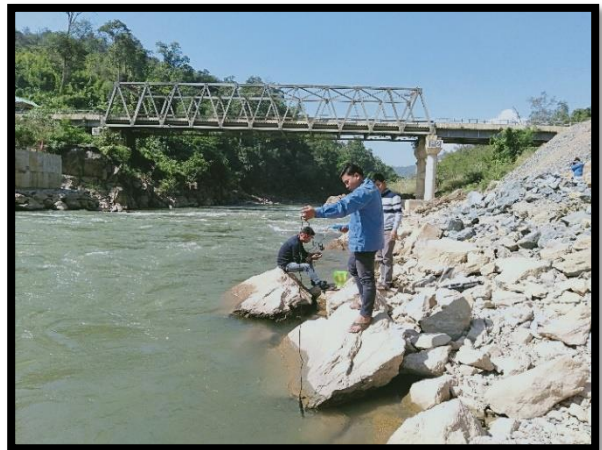
The locations of water samples and surveys are shown in Table 6.4-18. The detail of each sampling points are described as below.

<Table 6.4-18> Sampling and Survey Points of Surface Water Quality Survey

Category	Sampling Point	Coordinates	Description of Sampling Point
Surface Water	SW- 1	22°42'37.20"N 97°19'58.73"E	Myitnge River near Transmission Line Tower no, 20 and 21
Surface Water	SW -2	22°34'6.85"N 97°12'12.22"E	Near Longkon village, Hsipaw township and Transmission line Tower no. 76.
Surface Water	SW-3	22°14'34.38"N 97° 5'41.47"E	Near Dam site of Upper Yeywa Hydropower project and Dokehtawaddy Bridge (Yeywa)

iii. Survey Activity

Figure 6.4-10 is presented the survey activities and In-situ measurement survey for water quality.



<Figure 6.4-10> Survey Activities for Water Quality

iv. Survey Period

The sampling and measuring of the surface water were conducted on 22th – 26th November, 2019.

v. Survey Method

Water samples were taken by Alpha horizontal water sampler and collected in plastic and sterilized glass sample containers. All sampling was in strict accordance with recognized standard procedures. The parameters as pH, temperature, dissolved oxygen (DO), electrical conductivity (EC), and total dissolved solid including the odor and color in visual analyzing were measured at each site

concurrently with sample collection. According to the Laboratory standard, some samples were preserved using the chemicals. All samples were kept in iced boxes and were transported to the laboratory within 24 hours. Moreover, the river survey; the flow rate, width and depth of river, was also measured using Vale port Flow Meter equipment and depth sounder.

<Table 6.4-19> Field Equipment for Surface Water Quality Survey

No	Equipment	Manufacturer	Originate Country	Model/Serial No
1	SMART TROLL [®] MP_Multi parameter for water	In-Situ Inc.	USA	SN - 346054
2	Multi Parameters for water quality	HANNA	USA	H17609823 (Turbidity Sensor)
3	Alpha Bottle (Water Sampler)	Wildlife Supply Company [®]	Indonesia	Wildco P/N-1120-G45

v. Survey Result

Table 6.4-20 is presented the water quality result. These results were compared by general guideline of National Emission Quality in Myanmar. Each of the water samples were tested by both In-situ measurement and chemical analysis. Chemical analysis parameter for water quality was sent to the United Analyst and Engineering Consultant in Thailand (UAE). According to the analysis results, water quality along the transmission line was indicated as there has no water pollution.

<Table 6.4-20> Water Quality Result

Item/Sample Name	Unit	SW-1	SW-2	SW-3	Guideline
Location	-	Myitnge River	Near Longkon Village	Myitnge River (Upper Yeywa)	-
Weather	-	Sunny	Sunny	Sunny	-
Color	-	Colorless	Colorless	Colorless	-
Transparency	-	High	High	High	-
ORP	mv	19	57	83	-
Water Temperature	°C	22.1	20.2	22.9	<3 ^b
pH	S.U	8.51	8.42	8.49	6-9
DO	mg/L	7.67	7.36	8.9	-
EC	µs/cm	30	245	375	-
TDS	ppm	151	122	187	-
Biochemical oxygen demand	Mg/l	1.2	1.1	ND (<1.0)	30
Chemical oxygen demand	Mg/l	32	32	30	125
Total Suspended Solid	Mg/l	5.3	4.7	3.9	50
Total coliform bacteria	MPN/100ml	1,700	3.300	1,700	400
Oil and Grease	Mg/l	ND (<3)	3	5	10

Total Nitrogen	Mg/l	0.28	0.25	1.28	10
Total Phosphorus	Mg/l	ND	ND	ND	2

6.5 Ecological Environment

6.5.1 Scope and Purpose of the Biodiversity Baseline Study

The scope and purpose of the biodiversity baseline study are;

- to provide comprehensive and accurate information on the biodiversity baseline;
- to identify and predict potential biodiversity impacts;
- to evaluate the significance of the impacts identified;
- to recommend effective and practicable alternatives and mitigation measures; and
- to recommend the need for and the scope of an appropriate monitoring and audit program.

6.5.2 Site Reconnaissance

A targeted site reconnaissance was conducted from 22th to 28th November, 2019 to ground-truth information gathered and supplements it with site observations, data and photographs. The site reconnaissance targeted the following specific ecological objectives:

- To name, describe and map vegetation communities and habitats present within the Project Area at a suitable scale, using existing community nomenclature where possible;
- To identify, describe and map other ecologically sensitive areas within the Project Area such as springs, watercourses and other water bodies;
- To the extent possible within the survey time frame and season, determine if species of conservation significance known or predicted likely to be present in the Study Area are actually present within the Project Area;
- To identify opportunities for future ecological monitoring and enhancement within the framework of the proposed project.

6.5.3 Methodology

The methodologies used in the baseline study were discussed below.

6.5.3.1 Desktop Survey

Publicly available sources of information were analyzed to build an outline of known and likely ecological values for the Study Area. Aerial imagery was used to build a more complete spatial understanding of the pattern of vegetation communities and human uses on the site, and to map access routes and internal tracks. In addition, ecologists with experience of the Study Area were consulted where possible to obtain information about species known to be present or previously recorded from the site, and other ecological values considered by them to be relevant.

6.5.3.2 Field Observation

i. Flora

A Global Positioning System (GPS) was used to navigate and mark coordinates between sample points in/around the study area. Field observation was conducted within boundary of each project area. During the field survey period, transect sampling method was used. Transect is a long, thin

quadrat that are used to sample or to get better averages. In addition, all trees, shrubs, herbs and cultivated crops were recorded and listed. Identification of plants and animal species was conducted with assistances of skilled local people. The identified species and families were translated to scientific name with assistance of a checklist of trees, shrubs, herbs and climbers of Myanmar.

ii. Fauna

a. Bird

Random Point count method was used for bird survey and took the photograph of birds. Birds were observed with binoculars and identified aided with field guide. Nocturnal birds were observed when it becomes dusk. Point count and opportunistic methods were used to census the species richness and point counting was used to get the relative measure of bird abundance.

b. Mammal

Survey was performed using two methods. These are tracks and signs surveys, and interview survey method. Direct observations of tracks and signs was applied mainly on existing trails and following route across the forest identified by local people. The team collected and recorded animal tracks and signs in a systematic manner. Direct survey method includes direct sightings and hearings. Indirect survey includes observing of tracks and signs such as footprints/spoors, faeces/ scats/ dungs, resting sites, scratching places, eating signs etc. Records of structure and the measurements of footprints were also made for identification. The surveys were mainly conducted on the jungle paths and animal trails. Salt lick and small streams were also investigated during survey period. In addition, a number of local people such as hunter or ex hunter were interviewed from village near survey area. Verbal reports by reliable persons and old records from the area were also recorded. The mammals were identified with the references to John W. K. Parr., U Tin Than., 2000. *A Field guide to the Large Mammals of Myanmar*. Yon Kyi Chat Sarpe Publisher, Myanmar, 274 pp and Francis, C. M. (2008). *A field guide to the mammals of South-East Asia*. Asia Books, Bangkok, 392 pp. All data on the presence and species composition of mammal species were compiled.

c. Herpet

Surveys were conducted during the survey period. Specimens were observed by visual encounter surveys (Heyer et. al. 1994) supplemented with acoustic searching, turning rocks and logs, peeling bark, digging through leaf litter, and excavating burrows. Specimens were collected by hand or rubber ring and snake tongs were used to capture poisonous snakes. All encountered species are recorded during the survey period

d. Entomology (Butterfly)

Survey applying standard method was conducted randomly around the survey area and along the trails or footpath in the survey area. Identification of butterfly species was primarily made directly in the field. At the camp, collected specimens were observed and recorded for their morphological characters such as patterns, spots, stripes and colour. The mouth parts were carefully examined and the body and wing's length were measured. The specimens were taken picture and released back into the field. Insects and other small invertebrates were taken voucher specimens although familiar species and some others were only taken picture.

e. Aquatic

Examination of aquatic fauna included distribution of indigenous fish species and their abundance in particular areas of the survey. Interviewed with local people from the study area were conducted during the collection of the specimen. Fishermen were interviewed with regard to fishery process including kinds of gear used, number of fishing time per day, target species. Interviewed with local fishermen from the study area were conducted during the collection of the specimen. Fishermen were

interviewed with regard to fishery process including kinds of gear used, number of fishing time per day, and target species.

6.5.3.3 Interview survey

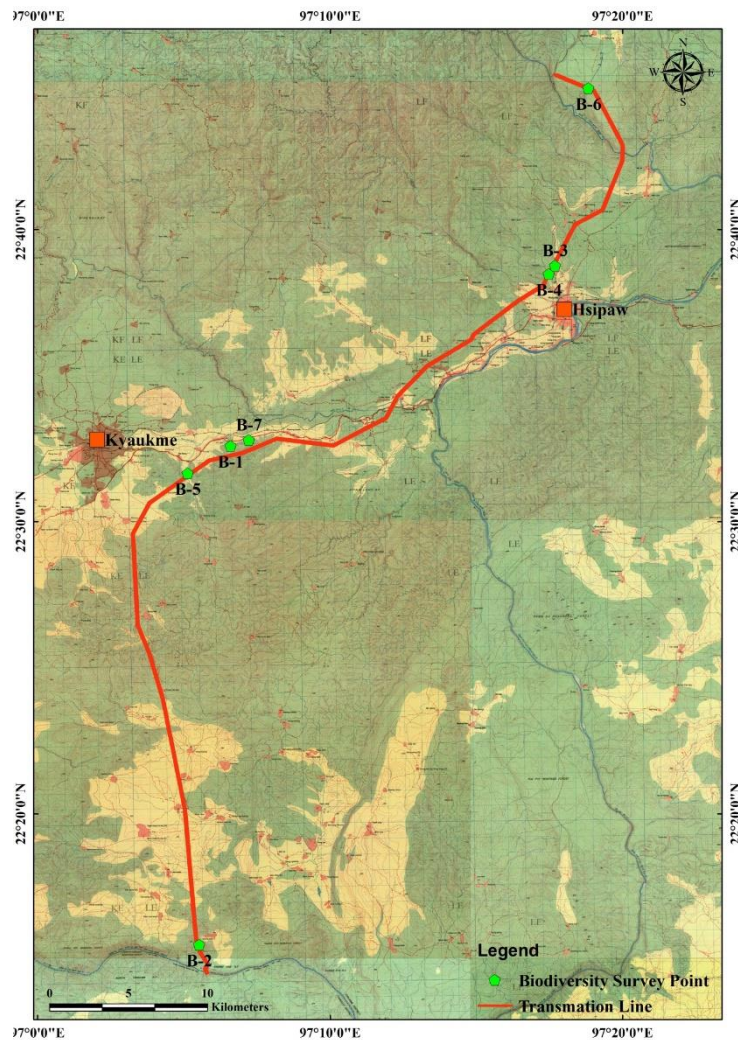
In addition to the field observation, secondary data was also surveyed by interviewing from local residents and literature reviewing. In the interview survey, the surveyor visited the residents in and around the survey area and interviewed the name of plants and animals existing in and around the area. Also, the past situation of flora and fauna, and the change on biodiversity and ecosystem in the area was interviewed for examination.



Figure 6.5-1: Interview Survey with Local People

6.5.4 Study Area of Biodiversity

The location of the survey area was shown in Figure 6.5-2 and the pin points in the figure were the survey points.



<Figure 6.5-2>

Location of Survey Area for Biodiversity

6.5.4.1 Survey Results of Floral

a. Habitat Types

In and around the proposed project area, five major habitat types were observed namely (1) deciduous forest, (2) crop and vegetation, (3) bare land, (4) shrub land and (5) plantation. Habitat Map of proposed project area was shown in Figure 6.5-3 and Land use/land cover map along the transmission line is shown in Figure 6.5-4.





<Figure 6.5-3> Habitat Types found in the Study Area

b. Vegetation Communities

The vegetation communities found around the survey area were discussed below.

<Table 6.5-1> Vegetation Community Description

Community name	Land form	Description
Shrub Land	Occurs in moist low-lying areas and along a narrow zone adjacent to streams.	Shrub land habitats contain thickets of shrubs and young trees mixed with scattered grasses and wildflowers.
Crop and Vegetation Land	Land able to be used for farming is called "cultivable land or agricultural land". Agricultural land or agriculturally-zoned land refers to plots that are permitted to be used for agricultural activities, without regard to its present use or even suitability.	Agricultural land is typically land devoted to agriculture, the systematic and controlled use of other forms of life – particularly the rearing of livestock and production of crops – to produce food for humans. It is thus generally synonymous with both farmland or cropland, as well as pasture or rangeland.
Bare Land	Bare land that is not covered by vegetation, litter or duff, downed woody material, or rocks is highly susceptible to erosion. Bare ground increases the possibility of compaction or bank shearing by hoofed animals, vehicles, or people. This reduces the water-holding capacity of the soil.	Bare land is not covered by vegetation, litter or duff, downed woody material, or rocks are highly susceptible to erosion. It can affect water quality as well as the loss of valuable soil and acreage. Soil not covered by desirable vegetation is a prime area for invasion of noxious weeds or other undesirable plant species.
Deciduous Forest	A deciduous forest is a biome dominated by deciduous trees which lose their leaves seasonally.	Deciduous forest, vegetation composed primarily of broad-leaved trees that shed all their leaves during one season. Deciduous forest can found in three middle-latitude regions with a temperate climate characterized by a winter season and year-round precipitation: eastern North America, western Eurasia, and northeastern Asia. Deciduous forest also extends into more arid regions along stream banks and around bodies of water.
Plantation	Plantation includes a great deal of land not devoted to agricultural use. The land actually under annually-replanted crops in any given year is instead said to constitute "plantation" or "cropped land". "Permanent cropland" includes forested plantations used to harvest coffee, rubber, or fruit but not tree farms or proper forests used for wood or timber.	A plantation is a large-scale farming that specialized in cash crops. The crops grown include cotton, coffee, tea, cocoa, sugar cane, sisal, oil seeds, oil palms, rubber trees, and fruits.

Total of 82 plant species were identified along the 230kV transmission line. According to the IUCN Red List of threatened species (2019), *Dipterocarpus tuberculatus* (In), one species of near threatened (NT) identified plant species were presented in Table 6.5-2.

<Table 6.5-2> List of Plant Species Recorded in Survey Area

No	Family Name	Scientific Name	Common Name	Habitat	Distribution	IUCN
1	Bombacaceae	<i>Bombax ceiba</i>	Letpan	Tree	Wide	NE
2	Boraginaceae	<i>Cordia dichotoma</i>	Thanat	Tree	Kachin, Kayah, Mandalay, Shan, Yangon	LC
3	Anacardiaceae	<i>Mangifera indica</i>	Thayet	Tree	Wide	DD
4	Anacardiaceae	<i>Lannea coromandelica</i>	Nabe	Tree	Bago, Kayin, Mandalay, Rakhine, Shan, Taninthayi, Yangon	NE
5	Combretaceae	<i>Terminalia crenulata</i>	Htauk-kyant	Tree	Bago, Mandalay, Rakhine, Sagaing, Yangon	NE
6	Malvaceae	<i>Pavonia odorata</i>	Bala	Herb	Mandalay	NE
7	Bignoniaceae	<i>Oroxylum indica</i>	Kyaung-sha	Tree	Wide	NE
8	Moraceae	<i>Ficus altissima</i>	Nyaung-peinne	Tree	Kachin, Mandalay, Taninthayi, Yangon	LC
9	Mimosaceae	<i>Mimosa pudica</i>	Htikayon	Herb	Wide	LC
10	Mimosaceae	<i>Albizia lebbek</i>	Kokko	Tree	Reported from Myanmar	LC
11	Caesalpiniaceae	<i>Bauhinia acuminata</i>	Swe-daw	Small tree	Wide	LC
12	Mimosaceae	<i>Albizia procera</i>	Sit	Tree	Reported from Myanmar	LC
13	Hypericaceae	<i>Mesua ferrea</i>	Gangaw	Tree	Cultivated	NE
14	Myrtaceae	<i>Psidium guajava</i>	Malaka	Small Tree	Cultivated	LC
15	Moringaceae	<i>Moringa aleifera</i>	Dantalon	Tree	Cultivated	NE
16	Asteraceae	<i>Chromolaena odorata</i>	Bizat	Shrub	Wide	NE
17	Euphorbiaceae	<i>Emblca officinalis</i>	Zi-phyu	Tree	Wide	NE
18	Caesalpiniaceae	<i>Delonix rigia</i>	Sein-ban gyi	Tree	Cultivated	NE
19	Myrtaceae	<i>Syzygium fruticosum</i>	Taung-thabye	Small tree	Wide	NE
20	Moraceae	<i>Artocarpus heterophyllus</i>	Peinne	Tree	Cultivated	NE
21	Caesalpiniaceae	<i>Senna siamea</i>	Mazali	Tree	Reported from Myanmar	LC
22	Moraceae	<i>Ficus obtusifolia</i>	Nyaung-gyat	Tree	Wide	LC
23	Lythraceae	<i>Lagerstromia speciosa</i>	Pyinma	Tree	Reported from Myanmar	NE
24	Musaceae	<i>Musa sapientum</i>	Nget-pyaw	Herb	Cultivated	NE
25	Combretaceae	<i>Anogeissus acuminata</i>	Yon	Tree	Bago, Chin, Mandalay, Yangon	NE
26	Nyctaginaceae	<i>Bougainvillea spectabilis</i>	Sekku-pan	Cl/Cr	Cultivated	NE
27	Mimosaceae	<i>Leucaena leucocephala</i>	Baw-sa-gaing	Tree	Mandalay, Sagaing, Yangon	NE
28	Rosaceae	<i>Eriolobus indica</i>	Taung-gwe	Tree	Kachin, Mandalay, Shan,	NE
29	Anacardiaceae	<i>Spondias pinnata</i>	Gwe	Tree	Reported from Myanmar	NE
30	Urticaceae	<i>Oreocnide frutescens</i>	Obok	Small tree	Bago, Mon, Taninthayi	LC
31	Verbenaceae	<i>Tectona grandis</i>	Kyun	Tree	Wide	NE
32	Poaceae	<i>Arundo donax</i>	Kyu	Grass	Reported from Myanmar	LC
33	Caesalpiniaceae	<i>Cassia fistula</i>	Ngu	Tree	Wide	LC
34	Moraceae	<i>Ficus glomerata</i>	Ye-thapan	Tree	Bago, Kachin, Mandalay, Yangon	NE
35	Dilleniaceae	<i>Dillenia pentagyna</i>	Zin-byun	Tree	Bago, Chin, Mandalay, Yangon	NE
36	Poaceae	<i>Bambusa bambos</i>	Kyakat-wa	Bamboo	Reported from Myanmar	NE
37	Caesalpiniaceae	<i>Tamarindus indica</i>	Magyi	Tree	Cultivated	LC
38	Caricaceae	<i>Carica papaya</i>	Thinbaw	Small tree	Cultivated	DD
39	Poaceae	<i>Cephalostachyum pergracile</i>	Tin-wa	Bamboo	Bago, Chin, Kachin, Kayin, Magway, Mandalay, Mon,	NE

					Shan	
40	Rubiaceae	<i>Anthocephalus morindaefolius</i>	Ma-u	Tree	Bago, Magway, Mandalay, Sagaing, Yangon	NE
41	Euphorbiaceae	<i>Croton calococcus</i>	Kanakho-gale	Shrub	Wide	NE
42	Poaceae	<i>Dendrocalamus calostachyus</i>	Wa-bo	Bamboo	Chin, Kachin, Mandalay, Sagaing, Shan, Taninthayi	NE
43	Asteraceae	<i>Sphagneticola calendulacea</i>	Nay-kyar-gale	Herb	Reported from Myanmar	NE
44	Poaceae	<i>Thysanolaena maxima</i>	Tabyetsi	Grass	Bago, Mandalay, Shan, Yangon	NE
45	Solanaceae	<i>Solanum indicum</i>	Khayan-kazaw	Shrub	Bago, Mandalay, Shan, Yangon	NE
46	Malvaceae	<i>Hibiscus hispidissimus</i>	Taw-chin-baung	Shrub	Yangon	NE
47	Anacardiaceae	<i>Mangifera caloneura</i>	Taw-thayet	Tree	Bago, Mon, Taninthayi, Yangon	NE
48	Mimosaceae	<i>Albizia odoratissima</i>	Taung-magyi	Tree	Wide	LC
49	Fagaceae	<i>Castanopsis argyrophylla</i>	Thit-e	Tree	Wide	NE
50	Cucurbitaceae	<i>Benincasa hispida</i>	Kyauk-pha-yon	Cl/Cr	Cultivated	NE
51	Sterculiaceae	<i>Sterculia foetida</i>	Shaw-byu	Tree	Chin, Kayah, Kayin, Mandalay, Yangon	NE
52	Araceae	<i>Lasia spinosa</i>	Zayit	Herb	Mandalay, Yangon	LC
53	Poaceae	<i>Bambusa polymorpha</i>	Kyathaung-wa	Bamboo	Bago, Chin, Kachin, Mandalay, Mon, Shan	NE
54	Annonaceae	<i>Miliusa roxburghiana</i>	Thabut-thein	Small tree	Ayeyarwady, Kachin, Mandalay, Shan	NE
55	Cucurbitaceae	<i>Luffa aegyptiaca</i>	Tha-but-nwe	Cl/Cr	Cultivated	NE
56	Euphorbiaceae	<i>Sapium baccatum</i>	Lin-lun	Tree	Wide	LC
57	Rutaceae	<i>Citrus sinensis</i>	Leinmaw	Small tree	Cultivated	NE
58	Euphorbiaceae	<i>Jatropha pungs</i>	Kyetsu	Shrub	Magway, Mandalay	NE
59	Solanaceae	<i>Physalis minima</i>	Bauk-pin	Herb	Bago, Taninthayi, Yangon	LC
60	Mimosaceae	<i>Acacia intsia</i>	Suboke	Cl/Cr	Wide	LC
61	Bignoniaceae	<i>Markhamia stipulata</i>	Ma-hlwa	Tree	Wide	LC
62	Dipterocarpaceae	<i>Dipterocarpus tuberculatus</i>	In	Tree	Wide	NT
63	Myrtaceae	<i>Eugenia praetermissa</i>	Thabye	Tree	Ayeyarwady, Sagaing, Taninthayi	NE
64	Lamiaceae	<i>Leucas aspera</i>	Taw-pin-sein	Shrub	Bago, Mandalay, Shan, Yangon	NE
65	Annonaceae	<i>Annona squamosa</i>	Awzar	Small tree	Cultivated	LC
66	Fabaceae	<i>Vigna catjang</i>	Pedaung-she	Cl/Cr	Cultivated	NE
67	Fabaceae	<i>Butea frondosa</i>	Pauk	Tree	Reported from Myanmar	NE
68	Verbenaceae	<i>Gmelina arborea</i>	Yemane	Tree	Bago, Shan, Kachin, Mandalay, Yangon	LC
69	Fagaceae	<i>Lithocarpus lindleyanus</i>	Phet-kyan	Tree	Ayeyarwady, Chin, Kachin, Mandalay, Shan	NE
70	Poaceae	<i>Oryza sativa</i>	Saba	Grass	Cultivated	LC
71	Theaceae	<i>Camellia drupifera</i>	Lapet	Shrub,ST	Chin, Kachin, Kayin, Magway, Shan, Taninthayi	DD
72	Poaceae	<i>Dendrocalamus membranaceus</i>	Hmyin-wa	Bamboo	Bago, Kachin, Kayin, Mon, Shan, Taninthayi	LC
73	Bombacaceae	<i>Bombax insigne</i>	Didok	Tree	Wide	NE
74	Euphorbiaceae	<i>Manihot esculenta</i>	Palaw-pi-nan	Tree	Bago, Mandalay, Taninthayi, Yangon	DD
75	Fabaceae	<i>Tadehagi triquetrum</i>	Lauk-thay	Shrub	Chin, Kachin, Kayin, Mandalay, Sagaing, Shan, Yangon	LC

76	Asteraceae	<i>Ageratum conyzoides</i>	Kadu-hpo	Shrub	Mandalay, Shan, Ysngon	NE
77	Burseraceae	<i>Garuga pinnata</i>	Chit-yok	Tree	Bago, Mandalay, Rakhine	NE
78	Loganiaceae	<i>Strychnos nux-vomica</i>	Kabaung	Tree	Reported from Myanmar	NE
79	Verbenaceae	<i>Lantana aculeata</i>	Seinnaban	Shrub	Reported from Myanmar	NE
80	Rutaceae	<i>Aegle marmelos</i>	Okshit	Tree	Bago, Kachin, Kayah, Kayin, Magway, Sagaing	NE
81	Meliaceae	<i>Cedrela serrata</i>	Taung-tama	Tree	Chin, Mandalay, Kachin, Sagaing, Shan	LC
82	Caesalpiniaceae	<i>Bauhinia racemosa</i>	Palan	Small tree	Wide	NE

NE = Not Evaluated

LC = Least Concerned

NT = Near Threatened

DD = Data Deficient

6.5.4.2 Survey Results of Fauna

In total, 120 fauna species belonging to 85 families were recorded in survey sites during survey period from 22th to 27th November, 2019. All of them 59 bird species, 11 mammal species, 4 reptile species and 35 butterfly species and other invertebrate species were respectively collected by fauna survey team. According to the IUCN conservation status, two near threatened (NT) were observed as globally threatened species and using with The IUCN Red List of Threatened Species Version 3.1 <www.iucnredlist.org> November, 2019.

a. Mammals

A total of 11 mammal species of 11 genera belonging to 10 families were recorded in survey sites, during the survey period. Within the survey area, 11 mammal species were recorded respectively. Based on globally threatened status of IUCN Red List, all species were least concerned (LC). There was no threatened species in survey area. 2 species were observed in field survey area. And then 9 species were recorded by interviewed information from local people who live in this survey area. Hunting and trapping wildlife were performed mainly by local resident using ancient tradition hunting method. Wild animals were hunted by bows and many kinds of traps, but also by guns. Guns are called in local name as Tome Gun (Tome) was widespread among the project area that represents the most dangerous method of hunting.

<Table 6.5-3> Mammal Species List Recorded around the Survey Area

No	Species Name	Common Name	Family Name	IUCN Status	Observation Status
1	<i>Canis aureus</i>	Golden Jackal	Canidae	LC	Interviewed
2	<i>Martes flavigula</i>	Yellow-throated Marten	Mustelidae	LC	Interviewed
3	<i>Viverricula indica</i>	Small Indian Civet	Viverridae	LC	Interviewed
4	<i>Viverra zibetha</i>	Large Indian Civet	Viverridae	LC	Interviewed
5	<i>Urva javanica</i>	Javan Mongoose	Herpestidae	LC	Interviewed
6	<i>Sus scrofa</i>	Eurasian Wild Pig	Suidae	LC	Interviewed
7	<i>Muntiacus muntjak</i>	Red Muntjac	Cervidae	LC	Interviewed
8	<i>Callosciurus phayrei</i>	Phayre 's Squirrel	Sciuridae	LC	Sighting
9	<i>Cannomys badius</i>	Lesser Bamboo Rat	Spalacidae	LC	Sighting
10	<i>Hystrix brachyura</i>	Malayan Porcupine	Hystricidae	LC	Interviewed
11	<i>Macaca mulatta</i>	Rhesus macaque	Cercopithecidae	LC	Interviewed

LC = Least Concerned



Phayre 's Squirrel (*Callosciurus phayrei*)



Rhesus macaque (*Macaca mulatta*)



Malayan Porcupine (*Hystrix brachvura*)



Lesser Bamboo Rat (*Cannomys badius*)

<Figure 6.5-5> Photo of Mammal Species Recorded in all Survey Areas

b. Herpet

A total of 4 Herpet species of 4 genera belonging to 3 families were recorded in survey sites during the survey period. Based on globally threatened status of IUCN Red List, there was no threatened species and no endangered species in this area. Two species was observed and two species was interviewed in survey area.

Indian Rat Snake (*Ptyas mucosa*), Rat snake was found common in survey area. Rat snakes are diurnal and semi arboreal. They inhabit forest floors, wetlands, rice paddies, farmland, and suburban areas where they prey upon small reptiles, amphibians, birds, and mammals. Adults, unusually for a colubrid, prefer to subdue their prey by sitting on it rather than by constricting, using body weight to weaken prey.

Common Gliding lizard (*Draco volans*) is commonly found in early second growth forest in open secondary forest and on forest edges. This species can be found in tropical rainforests in southern India and southern Asia.

<Table 6.5-4> Herpet Species List Recorded around the Survey Area

No	Species Name	Common Name	Family Name	IUCN Status	Observation Status
1	<i>Ptyas mucosa</i>	Indian Rat Snake	Colubridae	NE	Sighting
2	<i>Bungarus fasciatus</i>	Banded Krait	Elapidae	LC	Interviewed
3	<i>Bungarus candidus</i>	Malayan Krait	Elapidae	LC	Interviewed
4	<i>Draco volans</i>	Common Gliding Lizard	Agamidae	LC	Observed

NE = Not Evaluated

LC = Least Concerned



Draco volans

<Figure 6.5-6> Photo of Herpet Species Recorded in all Survey Areas

c. Butterfly

A total of 35 butterfly species of 6 families were recorded from the project area. The recorded butterfly species are 3 species of Papilionidae, 7 species of Pieridae, 16 species of Nymphalidae, 5 species of Lycaenidae and at least 2 species of Riodinidae and Hesperidae. According to the IUCN Red List (2019-2), *Euploea core* and *Junonia hierta* are least concerned were not under any major threatened.

<Table 6.5-5> Butterfly Species List in Survey Area

No	Family Name	Species Name	Common Name	IUCN List
1	Papilionidae	<i>Papilio polytes</i>	Common Mormon	NE
2	Papilionidae	<i>Papilio demoleus</i>	Lime Butterfly	NE
3	Papilionidae	<i>Graphium sarpedon</i>	Common Bluebottle	NE
4	Pieridae	<i>Leptosia nina</i>	Psyche	NE
5	Pieridae	<i>Catopsilia pomona</i>	Lemon Emigrant	NE
6	Pieridae	<i>Catopsilia pyranthe</i>	Mottled Emigrant	NE
7	Pieridae	<i>Appias libythea</i>	Striped Albatross	NE
8	Pieridae	<i>Hebomoia glaucippe</i>	Great Orange-Tip	NE
9	Pieridae	<i>Delias hyparete</i>	Painted Jezebel	NE
10	Pieridae	<i>Eurema hecabe</i>	Common Grass Yellow	NE
11	Nymphalidae	<i>Danaus genutia</i>	Common Tiger	NE
12	Nymphalidae	<i>Tirumala limniace</i>	Blue Tiger	NE
13	Nymphalidae	<i>Euploea core</i>	Common Crow	LC
14	Nymphalidae	<i>Euploea mulciber</i>	Striped Blue Crow	NE
15	Nymphalidae	<i>Cupha erymanthis</i>	Rustic	NE
16	Nymphalidae	<i>Cethosia cyane</i>	Leopard Lacewing	NE
17	Nymphalidae	<i>Phalanta phalantha</i>	Common Leopard	NE
18	Nymphalidae	<i>Tanaecia lepidea</i>	Grey Count	NE
19	Nymphalidae	<i>Moduza procris</i>	Commander	NE

20	Nymphalidae	<i>Ariadne merione</i>	Common Castor	NE
21	Nymphalidae	<i>Neptis hylas</i>	Common Sailor	NE
22	Nymphalidae	<i>Pantoporia hordonia</i>	Common Lascar	NE
23	Nymphalidae	<i>Ypthima baldus</i>	Common Five-Ring	NE
24	Nymphalidae	<i>Junonia orithya</i>	Blue Pansy	NE
25	Nymphalidae	<i>Junonia lemonias</i>	Lemon Pansy	NE
26	Nymphalidae	<i>Junonia hierta</i>	Yellow Pansy	LC
27	Riodinidae	<i>Dodona punches</i>	Long-tailed punch	NE
28	Riodinidae	<i>Abisara echerius</i>	Plum Judy	NE
29	Lycaenidae	<i>Rapala iarbus</i>	Common Red Flash	NE
30	Lycaenidae	<i>Hypolycaena erylus</i>	Common Tit	NE
31	Lycaenidae	<i>Castalius rosimon</i>	Common Pierrot	NE
32	Lycaenidae	<i>Heliophorus epicles</i>	Purple Sapphire	NE
33	Lycaenidae	<i>Jamides pura</i>	White Cerulean	NE
34	Hesperiidae	<i>Oriens gola</i>	Common Dartlet	NE
35	Hesperiidae	<i>Borbo cinnara</i>	Formosan Swift	NE

NE = Not Evaluated

LC = Least Concerned



Common Mormon (*Papilio polytes*)



Lime butterfly (*Papilio demoleus*)



Lemon Emigrant (*Catopsilia Pomona*)



Common Tiger (*Danaus genutia*)



Plum Judy (*Abisara echerius*)



Long-tailed punch (*Dodona punches*)

<Figure 6.5-7> Photo of Butterfly Species recorded in Survey Area

d. Fish

A total of 11 species distributed 8 families were identified and recorded from near the project area. Fishing activities are mostly traditional method. The most occurrence species are *Oreochromis spp* and *Labeo microphthalmus*. The dominant family is Cyprinidae.

<Table 6.5-6> Fish Species List of Transmission Line Project

No	Family	Scientific Name	Common Name	IUCN
1	Cyprinidae	<i>Puntius chola</i>	Chola barb	LC
2	Cyprinidae	<i>Labeo microphthalmus</i>	Murree labeo	LC
3	Synbranchidae	<i>Monopterus albus</i>	Rice swampeel	LC
4	Clariidae	<i>Clarias batrachus</i>	Magur	LC
5	Channidae	<i>Channa marulius</i>	Giant snakehead	LC
6	Cichlidae	<i>Oreochromis spp</i>	Tilapia	Not list
7	Cobitidae	<i>Lepidocephalichthys berdmorei</i>	Burmese loach	LC
8	Cobitidae	<i>Lepidocephalus thermalis</i>	Malabar loach	LC
9	Nemacheilidae	<i>Schistura callidora</i>		Not list
10	Bagridae	<i>Pseudomystus siamensis</i>	Bumble bee catfish	LC

LC = Least Concerned

NT = Near Threatened



Oreochromis spp



Labeo microphthalmus

<Figure 6.5-8> Photo of Fish Species in Survey Area

e. Bird

A total of 59 bird species recorded in the proposed project area. One species of Near Threatened was observed in the project area. Member of the family Psittadae, Grey-headed Parakeet (*Psittacula finschii*) are found near the survey site and listed as forested bird's species. A part from the species family Pycnontidae, 3 bird species were also observed Red-vented Bulbu (*Pyconotus cafer*), Red-whiskered Bulbul (*Pycnonotus jocosus*), Black-crested Bulbul (*Pycnonotus melanicterus*) and Himalayan Black Bulbul (*Hypsipetes leucocephalus*) were also noted as forest birds. Among the recorded of species- family Accipitridae, White-eyed buzzard (*Butastur teesa*), Black-Shoulder kite (*Elanus axillaris*), Crested serpent-eagle (*Spillornis cheela*) and Collared falconet (*Microhierax caerulescens*) were listed as predator birds species. Member of family Ardeidae, Eastern cattle Egret (*Bubuculus coromandus*) and Chinese pond-heron (*Ardecola bacchus*) were note as water bird species. Especially, bird species of migratory are Brown Shrike (*Lanius cristatus*), White Wagtail (*Motacilla alba*) and Eastern Yellow wagtail (*Motacilla tschutschensis*) were recorded in project area.

<Table 6.5-7> Bird Species List of Transmission Line

No	Scientific Name	Common Name	Family	IUCN Status
1	<i>Lophura leucomelanos</i>	Kalij Pheasant	Phasianidae	LC
2	<i>Accipiter badius</i>	Shikra	Accipitridae	LC
3	<i>Butastur teesa</i>	White-eyed buzzard	Accipitridae	LC
4	<i>Elanus axillaris</i>	Black-Shoulder kite	Accipitridae	LC
5	<i>Spillornis cheela</i>	Crested serpent-eagle	Accipitridae	LC
6	<i>Microhierax caerulescens</i>	Collared falconet	Falconidae	LC
7	<i>Bubuculus coromandus</i>	Eastern cattle Egret	Ardeidae	LC
8	<i>Ardecola bacchus</i>	Chinese pond-heron	Ardeidae	LC
9	<i>Picus canus</i>	Grey-headed woodpecker	Picidae	LC
10	<i>Megalaima haemacephala</i>	Coppersmith Barbet	Ramphastidae	LC
11	<i>Megalaima asiatica</i>	Blue-throated Barbet	Megalaimidae	LC
12	<i>Megalaima lineata</i>	Lineated Barbet	Ramphastidae	LC
13	<i>Coracias benghalensis</i>	Indian Roller	Coraciidae	LC
14	<i>Halcyon smyrnensis</i>	White-throated Kingfisher	Alcedinidae	LC
15	<i>Merops orientalis</i>	Little green bee-eater	Meropidae	LC
16	<i>Lalage melaschistos</i>	Black-winged Cuckooshrike	Campephagidae	LC
17	<i>Urocissa erythroryncha</i>	Red-billed blue magpie	Corvidae	LC
18	<i>Centropus sinensis</i>	Greater Coucal	Cuculidae	LC
19	<i>Psittacula finschii</i>	Grey-headed Parakeet	Psittadae	NT

20	<i>Ceropsis striolata</i>	Striated swallow	Hirundinidae	LC
21	<i>Streptopelia chinensis</i>	Spotted Dove	Columbidae	LC
22	<i>Columba livia</i>	Rock Pigeon	Columbidae	LC
23	<i>Vanellus indicus</i>	Red-wattled Lapwing	Charadriidae	LC
24	<i>Chloropsis aurifrons</i>	Golden-fronted Leafbird	Eurylaimidae	LC
25	<i>Lanius cristatus</i>	Brown Shrike	Laniidae	LC
26	<i>Lanius schach</i>	Long-tailed Shrike	Laniidae	LC
27	<i>Dendrocitta vagabunda</i>	Rufous Treepie	Corvidae	LC
28	<i>Corvus splendens</i>	House Crow	Corvidae	LC
29	<i>Corvus macrorhynchos</i>	Large-billed Crow	Corvidae	LC
30	<i>Oriolus xanthornus</i>	Black-hooded Oriole	Oriolidae	LC
31	<i>Pericrocotus cinnamomeus</i>	Small Minivet	Campephagidae	LC
32	<i>Pericrocotus flammeus</i>	Scarlet Minivet	Campephagidae	LC
33	<i>Aegithina tiphia</i>	Common Iora	Aegithininae	LC
34	<i>Dicrurus leucophaeus</i>	Ashy Drongo	Dicruridae	LC
35	<i>Dicrurus hottentottus</i>	Hair-crested Drongo	Dicruridae	LC
36	<i>Phaenicophaeus tristis</i>	Green-billed Malkoha	Cuculidae	LC
37	<i>Copsychus saularis</i>	Oriental Magpie-robin	Muscicapidae	LC
38	<i>Myophonus caeruleus</i>	Blue Whistling-Thrush	Turdidae	LC
39	<i>Copsychus malabaricus</i>	White-rumped shama	Muscicapidae	LC
40	<i>Pycnonotus cafer</i>	Red-vented Bulbul	Pycnontidae	LC
41	<i>Pycnonotus jocosus</i>	Red-whiskered Bulbul	Pycnontidae	LC
42	<i>Pycnonotus melanicterus</i>	Black-crested Bulbul	Pycnontidae	LC
43	<i>Hypsipetes leucocephalus</i>	Black Bulbul	Pycnontidae	LC
44	<i>Upupa epops</i>	Common Hoopoe	Upupidae	LC
45	<i>Acridotheres tristis</i>	Common Myna	Sturnidae	LC
46	<i>Acridotheres fuscus</i>	Jungle Myna	Sturnidae	LC
47	<i>Acridotheres javanicus</i>	White-vented Myna	Sturnidae	LC
48	<i>Sturnus burmnicus</i>	Vinous –breasted Myna	Sturnidae	Not list
49	<i>Monticola solitarius</i>	Blue rock thrush	Muscicapidae	LC
50	<i>Saxicola caprata</i>	Pied Bushchat	Muscicapidae	LC
51	<i>Saxicola maurus</i>	Siberian stonechat	Muscicapidae	NE
52	<i>Prinia flaxiventris</i>	Plain prinia	Cisticolidae	LC
53	<i>Prinia hodgsonii</i>	Grey-breasted prinia	Cisticolidae	LC
54	<i>Zosterops palpebrosus</i>	Oriental white-eye	Zosteropidae	LC
55	<i>Orthotomus sutorius</i>	Common Tailorbird	Sylviidae	LC
56	<i>Dicaeum cruentatum</i>	Scarlet-backed Flowerpecker	Dicaeidae	LC
57	<i>Motacilla alba</i>	White Wagtail	Motacillidae	LC
58	<i>Motacilla tschutschensis</i>	Eastern Yellow wegtail	Motacillidae	LC
59	<i>Lonchura punctulata</i>	Scaly-breasted Munia	Estrildidae	LC

LC = Least Concerned

NT = Near Threatened

NE = Not Evaluated



Crested serpent-eagle (*Spillornis cheela*)



White-eyed buzzard (*Butastur teesa*)



Black-winged Cuckooshrike (*Lalage melaschistos*)



Grey-headed Parakeet (*Psittacula finschii*)



Green-billed Malkoha (*Phaenicophaeus tristis*)



Siberian stonechat (*Saxicola maurus*)

<Figure 6.5-9> Photo of Bird Species around the Study Area



Grey-headed parakeet (*Psittacula finschii*)

<Figure 6.5-10> Near Threatened Species around Survey Area

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Aves	Psittaciformes	Psittacidae

Scientific Name:	<i>Psittacula finschii</i>
Species Authority:	(Hume, 1874)
Common Name(s):	English – Grey-headed Parakeet
Taxonomic Source(s):	del Hoyo, J., Collar, N.J., Christie, D.A., Elliott, A. and Fishpool, L.D.C. 2014. <i>HBW and BirdLife International Illustrated Checklist of the Birds of the World</i> . Lynx Edicions BirdLife International.

Assessment Information

Red List Category & Criteria:	Near Threatened <u>ver 3.1</u>
Year Published:	2013
Date Assessed:	2013-11-01
Assessor(s):	Bird Life International
Reviewer(s):	Butchart, S.
Contributor(s):	Choudhury, S., Duckworth, J.W., Gray, T., Mahood, S., Rainey, H., Round, P., Timmins, R. & Zhang, M.
Facilitator/Compiler(s):	Butchart, S., Ekstrom, J. & Taylor, J.
Justification: This species has been up listed from Least Concern on the basis of new information about its population trend. It is listed as Near Threatened because it is suspected to be undergoing a moderately rapid population decline owing to on-going habitat loss and trapping pressure.	
Previously published Red List assessments:	2012 – Least Concern (LC) 2009 – Least Concern (LC) 2008 – Least Concern (LC) 2004 – Least Concern (LC)

	2000 – Lower Risk/Least Concern (LR/LC) 1994 – Lower Risk/Least Concern (LR/LC) 1988 – Lower Risk/Least Concern (LR/LC)
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Geographic Range

Range Description:	<i>Psittacula finschii</i> is distributed from eastern India , Bhutan and Bangladesh , through southern and central Myanmar , northern and central Thailand and Cambodia , Laos , Vietnam and south-western China (central Szechuan and northern Yunnan) (Juniper and Parr 1998). The species is subject to fluctuations, with declines noted in some parts of its range (Juniper and Parr 1998). It is described as generally scarce to rare in Cambodia, and absent from large areas of superficially suitable habitat (S.Mahood <i>in litt.</i> 2013, H.Rainey <i>in litt.</i> 2013), but is locally common in Mondulkiri, in the east of the country (F.Goes <i>in litt.</i> 2013, T.Gray <i>in litt.</i> 2013). It may have been extirpated from south-western Cambodia (F.Goes <i>in litt.</i> 2013). Likewise, the species range has contracted in northern Laos, where favoured habitats are characterised as scarce and fragmented (J.W.Duckworth <i>in litt.</i> 2013). It is very rare in Bangladesh, and was believed to have been extirpated; the only recent sighting is from the Chittagong Hill Tracts (S.U.Choudhury <i>in litt.</i> 2013). In contrast, the species is characterised as common in parts of Myanmar (C.Robson <i>in litt.</i> 2013) and relatively widespread in Thailand (P.Round <i>in litt.</i> 2013). Overall, the population is suspected to be in on-going decline.
Countries occurrence:	Native: Bangladesh; Bhutan; Cambodia; China; India; Lao People's Democratic Republic; Myanmar; Thailand; Viet Nam

Habitat and Ecology

Habitat and Ecology:	This species frequents oak, teak, cedar and pine forest, open wooded hillsides and cultivated areas with tall trees, at up to 3,800 m (Juniper and Parr 1998). In Cambodia, it may more regularly occur in deciduous hill forest, and in areas with evergreen and semi-evergreen vegetation (S.Mahood <i>in litt.</i> 2013, R. J. Timmins <i>in litt.</i> 2013), and is noted to be patchily distributed in both lowland deciduous forest and degraded hill forest on the Sen Monorom plateau (T.Gray <i>in litt.</i> 2013). It is noted to extensively use habitats in anthropogenically modified open landscapes (R.J.Timmins <i>in litt.</i> 2013). In Myanmar, it is described as common in deciduous forest and partly cultivated areas (C.Robson <i>in litt.</i> 2013). It feeds on leaf buds, seeds, fruit and flowers. In central Myanmar, it breeds in January-March (Juniper and Parr 1998).
Systems:	Terrestrial
Continuing decline in area, extent and/or quality of habitat:	Yes
Generation Length (years):	7.5
Movement patterns:	Altitudinal Migrant

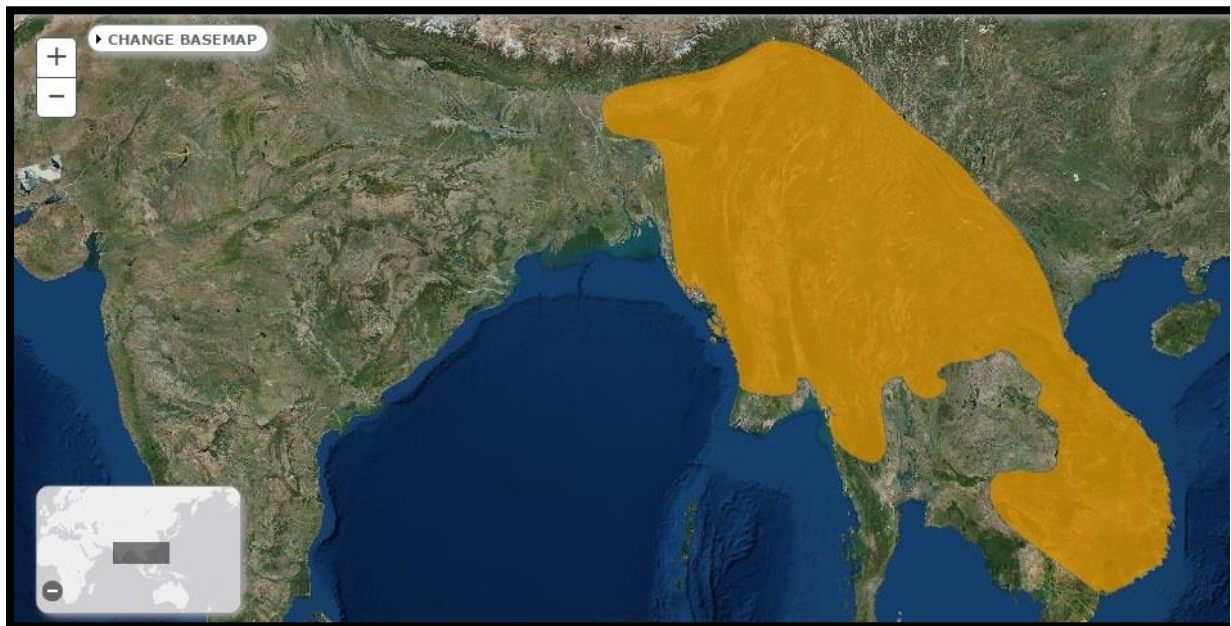
Threats

Major Threat(s):	The species is widely captured for the cage-bird trade and is locally kept as a pet, for example in Laos and China (J.W.Duckworth <i>in litt.</i> 2013, M.Zhang <i>in litt.</i> 2013). In China, poaching and illegal trade of this species continue: it is reported that in one village, every family has one individual of this species as a pet, and they carry an asking price of up to US\$80 (M.Zhang <i>in litt.</i> 2013). Trapping pressure may also be contributing to the observed decline in Cambodia (F.Goes <i>in litt.</i> 2013). Lowland forests in Indochina are under intense
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	<p>pressure, particularly in Cambodia, owing to clearance for large-scale industrial agriculture. This particularly affects areas with evergreen or semi-evergreen forest, rather than deciduous forest, owing to better conditions for cultivation (S.Mahood <i>in litt.</i> 2013). This species apparent reliance on patches of evergreen and semi-evergreen forest may make it more susceptible to the impacts of logging, particularly because it is likely to rely on large trees for nesting. In habitats where large trees are scarce, such as hill forest and landscapes with a mixture of deciduous forest, patches of evergreen and semi-evergreen forest are under particular pressure from logging, even for local use (S.Mahood <i>in litt.</i> 2013). Habitat loss in Cambodia is expected to have a devastating impact on this species during the next decade, although there may be a lag before the true effects are observed in the population (H.Rainey <i>in litt.</i> 2013). In Laos, the species's presence in hilly areas may have buffered it from the worst impacts of logging and habitat clearance (J.W.Duckworth <i>in litt.</i> 2013).</p>
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Conservation Actions

Conservation Actions:	<p>Conservation Actions Underway</p> <p>The species is known to occur in some protected areas across its range, such as Mondulkiri Protected Forest, Cambodia (T.Gray <i>in litt.</i> 2013).</p> <p>Conservation Actions Proposed</p> <p>Conduct regular range-wide surveys to monitor the species's population trend. Monitor rates of habitat loss and degradation within the species's range. List the species under CITES. Quantify the impacts of capture for trade. Conduct awareness-raising activities to reduce trapping pressure and trade. Increase the area of suitable habitat within protected areas.</p>
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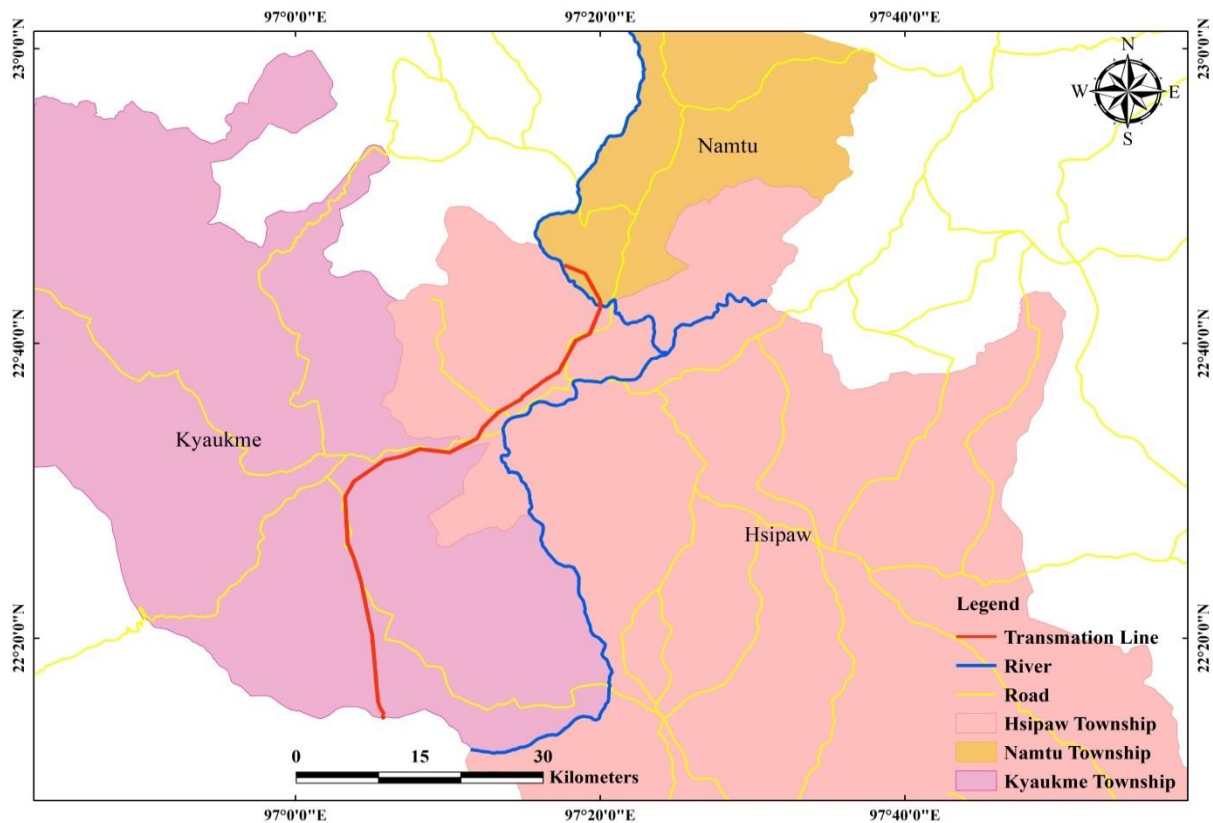
<Figure 6.5-11> Range Map for *Psittacula finschii* (Grey-headed Parakeet)

6.5.5 Protected Areas in Myanmar

According to the World Database on Protected Areas (WDPA, <http://www.protectedplanet.net/country/MM>) the Country hosts 57 Protected Areas including as reported in the following table.

<Table 6.5-8> World Database on Protected Areas – Myanmar

Type	Number
National Park	4
Nature Reserve	3
Wildlife Sanctuary	23
National Park and ASEAN Heritage Park	3
Not Reported	4
Bird Sanctuary	4
Other Area	3
Protected Area	2
Reserved Forest	1
Game Sanctuary	1
Wildlife Park	1
Wildlife Sanctuary and ASEAN Heritage Park	2
Bird Sanctuary and ASEAN Heritage Park	1
Tiger Reserve	1
Mountain Park	1
Elephant Range	1
Botanical Garden	1
Ramsar Site, Wetland of International Importance	1



<Figure 6.6-1> 230 kV Transmission Line Route

a. Kyaukme Township

Kyaukme Township is located between Latitude $22^{\circ} 28' 30''$ N and $23^{\circ} 00'$ and Longitude $97^{\circ} 27' 30''$ and $97^{\circ} 21' 15''$ E. From the east to west is 48 mile and south to north is 33 miles long. The total area of Kyaukme Township is 1584 square miles. The township is border with Hsipaw Township in the east, Yatsaut Township in the south. In the west is Naungcho Township and the north are Moegoke, Namsang and Minengaw. The township is mountainous town surrounded by mountains. The Nam Moe creek in Kyaukme Township flows from west to east. Kyaukme Township is located at an altitude of 270 feet. The highest mountain is the Shwe Nat Mountain and the lowest part of the area is Nam Huot Village.

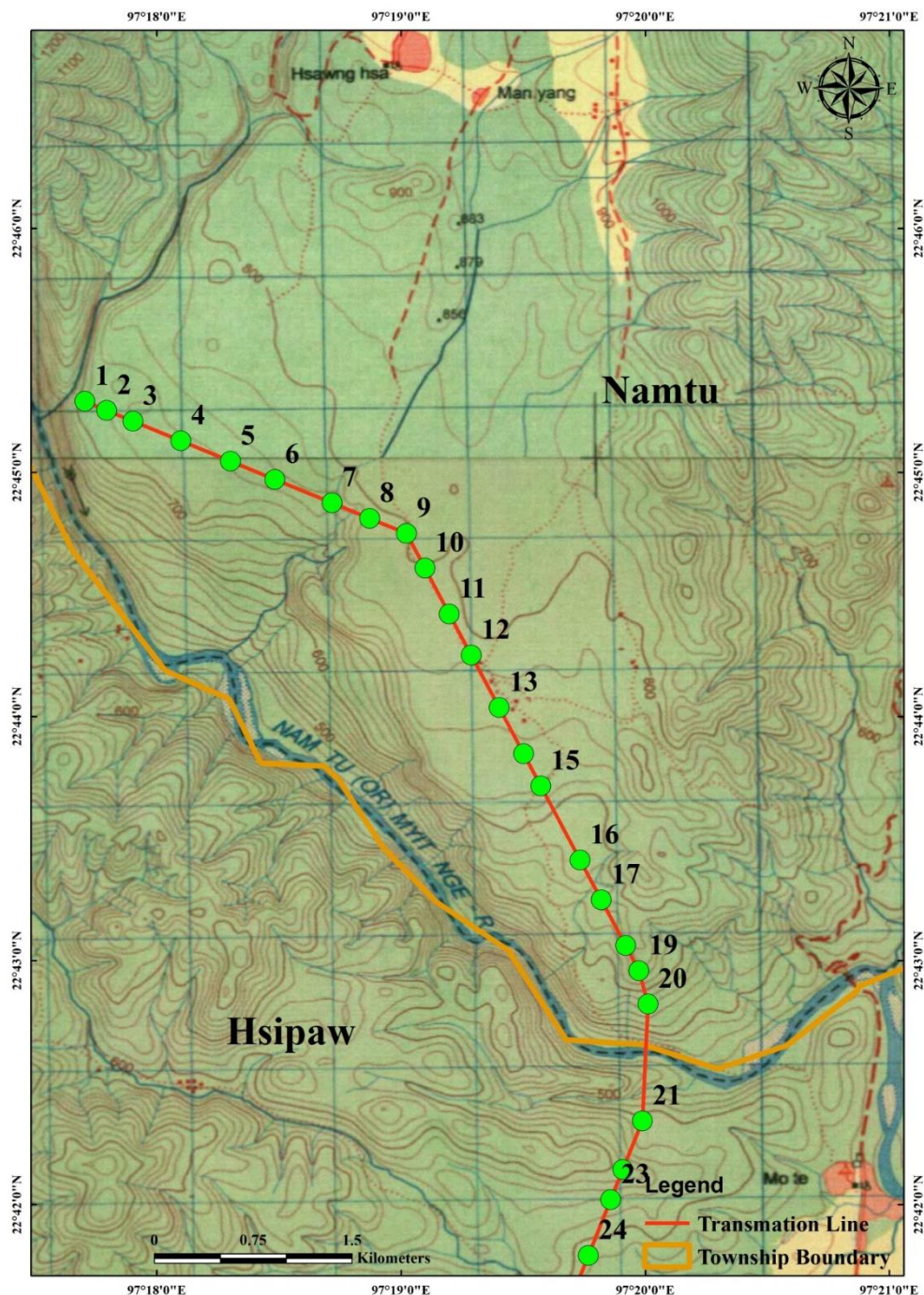
b. Namtu Township

Namtu Township is located in Kyaukme District, Northern Shan State and lies between Latitude $22^{\circ} 46'$ and $23^{\circ} 8'N$, Longitude $97^{\circ} 15'$ and $97^{\circ} 45'$ E. It is about 30.3 miles from east to west and 43.6 miles from south to north. The total square miles of the township are 652.11. The township is bordered to the north by Nantung Township and La Lue Township to the east. It is bordered by Hsipaw Township to the south and Namsang Township to the west. Namtu Township is rich in hills, with flat plains and rivers. The Namtu River flows in Namtu Township. The river is fresh and can be used for drinking water. The township is 1760 feet above sea level.

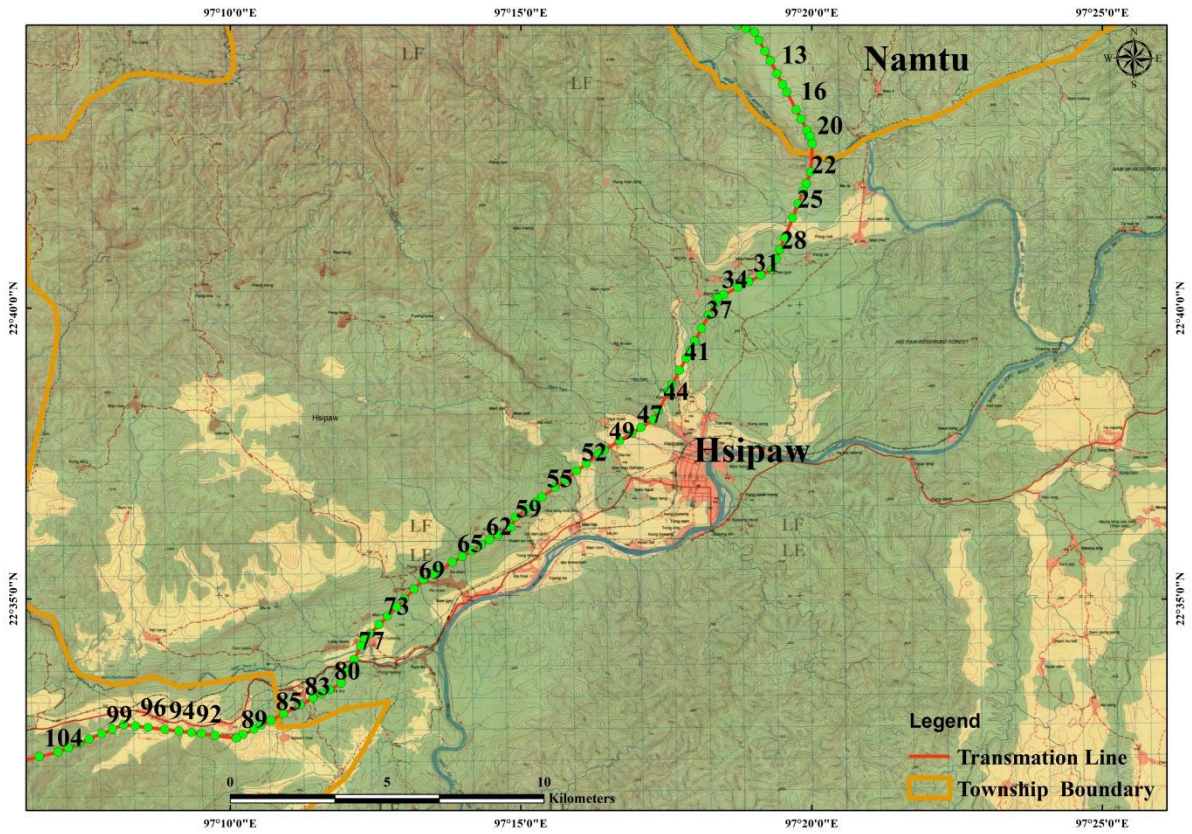
c. Hsipaw Township

Hsipaw Township is located in Kyaukme District, Shan State. Hsipaw Township is located between latitude $22^{\circ} 03'$ and $22^{\circ} 21'$ N and longitude $97^{\circ} 00'$ and $98^{\circ} 03'$ E and the area is 2045.34. From east to west is 60 miles and south to north is 136 miles. The total area of the township is 2045.34 square miles.

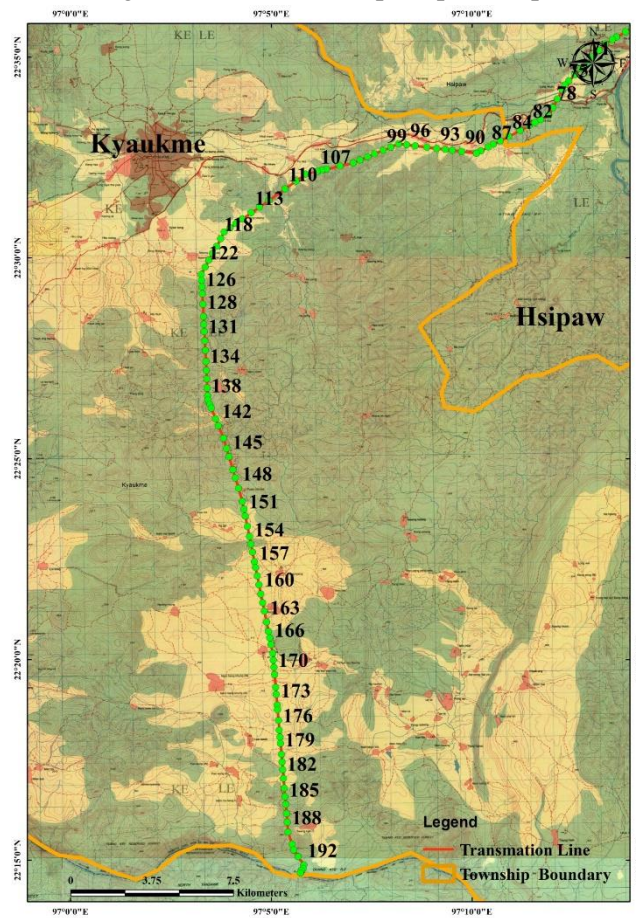
The eastern part of the township is bordered by Lashio and Mine Ye Townships. The south is Yatsauk, Minekyine, and Kayti Townships. The west of the township is Kyaukme Township and also border with Namsang and Namtu Townships in the north. Hsipaw Township is rich in hills with low plains. Hsipaw Township is rare in rivers and these rivers flow from north to south. The famous river is Dokehtawady River and flows through near Hsipaw Township form north to south. In the region, the Nanpaw creek and Kyinti creek are strangely flow from west to east and flow enter into the Dokehtawady River. Most of the water sources in the region are freshwater and can be used for agricultural and drinking water, and can be used to transport with boats in any season in the Dokehtawady River. The township is situated above 1398 feet. The transmission line route and information about the transmission line are shown in the following figure.



<Figure 6.6-2> Township Map of Namtu



<Figure 6.6-3> Township Map of Hsipaw



<Figure 6.6-4> Township Map of Hsipaw

6.6.1 Land and Demographic Structure

Some data about land and demographic structures of Kyaukme, Namtu and Hsipaw Townships are summarized in Table 6.6-1.

<Table 6.6-1> Data about Land and Demographic Conditions of Kyaukme, Namtu and Hsipaw Townships

No	Township	Area	Above Sea Level	Total Population (September 2018) (Person)	Household		Total Population (Person)	
		Square mile	feet		Number of House	Number of Household	Male	Female
1	Namtu	652.11	1,760	51,006	9,597	10,320	24,442	26,278
2	Kyaukme	1,662.4	2,506	1,795,40	3,567	34,087	85,841	93,698
3	Hsipaw	2,045.34	1,398	162,997	33,560	34,264	78,602	84,395

Source: GAD of related Townships

6.6.2 Ethnicity and Religion

Myanmar identifies eight major national ethnic races (which comprise 135 “prominent” ethnic groups), which include the Bamar (68%), Shan (9%), Kayin (7%), Rakhine (4%), Mon (2%), Kayah, and Kachin. However, the government classification system is flawed, because it groups ethnic groups under ethnic races by geography, rather than by linguistic or genetic similarity (e.g the Kokang are under the Shan ethnic race, although they are ethnic Chinese). Unrecognized ethnic groups include Burmese Indians and Burmese Chinese, who form 2% and 3% of the population respectively. The remaining 5% of the population belong to small ethnic groups such as the remnants of the Anglo-Burmese and Anglo- Indian communities, as well as the Lisu, Rawang, Naga, Padaung, Moken, and many minorities across Shan State. The majority of people in projected areas are Shan followed by Palaung and Burma people in both townships.

<Table 6.6-2> Races in Kyaukme Township

No	Race	Population	Township Population	% of Township Population
1	Kachin	3605	175499	2.03
2	Kayar	-	175499	-
3	Kayin	145	175499	0.08
4	Chin	77	175499	0.04
5	Mon	22	175499	0.01
6	Burma	19308	175499	10.86
7	Rakhine	111	175499	0.06
8	Shan	103349	175499	58.15
9	Other	12528	175499	7.06
10	Palaung	36354	175499	19.89
	Total	175499	175499	98.18

Source: Township Information of General Administration Department Offices

<Table 6.6-3> Races in Namatu Township

No	Race	Population	Township Population	% of Township Population
1	Kachin	3903	50331	7.63
2	Kayar	-	50331	-
3	Kayin	338	50331	0.66
4	Chin	253	50331	0.48
5	Mon	11	50331	0.01
6	Burma	9057	50331	17.71
7	Shan	21654	50331	42.53
8	Wa	23	50331	0.01
9	Koekant	608	50331	1.18
10	Palaung	7915	50331	15.48
11	Pao	4	50331	0.01
12	Danu	4	50331	0.01
13	Taungyoe	-	-	-
14	Mone Wang	1299	50331	2.54
15	Lisu	1206	50331	2.35
16	Larhu	57	50331	0.01
17	Rakhine	37	50331	0.01
18	Other	3962	50331	7.74
	Total	50331	50331	98.45

Source: Township Information of General Administration Department Offices

<Table 6.6-4> Races in Hsipaw Township (2018)

No	Race	Population	Township Population	% of Township Population
1	Kachin	389	164438	0.237
2	Kayar	10	164438	0.006
3	Kayin	104	164438	0.063
4	Chin	173	164438	0.105
5	Mon	5	164438	0.003
6	Burma	13053	164438	7.939
7	Rakhine	66	164438	0.040
8	Shan	132709	164438	80.705
9	Danu	43	164438	0.026
10	Ko kant	1596	164438	0.971
11	Li shaw	48	164438	0.029
12	Palaung	9893	164438	6.016
13	Larhu	64	164438	0.039
14	Lisu	1765	164438	1.073
15	Other	3299	164438	2.006
16	Wa	716	164438	0.435
17	Monewon	499	164438	0.303
18	Inn	3	164438	0.002
19	Pao	3	164438	0.002
	Total	164438	164438	100.00

Source: Township Information of General Administration Department Offices (September, 2018)

6.6.3 Religion

The different kinds of religion present in respective townships are shown in Table 6.6-5. More than 90% of the people living in the three townships are Buddhists.

<Table 6.6-5> Religious Status

Township	Buddhist	Christian	Hindu	Islam	Other	Total
Kyaukme	166203	7743	1763	2025	-	177734
Namtu	43147	5771	1211	902	97	51128
Hsipaw	159235	3211	276	1772	-	164494

Source: Township Information of General Administration Department Offices

6.6.4 Land Use

Land use of the respective townships is shown in Table 6.6-6.

<Table 6.6-6> Land Use Status

No	Land Category	Unit	Kyaukme	Namtu	Hsipaw
1	Agricultural Land	Acre	125,625	25,227	123,543
2	Forest and Natural Area	Acre	27,637	109,874	110,709
3	Industrial Land	Acre	609	457	307
4	Settlement Land	Acre	19,445	4,339	28,255
5	Unused Land	Acre	879,719	265,269	1,045,189
6	Fallow	Acre	13,051	9,186	1,012
7	Others (Invasion Land)	Acre	2,147	-	-
	Total Area	Acre	1,068,233	414,352	1,309,015

Source: Township Information of General Administration Department Offices

6.6.5 Local Economy and Livelihood

The main sources of livelihood in the three townships are agriculture, livestock breeding and official employment in the government. In three townships, other sources of earning are fish farming, casual labor and corn plantations as well as small-to-medium size business.

<Table 6.6-7> Existing Status of Local Livelihoods in Three Townships (2018-2019)

Township	Type of Workers (Person)								
	Government Staff	Service Staff	Agriculture	Livestock	Trader	Factory	Fishery	Odd Job	Others
Kyaukme	2798	450	16163	200	2614	60	-	13085	19351
Namtu	1103	550	16100	7378	3500	152	150	3200	1840

Hsipaw	2679	1161	54282	5102	18766	2597	-	10109	4303
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Source: Township Information of General Administration Department Offices

6.6.6 Economic Status

The economic status of Kyaukme, Namtu and Hsipaw townships are examined according to the aspects of industrial activities and business enterprises, and the occupational status.

Kyaukme Township is located in the northern part of Shan State and is economically important. Local people in the township is mainly focus on agriculture and tea leaf. Kyaukme Township have the highway, railway and located beside in Lashio-Mandalay Union road and good transportation. The main product of the township is tea leaf and corn and tea leaf is transported to Mandalay-Yangon. Corn is transported to Muse.

Namtu Township is located in northern Shan State and is economically underdeveloped. Local people in Namtu Township maily focus on agriculture and livestock farming. Namtu Township only can go by road to Lashio- Mandalay region and it is difficult to get transportation. The main products of Namtu Township are tea and orange that transported to the Lashio and Mandalay. Namtu Township mainly imports basic food and consumer goods from Lashio-Mandalay.

Hsipaw Township is located in northern Shan State and is economically important. Local people in the township is mainly focus on agriculture. Hsipaw Township is located on the Muse-Mandalay highway road and good in transportation. The main products are orange, Sweet lime and pineapple and transported to Muse and Mandalay.

6.6.7 Industrial Activities and Business Enterprises

Business activities in targeted townships are one aspect of the economic status.

<Table 6.6-8> Industrial Activities and Business Enterprises

No	Township	Number of Other Factories	Number of Workshops	Number of Small Scale/Domestic Enterprises	Total
1	Namtu	3	18	27	48
2	Kyaukme	60	46	3	109
3	Hsipaw	4	0	68	72

Source: Township Information of General Administration Department Offices

6.6.8 Occupational Status

According to the Township General Administration Department Offices, the occupational status of the targeted townships is shown in the Table 6.6-9.

<Table 6.6-9> Occupational Status

No	Township	Total Population	Number of Workable Person	Number of Employed Person	Number of Unemployed Person	% of Unemployed Person
1	Kyaukme	2038	291	1019	728	71.44
2	Namtu	51006	39473	33973	1500	7.35
3	Hsipaw	162997	98999	77714	12558	4.04

Source: Township Information of General Administration Department Offices

6.6.9 Income Status

Based on the secondary data received from related GAD offices, the income of the person of a year from 2014 to 2018 could be identified as follow Table 6.6-10.

<Table 6.6-10> Income Status of People Living in Namtu, Kyaukme and Hsipaw Townships

No	Township	2014-2015 (Kyats)	2015-2016 (Kyats)	2016-2017 (Kyats)	2017-2018 (Kyats)
1	Kyaukme	925547	928428	971708	1057997
2	Namtu	-	659983	675385	768523
3	Hsipaw	-	679338	716178	786642

Source: Township Information of General Administration Department Offices

6.6.10 Health Condition

The overall condition of the health including life expectancy (male/female), morbidity/major disease, Infant mortality rates are defined as following table.

<Table 6.6-11> Health Condition of Selected Townships

No	Township	Mother Population	Population of Children (1-5) year	% of Birth Rate	% of Mother Death	% of Infant mortality	Major Disease (person)			
							Diarrhea	TB	Dysentery	Malaria
1	Kyaukme	3497	3195	18.02	0.94	7.8	949	47	294	1
2	Namtu	9272	14961	20	-	5	54	115	11	2
3	Hsipaw	4011	3650	4.7	7.2	3.2	513	105	118	-

Source: Township Information of General Administration Department Offices

6.6.11 Social Infrastructures

Most of the targeted townships have enough characteristics of an urbanized area. Information on socio-economic infrastructures, such as banks, markets, hotels, lodging houses, etc. are collected as much as possible for all the townships. Table shows the number of different economic activities for each township.

<Table 6.6-12> Social Infrastructures

No	Township	Hotel	Lodging House	Beach/ Recreation Zone	Bank	Market	News & Media	Printing House	Hospital	Clinic
1	Kyaukme	4	13	-	1	2	7	29	5	43
2	Namtu	-	-	-	1	2	1	1	4	4
3	Hsipaw	10	8	1	6	3	10	19	4	43

Source: Township Information of General Administration Department Offices

6.6.12 Education Status

The education services of Namtu, Kyaukme and Hsipaw Townships as numbers of schools, colleges and universities are shown in Table 6.6-13.

<Table 6.6-13> Education Services

No	Township	High School	Middle School	Primary School	Pre School	Monastery Education School
1	Kyaukme	9	47	80	1	5
2	Namtu	6	11	65	12	-
3	Hsipaw	11	33	152	10	9

Source: Township Information of General Administration Department Offices

6.6.13 Cultural Buildings

The cultural and historical buildings are described in the following table.

<Table 6.6-14> Lists of Cultural Buildings

No	Townships	Christian		Islam		Hidi		Chinese	
		Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
1	Kyaukme	5	1	1	2	3	7	8	-
2	Namtu	5	18	4	1	9	9	2	-
3	Hsipaw	7	8	1	3	2	3	3	9

Source: Township Information of General Administration Department Offices

6.6.14 House, Household and Population

According to the field survey, the village tract that passes through along the transmission line is below. Detailed house, household and population are also described. They mainly depend on the agriculture. Nearly all of the villages are available electricity. All of the people who are accept and want to negotiate them.

<Table 6.6-15> House, Household and Population of village tracts

Village tract Name	Village Name	House	Household	Below 18			Above 18			Total		
				Male	Female	Total	Male	Female	Total	Male	Female	Total
Moe Tae	Moe Tae	201	201	131	127	258	371	407	778	502	534	1036
	Man Mai	159	159	117	120	237	314	297	611	431	417	848
	Pyin Sai	46	46	29	32	61	81	81	162	110	113	223
	Kun San Lake	74	74	31	47	78	154	163	317	185	210	395
	Pan Nay	56	56	34	37	71	92	88	180	126	125	251
	Naung Ta Kyar	127	127	103	88	191	230	255	485	333	242	676
	Kone Yan	40	40	29	19	48	50	67	117	79	86	165
	Nar Kyu	91	91	63	61	124	121	164	285	184	225	409

Village tract Name	Village Name	House	Household	Below 18			Above 18			Total		
				Male	Female	Total	Male	Female	Total	Male	Female	Total
Kyin Thi	Kyin Thi	159	159	48	48	106	249	242	491	297	300	597
	Tyun Saut	45	45	15	13	28	51	57	108	66	70	136
	Pone Phan	55	55	22	24	46	69	79	148	91	103	194
	Son Eite	132	132	58	55	113	185	208	393	243	263	506

Village Name	House	Household	Below 18	Above 18	Total
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				Male	Female	Total	Male	Female	Total	Male	Female	Total
Baw Gyo	Ywar Haung	138	138	119	137	256	104	235	439	323	372	695
	Kaung Khar	24	24	26	28	54	33	39	72	59	67	126
	Tong Kar	86	86	49	65	114	124	124	248	173	189	362
	Pan Kay	50	50	35	49	84	97	114	211	132	163	295
	Zay	155	157	163	150	313	227	231	458	390	381	771
	Homaw	113	115	101	101	202	169	161	330	270	262	532
	Pan Kyi	42	43	28	48	76	61	60	121	89	108	197

Village tract Name	Village Name	House	Household	Below 18			Above 18			Total		
				Male	Female	Total	Male	Female	Total	Male	Female	Total
Man Hae	Man Hae	43	43	42	37	79	73	104	177	115	141	256
	Nar Lin	33	33	28	19	47	53	46	99	81	65	146
	Tong Kaw	28	28	20	27	47	62	77	139	82	104	186
	Nan Hu Nwe	31	31	32	48	80	69	66	135	101	104	205
	Karlain kar lwe	102	102	76	65	141	182	192	374	250	257	507
	Pan Kwe	2	2	-	7	7	5	7	12	5	14	19
	Pan Mone	20	20	31	10	41	35	39	74	66	49	115
	Gaw Dan	43	43	30	45	75	68	82	150	98	127	225
	Nar Kae	70	70	75	46	120	122	144	266	197	190	387
	Kon Pu Yan	48	48	73	31	104	87	84	171	160	115	275

Village tract Name	Village Name	House	Household	Below 18			Above 18			Total		
				Male	Female	Total	Male	Female	Total	Male	Female	Total
San Pate	San Pate	230	230	145	169	304	485	562	1047	630	731	1361
	Sa Laing	20	20	10	9	19	23	24	47	33	33	66
	Nar Lwe	56	56	43	39	82	58	77	135	101	116	217
	Phar Pate	31	31	27	38	65	48	45	93	75	83	158
	Mai Mai Li Saw	12	12	4	2	6	10	20	30	14	22	36

Village tract Name	Village Name	House	Household	Below 18			Above 18			Total		
				Male	Female	Total	Male	Female	Total	Male	Female	Total
Ywar Thit	Ywar Thit	289	289	203	220	422	457	503	960	670	732	1393
	Kyaung Su	177	177	126	137	263	308	395	703	434	532	966
	Nar Tae San	103	103	68	81	149	176	181	357	244	262	506
	Nyaung Pin Kwin	181	181	135	141	276	341	389	730	476	530	1006
	Nan Ngone	37	37	37	24	61	50	50	100	67	74	161

6.6.15 Transportation

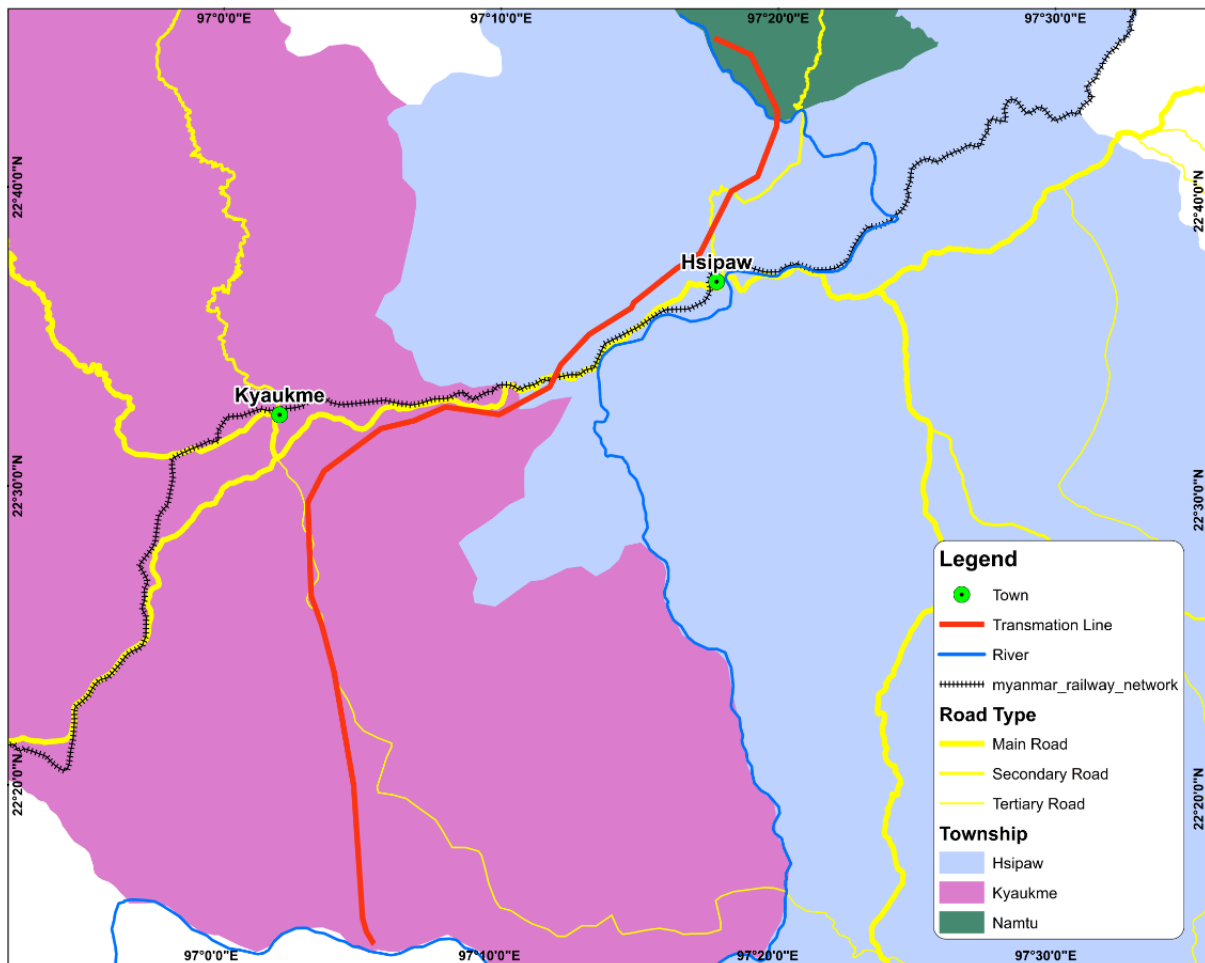
In the area, there is no airline (except there is one Helicopter port in Namtu township but it can no longer be used) and waterway transport system. The communities mainly rely on the road and railway transportation. The summarized mode of transports in the area is presented in the table 6.6-16.

<Table 6.6-16> Mode of Transport in Selected Townships

Mode of Transport & Itinerary	Namtu	Hsipaw	Kyaukme
Airway	Helicopter port (It can no longer be used)	Nil	Nil
Waterway	Nil	Nil	Nil
Railway	Namtu – Bawdwin – Nant Myaw (14 miles)	Mandalay – Lashio Railroad (from Bawkyo to Menseng) 33.25 miles	Mandalay – Lashio (35 miles)
Road	Namtu – Larshio Namtu – Mandalay Namtu – Muse	Hsipaw – Mandalay Hsipaw – Kyaukme Hsipaw – Lashio Hsipaw – Hsaung Kye Hsipaw - Nant Leng	Kyaukme – Muse – Mandalay Kyaukme – Taunggyi Kyaukme – Mandalay Kyaukme – Yangon Kyaukme – Hsipaw Kyaukme – Hsipaw - Nant Leng Kyaukme – Moegoat Kyaukme - Nant Leng Kyaukme – Mine Ngot Kyaukme – Moegoat - Lashio

Source: Township data of GAD

Along the TL alignment, there are two main types of roads such as car roads and jeep tracks (refer to unpaved village access roads). It is expected that there will be the total of 44 crossing points over the existing car roads and jeep tracks. The detailed crossing points, types of road and nearest villages are illustrated in table 2.3-12 of Chapter 2 and the transportation network along the TL alignment is stated in the figure 6.6-16.



<Figure 6.6-5> Transportation network along the 230kV transmission line

CHAPTER 7

IMPACTS ASSESSMENT AND MITIGATION MEASURES

7.1 Methodology and Approach

The scientific and technical reliability of an Initial Environmental Examination (IEE) study depends on the skills of the IEE practitioners/reviewers, who estimate and review the nature and magnitude of the environmental change that the proposed project may entail. Impact prediction and evaluation is a vital exercise for assessing impacts, deciding alternatives, setting down mitigation measures and developing an environmental management plan. Predicting the magnitude of impacts and evaluating their significance is the core exercise of impact assessment. This process is also known as impact analysis and can be broadly broken down into three overlapping phases:

Identification: To specify the impacts associated with each phase of the project and the activities undertaken

Prediction: To forecast the nature, magnitude, extent and duration of the main impacts; and

Evaluation: To determine the significance of residual impacts after taking into account how mitigation will reduce a predicted impact.

7.1.1 Impact Identification

The environmental and social impacts have been identified through field surveys, onsite measuring, and enquire with the village community. Discussions with project proponents, district officials, and village representatives were undertaken along the study area. A mix of quantitative and qualitative methods i.e. sampling, questionnaires, interviews, oral histories, have been used to derive these impacts. Potential impacts have also been predicted based on experience of working in past similar assignments.

The assessment process is based on available information, including the project description (as provided by Client), and social and environmental baseline data. The assessment considers all relevant social and environmental impact/risks, including issues identified in IFC Performance Standards 2 through 8, and those who will be affected by such risks and impacts.

Although the route for the transmission line has been selected to minimize social or environmental impacts, there will, nevertheless, be some impact along the corridor due to construction, erection of transmission line towers and stringing of overhead transmission line and in setting up associated utilities.

This section presents a summary of the environmental impacts from the activities related to construction and operation of the transmission line and substation. The impacts are based on the project description provided by the client, existing available data and similar past projects.

The transmission line design will involve approximately 195 towers for 230kV, based on proposed transmission line route by Department of Power Transmission and System Control, Ministry of Electricity and Energy.

The components of the present project will include the Right of Way (RoW), the transmission line, transmission towers, access roads and worker camps. No spoil areas are required as excavated material will be used for back fill and embankments at tower sites.

According to the preliminary survey, the width of corridors for 230kV line and 132kV line are temporarily about 50m and 40m respectively.

The construction area of each tower is occupied by 60 ft. (20m) x 60 ft. (20m) and only used for foundation work for tower and four concrete blocks (L=2.5 ft. x W=2.5 ft. x H=2 ft.) will be remained on the ground after completion of foundation work.

Vegetation below 3m will be retained within the RoW where land is not required for tower footprints or access. The consideration and selection of the transmission line route was based on engineering principles and environmental factors, such as slope, geological condition for foundations and other obstructions.

The main construction contents in the present transmission line are as follows:

- 230kV transmission line between Upper Yeywa HPP and Namtu
- 230kV Upper Yeywa Sub-station

In summary, project activities will include;

Construction Phase

- Clearing of vegetation for the RoW
- Earthworks for the installation of the transmission towers
- Construction of towers and stringing
- Rehabilitation of RoW areas not required to be permanently cleared and
- Construction of worker camp

Operation

- Maintenance of RoW, including repairs to transmission lines and trimming vegetation
- Road maintenance.

In general, the following things will be avoided in detailed line route survey and detailed engineering design.

- The proposed alignment will not pass through any environmentally critical area and avoids all known cultural heritage locations in Shan State.
- The potential human health and public safety effects on people living near the transmission lines will be minimized because the prescribed height of the towers is above the minimum safety requirement.
- There are five Major Rivers crossing along the proposed line route and need to protect river against sedimentation is necessary during piling activities.

This section presents the systematic identification of the potential impacts along the alignment of the 230kV transmission line to the environment. The identified impacts are described each phase in the following;

Pre-construction

- Loss of vegetation and disturbance to wildlife habitat in some areas and increase the generation of waste, especially vegetation debris from site clearance activities.

Construction

- Air emission, noise and vibration level will be increased due to mobilization of construction vehicles and machineries.
- Construction waste, domestic and sewage from the temporary worker camp will be increased.
- Water demand will be increased and surface water quality will also be affected due to improper discharge of sewage from temporary worker camp.

- Soil contamination and surface water pollution will occur due to accidental spill of engine oil/lubricant and other hazardous chemicals from vehicles and construction machineries.
- Removal of vegetation and trees during construction of foundation, especially on the slopes would render soil vulnerable to erosion.
- Loss of visual amenity due to the presence of man-made transmission line structures.
- Vegetation will be cleared for the ROW and wildlife habitat will also be disturbed due to the mobilization of the project.
- Traffic volume and traffic related accident in the area will be temporarily increased from mobilization of construction vehicles.
- Injury and sickness of workers will be caused due to construction works including tower erection, stringing and line pulling.

Operation

- Air emission, noise and vibration level will temporarily be increased while the maintenance operations are carried out.
- Electrical hazards will be increased due to corona effect.
- Worker exposure to electrical hazards will be increased due to the EMF, Electrocution and working at height when the maintenance operations are being undertaken.
- Growth of vegetation will be limited as regular trimming of vegetation along the ROW have to be done to meet with the designed ground clearance height.
- Employment opportunities will be increased during ROW maintenance work.

Decommissioning

- The anticipated potential environmental and social impacts are same as during construction phase.

7.1.2 Impact Prediction and Evaluation

The prediction and evaluation of the environmental impact was done based on the observation and results from baseline surveys of physical, ecological and social environment. In this stage, the combination of quantitative and qualitative approach is used to predict the nature, magnitude, extent and duration of the impacts and evaluate the impacts significance. The quantifiable impacts are assessed with quantitative approach whereas the non-quantifiable impacts are assessed with qualitative approach.

The criterion that has been used to evaluate impacts on various environmental and social aspects is as following.

<Table 7.1-1> Impact Evaluation Criteria

Context	Local	when an impact is restricted within 17.5 m of either side of the project foot print i.e. within the corridor defined for the project
	Medium	when an impact is spread from 17.5 m to 50 m either side of the project foot print i.e. beyond 17.5 m but within 50m either side of the corridor defined for the project
	Regional	when impact is spread beyond 50m either side of the project foot print i.e. beyond 50 m either side from the corridor defined for the project
Duration	Short	when impacting for a duration of six months (other than for ecology); this will result in the recovery of the effected environmental component (other than for ecology) within a year
	Medium	when impacting between six months and three years; this will result in the recovery of the effected environmental component (other than for ecology) within 1 to 10 years

	Long	when impacting beyond three years (other than for ecology); and will result in recovery of prevailing conditions within 10 years or beyond
Intensity	Low	Low intensity when resulting in changes in the environmental baseline of less than 20% in regional context or 20 to 30% in medium context or up to 30% in local context but for short duration
	Moderate	Moderate intensity when resulting in changes in the baseline for up to 30% in regional context or more than 30% in medium context or for ecology changes are expected to be recoverable in terms of medium duration
	High	High intensity when resulting change in the baseline beyond 30% in regional context or for ecology changes serious impairment to species, productivity or their habitat
Type	Adverse	Adverse impacts would deplete or negatively alter resources
	Beneficial	Beneficial impacts would improve resource conditions

<Table 7.1-2> Impact Significance Criteria for Environmental and Social Components (other than for Ecology)

Significance	Context	Duration	Intensity
Insignificant	Local	Short	Low
Minor	Local	Short	Moderate
	Local	Medium	Low
	Local	Medium	Moderate
	Medium	Short	Low
	Local	Long	Low
Moderate	Local	Medium	High
	Local	Long	Moderate
	Medium	Short	Moderate
	Medium	Medium	Low
	Medium	Medium	Moderate
	Medium	Long	Low
	Medium	Long	Moderate
	Regional	Short	Low
	Regional	Short	Moderate
	Regional	Medium	Low
	Regional	Medium	Moderate
Major	Local	Short	High
	Local	Long	High
	Medium	Short	High
	Medium	Medium	High
	Medium	Long	High
	Regional	Short	High
	Regional	Medium	High
	Regional	Long	Low
	Regional	Long	High
	Regional	Long	High

Note: Positive impacts are termed as beneficial while negative ones are adverse

Source: International Association for Impact Assessment

7.2 Pre-construction Phase

The impacts from the pre-construction phase of the 230kV power transmission line project will include land acquisition as land is required for tower foundation. In paddy fields, land will only be required for the basement of tower, not the ROW. However, in forest area, trimming of vegetation will be needed to meet with ground clearance. The other minor impacts such as air emission, noise and increase of vegetation debris from vegetation clearance for site preparation will be occurred.

7.3 Construction Phase

7.3.1 Air Quality

Activities and Potential Impacts

The construction activities of sub-station and transmission line will generate air pollutants particularly dust from the construction activities such as land clearance for ROW, excavation, earthmoving and levelling, and other pollutants such as CO, NO_x and PM are expected to generate from the mobilization of equipment and vehicles.

The emissions of CO, NO_x and PM from construction equipment and vehicles (which are preliminary intended to use in the construction phase by the project proponent) are estimated based on the number of equipment/vehicles to be utilized estimated for operating hours, estimated vehicles kilometer travelled (VKT) and emission factors which were referred to the AP42 of USEPA⁵ and Air Pollution and GHG Emissions Indicators for Road Transport and Electricity Sectors of Clean Air Asia. The detailed calculations are attached in appendix section and the table 7.3-1 summarizes the estimated emissions of CO₂, NO_x and PM throughout the construction period.

<Table 7.3-1> Estimated Emissions of CO₂, NO_x and PM

Vehicles	Numbers	Total Emission (kg)		
		CO ₂	NO _x	PM
15-ton Truck	1	2633.64	21.53	2.64
20-ton Truck	1	1789.33	14.63	1.79
5-tons Truck	2	28.92	0.16	0.05
Water Bowser	1	54.22	0.44	0.05
Lorry-mounted crane (10 tons)	1	54.22	0.44	0.05
Excavator	1	49213.44	274.64	0
Bulldozer	1	85760.4	478.59	972
Total	8	139534.17	790.42	976.58

According to the above table, although the total emission of selected pollutants seems in large quantity, CO₂ is at 139534.17 kg, NO_x, 790.42 kg and PM, 976.58 kg, these amounts represent the total emission of the whole construction (3 years) period and will be localized to the area where the construction site avoids the large settlement areas.

Mitigation measure

Although the potential of atmospheric emissions from construction and its related activities are not significant, the following mitigation measures are proposed to further reduce the impact of emissions;

⁵ Environmental Protection Agency (US EPA). Air Quality Analysis Guidance Handbook Off-Roads Mobile Source Emission Factors, 2006.

- Sprinkle water on dust generating areas,
- Restrict the speed limit of vehicles while moving on unpaved roads,
- Cover the vehicles carrying sand, loose soil and other construction materials,
- Check the vehicles, heavy machineries and construction equipment daily,
- Turn off the engines of vehicles and heavy machineries while not in use,
- Avoid dust generating activities while in high wind,
- Apply good site practice and house-keeping, and
- Prohibit the burning of wastes at all times.

Impact Significance

Since the route of transmission line avoided major settlement areas and the observed air quality status from baseline survey is well below the NEQG limit, it is anticipated that emission from construction activities will be localized and will not greatly effect on existing settlements. Consequently, the air quality impact during construction stage is considered as “Minor” and will be “Insignificant” in the condition that the proposed mitigation measures are being adopted.

<Table 7.3-2> Impact Significance on Air Quality during Construction Phase

Aspect	Scenario	Context			Duration			Intensity			Type		Significance			
Atmospheric emissions		Local	Medium	Regional	Short	Medium	Long	Low	Moderate	High	Adverse	Beneficial	Insignificant	Minor	Moderate	Major
	Without mitigation	<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>		
	With mitigation	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>			

7.3.2 Noise and Vibration

Activities and Potential Impacts

The construction of tower foundation, sub-station, mobilization of vehicles and construction equipment especially excavator and bulldozer will be sources of noise and vibration generation. Increased noise and vibration levels will disturb local residents and fauna. During the construction phase, short-term impact of noise will occur in the closet vicinity of the construction site. However, the attenuation of noise with distance results in a decrease in intensity with distance which is presented in the table 7.3-3.

<Table 7.3-3> Noise Attenuation by Distance

Equipment	Distance from source in meter				
	15m	30m	60m	120m	240m
Excavator	81	73.5	66	58.5	51
Bulldozer	82	74.5	67	59.5	52
Cement mixer	80	72.5	65	57.5	50
Crane	81	73.5	66	58.5	51
Truck	76	68.5	61	53.5	46
Pickup	75	67.5	60	52.5	45

The process of stringing of cables will produce only human voices, which might be audible to residents in very close proximity of the operations. However, again these impacts will be localized and short lived.

Regarding the vibration effect, except the mobilization of construction equipment, the construction activities will not involve the significant sources of vibration such as blasting and pile driving. Thus, potential vibrational effects can be negligible.

Mitigation measure

The following mitigation measures are proposed to undertake to minimize the sources of noise and vibration during the construction phase;

- Construction activities in close vicinity to monastery and settlement area, which includes the movement of construction vehicles and heavy machineries, should be restricted to normal working hours (7:00am – 17:00pm), and residents should be informed of these activities
- Avoid working at night,
- Restrict speed limit of vehicles
- Restrict operating of noisy equipment only when necessary switch off such equipment when not in use,
- Deliver the equipment operating training since careless or improper operation or inappropriate use of equipment can increase noise levels such as poor loading, unloading, excavation, and hauling techniques, and
- Carry out regular maintenance of vehicles and construction equipment as poor maintenance of equipment typically causes excessive noise levels.

Impact Significance

Since the transmission line alignment avoids the large settlements area, the construction noise and vibration will not be significantly effect to the nearby residents. However, it is anticipated that there will be occasional noise and vibration as some village roads are expected to use for transport of construction materials during construction stage. To be concluded, the noise and vibration impacts from construction activity is considered as “Moderate” and will be “Minor” in the condition that proposed mitigation measures are being adopted.

<Table 7.3-4> Impact Significance on Noise and Vibration Level during Construction Phase

Aspect	Scenario	Context			Duration			Intensity			Type		Significance			
Noise		Local	Medium	Regional	Short	Medium	Long	Low	Moderate	High	Adverse	Beneficial	Insignificant	Minor	Moderate	Major
	Without mitigation		☑			☑		☑			☑				☑	
	With mitigation	☑				☑		☑			☑			☑		

7.3.3 Waste Disposal

Activities and Potential Impacts

It is anticipated that there will be a potential increase of solid and liquid waste generated from sources in this stage such as vegetation debris from ROW clearance, removal of top soil and excavated materials, disposal of domestic wastes and sewage from temporary worker camps, disposal of packaging wastes from electrical equipment and cement bags, disposal of residual fuel oil and/or accidental spill, metal scraps and disposal of concrete debris from tower foundation works. Improper

disposal of construction wastes can affect the aesthetic view, hygienic condition and block the nearby streams.

Mitigation measure

The following mitigation measures are proposed in order to reduce generation of solid and liquid wastes caused by construction of 230kV transmission line and substation.

- Vegetation, construction debris and other associated wastes (packaging wastes from electrical equipment and cement bags, residual fuel oil and metal scraps) will be disposed in an approved site by the local authorities,
- Enough waste bins are to be provided in the places where waste generated.
- Domestic solid waste from temporary worker camp will be stored in a covered container and disposed in an approved site by the local authorities,
- Workers will be strictly instructed about random disposal of any waste generated from the construction activity and from the worker camp,
- Temporary pit latrine will be prepared for temporary worker camp,
- Excavated materials will be reused as backfill material, and
- Dropping materials on the road will be collected.

Impact Significance

Since construction will be taken place in almost remote area in Namtu township and other sections of transmission line are away from away from large settlement areas in Hsipaw and Kyaukme townships. Although some household structures are located within the ROW of TL (refer to Table 2.3-10 and Figure 2.3-9), the impact of the generation of solid and liquid wastes is not to be significantly affected to the local residents. Thus, the waste generation from transmission line construction stage is considered as “Moderate” and if the proposed mitigation measures will properly adopted during construction implementation, the impact is considered as “Minor”.

<Table 7.3-5> Impact Significance on Waste Disposal during Construction Phase

Aspect	Scenario	Context			Duration			Intensity			Type		Significance			
Waste Disposal (Construction wastes)		Local	Medium	Regional	Short	Medium	Long	Low	Moderate	High	Adverse	Beneficial	Insignificant	Minor	Moderate	Major
	Without mitigation		☑			☑			☑		☑				☑	
	With mitigation	☑				☑		☑			☑			☑		

7.3.4 Water Usage and Water Quality

Activities and Potential Impacts

There are two major river (Namtu) crossing points along this transmission line route. The first one lies between transmission line tower number 20 and 21, and the remaining one is between T003 and Gantry. The other points crossed over the small creeks are also found along its alignment. Contamination of surface water bodies is likely to result from the runoffs from construction activities close to the surface water bodies. Moreover, construction works along the slopes will affect small changes in the surface drainage pattern of the area. Accordingly, it is anticipated that increased

sedimentation of water courses, accidental spill of fuel oil, lubricants, paints, solvents, disposal of domestic wastes on bare land, and sanitation facilities especially leakage of sewage from toilets will not only impact on water quality but also contaminate the soil quality.



<Figure 7.3-1> The location and condition of towers near the river

Mitigation measure

- Optimal use of water will be planned and followed at construction site.
- At the river crossing the horizontal clearance (the distance between the towers) will be greater than the maximum river width at high flood levels and the vertical clearances will be according to the statutory requirements.
- Temporary drainage provision will be made to make sure that any rain storm water running off the construction areas will be controlled.
- Clearing and earthworks will be undertaken in the dry season wherever possible to minimize erosion and subsequent release of sediment.
- Material storage area for sand piles, excavated soil, aggregates, or other materials will be as much as away from water body.
- Chemical and oils storage areas will be laid on a hard concrete base. Overhead protection from rain and severe weather will be provided
- Regular maintenance of vehicles and construction equipment to avoid leakage of oil.
- Contingency plans for control of spills of oil and other hazardous substances will be formulated and spill collection kits kept readily available.
- Temporary pit latrine will be prepared for temporary worker camp.
- Disposal of solid and liquid wastes into the water body are prohibited.

Impact Significance

The construction activity will take place from 100 m to over 300 m from the river and small creeks as per final design of transmission line alignment. The potential impacts during the construction stage are expected to be in short term and low intensity. Thus the impacts from the construction works to quality are considered as “Minor” and if the proposed mitigation measures will properly adopted during construction implementation, the impact is considered as “Insignificant”.

<Table 7.3-6> Impact Significance on Water Usage and Water Quality during Construction Phase

Aspect	Scenario	Context			Duration			Intensity			Type		Significance			
Water Usage and Water Quality		Local	Medium	Regional	Short	Medium	Long	Low	Moderate	High	Adverse	Beneficial	Insignificant	Minor	Moderate	Major
	Without mitigation	☑				☑			☑		☑			☑		
	With mitigation	☑			☑			☑			☑		☑			

7.3.5 Erosion and Soil Quality

Activities and Potential Impacts

Soil erosion is likely to result from excavation of tower foundation, piling of excavated soil, lack of proper drainage channels on steep slope area during the construction stage. Besides, soil compaction and rutting can also occur due to the mobilization of construction vehicles and machineries. This may affect the agricultural productivities in the area where the transmission line passes the agricultural fields. On the other hand, the leakage of oil and lubricant from construction vehicles, improper disposal of domestic wastes and sewage from temporary worker camp can deteriorate soil quality in terms of contamination.

Mitigation measure

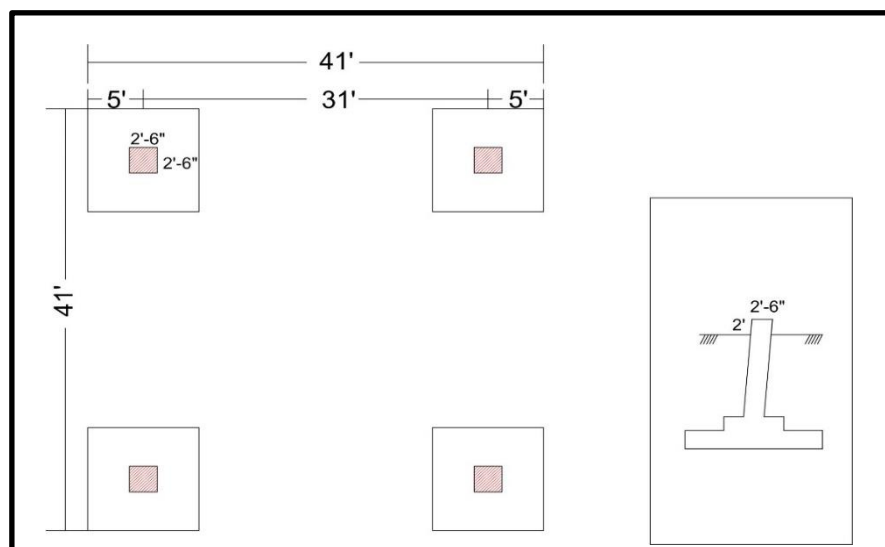
The following mitigation measures are proposed to avoid soil erosion and deterioration of soil quality.

- If possible, ROW clearance, earthworks and other civil works will be performed during the dry season to prevent soil erosion and runoff of sediments.
- Temporary barriers around excavation areas and stockpiles will be installed during the construction stage in proximity to the surface water body, and loose soil should be kept covered till the time of backfill and the excess soil should be removed after casting activities are complete
- Avoid or minimize mobilization of construction vehicles through sensitive farmland area so as to avoid rutting and soil compaction.
- Chemical and oils storage areas will be laid on a hard concrete base and overhead protection from rain and severe weather will be provided.
- Regular maintenance of vehicles and construction equipment will be conducted to avoid accidental leakage of oil on soil.
- Contingency plans for control of spills of oil and other hazardous substances will be formulated and spill collection kits kept readily available.

Impact Significance

Silt traps or temporary barriers and trenches around excavation areas and stockpiles of materials will be necessary during the construction of the lattice towers near Namtu River as well as other large streams. Site clearing, earthworks and other civil works should be scheduled during the dry season to prevent erosion and runoff of sediments. Likewise, the areas will be barricaded and provided with channels that will block silt from draining into streams.

Since construction of tower area will occupy 20m x 20m and the tower foundation for four concrete blocks will require 0.8m x 0.8m x 0.7m according to DPTSC of previous 230kV line projects, the utilization of construction materials and vehicles are fewer in numbers, and the potential impact on soil quality such as erosion from stockpiles of materials, rutting, soil compaction and contamination are considered as “Minor” and the impacts will be “Insignificant” on the condition that the proposed mitigation are adopted.



Source: DPTSC

<Figure 7.3-2> The area affected by the foundation of tower



Figure 7.3-3> The construction activities of the tower (Source: DPTSC)

The significance of impacts on soil and its reduction with mitigation measures during construction is summarized in Table 7.3-7.

<Table 7.3-7> Impact Significance on Erosion and Soil Quality during Construction Phase

Aspect	Scenario	Context			Duration			Intensity			Type		Significance			
Erosion and Soil Quality		Local	Medium	Regional	Short	Medium	Long	Low	Moderate	High	Adverse	Beneficial	Insignificant	Minor	Moderate	Major
	Without mitigation		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>		
	With mitigation	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>			

7.3.6 Aesthetics and Visual Impact

Activities and Potential Impacts

The visual amenity will be disturbed mainly during the construction phase due to the clearance of ROW, the casting of tower foundation and the presence of steel tower structures. The transmission line alignment will cross highways/roads, and other transmission line which may lead to change of landscape resource and character due to introduction of manmade features leading to visual intrusion and loss of visual amenity.

Mitigations

- The clearance of trees will be kept to minimum and wherever possible, trimming of trees will be adopted *vis-à-vis* felling of trees.
- The lattice structure of towers provide sufficient see through effect which diminish the visual impact on the aesthetics of the area.

- The area being hilly terrain with undulations restrict the view of many towers in a single view, moreover the height of tower do not appear to be significant with reference the terrain.
- To improve the landscape along the roads, trees will be preserved on the road easements so long as the vertical safety clearance is complied. Regular trimming of trees within the ROW of transmission line will be implemented to maintain vertical and lateral safety clearance.

Impact Significance

Short-term aesthetic impacts during construction would be temporary and any adverse visual impacts are expected to be restored to pre-existing conditions upon completion of construction. The overall landscape and visual impacts of the transmission line is expected to be “Minor” after mitigation. The impact is summarized in Table 7.3-8.

<Table 7.3-8> Impact significance on Aesthetics and Visual during Construction Phase

Aspect	Scenario	Context			Duration			Intensity			Type		Significance			
Aesthetics and Visual		Local	Medium	Regional	Short	Medium	Long	Low	Moderate	High	Adverse	Beneficial	Insignificant	Minor	Moderate	Major
	Without mitigation		☑			☑			☑		☑				☑	
	With mitigation		☑		☑			☑			☑			☑		

7.3.7 Biodiversity (Flora and Fauna)

Activities and Potential Impacts

The 230 kV transmission line alignment will traverse grassland, shrubland, paddy fields in Namtu, Hsipaw and Kayukme townships, Hteelone Reserved Forest in Hsipaw township and Taung Chae Reserved Forest in Kayukme township. Besides, the construction of new switching substation will be located in Taung Chae Reserved Forest of Kyaukme township.

The followings are the anticipated impacts to biodiversity during the construction stage;

- Temporary disturbance of habitat in areas required to facilitate construction. Temporary disturbance will mainly be associated with construction areas surrounding tower pads, any required access tracks to tower locations and temporary stockyards, workers camps and mobile offices.
- Disturbance and displacement of resident fauna due to noise, light and /or vibration as a result of construction activities (excavation, drilling, clearing, and vehicle movement) will cause indirect impact on the fauna due to loss of habitat.
- Fauna mortality due to vehicle/machinery strike, hunting, poaching and collection for trade due to the creation of access roads within and outside of the ROW.
- The trees and crops within the ROW are expected to be cutting down or trimming during construction of towers and during line stringing will cause indirect impact on the fauna due to loss of habitat. Coordination between DPTSC and Forest Department and private owner are essential for tree removal and subsequent mitigation by tree replacement at site or elsewhere in the townships.

Mitigations

- Follow the law and rules against logging outside the approved construction areas and against wildlife hunting and poaching will be imposed on project staff, workers and all contractors and personnel engaged in or associated with the Project, with penalties levied for anyone caught carrying and using animal snares and traps, including fines and dismissal and prosecution under the Forest Law, 2018 and Conservation of Biodiversity and Protected Areas Law 2018.
- The contractor shall be directly responsible for dissemination to its staff and workers of all rules, regulations and information concerning these restrictions as well as the punishment that can be expected if any staff or workers or other person associated with the Project violate rules and regulations.
- The planned clearance area for the construction works shall be clearly identified and marked to avoid accidental clearing;
- Construction contractor will establish management plan to manage the construction activities to be conducted and monitor compliance with relevant permits and environmental regulations in order to prevent potential impacts to terrestrial ecology, in particular, vegetation and wildlife.
- Construction vehicles and machinery will be maintained in accordance with industry standard to minimize unnecessary noise generation.
- Commitment will be made to raise awareness of values of natural habitat areas to construction work force and make arrangements for restriction of poaching.
- Speed limit to maximum of 40 km/hr for construction vehicles will be enforced to minimize potential for fauna strike.
- Minimizing vegetation clearance of ROW as much as possible and ensuring the clearance not beyond designated area.
- Leaving ground vegetation and shrub within ROW unless disturbance to access.
- Carrying out all vegetation clearance in consultation with Department of Forest.
- Disposing of chopped trees in accordance with guidance of Department of Forest.
- Prohibiting forest extraction by contractor employees.
- Prohibit using herbicide for clearing vegetation.
- Hunting wild animals will be strictly prohibited to all staff.
- In areas with concentrations of vulnerable bird species, the top (grounding) wire should be made more visible with plastic devices. Electrocuting (mainly of large birds of prey) should be avoided through bird-friendly tower design.
- Managing transmission line ROW to provide habitat for endangered/threatened resources, including osprey nesting platforms built on top of transmission poles.
- All construction activities will be undertaken within the ROW for the safe operation of the transmission line, considering minimum clearances indicated in the standard.

Impact Significance

Along the 230 kV transmission line alignment, the survey team observed 11 mammal species, 4 herpet species, 59 bird species, 35 butterfly species, 11 fish species during the survey period. According to the IUCN red list, 1 bird species, *Psittacula finschii* (grey-headed parakeet) was observed as Near Threatened (NT) species whereas the other group of animals appeared as Least Concerned (LC) and Not Evaluated (NE).

The impacts during the construction activities will be short-lived. The transmission line towers and electrical line will not cause any danger for grey-headed parakeet because they typically inhabit open agricultural land and crop land with scattered native trees.

They built their nests only in the cavities of the tree. Their breeding season is mostly in January to March in Myanmar. The nest is used as sleeping quarters all year round and is added to from year to year until at times it breaks the supporting branches. The near threatened bird species of birds are mobile animal and they can easily move to nearest suitable habitat and the potential impacts on biodiversity will be minor after mitigation measures.

Regarding the flora, the survey team identified 82 plant species during the time of survey. It was observed that only a plant species, *Dipterocarpus tuberculatus* (In), appeared as Near Threatened (NT). One near threaten plant species of IUCN red list is observed only in the reserve forest. There is no record of any IUCN red list plat species within the RoW therefore impact on IUCN listed flora are not expected. Forest fragmentation can occur if proper mitigation measures are not taken.

Thus, it is considered that the impacts on biodiversity (flora and fauna) during the construction stage will be “Moderate” and will be “Minor” if the proposed mitigation measures are adopted during the implementation of the construction activities.

<Table 7.3-9> Impact Significance on Biodiversity during Construction Phase

Aspect	Scenario	Context			Duration			Intensity			Type		Significance			
Biodiversity (Flora and Fauna)		Local	Medium	Regional	Short	Medium	Long	Low	Moderate	High	Adverse	Beneficial	Insignificant	Minor	Moderate	Major
	Without mitigation		☑		☑				☑		☑				☑	
	With mitigation		☑		☑			☑			☑			☑		

7.3.8 Socio Economy and Livelihoods

Activities and Potential Impacts

The employment opportunities will increase during the construction of power transmission line and other infrastructure of this project.

Mitigations

The following mitigation measures are proposed to reduce the adverse impacts or increase the beneficial impacts on socio economy and livelihoods of the nearby communities.

- The construction contractor will recruit local people during construction where local people have the required skills and experience.
- The contractor will carefully manage labor conditions
- It is acknowledged, however, that much of the labour, especially skilled labour, will come from outside the project area and
- Training in health and safety and technical areas will be provided to all personnel.

Impact Significance

It is considered that the impacts on the socio economy and livelihoods of the local community will be beneficial as “Minor” and will be “Moderate” if the proposed measures are adopted.

<Table 7.3-10> Impact Significance on Socio Economy and Livelihoods during Construction Phase

Aspect	Scenario	Context			Duration			Intensity			Type		Significance			
Socio economy and Livelihoods		Local	Medium	Regional	Short	Medium	Long	Low	Moderate	High	Adverse	Beneficial	Insignificant	Minor	Moderate	Major
	Without mitigation		☑		☑			☑				☑		☑		
	With mitigation		☑			☑			☑			☑			☑	

7.3.9 Community and Private Property

Activities and Potential Impacts

There are about 9 village house and 26 huts within the ROW (75 feet each) along the transmission line alignment. Those household structures will be affected during the construction period. The other properties such as farmland and other seasonal crops will also be affected while the stringing is being carried out.

Mitigations

The following mitigation measures are proposed to reduce the impacts on community and private properties of the nearby communities.

- Ensure that the construction activities are to be planned that any use of community and individual property is either avoided or prior permission sought before use.
- Any unforeseen use and/or damage to property or structures etc. needs to be immediately compensated.
- Livestock in the affected areas will be relocated, where necessary;
- Land acquisition and compensation for crops issues will be settled out before construction starts and will be reviewed by MOEE.
- Ensure that negotiations for compensation should include relevant stakeholders from government and communities.
- Also ensure that the compensation rates are at par with the market rates.
- It also needs to be ensured that the opportunity cost of such land is considered when deciding the compensation amount.

Impact Significance

Since the transmission line alignment avoids large settlement area and the construction of tower area will occupy 20m x 20m and the tower foundation for four concrete blocks will require 0.8m x 0.8m x 0.7m according to the information of previous 230kV line projects, the potential impact on community and private property will be “Minor” and the impacts will be “Insignificant” on the condition that the proposed mitigation are adopted.

<Table 7.3-11> Impact Significance on Community and Private Property during Construction Phase

Aspect	Scenario	Context			Duration			Intensity			Type		Significance			
Community and Private Property		Local	Medium	Regional	Short	Medium	Long	Low	Moderate	High	Adverse	Beneficial	Insignificant	Minor	Moderate	Major
	Without mitigation	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>		
	With mitigation	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>			

7.3.10 Community Health and Safety

Activities and Potential Impacts

The short-term negative impacts such as construction noise, dust and gaseous emission, and influx of the construction workers, restriction of access, and traffic accidents from the mobilization of construction vehicles will be emerged during the construction of overhead transmission line.

Mitigation measure

Sensitive receptors such as school, monastery and affected household structures are needed to be informed about the construction schedule and its activities prior to commence the construction.

Adopt the measures described in mitigation measures subsection of Air Quality, and Noise and Vibration. Refer to mitigation measures of “Traffic and Transport section of EMP table” to address traffic related accidents during the construction phase.

Impact Significance

It has been observed that the transmission line alignment avoids the large residential area, the impacts on community health and safety are considered as “Minor” and the impact will be “Insignificant” if the proposed mitigation measures are adopted during the construction implementation.

<Table 7.3-12> Impact Significance on Community Health and Safety during Construction Phase

Aspect	Scenario	Context			Duration			Intensity			Type		Significance			
Community Health and Safety		Local	Medium	Regional	Short	Medium	Long	Low	Moderate	High	Adverse	Beneficial	Insignificant	Minor	Moderate	Major
	Without mitigation		<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>		
	With mitigation		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>			

7.3.11 Occupational Health and Safety

Activities and Potential Impacts

Potential risk of fall from height, traffic accident, construction noise and vibration, accident during handling of heavy equipment, spread of transmissible diseases between workers, contract of disease

due to poor sanitation and environmental conditions in work and accommodation area will be the potential impacts of occupational health and safety in the construction stage.

Mitigation measure

The following measures will be implemented:

- Health Awareness Training will be mandatory for all personnel and will address both on-the-job safety and health awareness
- Clean drinking water will be provided to all camps and work areas
- Proper sanitation facilities will be provided at the worker camp
- First aid kits will be readily accessible by workers and first aid teams will be specifically trained and assigned in groups of two to three persons to the different sites and
- Vector control of mosquitoes and other pests will be managed including by minimizing mosquito breeding habitat and providing mosquito nets and other barriers.
- Testing structures for integrity prior to undertaking work.
- Implementation of a fall protection program that includes training in climbing techniques and use of fall protection measures.
- Use of helmets and other protective devices will mitigate against scratches, bruises, punctures, lacerations and head injuries due to dropping objects

Impact Significance

The impacts on occupation health and safety during the construction stage are considered as “Minor” and will be “Insignificant” on the condition that the proposed mitigation measures are adopted.

<Table 7.3-13> Impact Significance on Occupational Health and Safety during Construction Phase

Aspect	Scenario	Context			Duration			Intensity			Type		Significance			
Occupational Health and Safety		Local	Medium	Regional	Short	Medium	Long	Low	Moderate	High	Adverse	Beneficial	Insignificant	Minor	Moderate	Major
	Without mitigation	<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>		
	With mitigation	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>			

7.3.12 Impact on Railway, Car Road, Gas Pipeline and Existing Transmission Line

There are 6 times car road crossing, 1time railway road crossing and 12 times over 66 kV line along the 230 kV transmission line. The present 230kV line is crossing over the existing 230 KV transmission line.

The design of the transmission lines should take particular attention to the vertical line clearance when the line crosses the railway, car road and 230 kV line locations. The followings are the minimum vertical and horizontal clearance for these facilities.

<Table 7.3-14> Vertical and horizontal clearance of tower relevant to the facilities

Facility	Vertical	Horizontal	Other transmission line	Car road	Rail road
132 kV					
230 kV			5 meter	12 meter	12 meter
66 kV	3.9 meter	4.5 meter			
Building					
	Vertical	Horizontal			
132 kV	4.2 meter	15 meter			
230 kV	4.8 meter	15 meter			

The alignment between TL number 75 and 76 will pass over the existing China Gas Pipeline being operated by CNPC. During detailed design, the tower location at this section will be evaluated further to check further adjustments and to avoid the impact on the gas pipeline. This will be undertaken in close coordination with MOGE.

7.4 Operation Phase (Transmission Line and Substation)

7.4.1 Air Quality (Climate Change)

Activities and Potential Impacts

During the humid weather condition, generation of ozone and nitrogen oxides from the overhead transmission line can occur as a result of corona discharge occurring around active conductors. Besides, air emission can also generate from the mobilization of vehicles during the regular maintenance operations such as trimming of trees and maintaining other project facilities are carried out.

Operation and maintenance can affect air quality by:

- The emission of ozone from transmission lines when in active corona, however ozone emitted from transmission lines not known to carry any health risk and
- Air pollution due to burning of vegetation for RoW management.
- The operation of the transmission line will not contribute to any atmospheric emissions directly and hence the predicted impacts are negligible. Green House Gas emissions from the transmission line operation will be limited to fuel consumption in vehicle used for the maintenance activities. The Project on the whole being a hydroelectric power project will potentially prevent the emission of GHG which would have otherwise been generated for power generation of similar capacity. The GHGs generated from the Project will be negligible.

Mitigation measure

The following mitigation measures are proposed to reduce the generation of air emission during the operation period;

- Check the vehicles and other heavy machineries prior to start the maintenance operations,
- Restrict the speed limit of vehicles while moving on unpaved roads,
- Turn off the engines of vehicles and heavy machineries while not in use,
- Avoid dust generating activities while in high wind,
- Prohibit the burning of wastes including vegetation debris at all times.
- Vegetation will not be burnt for maintenance. Mechanical method will be used to trim tall and encroaching vegetation.

Impact Significance

It can be concluded that the impacts on ambient air quality during operation phase will local, long-lived and intensity is low. The impact significant on ambient air quality will be “Minor” and the impacts will be mitigated with suitable mitigation measures so the impacts will be “Insignificant” after adopting mitigation. The impact significance is summarized in Table 7.4-1.

<Table 7.4-1> Impact Significance on Air Quality during Operation Phase

Aspect	Scenario	Context			Duration			Intensity			Type		Significance			
Air Quality		Local	Medium	Regional	Short	Medium	Long	Low	Moderate	High	Adverse	Beneficial	Insignificant	Minor	Moderate	Major
	Without mitigation	<input checked="" type="checkbox"/>					<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>		
	With mitigation	<input checked="" type="checkbox"/>					<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>			

7.4.2 Noise and Vibration

Activities and Potential Impacts

The likely noise impacts from operation of the transmission line will be due to;

- Maintenance and repair activities;
- ‘Corona discharge’ from the overhead lines;

The vibration effect is not expected to occur significantly from the mobilization of vehicles during the maintenance work of operation period.

Mitigation measure

Conductors designed and constructed to minimize corona effects will be chosen for transmission.

It is highly unlikely that the corona discharge noise will exceed the normal background noise levels in the area and furthermore, such noises are restricted to certain weather conditions.

Impact Significance

The noise and vibration during the operational phase will be low but consistent for the entire life of transmission line. The impact of noise is considered to be “Minor”.

<Table 7.4-2> Impact Significance due to Noise and Vibration during Operation Phase

Aspect	Scenario	Context			Duration			Intensity			Type	Significance				
Noise and Vibration		Local	Medium	Regional	Short	Medium	Long	Low	Moderate	High	Adverse	Beneficial	Insignificant	Minor	Moderate	Major
	Without mitigation	<input checked="" type="checkbox"/>					<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>		
	With mitigation	<input checked="" type="checkbox"/>					<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>		

7.4.3 Waste Generation

No waste generation is expected during the operation stage of the overhead transmission line if the vegetation debris from the ROW maintenance are properly collected and disposed at the approved site by the local authorities. Thus the impact from waste generation is negligible.

7.4.4 Water Usage and Water Quality

There will not be significant impacts from the operation of power transmission line and hence the impact on water usage and water quality is negligible.

7.4.5 Erosion and Soil Quality

No impact of any significance is predicted on vegetation and soil due to operation of the power transmission line. However, spillage of aluminium oxide paint during operation and maintenance of the transmission line towers may impact soil quality. This activity is in low frequency and can be mitigated using experienced personnel with mitigations like prior spread of sheets underneath the tower structure while painting.

7.4.6 Aesthetics and Visual Impact

There will not be additional visual impact due to operation of power transmission line as this will only involve transmission of electricity through the established network.

7.4.7 Biodiversity (Flora and Fauna)

Activities and Potential Impacts

Anticipated impacts to biodiversity during operation include:

- The ROW may interrupt the continuity of forest habitat (mostly degraded deciduous forest), as vegetation heights will be limited to below 3 meters, however the maintenance of vegetation in the understorey and midstorey is likely to continue to allow arboreal species to move through the landscape.
- Disturbance and displacement of resident fauna due to noise as a result of electricity transmission and noise and light as a result of maintenance activities.
- During operation, mortality of avifauna (birds and bats) may occur due to collision with the transmission line and electrocution. Avian collisions could occur in large numbers if lines are located in daily flyers, or if avifauna are travelling during low light conditions.

Mitigation measure

- Within the ROW, vegetation trimming will be restricted to that required to safely operate the transmission line. Groundcover and midstorey vegetation will be retained wherever practicable.
- The Project shall implement landscaping and re-vegetation after completion of construction in suitable areas and,
- Vegetation management will be made to raise awareness of values of natural habitat areas to personnel work force and arrangements will be made for restriction of poaching and forest product collection.
- Hunting wild animal will be strictly prohibited and
- Transmission line will be designed to minimize risk of electrocution, including maintain a 1.5 meter spacing (refer to the guidelines or guidance from DPTSC) between energized components and grounded hardware, or covering energized parts.

Impact Significance

It can be concluded that the biodiversity impacts during operation phase will moderate and long-lived. The impact significant on biodiversity will be “Moderate” and the impacts will be mitigated with suitable mitigation measures so the impacts will be “Minor” after doing mitigation. The impact significance is summarized in Table 7.4-3.

<Table 7.4-3> Impact Significance on Biodiversity during Operation Phase

Aspect	Scenario	Context			Duration			Intensity			Type		Significance			
Biodiversity		Local	Medium	Regional	Short	Medium	Long	Low	Moderate	High	Adverse	Beneficial	Insignificant	Minor	Moderate	Major
	Without mitigation		☑				☑	☑			☑				☑	
	With mitigation	☑					☑	☑			☑			☑		

7.4.8 Socio Economy and Livelihoods

Beneficial impacts are predicted during the maintenance of the ROW, particularly vegetation management, can provide employment to local residents.

7.4.9 Community and Private Property

There will be no more additional impacts on the community and private property since the operation of power transmission runs through the established networks.

7.4.10 Community Health and Safety

Activities and Potential Impacts

Community will have concerns about its safety and possibility of any accidents like electrocution, headache, fatigue, muscle pain etc. Electrocution is caused by accidental contact with high voltage electricity or items such as tools, vehicles or ladders.

(The Project proponents through select consultations with relevant stakeholders have tried to allay all fears related to health impact.)

Mitigation measure

- Evaluate possible risks and ensure that these are addressed and minimized.
- Communicate about the technical aspects of the transmission line construction and operations, and allay fears about accidents or any other health concerns.
- Use simple diagrams and pamphlets in local language for this purpose.
- Train land owners about safety issues and action to be taken in case of risks.
- Demonstrate that the project proponent is very concerned about health and safety of workers as well as the community.
- Signs and barriers will be installed to prevent access to high voltage areas.
- Grounding conducting objects will be installed near transmission lines.
- Ensure communication of health and safety risks to villagers near to settlements in batches and explain the various health and safety measures being undertaken.

Impact Significance

Since the transmission line alignment avoids large settlement area, the impact on the community health and safety during the operation stage is considered as “Moderate” and will be “Minor” if the proposed mitigation measures are adopted.

<Table 7.4-4> Impact Significance on Community Health and Safety during Operation Phase

Aspect	Scenario	Context			Duration			Intensity			Type		Significance			
community health and safety		Local	Medium	Regional	Short	Medium	Long	Low	Moderate	High	Adverse	Beneficial	Insignificant	Minor	Moderate	Major
	Without mitigation		<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>	
	With mitigation	<input checked="" type="checkbox"/>					<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>		

7.4.11 Occupational Health and Safety

Activities and Potential Impacts

Hazards relevant to project personnel include;

- Exposure to EMF at levels higher than those experienced by the general public.
- Electrocutation due to contact with high voltage electricity or items in contact with high voltage electricity (such as tools, vehicles or ladders).
- Working at height on towers.

Mitigation measure

Electromagnetic fields

- An EMF safety program will be developed prior to operation which: identifies potential levels of exposure; provides training for all workers; delineates zones appropriate for public access and those restricted to appropriately trained workers; defines measures to limit exposure time, such as through work rotation; and provides personal monitoring equipment for workers.

- Ensure compliance of safe practices and implementation of safety manual
- Provide and ensure use of personal protective equipment (PPEs) like, safety goggles, gloves, safety harness, helmets, gumboots etc.
- Securing the workplace, wherein all lines are shut down prior to maintenance work, use of PPE and procedures for emergencies and compensation procedures in case of accidents.
- Prior training of the workers regarding health and safety procedures is essential.

Electrocution

- Transmission lines will be deactivated and grounded prior to work on, or near, transmission lines.
- Live work will only be conducted by trained workers.

Working at heights

- Fall protection measures will be implemented including provision of appropriate fall protection equipment, training in use of equipment, training in climbing techniques, and rescue of fall-arrested workers.
- All equipment, including hoisting equipment, power tools and tool bags, will be properly rated and maintained.

Impact Significance

The impact on the occupational health and safety during the operation stage is considered as “Minor” and can be “Insignificant” if the proposed mitigation measures are adopted.

<Table 7.4-5> Impact Significance on Occupational Health and Safety during Operation Phase

Aspect	Scenario	Context			Duration			Intensity			Type		Significance			
Occupational health and safety		Local	Medium	Regional	Short	Medium	Long	Low	Moderate	High	Adverse	Beneficial	Insignificant	Minor	Moderate	Major
	Without mitigation		☑		☑			☑			☑			☑		
	With mitigation	☑			☑			☑			☑		☑			

7.4.12 Electricity Hazard Caused by Forest Fire (During Operation)

There is no intact forest was observed along the transmission line. Figure 6.5-4 shows that the deciduous forest (Degraded) is observed only in some places and the crop and vegetation, bare land, shrub land and plantation are commonly found along the transmission line ROW area. There is no intact forest was observed along the transmission line.

Wildfire hazard is high in northern Shan State⁶. Modeled projections of future climate identify a likely increase in the frequency of fire weather occurrence in this region, including an increase in temperature and greater variance in rainfall. In areas already affected by wildfire hazard, the fire season is likely to increase in duration, and include a greater number of days with weather that could support fire spread because of longer periods without rain during fire seasons. Climate projections indicate that there could also be an increase in the severity of fire.

⁶ <https://thinkhazard.org/en/report/41775-myanmar-shan-n/WF>

The fire hazardous period is normally for about four months, from mid-January to mid-May, when public awareness campaigns are carried out through various mediums, and villagers are rallied to partake in fire-watch duties and assist in various pre-emptive activities such as construction of fire lines and fire traces, prescribed burning, etc.

In general, the wildfire occurred between March and April in Myanmar. Forest fire could damage distribution poles, overhead lines, and other infrastructure. Conversely, the transmission and distribution components of the project could increase the occurrences of wildfire (e.g. if sparks or other failure occurs in dry areas/seasons and acts as a trigger for forest fire in addition to natural triggers (e.g. lightning) and human triggers (e.g. burn the bush, burn in the paddy field etc.).

The recommendation for mitigation measures were made based on International Finance Corporation's EHS Guidelines for Electric Power Transmission and Distribution, April 30, 2007.

- Monitoring right-of-way vegetation according to fire risk;
- Removing blowdown and other high-hazard fuel accumulations;
- Time thinning, slashing, and other maintenance activities to avoid forest fire seasons;
- Disposal of maintenance slash by truck or controlled burning. Controlled burning should adhere to applicable burning regulations, fire suppression equipment requirements, and typically must be monitored by a fire watcher;
- Planting and managing fire resistant species (e.g. hardwoods) within, and adjacent to, rights-of-way;
- Establishing a network of fuel breaks of less flammable materials or cleared land to slow progress of fires and allow firefighting access.
- cutting gaps in vegetation to act as fire breaks (especially near transmission or distribution components of the project)

7.5 Social Risk and Impact Assessment Based on the Stakeholder's Concern

The followings are the main concerns of stakeholders about the present 230 kV transmission line.

The project proponent is needed to cooperate with Forest Department before the implementation of the project. For tree cutting, it may also need negotiation with affected landowners if there is planned to construct the new access roads.

It needs negotiations between the project proponent and the landowners.

- Fair compensation should be paid to the landowners.
- Crop compensation should also be made during the flowering seasons.
- Need to cooperate with Department of Agriculture.
- Impacts may arise from the "construction of new access road for the transport of materials during the construction phase."

The project proponent has to follow, the transmission line instructions.

- Crop compensation was made for two years,
- No land compensation was made since the project was run by the government and the government does not have sufficient budget for full compensation.

- If the affected trees are perennial, valuation is conducted carefully first and adjust the compensation rate.
- The committee was formed including representatives from the Project Proponent, Immigration Department, Forest Department, Agriculture Department, Agriculture Land Management and Statistics Department. This committee made valuation of land.
- The transmission line alignment seems included in the Reserve Forest (RF). It needs to request the permission to the headquarters of MONREC.
- The Transmission Line No. 78-90 pass the Thing Long RF and Line No. 191-192 pass the Tawng Kye RF.
- During the installing of cables, the farmland may be affected.
- During the construction period, the sand pile may destruct the farmland.
- After digging the farmland for the foundation of TL tower, top soil should be re-covered on that area so that the crop can be grown.
- It needs consultation meetings with the affected local communities.
- The TL is likely to pass over the farmland of the villages. Thus, compensation should be made.
- Education (including potential electrical hazards near the TL) of local communities should be conducted since one person from Nar Khaw village died due to the electrical hazards.

If the project is implemented during Summer season (March-May), the impacts on crop and farmland will be minimum.

Social risk and social impact assessment raised by stakeholders were collected through feedback forms and explained during public consultation meeting. Responses of feedbacks by the Proponent (NCEH) are shown in Table 8.4-1 in Chapter 8.

CHAPTER 8

PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

8.1 Approach to Public Consultation

Public consultation meeting (PCM) and public disclosure (PD) offer an opportunity for people to participate in the decision-making process for project design, development and implementation of the project. It provides a platform for project-affected persons and different stakeholders to express their views on possible impacts of the proposed intervention on environmental and social parameters.

8.2 Public Consultation Process

8.2.1 Detailed Activities

i. Consultations with the Government Organizations

- Meetings with officials from the General Administrative Departments (GADs) of the selected townships (Namtu, Hsipaw and Kyaukme).
- Meeting with the officials from the Department of Power Transmission and System Control (DPTSC) of MOEE, township EPC, Planning Department of MOPFI, and Forest Department of MONREC.
- Series of meeting with the Project Proponent in Nay Pyi Taw and Hsipaw township.
- Focus Group Meetings in the affected villages along the transmission line route.

ii. Identification of Stakeholders and Project Affected Groups

The project is located in the Northern Shan State and the townships that directly affected are Nammatu, Hsipaw and Kyaukme. For this overhead transmission line project, preliminary public engaged led by the REM, the project proponent, was conducted in these 3 townships respectively.

The stakeholders include the local communities, PAPs, local government authorities, CBOs, civil society and business associations in the affected localities.

iii. Stakeholder Engagement Plan

In order to ensure effective engagement and open, frequent and honest dialogue with local communities and other key stakeholders, a stakeholder engagement plan is designed throughout the life of the Project. This plan is to be developed and implemented in order to identify stakeholder and their issues of concern, establishes and methods for consultation, and provides a specific action plan for stakeholder engagement throughout the life of the project.

The most common procedure for conducting public consultation meetings in Myanmar is stated as follows; first, the project proponent, the project proponent will submit a request letter to Region officially for permission to engage with townships/village level the General Administrative Departments (GADs). Then, Project proponent is required to consult with Township level, village leader in order to receive permission to engage public consultation meetings.

<Table 8.2-2> Stakeholder Engagement Plan

Stakeholders	Method of Engagement with Stag	Purpose
National Government Departments - MONREC (Dept. of Forestry, ECD) - MOALI (Department of Agriculture Land Management and Statistics, Department of Rural Development) - Ministry of Social Welfare, Relief and Resettlement (Department of Relief& Resettlement) - Ministry of Religious Affairs and Culture (Department of Archeology and National Museum) - Ministry of Health and Sports (Department of Health)	[Consult/Involve/Collaborate] - Official correspondence by phone/email/text messaging - Individual interviews -if necessary - Formal meetings - if necessary	- Obtain necessary permission and contacts to engage with government departments at lower levels and to hold consultations in the Project area of influence; and - Obtain data from national as well as regional offices.
Region/Township - Chief Minister - MONREC Shan State - Region Ministry/Government Department - Region and Township GAD - Township Development Committee	[Consult/Involve/Collaborate] - Official correspondence by phone/email/text messaging - Individual interviews - if necessary - Formal meetings	- Seek introductory letters to meet various government departments and agencies; - Obtain necessary local permissions for meetings; - Seek clarity on the range of permissions and approvals required at different levels of regional government; - Obtain data and information; and - Provide an understanding of the specific issues and stakeholder concerns at the local level.
Village Level - Village Tract and Village Administrator - Communities living in and around the project area - Vulnerable Groups/Women - Representatives from local businesses (farmers, gardeners, etc.) - Directly impacted Land Owner and Resettled House/Structure Owner	[Consult/Involve/Collaborate] - Individual /Household -based interviews and consultations meetings [Inform] (Mass media broadcasts (Radio/TV/Newspaper), public sites posting, website, leaflet	- Obtain data and information; and - Provide an understanding of the specific issues and stakeholder concerns at the local level. - The consultations with this stakeholder group will be undertaken during the IEE for developing an understanding of the following : <ul style="list-style-type: none"> • Demographic profile • Socio-economic profile • Ownership of land and assets • Health care facilities • Cultural issues • Traditional usage of land not owned by individuals / communities in and around the Project site • Opinion about the Project • Perceptions about risks associated with the Project • Anticipation of benefits from

		<p>the Project (both direct and indirect)</p> <ul style="list-style-type: none"> • Concerns / apprehensions (if any) about the Project • Profile of farmers (ownership of land, crops grown, annual income from agriculture, employment of agricultural labour, etc.) • Profile of local business
Other Interested Persons/Organization <ul style="list-style-type: none"> - Member of Parliament (Pyithu Hluttaw and Region Hluttaw) - Local NGOs/CSOs 	[Consult/Involve] <ul style="list-style-type: none"> - Correspondence by phone/email/text messaging [Inform] <p>(Mass media broadcasts (Radio/TV/Newspaper)), public sites posting, website, leaflets (1&2)</p>	<ul style="list-style-type: none"> - Understanding of their opinion on environmental policies, laws and regulations in Myanmar - Understanding of key issues (if any) on the project site and the potential risks and mitigation measures - Understanding the perceptions on national and / or local laws and regulations and their effectiveness in protecting vulnerable communities / eco-systems

8.3 Results of Public Consultation

8.3.1 Results of Pre-consultation meetings with stakeholders

<Table 8.3-1> Results of Pre-consultation meeting with stakeholders

Date and Place of Meeting	Stakeholder	Issues and Concerns
22-11-2019 -Planning Department Office, Namtu	Daw Sam Sam Aye, Assistant Director Planning Department	<ul style="list-style-type: none"> - It is a good project and it may benefit to the development of the township. - Our statistics point out that there is less development in electricity sector in Namtu township and this project may bring the development in this sector.
22-11-2019 -Forest Department Office, Namtu	U Chan Myae Aung, Staff Officer, FD	<ul style="list-style-type: none"> - The project proponent is needed to cooperate with FD before the implementation starts.
22-11-2019 -At the house of village tract administrator, Manli village, Namtu	U Atta Oo, Administrator, Chaung Hsa village tract	<ul style="list-style-type: none"> - I am optimistic and there may not be significant negative effects by the project. - It needs to be carefully considered if the project causes negative impacts rather than positives. - I have no objection regarding with this project, however, I have to raise issues if my farmlands are affected. - It may also need negotiation with affected landowners if there is planned to construct the new access roads.
23-11-2019 -Forest Department (FD) Office, Hsipaw	U Zaw Zaw Oo, Staff Officer, FD	<ul style="list-style-type: none"> - The project proponent is needed to cooperate with FD. - Request permission letter from FD
23-11-2019 -At the house of village tract administrator, Moe Tae village, Hsipaw	U Sai Myint Aung, Administrator, Moe Tae village tract	<ul style="list-style-type: none"> - It is good if this project may electrify the every household, and bring the development of the township. Consequently, life can be more convenient since having access to water and electricity are of great asset for human beings.

23-11-2019 -Administrative office, Ywar Thit village tract, Hsipaw	U San Kaw, Administrator, Ywar Thit village tract	<ul style="list-style-type: none"> - It needs negotiations between the project proponent and the landowners. - The landowners are needed to know about the project properly.
23-11-2019 -At the house of village tract administrator, San Hpeik village tract, Hsipaw	U San Sai, Administrator, San Hpeik village tract	<ul style="list-style-type: none"> - It would be better if households can access 24-hr electricity. - It may bring development of the township.
23-11-2019 -At the house of village tract administrator, Man He village tract, Hsipaw	U Tun Kyi, Administrator, Man He village tract	- I have no special comments regarding with this project. One thing that it needs engagement meetings with farmland owners.
23-11-2019 -Administrative office, Baw Gyo village tract, Hsipaw	U Aung Shwe, Administrator, Baw Gyo village tract	<ul style="list-style-type: none"> - Fair compensation should be paid to the landowners. - Crop compensation should also be made during the flowering seasons. - Need to cooperate with Department of Agriculture. - Impacts may arise from the “construction of new access road for the transport of materials during the construction phase.”
23-11-2019 - At the house of village tract administrator, Long Khun village tract, Hsipaw	U Kyaw Tun, Administrator, Long Khun village tract	<ul style="list-style-type: none"> - I have no objection to this project. And it is a good project. - The project should not negatively affect to the local communities. - I had one experience regarding with the land compensation in Chinese Gas pipeline project. First of all, they identify and value the land price. Then they made compensation as per identified land category. - It seems the Transmission Line No. 75-76 will pass over the Chinese Gas pipeline. It should be taken care when the construction of Transmission Line starts.
23-11-2019 - At the house of village tract administrator, Kyin Thi village tract, Hsipaw	U Kyaw Zaw, Administrator, Kyin Thi village tract	<ul style="list-style-type: none"> - The project is good. - Special care should be taken to the villages affected. - Fair compensation should be made.
25-11-2019 - At the house of EE, Township Electricity, Kyaukme	U Win Lwin Shein, EE, MOEE	<ul style="list-style-type: none"> - According to my experience, 230kv transmission lines may not have adverse environmental effects. - The proponent has to follow, the transmission line instructions. - My previous experiences on transmission line project are follows, - Crop compensation was made for two years, - No land compensation was made since the project was run by the government and the government does not have sufficient budget for full compensation. - If the affected trees are perennial, valuation is conducted carefully first and adjust the compensation rate. - The committee was formed including representatives from the Project Proponent, Immigration Department, Forest Department, Agriculture Department, Agriculture Land Management and Statistics Department. This committee made valuation of land.
25-11-2019 -Forest Department (FD) Office, Kyaukme	U Thura Kyaw, Staff Officer, FD	<ul style="list-style-type: none"> - The transmission line alignment seems included in the Reserve Forest (RF). It needs to request the permission to the headquarters of MONREC. - The Transmission Line No. 78-90 pass the Thing Long RF and Line No. 191-192 pass the Tawng Kye RF.

27-11-2019 - At the monastery, Nar Khaw village, Kyaukme	U Wi Li Ya Administrator, Nar Khaw village tract	<ul style="list-style-type: none"> - Transmission line project does not have significant effects. - My previous experiences on the transmission line project are that the government implemented the project by force. We did not have rights to raise our issues and receive any kind of compensation. - Community safety should be considered to avoid electrical hazards, fall down of the Transmission Line (TL) towers. - The tension of the cable should not be too loose, not too close to the ground. - During the installing of cables, the farmland may be affected. - During the construction period, the sand pile may destruct the farmland. - After digging the farmland for the foundation of TL tower, top soil should be re-covered on that area so that the crop can be grown.
27-11-2019 - At the house of village tract administrator, He Kwi village tract, Kyaukme	U Sai Than Maung Administrator, He Kwi village tract	<ul style="list-style-type: none"> - It needs consultation meetings with the affected local communities. - The TL is likely to pass over the farmland of the villages. Thus compensation should be made. - Education (including potential electrical hazards near the TL) of local communities should be conducted since one person from Nar Khaw village died due to the electrical hazards.
27-11-2019 - At the village restaurant, Lwal Hsaut village tract, Kyaukme	U Daw Na Administrator, Lwal Hsaut village tract	<ul style="list-style-type: none"> - The local people from the affected villages should be consulted during the development stage of the project. - In the previous TL project implemented by the government, the local people did not know everything about the project. - Although the compensation was planned to be made to the affected landowners, and crop compensation was also said to be made during the cable installation, the compensations of crops and land acquisition are not received yet. - Thus, it should fully cooperate with local people from the effected village group.
27-11-2019 - At the house of village tract administrator, Kywal Kone village tract, Kyaukme	U Sai Hla Myint Administrator, Kywal Kone village tract	<ul style="list-style-type: none"> - There are other development projects in this area. i.e Chinese Gas Pipeline and Mandalay-Muse Railway projects. - The overall comment is that negotiation should be made with local people from the affected villages. - We have no objection. - Fair compensation should be made. - Negotiation with affected landowners is a must. - If the project is implemented during Summer season (March-May), the impacts on crop and farmland will be minimum.
27-11-2019 - At the house of village tract administrator, Pan Lawt village tract, Kyaukme	U Sai Hla Win Administrator, Pan Lawt village tract	<ul style="list-style-type: none"> - We need electricity. It would be good if the project make the village electricity accessed. - The proponent should negotiate with the local communities, and fulfill the needs of local people.

Recorded photos during the pre-consultation meeting with stakeholders



Hsipaw Township Administration Office



Hsipaw Planning Dpt



Hsipaw Forest Department



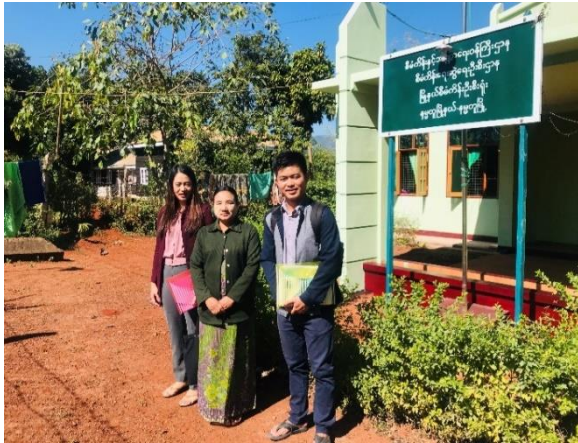
Namatu Township Administration Office



Namatu Township Forest Department



Namatu Township Administration Office



Namatu Township Planing



Chaung Hsa Village Administrator



Chaung Hsa Village Administrator



Moe Tae Village Administrator



U San Kaw, Ywar Thit Village Tract Head



Kyin Thi Village Administrator



San H pate Administrator



Man Hae Administrator



Baw Kyo Village Administrator



Law Khun Village Administrator



Forest Department Office



Kyaukme Township Planing



Nar Kaw Village Administrator



He Kwi Village Administrator



Lwal Hsaut Village Administrator



Kywal Kone Village Administrator

8.4 Information Disclosure

8.4.1 Approach to Information Disclosure

The draft version of the printed executive summary of this IEE reports in Myanmar language are distributed to the heads of villages and village tracts so that the local residents along the TL alignment can know more about the description of the project, baseline environmental and social settings and potential environmental and social impacts of the project. Meanwhile, public feedback forms are also distributed along with the executive summary. The public feedback forms are designed to express the issues and concerns of the villagers along the TL regarding the proposed project. The filled-in feedback forms are collected back from villagers through the heads of village tracts.

8.4.2 Public Feedbacks

The total of 109 filled-in feedback forms is received from the concerned villages. The feedbacks are translated and summarized in Table 8.4-1. The detailed filled-in feedback forms in local/Myanmar language are attached in appendix section.

<Table 8.4-1> Summary of Feedbacks

Village Tract	Village	No of respondents	Summarized Feedbacks	Responses of feedbacks by the Proponent (NCEH)
Kyin Thi	Kyin Thi	10	<p><u>Environmental Impacts</u></p> <ul style="list-style-type: none"> - Minimize the adverse environmental impact as much as possible. - Minimize the destruction of farmland and perennial crops (Sunkist). <p><u>Social Impacts</u></p> <ul style="list-style-type: none"> - The village access road should be upgraded to the concrete road by the project. - Minimize the impacts on farmland and garden land. - Let us know how to facilitate if the garden lands are destroyed by the project intervention. - Minimize the destruction of household structures. <p><u>Comments/Suggestions</u></p> <ul style="list-style-type: none"> - The construction of the Tower Foundation should follow the required standards and use the qualified ingredients. - Grid electricity should be provided to the Twan Hsaut village located near the Kyin Thi village. 	<p><u>Environmental Impacts</u></p> <ul style="list-style-type: none"> - We do care about the environmental impacts while implementing the projects and will follow the guidelines and procedures of the ECD. - We will manage to avoid the acquisition and impacts on farmlands and garden lands. - We will reinstate back into the present ground condition and the crop can be grown after reinstatement. <p><u>Social Impacts</u></p> <ul style="list-style-type: none"> - We will coordinate with relevant stakeholders depending on the feasibility of the CSR program of the project. - We will manage to avoid the acquisition and impacts on farmlands and garden lands. - If the project needs acquisition of farmland and garden land, we will coordinate with relevant stakeholders and pay the compensation as per rates from Valuation of Land and Crops Compensation Committee and Validation of Compensation Price Committee. - We have planned to avoid the household structures while implementing the project. If the households are likely to be affected, we will coordinate and negotiate with PAPs and relevant stakeholders. - We will discuss with the authority from EPGE and will response during next consultation meeting that will be held before construction. <p><u>Comments/Suggestions</u></p> <ul style="list-style-type: none"> - The experts from diverse sectors will be participated and lead the project implementation to meet with required standards. - We will coordinate with relevant stakeholders according to the feasibility of the CSR program of the project.
Kywal Kone	Mwe Daw, Saik Khaung and Kywal Kone	14	<p><u>Environmental Impacts</u></p> <ul style="list-style-type: none"> - Provide electricity to the villages which do not have access to grid electricity <p><u>Social Impacts</u></p>	<p><u>Environmental Impacts</u></p> <ul style="list-style-type: none"> - We will coordinate with relevant stakeholders depending on the feasibility of the CSR program of the project. <p><u>Social Impacts</u></p>

			<ul style="list-style-type: none"> - Undertake the project activities to avoid the crop growing season. - Provide fair compensation to the farmers who have direct impact by the project activities. <p><u>Comments/Suggestions</u></p> <ul style="list-style-type: none"> - Provide grid electricity to Lwan Mom village. 	<ul style="list-style-type: none"> - We will manage to avoid the crop growing season depending on the time and circumstance of the project implementation. If we cannot avoid, we will coordinate with relevant stakeholders and pay the compensation as per rates from Valuation of Land and Crops Compensation Committee and Validation of Compensation Price Committee. - If the project needs acquisition of farmland and garden land, we will coordinate with relevant stakeholders and pay the compensation as per rates from Valuation of Land and Crops Compensation Committee and Validation of Compensation Price Committee. <p><u>Comments/Suggestions</u></p> <ul style="list-style-type: none"> - We will coordinate with relevant stakeholders depending on the feasibility of the CSR program of the project.
San Hpeik	San Hpeik	10	<p><u>Environmental Impacts</u></p> <ul style="list-style-type: none"> - Undertake the project to minimize the environmental deterioration. - Adopt remediation measures if the environmental is adversely affected by the project. <p><u>Social Impacts</u></p> <ul style="list-style-type: none"> - Fair compensation should be paid if the TL traverses the farmlands. - Adopt mitigation measures if the project activities are undertaken in the farmland area. - Prioritize the community health and safety if the TL traverse the village. - Undertake the project activities so as not to destruct the household structures if the TL traverses the village. <p><u>Comments/Suggestions</u></p> <ul style="list-style-type: none"> - Nil 	<p><u>Environmental Impacts</u></p> <ul style="list-style-type: none"> - We do care about the environmental impacts while implementing the projects and will follow the guidelines and procedures of the ECD. - Same as above. <p><u>Social Impacts</u></p> <ul style="list-style-type: none"> - If the project needs acquisition of farmland and garden land, we will coordinate with relevant stakeholders and pay the compensation as per rates from Valuation of Land and Crops Compensation Committee and Validation of Compensation Price Committee. - Same as above. - We will manage for the health and safety of community and occupational risks, and wildlife in its vicinity while implementing the project. - We have planned to avoid the household structures while implementing the project. If the households are likely to be affected, we will coordinate and negotiate with PAPs and relevant stakeholders. <p><u>Comments/Suggestions</u></p> <ul style="list-style-type: none"> - Nil
Nar Kaw	Bu Khar, Pan Hote, Lwal Kaw and Nar Kaw	10	<p><u>Environmental Impacts</u></p> <ul style="list-style-type: none"> - Avoid springs and forests when undertaking the project. <p><u>Social Impacts</u></p>	<p><u>Environmental Impacts</u></p> <ul style="list-style-type: none"> - We will manage to avoid springs and forests. <p><u>Social Impacts</u></p>

			<ul style="list-style-type: none"> - Construct the TL at least 5 miles away from the Bu Khar, Pan Hote, Lwal Kaw and Nar Kaw villages. <p><u>Comments/Suggestions</u></p> <ul style="list-style-type: none"> - Avoid the TL passage to Nar Kaw village tract. 	<ul style="list-style-type: none"> - We have planned to avoid the household structures while implementing the project. If the households are likely to be affected, we will coordinate and negotiate with PAPs and relevant stakeholders. <p><u>Comments/Suggestions</u></p> <ul style="list-style-type: none"> - We have planned to avoid the household structures while implementing the project. If the households are likely to be affected, we will coordinate and negotiate with PAPs and relevant stakeholders.
Man He	Nar Ke	9	<p><u>Environmental Impacts</u></p> <ul style="list-style-type: none"> - Undertake the project activities so as not to deteriorate the environment. <p><u>Social Impacts</u></p> <ul style="list-style-type: none"> - Provide fair compensation if the TL traverse the farmlands. <p><u>Comments/Suggestions</u></p> <ul style="list-style-type: none"> - Nil. 	<p><u>Environmental Impacts</u></p> <ul style="list-style-type: none"> - We do care about the environmental impacts while implementing the projects and will follow the guidelines and procedures of the ECD. <p><u>Social Impacts</u></p> <ul style="list-style-type: none"> - If the project needs acquisition of farmlands, we will coordinate with relevant stakeholders and pay the compensation as per rates from Valuation of Land and Crops Compensation Committee and Validation of Compensation Price Committee. <p><u>Comments/Suggestions</u></p> <ul style="list-style-type: none"> - Nil.
Paw Lut	Paw Lut, Nant Pyin, Nant Phat, Eh Gyi, Pyein Nin Lwal, Awnmalin	6	<p><u>Environmental Impacts</u></p> <ul style="list-style-type: none"> - Avoid the environmental impacts in the vicinity of the project. - Provide the surrounding communities to have access the grid electricity. - Improve the access roads in close vicinity to the project. <p><u>Social Impacts</u></p> <ul style="list-style-type: none"> - Provide electricity and community development plans. <p><u>Comments/Suggestions</u></p> <ul style="list-style-type: none"> - Negotiate and compensate in transparent way if the project activities affect to the villages. - Compensate the land and crops if the project activities affect to villagers. 	<p><u>Environmental Impacts</u></p> <ul style="list-style-type: none"> - We do care about the environmental impacts while implementing the projects and will follow the guidelines and procedures of the ECD. - We will coordinate with relevant stakeholders depending on the feasibility of the CSR program of the project. - Same as above. <p><u>Social Impacts</u></p> <ul style="list-style-type: none"> - We will coordinate with relevant stakeholders depending on the feasibility of the CSR program of the project. <p><u>Comments/Suggestions</u></p> <ul style="list-style-type: none"> - If the project needs acquisition of farmlands and garden lands, we will coordinate with relevant stakeholders and pay the compensation as per rates from Valuation of Land and Crops Compensation Committee and Validation of Compensation Price Committee. - Same as above.
Aun Mu	Man Lwal	10	<u>Environmental Impacts</u>	<u>Environmental Impacts</u>

			<p>- Villagers should be notified about the project before prior to implement the project.</p> <p><u>Social Impacts</u></p> <p>- Villagers should be notified that the project does not impose social impacts prior to implement the project.</p> <p><u>Comments/Suggestions</u></p> <p>- Priority should be given to the villagers when the project needs labours.</p>	<p>- We will disclose the project information through Public Hearing Meetings in the villages where the TL alignment likely to be traversed.</p> <p><u>Social Impacts</u></p> <p>- We will disclose the project information through Public Hearing Meetings in the villages where the TL alignment likely to be traversed.</p> <p><u>Comments/Suggestions</u></p> <p>-We will manage to create job opportunities for the villagers depending on their skills.</p>
Moe Tay	Moe Tay, Pyein Hsaing, Mai Maing, Naung Tha Kyar, Pan Nay and Mai Maing Kun San Leik,	10	<p><u>Environmental Impacts</u></p> <p>- Undertake the project activities in terms of environmentally friendly.</p> <p>- Minimize the noise along the TL alignment.</p> <p><u>Social Impacts</u></p> <p>- Minimize the impacts on farmlands.</p> <p>- Minimize the impacts on livelihoods of the villagers.</p> <p>- Avoid damages to the village household structures if TL traverses the village.</p> <p><u>Comments/Suggestions</u></p> <p>- Minimize the adverse impacts and bring the developments to the villages.</p> <p>- Provide the fair compensation so as not to impact to the farmers.</p> <p>- Employ the villagers when the project needs labours.</p>	<p><u>Environmental Impacts</u></p> <p>- We do care about the environmental impacts while implementing the projects and will follow the guidelines and procedures of the ECD.</p> <p>- Same as above.</p> <p><u>Social Impacts</u></p> <p>- If the project needs acquisition of farmlands, we will coordinate with relevant stakeholders and pay the compensation as per rates from Valuation of Land and Crops Compensation Committee and Validation of Compensation Price Committee.</p> <p>- We will manage so as not to impact on livelihoods of the villagers.</p> <p>- We have planned to avoid the household structures while implementing the project. If the households are likely to be affected, we will coordinate and negotiate with PAPs and relevant stakeholders.</p> <p><u>Comments/Suggestions</u></p> <p>-We will coordinate with relevant stakeholders and representatives in order not to affect communities along the TL alignment.</p> <p>- If the project needs acquisition of farmlands and garden lands, we will coordinate with relevant stakeholders and pay the compensation as per rates from Valuation of Land and Crops Compensation Committee and Validation of Compensation Price Committee.</p> <p>-We will manage to create job opportunities for the villagers depending on their skills.</p>
Ywar Thit	Ywar Thit	10	<u>Environmental Impacts</u>	<u>Environmental Impacts</u>

			<ul style="list-style-type: none"> - No objection <p><u>Social Impacts</u></p> <ul style="list-style-type: none"> - Avoid mental-disturbance to the villagers. - Taking care about the community health and safety issues. <p><u>Comments/Suggestions</u></p> <ul style="list-style-type: none"> - Compensation rates should be fair and square. - Employ the villagers when the project needs labours. - No objection. 	<ul style="list-style-type: none"> - Nil <p><u>Social Impacts</u></p> <ul style="list-style-type: none"> - We will coordinate with heads of villages/village tracts and negotiate with villagers. - We will manage for the health and safety of community and occupational risks, and wildlife in its vicinity while implementing the project. <p><u>Comments/Suggestions</u></p> <ul style="list-style-type: none"> - If the project needs acquisition of farmlands and garden lands, we will coordinate with relevant stakeholders and pay the compensation as per rates from Valuation of Land and Crops Compensation Committee and Validation of Compensation Price Committee. - We will manage to create job opportunities for the villagers depending on their skills.
Lwal Hsaut	Namt Hu, Lwal Hsaut, Pan Sone and Shwe Kyaung	10	<p><u>Environmental Impacts</u></p> <ul style="list-style-type: none"> - Avoid the adverse impacts on spring and forests when unnecessary. - Fair compensation rate should be paid for the perennial crops. - Avoid the construction of towers within the watershed area. <p><u>Social Impacts</u></p> <ul style="list-style-type: none"> - Ensure the electrical safety for the villagers. - Project implementing staffs/workers have to follow the guidance and instructions from the village heads during their stay at project site or within the villages. - Pay field visits before the project implements. - Avoid the electrical hazards to the villagers. - Crop compensation should be paid when the project implements during the growing seasons. - Ensure the project can bring developments to the villages. <p><u>Comments/Suggestions</u></p> <ul style="list-style-type: none"> - Land and crops compensation rates should be negotiated and paid in transparent way. - Undertake the project activities during the dry seasons especially non-harvesting seasons. - This project is necessary to minimize the insufficient electricity across the country. 	<p><u>Environmental Impacts</u></p> <ul style="list-style-type: none"> - We will manage to implement the project to avoid the adverse impacts on spring and forests. - If perennial crops are likely to be affected, we will coordinate with relevant stakeholders and pay the compensation as per rates from Valuation of Land and Crops Compensation Committee and Validation of Compensation Price Committee. - We will care about it. <p><u>Social Impacts</u></p> <ul style="list-style-type: none"> - We will manage for the health and safety of community and occupational risks, and wildlife in its vicinity while implementing the project. - We will coordinate with relevant heads of villages while implementing the project. - TL alignment survey has been conducted. Detailed measurement survey will be conducted before the project implements. - We will manage for the health and safety of community and occupational risks, and wildlife in its vicinity while implementing the project. - If the project implements during the crop growing season, we will coordinate with relevant stakeholders and pay the compensation as per rates from Valuation of Land and

			<ul style="list-style-type: none"> - Negotiate with farmers for the compensation of land and crops to meet with their satisfaction. - Knowledge sharing on electricity hazards and safety should deliver to the nearby villages. 	<p>Crops Compensation Committee and Validation of Compensation Price Committee.</p> <p><u>Comments/Suggestions</u></p> <ul style="list-style-type: none"> - If the project implements during the crop growing season and needs acquisition of farmlands and garden lands, we will coordinate with relevant stakeholders and pay the compensation as per rates from Valuation of Land and Crops Compensation Committee and Validation of Compensation Price Committee. - We will manage to avoid the crop growing and harvesting seasons depending on the time and circumstance of the project implementation. If we cannot avoid, we will coordinate with relevant stakeholders and pay the compensation as per rates from Valuation of Land and Crops Compensation Committee and Validation of Compensation Price Committee. - Nil - We will share about knowledge on electrical safety when necessary.
Baw Kyo	Ho Maw	10	<p><u>Environmental Impacts</u></p> <ul style="list-style-type: none"> - Adopt remediation measures if the environment is degraded by the project. <p><u>Social Impacts</u></p> <ul style="list-style-type: none"> - Compensation should be paid when the TL traverses the farmlands. <p><u>Comments/Suggestions</u></p> <ul style="list-style-type: none"> - Proponent should pay the field visits in the villages that the TL traverses. 	<p><u>Environmental Impacts</u></p> <ul style="list-style-type: none"> - We do care about the environmental impacts while implementing the projects and will follow the guidelines and procedures of the ECD. <p><u>Social Impacts</u></p> <ul style="list-style-type: none"> - If the project needs acquisition of farmlands and garden lands, we will coordinate with relevant stakeholders and pay the compensation as per rates from Valuation of Land and Crops Compensation Committee and Validation of Compensation Price Committee. <p><u>Comments/Suggestions</u></p> <ul style="list-style-type: none"> -We will coordinate with heads of villages when the project implements.

Recorded photos during the public feedbacks collection



Kyin Thi village



Mwe Daw village



Mwe Daw village



Kywal Kone village



San Phate village



Nar Kaw village tract



Nar Ke village



Pan Lut village tract



Moe Tae village tract



Ywar Thit village tract



Lwal Hsaut and Namt Hu, Pan Sone, Shwe Kyaung villages of Lwal Hsaut village tract



Ho Maw village, Baw Kyo village tract



8.5 Grievance Redress Mechanism (GRM)

8.5.1 Objectives

The purpose of the grievance mechanism is to ensure that all requests and complaints from individuals, groups and local communities throughout the Project life, from planning and design through construction, operations and decommissioning, are dealt with systematically in a timely manner with appropriate corrective actions being implemented and the complainant being informed of the outcomes.

As aforementioned, NCEH will establish several channels for grievance and information to enable the public to register any concern about Project's environmental performance.

All complaints will be logged and processed and addressed within a fixed time, communicated to the complainant, as proposed in Figure 8.5-1 by the processing grievances flowchart.

NCEH shall appoint Grievance Focal Person (GFP) to Environmental Department to deal with complaints from complainant and implement the GRS procedure effectively. The appointed person for

role should have sound and broad experience within the social region and acting within such a role previous.

Prior to construction, the GFP will finalize the GRM and will get approval from DPTSC and township administrator in collaboration with local government. The local government bodies at the village and township level will act as focal points for contact with the GFP. DPTSC PMU and the village and township focal points will issue notices to inform the public within the project area of the GRM. The GFP's phone number, address, and email address will be disseminated to the people through displays on the notice boards at the construction site and at local government offices, e.g. villages, townships and district offices.

8.5.2 Village Grievance Committee

Village Grievance Committee shall be established and headed by village administrator, representative from NCEH and authorities concern in local and village level. The GFP will review the complaint and concerns and find a solution to cease the degree of complaints which will be agreed and accepted by the complainant. The GFP will be given 14 days to resolve the grievance and provide feedback to the complainant through the Village Grievance Committee on the results of the investigation and the proposed course of action.

The complaint shall be recorded and registered accordingly if the complaint will be satisfied by complainant and deliver the message to Village Grievance Committee promptly. The GFP documents the resolution of the complaint and will continue monitoring the remedial measures undertaken by the NCEH.

If the case is not addressed to the satisfaction of complainant within the given time frame, Village Grievance Committee shall proceed to submit the issue to Township Grievance Redress Committee for further review.

8.5.3 Township Grievance Management Committee

Township Grievance Management Committee is the highest authority to make final decision within project specific Grievance Redress System on the received issues which Village Grievance Committee cannot sort it out alone. Township Grievance Management Committee shall head by Township General Administrator with the members of DPTSC, and NCEH.

The Township Grievance Management Committee will record the grievance, further investigate the grievance, and will also call on the complainant, DPTSC, and the contractor to discuss the resolution of the complaint. Commitments and schedule of action and resolution of the complaint that is agreeable to all parties should be developed during the meeting with the Township – GAD. If the complainant considers the issue to be satisfactorily resolved, the grievance resolution process will be documented by the Township - GAD.

8.5.4 Unsolved Issue

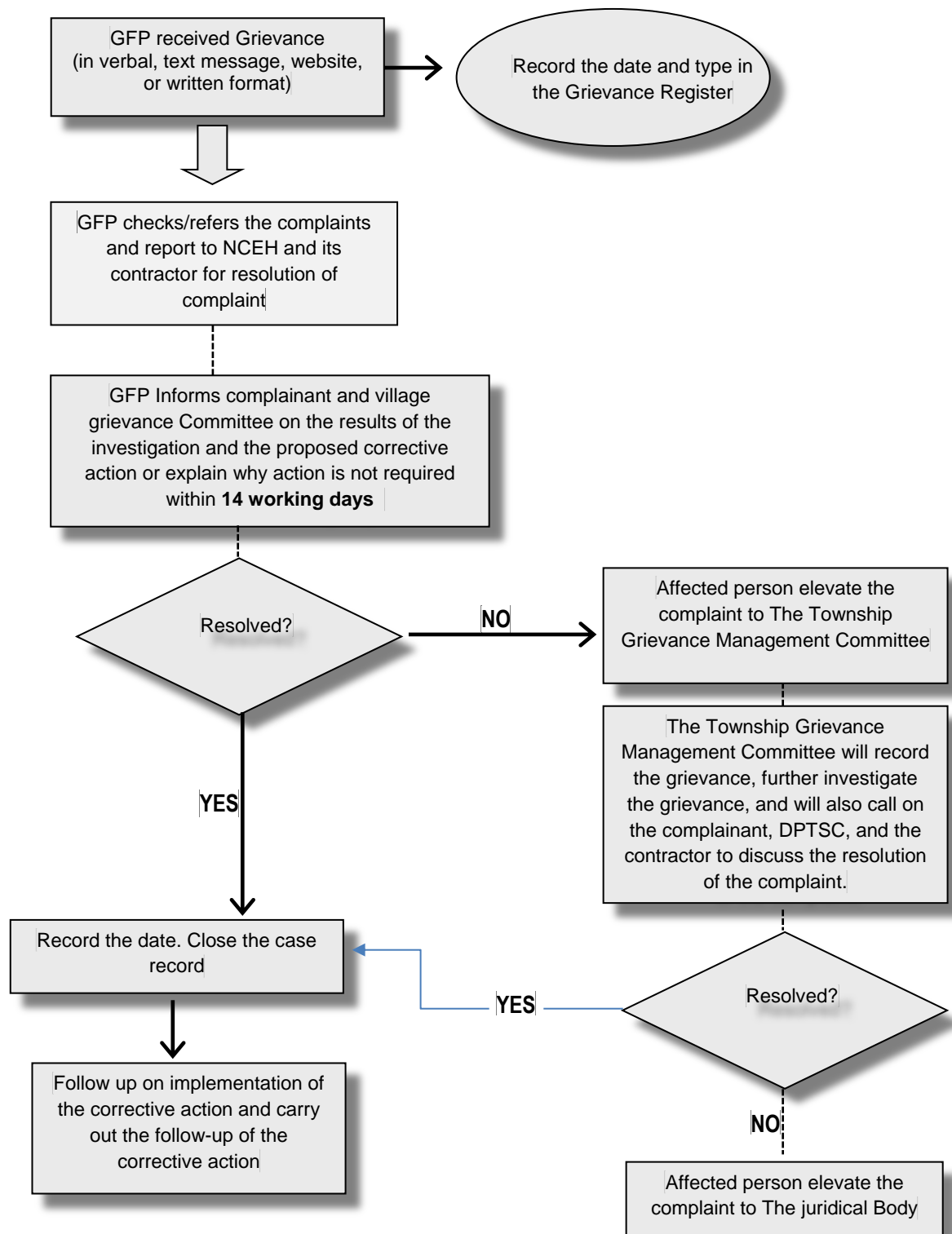
If the case is still not resolved by Township Grievance Management Committee, the complainant can proceed through juridical body through which punitive clauses of the Environmental Conservation Law may be used to prosecute offending parties.

The GRM will address all grievances raised by complainant across the Project, including a grievance raised by stakeholders located along the transmission line corridor.

The GRM, in the first instance, seeks to resolve disagreements or stakeholder concerns before they evolve into grievances. This is done through ongoing engagement with stakeholders throughout the Project, particularly the complainant.

The resulting informal negotiations and discussions will be conducted in a transparent manner and will be appropriately documented. This includes agreements that are reached, which will be voluntarily signed by all parties involved in the negotiation.

In cases where concerns or conflicts cannot be resolved through consultation and / or discussions, the GRM has established a hierarchy of grievance committees and procedures to receive and resolve grievances.



<Figure 8.5-1>

Flowchart for Processing Grievances

CHAPTER 9

ENVIRONMENTAL MANAGEMENT PLAN AND MONITORING PLAN

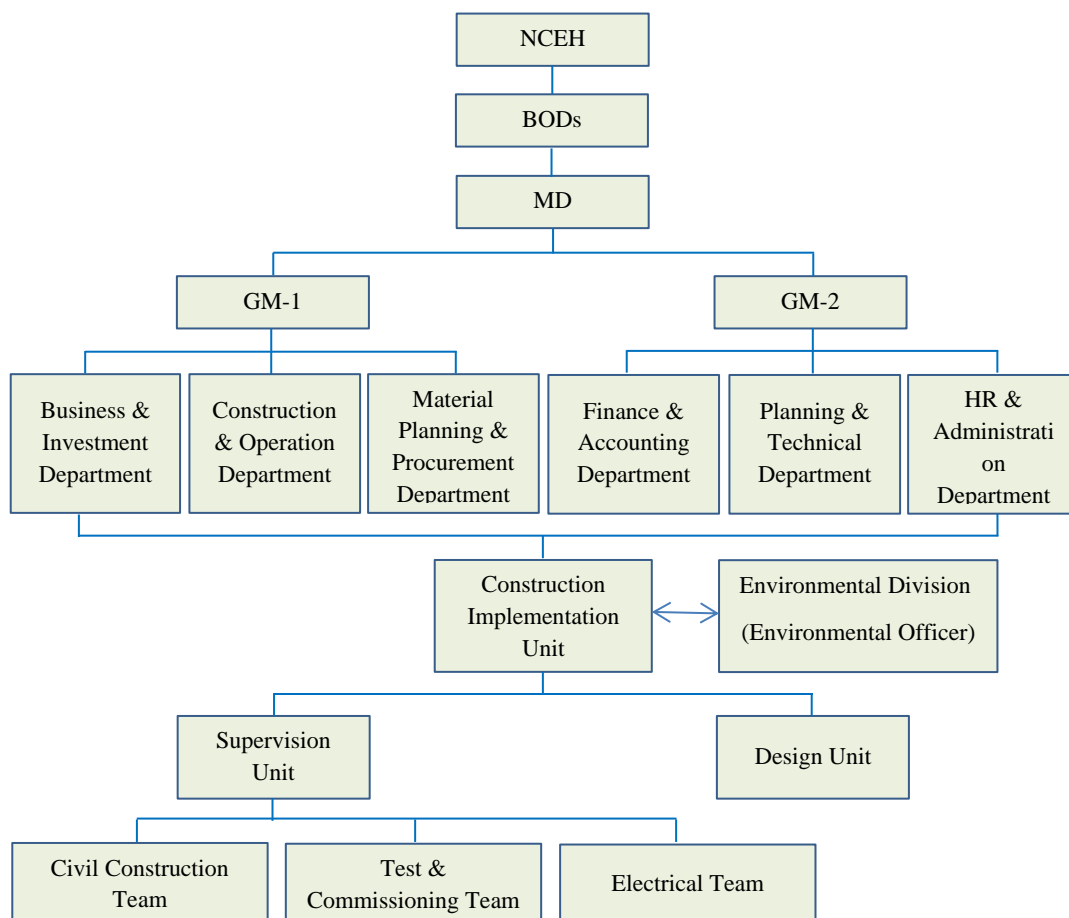
9.1 ENVIRONMENTAL MANAGEMENT PLAN

9.1.1 Introduction

An environmental management plan (EMP) has been prepared for the implementation of the 230 kV Namtu – Thipaw transmission line and Substation. The purpose of this EMP is to integrate the results of the IEE into a formal management plan that is implemented in parallel with the 230 kV transmission lines and substation to prevent or minimize the potential environmental impacts and issues that were identified by the IEE. The EMP addresses the results of the public consultations on the project that were convened as part of the IEE.

9.1.2 Institutional Arrangement

It is necessary that the Environmental Division (ED) will have to be established and Environmental Officer (EO) will be appointed to monitor the implementation of the proposed environmental mitigation measures and coordinate with construction implementation unit. Figure 9.1-1 illustrates the organizational structure of construction implementation unit including environmental division.



<Figure 9.1-1> Organization chart for construction implementation unit

Table 9.1-1 shows the project institutional structure of NCEH Company Ltd. who will be responsible for construction of transmission lines and substation.

<Table 9.1-1> Roles and Responsibilities for Implementation of EMP

Role	Responsibilities
Environmental Officer (EO)	<ul style="list-style-type: none"> • Develop the project ESMMP-CP based on the impacts and mitigation measures defined in the IEE report • Have a working knowledge of the environmental impacts, mitigation measures and recommendations of the ESMMP-CP • Review and improve method statements for environmental aspects prior to work starting • Verify that tender documents and civil works contracts include the project ESMMP-CP and specify requirement for preparation and implementation of construction ESMMP-CP • Identify environmental and health and safety competence requirements for all staff, including contractor personnel, working on the project and facilitate delivery of environmental training • Monitor construction performance to verify that appropriate control measures are implemented to comply with ESMMP-CP • Recommend corrective action for any environmental non-compliance incidents on the construction site, and provide advice and liaison with the construction teams to ensure that environmental risks are identified and appropriate controls are developed; • Compile a regular report addressing environmental performance progress and any non-compliance issues to relevant parties, including submitting semi-annual monitoring reports to ECD through the MOEE; • Inform affected parties of any changes to the construction program. The contact numbers of the Environmental Officer shall be made available to the affected parties. This will ensure open channels of communication and prompt response to queries and claims; • Establish an environmental grievance redress mechanism that is acceptable to ECD, to receive and facilitate resolution of affected peoples' concerns, complaints, and grievances about the Project's environmental performance; and • Liaise and cooperate with Local authorities responsible in arranging for adequate meeting and reporting to Local authorities on a regular basis.
Construction Contractor	<ul style="list-style-type: none"> • Recruit a qualified Environmental Expert on a full-time basis to manage compliance with contractual environmental obligations and implementation of the ESMMP-CP; • Develop and implement the Construction Contractor's Environmental Management Plan (Construction Contractor's EMP) to comply with Project commitments (i.e. Owner's EMP and ESMMP-CP); • Plan and direct construction activities to minimize environmental impacts and comply with environmental management procedures, license and approval requirements; • Verify the implementation of all applicable mitigation measures defined in the ESMMP-CP during construction phase; • Liaise with EMO to facilitate implementation of environmental mitigation measures; • Implement routine inspection and monitoring program, including undertaking the contractor's weekly environmental monitoring; • Implement a process of corrective and preventive action for noncompliance identified through internal and external inspections and audits; • Implement additional environmental mitigation measures where

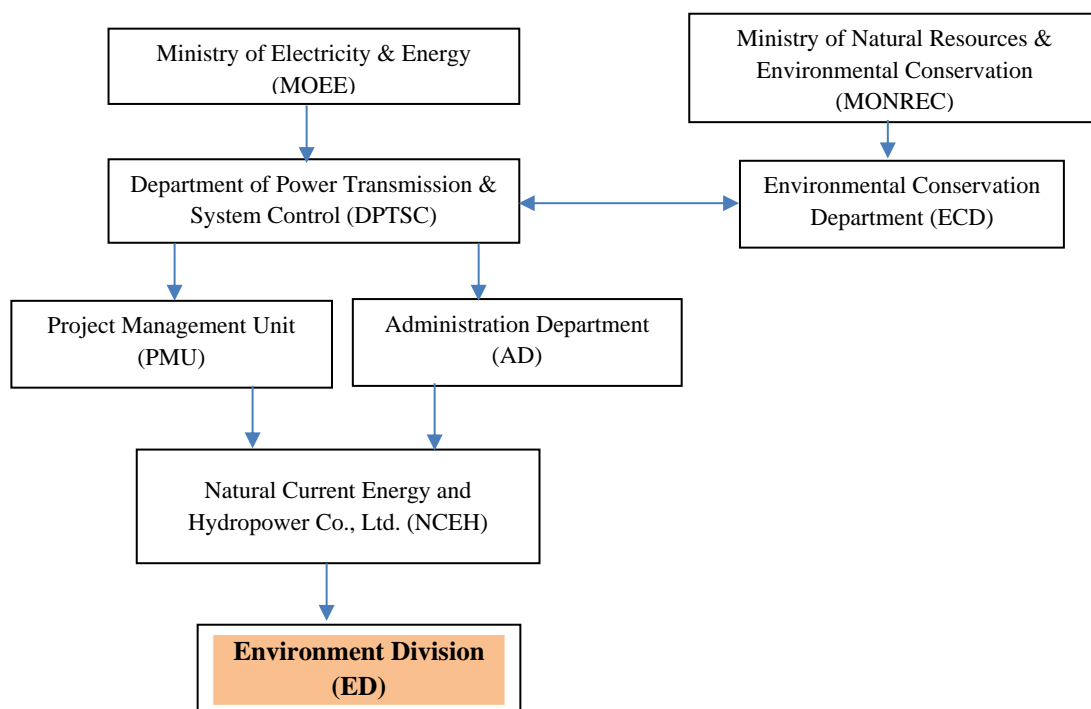
	<p>monitoring or other observations indicate opportunities for improved environmental management;</p> <ul style="list-style-type: none"> • Submit monthly reports to ESD/EMO on the implementation of environmental mitigation measures and environmental monitoring results; • Maintain an environmental register which keeps a record of all incidents which occur on the site during construction and report environmental incidents to Owner; • Manage safety of construction workers and local people during construction; • Prepare and submit monthly reports on mitigation and monitoring activities of EMP any environmental issues at construction sites to the PIC and PIU. • Prepare and submit monthly reports to HSE Division on the results of the monitoring activities. • Immediately act and resolve complaints received from the community and through GRM; and • Implement any corrective actions recommended by PMU.
All project personnel	<ul style="list-style-type: none"> • Protecting the environment by implementing relevant aspects of the EMP and ESMMP-CP

9.1.3 Institutional Arrangement (Government of Myanmar)

The Department of Power Transmission and System Control (DPTSC), under Ministry of Electricity and Energy is the major responsibility for coordination of EMP and the primary supervisory and monitoring body.

A Project Management Unit (PMU) should be established under DPTSC in MOEE to oversee monitoring of the Project. A Project Management Unit (PMU) and Administration Department (AD) shall coordinate the work of the government in resettling the most severely affected people in the project area, together with the technical assistance, financial support, and related work of the Project developers through the Project's Environment and Social Division.

Figure 9.1-2 shows the relationship between the Project institutional structure and the relevant departments of the concerned ministries.



<Figure 9.1-2> The relationship between the Project institutional structure and the relevant departments of the concerned ministries

The roles and responsibilities of institutions concerned for the Project's environmental management in a construction and operation phases are summarized in Table 9.1-2.

<Table 9.1-2> Role and Responsibility for Institutions Concerned

Institution	Roles and Responsibilities
Pre-Construction/Construction Phase	
Department of Power Transmission & System Control (DPTSC) in MOEE (DEPP)	<ul style="list-style-type: none"> Supervise tasks implemented by the Project Management Unit (PMU) Assign a staff dealing with environmental and social issues in Project Management Unit (PMU)
Project Management Unit (PMU), DPTSC	<ul style="list-style-type: none"> Support the environmental staff assigned by the MOEE (DEPP) as appropriate Notify MONREC to confirm approvals of 230 kV transmission line and substation are met;
Administration Department in MOEE (DEPP)	<ul style="list-style-type: none"> Finalize compensation price with affected people and disburse compensation/assistance to project affected peoples
Compensation Committee (SLRD, Police officer, Agriculture and Irrigation Department and General Administrated Department at the relevant township and project owner: MOEE)	<ul style="list-style-type: none"> Set compensation standards / assistances

Environmental Officer	<ul style="list-style-type: none"> • Develop the Construction Environmental Management Plan (CEMP) for project contractors. • Supervise the mitigation measures implemented by the construction contractor addressed in the Environmental and Social Management Plan (EMP) • Open windows for project affected peoples
Operation Phase	
Department of Power Transmission & System Control (DPTSC) in MOEE (DEPP)	<ul style="list-style-type: none"> • Implement operation and maintenance of transmission and substation including environmental management
ECD	<ul style="list-style-type: none"> • Review and update EMP in every six months. Review EMMP report and Environmental Audit will be conducted in every year.

The DPTSC with support from the MONREC are the agencies which will regulate environmental management of the 230 kV line and substation. The MONREC provides direction and support for environmental protection-related matters including application of the EIA Rules in support of the Environmental Conservation Law (2012).

The DPTSC will:

- (i) review and supervise project performance against the commitments of the EMP as described in the IEE report,
- (ii) assist in the conduct of the environmental assessment and updating of the IEE and EMP,
- (iii) carry out periodic review missions to review the implementation of the EMP,
- (iv) assist the PMU in conducting the training for DPTSC/MOEE on environmental safeguards and
- (v) review semi-annual reports on EMP activities compiled and submitted to ECD.

9.2 Environmental Mitigation and Management Plan

As stated in previous section, one Environmental Officer (EO) is required to be appointed to monitor the implementation of environmental mitigation measures by contractor during the construction phase of the project.

Prior to construction, the construction contractor will develop a suite of Site- Specific ESMMPs which address specific segments of the ROW, based on site conditions (e.g. proximity to villages, waterways and natural habitats).

If there are changes to the project locations and scope which would significantly affect the outcome of the project, the updated IEE and EMP will be prepared again to check whether additional mitigation plans and corrective action plans are necessary to meet the final detailed designs of the 230 kV lines.

The environmental mitigation measures described in the Table 9.2-1 aim to minimize the negative impacts of the transmission line construction and meanwhile, enhance the positive and beneficial impacts. The mitigation plan is structured by the three development phases defined by the pre-construction, construction, and post construction-operation phases. Environmental issues and concerns raised at the stakeholder meetings are addressed in the mitigation plans.

<Table 9.2-1> Environmental Mitigation and Management Plan

Project Activity/Potential Environmental Impact	Mitigation Measures	Location	Time Frame	Responsibility to Implement	In- charge of Supervision
Pre-construction					
Land Use Removal of productive land (temporary and permanent)	<ul style="list-style-type: none"> - Livestock in affected areas will be relocated, where necessary; - Land acquisition and compensation for crops issues will be settled out before construction and will be reviewed by DPTSC, MOEE. - Ensure that negotiations for compensation should include relevant stakeholders from government and communities. - Also ensure that the compensation rates are at par with the market rates. - It also needs to be ensured that the opportunity cost of such land is considered when deciding the compensation amount. 	Agricultural land and private land	Pre-construction	NCEH	Project Management Unit (DPTSC)
Project Information Disclosure	Conduct project information disclosure and grievance redress process at townships	Namtu, Thipaw and Kyaukme townships	Prior to the start of the actual construction	Environment Division (ED) of NCEH	Project Management Unit (DPTSC)
Detailed design of transmission lines and substation	<ul style="list-style-type: none"> - Conduct detailed survey along the transmission line route after approval of MOEE - Work with PMU and EA to complete the detailed designs of the 230 kV transmission lines and substation. Ensure the following measures are included: <ul style="list-style-type: none"> a) Compliance of electrical safety standards b) to select the shortest line route c) no disturbance or damage to cultural buildings, ancient heritage site, commercial areas, schools, airport and Military arears d) to obey 2014 Electricity Law especially Act 2N and Act 10 A e) notify affected residents of construction activities and schedule. 	Along the transmission lines and substation	Prior to the start of the actual construction	Planning and contract department of NCEH	Project Management Unit (DPTSC)
Project approval by Government	- Coordinate with Forest Department, Ministry of	Along the transmission	Prior to the start	Planning and	Project

Agencies	Transport and Communication, Ministry of Transport and Communication, Township Administration and other relevant government agencies to obtain permission to locate tower in their properties.	lines	of the actual construction	contract department of NCEH	Management Unit (DPTSC)
Initiate the Environmental Management Plan	- Measures to minimize runoff of sediments, oil spills and pollution of Namtu River, measures to avoid Military Camps, and Private Forest plantation area, measures to avoid hazards to public health and safety and damage to properties.	Along the transmission lines and substation area	Prior to the start of the actual construction	Environment Division (ED) of NCEH	Project Management Unit (DPTSC)
Preparation of EMP Implementation	- Develop and schedule training plan for HSE/PMU/Contractor to be able to fully implement & supervise EMP, and to manage implementation of mitigation measures by contractor(s). - Create awareness plan for contractor who will implement mitigation measures.	Along the transmission lines and substation area	Prior to the start of the actual construction	Environment Division (ED) of NCEH	Project Management Unit (DPTSC)
Construction					
Compliance with permits and licenses	- Contractor(s) to comply with all statutory requirements set out by GAD, MOEE, Forest Department, and other relevant agencies for use of construction equipment, and construction operations such as Township Development Committee approvals for construction vehicle use of city roads, and management of excavation and transport of soil, and from MOEE approvals for construction works near Namtu River pursuant to the Conservation Water Resources and Rivers Law.	For all construction sites including substation	Beginning of construction	Contractors	Project Management Unit (DPTSC)
Recruitment of workers	- Use local workers as much as possible thereby reducing number of migrant workers - Create registry for construction workers including migrant workers. - Implement the ID-system at construction sites.	All construction sites including substation	Throughout the construction phase	Contractors	Project Management Unit (DPTSC)
Air Quality (Atmospheric emission/dust) Dust emissions from exposed soils, transport of materials and increased traffic.	- Apply water on dust generating areas including unpaved roads and staging areas. - Restrict the speed limits of vehicles while moving on unpaved roads. - Cover of vehicles carrying soil, sand and other loose material. - Keep the vehicle and construction equipment in good	All construction areas	Throughout the construction phase	Contractors	Environment Division (ED) of NCEH

	<p>working condition.</p> <ul style="list-style-type: none"> - Minimize the idling time of vehicles and construction equipment. - Suspend dust generating activities while in high wind. 				
Increased noise and vibration levels may disturb local residents and fauna, and can present a risk to personnel.	<ul style="list-style-type: none"> - Carry out regular inspection on noise and vibration generating equipment (including construction vehicles). - Utilize appropriate noise and vibration control function in close proximity to sensitive receptors (such as school, monastery, hospital, retirement homes). - Install the Stationary equipment generating noise and vibration as much as away from the residence. - Limit the operating hour of noise generating construction activities and if possible, install temporary noise barriers in close proximity to settlement area. - Provide hearing protection to all construction personnel working in noisy condition (with noise level above 80dB). - Conduct the blasting (only if necessary) within 7am to 17pm, and limit the number of blasts that occur per hour or per day. Coordination with nearby residents is recommended. 	All construction areas	Throughout the construction phase	Contractors	Environment Division (ED) of NCEH
<p>(Waste Disposal)</p> <ul style="list-style-type: none"> - The debris generated from construction activities can be carried along with small springs, rivulets and rivers flowing in proximity of the tower. - Construction debris can also contaminate wells, canals etc. in proximity of the activity. - Random disposal of waste generated from the temporary worker camp can block the drainage, spring and stream. 	<ul style="list-style-type: none"> - Collect all construction wastes generated at the site and domestic waste from the worker camp, transport and dispose at the dump site approved by the local authorities. - Leave the site as original after the completion of construction activities. - Follow 3Rs principle (reduces, reuse and recycle) at the construction site. - Prohibit the random disposal of any waste generated from the construction activity. - Provide adequate number of waste bins in the places where waste generated. - Reuse the Excavated spoils as backfill material. - Re-collect drop of materials while transporting. - Install the temporary pit latrine for worker camp. - Prohibit burning the solid waste at the site. - managed in accordance with all applicable regulations if chemical are necessary to store at the site, prepare 	All construction areas including worker's camps	Throughout the construction phase	Contractors	Environment Division (ED) of NCEH

	Control and Emergency Response Procedure, follow the MSDS (Material Safety Data Sheets) as applicable.				
<p>(Water Usage and Water Quality)</p> <ul style="list-style-type: none"> - Over exploitation of water from underground, spring or stream can contribute water scarcity to nearby resident during dry season. - Release of sediment laden effluent during construction, for example soil waste from drilling activities can contaminate the nearby water quality. - There is potential for hazardous materials to be released to the environment, particularly during storage and handling and equipment/vehicle maintenance. 	<ul style="list-style-type: none"> - Optimize the usage of water at the construction site. - Ensure the prevention of runoffs in close proximity to water bodies. - At the river and stream crossing points, manage the horizontal clearance (the distance between the towers) to be greater than the maximum river/stream width at high flood level, and the vertical clearances to be according to the statutory requirements. - Undertake clearing and earthworking operations during dry season to minimize erosion and subsequent release of sediment which lead surface water pollution. - Locate the stockpile materials at least 30 meter away from steep slopes, water courses or drainage paths. - Manage chemical and oils to be stored on the hard concrete base, and provide overhead protection to cover rain and severe weather. - Prohibit Discharge/disposal of oil contaminated water and solid wastes into the water body. - Conduct regular maintenance of vehicles and construction equipment to avoid leakage of oil. - Prepare contingency plans for control of spills of oil and other hazardous substances and provide spill collection kits at the site. - Install Temporary pit latrine for worker camp. 	All construction areas	Throughout the construction phase	Contractors	Environment Division (ED) of NCEH
<p>(Erosion and Soil Quality)</p> <ul style="list-style-type: none"> - Potential impacts will be due to change to soil structure and soil quality as a result of excavation or compaction. - Removal of vegetation and trees during construction of foundation, especially on the slopes would render soil vulnerable to erosion. - The excavated if kept 	<ul style="list-style-type: none"> - If possible, carry out the construction activities (especially land clearance and earth working) in non-monsoon months which will minimize any rainwater run-off or any loss due to infiltration. - If vegetation clearing is required on river banks, vegetation will be cut near ground level to leave root mass in the ground. This helps to reinforce soil stability and reduce erosion. - Store construction materials within the footprint of the site where hard concrete base and overhead protection 	All construction areas	Throughout the construction phase	Contractors	Environment Division (ED) of NCEH

uncovered and unprotected will be rendered vulnerable to loss from erosion. - Discharge or spill of oil and other hazardous substances can contaminate the surface soil	are provided so as to avoid any kind of damage or contamination of soil/crop of adjoining fields. - Prepare contingency plans for control of spills of oil and other hazardous substances and provide spill collection kits at the site. - restrict the mobilization of construction vehicles through farmland area so as to avoid rutting and soil compaction. - Adopt the mitigation measures stated under the section of Waste Disposal and, Water Usage and Water Quality.				
(Aesthetics and Visual Impact) - ROW clearance, the casting of tower foundation and the presence of steel tower structures will be disturbed visual amenity. - TL structures which may lead to change of landscape resource and character due to introduction of manmade features leading to visual intrusion and loss of visual amenity.	- Minimize the clearing of trees wherever possible, and adopt <i>vis-à-vis</i> felling of trees while trimming. - The lattice structure of towers provide sufficient see through effect which diminish the visual impact on the aesthetics of the area. - The area being hilly terrain with undulations restrict the view of many towers in a single view, moreover the height of tower do not appear to be significant with reference the terrain. -Trees will be preserved on the road easements so long as the vertical safety clearance is complied	All construction areas	Throughout the construction phase	Contractors	Environment Division (ED) of NCEH
Biodiversity (Flora and Fauna) Impact on Flora will be due to vegetation clearance	- Follow the Forest Law (2018), Conservation of Biodiversity and Protected Areas Law 2018, especially the sections of laws and regulations highlighted in chapter 5. - Deliver awareness training on conservation of biological diversity to all level of construction unit prior proceeding to any construction works. - Consult and coordinate with Forest Department if trees are needed to be removed. - Identify and demarcate all trees to be removed within the ROW area. - Minimize vegetation clearance as much as possible and ensure that the clearance not beyond designated area. - Dispose the chopped trees in accordance with guidance of Department of Forest.	All construction areas	Throughout the construction phase	Contractors	Environment Division (ED) of NCEH

	<ul style="list-style-type: none"> - Prohibit the extraction of forest products by construction workers. - Prohibit utilization of herbicide for clearing vegetation. - Prohibit the burning of vegetation debris at the site and adopt the measures stated in Waste Disposal section. 				
Biodiversity (Flora and Fauna) Impact on Fauna can be resulted from mobilization of construction vehicles	<ul style="list-style-type: none"> - Carry out regular maintenance of Construction vehicles and machinery to minimize unnecessary noise generation. - Restrict the speed limit of construction vehicles within the project footprint to 40 km/hr to minimize potential for fauna strike. - Deliver awareness training on conservation of biological diversity to all level of construction unit prior proceeding to any construction works. - Prohibit strictly the hunting of wild animals (including birds), and fishing. 	All construction areas	Throughout the construction phase	Contractors	Environment Division (ED) of NCEH
(Socio Economy and Livelihoods) Construction of the transmission line and associated infrastructure will provide employment opportunities to local people	<ul style="list-style-type: none"> - Give the priority to local people while the project needs construction workers. - Avoid mass migration of workers from outside of project area. - Deliver Health and Safety Trainings before commencement of any construction activities. - Support local/community bazaar by buying meat, fish and vegetables from local market very often for the kitchen of Worker Camp. 	All construction areas	Before and during construction phase	Contractors	Environment Division (ED) of NCEH
Damages to community and private/individual property during construction activities. Potential disturbance of/damage to property and community facilities.	<ul style="list-style-type: none"> - Ensure that the construction activities are to be well planned/arranged that any use of community and individual property is either avoided or prior permission sought before use. - Immediately compensated if any unforeseen use and/or damage to property or structures etc. - Relocate livestock in affected areas where necessary. - Settle out land acquisition and compensation for crops issues and coordinate with MOEE before commencement of the construction. 	All construction areas	As necessary	Contractors	Environment Division (ED) of NCEH

	<ul style="list-style-type: none"> - Ensure that negotiations for compensation should include relevant stakeholders from government and communities. - Also ensure that the compensation rates are at par with the market rates. - Ensured that the opportunity cost of such land is considered when deciding the compensation amount. 				
<p>Community Health and Safety (Infectious Disease, and Accident)</p> <ul style="list-style-type: none"> - Possible increase in disease transmission. - Accident caused by mobilization of construction vehicles and other activities. 	<ul style="list-style-type: none"> - Commit to meet Electricity Law and other Myanmar regulation requirements as well as international conventions on labour, especially on issues of child and forced labour, working conditions, collective bargaining, non-discrimination and equal opportunity, complaint and grievance mechanism as well as occupation health and safety. - Inform and/or notify the construction schedule and its activities to the sensitive receptors such as school, monastery and affected household structures prior to commence the construction. - Adopt the measures described in mitigation measures subsection of Air Quality, and Noise and Vibration. 	The construction area in close vicinity to residential areas	Throughout the construction phase	Contractors	Environment Division (ED) of NCEH
<p>Traffic and Transport</p> <ul style="list-style-type: none"> - Accident associated with the traffic movement in working areas may lead to property/equipment damage and injury to workers or nearby villagers. 	<ul style="list-style-type: none"> - Minimize the use of village roads and if it is necessary to use the village roads, coordinate with village authorities to get permission of use and improve the roads before using it. - Arrange the flexible transport schedule for construction vehicles to avoid peak hours of road usage. - Install traffic signs for all roads throughout construction areas. - In the event that stringing conductors present a possible risk to traffic, construct the temporary barriers (such as bamboo scaffolds) across the roads and rivers to protect the public and property. 	All project roads and public roads	Throughout the construction phase	Contractors	Environment Division (ED) of NCEH

Occupational Health and Safety (Accident and Injury) - Potential for accident and injury during construction. - Accident and injury while working at height - Spread of transmissible diseases between worker and - Contraction of disease due to poor sanitation and environmental temporary worker camp	<ul style="list-style-type: none"> - Deliver Occupational Health and Safety awareness trainings to all workers before the construction starts. - Provide facilities to help workers access clean drinking water. - Provide proper sanitation facilities at the worker camp. - Provide first aid kits which can be easily accessible by worker at the site and deliver relevant trainings on first aid and utilization of first aid kits. - Minimize mosquito breeding habitat at the worker camp and provide mosquito nets and other facilities to avoid mosquito-borne diseases. - Provide PPE covering protection of head, eye, hearing, hand, feet and height and access to workers. - Ensure proper shutdown of the line/utilities with prior information and permission if stringing activities are near low tension wires/high tension wires and other electrical utilities. 	All construction areas	Throughout the construction phase	Contractors	Environment Division (ED) of NCEH
Operation					
Air Quality - Generation of ozone and nitrogen oxides from the overhead transmission line can occur as a result of corona discharge during the humid weather condition. - Potential air pollution due to burning of vegetation debris during ROW maintenance work.	<ul style="list-style-type: none"> - Prohibit the burning of vegetation debris after ROW maintenance trimming. - Check the vehicles and other heavy machineries prior to start the maintenance operations. - Restrict the speed limit of vehicles while moving on unpaved roads. - Turn off the engines of vehicles and heavy machineries while not in use. - Avoid dust generating activities while in high wind 	Along the ROW of TL	Throughout the operation phase	Environment Division (ED) of NCEH	Project Management Unit (DPTSC)
Noise and Vibration - Potential noise generation from maintenance and repair activities and 'Corona discharge' from the overhead lines -No vibration is expected during the operation period.	<ul style="list-style-type: none"> - Select the Conductors and other facilities to minimize the corona discharge. 	Along the ROW of TL	Throughout the operation phase	Environment Division (ED) of NCEH	Project Management Unit (DPTSC)

<p>Biodiversity (Flora and Fauna)</p> <ul style="list-style-type: none"> - The ROW may interrupt the continuity of forest habitat (mostly degraded deciduous forest) - Potential impact to resident fauna due to electrocution - Disturbance of resident fauna due to noise and light from maintenance activities 	<ul style="list-style-type: none"> - Restrict vegetation trimming within the ROW to safely operate the transmission line. - Retain the groundcover and mid-storey vegetation wherever practicable. - Implement landscaping and re-vegetation after completion of construction in suitable areas. - Adopt vegetation management program to raise awareness on the values of natural habitat areas to personnel work force and prohibit the poaching and forest product collection. - Strictly prohibit hunting wild animal. - Design the transmission line to minimize risk of electrocution, including maintaining a 1.5 meter spacing (refer to the guidelines or guidance from DPTSC) between energized components and grounded hardware, or covering energized parts. 	ROW Maintenance area	Throughout the operation phase	Environment Division (ED) of NCEH	Project Management Unit (DPTSC)
<p>Economy and Livelihoods</p> <ul style="list-style-type: none"> - Beneficial impacts are predicted during the maintenance of the ROW, particularly vegetation management, can provide employment to local residents 	<ul style="list-style-type: none"> - Give the priority to local people while the project needs during the operation phase. - Deliver Health and Safety Trainings before commencement of any construction activities. - Support local/community bazaar by buying meat, fish and vegetables from local market very often for the kitchen of Worker Camp. 	ROW Maintenance area	Throughout the operation phase	Environment Division (ED) of NCEH	Project Management Unit (DPTSC)
<p>Community health and safety</p> <ul style="list-style-type: none"> - Community will have concerns about its safety and possibility of any accidents like electrocution, skin diseases etc. - Electrocution due to contact with high voltage electricity or items in contact with high voltage electricity (such as tools, vehicles or ladders). 	<ul style="list-style-type: none"> - Evaluate possible risks and ensure that these are addressed and minimized. - Communicate about the technical aspects of the transmission line construction and operations, and allay fears about accidents or any other health concerns. - Use simple diagrams and pamphlets in local language for this purpose. - Train land owners about safety issues and action to be taken in case of risks. - Demonstrate that MOEE and its contractors are very concerned about health and safety of workers as well as the community. - Signs and barriers will be installed to prevent access to high voltage areas. - Grounding conducting objects will be installed near 	Along the ROW of TL	Throughout the operation phase	Environment Division (ED) of NCEH	Project Management Unit (DPTSC)

	<p>transmission lines.</p> <ul style="list-style-type: none"> - Ensure communication of health and safety risks to villagers near to settlements in batches and explain the various health and safety measures being undertaken. 				
<p>Occupational Health and Safety</p> <ul style="list-style-type: none"> - Exposure to EMF at levels higher than those experienced by the general public. - Electrocution due to contact with high voltage electricity or items in contact with high voltage electricity (such as tools, vehicles or ladders). - Working at height on towers. 	<ul style="list-style-type: none"> - Develop EMF safety program prior to operation which: identifies potential levels of exposure; provides training for all workers; delineates zones appropriate for public access and those restricted to appropriately trained workers; defines measures to limit exposure time, such as through work rotation; and provides personal monitoring equipment for workers. - Ensure compliance of safe practices and implementation of safety manual - Provide PPE covering protection of head, eye, hearing, hand, feet and height and access to workers. - Securing the workplace, wherein all lines are shut down prior to maintenance work, use of PPE and procedures for emergencies and compensation procedures in case of accidents. - Prior training of the workers regarding health and safety procedures is essential. - Deactivate transmission lines prior to work on, or near, transmission lines. - Conduct the Live work by trained workers. - Implement fall protection measures including provision of appropriate fall protection equipment, training in use of equipment, training in climbing techniques, and rescue of fall-arrested workers. - Rate and maintain properly all equipment, including hoisting equipment, power tools and tool bags. 	Along the ROW of TL	Throughout the operation phase	Environment Division (ED) of NCEH	Project Management Unit (DPTSC)

9.3 Environmental Monitoring Plan

The monitoring plan focus on all three phases (pre-construction, construction, post-construction operation) of the project, and consist of environmental indicators, sampling locations and frequency, method of data collection, responsible parties, and estimated costs. Successful implementation of Environmental Monitoring Plan depends on regular monitoring, documenting and reporting. The Environmental Officers should monitor the environmental measures and submit a quarterly report to the concerned department. Additionally, another yearly monitoring report with quarterly monitoring data should be submitted to the Environmental Conservation Department for renewing the Environmental Clearance Certificate.

The Environment Division of NCEH will oversee the implementation of the environmental monitoring program. The Environment Division will be responsible for the sampling of any environmental parameters that must be analyzed in a laboratory in coordination with the PMU.

The initial monitoring program based on the impacts and mitigation measures defined in this IEE is provided in Table 9.3-1. Monitoring in the construction period can be categorized in the following:

- For the contractor implementing construction, monitoring to ensure on a day to day basis that mitigation measures are fully implemented with construction activities, and that results observed comply with the contractual obligations.
- For the Environmental Officer, carry out routine inspections to ensure that monitoring results provided by the construction contractor are corrected, to provide the necessary environmental coordination and interface with the contractors, and to provide a comprehensive picture of the current environmental situation and efforts at site level.

After construction is completed, the potential impacts of the operation of the 230 kV transmission lines and the substations will be monitored by Project Management Unit (PMU), DPTSC. Monitoring of the success of any minor resettlement in the affected areas will be undertaken as part of the separate RP prepared for the project.

9.3.1 Monitoring and Inspection

The Environment Division will employ suitably qualified inspectors, who will conduct routine inspections to evaluate compliance with commitments defined in the Construction Contractor's EMMP-CP.

Results of field observations, including documenting compliance or noncompliance, will be reported on standard forms to enable observations to be recorded in a consistent manner. The information can be entered into the database that will be used to track the status of and allow analysis of noncompliance situations.

Monitoring activities will include verification of implementation of mitigation measures defined in the EMMP, as well as water quality, air quality, noise and vibration and biological monitoring. For ambient air, noise and water quality, sampling and analysis shall be carried out relying on certified equipment and/or laboratory.

The PMU will visit and inspect each of the construction sites at the frequency defined in the monitoring plan below.

Information collected during each visit will be reported on a standard form, which provides a checklist of issues to control, depending on the degree of compliance or non-compliance observed.

9.3.2 Performance Monitoring

Performance monitoring is required to assess the overall performance of the EMP. A performance monitoring system is normally developed by the PMU for the entire project. Selected indicators of major components of the environment that will be affected primarily by three phases are drawn from the mitigation and monitoring plans and summarized in Table 9.3-1.

9.3.3 Reporting

Regular reporting on the implementation of mitigation measures, and on monitoring activities during construction phase of the project is required. A report on environmental monitoring and implementation of EMP will be prepared semi-annually for the PMU with assistance of the Environment Division of NCEH. The report will compile monthly reports provided by the contractor and findings of the HSE's monitoring.

A semi-annual report on the environment monitoring of the project must be prepared and submitted to the ECD by the PMU.

Table 9.3-2 shows performance monitoring environmental indicators and location of environmental monitoring sampling points are shown in Figure 9.3-1, Table 9.3-3, 9.3-4 and 9.3-5.

<Table 9.3-1> Environmental Monitoring Plan for 230 kV Transmission Line and Substation

Environmental Indicator	Monitoring Location	Monitoring Method	Reporting Frequency	Responsibility		Estimated Cost (USD)
				Supervision	Implementation	
Pre-construction						
General	- All construction site	- Check and revise (if necessary) the environmental mitigation measures described in Table 9.2-1.	Once	PMU	Environmental Officer	No marginal cost
Community/private properties and sensitive receptors (e.g., cultural property and values, new schools or hospitals) along TL corridors and at substation sites.	- All construction site - Along the ROW of TL	- Field observation and consultation with local communities.	Once	PMU	Environmental Officer	No marginal cost
Construction						
Air Quality (Dust generation)	- Unpaved roads in close vicinity to the residential areas - The construction site operating earthworks	- Visual observation of whether dust suppression measures are applied or not.	Weekly	Environmental Officer	Contractor	Cost is included in the contract
Air Quality 1) Nitrogen dioxide, 2) Particulate Matter PM ₁₀ , 3) Particulate Matter PM _{2.5} , 4) Sulphur Dioxide, 5) Relative Humidity, 6) Temperature, 7) Wind Speed, and Wind Direction	See in Table 9.3-3 and Figure 9.3-1	Using field and analytical methods approved by MONREC	Annual	Environmental Officer/PMU	Environmental Contractor	3,500.00
Noise Level (dBA)	See in Table 9.3-4 and Figure 9.3-1	Using field and analytical methods approved by MONREC (24 hours continuous monitoring)	Annual	Environmental Officer/PMU	Environmental Contractor	1,600.00
Water quality: Biochemical oxygen demand (BOD), Chemical oxygen demand (COD), Oil and grease, pH, Temperature, Total coliform bacteria, Total	See in Table 9.3-5 and Figure 9.3-1	Using field and analytical methods approved by MONREC	Annual	Environmental Officer/PMU	Environmental Contractor	3,000.00

nitrogen, Total phosphorus, Total Suspended solid (TSS)						
Waste Disposal	<ul style="list-style-type: none"> - All construction areas - At temporary worker camp 	<ul style="list-style-type: none"> - Monitor the amount and types of generated wastes. - Visual observation of whether wastes are properly disposed and wastes bins are sufficiently provided or not. 	Weekly	Environmental Officer/PMU	Contractor	Cost is included in the contract
Water Usage and Water Quality (refer to the Table 6.4-17 for the parameter to be studied)	<ul style="list-style-type: none"> - The construction site near stream or river - At worker camp 	<ul style="list-style-type: none"> - Record the monthly water usage and sources. - Outflow of construction site to the stream or river. - Use equipment to check water quality or taking water samples and analyzed at the laboratory. - Visual observation of whether stockpiles are close to watercourses and drainage paths and sediment traps are installed or not. 	Annual	Environmental Officer/PMU	Contractor	Cost is included in the contract
Erosion and Soil Quality	<ul style="list-style-type: none"> - The construction site near stream or river - The area of land suspected to be contaminated by construction works 	<ul style="list-style-type: none"> - Visual observation of whether mitigation measures are applied or not. 	Annual	Environmental Officer/PMU	Contractor	Cost is included in the contract
Biodiversity (Flora and Fauna)	<ul style="list-style-type: none"> - The construction site where TL traverse the reserved forests - The construction site where vegetation are needed to be cleared - The construction site where wildlife species are observed 	<ul style="list-style-type: none"> - Field visual observation of whether the vegetation is cleared within the defined area or not. - Field visual observation of illegal hunting of wildlife by construction workers. 	Annual	Environmental Officer/PMU	Environmental Contractor	2,500.00
Community Health and Safety (Infectious Disease, and Accident)	<ul style="list-style-type: none"> - Along the ROW of TL - All construction areas 	<ul style="list-style-type: none"> - Record of infectious diseases electrocution and accidents related to the community. - Monitor if construction workers follow laws and regulations related to electricity, 	<ul style="list-style-type: none"> - Monthly by contractor - Annual by Environmental Officer 	Environmental Officer/PMU	Contractor	Cost is included in the contract

		traffic, health and safety.				
Traffic and Transport		- Monitor if the driver follows the speed limit, road safety rules or not.	- Monthly by contractor - Annual by Environmental Officer	Environmental Officer/PMU	Contractor	Cost is included in the contract
Occupational Health and Safety (Accident and Injury)	- All construction areas	- Monitor if the first-aid kits and PPE are sufficiently provided. - Monitor if the construction workers wear the provided PPE, fall protection measures are properly applied and follow the health and safety plans.	- Monthly by contractor - Annual by Environmental Officer	Environmental Officer/PMU	Contractor	Cost is included in the contract
Operation						
Waste Disposal	- The area where maintenance operations are periodically conducted	- Visual observation of whether wastes generated from maintenance operation are appropriate disposed or not.	During maintenance operations	Contractor	Environmental Officer	
Biodiversity (Flora and Fauna)	- The area where trimming of vegetation are necessary	- Monitor if trimming of vegetation are carried out within the define limit.	Annual	Environmental Officer/PMU	Environmental Contractor	2,500.00
Community Health and Safety (electrocution)	- Along the ROW of TL - The area where TL cross over the residential households, village access road and farmland	- Monitor if signs and barriers are properly installed, and conducting objects are grounded.	Annual	Environmental Officer/PMU	Environmental Contractor	1,000.00
Occupational Health and Safety	- Along the ROW of TL - The area where maintenance operations are potentially required	- Visual observation of whether fall protection measures are adopted and PPE are properly worn or not.	Annual	Environmental Officer/PMU	Environmental Contractor	1,000.00
EMF levels	Sites where sensitive receptors are located within 5m from the alignment	Measurement of EMF levels	Bi-annual	Environmental Officer/PMU	Environmental Contractor	1,200.00

<Table 9.3-2> Performance monitoring environmental indicators

Environmental Component	Key Indicator	Performance Objective	Data Source
Construction and Part of Preconstruction Phase			
Public consultation meeting	Affected public and stakeholders	Meetings with public stakeholders contacted during IEE and new stakeholders convened for follow-up consultation and to introduce grievance mechanism	Presentation, Minutes of meeting, and participants list
Air Quality	1) Nitrogen dioxide, 2) Particulate Matter PM ₁₀ , 3) Particulate Matter PM _{2.5} , 4) Sulphur Dioxide, 5) Relative Humidity, 6) Temperature, 7) Wind Speed, and Wind Direction	Levels never exceed pre-construction baseline levels	- Environmental contractor and PMU - Monitoring reports
Noise Level	(dBA)	Levels never exceed pre-construction baseline levels	- Environmental contractor and PMU - Monitoring reports
Water quality:	Biochemical oxygen demand (BOD), Chemical oxygen demand (COD), Oil and grease, pH, Temperature, Total coliform bacteria, Total nitrogen, Total phosphorus, Total Suspended solid (TSS)	Levels never exceed pre-construction baseline level	- Environmental contractor and PMU - Monitoring reports
Construction sites: solid waste mgt, sanitation, health and safety, public complaints, incidence of worker or public accidents, EMP measures	Solids and liquid waste	Rigorous program of procedures and rules to collect and store all waste from construction sites practiced	- Environmental contractor and PMU - Monitoring reports
Hazardous materials and waste	Oil, gasoline, grease	Rigorous program of procedures and rules to collect and store all waste from construction sites practiced	- Environmental contractor and PMU - Monitoring reports
Public and worker safety	Frequency of injuries	Follow occupational health and safety regulations	- Contractor reports
Traffic and Transport	Frequency of disruptions and blocked roadways	Monitor if the driver follows the speed limit, road safety rules or not.	- Public complaint and contractor reports
Operation			
Incidence of worker or public accidents and injuries, or spills of hazardous materials	Frequency of accidents and spills	No increase in pre-construction frequency	PMU
EMF levels	Measurement of EMF levels	EMF level are below National Environmental Quality Guideline Frequency - 50Hz 60Hz Electric field (Vm) - 5000 100 Magnetic field (μT) - 4150 83	EMF meter reading

<Table 9.3-3> Environmental Monitoring Location for Air Quality Survey

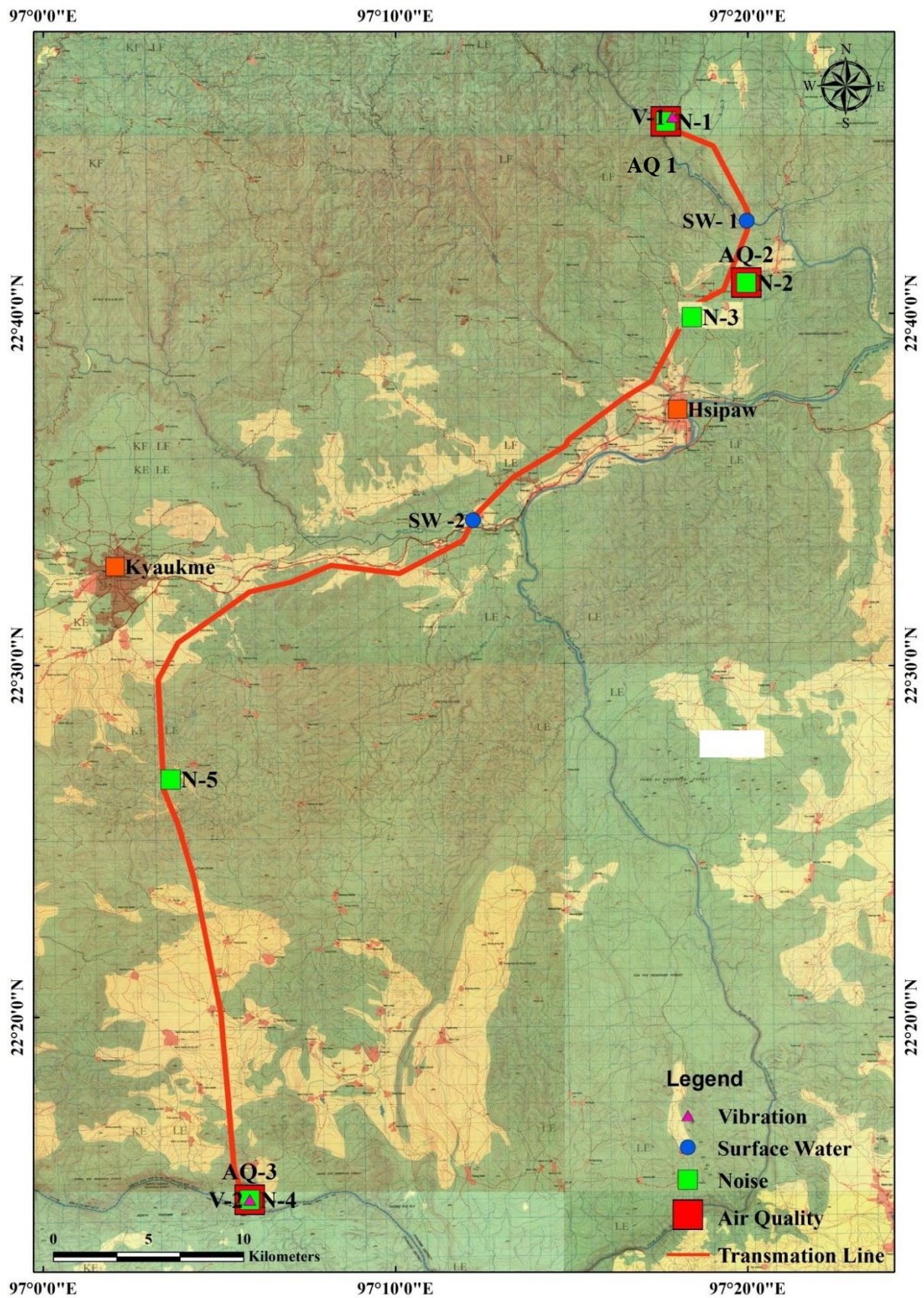
Sampling Point	Coordinates	Description of Sampling Point
AQ-1	22°45'26.29"N 97°17'41.05"E	Namtu HPP compound near Chaung Sar village, Namtu Township
AQ-2	22°40'51.79"N 97°19'57.97"E	Pan Ne Village, Hsipaw Township
AQ-3	22°14'48.93"N 97° 5'51.66"E	Upper Yeywa Hydropower project site

<Table 9.3-4> Environmental Monitoring Location for Noise Level Stations

Monitoring ID	Coordinates	Description
N-1	22°45'26.29"N 97°17'41.05"E	Namtu HPP compound near Chaung Sar village, Namtu Township
N-2	22°40'51.79"N 97°19'57.97"E	Pan Nea Village, Hsipaw Township
N-3	22°40'36.99"N 97°19'1.95"E	Naung Thagyar Village, Hsipaw Township
N-4	22°14'48.93"N 97° 5'51.66"E	Upper Yeywa Hydropower project site
N-5	22°26'45.30"N 97° 3'37.10"E	Pan Lock Village, Kyaukme Township

<Table 9.3-5> Environmental Monitoring Location for Surface Water Quality Survey

Category	Sampling Point	Coordinates	Description of Sampling Point
Surface Water	SW- 1	22°42'37.20"N 97°19'58.73"E	Myitnge River near Transmission Line Tower no, 20 and 21
Surface Water	SW -2	22°34'6.85"N 97°12'12.22"E	Near Longkon village, Hsipaw township and Transmission line Tower no. 76.
Surface Water	SW-3	22°14'34.38"N 97° 5'41.47"E	Near Dam site of Upper Yeywa Hydropower project and Dokehtawaddy Bridge (Yeywa)



<Figure 9.3-1> Sampling Location for Environmental Monitoring

9.4 Estimated cost for Environmental Monitoring

Implementation of environmental controls during construction is the responsibility of the construction contractor. The EMP costs are primarily for environmental monitoring because the costs for implementing impact mitigation measures are included with the construction costs in contractor bid documents. The environmental costs in Table 9.4-1 are for field sampling and laboratory analyses which include professional per diems of technicians. Estimated costs of monitoring will be updated with monitoring plan and overall EMP at detailed designs stage.

<Table 9.4-1> Estimated costs for Environmental Monitoring Plan of EMP

Project Phase	Monitoring Item	Estimated Cost (USD)	Source of Fund
Construction Phase	Training of PMU/Environmental officer on environment safeguards	2,000.00	NCEH
	Air quality (3 locations)	3,500.00	NCEH
	Noise level (5 locations)	1,600.00	NCEH
	Water quality (3 locations)	3,000.00	NCEH
	Public consultation (Prior to construction work)	2,000.00	NCEH
	EMF meter (1 unit)	1,200.00	NCEH
	Biodiversity (Flora and Fauna)	2,500.00	NCEH
Operation phase	EMF and safety clearance monitoring	No marginal cost	NCEH
	Biodiversity (Flora and Fauna)	2,500.00	NCEH
	Community Health and Safety (electrocution)	1,000.00	NCEH
	Occupational Health and Safety	1,000.00	NCEH
	Total cost (USD)	20,300.00	
Total cost (MMK)		29,435,000.00	

9.5 Agricultural Production

Table 9.5-1 shows the estimated total affected agricultural land in a rain season and dry season. 390 acres of agricultural land is to be affected from the project. The affected agricultural land is 100 % used for producing rice in a rain season. During a dry season, 75 % of total affected agricultural land is used for cultivating mainly maize, soybeans and sesame.

<Table 9.5-1> Usage of Affected Agricultural Land

Township	Rain Season	
	Affected Agricultural Land (acres)	Type of Crop
Namtu	32	Rice, Maze,
Hsipaw	234	Rice, Maze, Soybeans, Sesame
Kyaukme	124	Rice, Maze, Soybeans, Sesame
	390	-

Source : REM field survey and google map

9.5.1 Summary of potentially affected households and assets

According to the survey result, potential affected households were identified in villages under three townships. During construction of transmission line, assets such as hut in the R.O.W. need to be temporary setting back and agricultural activities in the R.O.W. will be disturbed. The construction activities will be carried out in a dry season.

During the transmission line construction, 35 assets in the construction R.O.W. will be temporary affected. Total agricultural land in R.O.W is about 390 acres and about 190 acres are paddy field in Rain Season. Similarly, about 200 acres of agricultural land for dry season crop cultivation will be affected. The summary of affected assets and land are shown in Table 9.5-2.

<Table 9.5-2> Summary of Affected Assets and Land

Item	Unit	
Affected Township	Number	3
Affected Village	Number	17
Agricultural Land in R.O.W.	Acre	390
Agricultural Land in the ROW in which the land is cultivated during construction period (dry season)	Acre	(293)
Farm Hut to use the land in the ROW for agriculture	Number	32
Household to own the assets in the ROW	Number	3

Source: Google Map

9.5.2 Temporary Land Occupation

As for the agricultural land, which is to be temporary occupied due to transmission line construction, cash compensation will be paid for the loss of one crop season produce from the affected land. The compensation standard will be finalized at compensation committee, which will be established in Namtu Township, Hsipaw Township and Kyaukme Township right after carrying out detailed measurement survey (DMS). The compensation standard will be based on market price recorded at agricultural department at Namtu Township, Hsipaw Township and Kyaukme Township.

Compensation committee: At the request of DPTSC/MOEE compensation committee for crop compensation shall be established in three Townships one or two months before the commencement of construction. The compensation committee comprises of General Administrated Department, Agricultural and Irrigation Department, Land Record Department in each township and DPTSC. The role of each member in the committee is as follows;

- 1) Land record department determines who owns the land and how much area is to be affected.
- 2) Agricultural department identifies the market price of to-be-affected-crop for estimating compensation and,
- 3) General Administration department negotiates with land occupiers about price of crop compensation.
- 4) DPTSC disburses crop compensation according to the decision of the crop compensation committee.

9.5.3 Compensation Estimate

i. Temporary Land Occupation Cost Estimates

Table 9.5-3 presents the market price and estimated yield for dry season cultivation and temporary land occupation (crop compensation and trees) cost estimate is shown in Table 9.5-4.

<Table 9.5-3> Market price and estimated yield per acre for sesame, soybeans and maize

Affected Crop		Unit Price
Item	Baskets (Tin)	Tin / MMK
Sesame	10	24,500
Soybeans	20	14,000
Maize	60	10,800

<Table 9.5-4> Temporary Land occupation Cost Estimates

Affected Crop	Affected Area	Yield (Average baskets of Sesame, Soybeans and Maize)	Unit Price	Amount
Item	acres	Baskets (Tin)	Tin / MMK	MMK
Sesame	293	87,90	16,433	144,449,000.00
Soyabeans				
Maize				
		Numbers	Price	
Trees		420	3000	1,260,000.00
Total Estimated Cost				145,709,000.00

CHAPTER 10

CONCLUSION AND RECOMMENDATIONS

The proposed project includes construction and operation of the 230kV overhead transmission line originated at the 210 MW hydropower station in Namtu township, traverses the Hsipaw township, and ends at the new switching substation under the construction unit 3 of the Upper Yeywa Hydropower Development project.

This IEE was prepared at the planning stage of the project, following the procedures and any applicable guidelines issued by MONREC. Field surveys (of physical, ecological and social) were carried out based on the sensitivity of the surrounding environment throughout the transmission line alignment to assess the potential environmental and social impacts. This IEE report reveals all potential environmental and social impacts, and proposed mitigation measures which were based on the description of the project information provided by the proponent and significance of the predicted impacts.

Since the alignment of this overhead transmission line avoids ecologically sensitive and large settlement areas, the project will not cause significant adverse environmental and social impacts except the farmland compensation issues due to the land requirement for the tower foundation structure. However, the project associated impacts such as dust and PM pollution, noise pollution, drainage congestion and water logging, soil contamination, increase of solid waste generation, occupational and community health hazards are mostly expected to occur during the construction stage. These impacts are expected to be short term in nature and can be minimized with the proposed mitigation measures.

It is recommended that regular monitoring of the proposed EMPs, EMoP stated in this IEE report and execution of environmental mitigation measures should be carried out during the construction and operation stages of the project.