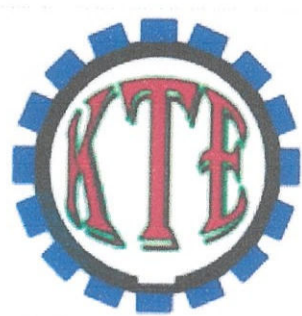


FEB 2018

KYAING TONG ENERGY CO.,LTD



ENVIRONMENTAL MANAGEMENT PLAN REPORT  
FOR  
NAN SO HYDROPOWER

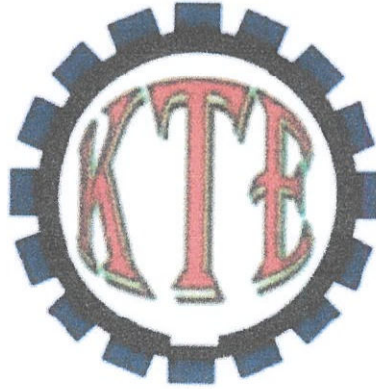
သယံဇာတနှင့်သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာန  
ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန  
အဝ. ညီ ပျံအစီရင်ခံစာ  
ဝန်ကြီးရုံးခွဲပုံပြတဲရအမှတ်/ရက်စွဲ ဦးစီးဌာန-အ. ၂/၂  
(၂၄၄၅၂) (က) / ၂၀၁၉ ( ၁၇-၁၁-၂၀၁၉ )  
ညွှန်ကြားရေးမှူး ( EIA )



Earth Tree Environmental Services Co., Ltd



Environmental Management Plan Report for Nan So Hydropower  
Kyaing Tong Energy Company Limited



**Environmental Management Plan [EMP] Report  
For Nan So Hydropower Project**

**Proposed by:**

**Kyaing Tong Energy Co.,Ltd**

**Prepared by:**

**Earth Tree Environment Services Co.,Ltd**

**Dec, 2018**

**ETES**

**1**

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## Contents

### Executive Summary 7

1	INTRODUCTION.....	9
1.1	Background of the Study .....	9
1.2	Project Description of the Nan So Hydropower Project .....	9
1.3	Project Location .....	10
1.4	Kyaing Tong District Maps.....	11
1.5	Project Location of the Nan So Hydropower .....	12
1.6	Near the villages of Nan So hydropower project .....	13
1.7	Point of the Project Location Area .....	14
1.8	Nan So hydropower project layout plan and design .....	15
1.9	Project Salient Features .....	16
1.10	Organization Chart .....	19
1.11	Project Proponent.....	19
1.12	Investment Plan of Kyaing Tong Energy Company.....	20
1.13	EARTH TREE ENVIRONMENTAL SERVICES CO., LTD .....	21
	EIA STUDY TEAM.....	22
2	OVERVIEW OF THE LEGAL FRAMEWORK .....	24
2.1	Relevant Legislations.....	24
1.1	APPLICATION OF INTERNATIONAL GUIDELINES .....	35
2.2	Application of International and Domestic Guidelines .....	36
2.3	Environmental Impact Assessment Procedures (2015).....	36
2.4	International Guidelines and Standards.....	36
2.5	World Bank Group Operation Policies.....	37
2.5.1	<i>Environmental Assessment</i> .....	37
2.5.2	<i>Natural Habitats</i> .....	37
2.5.3	<i>Forestry</i> .....	38
2.5.4	<i>Cultural Property</i> .....	38
2.5.5	<i>Involuntary Resettlement</i> .....	38
2.5.6	<i>Safety of Dams</i> .....	39
2.6	The IFC Performance Standards.....	39
2.7	IFC Environmental, Health and Safety (EHS) Guidelines.....	42
2.8	World Commission on Dams .....	42
2.8.1	<i>Strategic Priority 1 – Gaining Public Acceptance</i> .....	43
2.8.2	<i>Strategic Priority 2 – Comprehensive Options Assessment</i> .....	43
2.8.3	<i>Strategic Priority 3 – Addressing Existing Dams</i> .....	43
2.8.4	<i>Strategic Priority 4 – Sustaining Rivers and Livelihoods</i> .....	44
2.8.5	<i>Strategic Priority 5 – Recognizing Entitlements and Sharing Benefits</i> .....	44
2.8.6	<i>Strategic Priority 6 – Ensuring Compliance</i> .....	44
2.8.7	<i>Strategic Priority 7 – Sharing Rivers for Peace, Development and Security</i> .....	45
2.9	International Hydropower Association (IHA) Sustainability Guidelines .....	45
2.9.1	<i>Hydropower Sustainability Assessment Protocol</i> .....	47
3	DESCRIPTION OF THE PHYSICAL ENVIRONMENT OF NAN SO HYDROPOWER PROJECT .....	48
3.1	Relief and Drainage .....	49
3.2	Climate.....	49
3.3	Regional Geology .....	50
3.4	Topography.....	51
3.5	Soil.....	51
3.6	Natural Vegetation .....	52
3.7	Hydrology .....	52
3.8	Water Quality .....	52



Environmental Management Plan Report for Nan So Hydropower  
Kyaing Tong Energy Company Limited

3.9	Air Quality .....	53
3.10	Noise, Traffic and Vibration .....	56
3.11	Social and Cultural Resources .....	56
3.12	Educational Attainment .....	58
3.13	Health Facility .....	58
3.14	Culture Heritage .....	58
3.15	Social Groups .....	58
3.16	Township Economy .....	59
3.17	Land Use .....	59
4	ENVIRONMENTAL MANAGEMENT PLAN (EMP) OF NAN SO MINI HYDROPOWER PROJECT .....	60
4.1	SUMMARY .....	60
4.1.1	Environmental Monitoring Plan .....	61
4.1.2	Monitoring Parameters .....	61
4.1.3	Environmental Monitoring Reports .....	61
	<i>On-Site Emergency Plan</i> .....	63
	<i>Occupational Health Care (OHC)</i> .....	63
4.2)	OCCUPATIONAL SAFETY, HEALTH & ENVIRONMENT PROTECTION POLICY .....	64
4.2.1	Emergency Preparedness and Response Plan .....	64
4.3	BIODIVERSITY MANAGEMENT AND CONSERVATION PLAN .....	65
4.4	Introduction .....	65
4.5	Biological Environment .....	65
4.5.1	<i>Land Use</i> .....	65
4.5.2	<i>Hydropower Potential on Stream Nam So, Kyaing-Toung</i> .....	66
4.5.3	<i>Salient Feature of the Nam So Hydroelectric Power Station</i> .....	66
4.5.4	<i>Sampling Locations</i> .....	66
4.7	Terrestrial and Aquatic Fauna Survey .....	68
4.8	Classification of Terrestrial and Aquatic Fauna and Flora .....	68
4.8.1	<i>Fauna (Vertebrate)</i> .....	68
1.	<i>Mammals</i> .....	68
2.	<i>Birds</i> .....	68
3.	<i>Reptilian</i> .....	77
	<i>Agamidae</i> .....	78
	<i>Bronchocela cristatella</i> .....	78
4.	<i>Aquatic Fauna</i> .....	79
4.8.2	<i>Fauna (Invertebrate)</i> .....	80
4.8.3	<i>Fauna (Invertebrate)</i> .....	80
4.8.4	<i>Butterfly</i> .....	81
4.8.3	<i>Floristic and Forest Types</i> .....	83
5	CURRENT ENVIRONMENTAL ASPECTS .....	88
5.1	Terrestrial Ecosystem .....	88
i)	<i>Land Use and Land Cover</i> .....	88
ii)	<i>Submergence</i> .....	88
iii)	<i>Habitat / species loss</i> .....	88
iv)	<i>Riparian Vegetation</i> .....	89
5.2	Catchment area treatment Plan .....	89
5.3	Reservoir Rim Treatment plan .....	89
5.4	Preventive Biological Measures .....	90
5.5	Landscaping and Re-Vegetation Working Areas .....	90
	Mitigations of Biodiversity on Nam So Mini Hydropower Plan .....	91
6	EXISTING SOCIO-ECONOMIC ENVIRONMENT .....	97
6.1	Introduction .....	97
6.2	Project Location .....	97



Environmental Management Plan Report for Nan So Hydropower  
Kyaing Tong Energy Company Limited

6.3	Methodology .....	97
6.4	Population in Affected Villages.....	97
6.6	Education Level.....	100
6.7	Income Level and Source of Income.....	101
6.8	Socio-Economic Information.....	101
6.9	Changes in your village/community over the past 5 years.....	103
6.10	Understanding and perceptions of the Project.....	103
	Public Consultation and Disclosure.....	104
6.11	Public Stakeholder Meeting.....	104
6.11	COOPERATE SOCIAL RESPONSIBILITY (CSR).....	104
6.12	BUDGET FOR ENVIRONMENTAL MANAGEMENT PLAN AND CSR.....	105
6.13	ENVIRONMENTAL MONITORING PLAN (EMoP) .....	107
6.14	Scope of the Environmental Monitoring Plan .....	107
	Environmental Monitoring and Management Team.....	108
	COMMUNITY GRIEVANCE MECHANISM.....	108
6.15	ENVIRONMENTAL REPORTING.....	109
7	CONCLUSION AND RECOMMENDATION.....	110
7.1	Conclusion.....	110
7.2	Recommendation.....	111
	ACCOUNTABILITY STATEMENT.....	115
	REFERENCES (Fauna).....	116
	REFERENCES (Flora).....	118



## List of Table

Table 1. 1	Investment Plan of Kyaing Tong Energy Company .....	20
Table 1. 2	Team members and consultants of ETES .....	21
Table 3. 1	Average Temperature of Kyaing Tong (1997 to 2016) .....	49
Table 3. 2	Gaseous and particles concentration air .....	55
Table 3. 3	Population of Kyaing Tong Township (March 2016) .....	57
Table 3. 4	Population of different races living in Kyaing Tong Township (March 2016).....	57
Table 4. 1	Environmental Monitoring Plan .....	61
Table 4. 2	Budget allocation for Environmental Monitoring Plan .....	62
Table 4. 3	The Salient Features of the study site are as identified below.....	66
Table 4. 4	Ecological Sampling Locations and Elevation for Power House, Transport pipeline and Reservoir .....	67
Table 4. 5	Bird species recorded during the survey period in Nam So Mini Hydropower Project 69	
Table 4. 6	Reptile species recorded from Nam So Mini Hydropower Project Area during the survey period.....	78
Table 4. 7	Aquatic species recorded during the survey period in Project Area .....	79
Table 4. 8	Butterfly species recorded from Nam So Mini Hydropower Project Area during the survey period.....	81
Table 4. 9	Dragonfly and Damselfly species recorded from Nam So Mini Hydropower Project Area during the survey period.....	82
Table 4. 10	Plant Species Inventory List of the study area, the total of 26 species belongs to 25genera and 21 families. ....	83
Table 5. 1	Summary of Actual Impacts and Actual Management Plan .....	90
Table 5. 2	Financial requirements for the biological measures to rehabilitate study sites of Nam So HPP .....	96
Table.6. 1	Respondent Housholds in the Project Area .....	98
Table.6. 2	Near the villages of Nan So Mini Hydropower .....	99
Table.6. 3	Interview Responded Ages .....	99
Table.6. 4	Education Levels of Respondents.....	100
Table.6. 5	The estimated budget for environmental management and monitoring plan .....	106



## List of Figure

Figure 1. 1	Kyaing Tong District in Eastern Shan State Map .....	11
Figure 1. 2	Project Location of the Nan So Hydropower .....	12
Figure 1. 3	Near the villages of Nan So Hydropower Project .....	13
Figure 1. 4	Point of the Prpject Location Area .....	14
Figure 1. 5	Nan So hydropower project layout plan and design.....	15
Figure 1. 6	Project Salient Features .....	16
Figure 1. 7	Project Operation Building and Dam Site Map.....	18
Figure 2. 1	Kyaing Tong Township Map .....	48
Figure 3. 1	Gaseous and particles concentration in air .....	55
Figure 3. 2	Measuring the noise.....	56
Figure 4. 1	Mammals species recorded from Nam So Mini Hydropower Project Area .....	68
Figure 4. 2	Bird species recorded from Nam So Mini Hydropower Project Area .....	77
Figure 4. 3	Reptile species recorded from Nam So Mini Hydropower Project Area.....	79
Figure 4. 4	Fish species recorded through out up and down stream of Nam So in Nam So Mini Hydropower Project Area.....	80
Figure 4. 5	Butterfly species recorded from Nan So Mini Hydropower Project Area.....	82
Figure 4. 6	Dragonfly species recorded from Nam So Mini Hydropower Project Area.....	83
Figure 6. 1	Respondent Households in the Project Area.....	98
Figure 6. 2	Education Levels of Respondents.....	100
Figure 6. 3	Interview Responded Own Fields (Acres).....	102

စီမံကိန်းအကျဉ်းချုပ်

ယခုပတ်အစီရင်ခံစာသည် ကျိုင်းတုံစွမ်းအင် ကုမ္ပဏီလီမိတက်မှ နမ့်စိုချောင်းတွင် ROR နည်းလမ်းဖြင့် ရေအားလျှပ်စစ်ထုတ်လုပ်ခြင်း လုပ်ငန်းအတွက် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် အစီရင်ခံစာဖြင့်ပါသည်။ အဆိုပြုစီမံကိန်းတည်နေရာသည် ကျိုင်းတုံမြို့မှ (၁၄ မိုင်) ခန့်အကွာ၊ ကောင်းတန်ကျေးရွာနှင့် ဝမ်ကျင်းကျေးရွာတို့နှင့် (၁) မိုင်ကျော်ခန့်ကွာဝေးပြီး မြောက်လတ္တီတွဒ် (၂၁° ၁၀' ၁၇.၉၃") နှင့် အရှေ့လောင်ဂျီကျု (၉၉° ၃၄' ၃၀.၁၅") ဖြစ်ပြီး၊ အမြင့်ပေ (၃၃၉၅) ခန့်တွင်တည်ရှိပါသည်။ စီမံကိန်းမြေဧရိယာအကျယ်အဝန်းမှာ (၁၈၀ X ၂၅၈) စတုရန်းပေ (၁.၀၇) ဧကခန့်ကျယ်ဝန်းပါသည်။

နမ့်စိုချောင်းလျှပ်စစ်စက်ရုံ (၁၂၅၀ KW X ၂) တည်ဆောက်ပြီး လျှပ်စစ်ဓာတ်အား ထုတ်လုပ်ဖြန့်ဖြူးရေးကာ ကျိုင်းတုံမြို့သို့ လျှပ်စစ်ဖြန့်ဖြူးလျှက်ရှိပါသည်။ နမ့်စိုချောင်းလျှပ်စစ်စက်ရုံအတွက် စတင်ရေသွယ်ယူသောရေ သွယ်မြောင်းမှ အလျား (၇၅၈၉) ပေ နှင့် အနံ (၂၂) ပေရှိပြီး၊ ဧရိယာအားဖြင့် (၃.၈၃) ဧကခန့်ဖြစ်၍ အမြင့်ပေ (၅၅၀၀) ခန့်တွင်တည်ရှိပါသည်။

နမ့်စိုချောင်းလျှပ်စစ်စက်ရုံအတွက် ရေစု (ရေထိန်း) ကန် ဆောက်လုပ်ထားရှိသောနေရာမှာ (၃၇၀ X ၁၈၀) စတုရန်းပေဖြစ်ပြီး အကျယ်အဝန်းအားဖြင့် (၁.၅၃) ဧကခန့်ရှိပြီး၊ မြောက်လတ္တီတွဒ် (၂၁° ၁၀' ၄၅.၅၇") နှင့် အရှေ့လောင်ဂျီကျု (၉၉° ၃၃' ၁၂.၄၅") ၊ အမြင့်ပေ (၅၃၃၀) ခန့် တွင်တည်ရှိပါသည်။ နမ့်စိုချောင်းလျှပ်စစ် ရေစုကန်နေရာမှ လျှပ်စစ်ဓာတ်အားထုတ်လုပ်မည့် စက်ရုံသို့ဖိအားမြင့်ပိုက်သွယ်တန်းထားရှိသော လမ်းအူကြောင်းမှာ (၅၂၇ X ၂၄) စတုရန်းပေရှိ၍၊ ဧရိယာအကျယ်အဝန်းမှာ (၂.၉၁) ဧကခန့်ရှိပါသည်။

နမ့်စိုချောင်းလျှပ်စစ်ဓာတ်အားပေးစက်ရုံတည်ဆောက်ခြင်း၊ လမ်းဖောက်ခြင်း၊ ရေစု (ရေထိန်းကန်)၊ ဖိအားမြင့်ပိုက်လိုင်း၊ ရေသွယ်မြောင်းနှင့် စက်ရုံဓာတ်အားခွဲရုံတည်ဆောက်ခြင်းတို့အတွက် စုစုပေါင်း (၉.၃၄) ဧကရှိပါသည်။ နမ့်စိုချောင်းလျှပ်စစ်ဓာတ်အားဖြန့်ဖြူးရေးမှ တစ်နာရီလျှင် (၁၂.၅၀ KW) ထွက်ရှိပါသည်။ နမ့်စိုချောင်းလျှပ်စစ်မှထွက်ရှိသော ဓာတ်အားနှင့် နမ့်ဂုတ် (၂) မှထွက်ရှိသော (၃၃ KV) ဓာတ်အား တို့ပေါင်းကာ ကျိုင်းတုံမြို့သို့ လျှပ်စစ်ဓာတ်ဖြန့်ဖြူးလျှက်ရှိပါသည်။

ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီဌာနမှ စစ်ဆေးရေးအဖွဲ့သည် စီမံကိန်းလည်ပတ်ခြင်းကို ဩဂုတ်လ ၂၀၁၇ တွင်လာရောက် စစ်ဆေးမှုများပြုလုပ်ခဲ့ပြီး ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် အစီရင်ခံစာ (EMP) ရေးဆွဲရန်သဘောထားမှတ်ချက်ချပေးခဲ့ပါသည်။ နမ့်စိုချောင်းလျှပ်စစ်စီမံကိန်းသည် မိုင်ခွန်ကြီးပိုင်း အတွင်း တွင်ရှိပါသည်။ သို့ပါသောကြောင့် နမ့်စိုချောင်းလျှပ်စစ်စက်ရုံမှ သက်ဆိုင်ရာတာဝန်ခံများနှင့် သစ်တောဦးစီးဌာန တို့အတူတကွပူးပေါင်း၍ သစ်တောထိန်းသိမ်းခြင်းလုပ်ငန်းများကိုလုပ်ဆောင်လျက်ရှိပါသည်။



ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် အစီရင်ခံစာ (EMP) ပြင်ဆင်ရာတွင် လက်ရှိထုတ်ပြန်ထားသော ဥပဒေ နှင့် နည်းလမ်းများအတိုင်း လိုက်နာအသုံးပြုထားပါသည်။ Earth Tree Environmental Services Company Limited သို့ အစီရင်ခံစာရေးဆွဲရန်အတွက် အလုပ်အပ်နှင်းခဲ့ပါသည်။

ကွင်းဆင်းလေ့လာခြင်းဖြစ်သော ပတ်ဝန်းကျင် အရည်အသွေးတိုင်းတာခြင်းနှင့် နဂိုရှိပြီးဖြစ်သော အချက်အလက်များ စုဆောင်းခြင်းများဖြစ်သော ပတ်ဝန်းကျင် အရည်အသွေးတိုင်းတာခြင်းနှင့် နဂိုရှိပြီးဖြစ်သော အချက်အလက်များ စုဆောင်းခြင်းများကို အခြေခံအချက်အလက်များရရှိရန်အတွက် ၂၀၁၈ ဇန်နဝါရီလ တွင်လုပ်ဆောင်ခဲ့ပါသည်။ (အသေးစိတ်ကို အခန်း ၁ တွင်ဖတ်ရှုနိုင်ပါသည်)

စီမံကိန်းအတွက် ပတ်ဝန်းကျင် ကာကွယ်ရန်နိုင်ငံတော်၏ ဥပဒေများနှင့် စည်းမျဉ်းများကိုဖော်ပြ ထားပါသည်။ စီမံကိန်းမှ လိုက်နာဆောင်ရွက်ရမည့် နည်းဥပဒေများကို အခန်း ၂ တွင်ဖော်ပြထားပါသည်။ (အသေးစိတ်ကို အခန်း ၂ တွင်ဖတ်ရှုနိုင်ပါသည်)

နမ့်စိုရေအားလျှပ်စစ်ထုတ်လုပ်ဖြန့်ဖြူးခြင်းအနီးအနားသို့ ကွင်းဆင်းလေ့လာခြင်းသည် ထိခိုက်မှုများကို ဆန်းစစ်ခြင်းအတွက် အလွန်အရေးကြီးပါသည်။ ပတ်ဝန်းကျင်အရည်အသွေးတိုင်းတာခြင်းကဲ့သို့သော လက်ရှိအခြေအနေကိုကွင်းဆင်းလေ့လာခြင်းသည် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်ရေးဆွဲခြင်း လုပ်ငန်း အတွက် အရေးပါသောအခန်းကဏ္ဍအဖြစ် တည်ရှိနေသည်။ ထို့ကြောင့် ၂၀၁၈ ဇန်နဝါရီလ တွင် လေအရည်အသွေး၊ လေအရည်အသွေး နှင့် ဆူညံသံ တို့ကို စီမံကိန်းနေရာတွင် တိုင်းတာမှုများပြုလုပ်ခဲ့ပါသည် ရရှိလာသော အချက်အလက်များကို အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှန်မှု) လမ်းညွှန် ချက်များ နှင့် ကမ္ဘာ့ဘဏ် လမ်းညွှန် ချက်များနှင့် နှိုင်းယှဉ်ခဲ့ပါသည်။ တိုက်တာချက်များအရဖန်မှုန့် (PM<sub>10</sub>) သည် အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှန်မှု) လမ်းညွှန် ချက်များအတွင်းရှိနေပြီး (PM<sub>2.5</sub>) သည်လည်း လမ်းညွှန်ချက်များထက် ထဲတွင်ရှိနေပါသည်။ ဓာတ်ငွေ့ထုတ်လွှတ်မှု (CO, CO<sub>2</sub>, SO<sub>2</sub> နှင့် NO<sub>2</sub>) သည်သက်ဆိုင်သော လမ်းညွှန်ချက်များအတွင်း တွေ့ရှိရပါသည်။ ဆူညံသံသည်လည်း သတ်မှတ်ချက်အတွင်းရှိသည်။ ထို့ကြောင့် ဆူညံသံသည် ယခုစီမံကိန်းသည် ပတ်ဝန်းကျင်နှင့် ရေအရင်အမြစ်များ ထင်ရှားစွာ သက်ရောက်နိုင်သည့် အခြေအနေတွင်မရှိနေပါ။ (အသေးစိတ်ကို အခန်း ၃ တွင်ဖတ်ရှုနိုင်ပါသည်)။

နမ့်စိုရေအားလျှပ်စစ်ထုတ်လုပ်ဖြန့်ဖြူးခြင်း၏ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်ရေးဆွဲခြင်း အခန်း ၄ တွင်ဖော်ပြထားပါသည်။ (အသေးစိတ်ကို အခန်း ၄ တွင်ဖတ်ရှုနိုင်ပါသည်)။ ယခုပတ်ဝန်းကျင်အခြေအနေများကို အခန်း ၅ တွင်ရေးသားဖော်ပြထားပါသည်။ (အသေးစိတ်ကို အခန်း ၅ တွင်ဖတ်ရှုနိုင်ပါသည်)

စီမံကိန်းလုပ်ဆောင်ချက်များသည် ပတ်ဝန်းကျင်၊ ဂေဟစနစ်၊ လူမှုစီးပွားဆိုင်ရာ နှင့် သက်ဆိုင်ရာ အစိုးရဌာနများ၊ ဒေသခံပြည်သူများနှင့် တွေ့ဆုံရှင်းလင်းမှုများပြုလုပ်ခဲ့ပါသည်။ နမ့်စိုရေအားလျှပ်စစ်ထုတ်လုပ်

ခြင်း ဒေသဖွံ့ဖြိုးတိုးတက် နှင့် လူမှုစီးပွားဆိုင်ရာဖွံ့ဖြိုးရေးကိုလည်ကောင်မွန်သော အထောက်အပံ့ဖြစ် စေပါသည်။ (အသေးစိတ်ကို အခန်း ၆ တွင်ဖတ်ရှုနိုင်ပါသည်)

နမ့်စိုရေအားလျှပ်စစ်ထုတ်လုပ်ဖြန့်ဖြူးခြင်းလုပ်ငန်း လည်ချိန်၌ သစ်တောများကိုခုတ်လဲမှုမရှိခြင်း၊ နမ့်စိုချောင်းအတွင်းရှိ ရေကိုအကုန်သုံးဆွဲမှုမရှိပဲ ချောင်းအောက်ပိုင်ရှိကျေးရွာများရေရရှိရေအတွက် သတ်မှတ်ရေပမာဏကို ထုတ်လွှတ်ပေးသွားမည်ဖြစ်ပါသည်။ ထိုအပြင် စီမံကိန်းဧရိယာအတွင်းမြေပြိုကျမှုများ မဖြစ်စေရန်အတွက် အကြီးမြန်သစ်ပင်များ၊ ဝါးပင်များကိုစိုက်ပျိုးထားလျက်ရှိပါပြီး၊ နောက်ထပ်စိုက်ပျိုးသွားမည် ဖြစ်ပါသည်။ လူမှုစီးပွားဖွံ့ဖြိုးတိုးတက်စေရန်နှင့် လူမှုစီးပွားရေးတာဝန်ခံမှုအစီအစဉ် (CSR) ကိုလည်း ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် အစီရင်ခံစာတွင် ထည့်သွင်းဖော်ပြထားပါသည်။ စီမံကိန်းအဆိုပြုသူမှ လူမှုစီးပွားရေးတာဝန်ခံမှုအစီအစဉ် (CSR) ကို စီမံကိန်းမှ အသားတင်အကျိုးအမြတ်၏ ၂ %အား စီမံကိန်းဒေသဖွံ့ဖြိုးတိုးတက်ရေးအတွက် အသုံးပြုရမည်ဟု မြန်မာနိုင်ငံ သယံဇာတနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာနမှ ထုတ်ပြန်ထားသော နည်းဥပဒေတို့တွင်ဖော်ပြပါရှိပါသည်။ သို့ဖြစ်ပါသောကြောင့် ကျိုင်းတုံစွမ်းအင် ကုမ္ပဏီလီမိတက်သည် ကျန်းမာရေး၊ ပညာရေး၊ လူမှုရေး နှင့် အခြားသော ဒေသဖွံ့ဖြိုးတိုးတက်ရေးတို့တွင် ပုံမှန်လုပ်ဆောင်သွားမည်ဖြစ်ပါသည်။ ထိုအပြင် ၎င်း

နိဂုံးချုပ်အားဖြင့် ယခုစီမံကိန်းသည် လုပ်ငန်းလည်ပတ်သည့်ကာလနှင့် လုပ်ငန်းဖျက်သိမ်းသည့် ကာလနှစ်ခုလုံးတွင် ဒေသခံပြည်သူများကိုအလုပ်အကိုင်အခွင့်အလမ်းများ ဖန်တီးပေးနိုင်ပါသည်။ ပတ်ဝန်းကျင်ဆိုင်ရာစောင့်ကြည့်လေ့လာရေးအဖွဲ့ထားရှိကာ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် အစီရင်ခံစာ အတွင်းရေးဆွဲထားသည့်အချက်များတိုးဘက်မှုရှိစေရန်နှင့် ပြုပြင်မွမ်းမံမှုများပြုလုပ်နိုင်ရန်အတွက် ပုံမှန်ပြန် လည်စစ်ဆေးခြင်းများပြုလုပ်ရမည်ဖြစ်ပါသည်။ ထိုပြင် စီမံကိန်းအကောင်အထည်ဖော်သူသည် မြန်မာနိုင်ငံ၏ ပတ်ဝန်းကျင်နှင့် သက်ဆိုင်သော မူဝါဒများ၊ ဥပဒေများ၊ နည်းဥပဒေများ၊ သတ်မှတ်ချက်များကို လိုက်နာရန်လိုအပ်ပါသည်။ (အသေးစိတ်ကို အခန်း ၇ တွင်ဖတ်ရှုနိုင်ပါသည်)



## **Executive Summary**

This is the Environmental Management Plan (EMP) report for the generation of Electricity from the Nan So stream with the “Rum of River” hydropower project to be implemented by Kyaing Tong Energy Company Limited. The Nan So mini hydropower project location is about 14 miles (22.53 km) from Kyaing Tong Town. The main objective of the proposed is to distribute electrical energy to the Kyaing Tong for various kinds of regional development activities including small and medium enterprises (SMEs).

The government inspection teams visited the proposed area before the project was started. The inspection team from Environmental Conservation Department from Taunggyi visited the project site during August 2017 and give comments to carry out EMP study for the project.

The proponent has commissioned Earth Tree Environmental Services Company Limited as consultant to carry out the study for the Environmental Management Plan of this project. So, site reconnaissance survey, environmental quality measurement and secondary data collections were carried out during January 2018 to get the baseline data. The existing laws and regulations are regulations are applied for the preparation of this EMP report for Nan So mini hydropower plant.

This project active may cause impacts on environment, ecological resources and human and also socio economic condition of the local people. However, there is not much negative impact due to the nature of the project. As the project is to generate electricity, it can stimulate the development of the region.

There is concern about landslide and soil erosion due to the excavation work and removal of vegetation cover. Nevertheless, retaining wall will be constructed along the steep-slope areas and replanting of fast growing indigenous tree species will be done to compensate loss of vegetation cover and also to improve the aesthetic value. The project will not use all the water in the stream and the acceptable level of water will be left in the downstream. Thus there is no serious impact on the riparian and terrestrial communities in the downstream. The is recommendation is made in EMP for the extraction of wood, not to extract at the sample place for a long time as it can change not only the stream channel but also the flow rate

The Corporate Social Responsibility (CSR) programs are also taken into account in the EMP. The proponent commitment, that they will use 2% of the net profit for the sake of local communities as CSR plan. Moreover, Kyaing Tong Energy Company Limited should



organize Health, Safety and Environment (HSE) team to accomplish CSR and to review EMP regularly for the improvements and Modification.

Opinion of the local people and stakeholder affected by the development of the proposed project are taken into account to formulate EMP. Therefore, public consultation and information disclosure were held on 22<sup>th</sup> Jan 2018 at the Kyaing Tong Town. One of the women is participant discussion in the PCM. She very worries summary time for the water usage. That time GAD office head officer answer the worries question. We are protect the surrounding project area with forest department and Nan So Hydropower developer.



## 1 INTRODUCTION

### 1.1 Background of the Study

This report is the Environmental Management Plan (EMP) for the generation of electrical energy from Nan So stream with the run of river types mini hydropower project proposed by the Kyaing Tong Energy Co.,Ltd. The proposed project aims to generate electrical energy from the Nan So stream to distribute electricity to the Kyaing Tong and to its countryside for many regional development activities. With the good aims, the proponent signed the memorandum of Understanding (M.O.U) with the Electric Power, State Government.

According to Myanmar Environmental Conservation Law 2012 the proponent of every development project in the country have to submit an Environmental Management Plan (EMP) to the Ministry of Natural Resources Environmental Conservation (MONREC). On behalf of MONREC the Environmental Conservation Department (ECD) and other department under the MONREC, responsible for implementing National Environmental Policy, strategy, framework, planning and action plan for the integration of environmental conservation into in the national sustainable development processes. Thus, an inspection group from Taunggyi ECD visited to the project site on August 2017. Based on the nature project, the inspection team gave comments that it will not be necessary to build a big dam, only a diversion weir will suffice. ECD made final decision to prepare an Environmental Management Plan.

To complete the requires of ECD, Kyaing Tong Energy Co.,Ltd. Commissioned Earth Tree Environmental Services Co.,Ltd for environmental studies and to prepare that will be submitted to ECD.

This report was presented as a Environmental Management Plan report for Nan So Mini Hydropower Project to initiate the required processes under Myanmar's Environmental Impact Assessment Guidelines published on 29 December 2015

### 1.2 Project Description of the Nan So Hydropower Project

Sr. No	Details	Description
1	Project Name	Nan So
2	Project Location Point	21° 10' 17.9" N 99° 34' 30.15" E
3	Project Location Place	Nan So Creek, Kaung Kan, the Mine Kone Village Tract, Kyaing Tong
4	Proponent Name	Kyaing Tong Energy Co.,Ltd
5	Dam Elevation	3395 ft
6	Project Area	1.07 Acres



### 1.3 Project Location

Nan So Mini Hydropower site is located at latitude 21° 10' 17.9" N and longitude 99° 34' 30.15" E on the Nan So creek about 14 miles (22.53 km) from Kyaing Tong Town, Eastern Shan State of Myanmar. Nan So Mini Hydropower is lies in Mine Kon reserve forest. According to the field observation and field survey data, the Nan So Mini Hydropower is lies between 1 mile and 2 miles from Kaung Kan village and Wan Kyin Village. According to the secondary data, the dam is located near four villages (Kaung Kan, Wan Kyin, Kaung San and Wan Hwel). Total project land area is 9.47 Acres. That is included access road, diversion weir, water storage dam and operation factory. Nan So electricity is (12.50 KW)/per hr and Nan Wote electricity output is (33 KV). That compound to distribute electricity at Kyaing Tonge City and near the village.

The size of the reservoir created by a hydroelectric project can vary widely, depending largely on the size of the hydroelectric generators and the topography of the land. The size of the Nam So HPP reservoir is 1.53 acre and the altitude of 5312 meter. Hydroelectric plant in flat areas tend to require much more land than those in hilly areas where deeper reservoirs can hold more volume of water in a smaller space. The Nam So hydroelectric power plant, which was built in a flat area of near Kaung Htan village and the area, is 1.07 acre it only provides 1250 KW of power generating capacity. Along the ways of high presser transported pipeline from reservoir to power house is 5273 x 24 square ft. and 2.91 acre. Project area has the three building that is one of the building is Labor resident, power house and another building is power generator or operation building. Labor resident, power house size is 45 ft x 20 ft and power generator or operation building size is 50 ft x 35 ft. The topography of the study area is mountainous with a deep river valleys running beneath high cliffs. The higher slopes and the tops of the hills remain forested with most of the forested areas designated as reserves. The study area is predominantly rural in character with the majority of the population living in small rural communities. Flooding land for a hydroelectric reservoir has an extreme environmental impact: it destroys forest, wildlife habitat, agricultural land, and scenic lands.



1.4 **Kyaing Tong District Maps**

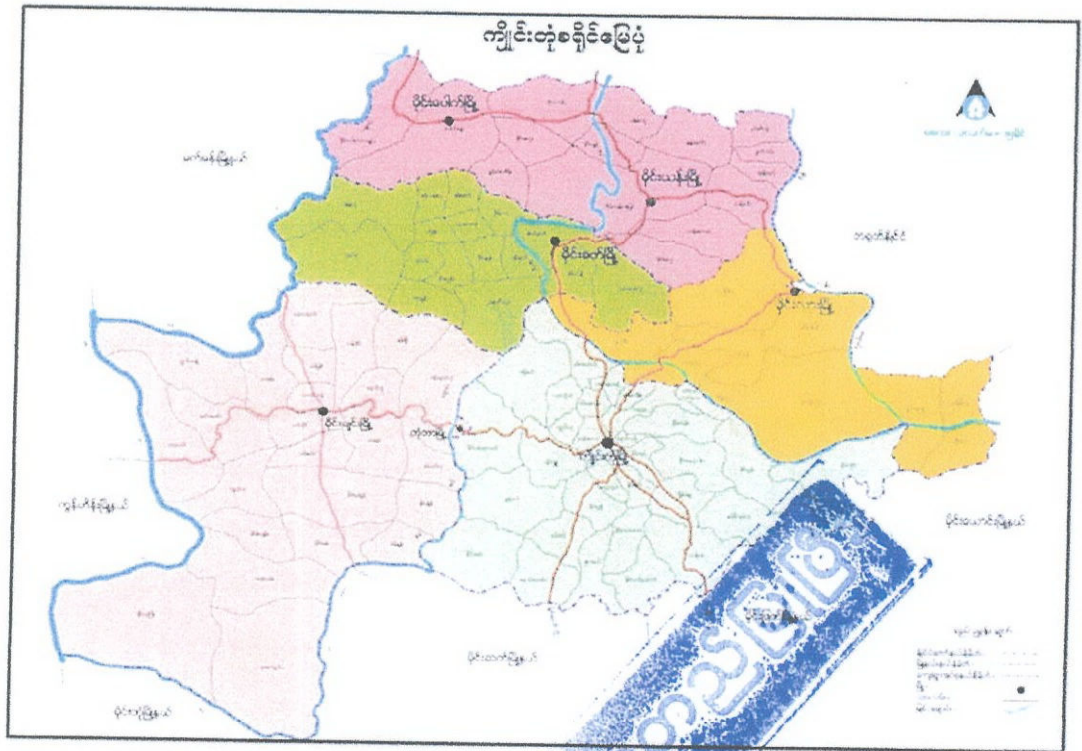


Figure 1.1 Kyaing Tong District in Eastern Shan State Map



### 1.5 Project Location of the Nan So Hdropower

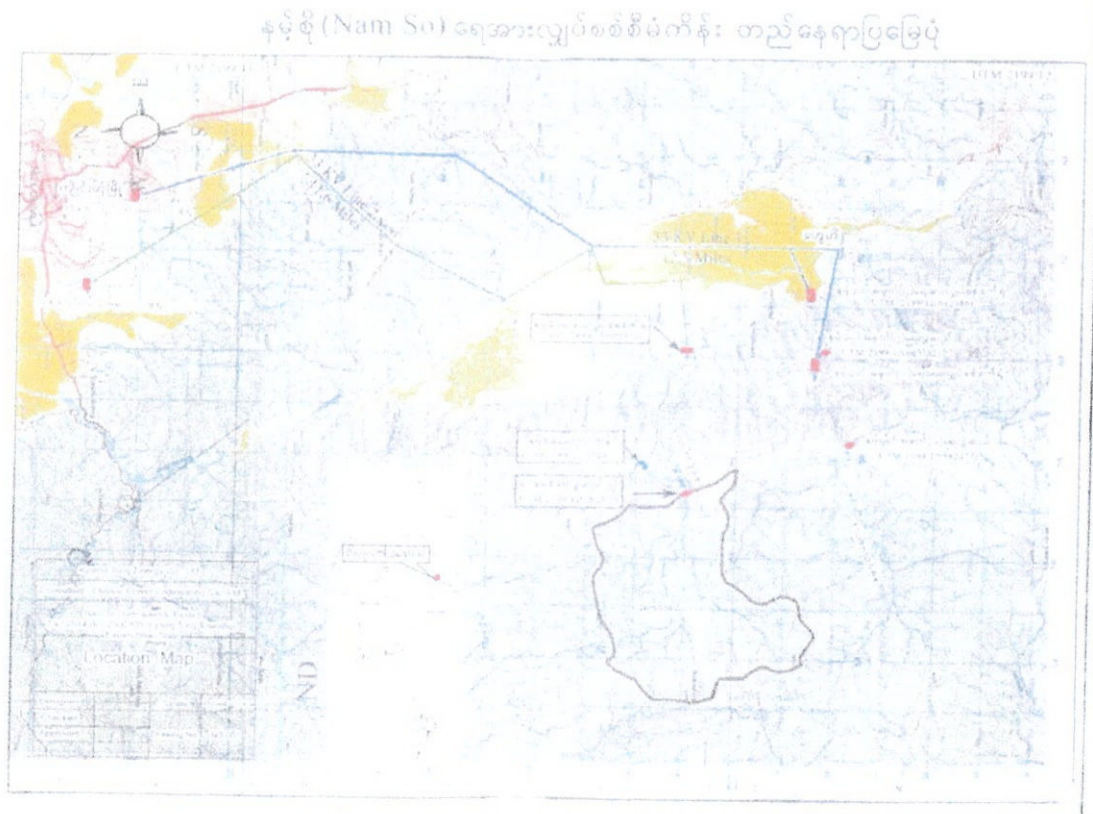


Figure 1. 2 Project Location of the Nan So Hydropower





1.6 Near the villages of Nan So hydropower project

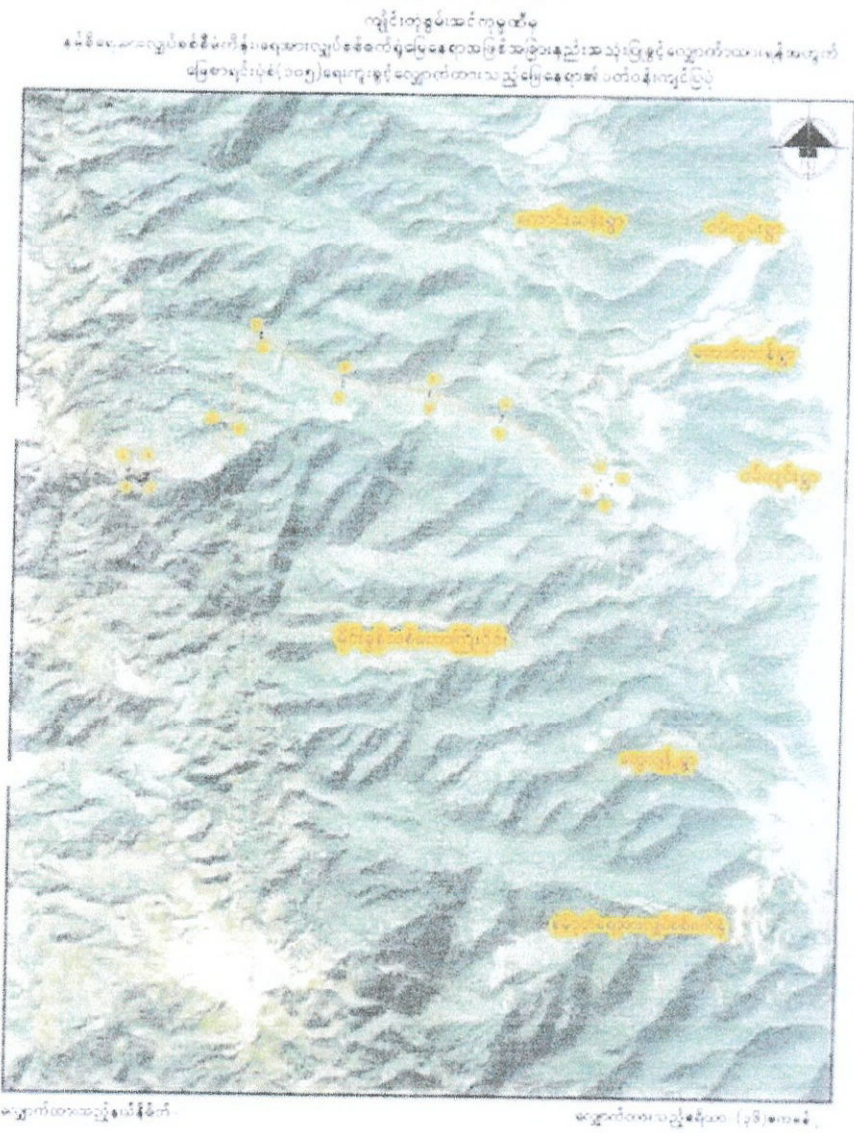
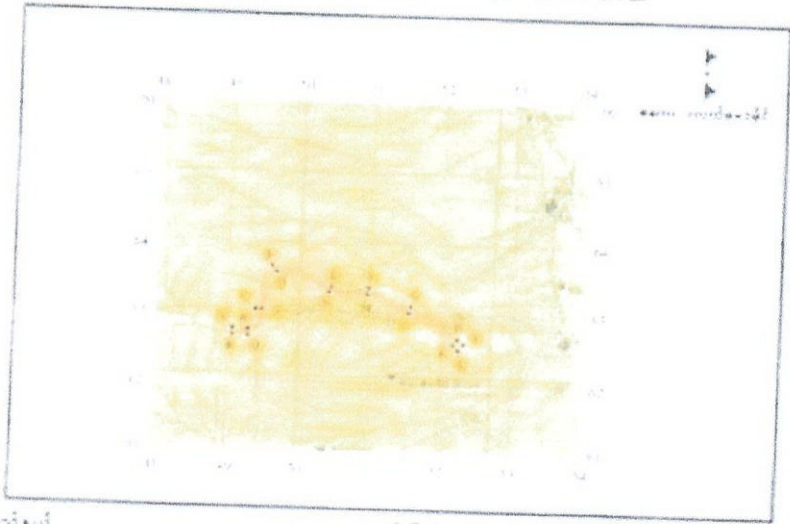


Figure 1.3 Near the villages of Nan So Hydropower Project



1.7 Point of the Project Location Area

ကျိုင်းတုံစွမ်းအင် ကုမ္ပဏီမှ  
နမ့်ခဲမြေအားလျှပ်စစ်ဓာတ်အားအားလျှပ်စစ်စက်ရုံ မြေနေရာအဖြစ် အခြားနည်းအားဖြင့် လျှောက်ထားရေးအတွက်  
မပြင်ဆင်ရင်ပုံစံ (၁၀၅) ရေးကူးစဉ် လျှောက်ထားသည့် တည်နေရာပြပုံကြမ်း



- |                            |   |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |
|----------------------------|---|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| ပြည်နယ်                    | - ရှမ်းပြည်နယ်  |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |
| ခရိုင်                     | - ကျိုင်းတုံခရိုင်  |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |
| မြို့နယ်                   | - ကျိုင်းတုံမြို့နယ်  |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |
| ကျေးရွာအုပ်စု              | - နမ့်ခဲမြေကျေးရွာအုပ်စု  |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |
| မပြင်ဆင်                   | - သစ်တောကြီး(ပိုင်းမမြေ(မှိုင်းစွန်(ကြီးပြင်ကံကျယ်တော)  |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |
| လျှောက်ထားသူအမည်           | - ကျိုင်းတုံစွမ်းအင်ကုမ္ပဏီလီမိတက်  |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |
| လျှောက်ထားသည့်အကြောင်းရင်း | - မရောင်းလျှပ်စစ်ဓာတ်အားအဖြစ် အခြားနည်း   |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |
|                            | - အသုံးပြုစဉ် လျှောက်ထားရေးအတွက်  |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |
|                            | - မပြင်ဆင်ရင်ပုံစံ(၁၀၅) ရေးကူးစဉ်-  |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |
|                            | -   |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |
| လျှောက်ထားသည့်နယ်နိမိတ်    | -   |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |
| လျှောက်ထားသည့်ဧရိယာ        | - ( ၉.၄၇ ) ဧကခန့်   |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |
| စနစ်၊ နမူနာ ပြင်ပုံညွှန်း  | - K3-0-32   |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |
|                            | <table border="0" style="margin-left: 20px;"> <tr> <td>A-1.P. 491528</td> <td>J-1.P. 523623</td> </tr> <tr> <td>B-1.P. 491628</td> <td>K-1.P. 523623</td> </tr> <tr> <td>C-1.P. 494633</td> <td>L-1.P. 516633</td> </tr> <tr> <td>D-1.P. 497637</td> <td>M-1.P. 506632</td> </tr> <tr> <td>E-1.P. 514674</td> <td>N-1.P. 506632</td> </tr> <tr> <td>F-1.P. 509633</td> <td>O-1.P. 497636</td> </tr> <tr> <td>G-1.P. 516633</td> <td>P-1.P. 495636</td> </tr> <tr> <td>H-1.P. 523625</td> <td>Q-1.P. 495627</td> </tr> <tr> <td>I-1.P. 524625</td> <td>R-1.P. 491627</td> </tr> </table> | A-1.P. 491528 | J-1.P. 523623 | B-1.P. 491628 | K-1.P. 523623 | C-1.P. 494633 | L-1.P. 516633 | D-1.P. 497637 | M-1.P. 506632 | E-1.P. 514674 | N-1.P. 506632 | F-1.P. 509633 | O-1.P. 497636 | G-1.P. 516633 | P-1.P. 495636 | H-1.P. 523625 | Q-1.P. 495627 | I-1.P. 524625 | R-1.P. 491627 |
| A-1.P. 491528              | J-1.P. 523623   |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |
| B-1.P. 491628              | K-1.P. 523623   |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |
| C-1.P. 494633              | L-1.P. 516633   |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |
| D-1.P. 497637              | M-1.P. 506632   |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |
| E-1.P. 514674              | N-1.P. 506632   |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |
| F-1.P. 509633              | O-1.P. 497636   |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |
| G-1.P. 516633              | P-1.P. 495636   |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |
| H-1.P. 523625              | Q-1.P. 495627   |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |
| I-1.P. 524625              | R-1.P. 491627   |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |               |

Figure 1. 4 Point of the Prject Location Area



### 1.8 Nan So hydropower project layout plan and design

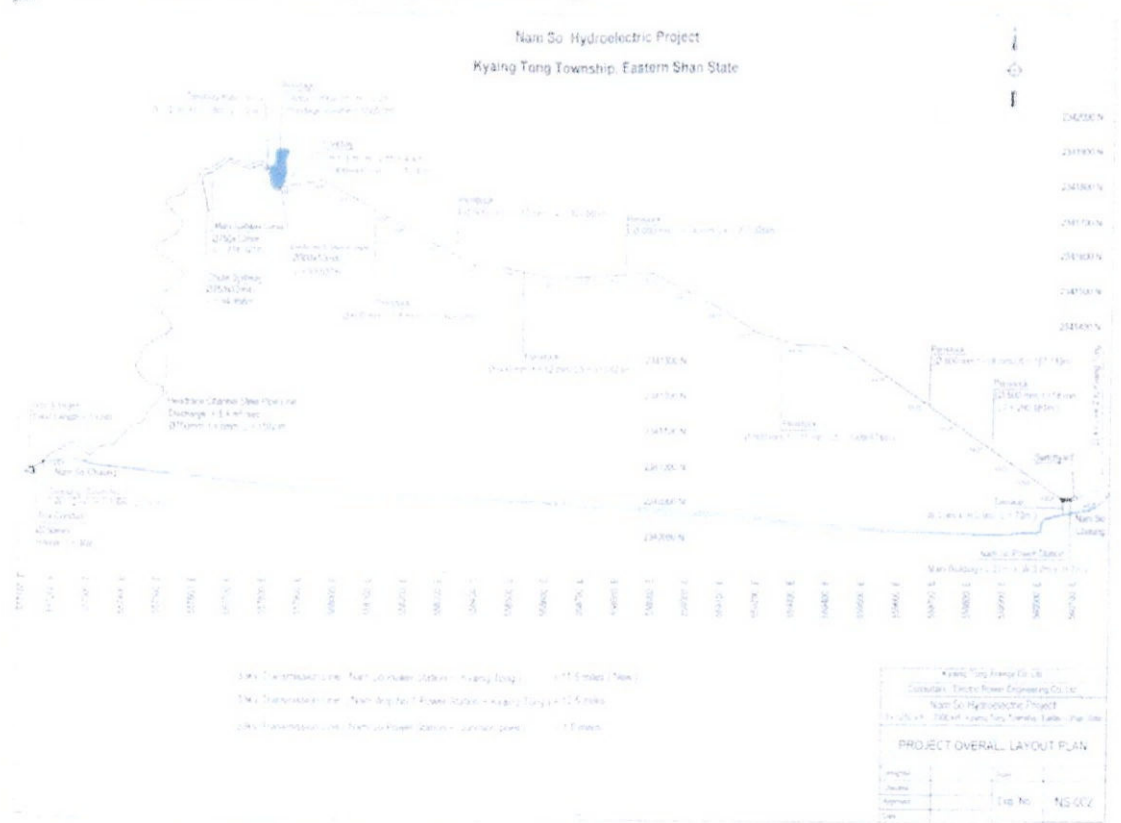


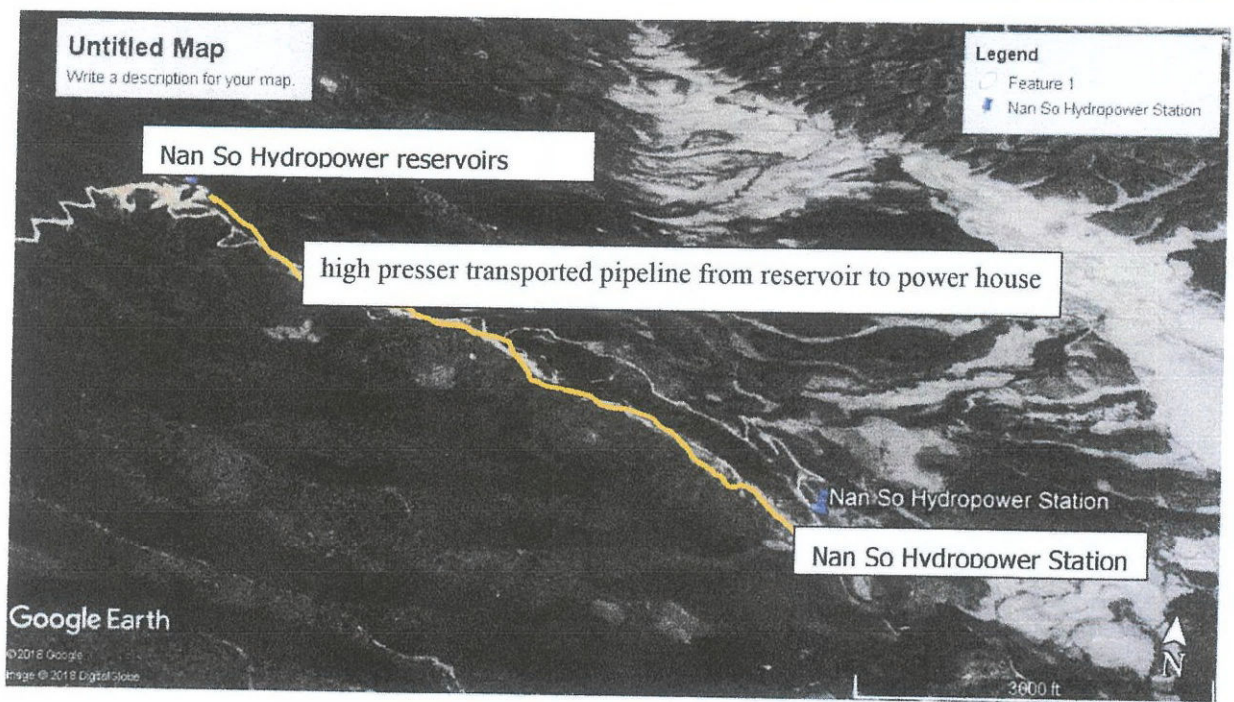
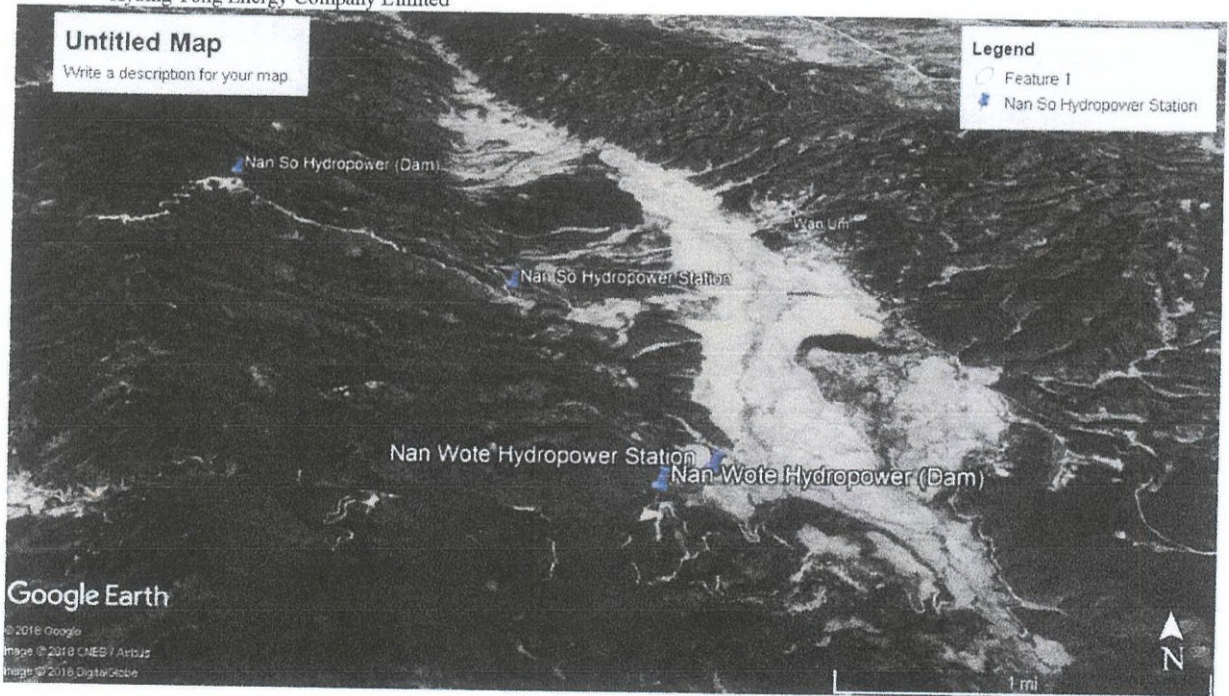
Figure 1.5 Nan So hydropower project layout plan and design



### 1.9 Project Salient Features

OBJECT	Salient Features	Quantity	Remarks
1.1	General Project Information		
1.2	Location		
1.3	Project Description		
1.4	Water Resources		
1.5	Water Management		
1.6	Water Distribution		
1.7	Water Treatment		
1.8	Water Storage		
1.9	Water Conveyance		
1.10	Water Discharge		
1.11	Water Quality		
1.12	Water Safety		
1.13	Water Security		
1.14	Water Conservation		
1.15	Water Pollution Control		
1.16	Water Resource Protection		
1.17	Water Resource Allocation		
1.18	Water Resource Management		
1.19	Water Resource Planning		
1.20	Water Resource Monitoring		
1.21	Water Resource Evaluation		
1.22	Water Resource Reporting		
1.23	Water Resource Review		
1.24	Water Resource Update		
1.25	Water Resource Approval		
1.26	Water Resource Implementation		
1.27	Water Resource Maintenance		
1.28	Water Resource Improvement		
1.29	Water Resource Optimization		
1.30	Water Resource Innovation		
1.31	Water Resource Sustainability		
1.32	Water Resource Resilience		
1.33	Water Resource Adaptability		
1.34	Water Resource Flexibility		
1.35	Water Resource Scalability		
1.36	Water Resource Portability		
1.37	Water Resource Transferability		
1.38	Water Resource Interchangeability		
1.39	Water Resource Complementarity		
1.40	Water Resource Substitutability		
1.41	Water Resource Redundancy		
1.42	Water Resource Diversity		
1.43	Water Resource Complexity		
1.44	Water Resource Uncertainty		
1.45	Water Resource Risk		
1.46	Water Resource Vulnerability		
1.47	Water Resource Exposure		
1.48	Water Resource Sensitivity		
1.49	Water Resource Fragility		
1.50	Water Resource Resilience		
1.51	Water Resource Robustness		
1.52	Water Resource Resilience		
1.53	Water Resource Resilience		
1.54	Water Resource Resilience		
1.55	Water Resource Resilience		
1.56	Water Resource Resilience		
1.57	Water Resource Resilience		
1.58	Water Resource Resilience		
1.59	Water Resource Resilience		
1.60	Water Resource Resilience		

Figure 1.6 Project Salient Features



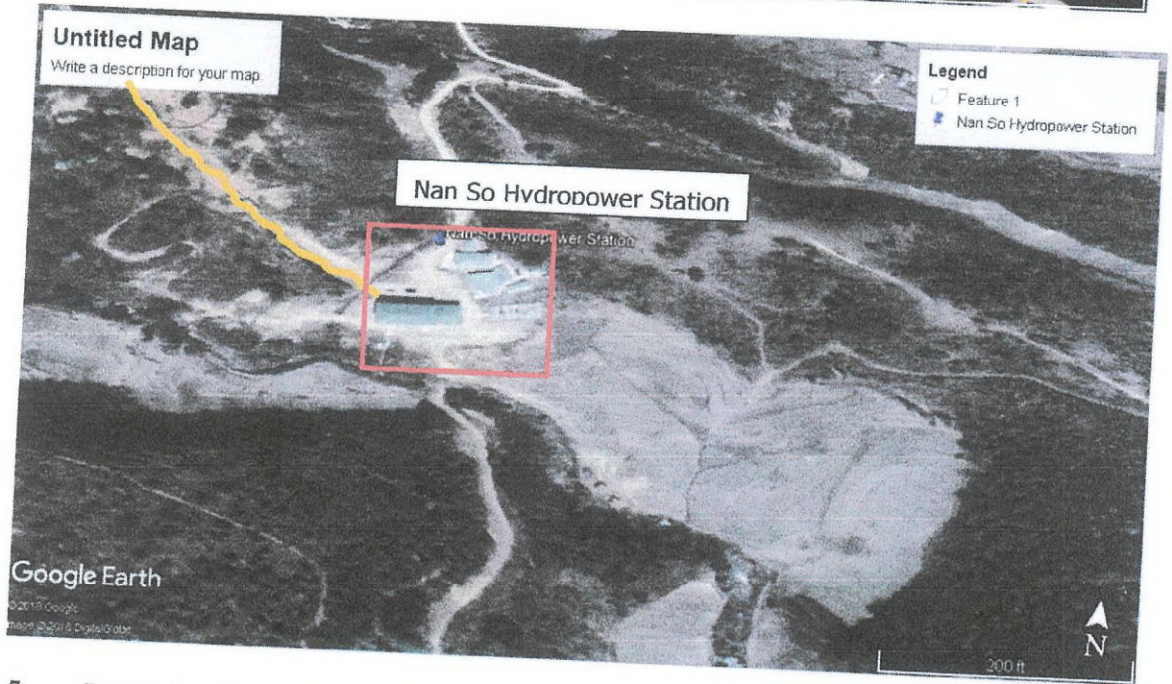
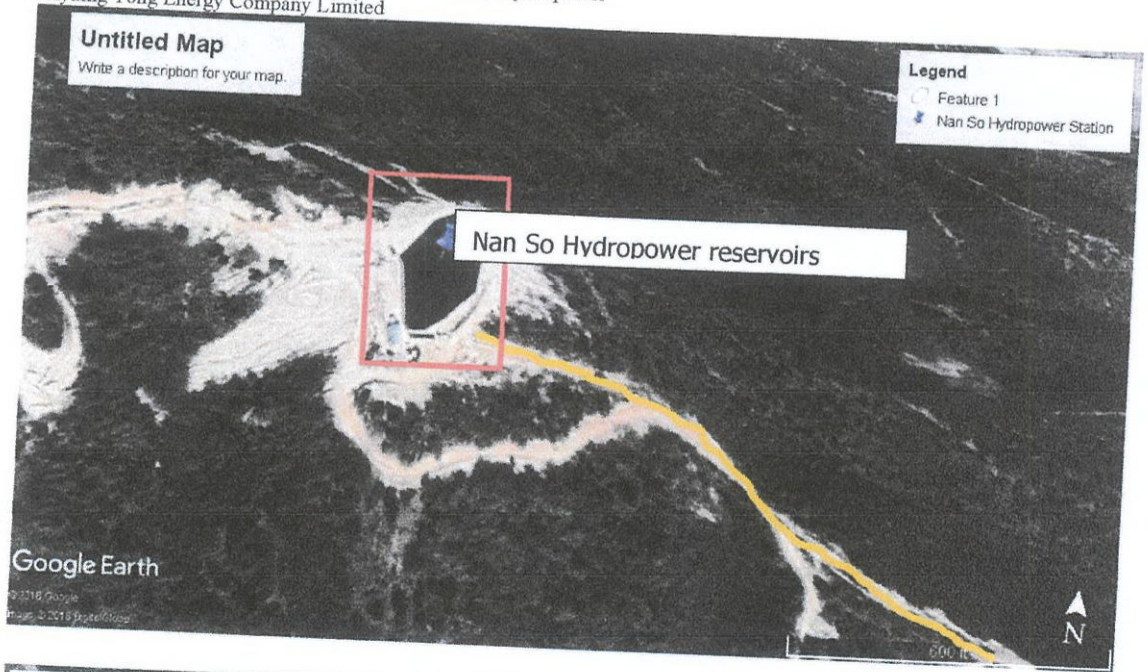
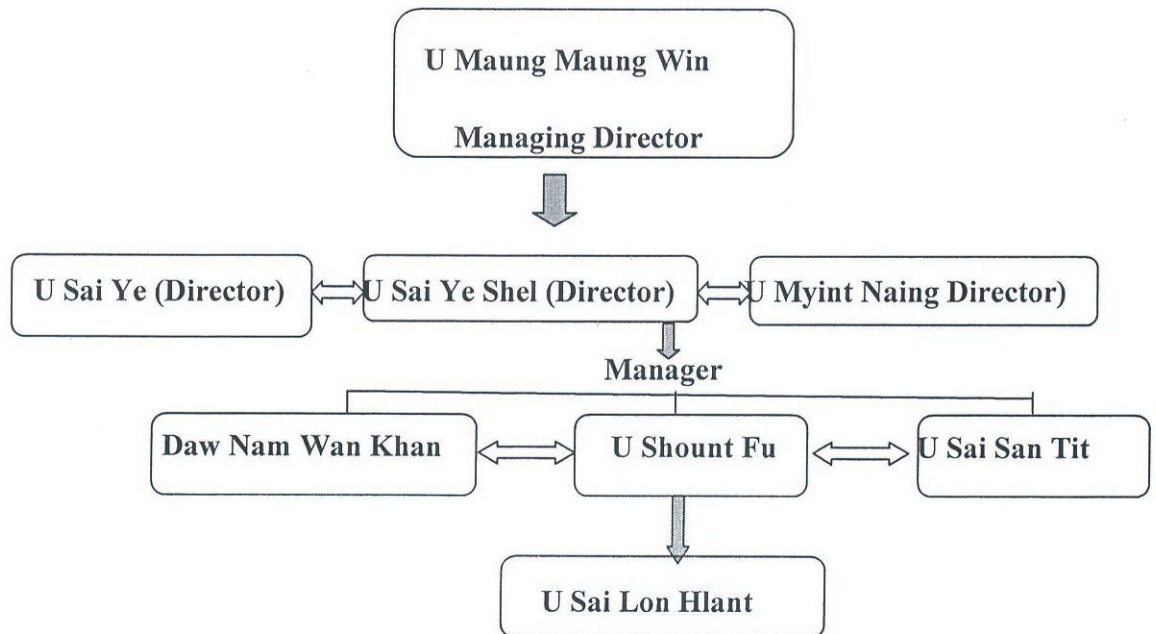


Figure 1.7 Project Operation Building and Dam Site Map



### 1.10. Organization Chat



### 1.11 Project Proponent

Kyaing Tong Energy Co., Ltd is considering developing 1250 KWx2 hydropower project (HPP), the height of the dam is 5330 meter, Reservoir Volume at full Tank level is less than 10,000 cubic meter. Reservoir area is less than 200 hectares. Nan So hydropower project is a storage type. Nan So mini hydropower on the Nan So creek in the Mine Kon village tract, Mine Kon reserve forest, in Kyaing Tong located near Kaung Kan, Wan Kyin, Kaung San and Wan Hwel, approximately 14 miles (22.53 km) from Kyaing Tong town. The Nan So HPP will consist of the development, financing, construction, operation, management and maintenance of a new electricity generation hydropower station. A roller compacted reinforced concrete dam will impound a reservoir of water required for the Nan So HPP. At the present, Nan So HPP is electricity distributing to Kyaing Tong town and near the villages.



## 1.12 Investment Plan of Kyaing Tong Energy Company

Table 1.1 Investment Plan of Kyaing Tong Energy Company

Sr. No	Objective	MMK (Lakhs)
1	Building of Nan So Power Station 6.3/3.3 KV 3150 KVA Transformer Switch Bay	2,300
2	Building of inside the Kyaing Tong Townships, 33/11 KV 5000KVA Transformer Branch power station 11 KV 4 Feeder	3,673
3	Building of inside the Kyaing Tong Townships, 11/0.4 KV 5000KVA Transformer Branch power station 11 KV Line and change of concrete Pole	13,243
4	Buying of the Operation Machineries	11,124
5	Building of Main building, Store, avenue and operation office	2,100
Total		32,440





### 1.13 EARTH TREE ENVIRONMENTAL SERVICES CO., LTD.

Earth Tree Environmental Services Co., Ltd. (ETES) is an environmental and social consultant team. The ETES office is located at Mingalardon Township, Yangon, Myanmar. The team members are from different disciplines since the environment is an integrated subject.

The ETES is registered in line with the current laws and regulations in Myanmar. The registration number of the ETES is (No. 70. 2016-2017 SHAN) and Certificate for Transitional Consultant Registration (No.30) for Earth Tree Environmental Services The Company can provide impact assessment services in major development projects. The ETES conducted EMP report preparation of Nan So mini hydropower under the Kyaing Tong Energy Company.

The ETES studied the ecology, soil and water, flora and fauna, socio-economic conditions, cultural heritage, public health, and ambient air quality of the proposed factory. After that, impact analysis and mitigation measures were undertaken based on the baseline data and information obtained. Environmental management plan and monitoring scheme were prepared so that Nan So mini hydropower can integrate these into the management systems of all phases of project life cycle. The ETES team members and consultants are as following.

Table 1.2 Team members and consultants of ETES

Sr.No.	Name	Degree	Specialization	Position
1	Dr. Nyo Nyo Lwin	Associate Professor (Zoology Department)	Biodiversity and Ecology	Team Leader
2	Dr. Aye Mya Phyu	Lecture (Zoology Department)	Biodiversity and Ecology	Team Member
3	Dr. Theingi Soe Myint	Lecture (Zoology Department)	Biodiversity and Ecology	Team Member
4	Dr. Thet Thet Mar Win	Associate Professor (Botany)	Biodiversity and Ecology	Consultant
5	Daw Aye Myat New	B.P.S (Yangon Institute of Economics)	Population Study and Social Development	Consultant
6	Daw Aye Aye Soe	MA/ MRes.	Land Use	Consultant



### Third Party Company Information

Company Name- Earth Tree Environmental Services Co.,Ltd  
Contact Person - Daw Aye Aye Soe  
Contact No. - +95 9 43124451, 262000285  
Office Address - No.(3A), Zebutheingi St, Bo KanNyunt Quarter,  
Thingangyun Township, Yangon Region  
Office Email - [info.earthtree@gmail.com](mailto:info.earthtree@gmail.com)  
Web - [www.etesmyanmar.com](http://www.etesmyanmar.com)

### Detail Information of the Project Proponent

Company Name- Kyaing Toung Energy Co.,Ltd  
Project Name - Nan So Hydropower  
Contact Person - U Myaint Naing  
Project Address- Kaung Tan Villae, Pyay – Pauk Kaung Road, Kyaing Toung  
Township, Kyaint District, Shan State  
- +95 9965142869, 5242869

### EIA STUDY TEAM

In line with the Environmental Law, Environmental Rules and related guidelines in Myanmar, the project owner has selected an independent consulting firm, Earth Tree Environmental Services team to undertake the EIA report for this Project. The following is a summary of Earth Tree Environmental Services team member's information specialization and responsibilities during the project

#### Dr Nyo Nyo Lwin

Dr Nyo Nyo Lwin is a Associate Professor from Department of Biology, Yangon University of Education. She received PhD (Zoology) from University of Yangon in 2007. She also got in Certificates of GIS from Magway University and Maubin University. She is a freelance Consultant as well as she received consultant registration No. 79 from Ministry of Natural Resources and Environmental Conservation Department, Nay Pyi Taw. She has worked extensively as a leader in Biodiversity survey team as well as her specialization field is Ecology and Biodiversity.



**Dr Aye Mya Phyu**

Dr Aye Mya Phyu is a Lecturer from Department of Zoology, University of Yangon. She received PhD (Zoology) degree specialized with ecology in 2007 from University of Yangon. She has worked extensively as a member for the study of environmental Impact Assessment (EIA). Her specialization field is ecology.

**Dr Theingi Soe Myint**

Dr Theingi Soe Myint is a Lecturer, Department of Zoology from University of Yangon. She received PhD (Zoology) degree specialized with Ichthyology in 2010 from University of Yangon. Later, she has worked extensively as a member for the study of environmental Impact Assessment (EIA). She has been researched Conservation of Crane by ICF (International Crane Foundation) and ARC project.

**Dr Thet Thet Mar Win**

Dr Thet Thet Mar Win is an Associate Professor from Department of Botany, Maubin University. She received PhD (Geobotany) from University of Yangon in 2010. She also got a Post-doctoral research scholarship, Life Science Department, Hallym University, Chuncheon, Republic of Korea. (2015-2016) from Hallym University, Korea. She is a freelance Consultant as well as she received consultant registration No. 120 from Ministry of Natural Resources and Environmental Conservation Department, Nay Pyi Taw. Her specialization field is Ecology and Biodiversity.

**Daw Aye Aye Soe**

Daw Aye Aye Soe is a Consultant at ETES Co., Ltd. who completed Master Degree specialized in Geography at Dagon University. She also got a Diploma in GIS and RS from Dagon University in 2014. She has experienced in Environmental Impact Assessment (EIA), Initial Environmental Examination (IEE) and Environmental Management Plan (EMP) and data analysis and report preparation. She received consultant certificate with the registration of No.91 from the Ministry of Natural Resources and Environmental Conservation Department. She specialized in land use.

**Daw Aye Myat Nwe**

Daw Aye Myat Nwe is a consultant at ETES Co., Ltd. who holds a Bachelor degree in Population Study from the Yangon Institute of Economic, and also got a Diploma in GIS and RS at Dagon University. She has specialized in socio-economic. She is also responsible for data analysis and interpretation of social impact assessment activities. She has participated in many EIA, IEE and EMP projects. She has received consultant certificate with registration No.92 from the Ministry of Natural Resources and Environmental Conservation Department. Her expertise is facilitation of meetings.



## OVERVIEW OF THE LEGAL FRAMEWORK

In line with Myanmar Environmental Conservation Law (2012) and Myanmar Environmental Rules (2014), and Environmental Procedures (2015) issued by the Ministry of Environmental Conservation and Forestry (MOECAF), the project on Industrial Development has to prepare Environmental Impact Assessment (EIA) according to the procedure on IEE/EIA categorization of projects. In addition to ECD legal requirements, the SIA will also need to conform to International Standards and Guidelines.

### 2.1 Relevant Legislations

The Acts and Laws that Nan So Mini-hydro Power Plant shall comply with are as follows:

1. The Conservation of Environment Law (2012)
2. The Conservation of Environment Rules (2014)
3. The Myanmar Citizen Investment Law (2012)
4. The Electricity Law (2014)
5. Prevention of the Danger of Hazardous Chemicals and Related Substances Law (2013)
6. The Development of Employment and Skill (2013)
7. The Myanmar Insurance Law (1993)
8. The Social Security Law (2012)
9. Factories Acts (1951)
10. The Fire Force Law (2015)
11. Workmen's Compensation Act (1923)
12. The Leave and Holiday Act (1951)
13. Minimum Wages Law (2013)
14. Petroleum Acts and Rules (1937)
15. The Public Health Law (1972)
16. Prevention and Control of Communicable Diseases Law (1995)
17. The Control of Smoking and Consumption of Tobacco Product Law (2006)
18. Conservation of Water Resources and Rivers Law (2006)



19. Conservation of Water Resources and Rivers Rules (2013)
20. Freshwater Fisheries Law (1991)
21. The Explosive Substance Act (1908)
22. The Motor Vehicles Law (1964) and Rules (1989)
23. The Conservation of Antique Objects law (2015)
24. Forest Law (1992)
25. Protection of Wildlife and Conservation of Natural Area Law (1994)
26. Already included Chemical Law (2013)
27. Labor Organization Law (2013)
28. National Environmental Policy (1994)
29. Protection and Preservation of Cultural Heritage Law (1998)
30. No enactment, only the firm land law, it is related to land use. If the project area is farm land how to get it and related to this law Agricultural Land Law (2012)
31. Same to fire law Fire Brigade Law (2015)
32. The related laws enacted by the respected Region or State Hluttaw and rules issued by respected Regional Government
33. International Treaties and Agreements related to Environmental Conservation

#### **MYANMAR CONSTITUTION LAW (2008)**

The Union shall protect and conserve natural environment.

Every citizen has the duty to assist the Union carrying out the environmental conservation.

#### **ENVIRONMENTAL POLICY (1994)**

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

#### **ENVIRONMENTAL CONSERVATION LAW (2012)**

The principle law governing environmental management in Myanmar is the Environmental Conservation Law, which was issued in March, 2012 (The Pyidaungsu Hluttaw Law No.9/20/2130rh). The law stipulates that government bodies are in charge of environmental



conservational as well as their relevant roles and responsibilities. It touches on water, noise, vibration and solid waste qualities but does not provide specific standards to be met.

It also mentions that any new development project must perform a system of Environmental Impact Assessment (EIA) and Social Impact Assessment (SIA) in order to find out whether or not a project or activity to be undertaken by any government department, organization or person may cause a significant impact on the environment or not. In the context of project development, it is important to note that the law adopts the notion of 'Polluter Pays Principle' as it implies that the project proponents are responsible for covering all environmental and social costs generated by the project.

The law serves as the basic for founding of Environmental Conservation Department (ECD) under the Ministry of Natural Resources and Environmental Conservation (MONREC), both of which will be explained later. Following the Environmental Conservation Law are two legal instruments: Environmental Conservation Rules (2014) and EIA Procedures (2015).

The main objectives of Environmental Conservation Law related to this Project are abstracted from Section 3 as follows.

- (a) To enable to emerge a healthy and clean environment and to enable to conserve natural and cultural heritage for the benefit of present and future generations;
- (b) To reclaim ecosystems as may be possible which are starting to generate and disappear;
- (c) To enable to manage and implement for decrease and loss of natural resources and for enabling the sustainable use beneficially;

As the important reference, the following sections are excerpted: Section 7 for provisions of duties and powers of MONREC, Section 10 for Environmental Quality Standards, Section 13 for monitoring as well as Section 14 and Section for polluter's responsible.

#### Section 7: Provisions of Duties and Powers relating to the Environmental Conservation of the Ministry

- (a) To specify categories and classes of hazardous wastes generated from the production and use of chemicals or other hazardous substances in carrying out industry, agriculture, mineral production, sanitation and other activities;
- (b) To prescribe categories of hazardous substances that may affect significantly at present or in the long run on the environment;
- (c) To promote and carry out the establishment of necessary factories and stations for the treatment of solid wastes, effluents and emissions which contain toxic and hazardous substances;
- (j) To prescribe the terms and conditions relating to effluent treatment in industrial estates and other necessary places and buildings and emissions of machines, vehicles and mechanisms;
- (m) To lay down and carry out a system of EIA and SIA as to whether or not a project or activity to be undertaken by any Government department, organization or person may cause a significant impact on the environment;
- (o) To manage to cause the polluter to compensate for environmental impact, cause to contribute fund by the organizations which obtain benefit from the natural



environmental service system, cause to contribute a part of the benefit from the businesses which explore, trade and use the natural resources in environmental conservation works.

#### Section 10: Environmental Quality Standards

The Ministry may, with the approval of the Union Government and the Committee, stipulate the following environmental quality standards:

- (a) Suitable surface water quality standards in the usage in rivers, streams, canals, springs, marshes, swamps, lakes, reservoirs and other inland water sources of the public;
- (b) Water quality standards for coastal and estuarine areas;
- (c) Underground water quality standards;
- (d) Atmospheric quality standards;
- (e) Noise and vibration standards;
- (f) Emissions standards;
- (g) Effluent standards;
- (h) Solid wastes standards;
- (i) Other environmental quality standards stipulated by the Union Government.

#### Section 13: Monitoring

The Ministry shall, under the guidance of the Committee, maintain a comprehensive monitoring system and implement by itself or in co- ordination with relevant Government departments and organizations in the following matters:

- (a) The use of agro- chemicals which cause to impact on the environment significantly;
- (b) Transport, storage, use, treatment and disposal of pollutants and hazardous substances in industries;
- (c) Disposal of wastes come out from exploration, production and treatment of minerals, industrial mineral raw materials and gems;
- (d) Carrying out waste disposal and sanitation works;
- (e) Carrying out development and constructions;
- (f) Carrying out other necessary matters relating to environmental pollution.

#### Section 14:

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

#### Section 15:

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

### **ENVIRONMENTAL CONSERVATION RULES (2014)**



Environmental Conservation Rules provide a platform to bridge the Environmental Conservation Law with more specific and practical rules and guidelines including EIA Procedures and environmental quality standards, the rules stipulate that the Ministry of Environmental Conservation and Forestry will adopt and carry out the environmental impact assessment system which includes determination of categories of plans, business or activity that requires Environmental Impact Assessment (EIA). The system will also stipulate the categories which are required to conduct the Initial Environmental Examination (IEE). Environmental Conservation Rules also provide a platform for developing Environmental Quality Standards.

Here the principle rules for EIA review and approval are specified as follows.

Rules 58:

The Ministry shall form the Environmental Impact Assessment Report Review Body with the experts from the relevant Government departments, Government organizations.

Rules 60:

The Ministry may assign duty to the Department to scrutinize the report of environmental impact assessment prepared and submitted by a third person or organization relating to environmental impact assessment and report through the Environmental Impact Assessment Report Review Body.

Rules 61:

The Ministry may approve and reply on the environmental impact assessment report or environmental management plan with the approval of the Committee.

## **ENVIRONMENTAL IMPACT ASSESSMENT PROCEDURES (2015)**

### **(1) Outline of the Procedures**

The objectives of the EIA procedures are to provide a common framework for EIA reporting and to ensure that EIA reporting is in line with legal requirements, good practices and professional standards. Concrete steps to be followed in conducting and accessing EIA are stipulated in the EIA procedures.

- (a) All development projects in Myanmar are subject to an environmental screening process through which project will be judged to determine if they require any environmental review and, if so, at which level (i.e. IEE or EIA)
- (b) EIA includes an environmental management plan and a social impact assessment report.
- (c) Describe the environmental and social baseline data of the study area as well as the changes that will occur during and after project implementation
- (d) Public participation is essential for the Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA), with an inclusion of an Environmental Management Plan (EMP).
- (e) Analyze project alternatives and define measures that will minimize negative environmental, social and health impacts and maximize benefits to affected communities;





- (f) Propose environmental, social and health management and monitoring plans to ensure that the requests from the government and the communities of the project proponent are implemented.
- (g) EIA Review committee is formed to give recommendations to the Minister of MONREC from an environmental point of view on whether to approve the EIA report or not. The Minister makes the final decision based on this recommendation.
- (h) Members of the EIA Review Committee will be selected by the Minister of MONREC and will include persons from the industry, academia, and civil society, as well as government officials.
- (i) Involuntary resettlement is carried out under the responsibility of a Respective Regional Government and hence will not be included in the EIA Procedures.

The objective of these national guidelines is to provide the basis for regulation and control of noise and vibration, air emissions, liquid discharges from various sources. According to these guidelines, all projects subject to EIA procedure have to comply with and refer to applicable national guidelines/ standards or international standards adopted by the Ministry. In addition, a project proponent shall be responsible for the monitoring of their compliance with general and applicable industry- specific guidelines as specified in the EMP and ECC (Environmental Compliance Certificate).

In addition, the Project Proponent is responsible to monitor the environmental quality based on the developed EMP as specified in the following sections.

#### Section 12:

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

#### Section 13:

Air emissions, noise, odor, and liquid/ effluent discharges will be sampled and measured at points of compliance as specified in the project EMP and ECC.

### **THE CONSERVATION OF WATER RESOURCES AND RIVERS LAW (2006)**

The State Peace and Development Council Law enacted this law by Law No. 8/ 2006 on the date of 2<sup>nd</sup> October, 2006. This law covers for all water sources above and underground within boundaries of rivers, creeks, banks and water fronts. Under this law, Ministry of Transport has power to direct for carrying out waterways conservation work, to notify the land boundary as waterfront boundary for bank protection, river-creek improvement and to navigate the vessels in the rivers and creeks with the objectives of:

- a) To conserve and protect the water resources and rivers system for beneficial utilization by the public;
- b) To smooth and safety waterways navigation along rivers and creeks;



- c) To contribute to the development of State economy through improving water resources and river system;
- d) To protect environmental impact.

## **MYANMAR INVESTMENT LAW (2016)**

### **40. Investment includes the followings:**

- a) Enterprise;
- b) moveable property, immovable property and related property rights, cash, pledges, mortgages and liens, machinery, equipment, spare-parts, and related tools;
- c) shares, stocks, and debentures of a company;
- d) intellectual property rights in accordance with applicable laws, including technical know-how, inventions, industrial designs, and trademarks;
- e) claims to money and to any performance under contract having a financial value;
- f) rights under contracts, including turnkey, construction, management, production or revenue-sharing contracts; and
- g) assignable rights granted by relevant laws or contract including the rights of exploration, prospecting and extraction of natural resources;

### **41. The following investments shall be stipulated as prohibited investment:**

- a) business/ investment activities which may bring or cause the hazardous or poisonous wastes into the Union;
- b) business/ investment activities which may bring technologies, medicines, flora and fauna and instruments which are still being tested abroad or which have not been obtained approvals for use, planting and cultivation except the investments which made for the purpose of research and development;
- c) business/ investment activities which may affect the traditional culture and customs of the racial groups within the Union;
- d) business/ investment activities which may affect the public health
- e) business/ investment activities which may cause significant damage to the natural environment and ecosystem; and
- f) business/ investment activities which manufacture goods or provide services that are prohibited in accordance with applicable laws.

### **42. The following investment activities shall be stipulated as restricted investment:**

- a) Investment activities allowed to carry out by Government only;
- b) Investment activities restricted to foreign investors;
- c) Investment activities allowed only in form of joint venture with a citizen owned entity or a citizen of Myanmar; and
- d) Investment activities permitted with the recommendation of the relevant ministries.

**50. (b)** Foreign investor may lease land or building up to an initial period of 50 years commencing on the date of receipt of the permit or endorsement from the Commission either from the Government or governmental organizations or from private land or building owners.

**(c)** After the expiry of the term permitted under sub-section (b), a consecutive period of 10 years and a further consecutive period of 10 years extension to the initial period of lease land or building may be obtained with the approval of the Commission.



(f) The Commission shall, for the purpose of the development of the entire Union with the approval of Pyidaungsu Hluttaw submitted through the Government, grant a longer period for the rights to lease land or building and the rights to use land under this Law, to investors who invest in least developed and remote region.

**65. The Investor -**

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

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

(q) The investments which need to obtain prior approval under the environmental conservation law and the procedures, shall take permit or endorsement of Commission before undertaking the assessment. Such Investments which obtained permit or endorsement, shall report environmental and social impact assessment to the Commission along the period in which the activities of the investments.

**75. (a)** With respect to the income tax exemption, the Commission will issue a notification with the approval of the Union Government to designate as Zone (1), the regions that are least-developed, and as Zone (2), the regions that are moderately developed, and as Zone (3), the regions that are adequately developed, and income tax exemption may be granted to investment businesses in Zone (1) for a period of 7 consecutive years including the year of commencement of the business, investment businesses in Zone (2) for a period of 5 consecutive years including the year of commencement the business, and investment businesses in Zone (3) for a period of 3 consecutive years including the year of commencement of the business.

**FACTORY ACT, 1951(LAW AMENDING THE FACTORIES ACT, 2016)**

Has been enacted for affairs concerning with health, safety, working time of employees. In section 3, mentions responsibilities of employer and manager regarding waste disposal, ventilation, extreme temperature, dust and gas generation, minimum space for each worker, lighting, portable drinking water and toilets for employees.

**THE PRIVATE INDUSTRIAL ENTERPRISE LAW, 1990**

Private Industrial Enterprises shall be conducted in accordance with the following basic principles: -

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

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

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



- (e) to cause opening up of more employment opportunities;
- (f) to cause avoidance of or reduction of the use of technical know-how which cause environmental pollution;
- (g) to cause the use of energy in the most economical manner.

### **NATIONAL LAND USE POLICY (2016)**

- a) To promote sustainable land use management and protection of cultural heritage areas, environment, and natural resources for the interest of all people in the country;
- b) To strengthen land tenure security for the livelihoods improvement and food security of all people in both urban and rural areas of the country;
- c) To recognize and protect customary land tenure rights and procedures of the ethnic nationalities;
- d) To develop transparent, fair, affordable and independent dispute resolution mechanisms in accordance with rule of law;
- e) To promote people centered development in land resources and accountable land use administration in order to support the equitable economic development of the country;

To develop a National Land Law in order to implement the above objectives of National Land Use Policy.

### **THE UNDERGROUND WATER ACT (1930)**

According to Act the President of the Union may, by notification, direct and shall apply only to the tubes, exceeding a depth to be prescribed the President of the Union and may prescribe different depths for different local areas.

Accordingly, "underground water" means water obtained from below the surface of the ground by the sinking of tubes. It is also stated that no person shall sink a tube for the purpose of obtaining underground water except under and in accordance with the terms of a license granted by the water officer, an officer by notification prescribed on his behalf.

### **Environmental Quality Standards**

The Ministry may, with the approval of the Union Government and the Committee, stipulate the following environmental quality standards:

- a) suitable surface water quality standards in the usage in rivers, streams, canals, springs, marshes, swamps, lakes, reservoirs and other inland water sources of the public;
- b) Water quality standards for coastal and estuarine areas;
- c) Underground water quality standards;
- d) Atmospheric quality standards;
- e) Noise and vibration standards;
- f) Emissions standards;
- g) Effluent standards;
- h) Solid wastes standards;
- i) Other environmental quality standards stipulated by the Union Government.



The Ministry shall, under the guidance of the Committee, maintain a comprehensive monitoring system and implement by itself or in co-ordination with relevant Government departments and organizations in the following matters:

- a) The use of agro-chemicals which cause to impact on the environment significantly;
- b) Transport, storage, use, treatment and disposal of pollutants and Hazardous substances in industries;
  - Disposal of wastes which come out from exploration, production and treatment of minerals, industrial mineral raw materials and gems;
  - Carrying out waste disposal and sanitation works;
  - Carrying out development and constructions;
  - Carrying out other necessary matters relating to environmental pollution.

### **SOCIAL SECURITY LAW (2012)**

The Pyidaungsu Hluttaw hereby enacts this law in 31<sup>th</sup> August, 2012.

In Article (53) stated about the occupational safety of workers. The employers and workers shall co-ordinate with the Social Security Board or insurance agency in respect of keeping plans for safety and health in order to prevent employment injury, contracting disease and decease owing to occupation and in addition to safety and educational work of the workers and accident at the establishment.

### **LABOR ORGANIZATION LAW (2011)**

The Pyidaungsu Hluttaw hereby enacts this Law in 11<sup>th</sup> October, 2011, in accord with section 24 of the Constitution of the Republic of the Union of Myanmar, to protect the rights of the workers, to have good relations among the workers or between the employer and the worker, and to enable to form and carry out the labor organizations systematically and independently.

In Section (7) in this Law stated the duties of the employer.

According to Article (29), the employer shall recognize the labor organizations of his trade as the organizations representing the workers.

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

### **THE EMPLOYMENT AND SKILL DEVELOPMENT LAW (2013)**

Employee Skill Development and Doing Training Program

14. The employer shall carry out the training program in accord with the work requirement in line with the policy of the skill development team to develop the skill relating to the employment for the workers who are proposed to appoint and working at present.
15. The Employer:
  - (a) shall carry out the training for each work or compounding the work individually or group – wise by opening on – job training, training systematically at worksite,



sending outside training and training by using information technology system, for arranging the training program to enhance the employment skill of the workers;

- (b) Appointing the youths of 16 years as apprentice, shall arrange the training for technology relating to the employment systematically in accord with the regulations prescribed by the skill development team.

The project proponent shall make training plans and programs for skill development of the workers and staff in accordance with the above-mentioned section 14 and 15 of the Employment and Skill Development Law.

### **THE LEAVE AND HOLIDAY ACT, 1951 (LAW AMENDED JULY, 2014)**

#### **Aim/ Objective:**

- To allow worker for leave and holiday allowances, religious or social activities with earn allowance, and benefits for Health allowances.
- Concerned workers: Daily wage workers/ temporary workers/ permanent workers.

#### **Casual Leave (6) days:**

- Casual leave of 6 days with wages is to be provided
- Casual leave can be taken a maximum of 3 days at a time except in special cases
- Casual leave cannot be joined with any other leave
- Leave will be cancelled if it has not been used within a year

#### **Earned leave (10) days:**

- For continuous services of 12 months and above, 10 days of 'earned leave' shall be entitled
- If the service day is not 24 days 1-day deduction from earned Leave is made-
- Can be accumulated for up to 3 years

#### **Medical Leave (30) days:**

- Workers are entitled to 30 days of medical leave with full pay if 6 months service has been completed
- If 6 months service has not been completed, 'leave without pay' can be granted for medical needs
- Medical leave can be joined with Earned Leave
- If not taken within a year, medical leave is void or cancelled.

#### **Maternity leave:**

- Workers requiring it are entitled to 6 weeks maternity leave before confinement and at least (8) weeks after confinement
- Can be entitled jointly with medical leave

#### **Public Holidays (21) days:**

- Workers can enjoy time off with full pay.
- If work is given on a public holiday, twice the rate of regular wages is required.

#### **Penalty for violation:**

- Individuals violating this law may be sentenced to up to 2 years of imprisonment.



The project proponent shall comply with the Leave and Holiday Act (1951) for the benefits of workers prescribed under this law.

### **THE MINIMUM WAGE LAW (2013)**

#### **The Duties of the Employer**

12. The employer:

- (a) shall not pay wage to the worker less than the minimum wage stipulated under this Law;
- (b) may pay more than the minimum wage stipulated under this Law;
- (c) shall not have the right to deduct any other wage except the wage for which it has the right to deduct as stipulated in the notification issued under this Law;
- (d) shall pay the minimum wage to the workers working in the commercial, production and services business in cash. Moreover, if the specific benefits, interests or opportunities are to be paid, it may be paid in cash or partly in cash and partly in property, with prevailing regional price, jointly according to the desire of the worker;
- (e) In paying minimum wage to the workers working in the agricultural and livestock business, some cash and some property at prevailing regional price may be paid jointly according to local custom or desire of the majority of workers or collective agreement. Such payment shall be for any personal use and benefit of the worker and his family and the value shall also be considerable and fair.

13. The employer:

- (a) Shall inform the workers the rates of minimum wages relating to the business among the rates of minimum wage stipulated under this Law and advertise it at the workplace to enable to be seen by the relevant workers;
- (b) Shall prepare and maintain the lists, schedules, documents and wages of the workers correctly;
- (c) Shall report the lists, schedules and documents prepared and maintained under subsection (b) to the relevant department in accord with the stipulations;
- (d) Shall accept the inspection when summoned by the inspection officer. Moreover, he shall produce the said lists and documents upon asking to submit;

The project proponent shall pay the minimum wage to the workers by obeying the section 12 and 13 stipulated under this Law.

### **1.1 APPLICATION OF INTERNATIONAL GUIDELINES**

Specifically, the Environmental Impact Assessment for this project will follow not only the national regulations such as the Environmental Conservation Law, Environmental Conservation Rules and relevant regulations of the Government of the Republic of the Union of Myanmar but also International Guidelines such as WHO standards, IFC Environmental Health and Safety Guidelines for environmental and social considerations.



## 2.2 Application of International and Domestic Guidelines

Based on the Myanmar environmental guidelines and International best practices, the ultimate ESIA report will be developed. Specifically, the environmental impact assessment for this project will follow not only the domestic guidelines such as the Environmental Conservation Law and Rules of the Government of the Republic of the Union of Myanmar but also International guidelines.

## 2.3 Environmental Impact Assessment Procedures (2015)

The objectives of the EIA Guidelines are to provide a common framework for EMP reporting, to present project proponents and their environmental consultants with clear guidance on structure, content to ensure that EMP reporting is consistent with legal requirements, good practices and professional standards. Furthermore, by following these guidelines, the quality of EMP reports should be improved which will there by facilitate a smooth and timely review by the concerned agencies.

EMP studies should:

- Present the characteristics of a project and its justification;
- Describe the environmental and social baseline data of the study area as well as the changes that will occur during and after project implementation;
- Analyze project alternatives and define measures that will minimize negative environmental, social and health impacts and maximize benefits to affected communities;
- Propose environmental, social and health management and monitoring plans to ensure that the requests from the government and the commitments of the project proponent are implemented.

The guidelines pay special attention to providing guidance on preparing easily understandable EMP reports.

## 2.4 International Guidelines and Standards

International guidelines and standards of applicability to this Project, especially with regards International Finance Institutions (IFIs) include the following:

- World Bank Safeguard Policies;
- The IFC performance standards;
- World Commission on Dams (WCDs); and





- The International Hydropower Association (IHA) Sustainability Guidelines and Sustainability Assessment Protocols.

## 2.5 World Bank Group Operation Policies

The World Bank has ten environmental and social “Safeguard Policies” that are used to examine the potential environmental and social risks and benefits associated with World Bank lending operations. These safeguard policies include the following:

1. Environmental Assessment;
2. Natural Habitats;
3. Forestry;
4. Pest Management;
5. Cultural Property;
6. Indigenous Peoples;
7. Involuntary Resettlement;
8. Safety of Dams;
9. Projects in International Waters; and
10. Projects in Disputed Areas.

The policies of relevance to the Nan So HPP are summarized below:

### 2.5.1 *Environmental Assessment*

Operational Procedure 4.01 Environmental Assessment (EA) evaluates a project's potential environmental risks and impacts in its area of influence; examines project alternatives; identifies ways of improving project selection, siting, planning, design, and implementation by preventing, minimizing, mitigating, or compensating for adverse environmental impacts and enhancing positive impacts; and includes the process of mitigating and managing adverse environmental impacts throughout project implementation.

### 2.5.2 *Natural Habitats*

Operational Policy 4.04 Natural Habitats promotes the conservation of natural habitats. The World Bank therefore supports the protection, maintenance, and rehabilitation of natural habitats. The Bank encourages borrowers to incorporate into their development and environmental strategies analyses of any major natural habitat issues, including identification



of important natural habitat sites, the ecological functions they perform, the degree of threat to the sites, and priorities for conservation. The Bank expects the borrower to take into account the views, roles, and rights of groups, including local non-governmental organizations and local communities, affected by any project involving natural habitats, and to involve such people in planning, designing, implementing, monitoring, and evaluating such projects. Involvement may include identifying appropriate conservation measures, managing protected areas and other natural habitats, and monitoring and evaluating specific projects.

### 2.5.3 *Forestry*

Operational Policy 4.36 – Forests, involves the management, conservation, and sustainable development of forest ecosystems and their associated resources to ensure lasting poverty reduction and sustainable development, whether located in countries with abundant forests or in those with depleted or naturally limited forest resources. The objective of this policy is to assist borrowers to harness the potential of forests to reduce poverty in a sustainable manner, integrate forests effectively into sustainable economic development, and protect the vital local and global environmental services and values of forests. In accordance with operational procedure 4.01, Environmental Assessment, the environmental assessment (EA) must address the potential impact of the project on forests.

### 2.5.4 *Cultural Property*

Operational Policy 4.11 – Cultural Property addresses physical cultural resources, which are defined as movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. Physical cultural resources may be located in urban or rural settings, and may be above or below ground, or under water. Their cultural interest may be at the local, provincial or national level, or within the international community. Any project involving significant excavations, demolition, movement of earth, flooding, or other environmental changes are to take cognizance of this policy in the EA.

### 2.5.5 *Involuntary Resettlement*

The World Bank's Operational Policy 4.12: Involuntary Resettlement is triggered in situations involving involuntary taking of land and involuntary restrictions of access to legally designated parks and protected areas. The policy aims to avoid involuntary resettlement to the extent feasible, or to minimize and mitigate its adverse social and



economic impacts. It promotes participation of displaced people in resettlement planning and implementation, and its key economic objective is to assist displaced persons in their efforts to improve or at least restore their incomes and standards of living after displacement.

The policy prescribes compensation and other resettlement measures to achieve its objectives and requires that borrowers prepare adequate resettlement planning instruments prior to Bank appraisal of proposed projects.

#### 2.5.6 *Safety of Dams*

Operational Policy 4.37: Safety on Dams requires that experienced and competent professionals design and supervise construction, and that the borrower adopts and implements dam safety measures through the project cycle. The policy also applies to existing dams where they influence the performance of a project. In this case, a dam safety assessment should be carried out and necessary additional dam safety measures implemented.

Operational Policy 4.37 recommends, where appropriate, that Bank staff discuss with the borrowers any measures necessary to strengthen the institutional, legislative, and regulatory frameworks for dam safety programs in those countries.

#### 2.6 The IFC Performance Standards

IFC uses the Sustainability Framework along with other strategies, policies, and initiatives to direct the business activities of the Corporation in order to achieve its overall development objectives. Together, the eight Performance Standards establish standards that the client is to meet throughout the life of an investment by IFC:

Performance Standards 1: Social and Environmental Assessment and Management underscores the importance of managing social and environmental performance throughout the life of a project.

- Impact identification and assessment. To identify and assess social and environmental impacts, both adverse and beneficial, in the
- project's area of influence
- Mitigation. To avoid, or where avoidance is not possible, minimize, mitigate, or compensate for adverse impacts on workers, affected communities, and the environment
- Stakeholder engagement. To ensure that affected communities are appropriately engaged on issues that could potentially affect them



- Effective management. To promote improved social and environment performance of companies through the effective use of
- management systems

Performance Standard 2: Labor and Working Conditions recognizes that the pursuit of economic growth through employment creation and income generation should be balanced with protection for basic rights of workers.

- To establish, maintain and improve the worker management relationship.
- To promote fair treatment, nondiscrimination and equal opportunity of workers, and compliance with national labor and employment laws.
- To protect the workforce by addressing child labor and forced labor.
- To promote safe and healthy working conditions, and to protect and promote the health of workers.

Performance Standard 3: Pollution Prevention and Abatement recognizes that increased industrial activity and urbanization often generate increased levels of pollution to air, water, and land that may threaten people and the environment at the local, regional, and global level.

- To avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities
- To promote the reduction of emissions that contribute to climate change

Performance Standard 4: Community Health, Safety and Security recognizes that project activities, equipment, and infrastructure often bring benefits to communities including employment, services, and opportunities for economic development.

- To avoid or minimize risks to and impacts on the health and safety of the local community during the project life cycle from both routines
- and non-routine circumstances
- To ensure that the safeguarding of personnel and property is carried out in a legitimate manner that avoids or minimizes risks to the community's safety and security

Performance Standard 5: Land Acquisition and Involuntary Resettlement outlines that involuntary resettlement refers both to physical displacement (relocation or loss of shelter)



and to economic displacement (loss of assets or access to assets that leads to loss of income sources or means of livelihood) as a result of project-related land acquisition –

- To avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities
- To promote the reduction of emissions that contribute to climate change

Performance Standard 6: Biodiversity Conservation and Sustainable Natural Resource Management recognizes that protecting and conserving biodiversity—the variety of life in all its forms, including genetic, species and ecosystem diversity—and its ability to change and evolve, is fundamental to sustainable development

- To protect and conserve biodiversity
- To promote the sustainable management and use of natural resources through the adoption of practices that integrate conservation needs and development priorities

Performance Standard 7: Indigenous Peoples recognizes that Indigenous Peoples, as social groups with identities that are distinct from dominant groups in national societies, are often among the most marginalized and vulnerable segments of the population.

- To ensure that the development process fosters full respect for the dignity, human rights, aspirations, cultures and natural resource-based livelihoods of Indigenous Peoples
- To avoid adverse impacts of projects on communities of Indigenous Peoples, or when avoidance is not feasible, to minimize, mitigate, or compensate for such impacts, and to provide opportunities for development benefits, in a culturally appropriate manner
- To establish and maintain an ongoing relationship with the Indigenous Peoples affected by a project throughout the life of the project
- To foster good faith negotiation with and informed participation of Indigenous Peoples when projects are to be located on traditional
- or customary lands under use by the Indigenous Peoples
- To respect and preserve the culture, knowledge and practices of Indigenous Peoples

Performance Standard 8: Cultural Heritage recognizes the importance of cultural heritage for current and future generations



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

In addition to meeting the requirements under the Performance Standards, clients must comply with applicable national law, including those laws implementing host country obligations under international law.

## 2.7 IFC Environmental, Health and Safety (EHS) Guidelines

The World Bank Group Environmental, Health and Safety Guidelines (EHS Guidelines) are technical reference documents with general and industry-specific examples of good international industry practice. IFC uses the EHS Guidelines as a technical source of information during project appraisal. The EHS Guidelines contain the performance levels and measures that are normally acceptable to IFC, and that are generally considered to be achievable in new facilities at reasonable costs by existing technology. For IFC-financed projects, application of the EHS Guidelines to existing facilities may involve the establishment of site-specific targets with an appropriate timetable for achieving them. The environmental assessment process may recommend alternative (higher or lower) levels or measures, which, if acceptable to IFC, become project- or site-specific requirements. The General EHS Guideline contains information on cross-cutting environmental, health, and safety issues potentially applicable to all industry sectors. It should be used together with the relevant industry sector guideline(s).

When host country (Myanmar) regulations differ from the levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, a full and detailed justification for any proposed alternatives is needed as part of the site-specific environmental assessment. This justification should demonstrate that the

## 2.8 World Commission on Dams

The World Commission on Dams (WCD) was established in May 1998 in response to the escalating local and international controversies over large dams, with the mandate to:

- i) review the development effectiveness of large dams and assess alternatives for water resources and energy development; and



- ii) develop internationally acceptable criteria, guidelines and standards for the planning, design, appraisal, construction, operation, monitoring and decommissioning of dams.

The WCD framework puts forward seven strategic priorities which are widely acknowledged as a framework for dialogue. These seven strategic priorities are each based on a set of policy principles. A set of 26 guidelines for good practice lay out specific actions for complying with the strategic priorities at five key stages of the project development process.

#### *2.8.1 Strategic Priority 1 – Gaining Public Acceptance*

In order to develop water and energy resources in an equitable and sustainable manner, it is essential that there is public acceptance of such initiatives. This entails recognizing the rights, addressing the risks and safeguarding the entitlements of all interested groups, by ensuring that they are informed about the issues at stake, able effectively to participate in decision making processes, and that there is demonstrable acceptance of key decisions. Particular care should be taken to include the most vulnerable parties, such as women, the poor and certain indigenous groups, and that decision-making processes are guided by their free, informed and prior consent.

#### *2.8.2 Strategic Priority 2 – Comprehensive Options Assessment*

The most appropriate development initiatives for a particular area can only be identified by assessing food, water and energy needs and clearly defining programmed objectives. The full range of policy, institutional and technical options, which may well include alternatives to dams, should then be comprehensively assessed in a participatory process that accords the same significance to social and environmental considerations as to economic and financial factors. This process of assessment should continue throughout the planning, development and implementation of the project.

#### *2.8.3 Strategic Priority 3 – Addressing Existing Dams*

Dams and the context in which they operate are not static over time. Their benefits and impacts may be transformed by changes in priorities for water use, physical and land use changes in the river basin, technological developments, and changes in public policy expressed in environmental, safety, economic and technical regulations. Management and operational practices should be continuously assessed and adapted to changing circumstances, in order to optimize the benefits, address social issues and improve measures to limit and restore damage to the environment. This process should extend beyond the life of the project, so that the performance, benefits and impacts of all existing large dams can be



monitored and evaluated on a long-term basis, and appropriate action taken to improve all aspects of their service delivery.

#### *2.8.4 Strategic Priority 4 – Sustaining Rivers and Livelihoods*

Dams transform the landscapes they inhabit, with potentially irreversible effect. It is essential to understand, protect and restore ecosystems at river basin level, in order to minimize their negative impact, limit and mitigate harm to the health and integrity of the river system and those dependent upon it, and promote equitable human development and the welfare of all species. These are key issues when selecting sites and designing projects. Governments should develop national policies for maintaining in their natural state selected rivers with high ecosystem functions and values, and look for alternative sites on tributaries when assessing proposals for dams on undeveloped rivers.

#### *2.8.5 Strategic Priority 5 – Recognizing Entitlements and Sharing Benefits*

Rather than benefiting from them, many of those affected by dams are aware only of their negative impacts. To redress the balance, a process of joint negotiation with such groups is required, based on recognition of rights and assessment of risks. The aim of these negotiations is to agree on legally enforceable mitigation and development provisions, which recognize entitlements that improve livelihoods and quality of life. States and developers are responsible for resettling and compensating all affected people, and satisfying them that their livelihoods will be improved by moving from their current situation. Legal means, such as contracts and accessible recourse at national and international levels, should be used to ensure that responsible parties fulfil their commitments to agreed mitigation, resettlement and development provisions.

#### *2.8.6 Strategic Priority 6 – Ensuring Compliance*

In order to win and maintain public trust and confidence, governments, developers, regulators and operators must meet their commitments for planning, implementing and operating dams. Compliance with applicable regulations, criteria and guidelines, and project-specific negotiated agreements should be ensured at all critical stages of project planning and implementation. A set of regulatory and non-regulatory mechanisms, incorporating incentives and sanctions, and flexible enough to accommodate changing circumstances, is needed to enforce social, environmental and technical measures. A clear, consistent and common set of criteria and guidelines to ensure compliance should be adopted by sponsoring, contracting and financing institutions, and compliance subjected to independent and transparent review.





Legislation, voluntary integrity pacts, debarments and other instruments should be used to eliminate corrupt practices.

#### 2.8.7 *Strategic Priority 7 – Sharing Rivers for Peace, Development and Security*

The storage and diversion of water on Trans Boundary Rivers can cause considerable tension within and between countries. As specific interventions for diverting water, dams require constructive co-operation, and states or political units within countries need to agree on the use of resources in order to promote regional co-operation and peaceful collaboration. Rather than focusing on allocating water as a finite resource, states need to work on sharing rivers and their associated benefits. This will involve negotiating a wide range of issues, and making provision in national water policies for basin agreements in shared river basins. These agreements should be based on the principles of equitable and reasonable use, no significant harm, prior information and the Commission's strategic priorities. If an objection by a riparian state to a proposal for a new dam on a shared river is upheld by an independent panel, construction should not be carried out. Furthermore, where a government agency plans the construction of a dam on a shared river in contravention of the principle of good faith negotiations between riparian, external financing bodies should withdraw their support for projects and programmes promoted by that agency.

#### 2.9 International Hydropower Association (IHA) Sustainability Guidelines

The IHA Sustainability Guidelines (SGs), were published in February 2004, with the aim to promote greater consideration of environment, social, and economic sustainability in the assessment of:

- new energy projects;
- new hydro projects; and
- the management and operation of existing hydropower facilities.

The principles set out in the SGs encompass a number of elements, which include:

- The role of governments;
- The decision making processes;
- Hydropower - environmental aspects of sustainability;
- Hydropower - social aspects of sustainability; and
- Hydropower - economic aspects of sustainability.



The IHA has put forward policy and sustainability criteria which encourage good governance within each country and collaboration between governments at an international level to ensure sustainable hydropower development prerequisites are met. According to the IHA, it is the responsibility of governments to:

- Have in place national and/or regional energy policies, which should:
  - clearly set out energy development strategies;
  - include a Strategic Assessment (SA) process that involves an assessment of cumulative impacts, determination of land use and environmental priorities, as well as goals for poverty alleviation and economic growth;
  - be framed in the context of the global need to reduce greenhouse emissions;
  - incorporate the three elements of sustainability - economic, social and environmental - in energy planning; and
  - be a participatory, streamlined process, focused on major issues, using common sense and readily available information, and with short and definite time limits for its completion.
- Evaluate alternative energy options using key sustainability criteria, prescribed by the IHA; and
- Evaluate hydropower project alternatives using key sustainability criteria, prescribed by the IHA.

In order to facilitate decision making and to ensure the sustainability of hydropower projects, the IHA's policy position is that Environmental Assessments (EAs) should be applied at the project level from the prefeasibility stage to the post-construction auditing stage. The IHA encourages governments and project proponents, through the use of key criteria, to ensure appropriate management of environmental and social issues throughout the life of the project by adopting strategies to maximize positive outcomes and reduce the severity or avoidance of negative social, economic and environmental impacts.

To support the IHA SGs, the IHA has also developed the Hydropower Sustainability Assessment Protocol, which was released in 2006 and updated in November 2010, to assist in assessing performance against the criteria set out in the IHA SGs.



### 2.9.1 *Hydropower Sustainability Assessment Protocol*

The IHA Hydropower Sustainability Assessment Protocol (the Protocol) is a sustainability assessment framework for hydropower development and operation. The intention of the Protocol is to enable the production of a sustainability profile for hydropower projects through the assessment of performance against sustainability topics. The sustainability of a hydropower project is assessed through the use of assessment tools. These tools are framed by underlying principles of sustainability, as set out below.

- Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.
- Sustainable development embodies reducing poverty, respecting human rights, changing unsustainable patterns of production and consumption, long-term economic viability, protecting and managing the natural resource base, and responsible environmental management.
- Sustainable development calls for considering synergies and trade-offs amongst economic, social and environmental values. This balance should be achieved and ensured in a transparent and accountable manner, taking advantage of expanding knowledge, multiple perspectives, and innovation.
- Social responsibility, transparency, and accountability are core sustainability principles.
- Hydropower, developed and managed sustainably, can provide national, regional, and local benefits, and has the potential to play an important role in enabling communities to meet sustainable development objectives.



### 3 DESCRIPTION OF THE PHYSICAL ENVIRONMENT OF NAN SO HYDROPOWER PROJECT

Kyaing Tone is included in Kyaing Tong Township which is one of the township of the Eastern Shan State. It is lies between north latitude 21° 13' and 21° 21', east longitude 99° 33' and 99° 39'. It is adjoined with Yangloc Village Tracts in the north and in the west, Mainglar and Mainglat Village Tracts in the east, Maingzin Villlage Tracts in the south. It is compact in shap.

According to the Kyaing Tong Township data, The township as a whole covers an area of 1460.98 square miles (934977 acres). It consists of an urban centre with 5 wards and a rural area with 31 village tracts (641 villages). The shape of the township is like a rectangle. The study area is bounded on the north by Mongkat Township, on the east by Myongyaung Township, on the south by Mongphyak and Monghsat Township and on the west by Tatton Township and Mongpyin Township. The total length of East to West is about 62 miles and South to North is about 63 miles.

Kyaing Tong township map

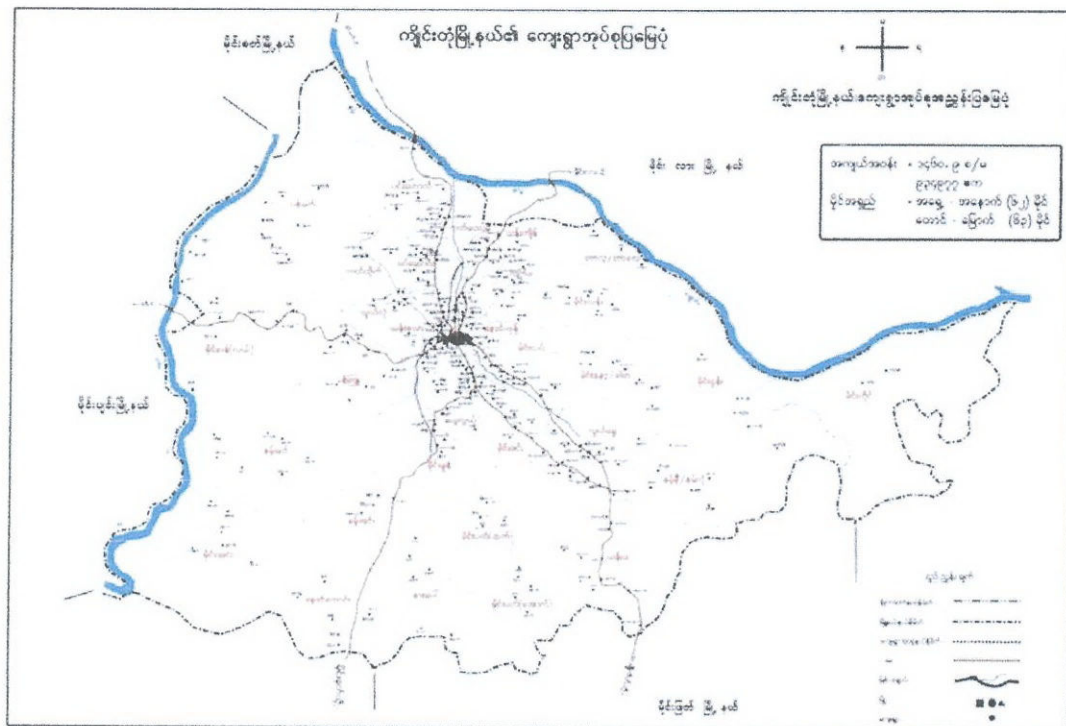


Figure 2.1 Kyaing Tong Township Map



### 3.1 Relife and Drainage

Kyaing Tong occupies part of the Kyaing Tong Valley which has a general elevation of 2700 feet above the sea level. It is 6 miles wide from east to west and 12 miles long from north to south, surrounding by lofty mountain. The town is located in Kyaing Tong Valley; the surface of the land is not flat, but undulating with low hills generally. The land slopes towards the north and east where several streams are drainage. The Nankhinnwet (NanKhum) Creek flows through the northern part into the Nawoke Creek. The Nanlatt Creek flow across the northeastern part of the town. These two creeks eventually join the Nanlway River which is one of the main tributaries of the Mekong River.

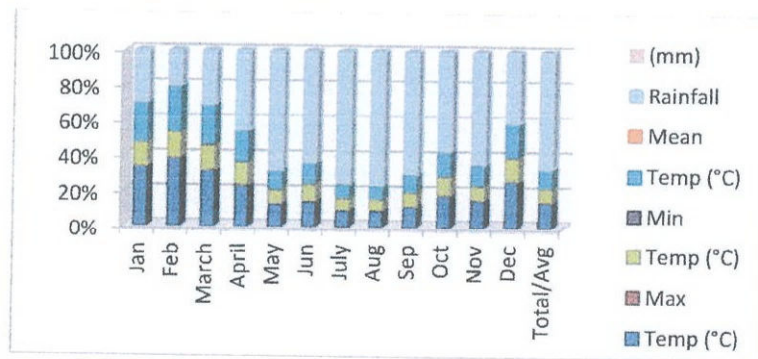
### 3.2 Climate

Although location of the Kyaing Tong Township falls within the tropic, the area experiences temperate mountain climate in response to its higher elevation. Based on the data recorded in 2014, The rainfall pattern is governed in time and space by the monsoons and topography. The rainfall records of rainfall records of rainfall stations in nearby basins in the Thailand and Myanmar presented. Kyaing Tong Township has maximum temperature of 29.8°C and minimum temperature is 16.9°C. Average mean temperature is 23.3°C and annual total rainfall is about 1364.0 mm.

Table 3.1 Average Temperature of Kyaing Tong (1997 to 2016)

Month	Jan	Feb	March	April	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total/ Avg
<b>Temp (°C) Max</b>	26.4	29.4	31.5	33.1	31.7	30.9	29.5	29.5	30.1	32.2	27.6	25.4	29.8
<b>Temp (°C) Min</b>	10.2	10.9	14.1	17.7	20.3	21.7	21.4	20.9	20.1	18.4	14.4	12.2	16.9
<b>Temp (°C) Mean</b>	18.3	20.2	22.8	25.4	26.0	26.3	25.45	25.2	25.1	25.3	21.0	18.8	23.3
<b>Rainfall (mm)</b>	22.9	15.2	30.5	63.5	170.2	139.7	241.3	248.9	180.3	99.1	114.3	38.1	1364.4

Source: Meteorology and Hydrology Department Of



Source: Meteorology and Hydrology Department Of  
Kyaing Tong

### 3.3 Regional Geology

Myanmar consists of the tectono - stratigraphic terrances which now form the continental mainland of the South East Asia. The project area included in the Sino-Burma Ranges or Shan-Tenasserim Massif as an ensialic continental region (Khin Zaw, 1992). The predominant bedrocks of town are limestone and rocks derived from metamorphosed limestone being part of the Eastern Shan Highland. Myanmar can be subdivided into the three provinces (Maung Thein, 1993) namely the Western Fold Belt (WFB) in the west, the Central Lowland (CL) in the middle and the Eastern Highland in the East. The project area lies in the Eastern Highland, which is a part of the Shan-Thai Block a large tectonic domain connects to the Pacific tectonic, is composed mainly of older rock groups containing plateau limestone and metamorphic complex. A large active fault, the Sagaing fault (Win Swe, 1981) is passing through the eastern margin of this province. The Sagaing Transform Fault occurs as a tectonically significant boundary between the Eastern Burma Basin and the continental, ensialic Sino-Burma Ranges.

The project are is lacted in township of Mong Hsat district in the Shan State of Myanmar. Shan State is a highland province in the eastern part of the Union Myanmar. It is bordered on the north by Kachin State and China, on the east by China, Laos and Thailand, on the south by Thailand and Kayah State, and on the west largely by Mandalay Region and partly by Sagaing Region. The western part of Shan State, west of the Thanlwin River, forms partly by Sagaing Region. The western part of Shan State west of the Thanlwin River, forms a reasonably levels high plateau region whereas the portion east of Thaiwin River, forms a rugged, mountainous territory. Accessibility is very poor in the eastern part of the Sate and is far in the western part.



According to Geology of Burma (Bender, 1983), the project area is the located at the eastern zone of Shan Plateau which consists of tectonically consolidated Percambrian, Paleozonic and Mesozonic sediment sequences with their overlying Mesooic-Cenozoic sediments, which intrusive and extrusive igneous rocks of various age generations and metamorphic rocks. From geological map of Myanmar Scale of 1: 1,500,000 (National Stratigraphic Committee for IGCP, 1977) the area consists of two rock types: granite and sedimentary rocks.

### 3.4 Topography

The project area is mostly the hilly platrau and higher mountains, where Nan So Creek flow through. The Mae Hkok River originates in the mountains of the Shan State of Myanmar, and flow to the south around 170 Km through the Shan State.

### 3.5 Soil

The major soil types are red earth and yellow earth, mountainous brown forest soils, meadow soils and swampy soils are found in the lowland areas. According to the field data, Nan So mini hydropower soil quality following the table

<i>Sr No</i>	<i>Sampl e Point</i>	<i>Moistur e (%)</i>	<i>PH soil:water 1:2.5</i>	<i>EC ms/cm 1:5</i>	<i>Organi c Carbon (%)</i>	<i>Texture</i>				<i>Humu s (%)</i>
						<i>San d</i>	<i>Silt</i>	<i>Clay</i>	<i>Tota l</i>	
1	Nan So	2	5.37	0.04	2.74	55.55	34.70	8.25	98.50	4.73

<b>SOIL INTERPRETATION OF RESULTS</b>			
<i>PH soil : water 1:2.5</i>	<i>EC ms/cm 1:5</i>	<i>Texture</i>	<i>Organic Carbon</i>
Moderately acid	Very Low	Sandy Loam	Medium



### 3.6 Natural Vegetation

Much of the natural vegetation has been removed from human settlements and agricultural activities. The most common trees are mazali, bamboos, myayar, taungthayet, Laukyar, Cherry, taungpaine and Thityar.

### 3.7 Hydrology

The Nan So creek basin is located in the eastern part of Myanmar. Since there are no the hydrologic stations available on Nan So creek in Myanmar side especially at the project area. The project area is lies in the Mong Kon Reserve Forest.

The hydrologic study for Environmental Management Plan (EMP) on the Nan So mini hydropower project includes the following items

- Data Collection
- Inspection of gauging stations
- Review of existing data in the nearby catchment areas
- Updating and gap-filling
- Analysis of monthly inflow
- Analysis of flood and sediment.

### 3.8 Water Quality

Water sampling were carried out at sugar mill and analyzed for parameters mentioned in the MONREC guideline. Observations are as follows

Point1 and Point 2. According to the laboratory results data, Dam Storage water site water quality is

Parameters	Lab results		NEQEG	WHO Guideline
	(Point One) Discharge Water Quality	(Point Two) Discharge Water Quality		
pH	7.1	7.2	6-9	6.5-8.5
Turbidity	3NTU	3NTU		5NTU
Total Hardness	20 mg/l as CaCO <sub>3</sub>	20 mg/l as CaCO <sub>3</sub>		500 mg/l as CaCO <sub>3</sub>
Total Solids	52mg/l	52mg/l		1500 mg/l
Suspended Solids	24 mg/l	26 mg/l	50 mg/l	
Dissolved Oxygen	7.2mg/l	7.8mg/l		
Dissolved Solids	50mg/l	50mg/l		1000 mg/l
Arsenic (As)	mg/l	mg/l		0.01 mg/l





Ammonia				
BOD	6mg/l	8mg/l	50 mg/l	
COD	129mg/l	125mg/l	250 mg/l	
Iron	0.37mg/l	0.38mg/l		
Sulphate	4mg/l	5mg/l		
Salinity	0.1mg/l	0.1mg/l		
Temperature increase	25°C	26°C	°C	3 mg/l
Total coliform bacteria	0ml	0ml	100ml	2 mg/l
Total nitrogen	mg/l	mg/l	10mg/l	5 mg/l
Total Phosphorus	mg/l	mg/l	2mg/l	0.05mg/l
Oil and Grease	3.2mg/l	3.63mg/l	10 mg/l	10mg/l

Point one storage water dam site water quality is found to be very lower affected in location.

Point2. According to the laboratory results data, Dam Weir site water quality is

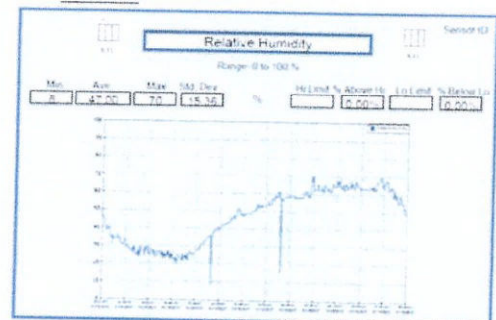
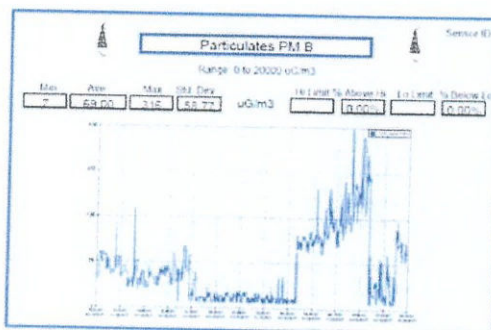
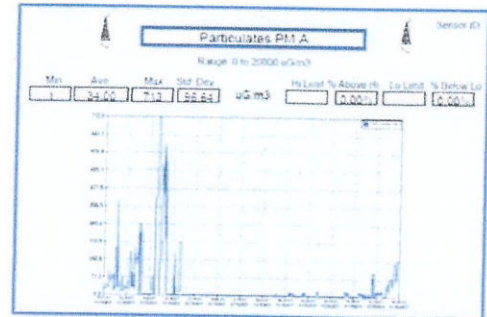
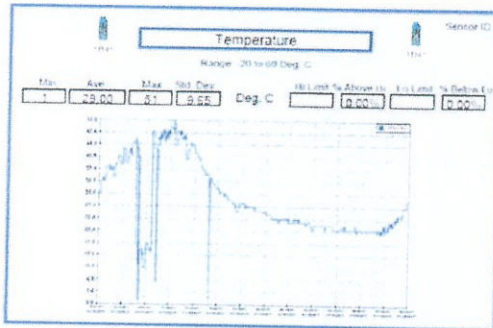
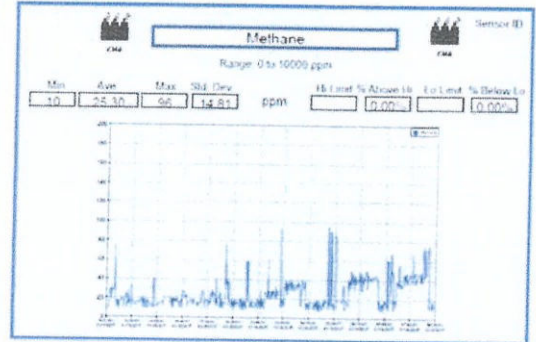
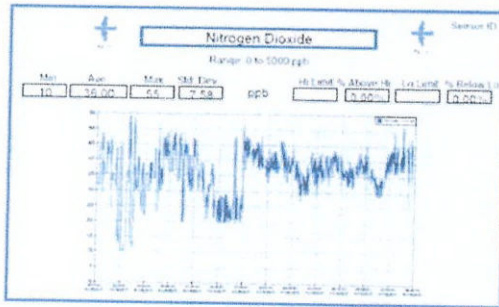
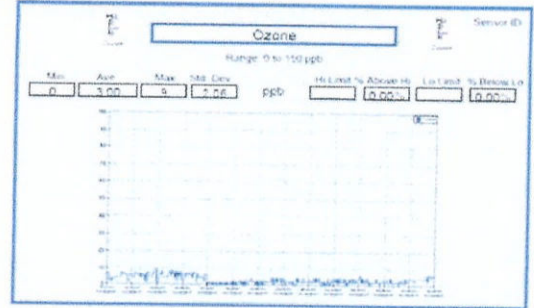
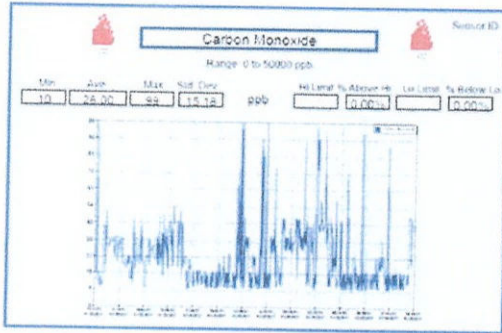
Also Point two storage water dam site water quality is found to be very lower affected in location.

### 3.9 Air Quality

In general, ambient air quality of any given area is affected by the presence of industry, transport routes and agricultural activities. Given the rural nature of the project Area and the lack of any heavy industry,

During site visit it was observed that the ambient air quality of the factory area was fairly good. The main reason of this is that there are sparsely distributed industrial activities around the factory which can deteriorate ambient air quality of the factory area.

Analysis of air quality data in the project site shows that PM10 and PM2.5 concentrations in factory is lower than the standard in survey period, SO<sub>2</sub>, CO, NO<sub>2</sub> and other parameters concentrations in survey period were lower the standard.



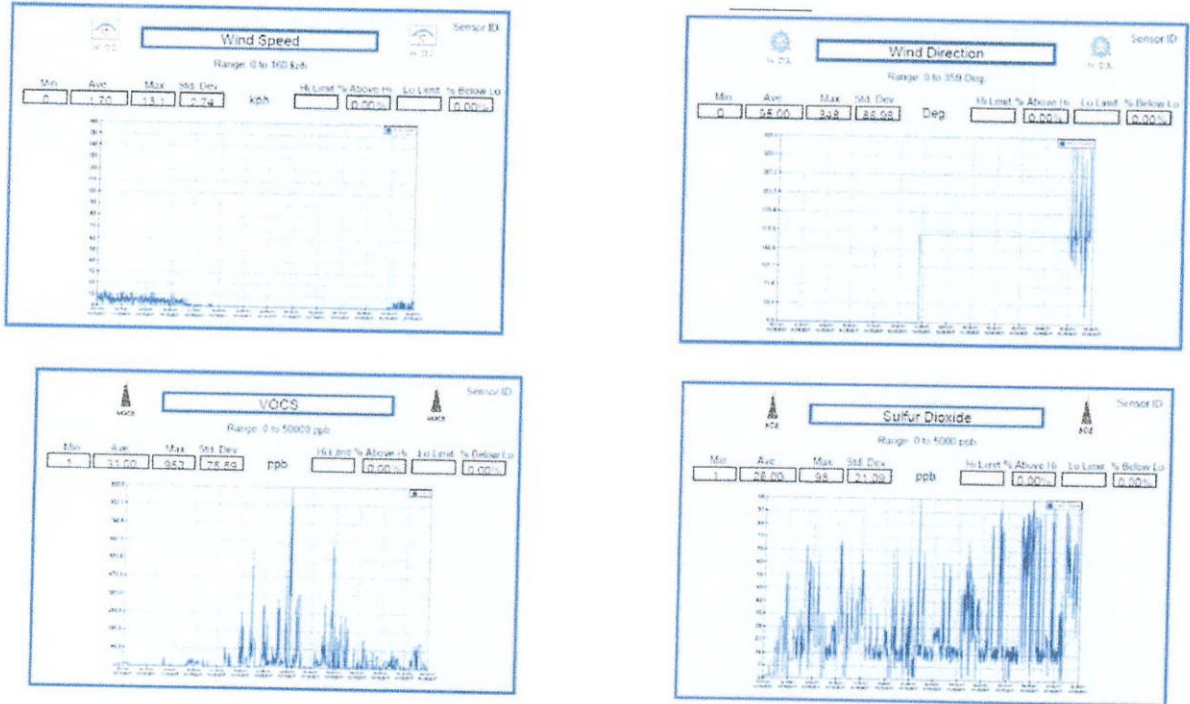


Figure 3.1 Gaseous and particles concentration in air

Table 3.2 Gaseous and particles concentration air

Code		Pollutant Parameters					
		SO <sub>2</sub>	NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2</sub>	HC
Statistical Parameters		≤80	≤80	≤100	≤60	≤04	BDL
1	Average	10.35	12.19	50.22	17.31	0.20	BDL
2	Maximum	11.5	13.2	52.3	19.3	0.39	BDL
3	Minimum	9.2	11.1	48.2	15.3	0.1	BDL
4	98 <sup>th</sup> percentile	11.454	13.2	52.3	19.3	0.3486	BDL

Note: All values in  $\mu\text{g}/\text{m}^3$ , except CO  $\text{mg}/\text{m}^3$  (BDL –Below Detectable Limit)



### 3.10 Noise, Traffic and Vibration

Noise levels of the proposed factory were recorded using Noise Meter and recorded every 18 second continuously for 24 hours. The noise levels 15m from the road exceed standards for residential and human settlement of 55dBA along the road. The noise predictions confirm the findings of other noise studies showing that the noise standards are frequently exceeded near to roads.



Figure 3.2 Measuring the noise

### 3.11 Social and Cultural Resources

Kyaing Tong Township is one of the townships of Kyaing Tong District and located in eastern part of the Shan State. The area of the Kyaing Tong Township is 1460.98 square miles (934977 acres). The Township has 5 wards, 31 village tracts and 641 villages in 2016. There are 26,889 households having a total population 164,796 in the township. An average households size is about 5.67 persons. The female population is slightly higher than male population. Female population ratio is more than the male population (5:4).



Table 3.3 Population of Kyauing Tong Township (March 2016)

No Sr.	Area	House House	House hold	Under 18 Age		Over 18 Age		Total		
				Male	Female	Male	Female	Male	Female	Total
1	Urban	7044	7193	7376	7600	15502	17468	22878	25068	47946
2	Rural	19165	19696	25776	25476	32645	32953	58420	58429	116850
Total		26309	26889	33152	33076	48147	50421	80299	83497	164796

In the Kyauing Tong township, most dominate people are Shan, Wa, Lahu, Lisu and Bamar. The majority of the people in the township are Buddhists, Christian, Islam and Deification are also found in this study area. Major religious is practice of Buddhism which consists of 50.4% of total population and other Christian, Hindu, Islam and Deification.

Table 3.4 Population of different races living in Kyauing Tong Township (March 2016)

Ethnic	Population	Population (%)
Kachin	28	0.01
Kayar	14	0.008
Kayin	1573	0.95
Chin	20	0.01
Bamar	4721	2.86
Mon	572	0.34
Rakhine	1009	0.6
Shan	39838	24.2
Danu	721	0.43
Taungyoe	2109	1.28
Palaung	378	0.23
Akha	3703	2.25
Lahu	49817	30.2
Lisu	16401	9.95
Wa	39071	23.7



Kayah	1101	0.67
Myaung Si	8	0.004
Others	3712	2.25
<b>Total</b>		100

### 3.12 Educational Attainment

According to the secondary data from General Administration Department, there are 9 basic education high schools, 3 middle schools, 17 primary schools and 1 pre-primary school which produce human resources development for residents within the Kyaing Tong area. Totally, there are student 27,648 population are more than teacher 818 populations. At the present teachers, students ratio of 1:34 observed Kyaing Tong Township.

### 3.13 Health Facility

Kyaing Tong Township has 1 Hospital (200 bedstead) are only government sector. One hospital is state township hospital and 3 hospitals are state cottage hospital. Kyaing Tong township has 10 Health care department and private health care centers. Totally population is 164796 populations. Population is more than doctor and nurse. At the present doctor, population ratio of 1:3832 and nurse and population ratio is 1:1063 observed Kyaing Tong Township.

### 3.14 Culture Heritage

Kyaing Tong Township has 32 pagodas, 59 monasteries, 3 nuns, 17 religious community hall and other San Kya deification monasteries. Other religious building churches are 41 in the township.

### 3.15 Social Groups

In the township, has only non-government organization (NGO). There are five local non-government organization: Myanmar Women Association (WMA) which favors the local women affairs, Myanmar Maternal and Child Welfare Association (MMCWA) for promoting health and welfare of mothers and children, Women's Affair Association, Maternal and Child Welfare Association, Bridge of Fire fighter and Red Cross Association which is a humanitarian organization and voluntary fire services which is community based organization.



### 3.16 Township Economy

Kyaing Tong township is fairly development township. Most of the people reply on agriculture and transport activities for their livelihoods. It has access to various transportation network. Kyaing Tong township has not rail way and navigation. Agriculture crop are corn, tea leaf, bean, rice are the main product of the township.

### 3.17 Land Use

The area of the Kyaing Tong township is 934,977 acres. This township has forest land (Protected/Reserve forest) 51,498 acres (4.8 percentages), residential lad 1919 acres (0.1 percentages), Agriculture land 82,901 acres (8.9 percentages), fallow land 236,957 acres (25.3 percentages), unused land 262,513 acres (28.1 percentages) and other land 301,108 acres (32 percentages) of the area.



## 4 ENVIRONMENTAL MANAGEMENT PLAN (EMP) OF NAN SO MINI HYDROPOWER PROJECT

### 4.1 SUMMARY

This report is a review of the Environmental Management Plan (EMP) report identifies potential environmental impacts associated with the proposed of the project area. The base line study and specimen collection of terrestrial and aquatic fauna, especially as major groups are vertebrate (mammals, birds, fish, reptiles, lizards and amphibians, especially visual observation) and invertebrate (butterflies, dragonflies, damselfly and many kinds of insects visually during survey). They are carried out in and around Nam So Mini Hydropower Project, near Kyaing Toung Town, Eastern part of Shan State. The surveyed was carried out in cool season January 20<sup>th</sup> – 25<sup>th</sup>, 2018). According to the survey results, total of 55 **fauna** species recorded in and around the Nam So Mini Hydropower Project Area during study period. Surrounding of the study, about 32 species of Avian Fauna belonging to 6 order and 21 families were recorded with different population abundance and different categorize bird species as insectivores, omnivores, carnivorous and nectar, fruit-eating species. During survey period, about 7 species of reptilian species belonging to 1 order and 4 families were recorded. As aquatic group, about 6 species of aquatic fauna belonging to 2 order and 4 families were recorded with different categorize aquatic species through out up and down stream of river. Biodiversity survey group are observed that there are about 5 species of Butterfly as well as male and female belonging to 3 families in surrounding of the dam area. The survey team investigated that the surrounding of the site of Nam So Mini Hydropower Project Area, about 3 species of Dragonfly belonging to one order and one family was recorded. This report is a review of the Environmental Management Plan (EMP) report identifies potential environmental impacts associated with the proposed of the project area. The baseline study and specimen collection of **flora** was carried out in and around the study site area. The project was conducted for the assessment of the diversity of local natural flora groups such as trees, small trees, shrubs, herbs, climbers, ferns and grass to predict the impacts and biotic ecology. The identification of the possible impact of the plant recommended mitigation measures for negative impacts identified. Plant Species diversity: A total of 26 species of plants were recorded under the ecological investigation during different sampling sites. Out of which 8 were trees (including small tree), 9 shrubs, 4 herbs, 3 fern, 1 bamboo and 1 grass were recorded in the study area.





#### 4.1.1 Environmental Monitoring Plan

Monitoring of the environmental and social impacts in the receiving environment is important in evaluating the effectiveness of the mitigation plan, so as to comply with the existing regulatory measures. During the construction and operation phase monitoring will be undertaken to ensure the proposed mitigation measures for negative impacts as well as enhancement measures for positive impacts.

#### 4.1.2 Monitoring Parameters

The monitoring parameters are selected based on impacts identified in the operation and decommissioning phases of the Nan So hydropower project. The parameters determined will reflect the effectiveness of the mitigation measures and general environmental performance of the project. Monitoring of the parameters will be carried out at the various stages of the project as follows:

**Operation Phase:** To determine the impacts that might arise from the operation of factory and office complex activities

**Decommissioning Phase:** Decommissioning is assumed to have the same impact as the construction phase and may entail parameters similar to those at the construction phase.

#### 4.1.3 Environmental Monitoring Reports

The proponents have to prepare the periodic (semi-annual) Environmental Monitoring Reports and submitted to ECD and disclosed the such reports to Project Affected Persons (PAPs) promptly upon submission. If unanticipated environmental and or social risks and impacts arise during operation of the project that will consider in the EMP, the proponent has to propose the corrective action plan.

**Table 4.1 Environmental Monitoring Plan**

Environmental Monitoring Plan						
No.	Environmental Concerns	Parameters	Location	Frequency	Responsible Party	Remarks
<b>Operation Phase</b>						
1.	Air quality	PM <sub>10</sub> , PM <sub>2.5</sub> , CO, CO <sub>2</sub> , NO <sub>2</sub> , SO <sub>2</sub>	1 points (Indoor air quality)	One times per year	Proponent	During operation phase, the environmental monitoring plan must be revised per year if it is necessary
2.	Noise Level	Noise Level dBA	1 points (operation area)	One time per year	Proponent	
3.	Water Quality	BOD, COD, Oil and Grease, PH, Temperature, Suspended solids	2 Point (Operation area)	Two time per year	Proponent	
4.	Occupational Health and Safety	Visual check and weekly inspection	Operation area	Weekly	HSE	
5.	Sewage disposal	Regular Maintenance	Sedimentation	Yearly	Proponent	



Environmental Monitoring Plan						
No.	Environmental Concerns	Parameters	Location	Frequency	Responsible Party	Remarks
			on Pond			
6.	Solid waste disposal	Visual check and weekly inspection	Operation area	Weekly	HSE	
7.	Fire Hazard	Regular check up	Operation area	Monthly	HSE	
Decommissioning Phase						
1.	Air quality	PM <sub>10</sub> , PM <sub>2.5</sub> , CO, CO <sub>2</sub> , NO <sub>2</sub> , SO <sub>2</sub>	1 point (indoor air quality)	Once	HSE/Contract or	
2.	Noise Level	Noise Level dBA	2 points-indoor and outdoor	Once	HSE/Contract or	
3.	Water Quality	BOD, COD, Oil and Grease, PH, Temperature, Suspended solids	2 Point (Operation area)	Once	HSE/Contract or	
4.	Sewage and wastewater	Regular Maintenance	Septic tank	Throughout decommissioning period	HSE/Contract or	
5.	Solid waste disposal	Visual check and daily inspection	Operation area	Throughout decommissioning period	HSE/Contract or	

Table 4.2 Budget allocation for Environmental Monitoring Plan

Budget allocation for Environmental Monitoring Plan					
Sr. No.	Monitoring items	Responsible person	Annual Estimated budget (USD) (provisional)	Frequency	Remark
<b>Operation phase</b>					
1.	Air quality	Operator	800	Twice per year	Operation periods 3 months per year
2.	Water quality		300		
3.	Noise quality		200		
4.	Fire Hazard		100	Regular check up	Monthly
		<b>Sub-Total</b>	<b>1,400</b>		
<b>Decommissioning phase</b>					



<b>Budget allocation for Environmental Monitoring Plan</b>					
<b>Sr., No.</b>	<b>Monitoring items</b>	<b>Responsible person</b>	<b>Annual Estimated budget (USD) (provisional)</b>	<b>Frequency</b>	<b>Remark</b>
1.	Air quality	Contractor	800	Once	Only field measurement is included.
2.	Water quality		300		
3.	Noise Level		200		
4.	Solid waste disposal		500		
<b>Sub-Total</b>			<b>1,800</b>		
<b>Total</b>			<b>3,200</b>		

#### *On-Site Emergency Plan*

The on-site emergency plan is supposed to be a dynamic, changing document focusing on continual improvement of emergency response planning and arrangement. A structure working on a Plan, Does, Check and Review (PDCR) cycle has been therefore suggested. A person, head of operations or factory in-charge will be deployed who will be in-charge of overall disaster management plan implementation during an emergency.

#### *Occupational Health Care (OHC)*

Sugar Mill has occupational health care center, as per the requirement of the act. It has one regular doctor and one visiting doctor. Full medical check up and also periodic medical examination will carry out prior to the employment of workers and contract workers. Following medical tests are carried out. 1) Blood group, 2) CBC, 3) Urine routine and micro, 4) Blood urea, 5) Blood sugar, 6) Cholesterol and 7) ECG.

- Ambulance is available
- Two male medically trend attendant and 2 female attends are available in OHC.
- 30 persons are trained every year in first aid.
- Local bodies, NGOs will help in relief operation, evacuation and help to police authorities in maintaining law and order.



## 4.2) OCCUPATIONAL SAFETY, HEALTH & ENVIRONMENT PROTECTION POLICY

The sugar mill has proposed their Safety, Health and Environment policy. The declaration is as under: We at Kyaing Toung Hydropower Co.,Ltd is committed to create and maintaining Safe and Healthy work place with environmental friendly operations in our organization. We will develop and implement our Occupational Health, Safety and Environment. Management system conforming to National and Environment Management System will be integral part of our work culture.

Occupational Health, Safety and Environment will be integrated part of our decision and activities. Will continually review and update performance on this front:

Sugar mill shall strive to achieve objectives by:

- Well-defined organization set up for implementation of the Health, Safety and Environment Policy implementation.
- Encouraging participation of all employees, contractor employees in Health, Safety and Environment activities.
- Ensuring competence by imparting adequate effective Training and Education to all employees.
- Evaluation of Health, Safety and Environment performance and communicate to all.
- Health, Safety and Environment performance will form as an integral part of Personal Assessment Pro-forma for all employees.
- Compliance of all statutory requirements.
- Periodic Risk Assessment and Safety Audits will be carried out to ensure effectiveness of Health, Safety and Environment systems and up-gradation.
- Work zone monitoring will be carried out periodically to ensure safe work environment and conservation of Natural Resources.
- Short resume will be mentioned about Health, Safety and Environment activities in the Kyaing Toung Hydropower Co.,Ltd Annual Report.

### 4.2.1 Emergency Preparedness and Response Plan

The project proponent must prepare an emergency preparedness plan in order to prevent consequences of natural disasters such as fire and manmade disasters. The purpose of the Emergency plan is to minimize the danger to life and property in the event of disasters in a Factory. In the factory, papers are mainly used for production of products which are easy to flammable and can accelerate the causes of fire hazards. Therefore, the emergency response plan for fire hazards must be planned at the factory.



- Fire extinguishers and signage will be installed in the factory.
- Regular inspection must be carried out.
- Employee instruction in regard to how to follow manufactures' directions and how to properly handle appliances.
- Emergency routes and exits doors must be clearly posted on a wall diagram to show employees the primary and secondary emergency routes for evacuating the building.
- All emergency phone numbers must be identified, listed in the emergency preparedness plan and posted. Each department must display the diagram in a highly visible area.
- To prevent the fire hazards, about five fire extinguishers (dry chemical, power type) are being placed at a site near to the exit and suitable places in the individual buildings.
- To prevent the fire hazards, audible and visible fire alarm system must be installed in the project area.
- Moreover, employees will attend firefighting training from Fire Services Department.

### **4.3 BIODIVERSITY MANAGEMENT AND CONSERVATION PLAN**

#### **4.4 Introduction**

Nam So Hydropower project area, Kyaing Toung is located at the Eastern part of Shan State in the Republic of the Union of Myanmar and is one of the richest areas in habitat and species diversity. It lies at Latitude 21°10'17.93" N, Longitude 99°34'30.15" E. The study area has wide variation in altitude, topography and climatic conditions, which result in a rich floral and faunal diversity.

#### **4.5 Biological Environment**

##### *4.5.1 Land Use*

The size of the reservoir created by a hydroelectric project can vary widely, depending largely on the size of the hydroelectric generators and the topography of the land. The size of the Nam So HPP reservoir is 1.53 acre and the altitude of 5312 meter. Hydroelectric plant in flat areas tend to require much more land than those in hilly areas where deeper reservoirs can hold more volume of water in a smaller space. The Nam So hydroelectric power plant, which was built in a flat area of near Kaung Htan village and the area, is 1.07 acre it only provides 1250 KW of power generating capacity. Along the ways of high presser transported pipeline from reservoir to power house is 5273 x 24 square ft. and 2.91 acre. The topography of the study area is mountainous with a deep river valleys running beneath high cliffs. The higher slopes and the tops of the hills remain forested with most of the forested areas designated as reserves. The study area is predominantly rural in character with the majority of the population living in small rural communities. Flooding land for a hydroelectric reservoir has an extreme environmental impact: it destroys forest, wildlife habitat, agricultural land, and scenic lands.



#### 4.5.2 Hydropower Potential on Stream Nam So, Kyauing-Toung

Electricity has a vital and significant role to play in the economic development of any state. In fact the growth of any country is dependent on the availability of power. Hydropower is perhaps the cleanest source of energy with bulk of its potential yet to be harnessed in many developing countries. The proposed hydropower project Nam So (1250 KW), utilizes the water of stream Nam So for its development. It rises from a Ming-khon and Pan-Kyu protected forests area.

#### 4.5.3 Salient Feature of the Nam So Hydroelectric Power Station

The proposed Nam So Hydroelectric power station has been conceived for harnessing the power potential of stream Nam So, it is started flow from the watershed area of Ming-khon and Pan-Kyu protected forests and in turn increase the output of the electricity generation unit. The station is a medium head scheme with rated design head of 623 meters. It has full reservoir level as 1661 meter above mean sea level, respectively.

**Table 4.3** The Salient Features of the study site are as identified below

Study site Location (Nam So HPP)	
State	Eastern Shan State
City	Kyauing-Toung
Stream	Nam So
Nearest Village	Kaung-Htan and Won-Kyin villages
Latitude	21°10'17.93" N
Longitude	99°34'30.15" E

#### 4.5.4 Sampling Locations

The topography of the area is mostly mountainous a greater part of which falls within the higher mountain zone. Development of terraces was observed along the stream course on both the banks. In general both the banks of the stream are mostly covered with rocks. Approximately, 60% of the area is covered by the forests. The study was carried out within



the 10 km radius of major project components. The co-ordinates and elevations of the power house, transport pipeline and reservoir are given in the Table:

**Table 4.4 Ecological Sampling Locations and Elevation for Power House, Transport pipeline and Reservoir**

No.	Site Name	Co-ordinates		Elevation (m)
1	Power House	21°10'17.93" N 99°34'30.15" E	21° 10'33.4" N 99° 34'19.9" E	623 - 955M
2	Transport pipeline	21°10'17.93" N 99°34'30.15" E	21° 10'46.2" N99° 33'12.6" E	623 -1660 M
3	Reservoir	21° 10'49.9" N 99° 33'12.6" E	N 21° 10'20.8" N E 99° 32'49.8" E	1660 - 1673 M

#### 4.6 Purpose and Objectives of Environmental Management Plan

The aim of the Environmental Management Plan (EMP) is to enumerate the entire panel of environmental issues. All the methods were structured for the identification, collection and organization of environmental impacts data. The information, thus gathered, has been analyzed and presented in the form of a number of visual formats for easy interpretation and decision-making. This study was investigated in catchment area, influence area (proposed reservoir and power house) and the surrounding (directly impacted area). Successive phases of the EMP study include reconnaissance visit, survey and data collection, identification, prediction and evaluation of impacts and possible mitigation measures and formulation of environment management plans. The Environmental Management Plan (EMP) is conducted in order to minimize the effects of the project on the surrounding environment by establishing a sustainable work line.

##### 4.6.1 Objectives

The main objectives of Biodiversity Management and Conservation Plan for Nam So HPP are given below.

- To maintain a sustainable approach of biodiversity conservation,
- Special efforts for conservation of critical/important flora and fauna species, if any, affected by the propose site,
- To prepare a Protection Plan for study area concern with vegetation and home rage of fauna.



#### 4.7 Terrestrial and Aquatic Fauna Survey

The base line study and specimen collection of terrestrial and aquatic species, especially as major groups are vertebrate (mammals, birds, fish, reptiles and amphibians, especially visual observation for the birds) and invertebrate (butterflies, dragonflies and many kinds of insects visually during survey). They are carried out in and around Nan So Mini Hydropower Project Area. Habitat preferences, relative abundances and diversity assessment were examined. Possible impacts (negative and positive impacts) were investigated and mitigation measures were proposed. Collected specimens were checked with the IUCN Red list version 2016.3 and CITE appendices.

#### 4.8 Classification of Terrestrial and Aquatic Fauna and Flora

##### 4.8.1 Fauna (Vertebrate)

##### 1. Mammals

Surrounding of the study site, according to the interview survey of native villagers, about two mammal species were recorded, Wild boar, *Sus scrofa* is known as the wild swine, Eurasian wild pig, or simply wild pig of family Suidae. Its wide range, high numbers, and adaptability mean that it is classed as **least concern** by the **IUCN** Redlist and it has become an **invasive species** in part of its introduced range. Porcupines are **rodent mammals** with a coat of sharp **spines**, or quills, that protect against predators (Figure 4.1).



Wild boar *Sus scrofa*



Porcupines

**Figure 4.1** Mammals species recorded from Nam So Mini Hydropower Project Area

##### 2. Birds

According to the survey results, surrounding of the Nam So Mini Hydropower Project site, about 32 species of Avian Fauna belonging to 6 order and 21 families were recorded by population abundance in the study period





**Table 4.5 Bird species recorded during the survey period in Nam So Mini Hydropower Project**

Sr.	Order/Family	Scientific Name	Common Name	IUCN RedList Status	Remarks
I	<u>Passeriformes</u>				
1	<u>Pycnonotidae</u>	<i>Hypsipetes leucocephalus</i>	Asian Black Bulbul	LC	Observed
2	<u>Pycnonotidae</u>	<i>Pycnonotus jocosus</i>	Red-Whiskered Bulbul	LC	Observed
3	<u>Pycnonotidae</u>	<i>Pycnonotus aurigaster</i>	Sooty-Headed Bulbul	LC	Observed
4	<u>Pycnonotidae</u>	<i>Pycnonotus aurigaster klossi</i>	Sooty-Headed Bulbul	LC	Observed
5	Passeridae	<i>Passer montanus</i>	Eurasian Tree Sparrow	LC	Observed
6	<u>Aegithinidae</u>	<i>Aegithina lafresnayei</i>	Great Iora	LC	Observed
7	Nectariniidae	<i>Aethopyga saturata</i>	Black-Throated Sunbird	LC	Observed
8	<u>Sturnidae</u>	<i>Acridotheres grandis</i>	White-Vented Myna	LC	Observed
9	<u>Phylloscopidae</u>	<i>Phylloscopus plumbeittarsus</i>	Two-Barred Warbler	LC	Observed
10	<u>Cisticolidae</u>	<i>Prinia flaviventris</i>	Yellow-Bellied Prinia	LC	Observed
11	<u>Corvidae</u>	<i>Corvus macrorhynchos</i>	Large-Billed Crow	LC	Observed
12	<u>Dicruridae</u>	<i>Dicrurus macrocercus</i>	Black Drongo	LC	Observed
13	<u>Dicruridae</u>	<i>Dicrurus leucophaeus</i>	Ashy Drongo	LC	Observed
14	<u>Zosteropidae</u>	<i>Zosterops palpebrosus</i>	Oriental White-Eye	LC	Observed
15	<u>Campephagidae</u>	<i>Pericrocotus flammeus</i>	Scarlet Minivet	LC	Observed
16	<u>Laniidae</u>	<i>Lanius schach</i>	Long-Tailed Shrike	LC	Observed
17	<u>Muscicapidae</u>	<i>Monticola solitarius</i>	Blue Rock Thrush	LC	Observed
18	<u>Muscicapidae</u>	<i>Saxicola ferrea</i>	Grey Bushchat	LC	Observed



Environmental Management Plan Report for Nan So Hydropower  
Kyaing Tong Energy Company Limited

19	<u>Muscicapidae</u>	<i>Saxicola jerdoni</i>	Jerdon's Bushchat	LC	Observed
20	<u>Muscicapidae</u>	<i>Saxicola caprata</i>	Pied Bushchat	LC	Observed
21	<u>Muscicapidae</u>	<i>Rhyacornis fuliginosus</i>	Plumbeous Water Redstart	LC	Observed
22	<u>Muscicapidae</u>	<i>Saxicola leucura</i>	White-Tailed Stonechat	LC	Observed
23	<u>Apodidae</u>	<i>Apus pacificus</i>	Fork-Tailed Swift	LC	Observed
24	<u>Motacillidae</u>	<i>Motacilla alba</i>	White Wagtail	LC	Observed
25	<u>Motacillidae</u>	<i>Motacilla cinerea</i>	Grey Wagtail	LC	Observed
26	<u>Timaliidae</u>	<i>Pomatorhinus schisticeps</i>	White-Browed Scimitar Babbler	LC	Observed
<b>II <u>Bucerotiformes</u></b>					
27	<u>Upupidae</u>	<i>Upupa epops</i>	Common Hoopoe	LC	Interviewed
<b>III <u>Columbiformes</u></b>					
28	<u>Columbidae</u>	<i>Chalcophaps indica</i>	Emerald Dove	LC	Observed
<b>IV <u>Cuculiformes</u></b>					
29	<u>Centropodidae</u>	<i>Centropus sinensis</i>	Greater Coucal	LC	Observed (Song)
<b>V <u>Accipitriformes</u></b>					
30	<u>Accipitridae</u>	<i>Circus melanoleucos</i>	Pied Herrier	LC	Observed
<b>VI <u>Galliformes</u></b>					
31	<u>Phasianidae</u>	<i>Gallus gallus</i>	Red Junglefowl (Male)	LC	Interviewed
32	<u>Phasianidae</u>	<i>Lophura leucomelanos</i>	Kalij Pheasant (Male)	LC	Interviewed

LC- Least Concern (IUCN 3.1), No. of species – 32, No. of Order – 6, No. of Family – 21



Sooty-headed Bulbul *Pycnonotus aurigaster*



Red-whiskered Bulbul *Pycnonotus jocosus*



Sooty-headed Bulbul *Pycnonotus aurigaster klossi*



White-Browed Scimitar Babbler *Pomatorhinus schisticeps*



Scarlet Minivet *Pericrocotus flammeus* (Male)



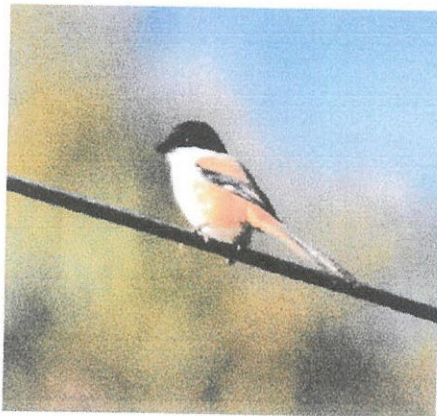
Emerald Dove *Chalcophaps indica* (Male) White-Vented Myna *Acridotheres grandis*



Blue Rock Thrush *Monticola solitaries*      Black Bulbul *Hypsipetes leucocephalus*



Large-Billed Crow *Corvus macrorhynchos*



Long-Tailed Shrike *Lanius schach*



Oriental White-Eye *Zosterops palpebrosus*

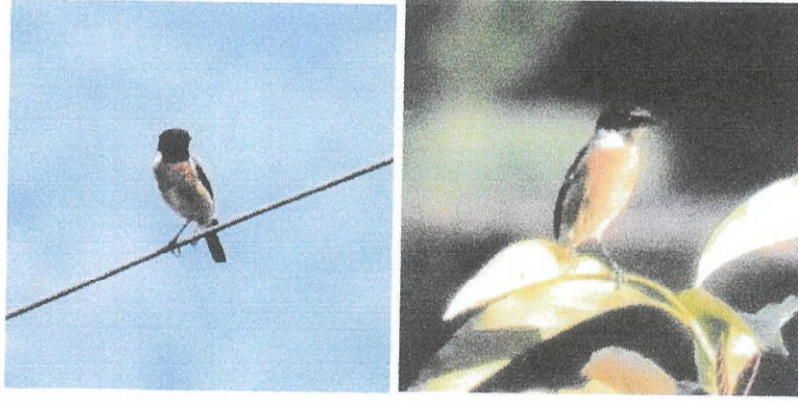


Yellow-Bellied Prinia *Prinia flaviventris*

Great Iora *Aegithina lafresnayei*



Grey Bushchat *Saxicola ferrea* (Male & Female)



White-Tailed Stonechat *Saxicola leucura*



White Wagtail *Motacilla alba*



Grey Wagtail *Motacilla cinerea*



Two-Barred Warbler *Phylloscopus plumbeittarsus*



Black-Throated Sunbird *Aethopyga saturate*    Black Drongo *Dicrurus macrocercus*

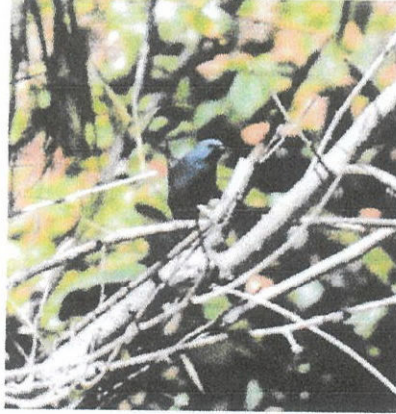


Ashy Drongo *Dicrurus leucophaeus*



Jerdon's Bushchat *Saxicola jerdoni*    Pied Bushchat *Saxicola caprata*





Plumbeous Water Redstart  
*Rhyacornis fuliginosus* (Male)



Grey-Breasted Prinia *Prinia hodgsonii*



Fork-Tailed Swift *Apus pacificus*



Eurasian Tree Sparrow *Passer montanus*



Pied Herrier *Circus melanoleucos*



Figure 4. 2 Bird species recorded from Nam So Mini Hydropower Project Area

### 3. Reptilian

Near Nam So Mini Hydropower Project area, about 7 species of reptilian species belonging to 1 order and 4 families were recorded in during survey period. Green Crested Lizard *Bronchocela cristatella* is a bright green lizard, sometimes possessing a blue tint on the head.



It is able to change colour, turning darker brown when threatened. There is a dark ring around each eye, and a dark spot at the back of the head (Table.4.7, Figure 4.3). According to interview survey, these are Russell's viper *Daboia russelii siamensis*, Indian Green Pit Viper / Common Green Pit Viper *Trimeresurus gramineus*, Water snake *Xenochrophis flavipunctatus*, Indochinese rat snake *Ptyas korros*, Banded Krait *Bungarus fasciatus*, Burmese Python *Python molurus bivittatus*. Chequered keelback water snake *Xenochrophis piscator* was recorded in this survey. According to interview records, there were caught accidentally some snakes both poisonous and non-poisonous snakes in this area according to report by the natives villagers.

**Table 4.6** Reptile species recorded from Nam So Mini Hydropower Project Area during the survey period

Sr.	Order/Family	Species	Common Name	IUCN RedList Status	Type of evidence
<b>I</b>	<b>Squamata</b>				
1	<b>Agamidae</b>	<i>Bronchocela cristatella</i>	Green Crested Lizard	LC	Observed
2	Colubridae	<i>Xenochrophis piscator</i>	Chequered keelback water snake	LC	Interviewed
3	Colubridae	<i>Xenochrophis flavipunctatus</i>	Water snake	LC	Interviewed
4	Colubridae	<i>Ptyas korros</i>	Indochinese rat snake	LC	Interviewed
5	Viperidae	<i>Daboia russelii siamensis</i>	Russell's viper	LC	Interviewed
6	Viperidae	<i>Trimeresurus gramineus</i>	Indian Green Pit Viper / Common Green Pit Viper	LC	Interviewed
7	Elapidae	<i>Bungarus fasciatus</i>	Banded Krait	LC	Interviewed

LC- Least Concern, No. of species – 7, No. of Order – 1, No. of Family – 4



Green Crested Lizard *Bronchocela cristatella*

Figure 4.3 Reptile species recorded from Nam So Mini Hydropower Project Area

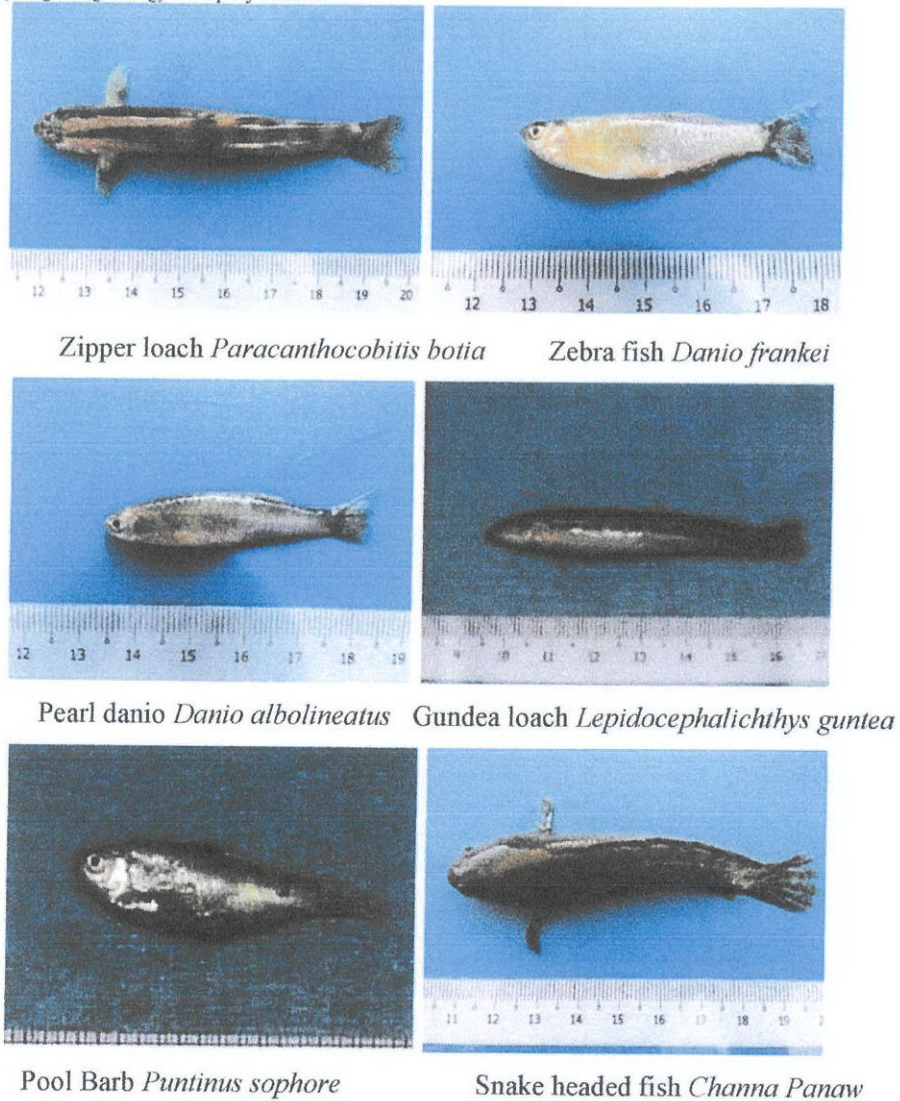
#### 4. Aquatic Fauna

Surrounding of the study site, about 6 species of aquatic fauna belonging to 2 order and 4 families were recorded with different population and different categorize aquatic species through out up and down stream of Nam So Chaung.

Table 4.7 Aquatic species recorded during the survey period in Project Area

Sr.	Order	Family	Species	Common Name	IUCN RedList Status	Type of evidence
1	Cypriniformes	Nemacheilidae	<i>Paracanthocobitis botia</i>	Zipper loach	LC	Observed
2	Cypriniformes	Cyprinidae	<i>Danio frankei</i>	Zebra fish	LC	Observed
3	Cypriniformes	Cyprinidae	<i>Danio albolineatus</i>	Pearl danio	LC	Observed
4	Cypriniformes	Cyprinidae	<i>Puntinus sophore</i>	Pool Barb	LC	Observed
5	Cypriniformes	Cobitidae	<i>Lepidocephalichthys guntea</i>	Gundea loach	LC	Observed
6	Perciformes	Channidae	<i>Channa Panaw</i>	Snake headed fish	LC	Observed

LC- Least Concern, No. of species – 6, No. of Order – 2, No. of Family – 4



**Figure 4.4** Fish species recorded through out up and down stream of Nam So in Nam So Mini Hydropower Project Area

4.8.2 Fauna (Invertebrate)

4.8.3 Fauna (Invertebrate)

Invertebrates are abundantly found in the nearby Nam So Mini Hydropower Project Area. Especially, in Survey area, many different kinds of invertebrates such as various kinds of butterflies and dragonflies species, insects were recorded.



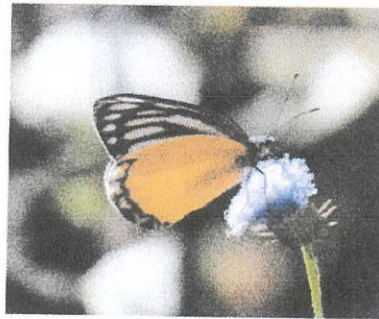
#### 4.8.4 Butterfly

Biodiversity survey group are observed that there are about 5 species of Butterfly as well as male and female belonging to 3 families in surrounding of the hydropower project area

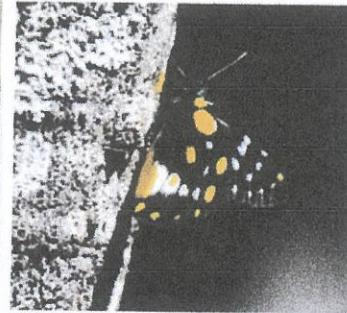
**Table 4.8** Butterfly species recorded from Nam So Mini Hydropower Project Area during the survey period

Sr.	Order/Family	Species	Common Name	IUCN RedList Status
<b>Lepidoptera</b>				
1	Pieridae	<i>Delias agostina</i>	Yellow Jezebel	NE
2	Pieridae	<i>Delias belladonna</i>	Hill Jezebel	NE
3	Pieridae	<i>Eurema hecabe</i>	Common Grass Yellow	NE
4	Nymphalidae	<i>Junonia atlite</i>	Grey Pansy	NE
5	Riodinidae	<i>Abisara fylla</i>	Dark Judy	DD

NE - Not Evaluated, DD - Data Deficient, No. of Species - 5, No. of Order - 1, No. of Family - 3



Yellow Jezebel *Delias agostina*



Hill Jezebel *Delias belladonna*



Common Grass Yellow *Eurema hecabe*



Dark Judy *Abisara fylla*



Grey Pansy *Junonia atlite*

Figure 4. 5 Butterfly species recorded from Nan So Mini Hydropower Project Area

### 1 Dragonfly

The survey team investigated that the surrounding of the site of Nam So Mini Hydropower Project Area, about 3 species of Dragonfly belonging to one order and one families (Libellulidae) was recorded with few number (Table. 4.10, Figure.4.6).

**Table 4. 9 Dragonfly and Damselfly species recorded from Nam So Mini Hydropower Project Area during the survey period**

Sr.	Order/Family	Species	Common Name	IUCN RedList Status
<b>1</b>	<b>Odonata (Dragonfly)</b>			
1	Libellulidae	<i>Potamarcha congener</i>	Common Chaser	LC
2	Libellulidae	<i>Pantala flavescens</i>	Wandering Glider	LC
3	Libellulidae	<i>Palpopleura sexmaculata</i>	Blue-Tailed Yellow Skimmer	LC

LC- Least Concern, No. of species – 3, No. of Order – 1, No. of Family – 1



Common Chaser *Potamarcha congener*



Blue-Tailed Yellow Skimmer *Palpopleura sexmaculata*

Figure 4. 6 Dragonfly species recorded from Nam So Mini Hydropower Project Area

#### 4.8.3 Floristic and Forest Types

Floristic study in the project area was undertaken with the objectives of preparing a checklist of flora in the study area and locations where project components (i.e. Reservoir, power house and along the river site) are proposed. Listing of rare/ endangered species was prepared by conducting primary surveys along all project components. The forest of the study area is Sub-tropical mixed hill type. Complementary studies on site have been conducted in order to the density of natural vegetation growing in the areas of Nam So HPP. The study focuses on assemblages of plant species growing in a particular area or aggregations of which form a distinct ecological unit. A total of 26 species of plants were recorded under the ecological investigation during different sampling sites. Out of which 8 were trees (including small tree), 9 shrubs, 4 herbs, 3 fern, 1 bamboo and 1 grass. For identification of threaten species, it is conducted matching with IUCN red list version 2016.3.

Table 4.10 Plant Species Inventory List of the study area, the total of 26 species belongs to 25genera and 21 families.







No.	Species Name	Myanmar Name	Family Name	Habit	IUCN status
1	<i>Ageratum conyzoides</i> L.	Goatweed	Asteraceae	S	Nil
2	<i>Bambusa</i> sp.	Notknown	Poaceae	Bamboo	Nil
3	<i>Blechnum finlaysonianum</i>	Notknown	Blechnaceae	Fern	Nil
4	<i>Buddleja asiatica</i> Lour.	Kyaung-migo	Buddlejaceae	S	Nil
5	<i>Castanopsis argyrophylla</i> King	Thit-e	Fagaceae	T	Nil
6	<i>Diplazium</i> sp.	Notknown	Athyriaceae	Fern	Nil
7	<i>Emilia sonchifolia</i> (L.) DC.	Notknown	Asteraceae	H	Nil
8	<i>Flemingia macrophylla</i> (Willd.) Merr.	Taw-shwe-war	Fabaceae	S	Nil



Environmental Management Plan Report for Nan So Hydropower  
Kvaing Tong Energy Company Limited



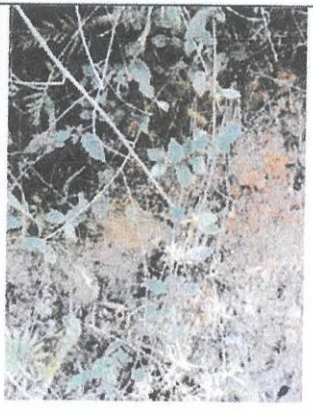
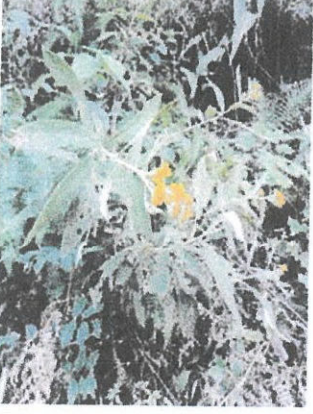




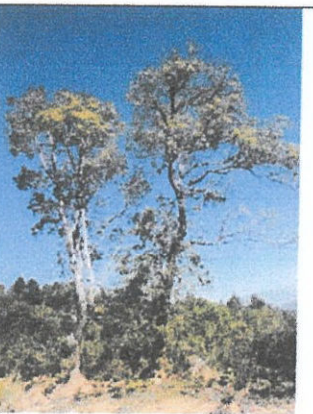
9	<i>Holmskioldia sanguinea</i>	Hti-pan	Lamiaceae	S	Nil
10	<i>Inula cappa</i> (Buch.-Ham.) DC.	Notknown	Asteraceae	S	Nil
11	<i>Lycopodium cernuum</i> L.	Notknown	Lycopodiaceae	Fern	Nil
12	<i>Musa itinerans</i> E.E. Cheesm.	Taw-nget-pyaw	Musaceae	H	Nil
13	<i>Mussaenda</i> sp.	Notknown	Rubiaceae	S	Nil
14	<i>Oroxylum indicum</i> (L.) Kurz	Kyaung-sha	Bignoniaceae	T	Nil
15	<i>Phyllanthus acidus</i> (L.) Skeels	Thinbaw-zibyu	Euphobiaceae	T	Nil
16	<i>Pogostemon auricularius</i>	Notknown	Lamiaceae	S	Nil
17	<i>Polygonum lapathifolium</i> L.	Notknown	Polygonaceae	H	Nil
18	<i>Prunus cerasoides</i> D. Don	Cherry	Rosaceae	T	Nil
19	<i>Rubus ellipticus</i> Sm.	Sumwe	Rosaceae	S	Nil
20	<i>Schima khasiana</i> Dyer	Laukya	Theaceae	T	Nil
21	<i>Solanum erianthum</i> D. Don	Daung-satpya	Solanaceae	ST	Nil
22	<i>Solanum virginianum</i> L.	Mye-bok-hkayan	Solanaceae	H	Nil
23	<i>Thysanolaena maxima</i> (Roxb.) Kuntze	Tabyetsi	Poaceae	Grass	Nil
24	<i>Tithonia diversifolia</i> A. Gray	Taung Nay-kyar	Asteraceae	S	Nil
25	<i>Trema orientalis</i> (L.) Blume	Kywe-sa	Ulmaceae	ST	Nil
26	<i>Vaccinium</i> sp.	Notknown	Ericaceae	T	Nil

S- shrub, ST - Small tree, T- Tree, H- Herb

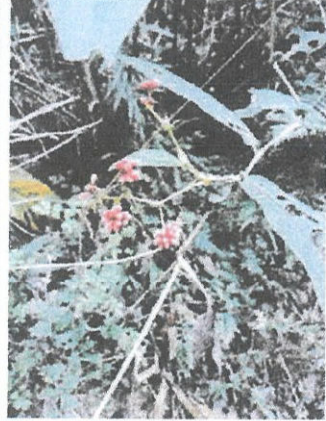
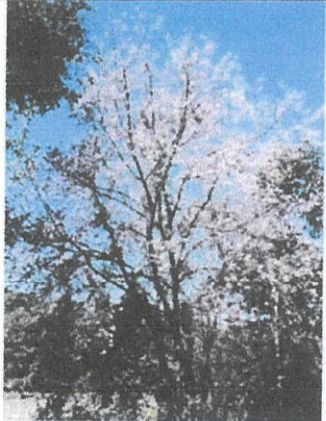
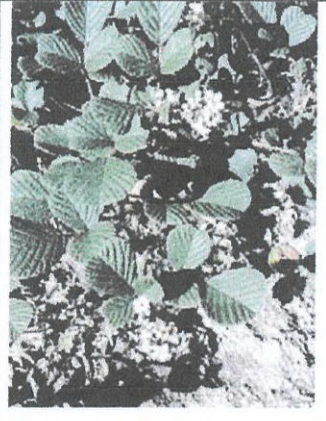


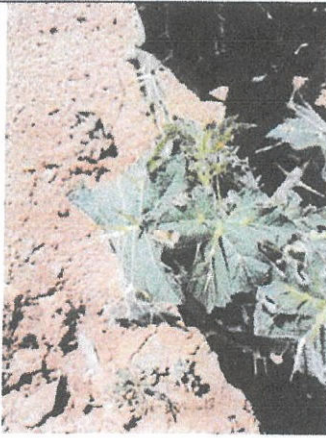



		
1. <i>Ageratum conyzoides</i>	2. <i>Bambusa</i> sp.	3. <i>Blechnum finlaysonianum</i>
		







4. <i>Buddleja asiatica</i> Lour.	5. <i>Castanopsis argyrophylla</i>	6. <i>Diplazium</i> sp.
		
7. <i>Emilia sonchifolia</i> (L.) DC.	8. <i>Flemingia macrophylla</i>	9. <i>Holmskioldia sanguinea</i>
		
10. <i>Inula cappa</i>	11. <i>Lycopodium cernuum</i> L.	12. <i>Musa itinerans</i>
		
13. <i>Mussaenda</i> sp	14. <i>Oroxylum indicum</i>	15. <i>Phyllanthus acidus</i>



		
16. <i>Polygonum lapathifolium</i>	17. <i>Prunus cerasoides</i>	18. <i>Rubus ellipticus Sm.</i>
		
19. <i>Schima khasiana</i>	20. <i>Solanum erianthum</i>	21. <i>Solanum virginianum</i>
		
22. <i>Pogostemon auricularius</i>	23. <i>Thysanolaena maxima</i>	24. <i>Tithonia diversifolia</i>



	
25. <i>Trema orientalis</i>	26. <i>Vaccinium</i> sp.



## 5 CURRENT ENVIRONMENTAL ASPECTS

According to the recorded data, mammals, birds, reptiles, fish and butterflies, dragonfly and some insects between 1000 Meter and 1500 Meter surrounding the project area are discovered because of there are enough food sources in these study area and approximately, 60% of the area is covered by the forests.

### Prediction of Impacts and some mitigation measures

The likely impacts of various actions were predicted for the following environment.

#### 5.1 Terrestrial Ecosystem

##### i) *Land Use and Land Cover*

Forest area has been cleared for the purpose, which result into land use and land cover changes. It is considered as a negative, direct and permanent impact, which, however, is small in magnitude. This activity is confined to the road construction phase.

##### ii) *Submergence*

Including the stream bed area a total of land would be required for the submergence. A significant number of plant species would come under the submergence during the rainy season. Tree canopy in the submergence area is comprised of *Castanopsis argyrophylla*, *Schima khasiana*, and *Trema orientalis*. Understory is represented by herbs and shrubs. *Buddleja asiatica*, *Mussaenda* sp., *Polygonum lapathifolium*, *Thysanolaena maxima*, and *Rubus ellipticus* are important fern, shrubs and grass. Though none of the species is threatened and endemic to the region, however the impact is long lasting and permanent in nature.

##### iii) *Habitat / species loss*

The activities like fuel, road construction etc. would have direct impacts on the habitat and plant species. The important tree species in and around the construction sites are mentioned above. A large number of trees would be removed from these areas by road construction. It is considered as habitat loss; however, the area required for the proposed site is small. Considering the species, no permanent loss is anticipated because no threatened and endemic species have been observed in the area. The loss of habitat would adversely affect the animal species like mammals, birds, butterfly etc.



iv) *Riparian Vegetation*

Low water flow in the downstream channel is anticipated to affect the riparian vegetation adversely. Number of bryophytes, pteridophytes (fern) and herbs which grow in the downstream stretch would be affected adversely.

## **5.2 Catchment area treatment Plan**

The entire catchment is characterized by mountains of complex topography with three distinct altitudinal zones, namely: i) Higher altitudinal zone (1661 m), ii) Middle altitudinal (1270 m), and iii) Lower altitudinal Zone (623 m). The minimum altitude in this Catchment is 623 m and maximum altitude reaches to 1675 m. Terrain slopes are important as they govern soil formation, runoff generation and resultant loss of precious soils, freedom of movement, communication and so on.

The types of erosion that are observed in the catchment are: gully erosion; it is the aggravated form of rill erosion (heavy rainfall associated with rainstorms, the overland flow or sheet flow is transformed into linear flow). Accelerated soil erosion in the catchment areas of the reservoir and transport of detached materials through the drainage network give rise to a series of problems, notably steady loss of storage capacity, consistent drop in hydro-electric power generation in lean season and landslides. The loss of active storage leads to heavy economic losses due to reduced lean season generation. Therefore, extensive soil conservation and management programmes are needed to minimize the damages to the catchment area and to mitigate soil erosion problems. In the upper regions of the valley, active processes of slope denudation are operative and loss of fertile soil is taking place.

## **5.3 Reservoir Rim Treatment plan**

The plan is formulated to protect the reservoir and check the sedimentation in the reservoir caused by the loose debris on critical slopes, landslides etc. A generalized scheme of Reservoir Rim is adopted accordingly, a green belt is suggested, which will be kept in the immediate vicinity of the Reservoir Rim; wherever feasible taking into account the geomorphology, physiographic features, land cover and other related aspects. In addition to the suitable plantation as proposed the mixed plantation with soil binding trees may be planted in the Reservoir Rim.



#### 5.4 Preventive Biological Measures

For undertaking soil conservation measures in the Nam So HPP catchment area up to barrage site indirect or preventive measures like biological measures. It is always better to undertake preventive measures than to mitigate the factors that ultimately lead to soil erosion. Such preventive measures will indirectly help to conserve soil in the long run. The preventive measures that are suggested for the study area discuss below:

##### a) Afforestation along the slope of reservoir and transported pipe line

In the upland region like this proposed site area, the trees and vegetation cover play an important role in the conservation of soil and ecology. Afforestation program should be taken up in such forest areas that contain large patches of barren grassy slopes and are generally devoid of trees. In critically degraded areas, plantation of locally useful, diverse and indigenous plant species such as *Trema orientalis*, *Schima khasiana*, *Prunus cerasoides*, and grass like *Thysanolaena maxima* etc. should be undertaken. Afforestation measures would be taken up under catchment area treatment plan.

##### b) Plantation

The selected species should be planted after their nurseries have been developed. Nearly 1-2 years old saplings should be used for the plantation. The plantation can be carried out in lines across the slopes. Grass and herb species would be used in the inter space of tree species. They will help in providing the continuous chain of support in retaining debris, reinforcing soil and increasing the infiltration capacity of the area. Plant saplings would be raised in biodegradable pots and transplanted as such. The plantation should be done in the monsoon season.

#### 5.5 Landscaping and Re-Vegetation Working Areas

Landscaping and Re-Vegetation Plan that includes measures for restoration of cleared areas. The measures will include landscaping, provision of adequate drainage and re-vegetation. The landscaping and re-vegetation of the areas will be done; so that the natural surroundings and the aesthetic look of the area are restituted. The restoration will depend on the topography of the area, and their detrimental effects on the terrain and the natural habitats.

Table 5.1 Summary of Actual Impacts and Actual Management Plan



No.	Environmental Attribute	Potential Impacts	Nature of Impact	Magnitude of Impacts	Mitigation Plan
1	Land use/ Land cover	Irreversible	Direct and permanent impact	Medium	Proper land agreement will be made with owners, users and state authorities (Forest Department)
2	Soil and geology	Soil erosion	Impact is indirect, localized but reversible	Medium	Preventive measures like biological measures (Afforestation along the slope)
3	Terrestrial Ecology	Habitat / species loss	Direct impact by road construction	Low	Replantation or restoration

#### Mitigations of Biodiversity on Nam So Mini Hydropower Plan

- **In Nam So Mini Hydropower**, The overall effects on biodiversity of hydropower development will be significant – involving a total transformation of aquatic systems and a reshaping of small segments of its terrestrial systems.
- In this proposed of Nam So site area, the trees and vegetation cover play an important role in the conservation of soil and ecology and loss of habitats.
- **Nam So Mini Hydropower** is a hotspot for endemic species including birds, reptiles, fishes, butterflies, dragonfly and flora including tree, small tree), shrubs, herbs, fern, bamboo and grass by terrestrial species. Nam So's freshwater biodiversity is equally significant.

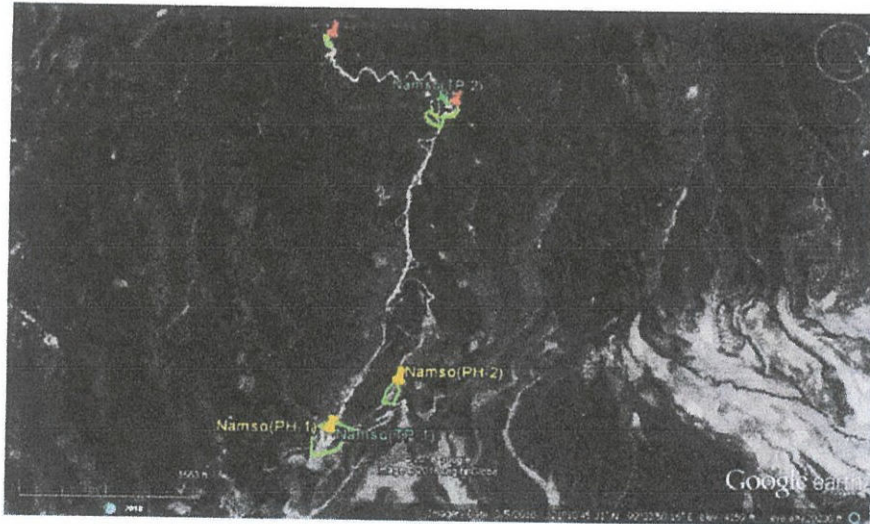
In critically degraded areas,

1. Management of water resources (flood control, waste treatment storm protection and soil erosion control)
2. Support to agriculture development (conservation of wild relatives of crops and natural habitats)
3. Conservation of biodiversity (e.g. protection of wild gene stocks and medicinal plants and hunting for animals)



4. Support to community development through regulating services and provision of ecosystem products (provision of clean water, medicine, food, fuel, natural disaster management, etc.)
  - Re-Vegetation Plan and plantation of locally useful, diverse and indigenous plant species such as *Trema orientalis*, *Schima khasiana*, *Prunus cerasoides*, and grass like *Thysanolaena maxima* etc. should be undertaken.
  - The selected species should be planted after their nurseries have been developed. Nearly 1-2 years old saplings should be used for the plantation.
  - The plantation can be carried out in lines across the slopes to mitigate the soil erosion. Grass and herb species would be used in the inter space of tree species. They will help in providing the continuous chain of support in retaining debris, reinforcing soil and increasing the infiltration capacity of the area.
  - Nam So HPP areas have suitable condition of site, population and species diversity of fauna. This condition will be faced a few percentage of impacts as terrestrial animals because to use the dam construction area is little space to compare with relative animal's habitats.
  - Catchment and influence areas of the Nam So Hydropower Project are covered with dense sub-tropical mixed hill forest housing rich flora diversity. The Proposed component sites are mainly covered with degraded /open forest and shrubs for fauna.
  - The reservoirs favor local and regional economic developments as well as it also bring no serious and run of river (ROR) system in the natural hydrologic regime of rivers, habitat quality and the dynamics of the biota. Management actions taken to minimize impacts of dams in study site considered construction of fish passages, fishery control and stocking.
- ❖ **The mechanisms for addressing social and environmental effects and the full economic consequences of hydropower developments are not adequate.** The pace and scale of hydropower development is well beyond existing mechanisms and capacities for addressing social and environmental effects and the full economic consequences.
- ❖ Hydropower development is proceeding on a rapid and comprehensive scale for maximizing power and profits but with only rudimentary or even misleading information and analysis on its sustainability and implications for other sectors and social and natural systems in local area;
- ❖ Especially support to energy development (particularly hydropower) and support to industrial development (e.g. provision of raw materials, navigation and carbon sequestration).





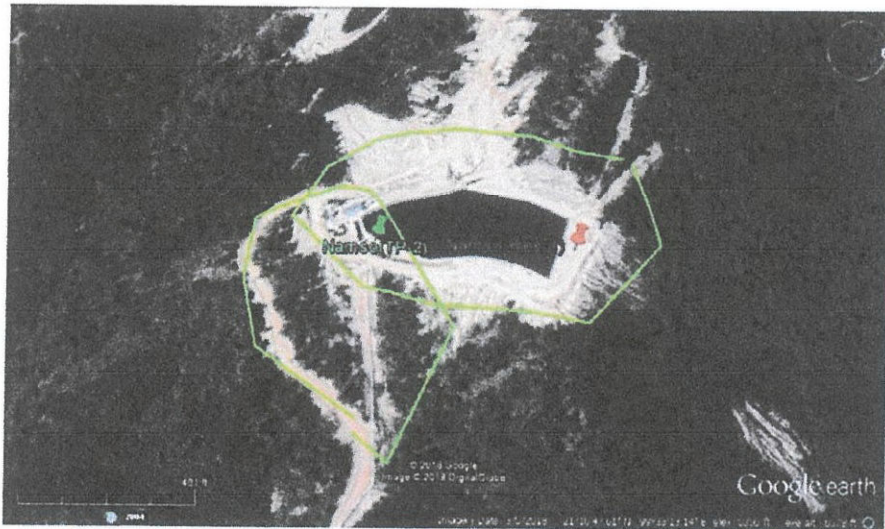
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(B)



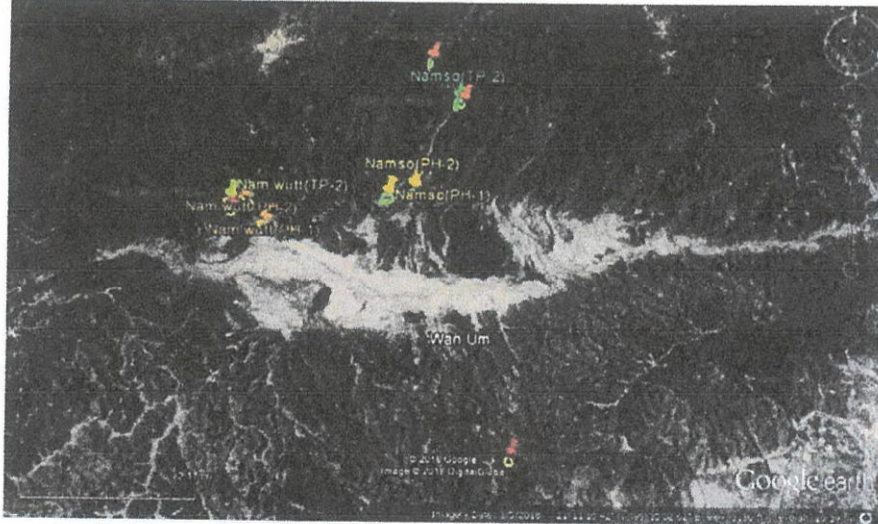
(C)



(D)

( PH-1,2 - Power House 1,2) , (TP 1,2 - Transport pipeline 1,2), (RS 1,2 – Reservoir 1,2)

### Nam So Mini Hydropower Plan



Nam So & Nam Wutt Mini Hydropower Plan



Table 5.2 Financial requirements for the biological measures to rehabilitate study sites of Nam So HPP

<b>Project / Activity Phase</b>	<b>Objectives</b>	<b>Mitigating and Enhancement Measures</b>	<b>Estimated Cost of Proposed Measures (USD)</b>	<b>Responsible Person / Unit</b>
Raising of plants (including nursery, manure, transport, etc.)	To mitigate the soil erosion	support in retaining debris, reinforcing soil and increasing the infiltration capacity of the area.	\$ 2800	Kyaing Toung Energy Company Limited
Maintenance, watering, transport, etc.	To develop the nursery	Landscaping, provision of adequate drainage and re-vegetation.	\$ 3200	Kyaing Toung Energy Company Limited
The reservoir rim treatment including biological measures	To protect the reservoir by the loose debris on critical slopes, landslides etc.	Feasible taking into account the geomorphology, physiographic features, land cover and other related aspects.	\$ 3400	Kyaing Toung Energy Company Limited



## 6 EXISTING SOCIO-ECONOMIC ENVIRONMENT

### 6.1 Introduction

This report was presented as a Environmental Management Plan report for Nan So Mini Hydropower Project to initiate the required processes under Myanmar's Environmental Impact Assessment Guidelines published on 29 December 2015.

### 6.2 Project Location

Nan So Mini Hydropower site is located at latitude 21° 10' 17.9" N and longitude 99° 34' 30.15" E on the Nan So creek about 14 miles (22.53 km) from Kyaing Tong Town, Eastern Shan State of Myanmar. Nan So Mini Hydropower is lies in Mine Kon reserve forest. According to the field observation and field survey data, the Nan So Mini Hydropower is lies between 1 mile and 2 miles from Kaung Kan village and Wan Kyin Village. According to the secondary data, the dam is located near four villages (Kaung Kan, Wan Kyin, Kaung San and Wan Hwel). Total project land area is 9.47 Acres. That is included access road, diversion weir, water storage dam and operation factory. Nan So electricity is (33KW) and Nan So electricity output is (33 KVA). That compound to distribute electricity at Kyaing Tonge City and near the village.

### 6.3 Methodology

Public meeting (or) focus group discussion, semi-structured interviews and questionnaire distribution were done with respondents' coverage for the affected Villages such as Kaung Kan, Wan Kyin, Kaung San and Wan Hwel. There were 26 respondents in the survey, and the survey focused to measure on potential impacts of the project to surrounding residential area.

### 6.4 Population in Affected Villages

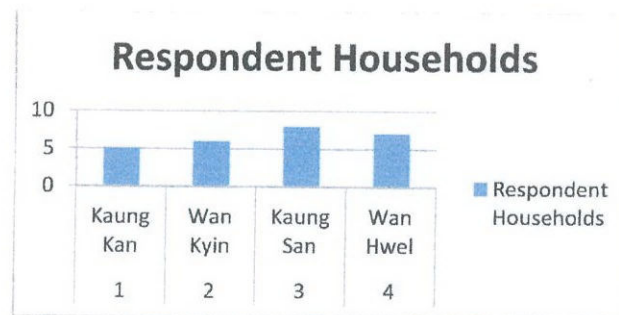
Mine Kon village tract have 4 villages. These are Kaung Kan, Wan Kyin, Kaung San and Wan Hwel villages. This (4) villages are nearest villages to the study site. Mine Kon is lies included Mine Kon Reserve forest. Among them, 26 respondents are selected as sample population for the study.



**Table.6.1 Respondent Households in the Project Area**

No.	Village	Respondent Households
1	Kaung Kan	5
2	Wan Kyin	6
3	Kaung San	8
4	Wan Hwel	7

(Source: Field Observation, Jan, 2018)



**Figure 6.1 Respondent Households in the Project Area**

### Socio-economic Profile of the Study Villages

#### 6.5 Gender, Ethnicity, Age Composition and Family Size

Field surveys and semi-structured interviews were done in six sample groups within the project areas. The respondents are 21 males (82 percent of total respondents) and remaining are 5 females (18 percent of the respondents). Most of the respondents belong to ethnic groups of Larhu, Shan, Lishu people and they are Buddhists and Christian.

Family size of respondents can be grouped into three classes as;

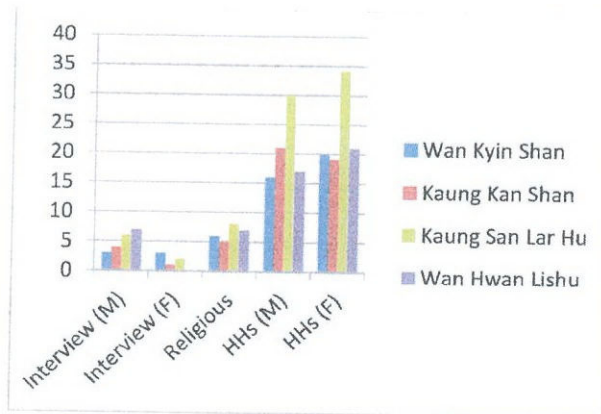
1. Family with members 0 to 5 persons,
2. Family with members 6 to 10 persons, and
3. Family with member more than 10 persons.

High number of respondents with big families (more than 10 persons) is found in Wan Kyin Village. Respondents with small families (0 to 5 persons) are mainly found in affected (4) villages (such as Kaung Kan, Wan Kyin, Kaung San and Wan Hwel) and 6 to 10 persons of families are found in 4 villages (Kaung Kan, Wan Kyin, Kaung San and Wan Hwel).



**Table.6.2** Near the villages of Nan So Mini Hydropower

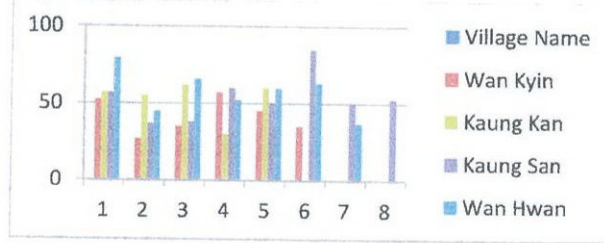
Near the villages of Nan So Mini Hydropower						
Village Name	Race	Interview (M)	Interview (F)	Religious	HHs (M)	HHs (F)
Wan Kyin	Shan	3	3	6	16	20
Kaung Kan	Shan	4	1	5	21	19
Kaung San	Lar Hu	6	2	8	30	34
Wan Hwan	Lishu	7	0	7	17	21



(Source: Field Observation, Jan, 2018)

**Table.6.3** Interview Responded Ages

Village Name	Interview Responded Ages							
	52	27	35	57	45	35		
Wan Kyin								
Kaung Kan								
Kaung San								
Wan Hwan								



(Source: Field Observation, Jan, 2018)

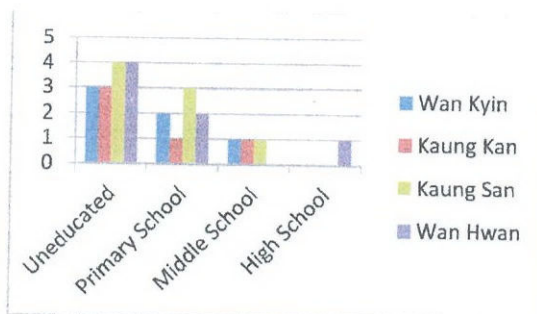
## 6.6 Education Level

High percentage of uneducated level among the respondents is found in affected (4) Village. Second high percentage of primary school level is found all affected villages. Respondents of graduate education level are unfound in this 4 villages. In general, most of the respondents are in the basic education levels from Monastery school, primary school, middle school and high school.

**Table.6. 4 Education Levels of Respondents**

Village Name	Uneducated	Primary School	Middle School	High School
Wan Kyin	3	2	1	
Kaung Kan	3	1	1	
Kaung San	4	3	1	
Wan Hwan	4	2		1

(Source: Field Observation, Jan, 2018)



**Figure 6. 2 Education Levels of Respondents**





According to the field survey data, Most of the local people doing type of occupation includes, agriculture especially yar and Le (such as farming) and odd jobs. The remaining persons are dependents. Most of the villagers are working in around the village. Cultivated on the alluvial land (or) dune farming are also common among the respondents in 4 Village (such as Kaung Kan, Wan Kyin, Kaung San and Wan Hwel).

#### **6.7 Income Level and Source of Income**

Income level of people in the affected villages was measured by using primary data received from field survey in Jan, 2018. All of the respondents from study area are in the income level between less than 10 lakh (kyats) and 50 lakh (kyats) per year. Main income source is for cultivation and livestock breeding. Main crop is various types of bean, rice, chili, corn, etc... and livestock breeding.

#### **6.8 Socio-Economic Information**

Most of the respondents are own farm land. According to the field survey data, own acres between 1 to 10 acres is found in study area Some of the people are own nearby the Nan So Power station. Nearby the water storage dam site farm are own San and Wan Hwel villages. Local people cultivated outside their villages. Types of the farm are corn, rice, various bean, and etc...But only all villages are done livestock breeding (Such as buffalo, cow, chicken and pig) .

Cultivated crops are rice field, several of beans and corn found in dune area. Most of respondents major income is cultivation for rice field, they are cultivated time only raining season but sometime they depend on the Nan So water storage dam, some of the famer are wanted to cultivate summer rice but insufficient water supply from Nan So water storage dam.

Nan So electric supply power plant owner is Kyaing Tong Energy Co.,Ltd. This Nan So hydropower plant is electric supply the whole Kyaing Tong town. Summer season not enough the water for supply electric so this hydropower plant waiting fully water storage tank and than they support water surrounding area villages and electric for Kyaing Tong. Also Kaung San and Wan Hwel are catch the fishing some of the households. Fishing time catch of the fish are various kinds of the fish. According to the survey date private business found mostly livestock breeding, second is grocery and shop.



Village Name	Interview Responded Own Fields (Acres)							
	1	2	3	4	5	6	7	8
Wan Kyin	2.5	1.5	2	3	4.5	5		
Kaung Kan	3.5	4	6	3	6			
Kaung San	3	1.2	10	1	6	2	3	2
Wan Hwan	2	3	4	3	2	3	6	

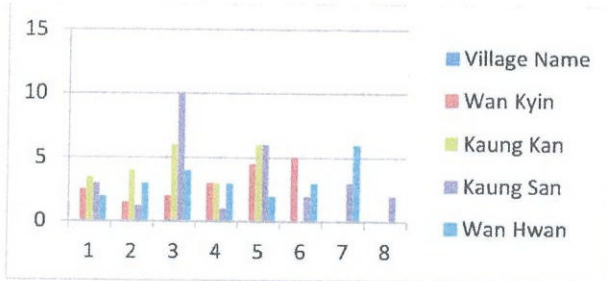
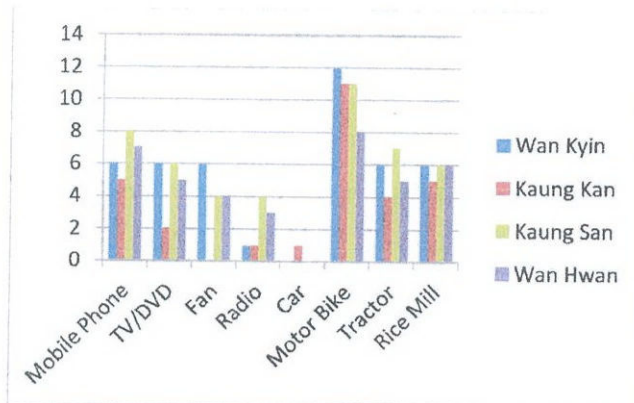


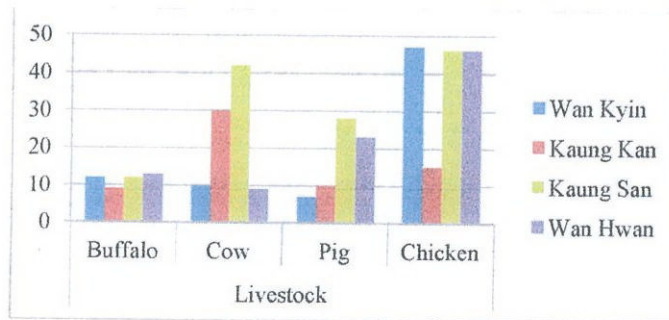
Figure 6.3 Interview Responded Own Fields (Acres)

Household Own Items								
Village Name	Mobile Phone	TV/DVD	Fan	Radio	Car	Motor Bike	Tractor	Rice Mill
Wan Kyin	6	6	6	1		12	6	6
Kaung Kan	5	2		1	1	11	4	5
Kaung San	8	6	4	4		11	7	6
Wan Hwan	7	5	4	3		8	5	6





Village Name	Livestock			
	Buffalo	Cow	Pig	Chicken
Wan Kyin	12	10	7	47
Kaung Kan	9	30	10	15
Kaung San	12	42	28	46
Wan Hwan	13	9	23	46



#### 6.9 Changes in your village/community over the past 5 years

According to the field survey data, slightly higher significantly better/ better access changes in village/ community over the past 5 years “such as road, school, energy, drinking water, irrigation water supply, security, community relation, employment opportunities and availability of household consumption goods”. No changes access in village/ community over the past 5 years “such as hospital, monasteries, government services, general environment, air, noise, water, soil, farming productivity and household income”. The study area local people are a little worse access “such as hospital, energy, drinking water, farming productivity, employment opportunities”. Local persons want to do working in the Nan So hydropower plant and want to enough water supply and electricity. Also electricity wanted to 4 villages (such as Kaung Kan, Wan Kyin, Kaung San and Wan Hwel) According to the field survey data, major changes is good transportation and living standard is higher in the village.

#### 6.10 Understanding and perceptions of the Project

According to the field survey data, study area local respondents are heard of the Nan So mini hydropower project. There receive source of information are first neighbors, second government and village administrative. Mine Kon village tract are need to school, electricity and opportunity for jobs in the Nan So.



### **Public Consultation and Disclosure**

The EIA procedure states the following requirements for public consultation and disclosure in the Environmental Management Plan

#### **6.11 Public Stakeholder Meeting**

On 22<sup>th</sup> Jan 2018, a public stakeholder meeting was held at the project site in order to disclose the project information to the nearby local residents. It is aimed at receiving public recommendations and feedbacks.

Nan So Hydropower public consultation meeting attendant is (19) persons. This public consultation meeting attended Township GAD (1) person, Forest Department (1) Person, Affected Village leaders, and participated women (1) & man (18) persons. Firstly explain to the Nan So hydropower project and then discussion on the project. All attendant persons wanted to jobs opportunities and develop their village. They are accepted Nan So Hydropower Project. But they are worries water usage problem in summer season. GAD head officer, forest department and project developer are protect the natural resources environmental. Public consultation was done by meeting with village administrators 22<sup>th</sup> Jan 2018. According to his comments, there was no complaining from the local people about the Nan So hydropower anymore.

1. Presentation of EIA Procedures and Project summary by Daw Nyo Nyo Lwin, Team Leader of Earth Tree Environmental Services Co.,Ltd.
2. Recommendation and suggestion by participants all affected villages around the project area.

#### **6.11 COOPERATE SOCIAL RESPONSIBILITY (CSR)**

According to the international practice and national guideline (Rule and regulation) and etc... KTE (Kyaing Tong Energy Co.Ltd) may want to invest in reducing poverty, improve education in the community, and provide health access and health status in those communities who have the most to gain from the intervention. Direct financing of community social development subprojects should be carried out as part of Cooperate Social Responsibility (CSR). The decision-making processes for allocating the grants will be publically disclosed and conducted in a fair, transparent, and auditable manner.



It is highly recommended that KTE CSR Program incorporates mechanisms to facilitate active and informed participation of the recipient communities. It is recommended that KTE utilizes experienced national personnel and technical assistance to design and implement its CSR Plan in a professional and auditable manner.

KTE is being a dedicated industry for its CSR activities, always keeps going with activities for social welfare & upliftment. The organization does lot of philanthropic activities for the community development. Some philanthropic activities carried out by company to strengthen cultural environment and the details are herein below: KTE also intend to carry out CSR activities in the region, particularly for the weaker sections of the society. An amount of (500 Lakhs) in the year 2000 to 2017 for CSR activities which will be utilized on the basis of requirement for weaker sections of the society.

#### Cooperate Social Responsibility (CSR)

Nan So Hydropower Project implements Corporate Social Responsibility (CSR) plan together with EMP during its 20-years operation period. The objective of this plan is to create social welfare of hotel workers and local community. Even though the project proponent participates in implementation of CSR plan using 2% of the net profit starting from the very first year of the project, the hotel focuses more on regional development. CSR plan formulated for the proposed project can be described in

No.	Activity	Responsible Company	Frequency	Estimated Amount (% of Net Profit)
1.	Donation	In Nga Gwa	Annually	0.4%
2.	Education	In Nga Gwa	Annually	0.4%
3.	Skill development and welfare of workers	In Nga Gwa	Annually	0.8%
4.	Development of nearby Community	In Nga Gwa	Annually	0.4%
<b>Total</b>				<b>2.0%</b>

#### 6.12 BUDGET FOR ENVIRONMENTAL MANAGEMENT PLAN AND CSR

The estimated budget for the environmental management and monitoring including Cooperate Social Responsibility (CSR) was calculated for five years, where the budget is drawn based on the total investment and conditions of the community. Budgets for community health, safety and security and for noise and dust control were high among the



items to be conducted as EMP. Budgets for year one and year two were lower than the succeeded three years. The budget amount of each item can be adjusted based on the situation faced in each year.

**Table.6.5 The estimated budget for environmental management and monitoring plan**

Sr. No	Activities	Year One (USD)	Year Two (USD)	Year Three (USD)	Year four (USD)	Year five (USD)
1	Budget for General dust control measures during operation phase	200	300	300	300	400
2	Budget for ambient air quality monitoring over the operations	200	200	300	300	300
3	Budget for the management of quality and quantity of waste water including laboratory testing	300	300	300	400	500
4	Budget for biodiversity conservation	100	100	200	200	200
5	Budget for general waste	200	300	300	300	300
6	Budget for general noise control measures and monitoring during operations	100	100	200	200	200
7	Budget for general vibration control measures and monitoring during operations	100	100	200	200	100
8	Budget for community health, safety and security	200	200	200	300	400
9	Budget for maintenance of quality and condition of access roads	200	200	200	300	400
10	Budget for Community and Social Development Plan: Electricity and energy	300	300	300	300	300
11	Budget for Community and Social Development Plan by providing cash, materials and others: Education	300	300	300	300	300
12	Budget for Community and Social Development Plan: human resources, training	300	300	300	300	300
13	Budget for Community and Social Development Plan: water	300	300	300	300	300
14	Budget for the Emergency Response Plan including material and training	300	300	300	300	300
	Total	3100	3300	3700	4000	4300



### **6.13 ENVIRONMENTAL MONITORING PLAN (EMoP)**

Environmental Monitoring Plan (EMoP) plays a vital role in safeguarding the environment and ensures that the Promoters and all Contractors and subcontractors including Consultants, understand the potential environmental risks arising from the implementation of the Nan So HPP. Environmental monitoring, mitigation program and the project implementation arrangements are addressed in this section.

The main objectives of the Environmental Monitoring Plan (EMoP) include:

- To provide a database from which the environmental impacts of the project can be assessed;
- To provide an early indication should any of the environmental control measures or practices fail to achieve the acceptable standards;
- To monitor the performance of the project and the effectiveness of mitigation measures;
- To determine project compliance with regulatory requirements, standards and government policies;
- To take remedial action if unexpected problems or unacceptable impacts arise.

### **6.14 Scope of the Environmental Monitoring Plan**

The scope of the EMoP shall include:

- To identify and resolve environmental issues and other functions that may arise during the operational phase;
- To implement water quality, air quality and noise impact monitoring plan during the operational phase;
- To check and quantify the Construction Contractor's as well as the hydropower Operator's overall environmental performance, implement action plans and recommend and implement remedial actions;
- To conduct regular reviews of monitored data as the basis for assessing compliance with defined criteria and to ensure that necessary mitigation measures are identified, designed and implemented;
- To assess and interpret all environmental monitoring data to ascertain whether environmental control measures and practices are functioning in accordance to specifications;



- To manage and liaise with all stake holders (residents of the surrounding areas, local authorities, business operators, etc.) concerning any environmental issues during the operational phase;
- Conduct formal and informal site visits during the operation phases to assess adherence of the concerned parties to the mitigation measures as set out in this EMP.

**Environmental Monitoring and Management Team**

No.	Name	Designation	Organization	Duty and Responsibility
1	U Myint Naing	Director	KTE	<ul style="list-style-type: none"> <li>• Implement the Environment Management Plan</li> <li>• Listen and follow the positive advices and guidelines of local senior villagers and administrative of local communities</li> <li>• Use of local labor where feasible</li> <li>• Train to upgrade their skills</li> <li>• Always check HSE plan</li> </ul>
2	Ma Nan	Manager	KTE	
3	Ko Sai	Site Manager	KTE	

**COMMUNITY GRIEVANCE MECHANISM**

The Community Grievance Mechanism (CGM) is the functional process to manage on the community's desire and response in the means of effectively and proactively. By applying the proper CGM, the community – especially PAPs – will have the opportunity for two-way dialogue with project proponent in concerning with project's activities. The CGM can enhance outcomes by giving people satisfaction that their voices are being heard and that their issue was subject to formal consideration.

This proposed project will have several years of construction and developing processes as well as the operation phase is in lifetime, thus the project proponent should set up a committee to implement the CGM. In this committee, not only representatives from project end but also representatives of PAPs and third party are important to involve.





## 6.15 ENVIRONMENTAL REPORTING

### During Operation Phase

During the operation phase, the manager shall be a member of the Hydropower Management Technical Team and will be responsible for all environmental matters pertaining to the day to day operation of the Hydropower.

The main responsibilities and duties of the manager include:

- 1) To monitor and evaluate the effectiveness of mitigation or control measures in achieving environmental protection;
- 2) To carry out and monitor environmental awareness within the hydropower personnel;
- 3) To establish and promote good relations with local communities on matter pertaining to environmental protection;
- 4) To prepare and submit reports regularly to Nan So Hydropower Team; and
- 5) To submit environmental reports to enforcement agencies in conformity with local regulations.



## 7 CONCLUSION AND RECOMMENDATION

### 7.1 Conclusion

This study was mean for the formulation of the Environmental Management Plan (EMP) for the Nan So hydropower project proposed by Kyaing Tong Energy Company Limited. Primary data collected such as onsite measured result: Surface water quality (Nan So steam water), air quality (NO<sub>2</sub>, SO<sub>2</sub>, CO<sub>2</sub>, CO) and noise an laboratory results for surface water quality (Nan So stream water) and secondary data collection for socioeconomic condition, biodiversity condition and weather condition were analysis to determine the environmental and social impact. As per analyzed data, it was observed that there not only positive impacts or negative impacts during projects operation and decommissioning phases.

Biodiversity is considered to exist at four levels, namely: genetic, species, population and ecosystem diversity. This review focuses on ecosystem diversity. Industrial growth based on biotic and abiotic ecosystem services and urbanization are closely linked together. Nam So HPP areas have suitable condition of site, population and species diversity of fauna. This condition will be faced a few percentage of impacts as terrestrial animals because to use the dam construction area is little space to compare with relative animal's habitats. Catchment and influence areas of the Nam So Hydropower Project are covered with dense sub-tropical mixed hill forest housing rich flora diversity. The Proposed component sites are mainly covered with degraded /open forest and shrubs. The area is sparsely populated with 'tribal families. Like other areas of animal hunting and crop cultivation is one of the main stresses on the biodiversity. The enforcement of forest rules are not strict in these areas because of the customary rights of the people on the forest and forest products. Indeed, the enforcement of strict rules is not a sound alternative for the biodiversity conservation. Also, the traditional knowledge of local peoples on forest and forest products can be used as a tool of biodiversity conservation. Nam So HPP is part of a programme of developments being undertaken by Kyaing Tong Energy Company Limited. Renewable energy is seen as a key source of power for Kyaing Tong city. The development of this renewable energy source has a number of benefits for local peoples, these include:

- The Nam So HPP represents an opportunity for Kyaing Tong city to reduce its reliance on imported fossil fuels and develop a more sustainable long-term power generation strategy.
- The annual replacement of diesel fuel and reduction in CO<sub>2</sub> emissions.



- Industry and other development in Kyaing Tong city will benefit by ensuring power supplies are more consistent.
- As the assumption, by the advantages of the project, it may be support for the developed country. Thus, the present study agreed with that statement.

As per the results of analysis most of the project activities have low significance impacts and positive significance on the environment and a few have moderate significance impacts on the environment which has to improve for environment performance. The good point is there is no high or very high significance impact on the environment. There are concerning with land slide and soil erosion due to excavation works and removing of the vegetation covers and roots. Both activities should be carefully carried out and taken into account the impact on the environment.

The Environmental Management Plan (EMP) covering the anticipated impacts, mitigation measures, management and monitoring plan during all phases should be implemented. Besides of EMP, Corporate Social Responsibility (CSR) plan will be performed annually by the project proponent for the sake of employees and local communities. Theses plan should be accomplished by Health, Safety and Environmental (HSE) Team of the Kyaing Tong Energy Company Limited and the team should be review EMP regularly to cover all potential impact improvements and modification.

## 7.2 Recommendation

The following recommendation has been made for efficient and effective implementation of EMP.

- Provide relevant Personal Protective Equipment (PPEs) for the workers during all phase of the project
- Keep acceptable level of water at the downstream before water released from the tailrace
- Make sure not to over cut the vegetation and its roots more than enough
- Segregate vegetation waste such as poles, post, bamboo can be reused and other twigs, leaves, climbers, creepers can be burned or should be landfill for fertilizer if possible
- Provide sufficient amount of fire extinguishers and develop firefighting plan



- Training programs should be done for the workers and staff for firefighting and environment awareness to meet the environmental performance
- Environmental Management plan should be modified according to the feedbacks obtained and lessons from the monitoring and current process
- Must be re-plantation fast growing tree species surrounding the storage water tank or dam
- Corporate Social Responsibility (CSR) plan should be implement annually
- Must be support to project near the villages
- Risk Prevention

Evacuation Plan in Case of emergency will be drafted and explain to all employees for in case of emergency such as earthquake, fire and other disaster. All employees must follow exiting plan.



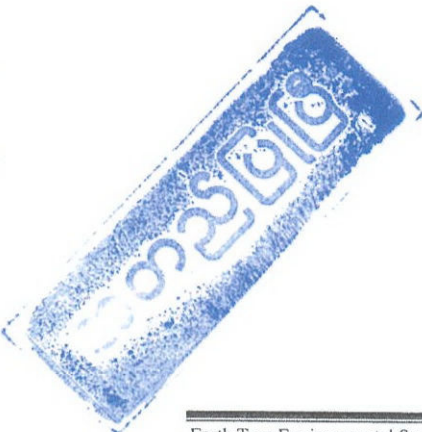
နောက်ဆက်တွဲ (၁) စီမံကိန်းဆောင်ရွက်သူ၏ ကတိပြုလွှာ

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နမ့်စိုချောင်းတွင် ROR နည်းလမ်းဖြင့် ရေအားလျှပ်စစ်ထုတ်လုပ်ခြင်း လုပ်ငန်းအတွက်  
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(၃၃၉၅) ခန့်တွင်တည်ရှိပါသည်။ စီမံကိန်းမြေဧရိယာအကျယ်အဝန်းမှာ (၁၈၀ X ၂၅၈) စတုရန်းပေ (၁.၀၇)  
ဧကခန့်ကျယ်ဝန်းပါသည်။

နမ့်စိုချောင်းရေအားလျှပ်စစ်စက်ရုံ (၁၂၅၀ KW X ၂) တည်ဆောက်ပြီး လျှပ်စစ်ဓာတ်အားထုတ်လုပ်  
ဖြန့်ဖြူးပြီး ကျိုင်းတုံမြို့သို့ လျှပ်စစ်ဖြန့်ဖြူးလျှက်ရှိပါသည်။ ယခုအကောင်အထည်ဖော် ဆောင်ရွက်နေသော  
နမ့်စိုချောင်းရေအားလျှပ်စစ်စက်ရုံ လျှပ်စစ်ဖြန့်ဖြူးမှုလုပ်ငန်း လုပ်ဆောင်နိုင်ရန်အတွက် ရေးဆွဲထားသော  
ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှု အစီရင်ခံစာတွင် ပါရှိသည့် ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှု အစီအစဉ်များသည်  
တိကျခိုင်မာ ပြည့်စုံကြောင်း၊ ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှု အစီအစဉ်ကို လုပ်ထုံးလုပ်နည်း များ၊  
သက်ဆိုင်ရာဥပဒေများအတိုင်း တိကျလိုက်နာ၍ ပတ်ဝန်းကျင် ဆန်းစစ်ခြင်းကို ဆောင်ရွက် ထားရှိကြောင်း၊  
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လေးစားစွာဖြင့်  
  
ဦးမြင့်နိုင်

ကျိုင်းတုံစွမ်းအင် ကုမ္ပဏီလီမိတက်



နောက်ဆက်တွဲ (၂) အစီရင်ခံစာရေးသားပြုစုသူ၏ ကတိပြုလွှာ

ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှု အစီရင်ခံစာတွင် ပါရှိသည့် ပတ်ဝန်းကျင်ဆိုင်ရာ ဥပဒေများ၊ နည်းဥပဒေများ၊  
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အစီအစဉ်များကို လိုက်နာဆောင်ရွက်မည် ဖြစ်ကြောင်း ကတိပြုလွှာ

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နမ့်စိုချောင်းတွင် ROR နည်းလမ်းဖြင့် ရေအားလျှပ်စစ်ထုတ်လုပ်ခြင်း လုပ်ငန်းအတွက်  
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မိုင်) ခန့်အကွာ၊ ကောင်းတန်ကျေးရွာနှင့် ဝမ်ကျင်းကျေးရွာတို့နှင့် (၁) မိုင်ကျော်ခန့်ကွာဝေးပြီး  
မြောက်လတ္တီတွဒ် (၂၁° ၁၀' ၁၇.၉၃") နှင့် အရှေ့လောင်ဂျီကျု (၉၉° ၃၄' ၃၀.၁၅") ဖြစ်ပြီး၊ အမြင့်ပေ  
(၃၃၉၅) ခန့်တွင်တည်ရှိပါသည်။ စီမံကိန်းမြေဧရိယာအကျယ်အဝန်းမှာ (၁၈၀ X ၂၅၈) စတုရန်းပေ (၁.၀၇)  
ဧကခန့်ကျယ်ဝန်းပါသည်။

နမ့်စိုချောင်းလျှပ်စစ်စက်ရုံ (၁၂၅၀ KW X ၂) တည်ဆောက်ပြီး လျှပ်စစ်ဓာတ်အားထုတ်လုပ်  
ဖြန့်ဖြူးပြီး ကျိုင်းတုံမြို့သို့ လျှပ်စစ်ဖြန့်ဖြူးလျှက်ရှိပါသည်။ ယခုအကောင်အထည်ဖော် ဆောင်ရွက်နေသော  
နမ့်စိုချောင်းလျှပ်စစ်စက်ရုံ လျှပ်စစ်ဖြန့်ဖြူးမှုလုပ်ငန်း လုပ်ဆောင်နိုင်ရန်အတွက် ရေးဆွဲထားသော  
ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှု အစီရင်ခံစာတွင် ပါရှိသည့် ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှု အစီအစဉ်များသည်  
တိကျခိုင်မာ ပြည့်စုံကြောင်း နှင့် ကျွန်တော်များ Earth Tree Environmental Services Co.,Ltd မှ  
နမ့်စိုချောင်းလျှပ်စစ်စက်ရုံအတွက် ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှု အစီရင်ခံစာသည် မြန်မာနိုင်ငံတွင်ဖော်ပြထား  
သော နည်းဥပဒေများ၊ ဆက်စပ်သည့် ဥပဒေများ၊ လုပ်ထုံးလုပ်နည်း များ၊ သက်ဆိုင်ရာဥပဒေများ၊  
လမ်းညွှန်ချက်များအတိုင်းလိုက်နာ၍ ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှု အစီရင်ခံစာအားရေး ဆွဲတင်ပြထားသည်  
ဖြစ်ကြောင်း ကတိပြုတင်ပြအပ်ပါသည်။



လေးစားစွာဖြင့်  
  
ဒေါ်အေးမြတ်နွယ်

Earth Tree Environmental Services Co.,Ltd

၀၉ - ၂၆၂၀၀၂၈၅၊ ၄၃၁၂၄၅၁



## ACCOUNTABILITY STATEMENT

This is to certify that all the information and Environmental Management Plan are true, accurate and complete. Should I/we learn of any information, which would make the EMP inaccurate, I/we shall bring the said information to the attention of the concerned department.

I/We hereby bind myself/ourselves jointly and solidarity for any penalties that may be imposed arising from any misrepresentations or failure to state material information in EMP report.

In witness whereof, I/we hereby set our hands this day of ( 05 ), ( SEP ), 2019 at  
In Nan So mini hydropower plant under the Kyaing Tong Energy (KTE).

Project Proponent



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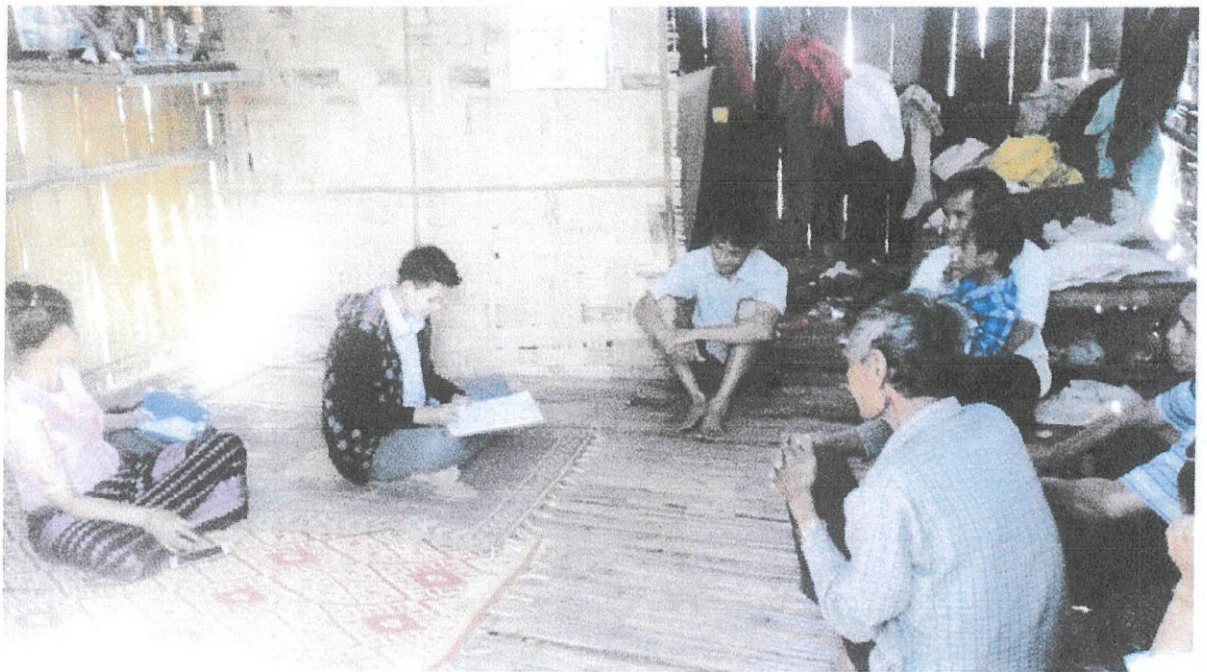
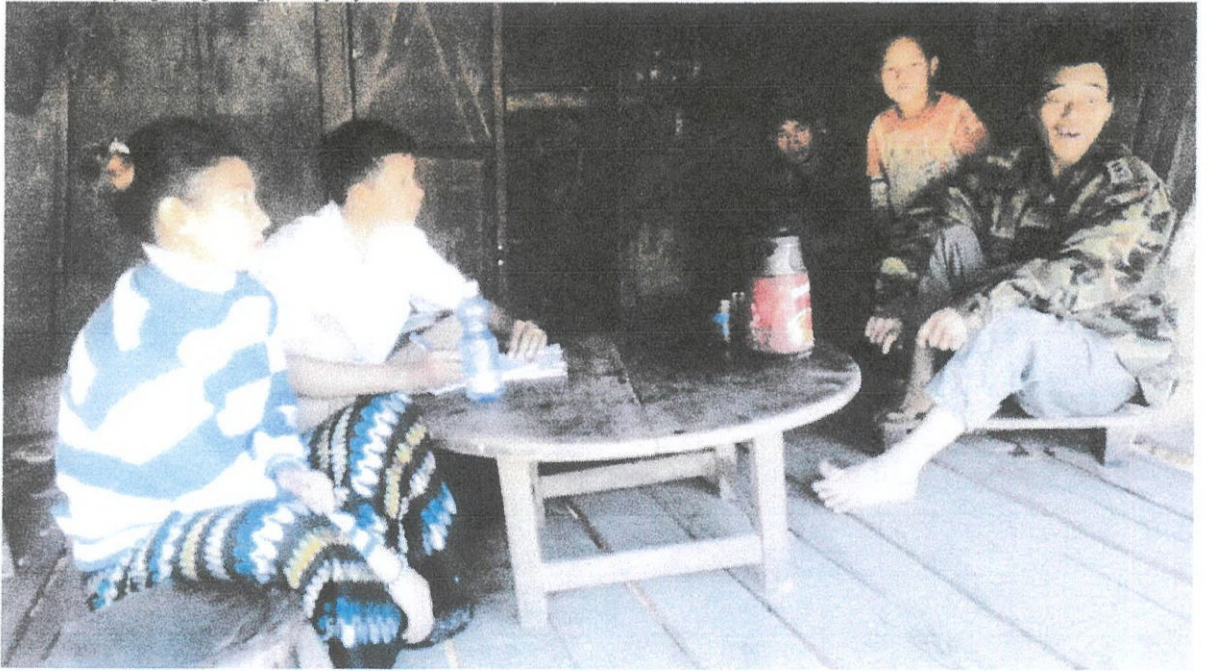


APPENDIX

- 1) Stakeholder Consultation Meeting
- 2) Activities Photo and attended list
- 3) Project Layout Plan
- 4) CSR recording Photo
- 5) MOU Contract with Shan State

အခမ်းအနားတက်ရောက်သူများ

စဉ်	အမည်	ရာထူး/ဌာန	ဖုန်းနံပါတ်နှင့် e-mail	လက်မှတ်
1.	ဒေါ်တင်မာ	ဗဟိုဌာန	09-52509112	
2.	ဒေါ်မောင်မောင်	M.D. နယ်စပ်ဒေသရေးရာဌာန	09-25775554	
3.	ဒေါ်မျိုးစိန်	ကောလိပ်/သစ်တော	09-250189418	
4.	ဒေါ်စိုင်းစိုင်း	အထွေထွေ	09-5251939	
5.	ဒေါ်ခင်စိန်စိုင်း	ဒီပလိုမာ/အထွေထွေ	0745831008	
6.	ဒေါ်ခင်စိန်	အထွေထွေ	09-5251508	
7.	ဒေါ်နီနီ	ကောလိပ်	0932768929	
8.	ဒေါ်ခင်စိန်	"		
9.	ဒေါ်ခင်စိန်	"		
10.	ဒေါ်ခင်စိန်	"		
11.	ဒေါ်ခင်စိန်	"		
12.	ဒေါ်ခင်စိန်	ကောလိပ်		
13.	ဒေါ်ခင်စိန်	"		
14.	ဒေါ်ခင်စိန်	ကောလိပ်		
15.	ဒေါ်ခင်စိန်	"	0936106091	
16.	ဒေါ်ခင်စိန်	"		
17.	ဒေါ်ခင်စိန်	ကောလိပ်	09262443366	
18.	ဒေါ်ခင်စိန်	ကောလိပ်	09-257757554	
19.	ဒေါ်ခင်စိန်	ကောလိပ်		
20.				
21.				
22.				
23.				
24.				
25.				

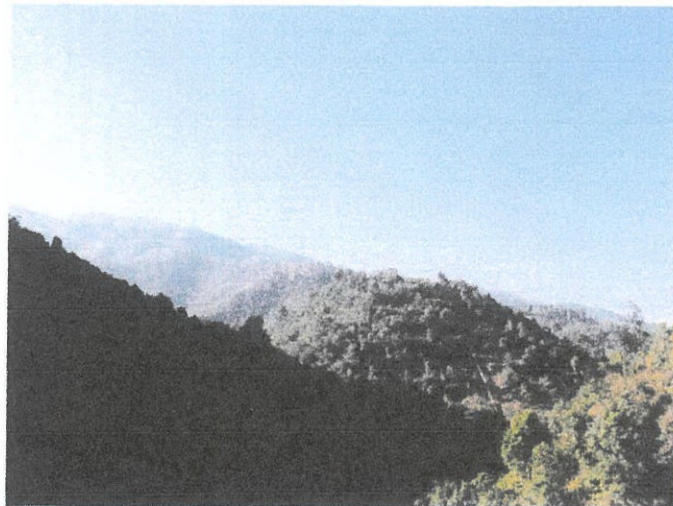
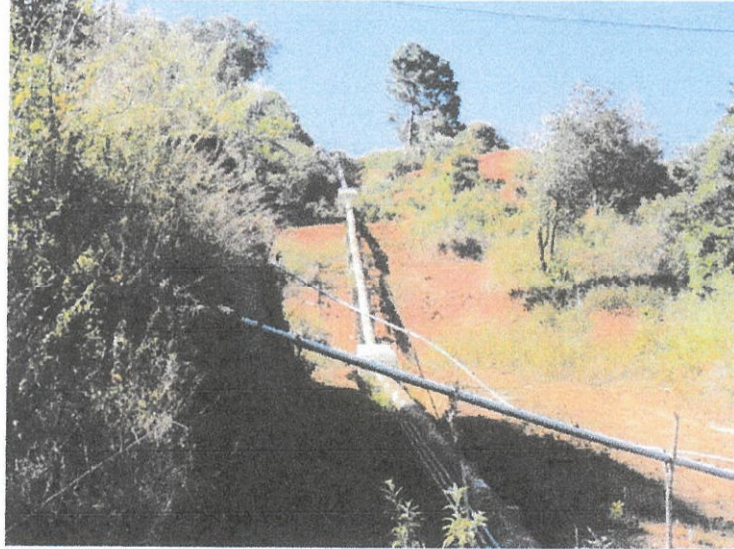




## Nan So Mini Hydropower Plant

### Nan So Hydropower Project Image and Activities Image



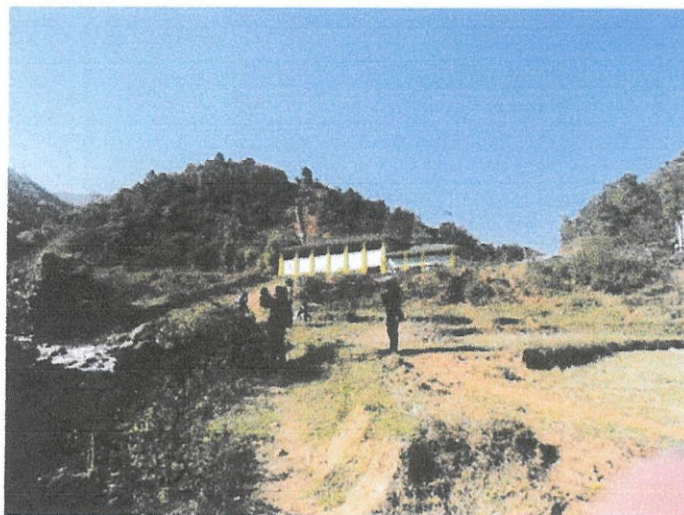


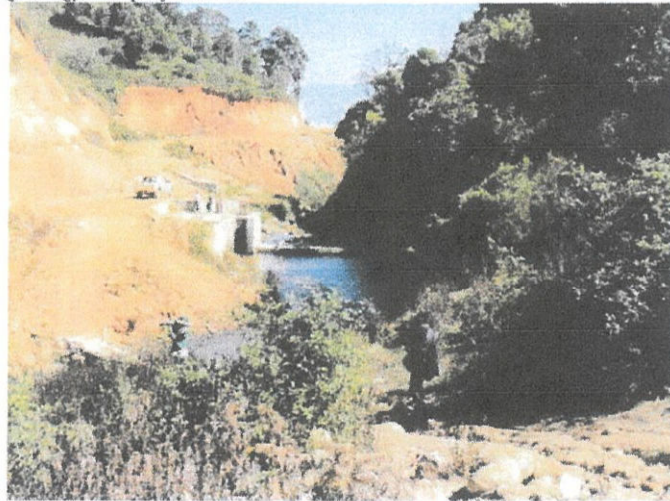
Study Site





Soil erosion





Study site of Nam So HPP, Biodiversity survey team and their activities



နမူနာရေအားလျှပ်စစ် (1250KW x 2) အတွက် တင်ပြလာသော (Environmental Management Plan – EMP) အပေါ်စစ်ဆေးမှုရုတ်ချက်နှင့် သုံးသပ်အကြံပြုချက်များ

စဉ်	စစ်ဆေးမှုရုတ်ချက်များ	သုံးသပ်အကြံပြုချက်များ	ပြန်လည်တင်ပြချက်
၁။	<p>အကျဉ်းချုပ်အစီရင်ခံစာ</p> <ul style="list-style-type: none"> <li>ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ် (Environmental Management Plan-EMP)ကို ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း အပိုဒ်(၆၃)၊ အပိုဒ်(၆၃)၊ အချက် အလက်များအတိုင်း ရေးဆွဲထားခြင်းမရှိပါ။</li> <li>အကျဉ်းချုပ်အစီရင်ခံစာပါရှိသော်လည်း လွှမ်းမိုးမှုမရှိပါ။ မြန်မာဘာသာဖြင့် ရေးသားတင်ပြ ထားပါသည်။</li> </ul>	<ul style="list-style-type: none"> <li>ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ် (Environmental Management Plan-EMP)ကို ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း အပိုဒ်(၆၃)၊ အပိုဒ်(၆၃)၊ အချက်အလက်များအတိုင်းရေးဆွဲရန် မြန်မာဘာသာဖြင့် ဖော်ပြရာတွင် အခန်းလိုက် အဓိကအချက်များပါဝင်ရန်နှင့် လွှမ်းမိုးမှုရှိအောင် ရေးသားတင်ပြရန်။</li> </ul>	<p>အစီရင်ခံစာအကျဉ်းချုပ်တွင် ဖြည့်စွက်ဖော်ပြထားပါသည်</p>
၂။	<p>စီမံကိန်းအကြောင်းအရာဖော်ပြချက်</p> <ul style="list-style-type: none"> <li>စီမံကိန်း ROR (Run of River) နည်းလမ်းဖြင့် ဆောင်ရွက်မည်ဟု ဖော်ပြထားသော်လည်း စီမံကိန်းတွင် ပါဝင်သည့် အခြေခံ အဆောက်အအုံ (၁)ခုချင်းစီ၏ ဒီဇိုင်း အမျိုးအစား၊ အရွယ် အစားများကို ဖော်ပြထားခြင်းမရှိပါ။</li> <li>စီမံကိန်းကာလ ဖော်ပြထားခြင်း မရှိပါ။</li> <li>စီမံကိန်းဆောင်ရွက်မည့် နေရာ၏ မြေအသုံးချမှုအခြေအနေ ဖော်ပြထားခြင်း မရှိပါ။</li> <li>စီမံကိန်းကြောင့် ဖြစ်ပေါ်လာသော ရေပစ်ရေယာ၏ အကျယ်ရေပစ်သွားမည့် သက်ရှိနှင့် အပင်အရေအတွက်များကို ဖော်ပြထားခြင်း မရှိပါ။ ထို့ပြင် ချောင်းမှ ရေလွှဲရာတွင် ဖြစ်ပေါ်လာသည့် Re-reduction Length အား</li> </ul>	<ul style="list-style-type: none"> <li>စီမံကိန်းတွင် ပါဝင်သည့် အခြေခံအဆောက်အအုံ (၁) ခုချင်းစီ၏ ဒီဇိုင်း၊ အမျိုးအစား၊ အရွယ်အစားများအား ထည့်သွင်းဖော်ပြရန်။</li> <li>စီမံကိန်းကာလအားဖော်ပြရန်နှင့် ခွင့်ပြုမိန့်များ ပူးတွဲဖော်ပြရန်။</li> <li>စီမံကိန်းဆောင်ရွက်မည့်နေရာ၏ မြေအသုံးချမှုအခြေအနေ (သစ်တော ကြီးထွား/ကြီးပြင်ကာလ) ကွယ်တော၊ လယ်/ယာမြေ၊ အခြားမြေ အသုံးချမှုကိုဖော်ပြရန်။</li> <li>စီမံကိန်းကြောင့် ဖြစ်ပေါ်လာသော ရေပစ်ရေယာ၏ အကျယ်၊ ရေပစ်သွားမည့် သက်ရှိနှင့် အပင်အရေအ</li> </ul>	<p>စာမျက်နှာ (၁၀) နှင့် ပူးတွဲပါနောက်ဆက်တွဲ တွင် ဖြည့်စွက်ဖော်ပြထားပါသည်</p> <p>ရေပစ်ရေယာမရှိပါ</p>

	<p>ဖော်ပြထားခြင်း မရှိပါ။</p>	<p>တွက်များကိုစိစစ်ပြရန်နှင့် ချောင်းမှ ရေလွှဲရာတွင် ဖြစ်ပေါ်လာသည့် Reduction Length အားဖော်ပြရန်</p>	
၃။	<p>မြေပုံနှင့် ကားချပ်များ</p> <ul style="list-style-type: none"> <li>• စာမျက်နှာ ၁၂ မှ ၁၇ တွင် စီမံကိန်း၏ တည်နေရာပြမြေပုံ၊ Hydro Power Project Layout Plan နှင့် design များသာ ဖော်ပြထားပြီးစီမံကိန်း၏ အနီးပတ်ဝန်းကျင်၊ Power house, reservoir များကို ရှင်းလင်းစွာ မြင်ရသော layout ပုံများ၊ မြေပုံ၊ မပါရှိကြောင်းစိစစ်တွေ့ရှိရသည်။</li> </ul>	<ul style="list-style-type: none"> <li>• စီမံကိန်းဧရိယာနှင့် ဆက်စပ်ပတ်သက်နေသော ပတ်ဝန်းကျင် အနေအထား၊ ဘေးပတ်ဝန်းကျင်ရှိ မြေအသုံးချမှုများနှင့် လူနေထိုင်သည့်နေရာများကို အလွယ်တကူ သိရှိစေနိုင်ရန် ပတ်ဝန်းကျင်အခြေအနေများ ပါဝင်သော မြေပုံဖော်ပြနိုင်သော တည်နေရာပြမြေပုံ၊ Layout ပုံများ၊ Google Map များကိုဖော်ပြပေးရန်၊</li> <li>• စီမံကိန်းအစိတ်အပိုင်း တစ်ခုချင်းအတွက် ( Power house, reservoir) တည်နေရာ၊ အဆောက်အဦများ သို့လှောင်ရုံများ၊ ချဉ်းကပ်လမ်းများ၊ နယ်နိမိတ်များ၊ မြေမျက်နှာသွင်ပြင်ကို ရှင်းလင်းစွာ မြင်ရသော မြေပုံများ၊ ဓာတ်ပုံများ၊ Google Image layout ပုံများကို ဖော်ပြပေးရန်၊</li> </ul>	<p>စာမျက်နှာ (၁၇၊ ၁၈) တွင် ဖြည့်စွက်ဖော်ပြထားပါသည်</p>
၄။	<p>ကတိကဝတ်</p> <p>ပြည့်စုံစွာ ဖော်ပြထားမှုမရှိပါ။</p>	<ul style="list-style-type: none"> <li>• စီမံကိန်း အဆိုပြုသူနှင့် အစီရင်ခံစာရေးသားပြုစုသူ တို့ လိုက်နာဆောင်ရွက်မည့်ကတိကဝတ်များကို သီးခြားခွဲခြားလက်မှတ်ရေးထိုးဖော်ပြရန်</li> <li>• စီမံကိန်း အဆိုပြုသူမှ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီရင်ခံစာတွင် ပတ်ဝန်းကျင်ထိခိုက်မှု လျော့ပါးစေရေး လုပ်ငန်းများကို အပြည့်အဝအစဉ်အမြဲလိုက်နာဆောင်ရွက်မည်ဖြစ်ကြောင်း ကတိကဝတ်အားဖော်</li> </ul>	<p>နောက်ဆက်တွဲ (၁) နှင့် (၂) တွင် ဖြည့်စွက်ဖော်ပြထားပါသည်</p>

	<p>ပြရန်၊</p> <ul style="list-style-type: none"> <li>• အစီရင်ခံစာရေးသားပြုစုသူမှ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီရင်ခံစာသည် တိကျမှုနှင့် ပြည့်စုံမှုရှိကြောင်း ကတိကဝတ်အားဖော်ပြရန်၊</li> </ul>	
၅။	<p>မူဝါဒဥပဒေနှင့် အဖွဲ့အစည်းဆိုင်ရာမူဘောင်</p>	
	<ul style="list-style-type: none"> <li>• စာမျက်နှာ ၂၁ မှ ၃၄ တွင် တည်ဆဲ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဥပဒေနှင့် နည်းဥပဒေများ ၊ အမျိုးသားနှင့် အပြည်ပြည်ဆိုင်ရာ စံချိန်စံညွှန်းများ အပါအဝင် မူဝါဒနှင့် ဥပဒေရေးရာမူဘောင်များကိုသာ ဖော်ပြထားပါသည်။ သို့ရာတွင်စီမံကိန်းမှ လိုက်နာ ဆောင်ရွက်မည်ဟု ဖော်ပြထားခြင်း မရှိကြောင်း၊ စီမံကိန်းမှ လိုက်နာဆောင်ရွက်မည့် ဥပဒေများပါပုဒ်များ ပုဒ်မခွဲ များအား ဖော်ပြထားမှုမရှိကြောင်း စိစစ်တွေ့ရှိရပါသည်။</li> </ul>	<ul style="list-style-type: none"> <li>• အဆိုပြုစီမံကိန်းမှ လိုက်နာရမည့် သက်ဆိုင်သည့် ဥပဒေ၊ နည်းဥပဒေများ၊ လုပ်ထုံးလုပ်နည်းများ၊ စံချိန် စံညွှန်းများနှင့် နိုင်ငံတကာစည်းကမ်း သတ်မှတ်ချက် များကိုသာ ထည့်သွင်းဖော်ပြရန်၊</li> <li>• ကုမ္ပဏီ၏ ပတ်ဝန်းကျင်ထိန်းသိမ်းဆိုင်ရာမူဝါဒ/မူ ဘောင်များ ရှိပါကထည့်သွင်းဖော်ပြရန်</li> <li>• အဆိုပြုစီမံကိန်းမှ လိုက်နာရမည့် တည်ဆဲ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ဥပဒေနှင့် နည်းဥပဒေ များ ၊ အမျိုးသားနှင့် အပြည်ပြည်ဆိုင်ရာ စံချိန်စံ ညွှန်းများနှင့် လမ်းညွှန်ချက်များ အပါအဝင် မူဝါဒနှင့် ဥပဒေရေးရာမူဘောင်များအပြင် အပြည်ပြည်ဆိုင်ရာ ကွန်းပင်းရှင်းများစာချုပ်များနှင့် သဘောတူညီချက် များကိုပါ ထည့်သွင်းဖော်ပြရန်</li> <li>• စီမံကိန်း၏ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးနှင့် လူမှုရေး ဆိုင်ရာ မူဝါဒများ၊</li> <li>• ကျန်းမာရေးအပေါ် ထိခိုက်စေနိုင်သည့် စီမံကိန်းလုပ် ငန်းများအတွက် ကျန်းမာရေးဆိုင်ရာ စံချိန်စံညွှန်း များ</li> <li>• အဆိုပြုစီမံကိန်းမှ လိုက်နာရမည့် ပြည်ထောင်စု</li> </ul>

	<p>သမ္မတမြန်မာနိုင်ငံတွင် ထုတ်ပြန်ထား သော လူမှုပတ်ဝန်းကျင်၊ လူမှုဖူလုံရေး၊ ကျန်းမာရေး နှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေး ကိစ္စရပ်များနှင့် ပတ်သက်သည့် ဥပဒေများ စည်းမျဉ်းစည်းကမ်းများ အနက်မှ စီမံကိန်းနှင့် သက်ဆိုင်သည့်ဥပဒေများ စည်မျဉ်းစည်းကမ်းများကိုသာ အစီရင်ခံစာတွင် ထည့်သွင်း၍ ဖော်ပြရန် လိုအပ်ပါသည်။</p>	
<p>စာမျက်နှာ (၅၂ မှ ၅၆) တွင် ထပ်မံ၍ဖြည့်စွက်ဖေ န်ပြထားပါသည်</p>	<p>မြေအရည်အသွေး၊ ရေအရည်အသွေး၊ လေအရည်အသွေး၊ ဆူညံသံနှင့်တုန်ခါမှု တိုင်းတာရန် ရယူသည့် နေရာအား Google Map Coordinate Point များအား WGS 84 System ဖြင့် ထည့်သွင်းဖော်ပြ ရန်၊</p> <ul style="list-style-type: none"> <li>• လေအရည်အသွေး တိုင်းတာမှု ရလဒ်များကို အမျိုးသား ပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များနှင့် အညီနှိုင်း ယှဉ်ဖော်ပြရန်၊</li> <li>• ဇီဝမျိုးစုံမျိုးကွဲများနှင့် ပတ်သက်၍ Base Line Data ကောက်ယူထားသည့် တည်နေရာသည် စီမံကိန်း (၁) ခုလုံးကို ခြုံငုံမှု ရှိ/မရှိဖော်ပြရန်နှင့် ကောက်ယူသည့်တည်နေရာအား မြေပုံပေါ်တွင်ရှင်းလင်းစွာ ထည့်သွင်းဖော်ပြရန်၊</li> <li>• ဇီဝမျိုးစုံမျိုးကွဲများပေါ် ထိခိုက်မှုလျော့နည်းစေရန် မည်ကဲ့သို့ စီမံဆောင်ရွက်မည်ကို တိကျစွာထည့်သွင်းဖော်ပြရန်၊</li> <li>• စီမံကိန်း မစတင်မီ နမူနုချောင်း၏ အကျယ်၊ အနက်၊</li> </ul>	<p>လက်ရှိပတ်ဝန်းကျင်အကြောင်းအရာများဖော်ပြချက်</p> <ul style="list-style-type: none"> <li>• စာမျက်နှာ ၃၈ မှ ၄၄ တွင် မြေအရည်အသွေး၊ ရေအရည်အသွေးလေအရည်အသွေး၊ ဆူညံသံနှင့် တုန်ခါမှုတို့ကို တိုင်တာထားကြောင်း ဖော်ပြထားပြီး တိုင်းတာသည့် နေရာအားအတိအကျဖော်ပြထားခြင်းအရှိပါ။</li> <li>• ဇီဝမျိုးစုံမျိုးကွဲများနှင့် ပတ်သက်၍ အနီးဝန်းကျင်ရှိ သက်ရှိများနှင့် အပင်များကို သုတေသနပြုစဉ် Base Line Data ကောက်ယူထားရှိမှုအခြေအနေအား ဇယားနှင့်တကွ ဖော်ပြထားပါသည်။</li> <li>• ဇီဝမျိုးစုံမျိုးကွဲများပေါ် ထိခိုက်မှုလျော့နည်းစေမည့် အစီအစဉ်အားဖော်ပြထားခြင်းမရှိပါ။</li> <li>• စီမံကိန်း မစတင်မီက နမူနုချောင်း၏ အကျယ်၊ အနက်၊</li> </ul>
		<p>ပူတွဲပါနောက်ဆက်</p>

	<p>ရေထု၊ အပူချိန်၊ ရေစီးနှုန်း၊ တိုက်စာမှုနှင့် နန်းအနည်ကျမှုများ ပမာဏတို့အား ဖော်ပြထားခြင်း မရှိပါ။</p> <ul style="list-style-type: none"> <li>• စီမံကိန်းဆောင်ရွက်နေစဉ် နမ့်စိုချောင်းမှ ဆည်အတွင်း နန်းများပိုချမှုပမာဏနှင့် ထိုနန်းများအား စီမံဆောင်ရွက်ထားမှုကိုဖော်ပြထားခြင်းမရှိပါ။</li> <li>• စီမံကိန်းဆောင်ရွက်နေစဉ်က လူမှုပတ်ဝန်းကျင်နှင့် သဘာဝပတ်ဝန်းကျင်အပေါ် ထိခိုက်ခဲ့မှုများ၊ ပြဿနာများ ရှိ/မရှိ ဖော်ပြထားခြင်းမရှိပါ။</li> </ul>	<p>ရေထု၊ အပူချိန်၊ ရေစီးနှုန်း၊ တိုက်စာမှုနှင့် နန်းအနည်ကျမှုများ ပမာဏတို့အား တိုင်းတာခဲ့ပါက ဖော်ပြရန်နှင့် တိုင်းတာခြင်း မရှိခဲ့ပါက ကိုးကားချက်များကို အချက်အလက်ပြည့်စုံစွာဖြင့် ဖော်ပြရန်၊</p> <ul style="list-style-type: none"> <li>• စီမံကိန်းဆောင်ရွက်နေစဉ် နမ့်စိုချောင်းမှ ဆည်အတွင်း နန်းများပိုချမှုပမာဏနှင့် ထိုနန်းများအား စီမံဆောင်ရွက် ထားမှုကိုဖော်ပြရန်၊</li> <li>• စီမံကိန်းဆောင်ရွက်နေစဉ်က လူမှုပတ်ဝန်းကျင်နှင့် သဘာဝပတ်ဝန်းကျင်အပေါ် ထိခိုက်ခဲ့မှုများ ပြဿနာများရှိခဲ့ပါက ထည့်သွင်းဖော်ပြရန်၊</li> </ul>	<p>တွဲတွင်ဖော်ပြထားပါသည်</p> <p>ပုတွဲပါနောက်ဆက်တွဲတွင်ဖော်ပြထားပါသည်</p> <p>မရှိပါ</p>
၇။	<p>ထိခိုက်နိုင်မှုများနှင့် လျော့ပါးစေရေး ဆောင်ရွက်မည့်အစီအစဉ်များ</p> <ul style="list-style-type: none"> <li>• စာမျက်နှာ ၇၀ တွင် စီမံကိန်းကြောင့် ထိခိုက်လာနိုင်မှုကို တွက်ချက်ရာတွင် အချက် (၃) ချက်သာ ဖော်ပြထားပြီး လျော့ပါးစေရေး ဆောင်ရွက်မည့် အစီအစဉ်မှာလည်း အချက် (၃) ချက်အတွက်သာ ပါရှိပါသည်။</li> <li>• စာမျက်နှာ ၇၀ တွင် “Summary of Anticipated Impacts and Proposed Management Pla” ဟုဖော်ပြထား ပါသည်။</li> </ul>	<ul style="list-style-type: none"> <li>• စီမံကိန်းကြောင့် ထိခိုက်သည့် လူမှုပတ်ဝန်းကျင်နှင့် သဘာဝပတ်ဝန်းကျင်ဆိုင်ရာ အချက်အလက်များကို ပြည့်စုံစွာ ဖော်ပြရန်နှင့် ထိခိုက်နိုင်မှုကို လျော့ချဆောင်ရွက်မည့် အစီအစဉ်များအား အချိန်ကာလ၊ အကြိမ်အရေအတွက်၊ လူအင်အား၊ သုံးစွဲမည့်ငွေကြေးများကိုဇယားနှင့်တကွ ထည့်သွင်းဖော်ပြရန်</li> <li>• Anticipated နှင့် Proposed ဟု မဖော်ပြဘဲ ‘Summary of Actual Impacts and Actual Management Plan’ ဟုဖော်ပြရန်နှင့် အမှန်တကယ် လုပ်ဆောင်သွားရန်၊</li> </ul>	<p>အခန်း (၅)၊ ၆) တွင်ဖြည့်စွက်ထားပါသည်</p>
၈။	<p>ဘေးအန္တရာယ် ကာကွယ်ရေးအစီအစဉ်</p> <ul style="list-style-type: none"> <li>• ဖော်ပြထားခြင်းမရှိပါ</li> </ul>	<ul style="list-style-type: none"> <li>• ဘေးအန္တရာယ်၊ မတော်တဆ ဘေးအန္တရာယ်များ ကျရောက်ပါက အရေးပေါ်တုံ့ပြန် ဆောင်ရွက်မည့် အစီအစဉ်နှင့် ကြိုတင်ဆောင်ရွက်ထားရှိမှုအား ဖော်ပြရန်၊</li> </ul>	<p>အခန်း (၄) တွင်ဖြည့်စွက်ထားပါသည်</p>
၉။	<p>အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးခြင်း</p> <ul style="list-style-type: none"> <li>• အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးမှုတွင် ဌာနဆိုင်ရာ အဖွဲ့</li> </ul>	<ul style="list-style-type: none"> <li>• အများပြည်သူနှင့်တိုင်ပင် ဆွေးနွေးသည့် နေရာ၊</li> </ul>	<p>စာမျက်နှာ (၁၀၄)</p>

	အစည်းများဒေသခံများတက်ရောက်ကြောင်းကို စာမျက်နှာ ၈၉တွင် ဖော်ပြပါဇယားအရ သိရှိရပါသည်။	နေ့ရက်၊ အချိန်နှင့် အကြိမ် အရေအတွက်တို့အား ဖော်ပြပြီး မှတ်တမ်း၊ ဓာတ်ပုံများနှင့် အတူပူတွဲ ဖော်ပြရန်။	တွင်ဖြည့်စွက်ထားပါသည်
၁၀	<p>စောင့်ကြပ်ကြည့်ရှုခြင်းနှင့် ရန်ပုံငွေလျာထားချက်</p> <ul style="list-style-type: none"> <li>စာမျက်နှာ ၇၈ တွင် စောင့်ကြပ်ကြည့်ရှုမည့် အစီအစဉ် အတွက်ရန်ပုံ ငွေလျာထားချက်ကျ စီမံကိန်း၏ ၅နှစ် အတွက်သာ ဖော်ပြထားပါသည်။ စာမျက်နှာ ၇၉ တွင်စောင့်ကြပ်ကြည့်ရှုမည့် အစီအစဉ်အား ဖော်ပြထားပါသည်။</li> </ul>	<ul style="list-style-type: none"> <li>ပတ်ဝန်းကျင်အခြေအနေ (မြေအရည်အသွေး၊ ရေအရည်အသွေး၊ မြေအရည်အသွေး၊ လုပ်သားများ၏ ကျန်မားရေး) များထိခိုက်မှု အနည်းဆုံးဖြစ်စေရန် စောင့် ကြပ်ကြည့်ရှုမည့် အစီအစဉ်နှင့် ရန်ပုံငွေလျာ ထားချက်များကို စီမံကိန်းပြီးဆုံးသည်အထိ မည်ကဲ့သို့ ဆောင်ရွက်မည်ကို အသေးစိတ် ဖော်ပြရန်နှင့်</li> </ul>	အခန်း (၄) တွင်ဖြည့်စွက်ထားပါသည်
၁၁	<p>အဖွဲ့အစည်းနှင့် ရန်ပုံငွေလျာထားချက်</p> <ul style="list-style-type: none"> <li>အဖွဲ့အစည်းနှင့် ရန်ပုံငွေလျာထားချက်အား ဖော်ပြထားခြင်း မရှိပါ</li> </ul>	<ul style="list-style-type: none"> <li>စီမံကိန်းကြောင့်ဖြစ်ပေါ်လာမည့် လူမှုပတ်ဝန်းကျင်နှင့် သဘာဝပတ်ဝန်းကျင်အပေါ် ထိခိုက်မှုများအား ပြည့်စုံစွာဖော်ပြ၍ လျော့ချမည့် အစီအစဉ်များကို အသေးစိတ် ထည့်သွင်းဖော်ပြရန်။</li> </ul>	အခန်း (၄) တွင်ဖြည့်စွက်ထားပါသည်
၁၂	<p>စီမံကိန်းကြောင့် ထိခိုက်ခံစားရသူများအတွက် ဖွံ့ဖြိုးရေးလုပ်ငန်းများတာဝန်ယူဆောင်ရွက်ပေးမှုအခြေအနေ</p> <ul style="list-style-type: none"> <li>စာမျက်နှာ ၇၆ တွင်ကမ္ဘာ့ကုမ္ပဏီမှ လူမှုတာဝန်ယူမှုအနေဖြင့် သိန်း ၅၀၀ ကျပ်ကို လူမှုပတ်ဝန်းကျင်၏ အားနည်းသည့် အပိုင်းများတွင် အသုံးပြုသွားမည်ဟုဖော်ပြထားပါသည်။</li> </ul>	<ul style="list-style-type: none"> <li>စီမံကိန်းကြောင့် ထိခိုက်ခံစားရသူများအတွက် ဖွံ့ဖြိုးရေးလုပ်ငန်းများတာဝန်ယူဆောင်ရွက်ပေးမှု အခြေအနေအား ဒေသခံပြည်သူများနှင့် တိုင်ပင်ဆွေးနွေးပြီး အမှန်တကယ် လိုအပ်သည့် ထိခိုက်ခံစားရသူများအတွက် ဖွံ့ဖြိုး ရေးလုပ်ငန်းများကို အကောင်အထည်ဖော် ဆောင်ရွက်ပေးမည့် အစီအစဉ်များ ဖော်ပြရန်နှင့် ဆောင်ရွက်ထားမှုများ ရှိပါကလည်း ဓာတ်ပုံမှတ်တမ်းများဖြင့်ဖော်ပြပေးရန်။</li> </ul>	စာမျက်နှာ (၁၀၄) တွင် ဖြည့်စွက်ထားပါသည် ပူတွဲပါနောက်ဆက် တွဲတွင်ဖော်ပြထားပါသည်
၁၃	အထွေထွေ		

	<ul style="list-style-type: none"><li>• ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှုအစီအစဉ်ကို ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း အပိုဒ် (၆၃) (ဇ) ပါ အစီအစဉ်အတိုင်း ရေးဆွဲ၍ပြန်လည်တင်ပြရန်၊</li><li>• ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း အပိုဒ် (၇၇) အရပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် အစီရင်ခံစာ တင်ပြသည့်အခါ အစီရင်ခံစာနှင့် အတူ အဆိုပါ (EMP) Soft Copy ကိုပူးတွဲ၍ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန၊ နေပြည်တော်သို့တင်ပြရန်၊</li></ul>
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