MINHLA HYDROPOWER PROJECT

INITIAL ENVIRONMENTAL EXAMINATION

HYDROPOWER AND SOLAR ENERGY DEVELOPMENT CO., LTD.

Prepared by:

MYANWEI ENVIRONMENTAL SOLUTIONS

MYANWEI ENVIRONMENTAL SOLUTIONS COMPANY LIMITED

22/11/2021

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Date: 22, 11, 2021

Dear: Director

Environmental Conservation Department

Subject: Initial Environmental Examination (IEE) Report in respect of the Minhla hydropower project

We refer to the captioned IEE, which has been prepared by Myanwei Environmental Solutions Co., Ltd. (Third Party Consultant) in compliance with EIA procedure (2015) and other related laws/rules.

We believe, to the best of our knowledge at the time of writing, that;

- The Scoping report is accurate and complete
- The Scoping report has been prepared in strict compliance with all applicable laws, rules, regulation and procedures in force.

Hydropower & Solar Energy Development Company Limited will always comply fully with all commitment and obligations in the IEE report.

We acknowledge and understand that

(ခင်မောင်ညွန့်)
General Manager
Hydropower & Solar Energy Development.Co.,Ltd.

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Date: 22.11.2021

Attention: Dear Director

Environmental Conservation Department

Subject: Initial Environmental Examination (IEE) Report in respect of the Minhla Hydropower project resort by Hydropower & Solar Energy Development Company Limited.

IEE report describes the environmental condition of a project, including significant impact, formulation of mitigation measures and preparation of institutional requirements and environmental monitoring.

Myanwei Environmental Solutions Company Limited has prepared this report with all reasonable skill, care, and diligence within the terms of the Contract with the client, incorporating our General Terms and Conditions of Business and taking into account of the resources devoted to it by agreement with the client. We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above. This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own risk.

We strongly commit that this report was prepared in compliance with Myanmar Environmental Laws and Regulations.

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1. CEMP = Construction Environmental Management Plan
2. CSR = Corporate Social Responsibility
3. EMP = Environmental Management Plan
4. EIA = Environmental Impact Assessment
5. ECD = Environmental Conservation Department
6. ECC = Environmental Compliance Certificate
7. EMoP = Environmental Monitoring Plan
8. GIIP = Good International Industry Practices
9. HSE = Health, Safety and Environment
10. IEE = Initial Environmental Examination
11. IFC = International Finance Corporation
12. NEQG = National Environmental Quality (Emission) Guidelines
13. MIC = Myanmar Investment Commission
14. MOECAF = Ministry of Environmental Conservation and Forestry
15. MONREC = Ministry of Natural Resources and Environmental Conservation
16. OEMP = Operation Environmental Management Plan
17. OSHA = Occupational Safety and Health Administration
18. PPE = Personal Protective Equipment
19. WHO = World Health Organization
20. YCDC = Yangon City Development Committee
21. YESB = Yangon City Electricity Supply Board
22. YCDC = Yangon City Development Committee
23. Sq meter = Square meter
24. % = Percentage
25. ˚C = Degree Celsius
26. BOD = Biochemical Oxygen Demand
27. COD = Chemical Oxygen Demand
28. CO = Carbon Monoxide
29. CO_2 = Carbon Dioxide
30. NO_2 = Nitrogen Dioxide
31. VOC = Volatile Organic Compound
32. O_3 = Ozone
33. dB (A) = Decibel Unit
34. MT = Metric Ton
35. Kt = Kilo Ton
36. kWh = Kilo Watt Hour
37. km = Kilo Meter
38. PM = Particulate Matter
39. ppm = Part Per Million

အစီရင်ခံစာ အကျဉ်းချုပ်

အကျဉ်းချုပ်

မင်းလှရေအားလျှပ်စစ်စီမံကိန်း၏ ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း အစီရင်ခံစာကို သယံဇာတနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ဝန်ကြီးဌာန လက်အောက်ရှိ သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန၏ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းအပိုဒ်ခွဲ ၃၆ အရ ပတ်ဝန်းကျင်ဆိုင်ရာ ဥပဒေ စည်းမျဉ်းများနှင့် အညီ ရေးသားခဲ့ပါသည်။ အဆိုပြုစီမံကိန်း၏ကနဦး ပတ်ဂန်းကျင် ဆန်းစစ်ခြင်း အတွက် စာအမှတ် ၆၁၆/ ၂၀၁၅ အရ အစီရင်ခံစာကို မတ်လ ၂၀၁၆ ခုနှစ်တွင် ရေးသားတင်ပြခဲ့ပါသည်။ အစီရင်ခံစာသည် စီမံကိန်း၏ ပတ်ဝန်းကျင်နှင့် လူမှုပတ်ဝန်းကျင် ကောင်းမွန်းရေးကို ရေရှည်ထိန်းသိမ်းနိုင်ရန်ရည်ရွယ်ပါသည်။

စီမံကိန်း အဆိုပြုသည့် Myanmar Hydropower Development Co. Ltd (MHD) သည် ရှမ်းပြည်နယ်မြောက်ပိုင်း နောင်ချိုမြို့နယ်တွင် လူမှုရေးနှင့် စီးပွားရေးဆိုင်ရာ လိုအပ်သော လျှပ်စစ်မာတ်အား ၁၀ မီဂါဝပ်ကို ပေးဆောင်မည်ဖြစ်သည်။

အစီရင်ခံစာတွင် စီမံကိန်း၏ ပတ်ဝန်းကျင်နှင့် လူမှုပတ်ဝန်းကျင်ဆိုင်ရာ ဆန်းစစ်ခြင်း၊ လူမှုစီးပွားဆိုင်ရာ သက်ရောက်မှုများ၊ ယဉ်ကျေးမှုအမွေအနှစ်များ၊ ဂေဟစနစ်နှင့် စီမံကိန်းလုပ်ဆောင်ချက်ကြောင့် သက်ရောက်မှုများကို လေ့လာခဲ့ပါသည်။ စီမံကိန်းကြောင့် သက်ရောက်မှုများ အပေါ် လျော့ချခြင်း နှင့် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်များကိုရေးဆွဲခဲ့ပါသည်။

ကတိကဝတ်ပြုခြင်း

ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း အစီရင်ခံစာကို ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဆိုင်ရာ ဥပဒေများနှင့် အညီ ရေးသားပြုစုထားပါသည်။

အဆိုပြုစီမံကိန်သည် အစီရင်ခံစာတွင်ပါဝင်သော ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ် နှင့် လျော့ချရေး နည်းလမ်းများကို ပြုလုပ်သွားပါမည်။ စီမံကိန်းအပေါ် သက်ရောက်မှုများကို တိုင်းတာ မှုပြုလုပ်ခြင်းကိုလည်း အပြည့်အဝ လုပ်ဆောင်သွားပါမည်။

စီမံကိန်းအကြောင်းအရာ

အဆိုပြုစီမံကိန်းသည် တာတမံနှင့် ဆည်များ၊ တူးမြောင်းများ ဘယ်မှ ညာသို့စီးဆင်းသော ရေအားလျှပ်စစ်စီမံကိန်းဖြစ်သည်။ မင်းလှရေအားလျှပ်စစ်စီမံကိန်း၏ ညာဘက်တွင် တည်ရှိသော ဘန်ဘွေးကျင်း ဝီယာ(Weir)၊ ဆည် (၂)၊ ညောင်ချောင်းဆည်၊ ဆည် (၄) တို့ သည် တူးမြောင်းမှတစ်ဆင့် မင်းလှဆည်အတွင်းသို့စီးဆင်းသည်။ မင်းလှရေအားလျှပ်စစ်စီမံကိန်း၏ ဘယ်ဘက်တွင် တည်ရှိသော သပြေတိုး ဝီယာ၊ သပြေတိုးဆည်၊ ပါဝါဟောက်စ် (၁)၊ ရွှေတောင်ဆည်၊ မြေသုံးပုံဆည် (ဘယ်ဘက်)၊ မြေသုံးပုံဆည် (ညာဘက်)၊ ပါဝါဟောက်စ် (၂) တို့သည် တူးမြောင်းမှတစ်ဆင့် မင်းလှဆည်အတွင်းသို့စီးဆင်းသည်။

ပါဝါဟောက်စ် (၁)၊ ပါဝါဟောက်စ် (၂) နှင့် မင်းလှ ရေအားလျှပ်စစ် စသော စီမံကိန်း ၃ခုဖြင့် လျှပ်စစ် ၁၈ မီဂါဝပ် ပေးနိုင်ရန်စီစဉ်ထားရှိပါသည်။စီမံကိန်းကြောင့် ပတ်ဝန်းကျင်အပေါ်သက်ရောက်မှု အနည်းဆုံးဖြစ်နိုင်ရန် ရည်ရွယ်ပါသည်။

နောက်ခံအကြောင်းအရာ

Hydropower & Solar Energy Development Co., Ltd (H&S) ၏ ရေအားလျှပ်စစ်စီမံကိန်းစီမံကိန်းကို တတိယအဖွဲ့အစည်းဖြစ်မှ အင်ဂျင်နီယာများနှင့် အတူ ဇွန်လ ၂၀၁၃ ခုနှစ်တွင် သွားရောက် စစ်တမ်းကောက်ယူခဲ့ပါသည်။

ဘန်ဘွေးကျင်းချောင်းသည် ရှမ်းပြည် နောင်ချိုမြို့နယ် ဘန်ဘွေးကျင်းကျေးရွာ မြောက်ပိုင်း တွင်တည်ရှိသည်။ ယင်းချောင်းသည် ၀.၇၁ ကုဗမီတာ နှုန်းဖြင့် စီးဆင်းသည်။ ဘန်ဘွေးကျင်းကျေးရွာတောင်ဘက်တွင် (၀.၀၈ ကုဗမီတာ) နှုန်းဖြင့် စီးဆင်းသော ညောင်ချောင်း နှင့် (၀.၁) ကုဗမီတာနှုန်းဖြင့် စီးဆင်းသော မင်းလှချောင်းတို့တည်ရှိသည်။ မြေသုံးပုံချောင်း သည် ဘန်ဘွေးကျင်းရွာ အနောက်ဘက်တွင်တည်ရှိသည်။ ယင်းချောင်းသည် ၀.၀၆ ကုဗမီတာနှုန်းဖြင့် စီးဆင်းသည်။ အထက်ဘက်တွင် သပြေတိုးချောင်းတည်ရှိသည်။ ယင်းချောင်းသည် ၀.၂၆ ကုဗမီတာနှုန်းဖြင့် စီးဆင်းသည်။တတိယအဖွဲ့အစည်းသည် စီမံကိန်းဆိုင်ရာ အချက်အလက်များကို ပဏာမအဆင့် လေ့လာရန် ဩဂုတ်လ ၂၀၁၃ခုတွင် သွားရောက်လေ့လာခဲ့သည်။ ဘူမိဗေဒ အဖွဲ့သည် အဆိုပြုစီမံကိန်း၏ စီးဆင်းမှု၊ သယ်ယူပို့ဆောင်မှု၊ တူးမြောင်းများညှိခြင်း၊ ရေကန်များ၊ ခေါင်းစီးများ၊ သံတိုင်များနှင့် ဓာတ်အားပေးစက်ရုံနေရာများကို သွားရောက်စစ်တမ်းကောက်ယူခဲ့ပါသည်။ ဘူမိ အင်ဂျင်နီယာများသည် အထက်တွင်ဖော်ပြခဲ့သော ဘူမိလက္ခဏာများကို လေ့လာခဲ့သည်။ လေ့လာ စစ်ဆေးမှုများကို ၎င်းအတွင်း နည်းပညာဒီဇိုင်းအစီရင်ခံစာကို ပြင်ဆင်ရန်ရည်ရွယ်ပါသည်။

မြစ်များအားလုံးပေါင်းဆုံပြီး ဆည် တော်ကြီးရေလှောင်တမံအတွင်းသို့ ရေများစီးဆင်းရာမှ လျှပ်စစ်ဓာတ်အား ထုတ်လုပ်မည်ဖြစ်သည်။ အဆိုပြုသူမှ ရှမ်းပြည်နယ် ရေရှည်တည်တံ့ခိုင်မြဲသော ဖွံ့ဖြိုးရေးအတွက် ဖြစ်နိုင်ချေရှိသော ပြည်လည်ဖြည့်တင်းနိုင်မည့် စွမ်းအင်အလားလာကို လေ့လာ ရန်တတိ ယအဖွဲ့အစည်းကို ဖိတ်ကြားခဲ့သည်။ တတိယအဖွဲ့အစည်းမှ အင်ဂျင်နီယာများနှင့် သဘာဝ ပတ်ဝန်းကျင်ထိန်းသိမ်းကာကွယ်ရေး ပညာရှင်များမှ စီမံကိန်းမှ အင်ဂျင်နီယာများနှင့် ပူးပေါင်းကာ စီမံကိန်း အနီးရှိ ရွာများ၊ စီမံကိန်းအနီးရှိ မြစ်ချောင်းများနှင့် ၎င်းတို့စီးဆင်းရာနေရာများသို့ ကွင်းဆင်းလေ့လာခဲ့သည်။ ကွင်းဆင်း လေ့လာခြင်း အတွင်း သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းကာကွယ်ရေး ပညာရှင်များမှ စီမံကိန်းကြောင့် ဖြစ်ပေါ်လာနိုင်သော သဘာဝပတ်ဝန်းကျင်နှင့် လူမှုပတ်ဝန်းကျင်ဆိုင်ရာ သက်ရောက်မှုများကို လေ့လာဆန်းစစ်ပြီး လျော့ပါးစေရန်ဆောင်ရွက်ရမည့် နည်းလမ်းများကို ဖော်ထုတ်ခြင်း၊ အင်ဂျင်နီယာများမှ စီမံကိန်း၏ ဖြစ်နိုင်ချေ ရှိသော အချက်အလက်များနှင့် ဖြစ်နိုင်ချေရှိသော ဖွဲ့စည်းတည်ဆောက်ပုံ ကို ဆောက်လုပ်ခြင်းများ ဆောင်ရွက်ခဲ့ ကြသည်။

မြစ်ရေများကို ဆည်တော်ကြီးရေလှောင်တမံအတွင်းသို့ မစီးဆင်းမီ မြစ်ကြောင်းအတိုင်း စီးဆင်းစေခြင်းဖြင့်အနီးအနားရှိ ကျေးရွာများအတွက်လျှပ်စစ်မော်တော်အားကို ထုတ်လုပ်ပေးနိုင်သည်။ အဓိကမော်တော်အားပေးစက်ရုံမှ လျှပ်စစ်မော်တော်အား ပိုမိုထုတ်လုပ်နိုင်မည်ဖြစ်ပြီး ၎င်းတို့ကို မွန်လေးရှိ ဆည်တော်ကြီး မော်တော်အားခွဲရုံးသို့ ပို့ဆောင်မည်။ ၎င်းကို အခြေအနေ နှစ်ရပ်ဖြင့် ဆုံးဖြတ်သည်။ ပထမအခြေအနေအဖြင့် မြစ်ငယ်များ စီးဆင်းစေခြင်း မှ ၉ မီဂျာဝပ် ထုတ်လုပ်ခြင်းဖြစ်သည်။

သို့သော်အဆိုပြုသူ၏ တောင်းဆိုချက်များအရ တတိယအဖွဲ့အစည်းသည် မြေဆီလွှာရှိ မြေသားနှင့် ကျောက်တုံးများအား အသုံးပြု၍ ပိုမိုကြီးမားသော ရေသိုလှောင်ကန်တည်ဆောက်ရန် သင့်လျော်သော နည်းလမ်းအား လေ့လာရန် ဆောင်ရွက်ခဲ့သည်။ ပိုကြီးမားသော ရေသိုလှောင်ကန်အား တည်ဆောက်ပြီး တစ်နှစ်လျှင် ၆.၃ ကီလိုဝပ်ကို ပိုမိုထုတ်လုပ်ရန် အသေးစားသိုလှောင်ကန်အမျိုးအစားဖြင့် ၁၀ မီဂျာဝပ်ထုတ်လုပ်ခြင်းသည် စီးပွားရေးအရ အကောင်အထည်ဖော်ရန်အတွက် ဖြစ်နိုင်ချေရှိသော ဒုတိယ အခြေ အနေတစ်ရပ်ဖြစ်သည်။

စီမံကိန်းအကြောင်းအရာ

အဆိုပြုစီမံကိန်းသည် ၂၁၀ ဇက ကျယ်ဝန်းပြီး နောင်ချိုမြို့နယ်၏ အရှေ့တောင်ဘက်တွင် တည်ရှိသည်။ စီမံကိန်းအနီးရှိ ကျေးရွာများ၏အနီးတစ်ပိုက်တွင်ဘန့်ဘွေးကျင်းချောင်း၊ နောင်ချိုချောင်း၊ သပြေတိုးချောင်း၊ မြေသုံးပုံချောင်းနှင့် မင်းလှချောင်းများ စီးဆင်းလျက်ရှိသည်။

ဘန့်ဘွေးကျင်းချောင်းသည် မုတ်သုံရာသီတွင် ရေတံခွန်များ ဖြစ်ပေါ်တတ်သည်။ ညောင်ချောင်း နှင့် မင်းလှချောင်းတို့သည် မုတ်သုံရာသီတွင် ရေတံခွန်များ ဖြစ်ပေါ်တတ်ပြီး အနီးအနားရှိ ချိုင့်ဝှမ်းများထဲသို့ စီးဝင်သည်။ သပြေတိုးနှင့် မြေသုံးပုံချောင်းတို့ ပေါင်းဆုံပြီး ချောင်းသုံးဆယ်ချောင်း ဖြစ်ပေါ်လာပြီး ၎င်းသည် ရေတံခွန်ဖြစ်ပေါ်ခြင်းမရှိဘဲ မွန်လေးတိုင်းဒေသကြီးရှိ ဆည်တော်ကြီး ရေလှောင်တ မံအတွင်းသို့ စီးဝင်သည်။ သပြေတိုးရေကာတာမှ ရွှေတောင်ဆည်၊ မြေသုံးပုံဆည် အထက်ပိုင်းမှ အောက်ပိုင်းမှတစ်ဆင့် မင်းလှချောင်းထဲသို့ စီးဝင်သည်။

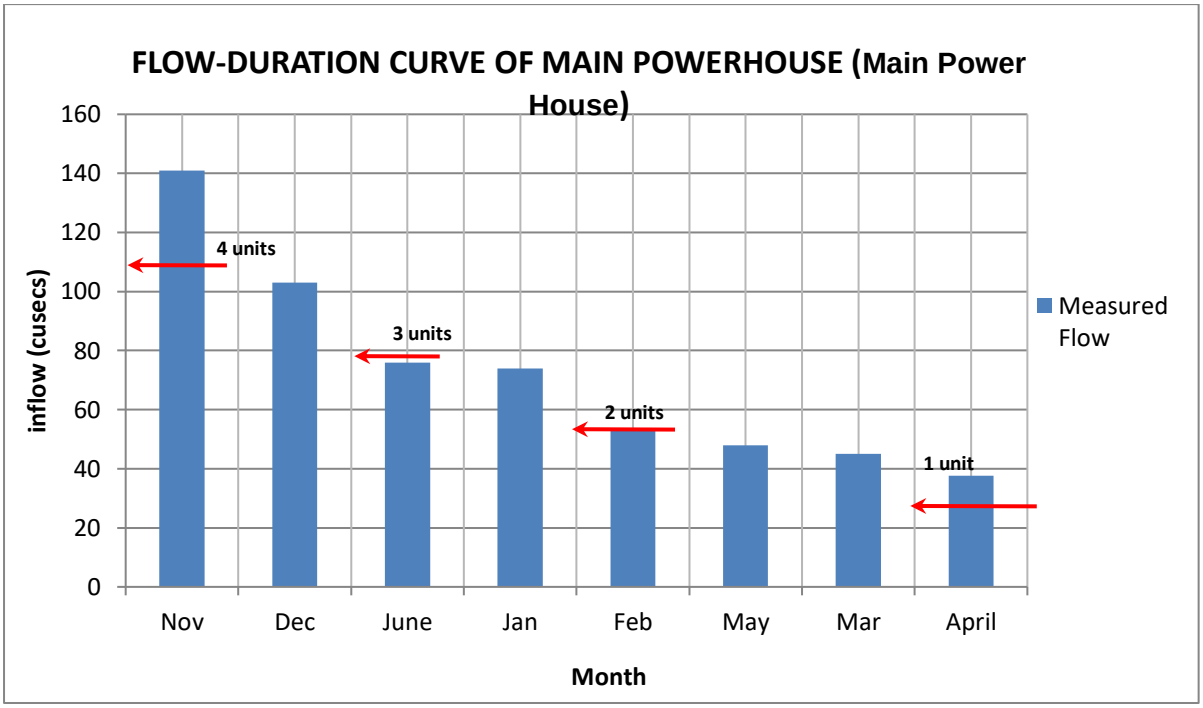
အဆိုပြုစီမံကိန်းသည် မင်းလှချောင်းကိုဖြတ်ကာ တည်ဆောက်ထားသော မင်းလှဆည်စီမံကိန်း ဖြစ်ပြီး ဆည်၏ ဘယ်ညာတစ်ဖက်စီတွင် တာတမံ၊ ဆည်၊ မော်တော်အားပေးစက်ရုံ၊ တူးမြောင်းများပါဝင်၍ မင်းလှဆည်အတွင်းသို့ ရေများစီးဆင်းစေပြီး နောင်ချိုမြို့နယ်ရှိ ဒေသခံများ လိုအပ်သော ၁၀ မီဂျာဝပ်ကို ထုတ်လုပ်နိုင်မည်ဖြစ်သည်။

စီမံကိန်းလည်ပတ်မှု အစီအစဉ်

တစ်နှစ်စာ လျှပ်စစ်စွမ်းအင်ထုတ်လုပ်မှု စီမံကိန်းလည်ပတ်မှုများကို အောက်ပါ ဇယားတွင် ဖော်ပြထားသည်။

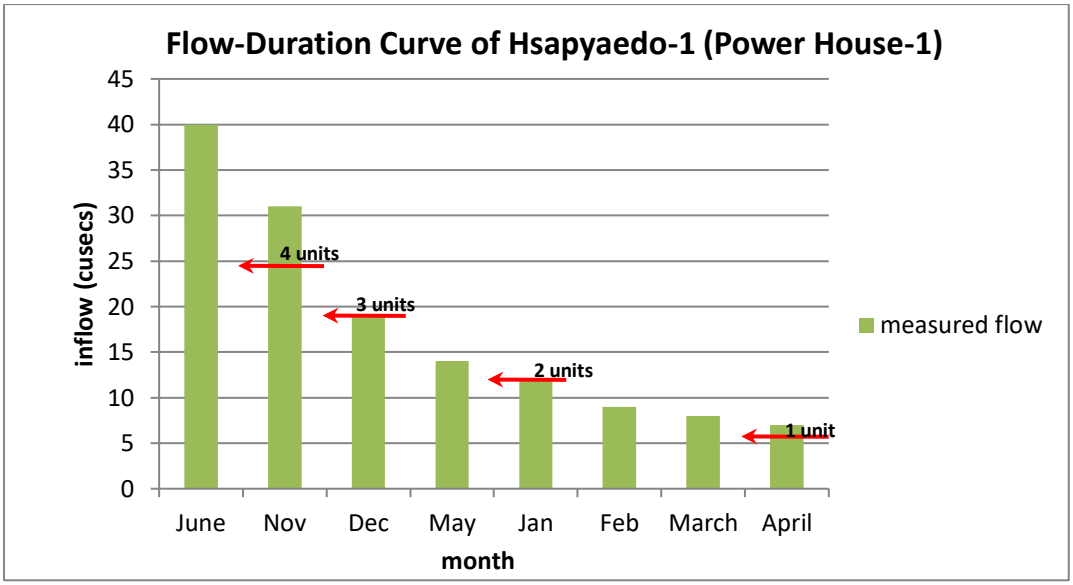
Monthly Power Generation of Main Power House (Main Power House)

Month	Monthly Average Inflow (Ac. ft)	Head (m)	Discharge, Q (m3/sec)	Power, P (kW)	Generated Energy (kWh)	
Jan:	4458	470.00	2.097	5000	3720000	
Feb:	3384	470.00	1.5	5000	3360000	
Mar:	2604	470.00	1.28	2500	1860000	
Apr:	4244	470.00	1.07	2500	1800000	
May:	7343	470.00	1.36	2500	1860000	
Jun:	6181	470.00	2.15	7500	5400000	
Jul:	7148	470.00	-	7500	5580000	
Aug:	9621	470.00	-	10000	74400000	
Sep:	10336	470.00	-	10000	7200000	
Oct:	9390	470.00	-	10000	74400000	
Nov:	5682	470.00	3.99	10000	7200000	
Dec:	4958	470.00	2.92	7500	5580000	
					58440000	
					0.058	GWh
			Installed Capacity P =		10	MW
			Plant Factor PF =		0.73	



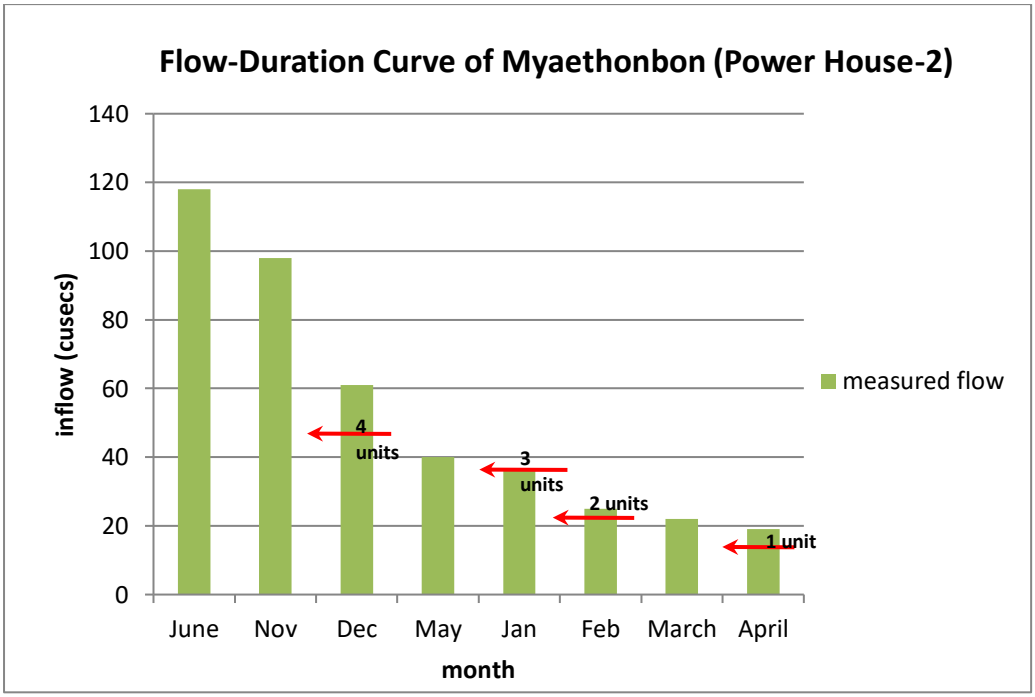
Monthly Power Generation of Hsapyaedo Stream (Power House - 1)

Month	Monthly Average Inflow (Ac. ft)	Head (m)	Discharge, Q (m3/sec)	Power, P (kW)	Generated Energy (kWh)
Jan:	866	22	0.34	60	44640
Feb:	700	22	0.26	30	20160
Mar:	641	22	0.23	30	22320
Apr:	1320	22	0.19	30	21600
May:	2205	22	0.39	60	44640
Jun:	1933	22	1.13	120	86400
Jul:	2102	22	-	120	89280
Aug:	2521	22	-	120	89280
Sep:	2728	22	-	120	86400
Oct:	2370	22	-	120	89280
Nov:	1219	22	0.88	120	86400
Dec:	917	22	0.54	90	89280
					769680
					0.00077 GWh
			Installed Capacity P =		120 KW
			Plant Factor PF =		0.73



Monthly Power Generation of Myaethonbon Stream (Power House - 2)

Month	Monthly Average Inflow (Ac. ft)	Head (m)	Discharge, Q (m3/sec)	Power, P (kW)	Generated Energy (kWh)
Jan:	197	12	1.02	120	89280
Feb:	138	12	0.71	80	53760
Mar:	100	12	0.62	40	29760
Apr:	263	12	0.54	40	28800
May:	283	12	1.13	120	89280
Jun:	313	12	3.34	160	115200
Jul:	282	12	-	160	119040
Aug:	400	12	-	160	119040
Sep:	426	12	-	160	115200
Oct:	379	12	-	160	119040
Nov:	341	12	2.78	160	115200
Dec:	420	12	1.73	160	119040
					1112640
					0.0011 GWh
			Installed Capacity P =		160 KW
			Plant Factor PF =		0.73



ပတ်ဝန်းကျင်နှင့် လူမှုပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း

ထိခိုက်မှုများကို လေ့လာဆန်းစစ်ရာတွင် စီမံကိန်း အကောင်အထည်ဖော်သည့် ကာလနှင့် စီမံကိန်း လည်ပတ်သည့် ကာလများအဖြစ် လေ့လာကာ ကောင်းကျိုးဆိုးကျိုးများ၊ သက်ရောက်မှုများကို ခွဲခြားခြင်း၊ ဂေဟစနစ်နှင့် လူမှုစီးပွားရေး၊ ယဉ်ကျေးမှုနှင့်ဆိုင်သော အချက်များ စသည်တို့ အပေါ်တွင် သိသာထင်ရှားသော မည်သည့်သက်ရောက်မှုမဆို ရှာဖွေခြင်း၊ ဇီဝမျိုးစုံ၊ မျိုးကွဲသဘာဝပတ်ဝန်းကျင်နှင့် လူမှုအကျိုးသက်ရောက်မှု အကဲဖြတ်ခြင်းများနှင့် ကောင်းကျိုး၊ ဆိုးကျိုးသက်ရောက်မှုများကို အောက်ပါအတိုင်း အကျဉ်းချုပ် တွေ့ရှိရပါသည်။

နောင်ချိုမြို့နယ်၊ မင်းလှရေအားလျှပ်စစ် စီမံကိန်းအတွက် သဘာဝပတ်ဝန်းကျင်နှင့် လူမှုရေးသက်ရောက်မှု အကဲဖြတ်ခြင်း အနှစ်ချုပ်

စီမံကိန်း တည်ဆောက်ရေးကာလ			စီမံကိန်း လည်ပတ်သည့်ကာလ		
အမှတ်စဉ်	စိစစ်သည့် အဓိက အချက်များ	အဆင့်သတ်မှတ်ချက်	အမှတ်စဉ်	စိစစ်သည့် အဓိက အချက်များ	အဆင့်သတ်မှတ်ချက်
ရုပ်ဇီဝနှင့် ဓာတုဗေဒဆိုင်ရာ ထိခိုက်မှုများ			ရုပ်ဇီဝနှင့် ဓာတုဗေဒဆိုင်ရာ ထိခိုက်မှုများ		
BPC/1	ရေမျက်နှာပြင် အရည်အသွေးပြောင်းလဲမှု	နိမ့်	BPC/1	ရေမျက်နှာပြင် အရည်အသွေးပြောင်းလဲမှု	အလယ်အလတ်
BPC/2	မြေအောက်ရေ အရည်အသွေးပြောင်းလဲမှု	နိမ့်	BPC/2	မြေအောက်ရေ အရည်အသွေးပြောင်းလဲမှု	နိမ့်
BPC/3	ရေစီးဆင်းမှုလမ်းကြောင်း ပြောင်းလဲမှု	နိမ့်	BPC/3	ရေစီးဆင်းမှုလမ်းကြောင်း ပြောင်းလဲမှု	အလယ်အလတ်

စီမံကိန်း တည်ဆောက်ရေးကာလ			စီမံကိန်း လည်ပတ်သည့်ကာလ		
အမှတ်စဉ်	စီစစ်သည့် အဓိက အချက်များ	အဆင့်သတ်မှတ်ချက်	အမှတ်စဉ်	စီစစ်သည့် အဓိက အချက်များ	အဆင့်သတ်မှတ်ချက်
BPC/4	ရေတိုက်စားမှုနှင့် အနည်ထိုင်မှု	နိမ့်	BPC/4	ရေတိုက်စားမှုနှင့် အနည်ထိုင်မှု	နိမ့်
BPC/5	လေထုအရည်အသွေး ပြောင်းလဲမှု	နိမ့်	BPC/5	လေထုအရည်အသွေး ပြောင်းလဲမှု	နိမ့်
BPC/6	ပတ်ဝန်းကျင် အသံ ညစ်ညမ်းမှု	အလွန် နိမ့်	BPC/6	ပတ်ဝန်းကျင် အသံ ညစ်ညမ်းမှု	နိမ့်
BPC/7	ရေနေသတ္တဝါ ပြောင်းလဲမှု	နိမ့်	BPC/7	ရေနေသတ္တဝါ ပြောင်းလဲမှု	နိမ့်
BPC/8	ကုန်းနေသတ္တဝါပြောင်းလဲမှု	နိမ့်	BPC/8	ကုန်းနေသတ္တဝါပြောင်းလဲမှု	နိမ့်
BPC/9	ရောဂါကူးစက်နိုင်မှု အခြေအနေ	အလွန် နိမ့်	BPC/9	ရောဂါကူးစက်နိုင်မှု အခြေအနေ	အလွန် နိမ့်
BPC/10	မြေမျက်နှာပြင် ပြောင်းလဲမှု	နိမ့်	BPC/10	မြေမျက်နှာပြင် ပြောင်းလဲမှု	အလွန် နိမ့်
BPC/11	သဘာဝ အမွေအနှစ်နေရာများ ပြောင်းလဲမှု	နိမ့်	BPC/11	သဘာဝ အမွေအနှစ်နေရာများ ပြောင်းလဲမှု	အလွန် နိမ့်
လူမှုစီးပွားနှင့် ယဉ်ကျေးမှု အမွေအနှစ်များ			**လူမှုစီးပွားနှင့် ယဉ်ကျေးမှု အမွေအနှစ်များ**		
SEC/1	ကိုယ်ပိုင်ပစ္စည်းများ ပျက်စီးဆုံးရှုံးခြင်း	အလွန် နိမ့်	SEC/1	ကိုယ်ပိုင်ပစ္စည်းများ ပျက်စီးဆုံးရှုံးခြင်း	-
SEC/2	ဘာသာရေး၊ ယဉ်ကျေးမှု အဆောက်အဦးများ ပြောင်းလဲမှု	အလွန် နိမ့်	SEC/2	ဘာသာရေး၊ ယဉ်ကျေးမှု အဆောက်အဦးများ ပြောင်းလဲမှု	-
SEC/3	နေရာဒေသရွှေ့ပြောင်းရခြင်း၊ လူအများ ရွှေ့ပြောင်းမှု	အလွန် နိမ့်	SEC/3	နေရာဒေသရွှေ့ပြောင်းရခြင်း၊ လူအများ ရွှေ့ပြောင်းမှု	-
SEC/4	ယာဉ်လမ်းကြောင်း ပြောင်းလဲမှု	နိမ့်	SEC/4	ယာဉ်လမ်းကြောင်း ပြောင်းလဲမှု	-
SEC/5	ငါးဖမ်းသမားများအပေါ် သက်ရောက်မှု	နိမ့်	SEC/5	ငါးဖမ်းသမားများအပေါ် သက်ရောက်မှု	နိမ့်
SEC/6	ဒေသအတွင်း အသက်မွေးဝမ်းကျောင်း အခွင့်အလမ်းများ/ အလုပ်သမား ဝင်ငွေနှင့် လုပ်အားခ	အလယ်အလတ်	SEC/6	ဒေသအတွင်း အသက်မွေးဝမ်းကျောင်း အခွင့်အလမ်းများ/ အလုပ်သမား ဝင်ငွေနှင့် လုပ်အားခ	အလယ်အလတ်

စီမံကိန်း တည်ဆောက်ရေးကာလ			စီမံကိန်း လည်ပတ်သည့်ကာလ		
အမှတ်စဉ်	စိစစ်သည့် အဓိက အချက်များ	အဆင့်သတ်မှတ်ချက်	အမှတ်စဉ်	စိစစ်သည့် အဓိက အချက်များ	အဆင့်သတ်မှတ်ချက်
SEC/7	ဒေသအတွင်း ကုန်သွယ်စီးပွားဖြစ်ငွေ/ အခွင့်အလမ်းများ	အလွန် နိမ့်	SEC/7	ဒေသအတွင်း ကုန်သွယ်စီးပွားဖြစ်ငွေ/ အခွင့်အလမ်းများ	အလယ်အလတ်
SEC/8	မျက်စိပသာဒရှိမှု	နိမ့်	SEC/8	မျက်စိပသာဒရှိမှု	အလယ်အလတ်
SEC/9	လူနေအတောက်အဦး/ ဆက်သွယ်ရေး အရင်းအမြစ်များ	နိမ့်	SEC/9	လူနေအတောက်အဦး/ ဆက်သွယ်ရေး အရင်းအမြစ်များ	အလယ်အလတ်

သုံးသပ်ချက်များနှင့် အကြံပြုချက်များ

သဘာဝပတ်ဝန်းကျင်နှင့် လူမှုပတ်ဝန်းကျင် ထိခိုက်မှုများ ဆန်းစစ်ရာတွင် အောက်ပါအတိုင်း တွေ့ရှိရပါသည်။

အဆိုပါ စီမံကိန်းသည် မင်းလှချောင်းကို ဖြတ်၍ တည်ဆောက်ထားသော ဆည်အမျိုးအစားဖြစ်ပြီး ဝဟိုက်ဝါပ် ထုတ်လုပ်နိုင်သော အသေးစားရေအားလျှပ်စစ်စီမံကိန်းဖြစ်သောကြောင့် ဇီဝရုပ်သွင်အပေါ် သိသာထင်ရှားသော ထိခိုက်မှုမရှိကြောင်း တွေ့ရှိရသည်။ သို့သော် ဤအစီရင်ခံစာ၏ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်တွင် အကြံပြုထားသည့်အတိုင်း စီမံကိန်းတည်ဆောက်စဉ်နှင့် လည်ပတ်စဉ်ကာလအတွင်း လေ၊ အသံဆူညံမှု၊ ရေထုညစ်ညမ်းခြင်းနှင့် အနည်ကျခြင်း စသည်တို့ကို ဆောင်ရွက်သင့်သည်။

ရေနတ်မြောင်းအပိုင်း (မြစ်အောက်ပိုင်း) ကို အထူးသဖြင့် တာတမံများကို မဖိတ်သောအခါ ဖြစ်ပေါ်လာနိုင်သော မည်သည့်ရေအရည်အသွေးကိုမဆို ဆုံးဖြတ်ရန် စောင့်ကြည့်သင့်သည်။ အဆိုပြုထားသော စီမံကိန်းနှင့် ဓာတ်အားလိုင်းသွယ်တန်းခြင်းအကြောင်းကို ရပ်ရွာလူထုကို ဘေးအန္တရာယ်ကင်းဝေးစေရန် အသိပညာပေး လုံခြုံဆော်မှုများကို ပြုလုပ်သင့်သည်။

စီမံကိန်းအဆိုပြုသူသည် အဆိုပြုထားသော စီမံကိန်းအကောင်အထည်ဖော် ဆောင်ရွက်မှုများကြောင့် သစ်ပင်များဆုံးရှုံးခြင်းအတွက် လျော်ကြေးငွေပေးရန် ကျွန်းစိုက်ခင်းများနှင့် ဒေသခံအပင်များ ပြန်လည်စိုက်ပျိုးခြင်း အစီအစဉ်ကို ပြုလုပ်သင့်သည်။

အသေးစားရေအားလျှပ်စစ်စီမံကိန်း၏ ရေရှည်တည်တံ့ခိုင်မြဲရေးအတွက် သဘာဝသစ်တော အရင်းအမြစ်ဥကပဒေနှင့် အမိန့်ကို လိုက်နာရန် အရေးကြီးသည်။ ထို့ပြင် မြေဆီလွှာတိုက်စားခြင်း နှင့် လေထုညစ်ညမ်းမှုကို ကာကွယ်ရန် စီမံကိန်းဇရိယာတစ်ဝိုက်ရှိ သစ်ပင်ကို ပြန်လည်စိုက်ပျိုးရန် အရေးကြီးသည်။

အဆိုပြုသူအား လုံခုတ်ချောင်းနှင့် တခြားသော ချောင်းငယ်များစွာတို့၏ သဘာဝရေစိုမြေများကို ထိန်းသိမ်းရန် အကြံပြုသည်။ စိုစွတ်သောမြေသည် စီမံကိန်းဧရိယာ၏ မြောက်ဘက်တွင်တည်ရှိပြီး ၂၀၂၃ ဟတ်တာ ကျယ်ဝန်းသည်။

လူမှုစီးပွားစစ်တမ်းကောက်ယူခြင်းကို သပြေတိုးကျေးရွာနှင့် ဘန်ဘွေးကျင်းကျေးရွာများတွင် တတိယအဖွဲ့အစည်းမှ မတ်လ ၂၆ရက်နေ့တွင် ကောက်ယူခဲ့ရာ ရပ်ရွာလူထုမှ စီမံကိန်းအား သဘောတူထောက်ခံကြောင်းတွေ့ရှိရသည်။ အများပြည်သူနှင့် ဆွေးနွေးတိုင်ပင်ခြင်းကို ရှမ်းပြည်တောင်ပိုင်း ရှိ နောင်ချိုခန်းမတွင် ၂၀၁၆ခုနှစ် ဩဂုတ်လ ၁၆ရက်နေ့တွင် ကျင်းပခဲ့ရာ အများပြည်သူမှ ၄င်းတို့၏ လူမှုစီးပွားအခြေအနေကို မထိခိုက်ပါက ကန့်ကွက်ခြင်းမရှိကြောင်းနှင့် စီမံကိန်းသည် ကျေးလက် လျှပ်စစ်မာတ်အားလိုအပ်ချက်ကို ဖြည့်ဆည်းပေးနိုင်မည့်အပြင် နိုင်ငံတော်၏ အမျိုးသား လျှပ်စစ်မာတ်အားရရှိရေး ရည်မှန်းချက်များအား ဖြည့်ဆည်းပေးနိုင်မည့် စီမံကိန်းဖြစ်သောကြောင့် ဒေသခံပြည်သူတို့၏ ဘဝနေထိုင်ရေးကို တိုးတတ်စေနိုင်မည်ဟု မျှော်လင့်ကြောင်း တွေ့ရှိရပါသည်။

ထို့အပြင် နောင်ချိုမြို့သူမြို့သားများနှင့် ဒေသခံအစိုးရဝန်ထမ်းများမှ အဆိုပြုထားသော စီမံကိန်းမှ ရရှိလာသော လျှပ်စစ်မာတ်အားကို မွန္တလေးတိုင်းဒေသရှိ စည်တော်ကြီးရှိ နိုင်ငံတော်လျှပ်စစ်ပိုက်လမ်းအစား နောင်ချိုမြို့နယ်သို့ လွှဲပြောင်းပေးရမည်ဟူသော ဆန္ဒရှိကြောင်း ထုတ်ဖော်ပြောကြားခဲ့သည်။

စီမံကိန်းအကောင်အထည်ဖော် ဆောင်ရွက်ရာတွင် သဘာဝပတ်ဝန်းကျင်နှင့် လူမှုပတ်ဝန်းကျင် သက်ရောက်မှုများကို နိုင်ငံတကာ၏ အကောင်းဆုံး အလေ့အကျင့်များကို လိုက်နာခြင်း၊ နိုင်ငံ၏ လုပ်ထုံးလုပ်နည်းများနှင့်အညီ ထိရောက်သော ကျန်းမာရေးလုံခြုံမှုနှင့် ပတ်ဝန်းကျင်ဆိုင်ရာ မူဝါဒတို့ကို လိုက်နာကျင့်သုံးခြင်းအားဖြင့် လျော့ချမည်ဖြစ်သည်

လုပ်ငန်းလည်ပတ်စဉ်ကာလအတွင်း ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်သည် ကျန်းမာရေးနှင့် ဘေးအန္တရာယ်ကင်းရှင်းစေရေးအတွက် အရေးပါသည်။ ပုံမှန်စစ်ဆေးခြင်းနှင့် စာရင်းပြုစုခြင်းသည် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအတွက် ထိရောက်စေရန် အကြံပြုထားသည်။

စီမံကိန်းကြောင့် ဖြစ်ပေါ်လာနိုင်သော ပတ်ဝန်းကျင်ထိခိုက်မှုများကို ကိစ္စရပ်များကိုအကဲဖြတ်ထားပြီး ၄င်းထိခိုက်မှုများကို နိုင်ငံ၏စက်မှုကဏ္ဍစံနှုန်းသတ်မှတ်ချက်များနှင့်အညီ စနစ်တကျ လည်ပတ်တပ်ဆင်စေခြင်းဖြင့် လျော့ပါးသက်သာစေမည်ဖြစ်သည်။ ပြင်းထန်သော ရာသီဥတု သို့မဟုတ် သဘာဝဘေးအန္တရာယ်များ (ဆိုင်ကလုန်း၊ ရေကြီးခြင်း) သည် အမြဲတစေဖြစ်ပေါ်လာနိုင်သော်လည်း ၄င်းတို့ကို သင့်တော်သော အဆောက်အဦးဒီဇိုင်းများဆောက်လုပ်ခြင်းဖြင့် လျော့ပါးသက်သာစေမည် ဖြစ်သည်။

EXECUTIVE SUMMARY

Preamble

This report is submitted to supplement the initially submitted Report on Initial Environmental Examination) of Minhla Hydropower Project, March 2016 to comply to relevant environmental laws and regulation, particularly Section 36 of EC (Environmental Conservation), EIA (Environmental Impact Assessment) Notification Order No. 616/2015 as advised by the ECD (Environmental Conservation Department) of the MNREC (Ministry of Natural Resources and Environmental Conservation) to ensure that the proposed development project is sustainable in its environmental and social context.

The project proponent "Myanmar Hydropower Development Co. Ltd (MHD)" intends to develop hydropower of 10 MW in order to satisfy the needs of the local communities in supplying reliable electricity and thereby upgrading the social and economic status of the inhabitants of Naung Cho Township, Northern Shan State.

The study examines the environmental and social context of the proposed site and then identifies potential impacts on socio-economic, cultural heritage and ecological issues based on the activities associated with the Minhla Hydropower Project, Naung Cho Township, Northern Shan State, Myanmar and recommends on relevant mitigation measures and monitoring plan framework of the Environmental Management Plan (EMP).

Affirmation

The service rendered to the study on Initial Environmental Examination (IEE) of the Project is affirmed to prepare report on reliable data and based on and obeyed to existing laws of environmental conservation.

H&S has agreed to keep the promise and to fulfill the requirement to mitigate the measures described in Environmental Management Plan. They are fully responsible to them and they always have to monitor the negative impact and ready to respond it.

Project Description

The Proposed Project is the Minhla hydropower project which consists of collecting runoff water from the left and right series of small dams, weirs and canals: (1) Right System of Minhla consists of Ban Bwe Gyin weir, dam2, Nyaung Chaung dam, dam 4 of which runoff flows through canals into the Minhla dam from the right side. (2) Left System of Minhla consists of Hsapyedo weir, Hsapyedo dam, Power House 1, Shwetaung dam, Left Myay Thone Pon dam, Right Myay Thone Pon dam, Power House 2, which all flows through canals into the Minhla dam from the left side.

A total of 3 (three) hydropower plants (Power Houses 1, 2 and MPH) are planned to be constructed to develop hydropower amounting to 10MW. All plants will be run-off river dams and will have less impact on the environment than closed dam projects.

Background

At the invitation of Hydropower & Solar Energy Development Co., Ltd (H&S), engineers and surveyors of National Engineering and Planning Services Co., Ltd. (NEPS) had visited the project area in June, 2013 for reconnaissance survey.

Banbwekyin stream is situated in the north of Banbwekyin village in Naung-cho Township, Shan State. The stream begins at the vicinity of the village and discharging about 0.71 cumecs. In the south of Banbwekyin village, there are two streams called Nyaung and Minhla stream, flowing about 0.08 cumecs and 0.1 cumecs of water. Another stream called Myethonepone stream is in the west of Banbwekyin village. This stream originates from a valley, flowing with the discharge of about 0.06 cumecs. Within the above area, there is also a stream called Hsapyedoe stream, in the south of Hsapyedoe village. This stream flows about 0.26 cumecs. After desk study and collecting available data, at preliminary level, team NEPS went to the above site, on August, 2013. The geomantic team surveyed the proposed streams, conveyance canal alignments, pondages, headrace, forbays tailrace penstocks and powerhouse sites. The engineering geology team investigated the geology feature of above structures. The investigation was intended to prepare the technical feasibility design report within 8 months.

It is found out that combining these streams, the hydropower would be produced before discharging to the Sedawgyi reservoir through their falls. H&S invited NEPS to study for feasibility of hydropower facility from these power potentials of renewable energy to be exploited for the sustainable development of the Shan State.

Team of NEPS engineers and environmentalists, accompanied with engineers of H&S made more detail study trips, to proposed streams, their catchments and nearby villages in project area. During their trips, the environmentalists studied the possible environmental and social impacts and found out ways of mitigation measures, also the engineers studied the more required facts and data for the feasibility study of the project and also to be able to construct some structure as soon as possible.

Before all of the stream flow into Sedawgyi reservoir, mini hydropower facilities can be provided to generate electricity for nearby villages by the run off the river type system. The more power would be produced from the main powerhouse, favorable to be located at the toe of the cliff and transmitted to Sedawgyi substation in Mandalay Region. It would be decided on two options. The power would be produced 9 MW (40 MKH per year) by this run off the river type system with small pondages as first option.

However, according to the H&S request NEPS made more investigation and found out more favorable condition of building bigger pondages on shale bed by using closed filling material of soil and protection material of rocks. More and bigger pondages are preferably constructed and power will be produced 10 MW by small storage reservoir type to generate more kilo-watt hours per year 6.3 MKH as the second option in this revised feasibility report for economically implementation, H&S is able to use its earth moving equipment.

Project Setting

The project area (210 acres) lies in the North Eastern part of the Naung Cho Township. There are 5 (five) creeks namely Ban Bwe Gyin Creek, Nyaung Chaung Creek, Has Pye Do Creek, Myay Thon Bon Creek and Minhla Creek flowing near the surrounding villages of the project site.

The Ban Bwe Gyin Creek has a water fall during monsoon. Nyaung Chaung and Minhla Creeks have waterfalls during the monsoon and some of the surface water flows into sink-holes nearby. Has Pye Do and Myay Thon Bon Creeks combined to become Chaung Thon Sae Creek, which has no waterfall and flows into the Sedawgyi Reservoir in Mandalay Region.

Surface water is diverted from the Has Pye Do weir to Shwe Taung Dam, Upper Myay Tho Bon Dam, Lower Myay Thon Bon Dam, and discharged into Minhla Creek.

The proposed project is the Minhla Dam Project which is a run-off river dam project across the Minhla Creek and consists of the Left and Right Systems of weirs, dams, power houses and canals to convey the runoff water into the catchment area of the Minhla Hydropower dam, developing hydropower totaling 10 MW to provide the dire need of electricity to the local inhabitants of Naung Cho Township. The proposed project is the Minhla Dam Project which is a run-off river dam project across the Minhla Creek and consists of the Left and Right Systems of weirs, dams, power houses and canals to convey the runoff water into the catchment area of the Minhla Hydropower dam, developing hydropower totaling 10 MW to provide the dire need of electricity to the local inhabitants of Naung Cho Township.

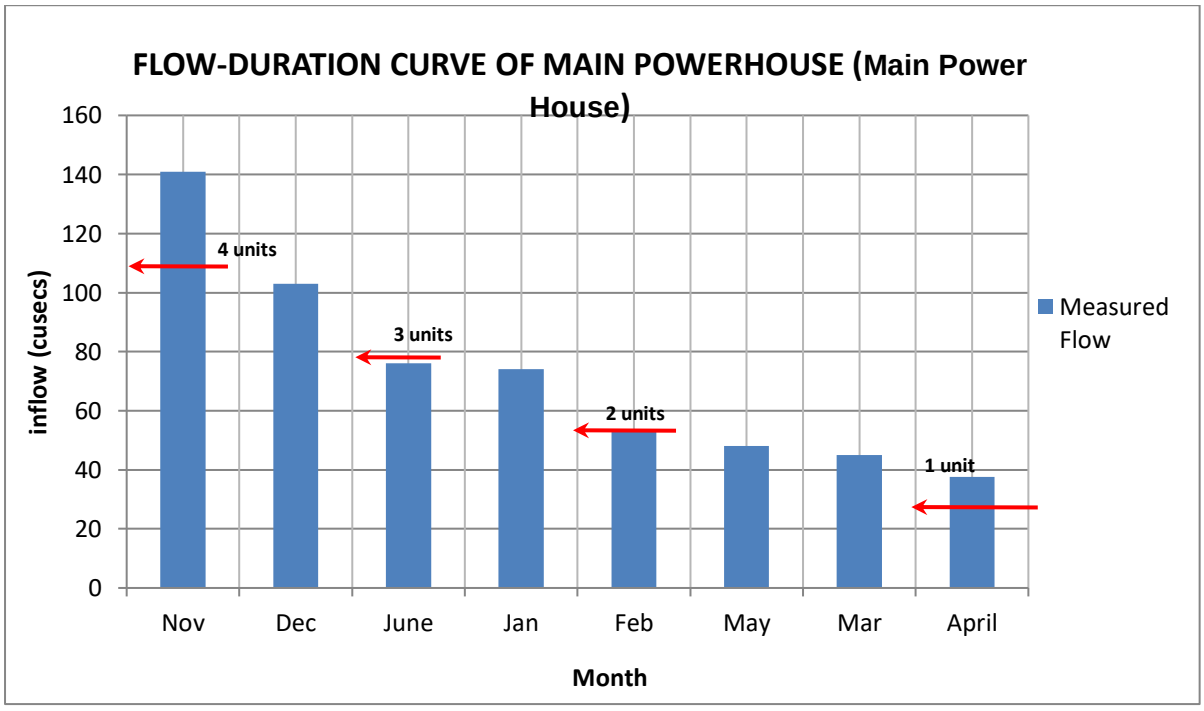
Operation Plan

The project is planned to operate the power generation for the whole year as the follow table and graph.

Monthly Power Generation of Main Power House (Main Power House)

Month	Monthly Average Inflow (Ac. ft)	Head (m)	Discharge, Q (m3/sec)	Power, P (kW)	Generated Energy (kWh)	
Jan:	4458	470.00	2.097	5000	3720000	
Feb:	3384	470.00	1.5	5000	3360000	
Mar:	2604	470.00	1.28	2500	1860000	
Apr:	4244	470.00	1.07	2500	1800000	
May:	7343	470.00	1.36	2500	1860000	
Jun:	6181	470.00	2.15	7500	5400000	
Jul:	7148	470.00	-	7500	5580000	
Aug:	9621	470.00	-	10000	74400000	
Sep:	10336	470.00	-	10000	7200000	

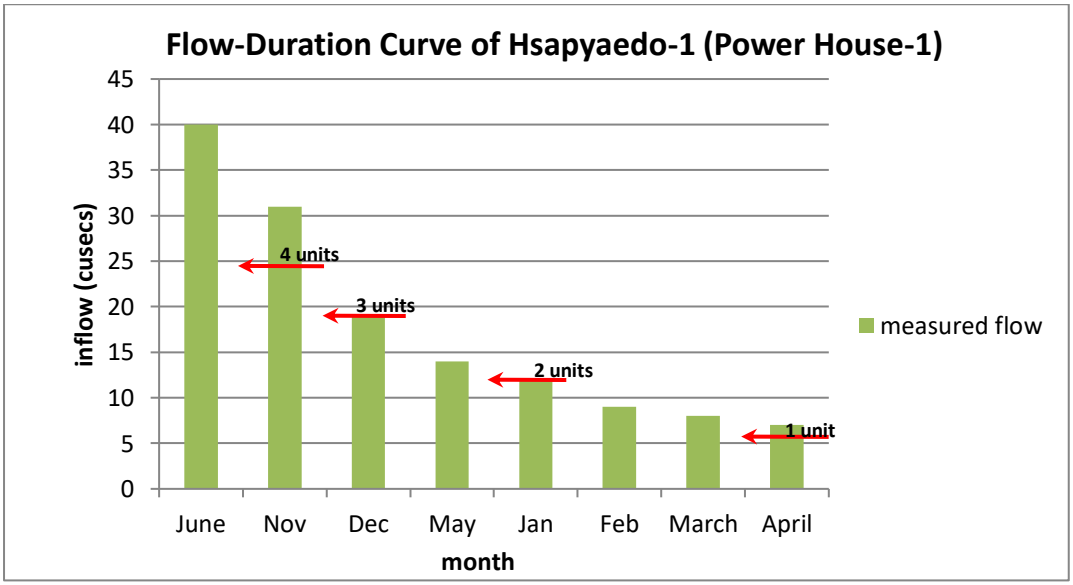
Month	Monthly Average Inflow (Ac. ft)	Head (m)	Discharge, Q (m3/sec)	Power, P (kW)	Generated Energy (kWh)	
Oct:	9390	470.00	-	10000	74400000	
Nov:	5682	470.00	3.99	10000	7200000	
Dec:	4958	470.00	2.92	7500	5580000	
					58440000	
					0.058	GWh
			Installed Capacity P =		10	MW
			Plant Factor PF =		0.73	



Monthly Power Generation of Hsapyaedo Stream (Power House - 1)

Month	Monthly Average Inflow (Ac. ft)	Head (m)	Discharge, Q (m3/sec)	Power, P (kW)	Generated Energy (kWh)	
Jan:	866	22	0.34	60	44640	
Feb:	700	22	0.26	30	20160	
Mar:	641	22	0.23	30	22320	
Apr:	1320	22	0.19	30	21600	
May:	2205	22	0.39	60	44640	

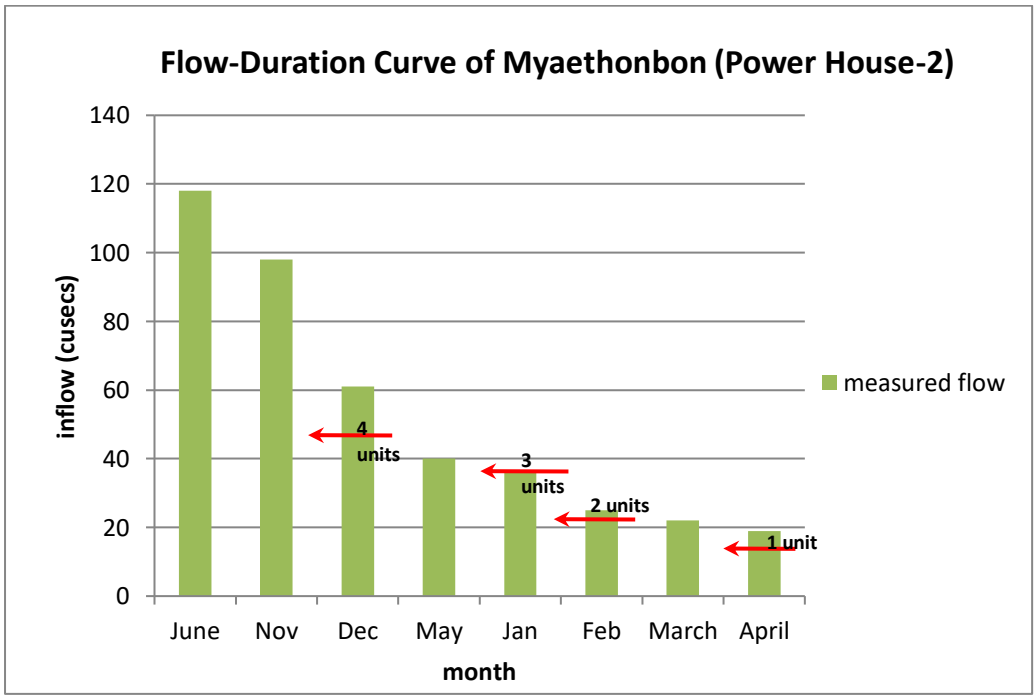
Month	Monthly Average Inflow (Ac. ft)	Head (m)	Discharge, Q (m3/sec)	Power, P (kW)	Generated Energy (kWh)	
Jun:	1933	22	1.13	120	86400	
Jul:	2102	22	-	120	89280	
Aug:	2521	22	-	120	89280	
Sep:	2728	22	-	120	86400	
Oct:	2370	22	-	120	89280	
Nov:	1219	22	0.88	120	86400	
Dec:	917	22	0.54	90	89280	
					769680	
					0.00077	GWh
			Installed Capacity P =		120	KW
			Plant Factor PF =		0.73	



Monthly Power Generation of Myaethonbon Stream (Power House - 2)

Month	Monthly Average Inflow (Ac.ft)	Head (m)	Discharge, Q (m3/sec)	Power, P (kW)	Generated Energy (kWh)	
Jan:	197	12	1.02	120	89280	
Feb:	138	12	0.71	80	53760	

Month	Monthly Average Inflow (Ac.ft)	Head (m)	Discharge, Q (m3/sec)	Power, P (kW)	Generated Energy (kWh)	
Mar:	100	12	0.62	40	29760	
Apr:	263	12	0.54	40	28800	
May:	283	12	1.13	120	89280	
Jun:	313	12	3.34	160	115200	
Jul:	282	12	-	160	119040	
Aug:	400	12	-	160	119040	
Sep:	426	12	-	160	115200	
Oct:	379	12	-	160	119040	
Nov:	341	12	2.78	160	115200	
Dec:	420	12	1.73	160	119040	
					1112640	
					0.0011	GWh
			Installed Capacity P =		160	KW
			Plant Factor PF =		0.73	



Environmental and Social Impact Assessment

Environmental and social impact assessments were carried out in a systematic manner, separating impacts into the construction and operational phases and seeking to identify any impacts that may be "significant" from an ecological, socio-economic or cultural perspective. The assessment is summarized below with positive impacts denoted by green shading.

Summary Impact Assessment Matrix for Minhla Hydropower Project, Naung Cho Township.

Construction Phase			**Operational Phase**		
Ref.	**Impact/Issue**	**Significance**	**Ref.**	**Impact/Issue**	**Significance**
Bio-Physical & Chemical			Bio-Physical & Chemical		
BPC/1	Changes in surface water quality	low	BPC/1	Changes in surface water quality	Moderate
BPC/2	Changes in groundwater quality	low	BPC/2	Changes in groundwater quality	low
BPC/3	Changes to drainage patterns	low	BPC/3	Changes to drainage patterns	moderate
BPC/4	Changes in rates of erosion and siltation	low	BPC/4	Risk of Soil erosion and siltation	low
BPC/5	Changes to air quality	low	BPC/5	Changes to air quality	low
BPC/6	Changes to ambient noise levels	Very low	BPC/6	Changes to ambient noise levels	low
BPC/7	Changes to aquatic biota	low	BPC/7	Changes to aquatic biota	low
BPC/8	Changes to terrestrial biota	low	BPC/8	Changes to terrestrial biota	low
BPC/9	Changes to disease vector populations	Very low	BPC/9	Changes to disease vector populations	Very low
BPC/10	Changes to land cover	low	BPC/10	Changes to land cover	Very low
BPC/11	Changes to areas of natural habitat	low	BPC/11	Changes to areas of natural habitat	Very low
Socio-Economic & Cultural			**Socio-Economic & Cultural**		
SEC/1	Changes involving loss of private assets	Very low	SEC/1	Changes involving loss of private assets	-

Construction Phase			Operational Phase		
Ref.	**Impact/Issue**	**Significance**	**Ref.**	**Impact/Issue**	**Significance**
SEC/2	Changes involving loss of cultural heritage	Very low	SEC/2	Changes involving loss of cultural heritage	-
SEC/3	Changes involving displacement of people	Very low	SEC/3	Changes involving displacement of people	-
SEC/4	Changes to local traffic patterns	low	SEC/4	Changes to local traffic patterns	-
SEC/5	Changes to fisheries	low	SEC/5	Changes to fisheries	low
SEC/6	Changes in local wage labour incomes/livelihood opportunities	moderate	SEC/6	Changes in local wage labour incomes/livelihood opportunities	moderate
SEC/7	Changes in local trade/commercial incomes/opportunities	Very low	SEC/7	Changes in local trade/commercial incomes/opportunities	moderate
SEC/8	Changes in visual amenity	low	SEC/8	Changes in visual amenity	moderate
SEC/9	Changes to public infrastructure/community resources	low	SEC/9	Changes to public infrastructure/community resources	moderate

Conclusions and Recommendations

There are not much bio-physical impacts that are so highly negative that they would militate against project development as the proposed project is a Small Hydropower Plant of 10 MW and is characterized as a "run-off the river type dam" across the Minhla Stream. However, it is suggested that reasonable endeavors should be taken to conserve the environment by mitigation measures for air, noise and surface water pollution and siltation control as recommended in the EMP (Environmental Management Plan) of this report which includes a set of mitigation and monitoring measures during the construction and operational phases of the proposed project.

The dewatered section (downstream portion) should be monitored to determine any water quality issues that may arise especially when the weir is not spilling. Safety awareness campaigns should be carried out to advise communities about the proposed project and the transmission line.

The project proponent should establish a plan for teak plantation and reforestation of local plants to compensate for the loss of trees because of the implementation of the proposed project.

It is important to adhere to the National Forest Law and order in the whole area and to maintain the natural water resource for the sustainability of the Small Hydropower Project. Moreover,

it is important to replant the trees surrounding the project area so as to prevent soil erosion and air pollution.

The project proponent is advised to establish a plan to maintain the natural wetland namely the "In-ma" formed by the drainage of Lon-khote Stream and many other small creeks. The wet land is situated near the proposed project area at the North and comprises of 20.23 hectares.

The socio-economic survey was conducted during March 2016 by the consultant team in the Hsapyedo and Ban Bwe Gyin villages and learnt that all of the respondents were agreeable to the implementation of the proposed project. Public Consultation Meeting was undertaken on 16 August 2016 at the Naung Cho Meeting Hall, Northern Shan State and the majority of participants have no objection to the proposed project if it would not hinder the socio economic status of the inhabitants but would improve their livelihood in providing access to the dire need of electricity in their homes as the project is expected to supply reliable green energy which will enhance rural electrification facilities and so comply to the national Electrification Goals of our Nation.

Furthermore, the Naug Cho Township inhabitants and local government staff expressed their desire that the electrical power generated from the proposed project should be sent to the Naung Cho Township instead of the National Grid in Sedaw Gyi, which is in Mandalay Region and the tax duly remitted to the Naung Cho Township.

All the environmental and social impacts identified are capable of mitigation through a combination of adherence to international best practices in project implementation, use of the country's design codes and an effective health safety and environment (HSE) policy by the operators.

During the operation phase, an environmental management plan is an important component of the operator’s HSE implementation. Regular inspection and audit are recommended for the efficacy of the EMP.

The environmental impact of the project has been evaluated and indicates there are some potential issues; however, these can be mitigated assuming that the facilities are properly designed and operated according to the country's industry norms for the sector. Risks of severe weather or natural disasters (cyclones, floods, etc.) always exist, however, these are assumed to be mitigated through appropriate design of the facilities.

CHAPTER 1
PROJECT DESCRIPTION

1.1. INTRODUCTION

The Proposed Project is the Minhla hydropower project which consists of collecting runoff water from the left and right series of small dams, weirs and canals: (1) Right System of Minhla consists of Ban Bwe Gyin weir, dam 2, Nyaung Chaung dam, dam 4 of which runoff flows through canals into the Minhla dam from the right side. (2) Left System of Minhla consists of Hsapyedo weir, Hsapyedo dam, Power House 1, Shwetaung dam, Left Myay Thone Pon dam, Right Myay Thone Pon dam, Power House 2, which all flows through canals into the catchment area of the Minhla Dam.

The proposed project is a SHPP (Small Hydropower Plant Project) aiming to develop a total of 10 MW of hydropower and is a run-off the river scheme across the Minhla Stream, utilizing only 10% of the runoff stream water and diverting into an intake canal with fish screen or fish by pass before reaching the fore-bay and passing via penstock through hydraulic turbine with generator to develop hydropower for generating electricity. Then the water is discharged into the natural stream course without losing any the natural stream water. The SHPP is being properly designed by the NEPS (National Engineering and Planning Services) professional hydraulic engineers, hydrologist and geologists so that the project would be environmentally sustainable and be naturally integrated into the local ecosystem, preventing natural aquatic biota from being caught or trapped by the hydraulic turbines.

Basically, the proponent needs to take action complying with the Environmental Conservation Law, Pyiduhlutaw Law Number 9 of 2012 of the Republic of the Union of Myanmar and other relevant standing laws and regulations regarding water, river, forest and hydropower development and electrical power generation mentioned later in Chapter 4 this report and to applying the EMP (Environmental Management Plan), mitigation measures for potential negative impacts recommended in Chapters 6 to 7 this report.

1.1.1. Scope of the Study

This IEE exercise is to confirm the environmental and social considerations and assess the environment category of the project before the decision-making process concerning project implementation, which aims for a sustainable development for the Minhla Hydropower. The components are as below:

- Screening
- Environmental Impact Assessment
- EMP (Environmental Management Plan) and mitigation measures
- Monitoring Plan Framework

1.1.2. Approach and Methodology

- The consultant has used a variety of approaches for the establishment of the environmental and social baseline and the assessment of impacts; i.e.
- Secondary data collection from literature review
- Remote sensing data and maps
- Primary data collection and empirical analysis

- Public consultation through key informant interviews and focal group discussion
- Quantitative and qualitative assessment of impacts through a weighted multi-criteria analysis

1.2. PROJECT IMPLEMENTATION

It is planned to complete the project in 3years, taking into consideration the number of working days per year, the work load including both civil and electro-mechanical, economic viability and financial requirement. The items of work are divided into two main categories, namely preliminaries including procurement and actual construction works.

1.2.1. **Year I (From mid-2013 to mid-2014)**

Site investigation which includes, surveying, hydrological investigation, geological investigation, and data collection on all aspects has been carried out in conjunction with mobilization and preliminary works, such as road construction from Pyin Oo Lwin-Moe Goke Road to weir site and then access to power house site at the start of season.

Having submitted feasibility study report at the end of fourth quarter of year I, the detail design report will be carried out to be finished at the end of year II in accordance with the agreement granted by the client.

By the end of year, I raining season, office, camp facilities and all other infrastructure shall be constructed foundation preparation including excavation, blasting for some structures, on head works, headrace canal, forebay, penstock alignment and power house site where possible are to be commenced during the fourth quarter of year I.

1.2.2. **Year II (From mid-2014 to mid-2015)**

At the start of year II second quarter diversion works will be carried out for sluice, weir and intake structure and dam construction. Foundation treatment works on weirs shall have to be carried out before year III raining season, so as to divert the stream flow for the coming construction works. Weir with diversion facilities and intake structures, which are located at the higher elevation, construction shall then be carried out simultaneously after the raining season.

Procurement procedures should be established for hydro-electrical, mechanical works, at the beginning of year II third quarter, which include processing and ordering the machineries. Machineries like turbines and generators which are to be manufactured as specified have to give sufficient time for the manufacturer.

During the second quarter of year II excavation of rock and earthwork on headrace, forebay, saddle piers, flume, switchyard and powerhouse foundation plus major super structure like column and tie bean followed by concrete works on each structure. Materials for penstock and associated accessories are to be procured and fabricated during this quarter.

1.2.3. **Year III (From mid-2015 to mid-2016)**

At the start of year III Procurement procedures should be established for hydro-electrical, mechanical works, which include processing and ordering the machineries. Machineries like turbines and generators which are to be manufactured as specified have to give sufficient time for the manufacturer.

During the third quarter of year III, except excavation of rock remaining works on headrace, forebay, switchyard and powerhouse foundation in addition to major super structure like column and tie beans followed by concrete works on each structure. Materials for penstock and associated accessories are to be procured and fabricated during this quarter.

During the last quarter of the year III, the finished works on headrace canal, masonry and concreting of all structures will have to be continued throughout the quarter.

Installations of turbines, generators and transformers have to be completed in Year III. With the completion of concrete works on all structures, assembling and installation of gates, and hydro-electrical mechanical machines by the end of year III. All gates will be tested on proper functioning and machines. The entire scheme is fully commissioned by the end of Year III.

The transmission line construction will be started from the third quarter of the year III and should proceed eventually to be completed by the end of the year III.

Table 1-1 Time schedule of project

Sr No.	Works	YEAR I												YEAR II												YEAR III											
		2013						2014												2015												2016							
		June	July	August	September	October	November	December	January	February	March	April	May	June	July	August	September	October	November	December	January	February	March	April	May	June	July	August	September	October	November	December	January	February	March	April	May	June	July
1	Reconnaaissance Site Visit																																				
2	Investigatioin																																				
	1. Topography																																				
	2. Hydrology																																				
	3. Geology																																				
	4. Demand Assessment																																				
	5. EIA & SIA																																				
3	Feasibility Design																																				
4	Detailed Design																																				
5	**Project Implementation**																																				
	1. Preparatory Works																																				
	2. Turbine/ Generator Collection																																				
	3. Construction of Weir, Dams, Spillway and Power Intakes Structures																																				
	4. Construction of Conveyance Canals, Forebay and other structures																																				
	5. Penstocks																																				
	6. Powerhouses																																				
	7. Transmission Lines and Transformers																																				
	9. Commissioning																																				

1.3. LOCATION OF THE SITE

The Project Area is situated in Naungcho Township, Shan State, between Banbwegyin and Hsapyedo villages. The structure of the project is approximately within the grids PO 975135 (Ref: Map, one inch 93/B-7). The project site plan location is described in Figure 1-1 to Figure 1-4.

The project area lies about 23 miles south of Pyin-Oo-Lwin, on the left of Moe-Koke Road. It can be assessed only by the village road.

The elevation of Banbwegyin village is 844.51 M above mean sea level while the main streams, Hsapyedoe bed level is 835 m, Banbwegyin 675.3 m, Min Hla 762 m at their pondage site respectively. The ground level at the main powerhouse in the project area is 276 m. There will be 5 miles of main metal road from the motor road to project base camp.

The project area lies in a plain of Shan Plateau on the left of Sedawgyi reservoir. The surface water from Hsapyedoe, Minhla, Myaethonpone, Nyaung and Banbwegyin Creeks flows to the reservoir rim of SedawGyi dam. So many boulders are seen at Creek beds. The area is sparsely populated and only two small villages can be seen in the vicinity of project area namely the “Hsapyedo” and “BanBweGyin” Villages. Since there has small plains in the area, only patches of shifting cultivation can be found while the rest of the area is covered by forest.

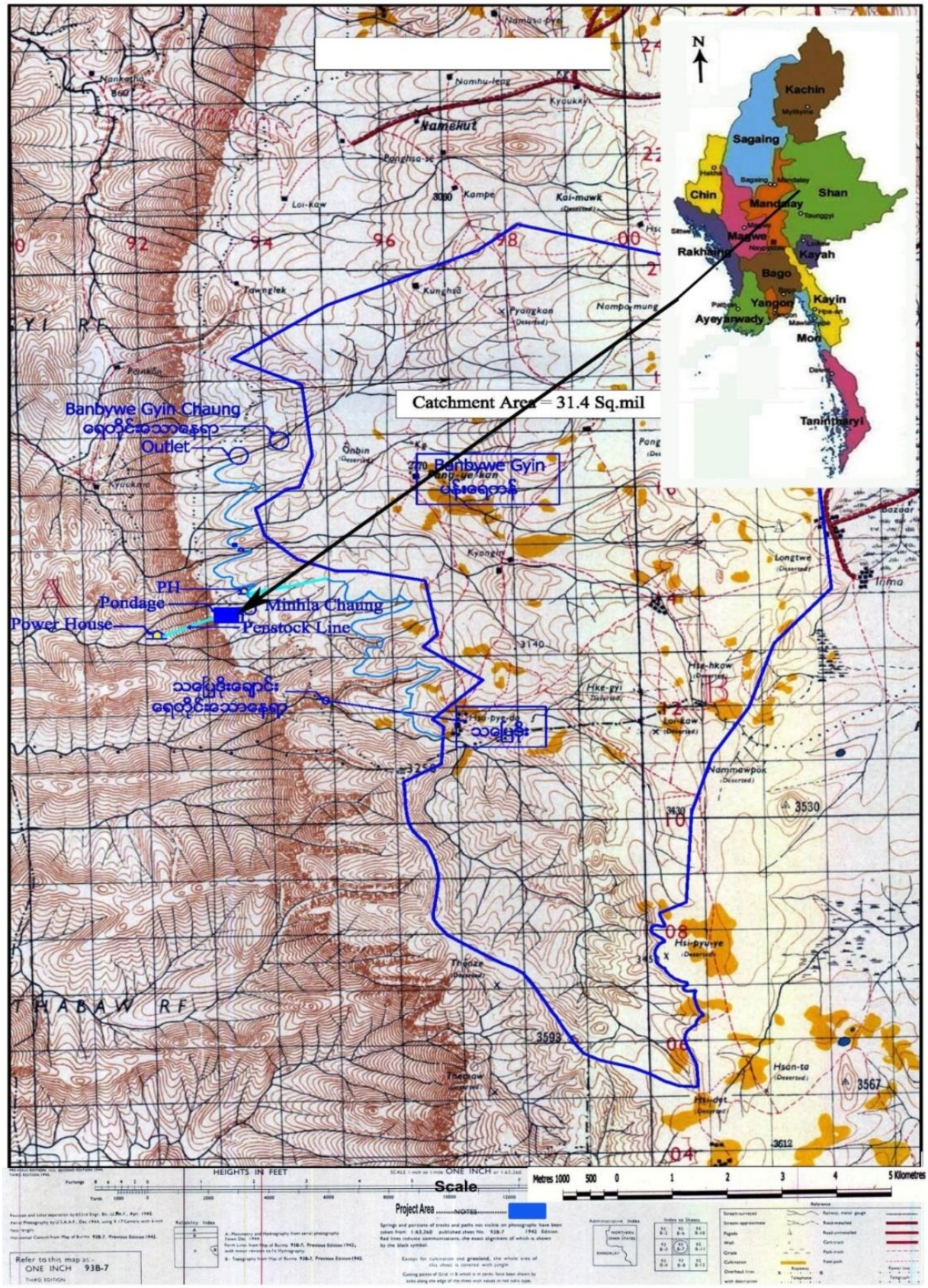


Figure 1-1 Location Map of Minhla Hydropower Project, Northern Shan State

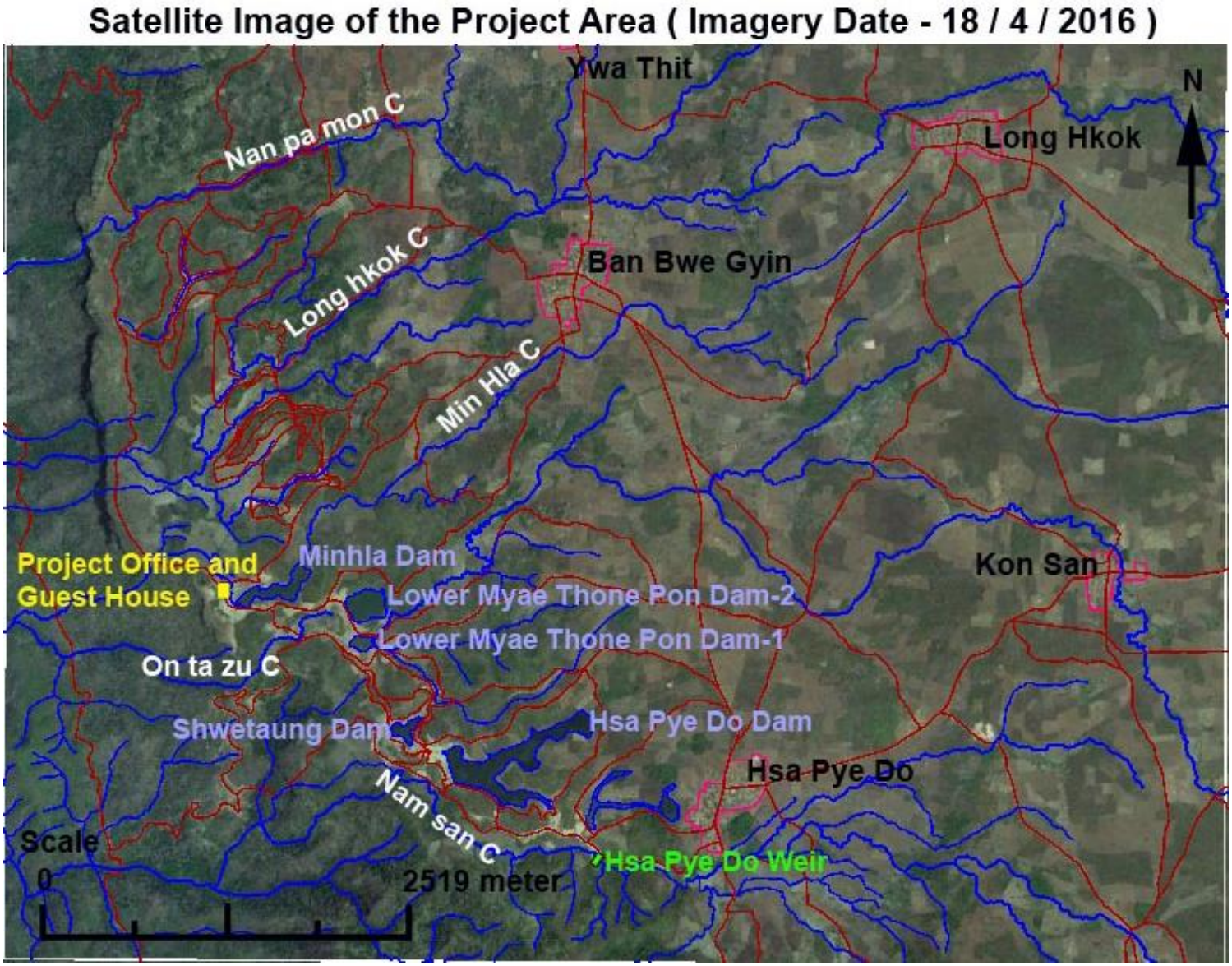


Figure 1-2 Satellite Image of Proposed Project Area

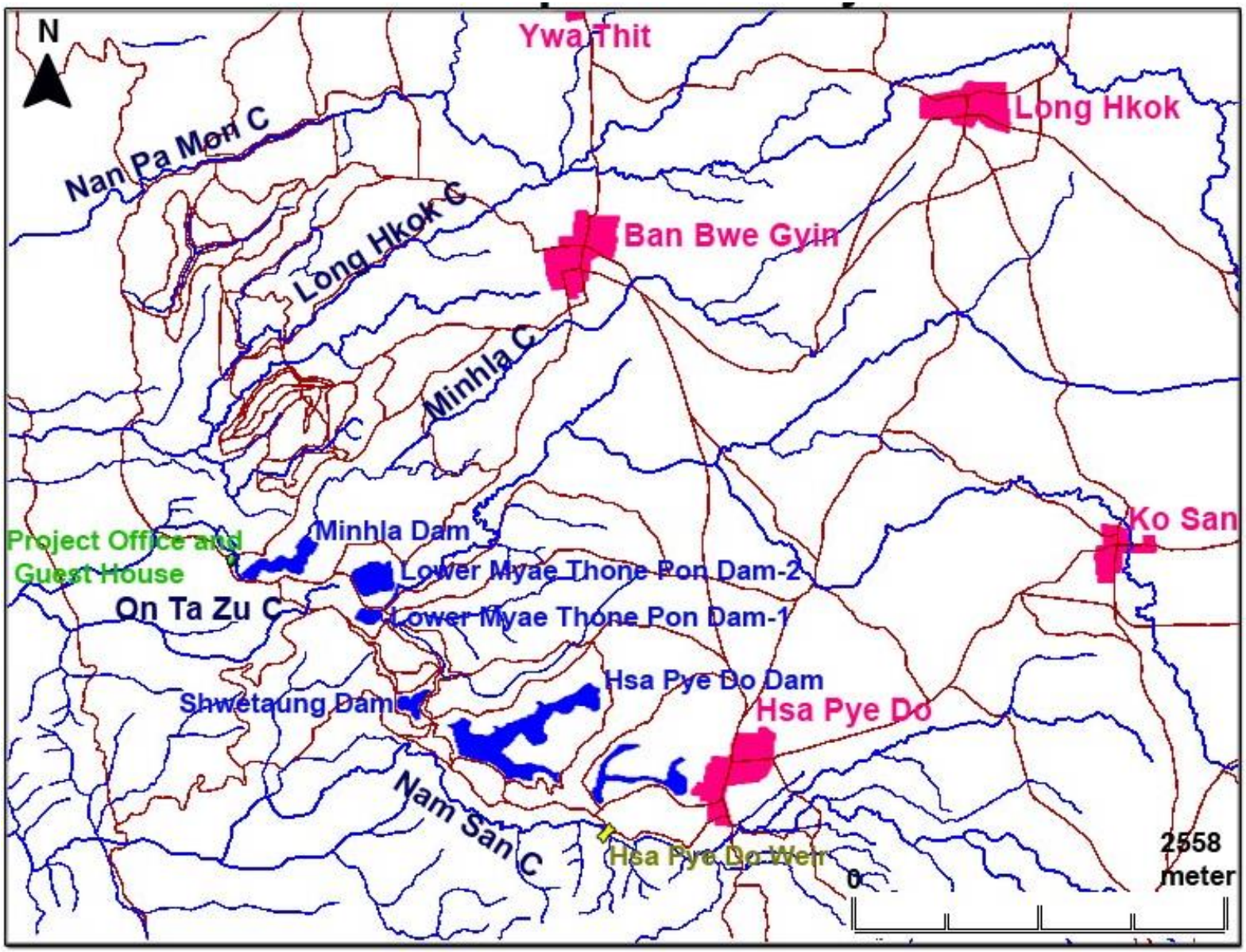


Figure 1-3 Project Site Plan

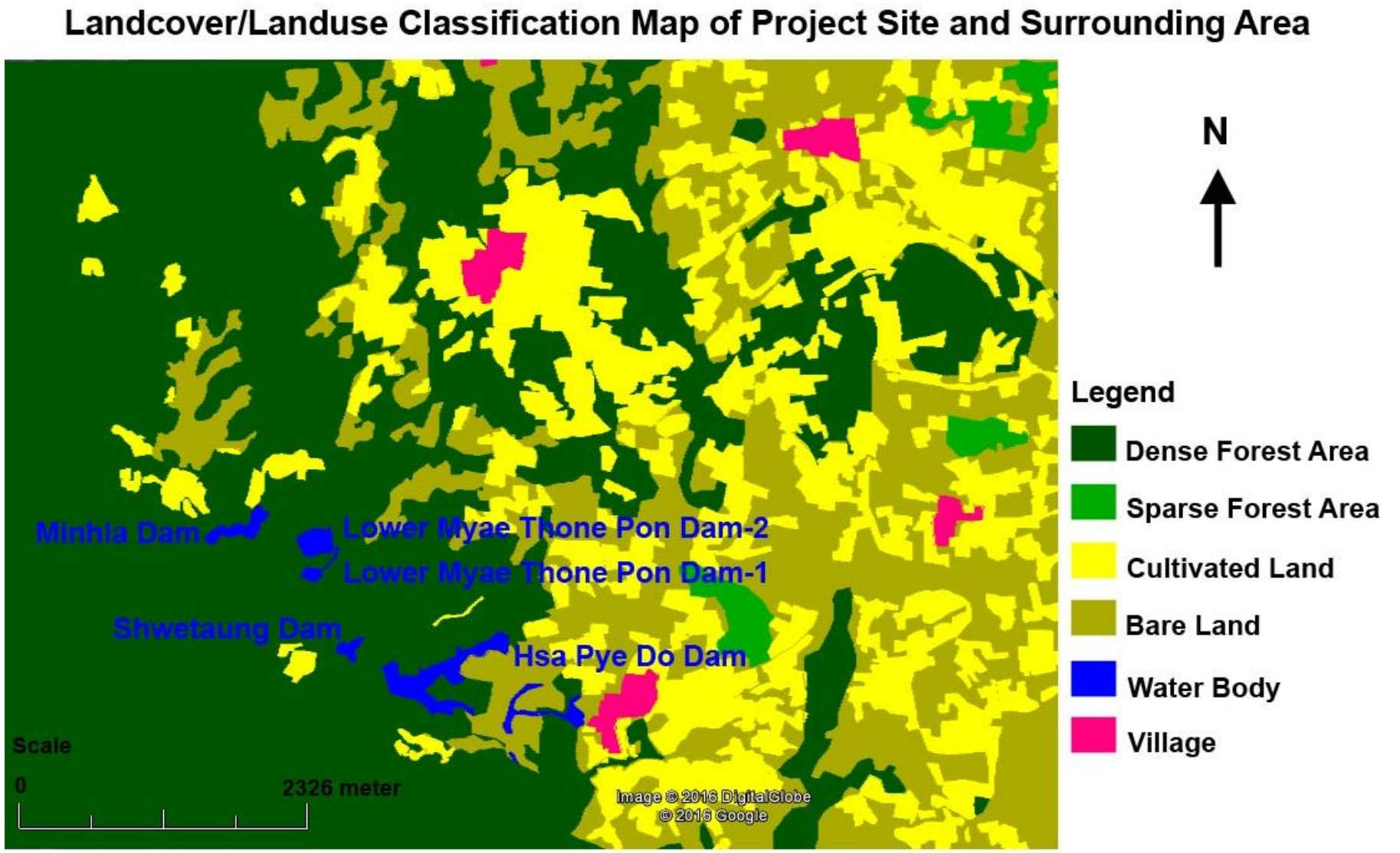


Figure 1-4 Land use Map and Proposed Project Site Location

1.4. PROJECT INFRASTRUCTURE

The project area (210 acres) lies in the North Eastern part of the Naung Cho Township. There are 5 (five) creeks namely Ban Bwe Gyin Creek, Nyaung Chaung Creek, Has Pye Do Creek, Myay Thon Bon Creek and Minhla Creek flowing near the surrounding villages of the project site.

The Ban Bwe Gyin Creek has a water fall during monsoon. Nyaung Chaung and Minhla Creeks have waterfalls during the monsoon and some of the surface water flows into sink-holes nearby. Has Pye Do and Myay Thon Bon Creeks combined to become Chaung Thon Sae Creek, which has no waterfall and flows into the Sedawgyi Reservoir in Mandalay Region.

Surface water is diverted from the Has Pye Do weir to Shwe Taung Dam, Upper Myay Tho Bon Dam, Lower Myay Thon Bon Dam, and discharged into Minhla Creek.

The proposed project is the Minhla Dam Project which is a run-off river dam project across the Minhla Creek and consists of the Left and Right Systems of weirs, dams, power houses and canals to convey the runoff water into the catchment area of the Minhla Hydropower dam, developing hydropower totaling 10 MW to provide the dire need of electricity to the local inhabitants of Naung Cho Township.

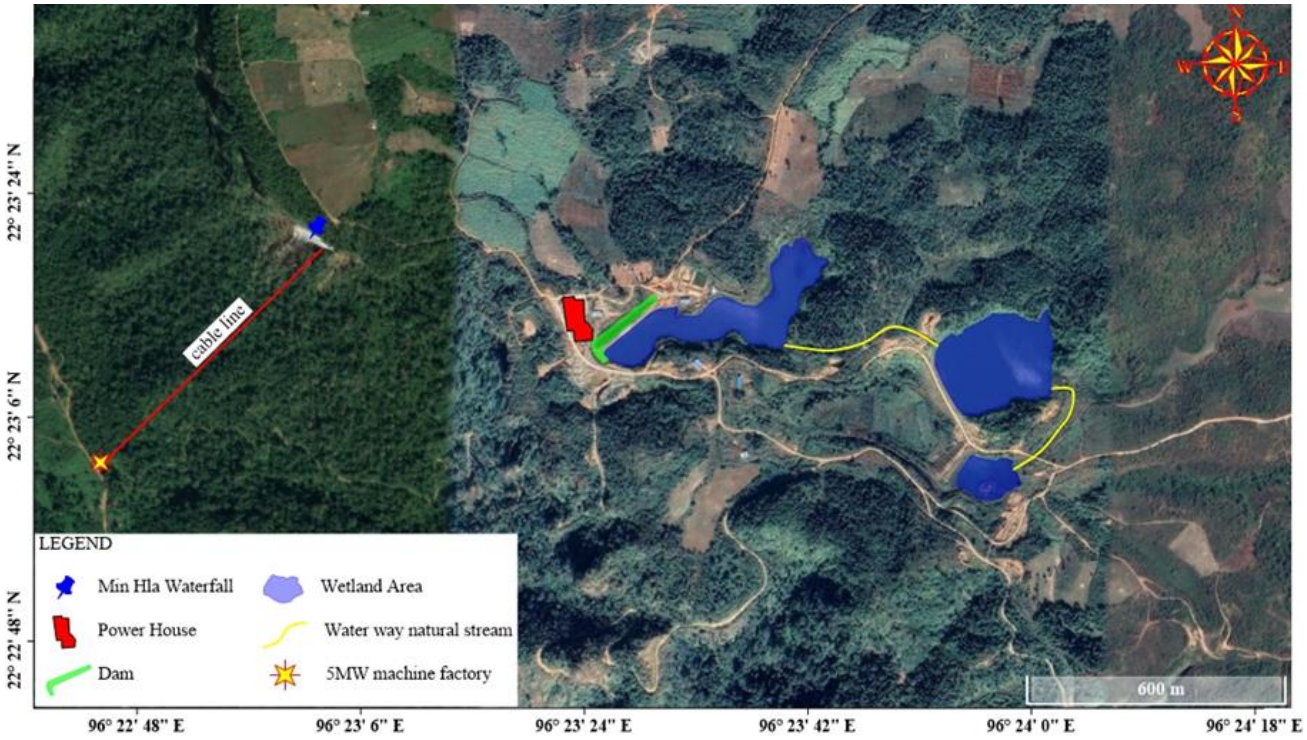


Figure 1-5 Wetland area, Main Power House and Water way in Project Area

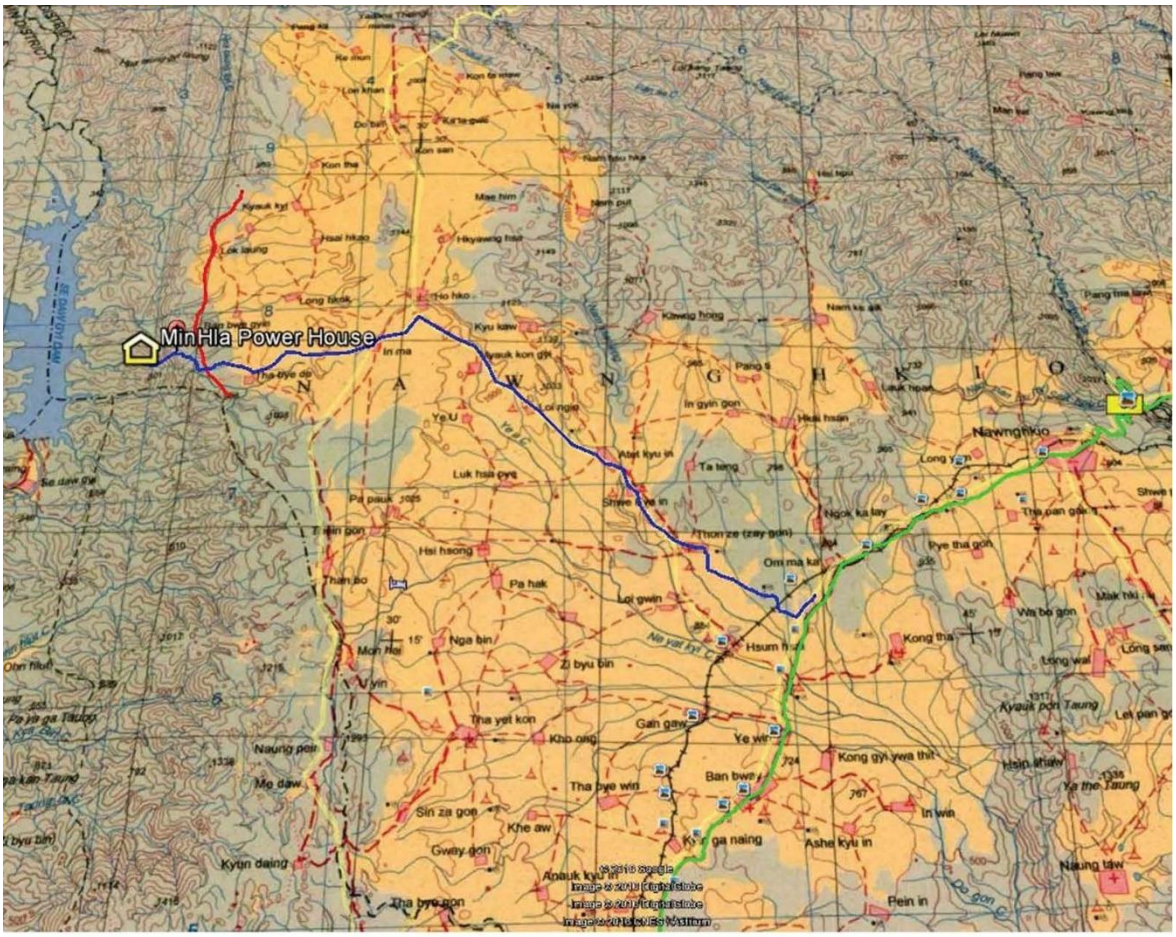


Figure 1-6 Transmission line plan

1.5. OPERATION ACTIVITIES

Exploiting the favorable condition of the area to implement a diversion type hydropower scheme, investigation works are first done for feasibility study. However according to the MHD requests, additional investigations was done to produce more power by storing more water by bigger pondages. Abundant filling materials of soil are on the left and right banks of the streams. For protection and internal erosion control material for dam, rock and regional sand are easily taken from nearby hills. So, in revised feasibility stage small tank power production system is applied to get more power. Weir of about 2 m high above stream bed levels is planned at 835.36 m. Five mini powerhouses above the cliff and one main powerhouse below it are set to generate the power, with about 15 m to 28 m heads and plant discharges 0.68 cumecs to 1.70 cumecs for mini ones, and with 471 m head and 3.06 cumecs for a big one.

In the preliminary survey, diversion weir on Haspyedoe stream, on Minhla is located to take enough expected project flow. But during the feasibility study, it is found that only diversion weir on Haspyedoe stream is enough to get project water with 11 mini reservoirs spreading water area of 8000sq-m to 36000sq-m as sedimentation and peak-load storage facilities.

There would be one system before the main forebay. On the left system, the headrace canal with settling basin and pondage No.1 starts at the weir on Haspyedoe stream and ends at the forebay No.2. The tailrace canal begins from mini powerhouse No.1 produced the power with the pondage No. 2 and terminates at the pondage No.3 where another link canal takes the water to pondage No. 4. The mini powerhouse No.2 is provided at the upstream of pondage No. 4 and also mini powerhouse No. 3 is upstream of pondge No. 7. The last tailrace canal of the system connects the mini powerhouse No. 4 downstream of pondage No. 7 and main canal before the main forebay.

On the right system, pondage No. 9 to No. 11 is linked to supply water to mini power house No. 5. The link canal carries the water from the pondage No.8 to main forebay. It supplies the water through the main penstock to the main powerhouse.

The diversion weir site is selected at the places, where the foundation bed rock is so thick and hard. Concrete energy dissipaters are provided exploiting the existing topography and bed rock condition. Two gates are provided at the lowest stream bed to sluice out bed load sediment. Bed load at the weir site is mostly median size particles ranging gravel to small boulder. To prevent the accumulation of this bed load at the stream bed near the upstream toe of weir, regular removal is planned. To prevent the harmful floating debris, trash booms are also provided at the upstream of weir.

Due to the topographic condition and maintenance works required in the project life time, the brick lined canals are adopted in cost effectiveness, which also have more tolerance and flexibility for variation in discharge about 2 cumecs. In the reach of headrace (main) canal before main forebay the concrete lined canal, passing through between two sinkhole edges, is recommended in the final design.

Main Forebay is provided at the head of penstock pipe, where an overflow spillway is designed to pass the excess flow. The size of steel penstocks of mini powerhouses is 760 mm in diameter, 4mm to 5mm thickness and 1200 mm in diameter, 25 mm thickness for main one. Four number of horizontal shaft type Francis turbines are planned to be installed in mini powerhouses and Pelton turbines in big one to match the seasonal flow variation. According to the hydrology, all four turbines on the average can be operational from mid-May to December.

The generated electric power will be supplied from the main powerhouse to Sedawgyi substation by 33 kV overhead transmission line. The mini ones are generated electricity to nearby villages by 11 kV line.

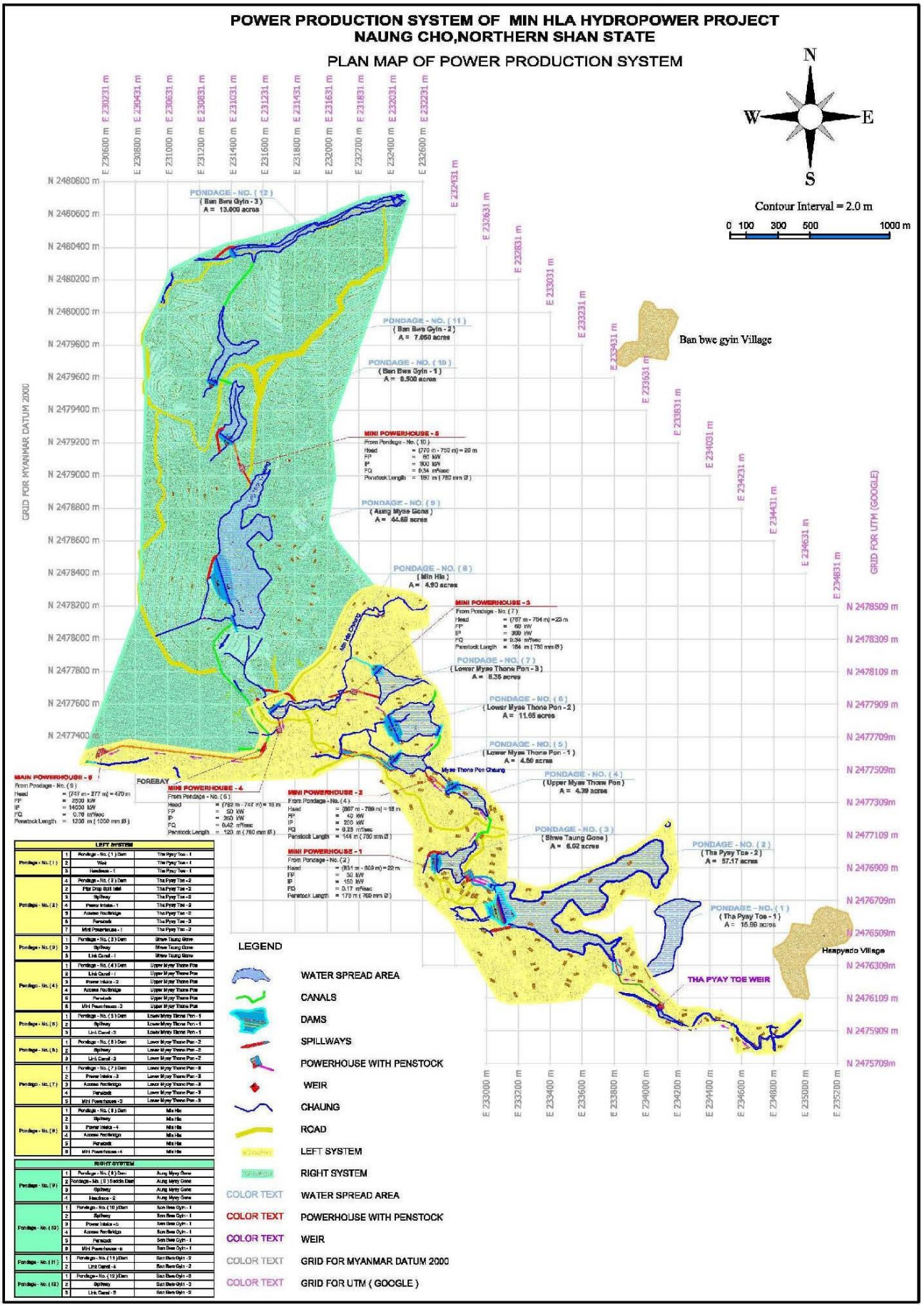


Figure 1-7 Power production system

1.5.1. Organization for Operation of the Hydropower Scheme

The project is planned to operate the power generation for the whole year as the follow table and graph.

Table 1-2 Monthly Power Generation of Main Power House (Main Power House)

Month	Monthly Average Inflow (Ac. ft)	Head (m)	Discharge, Q (m3/sec)	Power, P (kW)	Generated Energy (kWh)
Jan:	4458	470.00	2.097	5000	3720000
Feb:	3384	470.00	1.5	5000	3360000
Mar:	2604	470.00	1.28	2500	1860000
Apr:	4244	470.00	1.07	2500	1800000
May:	7343	470.00	1.36	2500	1860000
Jun:	6181	470.00	2.15	7500	5400000
Jul:	7148	470.00	-	7500	5580000
Aug:	9621	470.00	-	10000	74400000
Sep:	10336	470.00	-	10000	7200000
Oct:	9390	470.00	-	10000	74400000
Nov:	5682	470.00	3.99	10000	7200000
Dec:	4958	470.00	2.92	7500	5580000
					58440000
					0.058 GWh
			Installed Capacity P =		10 MW
			Plant Factor PF =		0.73

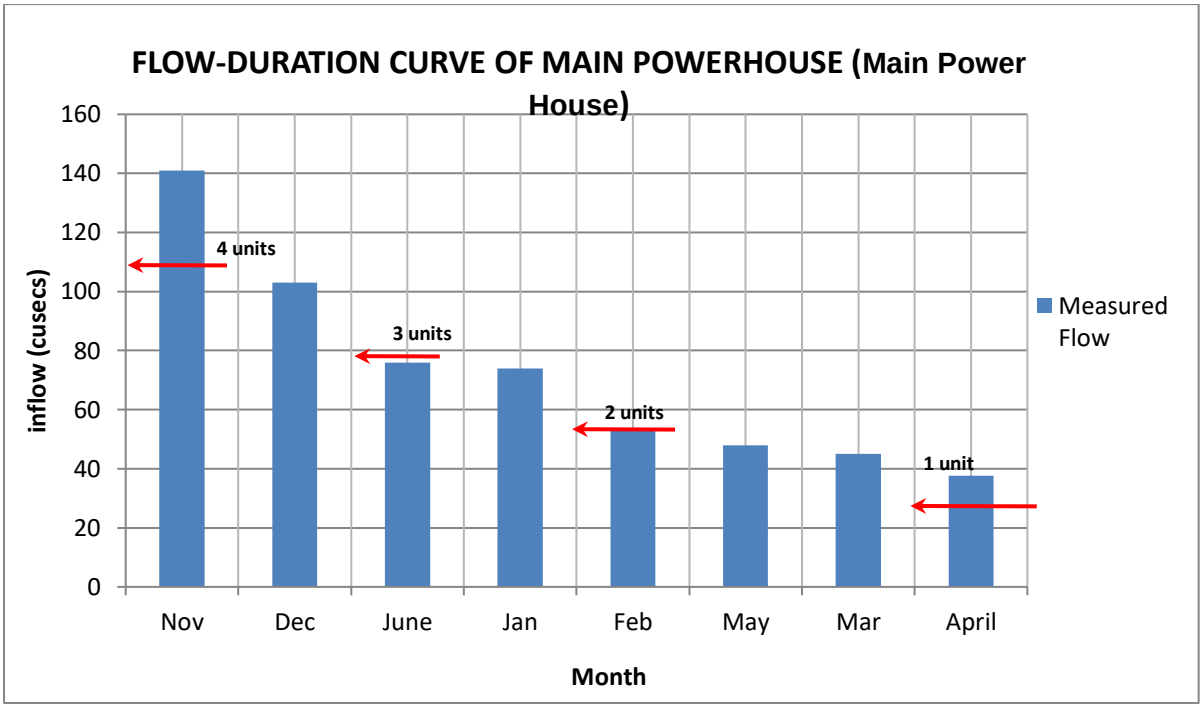


Table 1-3 Monthly Power Generation of Hsapyaedo Stream (Power House - 1)

Month	Monthly Average Inflow (Ac. ft)	Head (m)	Discharge, Q (m3/sec)	Power, P (kW)	Generated Energy (kWh)
Jan:	866	22	0.34	60	44640
Feb:	700	22	0.26	30	20160
Mar:	641	22	0.23	30	22320
Apr:	1320	22	0.19	30	21600
May:	2205	22	0.39	60	44640
Jun:	1933	22	1.13	120	86400
Jul:	2102	22	-	120	89280
Aug:	2521	22	-	120	89280
Sep:	2728	22	-	120	86400
Oct:	2370	22	-	120	89280
Nov:	1219	22	0.88	120	86400
Dec:	917	22	0.54	90	89280
					769680
					0.00077 GWh
			Installed Capacity P =		120 KW

Month	Monthly Average Inflow (Ac. ft)	Head (m)	Discharge, Q (m3/sec)	Power, P (kW)	Generated Energy (kWh)
			Plant Factor PF	=	0.73

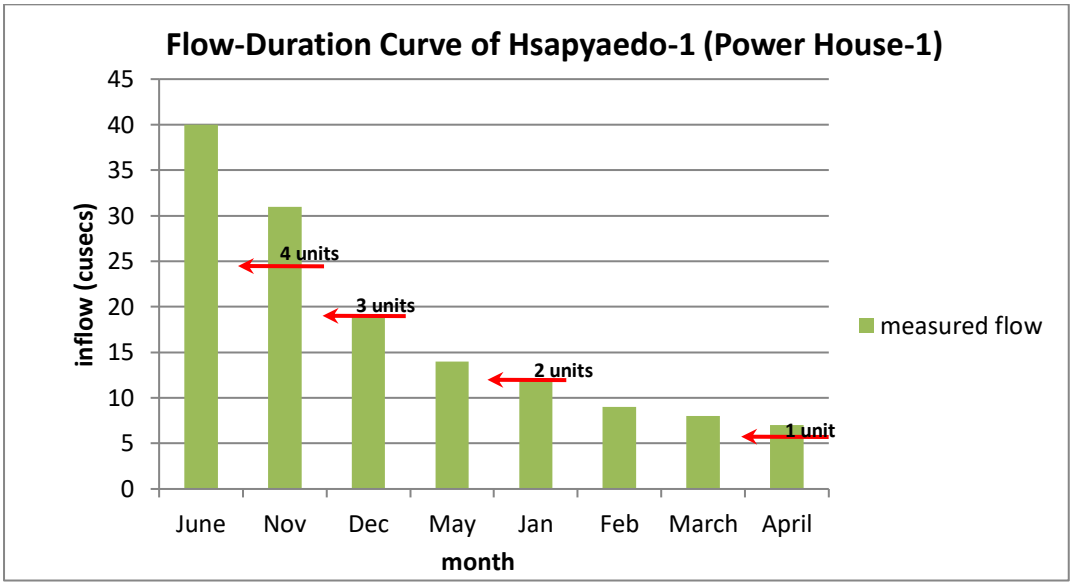
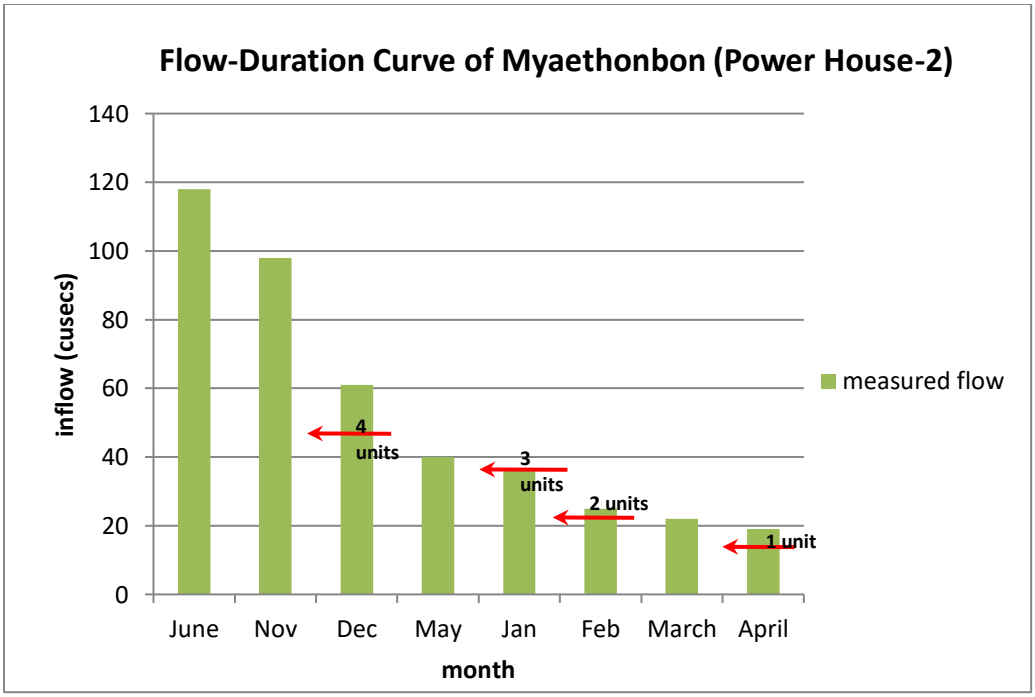


Table 1-4 Monthly Power Generation of Myaethonbon Stream (Power House - 2)

Month	Monthly Average Inflow (Ac.ft)	Head (m)	Discharge, Q (m3/sec)	Power, P (kW)	Generated Energy (kWh)
Jan:	197	12	1.02	120	89280
Feb:	138	12	0.71	80	53760
Mar:	100	12	0.62	40	29760
Apr:	263	12	0.54	40	28800
May:	283	12	1.13	120	89280
Jun:	313	12	3.34	160	115200
Jul:	282	12	-	160	119040
Aug:	400	12	-	160	119040
Sep:	426	12	-	160	115200
Oct:	379	12	-	160	119040
Nov:	341	12	2.78	160	115200
Dec:	420	12	1.73	160	119040
					1112640

Month	Monthly Average Inflow (Ac.ft)	Head (m)	Discharge, Q (m3/sec)	Power, P (kW)	Generated Energy (kWh)
					0.0011 GWh
			Installed Capacity P =		160 KW
			Plant Factor PF =		0.73



1.6. DECOMMISSIONING/CLOSURE/POST CLOSURE ACTIVITIES

Unlike industrial and mining development projects, decommissioning of hydropower projects is not normally an issue. In the USA, some small dams have been decommissioned and demolished to restore ecology of the rivers to their pre-project conditions. The need for decommissioning the Minhla Hydropower Project is not foreseen at this stage.

CHAPTER 2
PROJECT PROPONENT PROFILE

2.1. PROJECT INFORMATION

Hydropower & Solar Energy Development Company Limited (H&S) is leading hydropower development in Myanmar, with the management of diversified well experienced professionals. It is mainly focused on hydropower development and investment business and has been successfully instigating several projects in hydropower, infrastructure, water resources, environment, socio-economic sectors and project management. It is committed to create superior value for all its stakeholders and aimed to be among most admired and trusted companies in the country. With one project in hand and many other pipelines, H &S has planned to contribute in the national economy accelerated hydropower development.

2.1.1. **Company Background**

In 2014, H & S established in Mandalay. H & S vision is to leading professional consulting provide in Hydropower development in Myanmar and providing good quality and cost-effective services in energy and environment satisfaction.

Name of company	Hydropower & Solar Energy Development Company Limited
Head office address	No. 2 A, Moulding Factory Compound, Mhan Tann Quarter, Amarapura Township, Mandalay
Certificate of Incorporation	No. 1401/2014-2015 (17-6-2014) Company Registration No. 100344122
Certificate of Exporter/Importer Registration	No. 33987 (07-07-14)
Contact	(95-9) 796506589, 250848310, 011201635 Headoffice.hydropowersolar@gmail.com

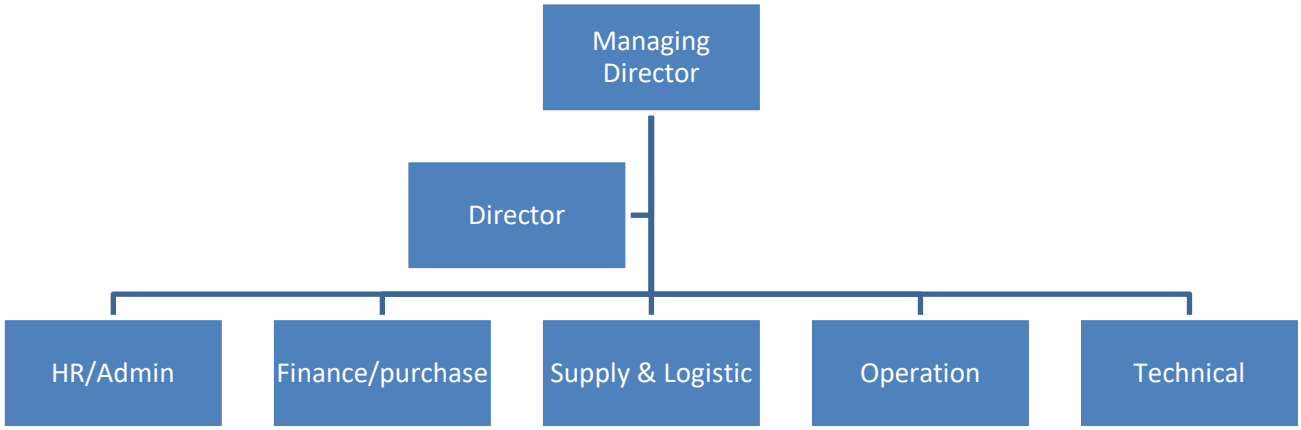


Figure 2-1 Organization structure

Main Forebay is provided at the head of penstock pipe, where an overflow spillway is designed to pass the excess flow. The size of steel penstocks of mini powerhouses are 760 mm in diameter, 4 mm to 5 mm thickness and 1200 mm in diameter, 25 mm thickness for main one. Four number of horizontal shaft type Francsis turbines are planned to be installed in mini powerhouses and Pelton turbines in big one to match the seasonal flow variation. According to the hydrology, all four turbines on the average can be operational from mid-May to December.

The generated electric power will be supplied from the main powerhouse to Sedawgyi substation by 33 kV overhead transmission line. The mini ones are generated electricity to nearby villages by 11 kV line.

According to the output of the study, the Minhla Hydropower Project is a feasible one in all technical, economic and environmental aspects. The project cost per Kilowat is at the lowest level in Asia region. It is 1500USD between 1000 USD and 4000 USD for mini hydropower project under 10 MW installed capacity in the region. Again, it will have intangible benefits for the development of the least developed area of indigenous people of the Shan State. So, it can be concluded that the project is an essential one for implementation. which is described in below Table 2-1.

Table 2-1 General Information of project

Project Name	Min Hla Hydropower Project
Type of Project	Hydropower Project
Location (district/region)	Naung Cho Township, Pyin Oo Lwin Dist, Shan State
Ownership	Hydropower & Solar Energy Development Company Limited
Present Land Use	Agriculture
Installed Capacity (MW)	10 MW
Project Cost (USD)	16,000,000 $
Contact person:	Ko Ye Zaw Maung

Phone:	09250848310
Email	Yezaw.maung@gmail.com

CHAPTER 3
ENVIRONMENTAL CONSULTANT PROFILE

3.1. SCOPE OF IEE STUDY

The IEE study firstly established baseline environmental setting within 100 meters of the project area, including existing conditions of air quality, water quality, noise, weather and local climate, waste, landscape and social assessment. The field studies were carried out by Myanwei Environmental Solutions Co., Ltd. conducted field survey, assessment activities, and prepared the report.

A reconnaissance study was performed on the proposed project site and baseline environmental data were also collected from possible sources using the appropriate measuring devices. Data interpretation and analysis were made based on those collected data for the present and potential future conditions. Suitable measures were proposed for the impacts to be mitigated to reduce to acceptable ones.

3.1.1. The specific objectives of the IEE study are as follows:

- To conduct preliminary examination of the environmental consequences of the project
- To describe the existing environmental condition of the proposed project site
- To collect detailed information about used of process, technology, equipment and machinery for proposed project
- To assess the potential environmental impacts of the proposed project
- To develop environmental management plan (EMP) with site specific environmental mitigation measures and monitoring standards guidelines for the proposed project
- To carry our public consultants to address any issues in concern with implementation of this project

3.2. IDENTIFICATION OF IEE STUDY TEAM

MYANWEI ENVIRONMENTAL SOLUTIONS COMPANY LIMITED prepares the Initial Environmental Examination (IEE) with the Environmental Management Plan (EMP) for the proposed project. The environmental study was carried out by the study team and the following is a summary of team member's responsibilities during the study period.

Myanwei Environmental Solutions Company Limited	No. 36-38, 9th floor (A), Grand Myay Nu Condo, Myay Nu Street, Sanchaung Township, Yangon, Myanmar.	01-501221 env@myanweiconsulting.com www.myanwweiconsulting.com.

Table 3-1 Member of IEE study team

Name	Qualification	Responsibility
MYANWEI ENVIRONMENTAL SOLUTIONS COMPANY LIMITED	**Transition Consultant Registration Certificate No. 0069**	**EIA Organization**

Name	Qualification	Responsibility
Dr. Hein Lynn Aung	M.B, B.S (Yangon), Business Management (International Collage of Management Sydney, Australia)	Project Director, Public Health Consultant, Project Management
Mr. Lin Htet Sein	MSc (Regional Geology) BSc (Hons) Geology Dip in Environmental Science Certificate in Environmental & Social Assessment Certificate in Environmental Stainability TCR No. 0048	Project Director, Environmental Consultant, Project Management
Ms. Khin Thu Zar Myint	B.E(Materials and Metallurgy) Dip in Environmental Planning and Management	Senior Environmental Consultant, Social Research, Public consultation, Social Economic Investigation
Mr. Kyaw Win Han	B.E. Chemical Engineering B. Tech Chemical Engineering	Junior Environmental Consultant, Team Leader of Baseline Survey, Monitoring Measure
Mr. Aung Kyaw Moe	B.E. Chemical Engineering B. Tech Chemical Engineering	Junior Environmental Consultant, Monitoring measure, Document Administration
Mr. Saw Yan Naung	B.E. Chemical Engineering B. Tech Chemical Engineering	Junior Environmental Consultant, Monitoring Measure, Document Administration
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CHAPTER 4
POLICY, LEGAL AND INSTITUTIONAL FRAME WORK

Basic information of legal aspects on environmental conservation in Myanmar is the Protection of Wild Animals, Wild Plants and Preservation of Natural Areas Laws; 1994. These are observed throughout the years and are still active at present. The following National Legislation and associated Regulations with regard to Forestry, Agriculture, Water and Environment Conservation are outlined below:

(1) Law for Environmental Conservation, 2012
(2) Rules Notification Order No. 50/2014 for Environmental Conservation
(3) Conservation of Water Resources & River Law, 2006
(4) Protection of Wild Animals, Wild Plants and Preservation of Natural Areas Laws, 1994
(5) Law on Agricultural Land, March 30, 2012
(6) The Forest Law, 1995
(7) The Electricity Law, 2013

4.1. ENVIRONMENTAL POLICY, LEGAL FRAMEWORK AND ENVIRONMENTAL LEGISLATION

The Environmental Policy in Myanmar is as per Law for Environmental Conservation, enacted in 2012.

The Ministry of Natural Resources and Environmental Conservation administers the Legal Framework and Environmental Legislation in Myanmar; delegating duties and power by forming the Environmental Conservation Committee to carry out the conservation of the environment in Myanmar according to existing Law, rules and regulation of the Law for Environmental Conservation, 2012. The Environmental Rules Regulation was enacted by order No.50/2014 by the Ministry of Environmental Conservation and Forestry in 2014. The EIA (Environmental Impact Assessment) Notification Order No. 616/2015 has also been enacted on 29 Dec 2015 from the ECD (Environmental Conservation Department) of the Ministry of Natural Resources and Environmental Conservation of the Union of Myanmar.

It is customary to adhere to the Conservation of Water Resources and River Law, the Forest Law and the other National Legislation and relevant regulations mentioned earlier and also to refer to the International Guidelines for Hydropower from IFC (International Finance Corporation) or other similar organization regarding development of hydropower and generating electricity.

4.2. MYANMAR REGULATORY FRAMWORK

The Ministry of Environmental Conservation and Forestry (MOECAF) was reformed as the Ministry of Natural Resources and Environmental Conservation (MONREC) in April 2016 to be the focal point and coordinating agency for environmental management.

The Environmental Conservation Department (ECD) was established in October 2012 based on Environmental Conservation Law. ECD is responsible for managing the EIA process in Myanmar

4.2.1. Fundamental Laws and Regulations Related to Environmental and Social Considerations

The fundamental laws and regulations related to the environmental and social considerations and health in Myanmar and major international agreements and treaties that the Myanmar government has ratified related to the environmental and social considerations are shown in below:

4.2.2. National Environmental Policy of Myanmar, (Notification No. 26/94 dated 5 December 1994)

Purpose: To achieve harmony and balance between socioeconomic, natural resources and environment through the integration of environmental considerations into the development process enhancing the quality of the life of all its citizens.

4.2.3. Environmental Conservation Law, 30 March 2012

Objectives	to contract a healthy and clean environmental and to conserve natural and cultural heritage for the benefit of present and future generations; to maintain the sustainable development through effective management of natural resources and to enable to promote international, regional and bilateral cooperation in the matters of environmental conversation.
Chapter IV Provisions of Duties and Powers relating to the Environmental Conservation of the Ministry: Section 7	(d) prescribing environmental quality standards including standards on emissions, effluents, solid wastes, production procedures, processes and products for conservation and enhancement of environmental quality;
Chapter VI Environmental Quality Standards: Section10	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 14	A person causing a point source of pollution shall treat, emit, discharge and deposit the substances which cause pollution in the environment in accord with stipulated environmental quality standards.
Section 15	The owner or occupier of any business, material or place which causes a point source of pollution shall install or use an on-site facility or controlling equipment in order to monitor, control, manage, reduce or eliminate environmental pollution. If it is impracticable, it shall be arranged to dispose the wastes in accord with environmentally sound methods.
Chapter X Prior Permission Section 24	The Ministry may, in issuing the prior permission, stipulate terms and conditions relating to environmental conservation. It may conduct inspection whether or not it is performed in conformity with such terms and conditions or

	inform the relevant Government departments, Government organizations to carry out inspections.
Chapter XIII Offences and Penalties Section 32	Whoever violates any prohibition contained in the rules, notifications, orders, directives and procedures issued under this Law shall, on conviction, be punished with imprisonment for a term not exceeding one year, or with fine, or with both.

4.2.4. **Environmental Conservation Rules, 2014**

Chapter XIII Prohibitions Section 69	(a) Any person shall not emit, cause to emit, dispose, cause to dispose, pile and cause to pile, by any means, the pollutants to environment and the hazardous waste or hazardous material stipulated by notification under the Law and any of these rules at any place which may affect the public directly or indirectly. (b) Any person shall not carry out the actions which can be damaged to natural environment which is changing due to ecosystem and such system, except the permission of the relevant Ministry in order to the interest of the public.

4.2.5. **Environmental Impact Assessment Procedure, December 2015**

CHAPTER VIII. Responsibility for all Adverse Impacts Section 102	The Project Proponent shall bear full legal and financial responsibility for: a) all of the Project Proponent's actions and omissions and those of its contractors, subcontractors, officers, employees, agents, representatives, and consultants employed, hired, or authorized by the Project acting for or on behalf of the Project, in carrying out work on the Project; and b) PAPs until they have achieved socio-economic stability at a level not lower than that in effect prior to the commencement of the Project, and shall support programs for livelihood restoration and resettlement in consultation with the PAPs, related government agencies, and organizations and other concerned persons for all Adverse Impacts.
Section 103	The Project Proponent shall fully implement the EMP, all Project commitments, and conditions, and is liable to ensure that all contractors and subcontractors of the Project comply fully with all applicable Laws, the Rules, this Procedure, the EMP Project commitments and conditions when providing services to the Project.
Section 104	The Project Proponent shall be responsible for, and shall fully and effectively implement, all requirements set forth in the ECC, applicable Laws, the Rules, this Procedure and standards.
Section 105	The Project Proponent shall timely notify and identify in writing to the Ministry, providing detailed information as to the proposed Project's potential Adverse Impacts.
CHAPTER IX. Monitoring Section 106	The Project Proponent shall, during all phases of the Project (pre-construction, construction, operation, decommissioning, closure and post-closure), engage in continuous, proactive and comprehensive self-monitoring of the Project and activities related thereto, all Adverse Impacts, and compliance with applicable laws, the Rules, this Procedure, standards, the ECC, and the EMP.
Section 107	The Project Proponent shall notify and identify in writing to the Ministry any breaches of its obligations or other performance failures or violations of the ECC and the EMP as soon as reasonably possible and in any event, in respect of any breach which would have a serious impact or where the urgent attention of the Ministry is or maybe required, within not later than twenty-four (24) hours, and in all other cases within seven (7) days of the Project Proponent becoming aware of such incident.
Section 108	The Project Proponent shall submit monitoring reports to the Ministry not less frequently than every six (6) months, as provided in a schedule in the EMP, or periodically as prescribed by the Ministry.
Section 109	The monitoring reports shall include:

	a) documentation of compliance with all conditions; b) progress made to date on implementation of the EMP against the submitted implementation schedule; c) difficulties encountered in implementing the EMP and recommendations for remedying those difficulties and steps proposed to prevent or avoid similar future difficulties; d) number and type of non-compliance with the EMP and proposed remedial measures and timelines for completion of remediation; e) accidents or incidents relating to the occupational and community health and safety, and the environment; and f) Monitoring data of environmental parameters and conditions as committed in the EMP or otherwise required.
Section 110	Within ten (10) days of completing a monitoring report as contemplated in Article 108and Article 109 in accordance with the EMP schedule, the Project Proponent shall make such report (except as may relate to National Security concerns) publicly available on the Project's website, at public meeting places (e.g. libraries, community halls) and at the Project offices. Any organization or person may request a digital copy of a monitoring report and the Project shall, within ten (10) days of receiving such request, submit a digital copy via email or as may otherwise be agreed upon with the requestor.
Section 113	For purposes of monitoring and inspection, the Project Proponent: a) shall grant to the Ministry and/or its representatives, at any time during normal working hours, access to the Project's offices and to the Project site and any other location at which the Project activities or activities related to the Project are performed; and b) from time to time as and when the Ministry may reasonably require, shall grant the Ministry access to the Project's offices and to the Project site and any other location at which the Project activities or activities related to the Project are performed.
Section 115	In the event of an emergency, or where, in the opinion of the Ministry, there is or may exist a violation or risk of violation of the compliance by the Project with all applicable environmental and social requirements, the Project shall grant full and immediate access to the Ministry at any time as may be required by the Ministry.
Section 117	The Project Proponent shall further ensure that the Ministry's rights of access hereunder shall extend to access by the Ministry to the Project's contractors and sub-contractors.

4.2.6. **National Environmental Quality (Emission) Guidelines (NEQG) (December 2015)**

Objectives	To provide the basis for regulation and control of noise and vibration, air emissions, and liquid discharges from various sources in order to prevent pollution for purposes of protection of human and ecosystem health.
Scope of Application	Provisions of the general and applicable industry-specific Guidelines shall be reflected in project environmental management plan (EMP)and environmental compliance certificate (ECC)and together constitute a project's commitment to take necessary measures to avoid, minimize and control adverse impacts to human health and safety, and the environment through reducing the total amount of emissions generation; to adopting process modifications, including waste minimization to lower the load of pollutants requiring treatment; and as necessary, to apply treatment techniques to further reduce the load of contaminants prior to release or discharge.
CHAPTER II Implementation Procedures	As specified in the EIA Procedure, all projects are obliged to use, comply with and refer to applicable national guidelines or standards or international standards adopted by the Ministry. These Guidelines will henceforth be

	applied by the Ministry in satisfying this requirement until otherwise modified or succeeded by other guidelines or standards
Section 10	As specified in the EIA Procedure, following project approval a project shall commence implementation strictly in accordance with the project EMP and any additional requirements set out in the project ECC, which will encompass conditions relating to 3 emissions. In this regard, the Ministry will require that project sad here to general and applicable industry guidelines asset out in Annex 1.
Section 11	While these Guidelines generally apply to all projects subject to the EIA Procedure, it is the prerogative of the Ministry to decide how the Guidelines should be applied to existing projects as referred to in the EIA Procedure, as distinguished from new projects. At the Ministry's discretion less stringent levels or measures than provided for in these Guidelines may be specified as appropriate, and a timeframe agreed for a project to fully comply with these Guidelines.
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 project 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.

4.2.7. **The Ethnic Rights Protection Law (24th February, 2015)**

Chapter II Objectives	The objectives of this Law are as follows: (a) to obtain equal citizen's rights for all ethnic groups; (b) to live eternally together with amicable relations among ethnic groups on the basic of genuine Union Spirit; (c) to preserve and develop language, literature, fine art, culture, custom, national character, and historical heritage of ethnic groups; (d) to promote solidarity, mutual rarity and respect, and mutual assistance among ethnic groups; (e) to promote socioeconomic development including education, health, economy, transport and communication, so forth, of less-developed ethnic groups; (f) to fully obtain the rights prescribed in the Constitution by ethnic groups.
Chapter IV Formation of the Ministry and Appointment of the Union Minister	5. The matters of projects shall completely be informed, coordinated and performed with the relevant local ethnic groups in the case of development works, major projects, businesses and extraction of natural resources will be implemented within the area of ethnic groups.

4.2.8. **Myanmar Investment Law, 2016**

Chapter XII Rights to be used land Section 50	(d)The investor shall register the land lease contract at the Office of Registry of Deeds in accordance with the Registration Act.
Chapter XIII	The investor: (a) may appoint of any citizen who is a qualified person as senior

Employment of Staff and Workers Section 51	manager, technical and operational expert, and advisor in his investment within the Union in accordance with the Laws; (b) shall appoint them to replace, after providing for capacity building programs in order to be able to appoint citizens to different level positions of management, technical and operational experts, and advisors; (c) shall appoint only citizens for works which does not require skill; (d) shall appoint skilled citizen and foreign workers, technicians, and staff by signing an employment contract between employer and employee in accordance with the labor laws and rules; (e) shall ensure to obtain the entitlements and rights in the labor laws and rules, including minimum wages and salary, leave, holiday, overtime fee, damages, compensation of the workman, social welfare, and other insurance relating to workers in stipulating the rights and duties of employers and employees and occupational terms and conditions in the employment contract; (f) shall settle disputes arising among employers, among workers, between employers and workers, and technicians or staff in the investment in accordance with the applicable laws.
Chapter XVI Responsibilities of Investors Section 65	The Investor: (f) shall not make any significant alteration of topography or elevation of the land on which he is entitled to lease or to use, without the approval of the Commission; (g) shall abide by applicable laws, rules, procedures and best standards practiced internationally for this investment so as not to cause damage, pollution, and loss to the natural and social environment and not to cause damage to cultural heritage; (i) shall close and discontinue the investment only after payment of compensation to employees in accordance with applicable laws for any breach of employment contracts, closure of investment, sale and transfer of investment, discontinuation of investment, or reduction of workforce; (j) shall pay wages and salaries to employees in accordance with applicable laws, rules, procedures, directives and so forth during the period of suspension of investment for a credible reason; (k) shall pay compensation and indemnification in accordance with applicable laws to the relevant employee or his successor for injury, disability, disease and death due to the work; (l) shall supervise foreign experts, supervisors and their families, who employ in their investment, to abide by the applicable laws, rules, orders and directives, and the culture and traditions of Myanmar;
Chapter XVII Insurance Section 73	The investor shall ensure the types of insurance stipulated in the provision of the rules at any insurance enterprise which is entitled to carry out insurance businesses within the Union.

4.2.9. **Myanmar Insurance Law (1993)**

Chapter II Establishment and Aim Section 4	The Myanmar Insurance is established with the following aims: - social and economic losses which the people may encounter, due to common perils; (b) to promote the habit of savings individually by effecting life assurance, thus contributing to the accumulation of resource, of the State; (c) to win the trust and confidence of the people in the insurance system by providing effective insurance safeguards which may become necessary in view of the social and economic developments.
Chapter VI	Owners of motor vehicles shall effect compulsory Third Party Liability Insurance with the Myanmar Insurance.

Effecting Insurance and Granting of Benefits Section 15	
Section 16	An entrepreneur or an organization operating an enterprise which may cause loss to State-owned property or which may cause damage to the life and property of the public or which may cause pollution to the environment shall affect compulsory General Liability Insurance with the Myanmar Insurance.

4.2.10. **The Myanmar Fire Force Law (2015)**

Purpose	To ensure to prevent the fire, to provide the precautionary material and apparatuses, if the fire caused in the project area to be defeated because the project is business in which electricity and any inflammable materials such as petroleum are used. So, the project owner has to institute the specific fire service in line with the above law.
Section 25	(a) The project proponent has to institute the specific fire services. (b) The project owner has to provide materials and apparatuses for fire precaution and prevention.

4.2.11. **Myanmar Investment Rules, 2017**

Rule 202	The project proponent has to comply with the conditions of the permit issued by the MIC and applicable laws when making the investment
Rule 206.	The project proponent has to submit the passport, expert evidence or document of degree and profile to the MIC office for approval if decide to appoint a foreigner as senior management, technician expert or consultant according to subsection (a) of section 51 of Myanmar Investment Law
Rule 212	The investor obtained the permit or tax exemption or relief shall insure the relevant insurance out of the following types of the insurance at any insurance business entitled to carry out insurance business within the Union based on the nature of the business: (a) Property and Business Interruption Insurance; (b) Engineering Insurance; (c) Professional Liability Insurance; (d) Bodily Injury Insurance; (e) Marine Insurance; or (f) Workmen Compensation Insurance.

4.2.12. **The Private Industrial Enterprise Law, 1990**

Chapter III Registration of Private Industrial Enterprises Section 4	(a) Any person desirous of conducting any private industrial enterprise; (b) Any person conducting any private industrial enterprise on the day this Law is enacted; by using any type of power which is three horsepower and above or manpower of ten wage-earning workers and above shall register under this Law.
Chapter VI Duties and Rights of the Entrepreneur Section 13	The duties of the entrepreneur are as follows: - (b) shall abide by the terms and conditions of the registration certificate; (I) shall shift the place of enterprise, change the nature of enterprise, amalgamate enterprises and split up enterprises only with the approval of the Directorate; (g) shall abide by the orders and directives issued from time to time by the Ministry and the Directorate;
Section 15	The entrepreneur has the right to carry out the followings:- (a) appointing foreign exports and technicians with the approval of the Ministry;

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

4.2.13. **Public Health Law (1972)**

အခန်း(၂) ပြည်သူတို့၏ ကျန်းမာရေးကို ကာကွယ်ခြင်း ဥပဒေပုဒ်မ (၃)	အခြားတည်ဆဲတရားဥပဒေများတွင် မည်သို့ပင်ပါရှိစေကာမူ အစိုးရသည် လုပ်သား ပြည်သူတို့၏ ကျန်းမာရေးကို ပိုမိုတိုးတက်ကောင်းမွန်လာစေရန်လည်းကောင်း၊ လုပ်သား ပြည်သူတို့၏ ကျန်းမာရေးကို ထိခိုက်ခြင်းမှ ကာကွယ်ရန် လည်းကောင်း အောက်တွင် ဖော်ပြသော ကျန်းမာရေးဆိုင်ရာ ကိစ္စရပ်များကို အကြံပေးခြင်း၊ စစ်ဆေးခြင်း၊ ကြီးကြပ်ခြင်း၊ ပြုပြင်ခြင်း၊ တားမြစ်ခြင်း စသည့် လုပ်ငန်းတို့ကို လုပ်ဆောင်ရမည်။ (၁) ပတ်ဝန်းကျင်ကျန်းမာရေးဆိုင်ရာလုပ်ငန်းများ (က)လူအများနေထိုင်ရာ ပတ်ဝန်းကျင်တွင် အမှိုက်သရိုက်၊ အညစ်အကြေးများကို သိမ်းဆည်း စွန့်ပစ်ခြင်း (ခ)လူအများအတွက် သောက်သုံးသောရေများကို အပြည်ပြည်ဆိုင်ရာ စံချိန်မှီ သတ်မှတ်ခြင်း နှင့် ကာကွယ်စောင့်ရှောက်ခြင်း (ဂ)လူအများ နေထိုင်ရာ ပတ်ဝန်းကျင် လေထုတွင် လူတို့ကို ဘေးအန္တရာယ် ဖြစ်စေမည့် အခိုးအငွေ့၊ အနံ့အသက်၊ အမှုန့်အမွှား၊ အသံပလံ နှင့် ဓါတ်ရောင်ခြည်များကြောင့် ညစ်ညမ်းခြင်းမှ ကာကွယ်ခြင်း။ (ဃ)မြို့ရွာ စည်ပင်သာယာရေး၊ အိမ်ယာဆောက်လုပ်ရေး နှင့် လုပ်သားပြည်သူတို့ သွားလာနေထိုင်အသုံးပြုသည့် အဆောက်အဦး၊ သို့မဟုတ် နေရာများ၏ ကျန်းမာသန့်ရှင်းရေးအတွက် ဆောင်ရွက်ခြင်း။ (၂)လုပ်သားပြည်သူတို့ထုတ်လုပ်ရောင်းချသော အစားအသောက်နှင့် ပတ်သက်သည့် ကိစ္စများ (က) အစားအသောက်ထုတ်လုပ်ရောင်းချသည့် အလုပ်ရုံ၊စက်ရုံ လုပ်ငန်းဌာနများကို မှတ်ပုံတင်ခြင်း၊ မှတ်ပုံတင်ခြင်းမှ ပယ်ဖျက်ခြင်း နှင့် ပြန်လည်မှတ်ပုံတင်ခြင်း။ (ခ) လုပ်သားပြည်သူသို့ ရောင်းချသော အစားအသောက်တို့ကိုကျန်းမာသန့်ရှင်းစေခြင်း (ဂ) လုပ်သားပြည်သူသို့ ရောင်းချသော အစားအသောက်များကို အတုအပပြုလုပ်ခြင်း၊ အခြားယုတ်ညံ့သော ပစ္စည်းများနှင့် ရောစပ်ခြင်း၊ အစားအသောက်ထဲတွင် ရှိယင်းစွဲ ဝတ္ထုပစ္စည်းများအား ထုတ်နှုတ်ခြင်းတို့မှ ကာကွယ်ခြင်း (ဃ) အစားအသောက် ထုတ်လုပ်ရောင်းချသော အလုပ်ရုံ၊ စက်ရုံလုပ်ငန်းဌာနတို့ကို ကျန်းမာသန့်ရှင်းစေခြင်း (င) အစားအသောက်ရောင်းချသော ဥပစာအဆောက်အဦးများကို ကျန်းမာသန့်ရှင်းစေခြင်း။ (စ)လုပ်သားပြည်သူသို့ ရောင်းချသော အစားအသောက်များ ထုတ်လုပ်ရောင်းချသည့်နေရာများတွင် ကူးစက်ရောဂါရှိသူများ ဝင်ရောက်အမှုထမ်းခြင်းမှ ကာကွယ်ခြင်း (ဆ)ဘေးအန္တရာယ်ဖြစ်စေသော အစားအသောက်များကို သိမ်းဆည်းဖျက်ဆီးခြင်း၊ (ဇ) အစားအသောက်နှင့် ပတ်သက်သည့် ကိစ္စရပ်များကို စစ်ဆေးကြည့်ရှု လိုအပ်လျှင် အစိုးရ မာတ်ခွဲခန်းများသို့ ပို့၍ စစ်ဆေးခြင်း (ဈ) အစားအသောက်များကို အစိုးရက အခါအားလျော်စွာသတ်မှတ်ပေးသော စံချိန်နှင့် ကိုက်ညီစေရန် ဆောင်ရွက်ခြင်း (ဉ) လုပ်သားပြည်သူများအတွက် အသုံးပြုရန်ဖြစ်သော နေအိမ်သုံးပစ္စည်းများ နှင့် အလှကုန်ပစ္စည်းများ နှင့် ပတ်သက်သည့် ကိစ္စများ

	(က) နေအိမ်သုံးပစ္စည်းများ နှင့် အလှကုန်ပစ္စည်းများ ထုတ်လုပ်သော အလုပ်ရုံ၊ စက်ရုံများ မှတ်ပုံတင်ခြင်း၊ မှတ်ပုံတင်မှ ပယ်ဖျက်ခြင်း နှင့် ပြန်လည်မှတ်ပုံတင်ခြင်း (ခ)ထုတ်လုပ်သော နေအိမ်သုံးပစ္စည်းများနှင့် အလှကုန်ပစ္စည်းများသည် လုပ်သားပြည်သူတို့အတွက် ဘေးအန္တရာယ်ဖြစ်ပွားနိုင်လျှင်သော်လည်းကောင်း၊ အဆိပ်အတောက်ဖြစ်စေနိုင်လျှင်သော်လည်းကောင်း၊ ဘေးအန္တရာယ်ဖြစ်စေတတ်သော ဓါတ်ရောင်ခြည်ပါခဲ့လျှင်သော်လည်းကောင်း ၎င်းကုန်ထုတ်လုပ်ခြင်းကိုတားမြစ်ခြင်း။ (ဂ)ဘေးအန္တရာယ်ရှိသော ထုတ်လုပ်ပြီးသည့် နေအိမ်သုံးပစ္စည်းများ နှင့် အလှကုန်ပစ္စည်းများ နှင့် အလှကုန်ပစ္စည်းများကို လုပ်သား ပြည်သူများအား ဘေးအန္တရာယ်မရှိစေသောနည်း ဖျက်ဆီးခြင်း (ဃ) ကုန်ရောင်းဆိုင်များ မှ ဘေးအန္တရာယ်ရှိစေသော နေအိမ်သုံး ပစ္စည်းများ နှင့် အလှကုန်ပစ္စည်းများကို သိမ်းဆည်းဖျက်ဆီးခြင်း (င) နေအိမ်သုံးပစ္စည်းများ နှင့် အလှကုန်ပစ္စည်းများကို အစိုးရက အခါအားလျော်စွာ သတ်မှတ်ပေးသော စံချိန် နှင့် ကိုက်ညီစေရန်ဆောင်ရွက်ခြင်း။
ဥပဒေပုဒ်မ (၅)	ကိုယ်ပိုင်ဆေးကုဌာနများ နှင့် ပတ်သက်သည့် ကိစ္စများ (က) ကိုယ်ပိုင်ဆေးကုဌာနများ နှင့် ပတ်သက်၍ လိုအပ်သည့် စည်းကမ်းချက်များကို သတ်မှတ်ခြင်း (ခ) ကိုယ်ပိုင်ဆေးကုဌာနအားလုံးကို မှတ်ပုံတင်ခြင်း၊ မှတ်ပုံတင်မှ ပယ်ဖျက်ခြင်း နှင့် ပြန်လည်မှတ်ပုံတင်ခြင်း။

4.2.14. **Prevention and Control of Communicable Disease Law 1995 (Amendment in 2011)**

Chapter 2 Prevention and Response Section 3	(a) In order to prevent the outbreak of communicable diseases, the Department of Health shall implement the following activities systematically under the guidance of the Ministry of Health: (i) immunization of children by injection or orally; (ii) immunization of those who have attained eligible target group including adult by injection or orally, when necessary; (iii) carrying out health education activities relating to communicable disease; (iv) carrying out the activities of surveillance, prevention and control concerning communicable disease; (v) carrying out the activities of medical examination for prevention of communicable disease in cross-border entrance and exit of the country, international airport, seaport, other necessary airport, seaport and bus terminal; (vi) prohibition or restriction of movements at home, hotel, motel and guest house; (vii) isolation of infected person of communicable disease or suspect of being infected there with; (viii) carrying out the activities of spraying, immunization by injection or orally and environmental sanitation necessary for prevention and control according to communicable diseases; (ix) giving advice to and coordinating with relevant Government departments, organizations and non-governmental organizations for construction of healthy housing, obtaining safe drinking water and fresh water for use, proper waste disposal in order to prevent occurrence of communicable disease for workers who are carrying out activities of social and economic development; (x) carrying out other functions prescribed by the Ministry of Health, from time to time.

Section 4	The public shall comply with the measures undertaken by the Ministry of Health and the Department of Health under section 3 in respect of prevention of the occurrence and spread of communicable disease and control thereof."
Section 9	Sub-sections (d) and (e) contained in section 11 of the Prevention and Control of Communicable Diseases Law shall be substituted as follows: "(d) other necessary investigation; (e) prohibition of the right of movement of the vehicle carrying animal or animal product suspected of having epidemic disease."
Section 11	After sub-section (e) of section 14 of the Prevention and Control of Communicable Diseases Law, sub-section (f) shall be inserted as follows: "(f) right of movement of the vehicle carrying animal or animal product suspected of having epidemic disease."

4.2.15. **The Control of Smoking and Consumption of Tobacco Product Law (2006)**

Chapter VI Functions and Duties of Person-in-charge Section (9)	The person-in-charge shall: (a) keep the caption and mark referring that it is a non-smoking area at the place mentioned in section 6 in accordance with the stipulations. (b) arrange the specific place where smoking is allowed as mentioned in section 7, and keep the caption and mark also referring that it is a specific place where smoking is allowed, in accordance with the stipulations. (c) supervise and carry out measures so that no one shall smoke at the non-smoking area. (d) accept the inspection when the supervisory body comes to the place for which he is responsible.

4.2.16. **Boiler Law (2015)**

Chapter IV	Boiler Registration
Section 5	Any person desirous to use a boiler for any enterprise shall register under this Law.
Section 6	A boiler shall be manufactured in accord with Myanmar standards and international standards.
Section 7	The documents and certificates relating to the boiler shall be attached to the application and submitted to the inspector when applying for registration of the boiler under section 5.
Section 14	The owner shall apply to the respective inspector in advance in order to obtain permission though he or she has obtained the certificate or the provisional order if desirous to carry out any of the following matters: (a) using of the boiler at more than allowable pressure; (b) repairing, altering, adding or renewing any steam-pipe, feed-pipe or any mounting or other fitting attached to such steam pipe, feed-pipe or mounting or other fitting attached to the boiler.
Section 15	The owner shall submit the certificate or provisional order when so requested by the respective government department and organization as may be necessary.
Section 18	The owner shall inform immediately to the inspector if any accident occurs.
Section 20	The owner shall not use the following boiler: (a) boiler without certificate or provisional order; (b) boiler of which certificate or provisional order is void; (c) boiler of which certificate or provisional order is revoked.
Section 21	The owner shall engrave the register number specified by the chief inspector in accord with the prescribed manner.
Section 24	The owner shall not:

	(a) carry out with the person who has not boiler repairer certificate on the receipt of notice to repair, alter, add or renew any boiler, steam-pipe, feed-pipe or any mounting or other fitting attached to such boiler, steam-pipe and feed-pipe; (b) assign any person to charge the boiler used in the work except the person who operates and maintains the boiler.
Section 31	The boiler attendant shall not use the boiler at more than allowable pressure.
Section 38	The inspector, in accord with the prescribed manners, shall: (a) inspect the boilers existing within the area where he is responsible; (b) inspect any boiler existing anywhere according to the assignment of the chief inspector.

4.2.17. **The Labor Organization Law (2011)**

Chapter V Rights and Responsibilities of the Labour Organization Section 17	The labour organizations shall have the right to carry out freely in drawing up their constitution and rules, in electing their representatives, in organizing their administration and activities or in formulating their programmes. The Labour Organizations have the right to negotiate and settle with the employer if the workers are unable to obtain and enjoy the rights of the workers contained in the labour laws and to submit demands to the employer and claim in accord with the relevant law if the agreement cannot be reached.
Section 18	The labour organization has the right to demand the relevant employer to re-appoint a worker if such work er is dismissed by the employer and if there is cause to believe that the reasons of such dismissal were based on labour organization membership or activities, or were not in conformity with the labour laws.
Section 19	The labour organizations have the right to send representatives to the Conciliation Body in settling a dispute between the employer and the worker. Similarly, they have the right to send representatives to the Conciliation Tribunals formed with the representatives from the various levels of labour organizations.
Section 20	In discussing with the Government, the employer and the complaining workers in respect of worker's rights or interests contained in the labour laws, the representatives of the labour organization also have the right to participate and discuss.
Section 21	The labour organizations have the right to participate in solving the collective bargains of the workers in accord with the labour laws.
Section 22	The labour organizations shall carry out peacefully in carrying out holding of meetings, going on strike and carrying out other collective activities in accordwith their procedures, regulations, by-laws and any directives prescribed by the relevant Labour Federation.

4.2.18. **Labor Dispute Settlement Law (28 Mar 2012 replacing 1929 version)**

This law was enacted for safeguarding the right of workers or having good relationship between employer and workers and making peaceful workplace or obtaining the rights fairly, rightfully and quickly by settling the dispute of employer and worker justly. It stipulates that employer in which more than 30 workers are employed shall form the workplace coordinating committee consisting of the representatives of workers and the representatives of employer.	
Section 38	No employer shall fail to negotiate and coordinate in respect of the complaint within the prescribed period without sufficient cause.
Section 39	No employer shall alter the conditions of service relating to workers concerned in sucg dispute at the consecutive period before commencing the dispute

	within the period under investigation of the dispute before the Arbitration Body or Tribunal, to affect the interest of such workers immediately.
Section 40	The project proponent has to not close the work without negotiation, discussion on dispute in accord with this law, decision by Tribunal
Section 51	The project proponent has to pay the compensation decided by Tribunal f violates any act or any emission to omission to damage the interest of labour by reducing of product without efficient cause.

4.2.19. **The Employment and Skills Development Law (2013)**

This law was enacted for safeguarding the right of workers or having skillful of workers and making peaceful workplace or obtaining the rights fairly, rightfully and quickly by settling the dispute of employer and worker justly. Employer shall conduct occupational training to enhance the skills of workers.	
Chapter (3) Making Contract of Employment Section 5	(a)(1) After the employer has employed a worker for any job, he shall within 30 days of so doing, sign a Contract of Employment with the worker. This clause however shall not apply to permanent workers of government departments and organizations. (2) If prior to employment, the worker is required to attend any per-employment training for a period or appointed on probation for a period, sub-section (1) shall not apply for that period. (c) The workplace rules in the Employment Contract shall conform to the rules made under existing laws and the rights of the workers in the Contract shall not be less than those in existing laws.
Chapter (5) Implementing Training Programs and Skills Development of Workers Section 14	Employer shall conduct occupational training to enhance the skills of workers who are to be employed as well as workers who are presently employed in accordance with the requirements of the enterprise and the policy of the Skills Development Agency.
Chapter (8) Establishing and Utilizing Workers' Skills Development Fund Section 30	(a) The employers of Industrial and Service Enterprises shall pay contribution to the fund every month without fail amounting to not less than below 0.5% of the payroll of his workers up to the level of supervisors of the workers. (b) The employer shall not deduct the contribution paid under sub-section (a) to the fund from the wages of the workers.

4.2.20. **The Minimum Wage Law (2013)**

The minimum wage law, passed in March 2013, was replaced the 1949 Minimum Wage Act. The law provides a framework for minimum wage determination: the presidential office establishing a tripartite minimum wage committee shall decide minimum wage with industrial variation based on a survey on living costs of workers possibly every two years. This also stipulates equal payment.	
Chapter VII The Duties of the Employee Section 12	The employer: (a)shall not pay wage to the worker less than the minimum wage stipulated under this Law (b)may pay more than the minimum wage stipulated under this Law; (c) shall not have the right to deduct any other wage except the wage for which it has the right to deduct as stipulated in the notification issued under this Law; (d) Shall pay the minimum wage to the workers working in the commercial, production and service business in cash. Moreover, if the specific, benefits, interests or opportunities are to be paid, it may be paid in cash 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 customer desire of the majority of

	workers or collective agreement. Such payment shall be for any personal use and benefit to the worker and his family and the value shall also be considerable and fair.
Section 13	The employer: (a) shall inform the workers the rates of minimum wage relating to the business among the rates of minimum wage stipulated under this Law and advertise it at the workplace to enable to be seen by the relevant workers; (b) shall prepare and maintain the lists, schedules, documents and wages of the workers correctly; (c) shall report the lists, schedules and documents prepared and maintained under 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; (e) shall allow the entry and inspection of the inspection officer to the commercial, production and service businesses, agricultural and livestock breeding workplaces and give necessary assistances; (f) if the workers cannot work due to sickness, shall give them holiday for medical treatment in accord with the stipulations; (g) if the funeral matter of the member of the family of worker or his parent occurs, shall give holiday without deducting from the minimum wage, in accord with the stipulations.
Chapter IX Assigning Duty to the Inspection Officer, Inspection and Taking Action Section 18	The inspection officer: (a)has the right to enter and inspect the relevant commercial, production and service work places, agricultural and livestock breeding workplaces and inspect whether or not they comply with and carry out in accord with the rules, notifications, orders, directives and procedures under this Law, whether or not the lists, schedules and documents, wages relating to the workers are prepared correctly, and whether or not such lists, schedules and documents are reported to the Department in accord with the stipulations; (b) May summon, inspect the relevant persons under the assignment of duty by the Department, asking and copying for the relevant lists, schedules and documents. (c)if there are outside workers at employer, has the right to inspect information relating to such outside workers, their names and addresses and the right to ask for and copy their lists and documents and lists relating to minimum wage; (d)in carrying out under sub-section (a),(b)and(c)relating to inspection, if required by the employer to produce the document, shall show the civil service identify car disused by the relevant department; (e)report to the Department in accord with the stipulations relating to the finding under sub-sections(a),(b)and(c),and documents and papers called for.

4.2.21. **Payment of Wages Law (2016)**

The Payment of Wage Act defines the payment obligation to the workers employed in the factories or railway administration. It stipulates the method of payment stating that the payment should be made in cash on a regular payday, and allows legal action against delayed payment or un-agreeable deduction.	
Chapter II Methods and Time of Payment of Wages Section 3	The employer: (a) shall pay wages to the workers employing in his business in local currency or foreign currencies stipulated by the Central Bank of Myanmar. Such payment may be paid in cash or cheque or deposit into the bank account of the worker with the agreement between the employer and the worker. (b) In paying such wages: (i) if it is necessary to pay particular benefit, profits and opportunities for workers working in commerce, production and service businesses, it may be

	paid in cash or some in cash and some in things set up by local price on own volition of workers in accordance with the stipulations. (ii) For workers employing in agriculture and livestock breeding business, it may be paid some wage in cash and something set up by local price according to custom, or on the volition of majority of worker or by collective agreement. In paying so, it shall be for personal use and the interest of his family, and shall be appropriate and equitable. (c) If any worker is conscripted under the Public Military Service Law, the (60) days of wages shall be paid as a special right
Section 4	The employer: (a) shall pay wages at the end of the work or at the time agreed to pay to the worker for hourly, daily, weekly or other part time work, or temporary or piece work; (b) shall not exceed one month than the period agreed with the worker under sub-section (a) to pay wages; (c) shall pay the wages for the permanent work monthly. In making such payment: (i) if workers are not more than 100, wages shall be paid at the end of the period for payment of wage; (ii) If workers are more than 100, it shall be paid no later than five days after the end of the period for payment of wage; (d) shall pay the due wages within two working days from the date of termination, if a worker is terminated; (e) shall pay the wages at the end of the period for payment of wages, if a worker resigns on his own volition by sending prior written notice of resignation; (f) shall pay the due wages to a legal heir within two working days after the decease, if a worker is deceased; (g) shall pay all wages on a working day
Section 5	If an employer encounters difficulty to make payment under sub-section(c) of the Section 4 due to any unexpected condition, including natural disaster, the employer shall submit that which date has been altered for the payment of wages with the consent of the workers to the Department on reasonable ground.
Chapter III Deduction from Wages Section 13	The employer: (a) may deduct from wages, except leaves which are entitled wages under the relevant law and public holidays, for the absent period from work; (b) may detect expenses which are allowance accommodation and ferry service are arranged by the employer, meal allowance, electricity charges, water service charges and income taxes liable to be paid by worker and cash paid in excess under a mistake, which are not included in the expression of wages under this Law; (c) may deduct advance payment or reimburse or savings for the worker or any contribution under any law demanded by a worker from wages; (d) may deduct from the wages of the worker under a decision of a Court or Arbitration Council or Arbitration Body.
Chapter IV Overtime Wages Section 14	The worker has the right to enjoy overtime wages stipulated by the law if he works over time.

4.2.22. **The Leave and Holidays Rules (1951, partially revised in 2018)**

This act has been used as the basic framework for leaves and holidays for workers with minor amendment in 2006 and 2014. This defines the public holidays that every employee shall be granted with full payment. It also defines the rules of leaves for workers including medical leave, earned leave and maternity leave.

Chapter (3) Leave Section 23	A worker has the right to take leave with respective wages or with respective salary according to the type of leave and designated period set-up by the law. However, workers are entitled to take earned leave with respective average wages or average salary.
Section 24	Workers have the right to take casual leave, medical leave or maternity leave within the probation period.
Section 25	For days in which a worker is not in the workplace after the end of a period of leave, such days shall not be counted as leave.
Section 26	If there are holidays just before or right after one's leave commences, these days cannot be counted as part of the leave period.
Section 27	Subjecting a worker to relocation, suspension of duty, reduction of salary or termination within their leave period is not allowed.
Chapter (4) Duties and Responsibilities of Worker Section 49	The worker (a) must ask for leave from the employer or the manager or from an authorized person with Form (1) within the normal working hours. (b) must report to the employer or to the manager or to an authorized person when the worker is back in the workplace after taking leave. (c) must inform employer or manager or authorized person, by phone or any other method, if the worker is unable to return to the workplace from their current location by the end of leave due to natural disaster or unforeseen happenings or accident occurring within the leave period.
Chapter (5) Duties and Responsibilities of an Employer Section 50	The employer (a) must provide the worker casual leave, medical leave and maternity leave with respective wages or salary. Moreover, must allow the worker earned leave with respective average wages or average salary. If the employer normally pays the cost of living, then the cost of living must also be included. (b) must provide the worker with earned leave starting from the day of entitlement within 12 months, with respective average wages or with average salary, and also must advance the entitled wage prior to the worker taking leave. (c) must announce the number of entitled earned leave calculations within three months starting from the last day of the 12-month period or entitled earned leave. In this way, workers can take leave by turns (alternatively). Moreover, to fix the eligibility period within which workers can take earned leave. (d) if the worker resigns or is terminated or in case of death, has to pay the respective wages/salary within two business/working days starting from the date of incidence. (e) has to pay the eligible wage/salary for earned leave to his/her official representative (if the worker is deceased). (f) has to pay for the respective earned leave period if there is a temporary or permanent shutdown. has to allow eligible earned leave if the nature of work is less than twelve months. (g) is not allowed to suspend, to reduce the salary, to relocate or to terminate a worker due to the worker taking maternity leave or medical leave. (h) has to fill up Form (1), (2), (3), (4), (5) and (6) according to the law. These forms shall be easily accessible from the Inspector. The employer must maintain these documents for up to twelve months' period. (i) has to record the leave taken in Form (7) and submit to the Inspector not later than every seventh day of each month.

	(j) wants the worker to work on a gazette holiday, the employer must receive consent from the worker. The employer must submit Form (8) to the Inspector for approval.

4.2.23. The Amended Law for Factories Act, 1951 (Amended in 2016)

Hygiene in Working Environment: 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.
Safety in Working Environment: Section 4	States responsibilities of employer and manager concerning with machine guarding, personal protective equipment, housekeeping, aisles and exits, chemical storage and fire protection system to avoid accident.

4.2.24. The Workmen's Compensation Act, 1923

It stipulates that employer is required to make payments to employees who become injured or who die in any accidents arising during and in consequence of their employment. Such compensation also must be made for diseases which arise as a direct consequence of employment, such as carpal tunnel syndrome.	
Chapter IV Determining the Categories of Work Section 6	The National Committee shall determine, by notification, commercial, production and service, agricultural and livestock breeding business which shall be applied by the provisions relating to minimum wage contained in this Law, in the whole country or relevant Union, Region or State. Moreover, it may amend the said businesses in accord with the changing situation from time to time.
Chapter VII The Duties of the Employer Section 12	The employer: (a) shall not pay wage to the worker less than the minimum wage stipulated under this Law; (b) may pay more than the minimum wage stipulated under this Law; (c) shall not have the right to deduct any other wage except the wage for which it has the right to deduct as stipulated in the notification issued under this Law; (d) shall pay the minimum wage to the workers working in the commercial, production and service business in cash. Moreover, if the specific benefits, interests or opportunities are to be paid, it may be paid in cash or partly in cash and partly in property, with prevailing regional price, jointly according to the desire of the worker; (e) in paying minimum wage to the workers working in the agricultural and livestock business, some cash and some property at prevailing regional price may be paid jointly according to local custom or desire of the majority of workers or collective agreement. Such payment shall be for any personal use and benefit of the worker and his family and the value shall also be considerable and fair.
Section 13	The employer: (a) shall inform the workers the rates of minimum wage relating to the business among the rates of minimum wage stipulated under this Law and advertise it at the workplace to enable to be seen by the relevant workers; (b) shall prepare and maintain the lists, schedules, documents and wages of the workers correctly; (c) shall report the lists, schedules and documents prepared and maintained under 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; (e) shall allow the entry and inspection of the inspection officer to the commercial, production and service businesses, agricultural and livestock breeding workplaces and give necessary assistances;

	(f) if the workers cannot work due to sickness, shall give them holiday for medical treatment in accord with the stipulations; (g) if the funeral matter of the member of the family of worker or his parent occurs, shall give holiday without deducting from the minimum wage, in accord with the stipulations.
Chapter IX Assigning Duty to the Inspection Officer, Inspection and Taking Action Section 18	The inspection officer: (a) has the right to enter and inspect the relevant commercial, production and service workplaces, agricultural and livestock breeding workplaces and inspect whether or not they comply with and carry out in accord with the rules, notifications, orders, directives and procedures under this Law, whether or not the lists, schedules and documents, wages relating to the workers are prepared correctly, and whether or not such lists, schedules and documents are reported to the Department in accord with the stipulations; (b) may summon, inspect the relevant persons under the assignment of duty by the Department, asking and copying for the relevant lists, schedules and documents. (c) if there are outside workers at employer, has the right to inspect information relating to such outside workers, their names and addresses and the right to ask for and copy their lists and documents and lists relating to minimum wage; (d) in carrying out under sub-section (a), (b) and (c) relating to inspection, if required by the employer to produce the document, shall show the civil service identify card issued by the relevant department; (e) Report to the Department in accord with the stipulations relating to the finding under sub-sections (a), (b) and (c), and documents and papers called for.

4.2.25. **Animal Health and Development Law (1993)**

Chapter IV Inspection of Animal Feed for Domestic Scale Section (5)	The Director General may Inspection animal feed for domestic sale in the prescribed manner Prohibit further scale of animal feed if it is found that the animal feed for sale is harmful to animals Make a list of animal feed sellers
Section (6)	A person who sells animal feed shall, in respect of the animal feed he sells Submit for inspection by the Department Abide by the prohibition made by the Department in accordance with the Law
Section (22)	If a person who sells animal feed commits any of the following act, he shall on conviction be punishable with fine which may extend to kyats 5,000 or with imprisonment for a term which may extend to 6 months or with both Refusing to submit for inspection by the Department of the animal feed for sale Selling animal feed prohibited by the Department from further sale.

4.2.26. **The Export and Import Law (2012)**

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

4.2.27. **The Law on Standardization (2014)**

Chapter (IX) Offences and Penalties Section 25	**Any person who commits any of the following acts shall, on conviction, be punished with imprisonment for a term not exceeding three years or with fine not more than three million Kyats or with both:**

	(c) advertising, selling or possessing in order to sell any product or advertising or carrying out any service that is not in conformity with mandatory standard prescribed by the Council knowingly or likely to know
Chapter (IX) Offences and Penalties Section 26	If any person who obtained certificate of certification uses standardization mark on the product which is not in conformity with the relevant standard or relating to service shall be punished with imprisonment for a term not exceeding one year or with fine not more than one million Kyats or with both.

4.2.28. **Underground Water Act (21st June, 1930)**

The underground water act enacted on the date of 21st June in 1930 whereas it is expedient to conserve and protect underground sources of water supply in the Union of Burma. This act prohibits sinking of 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. Township Officer or sub-divisional officer had power to close a license tube after exercising jurisdiction over the local area concerned and the expense of such closure shall be recoverable from the owner of the tube as if it were an arrear of land-revenue.	
Section 3	No person shall sink a tube for the purpose of obtaining underground water except under and in accordance with the terms of a licence granted by the water officer. Every person owning a tube which was in existence before the extension of this Act to the local area concerned shall apply to the water officer for a licence for the said tube, and such licence shall be granted free of charge.
Section 6	The President of the Union may make rules 1- (a) prescribing the conditions subject to which licences may be granted by the water officer under section 3; (b) prescribing the form of and the procedure for granting such licences and the fees payable for the issue thereof; (c) Prescribing the information to be supplied to the water officer under section 5.

4.2.29. **Myanmar Engineering Council Law, 2013**

Chapter 2 Objectives Section 3	The Objectives of this law are as follows: (a) to develop the dignity, ethical principles and ability of Myanmar citizen engineers, graduate technologists and technicians who are working in the engineering services (b) to explore beneficial, useful and good methods to research and develop the State's natural resources and human resources with the least environmental impact by a combination of engineering technology and information technology; (c) to guide, control, maintain and take necessary action with regard to specified standards and norms relating to specified subjects, systematic methods, safety and ethical principles and duties in teaching engineering subjects and in technological research and services; (d) to perform engineering and technological activities of the State and tasks assigned by the relevant ministry or organization from time to time;
Chapter 13 Prohibitions and Penalties Section 37	No one shall perform any engineering work and technological work which are specified as being dangerous to the public by a rule enacted under this law without having received a registration certificate issued by the council, except for engineers appointed in a government department or an organization in the performance of their duties.
Section 37	No engineer, graduate technologist and technician shall use, together with his name, a title which is not compatible with his status.
Section 38	No registered engineer, graduate technologist and technician-

	(a) shall transfer his registration certificate to anyone or allow it to be used by anyone; (b) shall fail to return his registration certificate to the council within 30 days from the day on which a decision is passed, or an administrative action is taken, under this law to cancel the registration certificate.
Section 39	Anyone convicted of having violated the prohibition contained in section 37 shall be punished with imprisonment for not more than 2 years or with a fine or with both.
Section 40	any registered engineer, graduate technologist or technician convicted of having violated the prohibition contained in section 38 shall be punished with imprisonment of not more than 1 year or with a fine or with both.
Section 41	Any registered engineer, graduate technologist or technician convicted of having violated the prohibition contained in 39 shall be punished with imprisonment of not more than 1 year or with a fine or with both.
Section 42	Any registered engineer, graduate technologist or technician convicted of having violated any prohibition under this law shall be punished with imprisonment of not more than 6 months or with a fine or with both.

4.2.30. **The Conservation of Water Resources and Rivers Law, 2016**

Chapter II Aims Section 3	The aims of this Law are as follows: (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.
Chapter V Prohibitions Section 8	No person shall: (a) carry out any act or channel shifting with the aim to ruin the water resources and rivers and creeks. (b) cause the wastage of water resources wilfully.
Section 11	No person shall: (a) dispose of engine oil, chemical, poisonous material and other materials which may cause environmental damage, or dispose of explosives from the bank or from a vessel which is plying, vessel which has berthed, anchored, stranded or sunk.
Section 19	No one shall dispose of any substance into the river-creek that may cause damage to waterway or change of watercourse from the bank or vessel which is plying, vessel which has berthed, anchored, stranded or sunk.
Section 22	No one shall, without the permission of the directorate, pile sand, shingle and other heavy materials for business purposes in the bank area and waterfront area.
Chapter VI Penalties Section 29	Whoever attempts or conspires or abets in the commission of an offence under this Law shall be punished with the punishment provided for such offence in this Law.
Chapter VII Miscellaneous Section 30	Any government department and organization or any person desirous of constructing drainage, utilizing river water intake, constructing bridges spanning rivers, connecting underground pipe, connecting underground electric power cable, connecting underground telecom cable or digging in rivers and creeks, bank boundary and waterfront boundary, under the requirement of work, shall in order not to adversely affect the water resources

	and rivers and creeks, carry out only after obtaining the approval of the Ministry of Transport.

4.2.31. **Aquaculture Law (1989)**

အခန်း (၈) တားမြစ်ချက်များ ဥပဒေပုဒ်မ (၂၉)	(ခ)ငါးလုပ်ငန်းရေပြင်တွင် ရေကြောင်းသွားလာမှု နှင့် ရေစီးရေလာများကို အဟန့်အတားဖြစ်စေခြင်း သို့မဟုတ် ရေကို ညစ်ညမ်းစေခြင်း၊ သို့မဟုတ် ထိုသို့ပြုလုပ်ခြင်းကို အားပေးကူညီခြင်း။

4.2.32. **Protection and Preservation of Cultural Heritage, 1998**

Chapter II Objectives Section 3	The objectives of this Law are as follows: (a) to implement the protection and preservation policy with respect to perpetuation of cultural heritage that has existed for many years; (b) to protect and preserve the cultural heritage regions and the cultural heritage therein so as not to deteriorate due to natural disaster or man-made destruction; (c) to uplift hereditary pride and to cause dynamism of patriotic spirit of citizens by protecting and preserving the cultural heritage regions. (d) to promote public awareness and will as to the high value of the protection and preservation of the cultural heritage regions; (e) to protect the cultural heritage regions from destruction; (f) to carry out protection and preservation of the cultural heritage regions in conformity with the International Convention approved by the State.
Chapter VI Applying for Prior Permission, Scrutinizing and Issuing Section 13	A person desirous of carrying out one of the following shall abide by the provisions of other existing laws and also apply to the Department in accordance with stipulations to obtain prior permission under this Law : (a) within the ancient monumental zone or the ancient site zone: (1) constructing or extending a building; (2) renovating the ancient monument or extending the boundary of its enclosure; (b) within the protected and preserved zone, constructing, extending, renovating a hotel, motel, guesthouse, lodging house or industrial building or extending the boundary of its enclosure; (c) within the cultural heritage region (1) carrying out the renovation and maintenance work of the ancient monument without altering the original ancient form and structure or original ancient workmanship; (2) carrying out archaeologica4 excavations; (3) building road, constructing bridge, irrigation canal and embankment or extending the same.
Chapter VII Prohibitions Section 22	No person shall construct a building which is not in conformity with the conditions prescribed region wise by the Ministry of Culture in the cultural heritage region.

4.2.33. **The Protection and Preservation of Ancient Monument Law (2015)**

Purpose	To ensure the protection of the ancient monument and information about it if it was in the project area. This law focuses as follows;
Section 12	The project proponent has to report to the village-tract or ward administrators if the project proponent will find any ancient monument under the ground or on the ground or under the water.

4.2.34. The Commercial Tax Law (1990) Amended 2014

Chapter 5 Registration and Intimation of Commencement of Enterprise Article 11 (b)	Any Person who commences operation of a goods production enterprise or service enterprise shall furnish letter of intimidation on the commencement of the operation as such to the relevant Township Revenue Officer as stipulated by regulations.
Chapter 6 Monthly Payment of Tax and Sending of Three-Monthly Return Article 12 (a)	Any person who has taxable proceed of sale or receipt from service within a year, shall pay due monthly tax within ten days after the end of the relevant month. Moreover, a three-monthly return shall be furnished to the relevant Township Revenue Officer within one month after the end of relevant three-month.
Article 12 (b)	The Township Revenue Officer may intimate any person to pay due monthly tax and send three-monthly return if there is cause to consider that he has taxable proceed of sale or receipt from service within a year.
Article 12 (c)	If it is failed to pay tax under sub-section (a) or (b), or if there is cause to consider that the tax paid is less than the tax payable, the Township Revenue Officer may, based on the information received, estimate and claim the tax payable or the additional tax payable.
Article 12 (d)	The tax paid under sub-section (a), (b) or (c) shall be set-off from the tax due in the assessment.
Article 12 (e)	The tax payable on goods imported under sub-section (c) of section 4 of the Law shall be collected together with the customs duties by the Customs Department in accord with the manner of collecting customs duties.

4.2.35. The Prevention of Hazard from Chemical and Related Substances Law, 2013

Chapter II Aims Section 3	This law was enacted with the objectives of: a. To protect from being damaged the natural environment resources and being hazardous any living beings by chemical and related substances; b. To supervise systematically in performing the chemical and related substances business with permission for being safety; c. To perform the system of obtaining information and to perform widely educative and research for using the chemical and related substance systematically; d. To perform the sustainable development for the occupational safety, health and environmental conservation. Regarding the chemical management and storage, currently, regulations governing chemicals management are divided between various Acts, mostly dating from colonial times; hence the legislation is in many respects related to the British framework. The Factory Act and the Public Health Act contain the provisions for chemicals management and storage. Some chemicals are likely to require permits.
Section 15	A person who has obtained a licence, before starting the respective chemical and related substances business: - (a) shall be inspected for the safety and the power of resistance of the machinery and equipment by the respective Supervisory Board and Board of Inspection; (b) shall be attended the person who serve in the work to the respective foreign trainings or the trainings and the expert trainings on prevention of hazard from the chemical and related substances opened by the government department and the government organizations.
Section 16	A person who has obtained a licence: - (a) shall abide the licence regulations; (b) shall perform to abide strictly the instructions for being safety in using the chemical and related substances by himself and also the persons who serve the work;

	(c) shall keep the required safety equipment enough in the chemical and related substances businesses, furthermore shall grant the personal protection equipment and dresses free of charge to the working persons; (d) shall make the course of training and study and instruction if necessary to the working persons for using the occupational safety equipment, the personal protection equipment and the dresses systematically in the chemical and related substances business; (e) shall be inspected by the respective Supervisory Board and Boards of Inspection in respect of whether or not the hazard may impact on the Human Being and Animals' health and the environment; (f) shall make medical checkup the working persons who will work in the chemical and related substances business and shall permit to serve in that work after obtaining the recommendation that his health is suitable for that work. This medical checkup records shall be kept systematically; (g) shall send the copy of informative letter of the permission to the respective Department of Township Administration, if the hazardous chemical or related substances are permitted to store; (h) shall acquire in advance the guidance and agreement of the respective Department of Fire Brigade, if the business that is worried to fire hazard is operated by using the fire hazard substances or the explosive substances; (i) shall transport only the permitted amount of the chemical and related substances in accordance with the prescriptive stipulations, if they are transported in local; (j) shall take the permission from the Central Supervisory Board if the chemical and related substance is altered and transferred from one place to any other place which contained in the license; (k) shall abide and perform in accordance with the related environmental laws not to impact and damage to the environment in operating the chemical and related substances business.
Section 17	A person who has obtained a licence, shall put the insurance in accordance with the prescriptive stipulations to be able to pay the compensation, if the impact and damage is occurred on the Human Being and Animals or the environment in respect of the chemical and related substances businesses.
Section 22	A person who has obtained the registration certificate shall abide the regulations consisted in the registration certificate furthermore shall also abide the order and instructions issued occasionally by the Central Supervisory Board.
Chapter IX Hazard Control and Decrease Section 27	A person who has obtained the licence to be complied the following matters to control and decrease the hazard of the chemical and related substances: - (a) classifying the hazard level to protect in advance the hazard according to the properties of the chemical and related substances; (b) expressing the Material Safety Data Sheet and Pictogram; (c) providing the safety equipment, the personal protection equipment to protect and decrease the accident and attending to the training to be used systematically; (d) performing in accordance with the stipulations in respect of transporting, possessing, storing, using, discharging the chemical and related substances;

4.2.36. **Petroleum and Petroleum Product Law (2017)**

Chapter II Objective Section 3	The Objectives of this law are as follows: a.to carry out the petroleum and petroleum product businesses activities systematically in accordance with the provisions of the law, stipulated standards, procedures and conditions; b.to enable the petroleum and petroleum product business activities to carry out safely without environmental impact; c.to establish free and fair competition in carrying out petroleum and petroleum product business activities; d.to secure energy requirement and energy security of the Union;

	e.to obtain tax revenue of the Union
Chapter IV Application for Licence, Issue of Permit, Determining Conditions to be abided by, and Supervision Section 9	The Ministry of Transport and Communications shall carry out the following functions relating to any petroleum and petroleum product; a. issuing licence to vehicles, vessels and barges that carry any petroleum and petroleum product; b. determining period, form, conditions, means of applying for licence, permitting authority and fees to be assessed, for licences under subsection (a); c. determining and supervision on ports for vessels and barges that carry out import, export, and transport by water in accord with procedures; d. taking action, as necessary, in accordance with the existing laws if it occurs spill or accident in carrying out import, export, transport, and sale and distribution of petroleum and petroleum product by water; e. determining procedures and conditions to be abided by in carrying out transport business except transport by pipeline.
Section 10	The Ministry of Natural Resources and Environmental Conservation shall carry out the following functions relating to any petroleum and petroleum product; a. issuing licence for the right to store for the storage tanks and warehouses; b. issuing transport permit for the vehicles, vessels and barges that shall carry any petroleum and petroleum product; c. determining the period, form and terms and conditions, manners of applying licence, permitting authority and fees to be assessed, for licence under subsection (a) and permit under subsection (b); d. if it occurs environmental impacts in carrying out petroleum and petroleum product business activities, taking action, as necessary, in accordance with the existing laws of on-site inspection; e. determining, in coordination with ministries concerned, procedures and conditions relating to standard and quality of storage tanks and warehouse, and tanks of vehicles, vessels and barges that carry any petroleum and petroleum product.
Section 11	On all receptacles containing any dangerous petroleum and petroleum product, the warning sign of danger by stamping, embossing, painting, printing or any other means shall be expressed. If it is impossible to express as such, similar warning signs of the nature of danger of gasoline, spirit or petroleum shall be expressed in writing at the ostensible place in salient words or signs near the receptacle.
Chapter VI Prohibition Section 31	Any licensee: a. shall not violate any prohibition contained in the rules, regulations, bye-laws, notifications, orders, directives, procedures and conditions or fail the duty to implement; b. shall not use a receptacle and transport vehicles and pipelines that contains any dangerous petroleum and petroleum product without saliently mentioning in writing of warning signs; c. shall not import, transport, store and sell and distribute the dangerous petroleum and petroleum product, or non-dangerous petroleum and petroleum product except by the means stipulated in this law; d. shall not have the right to carry out without undertaking the environmental impacts, in operating petroleum and petroleum product business activities; e. shall not distribute and sell petroleum and petroleum products which do not fulfill or are not in conformity with the standard, quality and measurement.

4.2.37. **Industrial Use Explosive Substances Law, 2018**

Objective:	The objectives of Industrial Use Explosive Substances Law (2018) are as follow:

	(a) to make, import, transport, store and use of exploiting materials that explode in the workplace must be carefully handle and use. (b) to take care of safety in the workplace which use yarns and accessories (c) to properly supervise the use of explosive materials in the workplace.
Chapter 7 Prohibitions Article 18	Any license holder shall not be refused to perform the inspection of the inspector or the inspector general.
Article 19 (b)	Under Section 8, any explosive materials shall not be destroyed materials without the approval of the Defense Ministry's Executive Board.
Article 19 (c)	Rules and Regulations, orders, disciplines, instructions issued under this law must not fail to act.

4.2.38. **The Social Security Law (2012)**

The Social Security Law, enacted in 2012, was amended the Social Security Act in 1954. It stipulates the formation and implementation of social security systems.	
Chapter II Objectives Section 3	The objectives of this Law are as follows: (a) to support the development of the State's economy through the development of production by causing to enjoy more security in social life and health care by the workers who are major productive force of the State by the collective guaranty of the employer, worker and the State; (b) to enjoy more security in social life and medical care by the public by effecting their insurance voluntarily; (c) to raise public confidence upon the social security scheme by providing benefits which are commensurate with the realities; (d) to have the right to draw back some of the contributions paid by the employers and the workers as savings, in accord with the stipulations; (e) to obtain the right to continued medical treatment, family assistance benefit, invalidity benefit, superannuation benefit, survivors' benefit, unemployment benefit, the right to residency and ownership of housing after retirement in addition to health care and pecuniary benefit for sickness, maternity, death, employment injury of the workers.
Chapter V Social Security System and Benefits Section 11	(a) The following establishments shall be applied with the provisions for compulsory registration for social security system and benefits contained in this Law if they employ minimum number of workers and above determined by the Ministry of Labour in co-ordination with the Social Security Board: (i) production industries doing business whether or not they utilize mechanical power or a certain kind of power, works of production, repairing or services, or engineering works, mills, warehouses, establishments; (ix) works carried out with foreign investment or citizen investment or joint ventured businesses; (b) Any establishment which is applied with the provisions of compulsory registration under sub-section (a) shall continue to be applied by this Law even though any of the following situations occurs if it continues to carry out such work: (i) carrying out work by employing under stipulated minimum number of workers but more than one worker; (ii) changing the employer or changing the type of business.
Social Security System Section 13	The Social Security Board shall manage and keep the following social security systems in accord with the stipulations that insured persons may enjoy social security benefits: (b) Family Assistance Insurance System:

	i) education allowance benefit for the children of insured persons who earn below the specified amount of income; ii) health care and aid benefit in time of natural disaster; iii) suitable benefit for dependent family members.
Section 15	(a) The following funds are included in the Social Security Fund: (i) health and social care fund; (ii) family assistance fund; (iii) invalidity benefit, superannuation pension benefit, and survivors' benefit fund; (iv) unemployment benefit fund; (v) other social security fund for social security system of compulsory registration and contribution specified by the Ministry of Labour, in co-ordination with the Social Security Board, according to clause (2) of subsection (e) of section 13; (vi) other social security fund specified as to which contribution may be paid after voluntary according to clause (2) of sub-section (e) of section 13; (vii) fund for Social Security Housing Plan;
Section 18	(b) The employer shall deduct contributions to be paid by worker from his remuneration and pay to the social security fund together with contribution to be paid by him. The employer shall also bear the expenses for such contribution.
Chapter VI Application to Employment Injury Benefit Insurance System, Employment Injury Benefit Fund and Benefits Section 45	The provisions contained in this Law relating to the employment injury benefit insurance system shall apply to the following workers: (a) workers at establishments which are applied to social security system who have registered compulsorily in accord with sub-section (a)of section 16 and contributed to the social security funds contained in clauses (1), (3), (4) and (5) of sub-section (a) of section 15; (b) workers specified as being applied to provisions of compulsory registration for employment injury benefit insurance system by notification of the Ministry of Labour, in co-ordination with the Social Security Board with the approval of the Union Government.
Section 48	(a) The employer shall affect insurance by registering for employment injury benefit insurance system contained in section 45 at the relevant township social security office and pay contribution to employment injury benefit fund in accord with stipulations in order that workers applied to provisions of compulsory registration may obtain the employment injury benefits; (b) The employers may affect insurance by registering voluntarily for insurance of the workers who are not applied to provisions of compulsory registration for employment injury benefit insurance system, by paying stipulated contribution to employment injury benefit insurance fund; (c) When registering to effect insurance for employment injury benefit in accord with sub-sections (a) and (b), the worker shall submit medical certificate.
Section 49	Non-application to the Workmen's Compensation Act (a) The employers and insured persons of establishments where the employer had registered compulsorily in accordance with sub-section (a) of section 48 or where the employer had registered voluntarily in accord with sub-section (b) of section 48 who have paid contribution to employment injury benefit fund shall not apply to the provisions contained in the Workmen's Compensation Act as regards the employment injury benefit; (b) The insured persons who has affected insurance for employment injury benefit in accord with sub-sections

	(a) and (b) of section 48 shall be entitled only to the employment injury insurance benefits contained in this Law.
Section 53	(a) 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;
Section 75	The employer of establishments applied by this Law: (a) shall prepare and keep the following records and lists correctly and submit to the relevant township social security office in accord with the stipulations: i) records and lists of workers' daily attendance; ii) records of appointing new worker, employing worker by changing of work, suspension from work, dismissal from work and resignation from work; iii) records of promotion and paying remuneration; iv) records and lists of employers, managers, and administrators; and records of changes of them; (b) shall inform the relevant township social security office if the following matters arise: i) change in number of workers and address of establishment; ii) change of employer, change of business, suspension from work, and termination of work; iii) employment injury, employment death, and occupational diseases; (c) shall produce work records and lists on requirement of inspection team or official assigned duty under this Law by the Social Security Head Office and various Regional Social Security Offices.

4.2.39. **Occupational Safety and Health Law (2019)**

Purpose:	To effectively implement measures related to safety and health in every industry and to set occupational safety and health standards;
Section-26 Sub-section (e)	The project proponent has to provide adequate and relevant personal protective equipment to workers free of charge and make them wear it during work so as not to expose workers to any serious occupational diseases or hazards.
Section-26 Sub-section (1)	The project proponent has to arrange and display occupational safety and health instructions, warning signs, notices, posters, and signboards.
Section-30 Sub-section (a)	The worker shall wear or use at all times any protective clothes, equipment and tools provided by the employer for the purpose of safety and health.
Section-30 Sub-section (d)	The worker shall proper and systematic use any equipment and tools, machines, any parts of the machines, vehicles, electricity and other substances being used at the workplace.
Section-30 Sub-section (e)	The worker shall take reasonable care for the safety and health of himself/ herself and of other persons who may be affected by his/ her acts or omissions at work.

4.2.40. **Natural Disaster Management Law (2013)**

Chapter II Objectives Section 3	The objectives of this Law are as follows: (a) to implement natural disaster management programmes systematically and expeditiously in order to reduce disaster risks;

	(b) to form the National Committee and Local Bodies in order to implement natural disaster management programmes systematically and expeditiously; (c) to coordinate with national and international government departments and organizations, social organizations, other non-government organizations or international organizations and regional organizations in carrying out natural disaster management activities; (d) to conserve and restore the environment affected by natural disasters; (e) to provide health, education, social and livelihood programmes in order to bring about better living conditions for victims.
Chapter VI Natural Disaster Management Section 13	The department, organization or person that has been assigned responsibility under this Law: (a) shall undertake the following functions after laying down the plan in accord with the natural disaster management plans in order to reduce damage and losses that are likely to be caused by natural disaster; (i) preparatory and preventive measures for natural disaster risk reduction in pre-disaster period; (ii) emergency responses including search and rescue during natural disaster; (iii) rehabilitation and reconstruction activities for improving better living standard in post disaster period and conservation of the environment that has been affected by natural disaster; (b) shall give priority and protect infants, the elderly, the disabled and women (especially pregnant women or mothers and suckling mother) in carrying out the functions contained in sub-section (a); (c) shall refrain from the act that causes injuring human dignity in supporting the victims.
Chapter VIII Offence and Penalties Section 25	Whoever, if the natural disaster causes or is likely to be caused by any negligent act without examination or by willful action which is known that a disaster is likely to strike, shall be punished with imprisonment for a term not exceeding three years and may also be liable to fine.
Section 26	Whoever interferes, prevents, prohibits, assaults or coerces any natural disaster management to the department, organization or person assigned by this Law shall, on conviction, be punished with imprisonment for a term not exceeding two years or with fine or with both.
Section 27	Whoever misinforms about the natural disaster for the purpose of dread to the public shall, on conviction, be punished with imprisonment for a term not exceeding one year or with fine or with both.
Section 28	Any department, organization or person assigned by this Law commits any of the following acts or omissions shall, on conviction, be punished with imprisonment for a term not exceeding one year or with fine or with both: (a) falsification of data on damage and losses caused by natural disasters dishonestly; (b) willful failure to perform assigned responsibility.
Section 29	Whoever violates any prohibition contained in rules, notifications and orders issued under this Law shall, on conviction, be punished with imprisonment for a term not exceeding one year or with fine or with both.
Section 30	Whoever commits any of the following acts or omissions shall, on conviction, be punished with imprisonment for a term not exceeding one year or with fine or with both: (a) willful failure to comply with any of the directives of the department, organization or person assigned by this Law to perform any of the natural disaster management; (b) entering into the area or building affected by natural disaster without permission;

	(c) utilizing, trading, preventing or destroying food, relief items and rehabilitation materials provided for victims dishonestly; (d) making a false application for food, relief items and rehabilitation materials or cash assistance to the department, organization or person assigned by this Law as it is affected by natural disaster.
Section 31	Whoever fails willfully to comply with the direction of remove or evacuation from an area or building at risk natural disaster to the public in such place for the purpose of reduction of damage and losses when the natural disaster strikes or it will be a natural disaster and for the purpose of no obstruction to the prevention and reduction activities of the natural disaster shall, on conviction, be punished with imprisonment for a term not exceeding one month or with fine or with both.

4.2.41. **Facts about YCDC (2014)**

Yangon City Development Committee (YCDC) is the administrative body of Yangon which covers a total land area of 306.73 square miles. To maintain and develop the city within its territory, YCDC carries out the following duties and responsibilities:

- Drawing and implementing land policies, administration of lands, developing and enforcing planning controls, protection of heritage buildings, regulation of construction sites.
- Construction and maintenance of parks, gardens, playgrounds, recreation centers.
- Promoting events and exhibitions to enhance the work of YCDC.
- Proving parking spaces for vehicles and reducing traffic congestion.
- Construction, maintenance, upgrading and administration of markets.

4.2.42. **Myanmar Fire Brigade Law, 2015**

Chapter II Objectives Section 3	The objectives of this Law are as follows: (a) to prevent destruction of State-owned property, private property, cultural heritage and the lives and property of the public by fire and other natural disaster; (b) to organize the Fire brigade systematically and to train members of the fire brigade; (c) to carry out extinguishing fire, prevention and search and rescue when fire, other natural disaster, epidemic disease or any kind of sudden disaster occurs; (d) to educate, organize and incite extensively so as to achieve public cooperation when any disaster occurs; (e) to participate and help, if necessary, for the State safety, peace of the public and the rule of law
Chapter VIII Activities for Fire Safety Section 15	The different levels of Fire Safety Body shall: (a) perform the activities for fire safety in accord with the procedures laid down by the Central Body; (b) organize and educate to obtain the cooperation of the public in the activities for fire safety; (c) supervise as may be necessary the participation of all the relevant members of fire brigade in accord with the work programmes laid down by the Central Body when fire hazard, other natural disaster, epidemic disease or sudden disaster occurs; (d) appoint fire safety warning groups in coordination with the relevant administrative organizations.
Section 16	The person-in-charge of the Township Fire Services Department shall: (a) issue, from time to time, the directives on fire safety to be abided by the residents in the city, ward or village - tract;

	(b) inspect or cause to inspect in accord with the stipulations whether the residents in the city, ward or village - tract abide by the directives issued under sub-section (a) and arrange to enable warning or taking action, as may be necessary, against those who do not abide by.
Chapter XI Prohibitions Section 24	No person shall fail to abide by the directives of fire safety issued under section 16 by the head of the relevant Township Department of Fire Services.
Section 25	The owner or manager of the factory, workshop, bus terminal, airport, port, hotel, motel, lodgings, condominium, market, department, organization or business exposed to fire hazard shall, in accord with the directive of the Department of Fire Services: (a) not fail to form the Reserve Fire Brigade; (b) not fail to provide fire safety equipment.
Section 26	No person shall, knowing that there is no outbreak of fire, report fraudulently the outbreak of fire to the Fire brigade.
Section 25	No person shall, without cause, obstruct, block, disturb, or attack the members of the fire brigade and vehicles which departed to extinguish the fire and direct by any means to the place which is not related to the outbreak of fire.

4.2.43. **The Electricity Law (2014)**

In 2014, the new Electricity Law, a comprehensive piece of legislation covering licensing, a new regulatory commission, standards, inspection, tariff, and restrictions, replaced the Electricity Law of 1984. The Electricity Law divides projects into “small” (up to 10 MW), “medium” (between 10 MW to 30 MW) and large (upwards of 30 MW); the states and regions can issue permits for small and medium power plants. In case these plants are not connected to the national grid, the Union Government Ministry is not the primary authority involved. The authorities have a legal right to use land for the purpose of power plants under the Electricity Law, and have the right to expand and maintain their facilities. The law also provides that the authorities can build transmission lines in accordance with existing laws.	
Purpose	To ensure compliance with the conditions of permission for productions of in line with the above law.
Section 10 (b)	The project proponent will implement the project with the best practices to reduce the damages on the environment, health and socio-economy also will pay compensation for the damages and will pay the fund for environmental conservation.
Section 18	The project proponent has to take the certificate of electric safety, issued by the chief-inspector, before the commencement of power generation.
Section 21 (a)	The project proponent has to be liable for damages to any person or enterprise by failure to abide by the quality standards or rules, regulation, by-law, order, and a directive issued
Section 22 (a)	The project proponent has to be liable for damages to any person or enterprise by the negligence of project owner.
Section 26 (a, b)	The project owner has to comply with the permission for electric searching and generation.
Section 27	The project proponent will inform promptly to chief-inspector and head officer of related office while occurring of accident in electricity generation.
Section 40	The project proponent will comply with the standards, rules, and procedure. Moreover, will allow the inspection by respected governmental department and organization if it is necessary.
Section 68	The project proponent will pay the compensation to anyone who is injured or caused to death in electric shock or fire caused by the negligence or omitting of the project owner or representative of the project owner.

4.2.44. The Motor Vehicles Law, 2015

Chapter 2 Objectives Section 3	The main objectives of this law are as follows: (a) For the safe driving of motor vehicles in public areas through registration according to official rules and regulations. (b) To provide driving licenses for driving particular types of motorized vehicles after qualification checks. (c) For the easy flow of road users and for the protection against road risks and vehicle perils. (d) To avoid traffic congestion and to use high technology transportation systems efficiently in order to implement protection against road risks and vehicle perils. (e) To reduce environmental pollution caused by motor vehicles.
Chapter (3) Motor vehicle registration Section 4	Every owner of a motor vehicle must register the vehicle with the registration officer.
Section 5	The owner of a motor vehicle must maintain the vehicle in a safe condition equal to the standard condition.
Section 6	The registration officer may not register the motor vehicle if the vehicle is disqualified for failing to comply with safety standards or the engine is broken or if the applicant has failed to disclose previous facts about former registrations of the vehicle.
Section 8	(a) The owner of the vehicle can request the registration officer to issue a temporary registration according to the regulations. (b) The temporary registration according to this section cannot be valid for more than three months. And this law does not allow temporary registration more than one time.
Section 10	The owner of a vehicle must notify the registration officer if the main parts of his/her vehicle needs to be changed or repaired.
Chapter (9) Prohibitions Section 45	No one is allowed to drive, request someone to drive, or park, motor vehicles in public places under the following conditions: (a) The motor vehicle is not registered. (b) The registration has been suspended, revoked or expired; the registration card is not displayed. (c) The registration card has been revoked or is expired.
Section 46	No one is allowed to drive, or allow to drive, motor vehicles in public places without risk insurance for others. This prohibition does not extend to passengers.
Section 47	(a) No one is allowed to drive a motor vehicle in public places without carrying the driving license with him/her. (b) No one is allowed to drive a motor vehicle in public places without a driving license. (c) The owner of, and the person responsible for, a motor vehicle are not allowed to give permission to someone without a driving license to drive in public places.
Section 50	No one is allowed to do the following in public places: (a) Driving above the speed limit or below the minimum speed. (b) Driving a motor vehicle which endangers others. (c) Driving a motor vehicle after the consumption of narcotic drugs or alcohol.
Section 50	No one is allowed:

	(a) To operate a business of manufacturing, selling or equipping motor vehicles without a business license. (b) To operate a business of maintaining or repairing motor vehicles without a business license.

4.2.45. The Forest Law, 3rd November, 1992

Chapter II Basic Principles Section 3	This Law shall be implemented in accordance with the following basic principles: - (a)to implement the forestry policy of the Government; (b)to implement the environmental conservation policy of the Government; (c)to promote the sector of public co-operation in implementing the forestry policy and the environmental conservation policy of the Government; (d)to develop the economy of the State, to contribute towards the food, clothing and shelter needs of the public and for perpetual enjoyment of benefits by conservation and protection of forest; (e)to carry out in accordance with international agreements relating to conservation of forests and conservation of environment; (f)to prevent the dangers of destruction of forest and bio-diversity, outbreak of fires, infestation of insects and occurrence of plant disease; (g) to carry out simultaneously conservation of natural forests and establishment of forest plantations; (h)to contribute towards the fuel requirement of the country.
Chapter III Constitution of Reserved Forest and Declaration of Protected Public Forest Section 8	(a) A standing teak tree wherever situated in the State is owned by the State; (b) The Minister may declare, alter of cancel according to the locality the species of reserved trees which are to be conserved by the Forest Department.
Chapter V Establishment of Forest Plantation Section 16	A person having obtained the right to extract forest produce on a commercial scale who has the responsibility of establishing forest plantations or carrying out natural regeneration under a permit for the State shall carry out the same at his own expense and in accordance with stipulation.
Chapter VI Permission for Extraction of Forest Produce Section 16	A person who has obtained permission for extraction of forest produce shall: - (a) abide by the conditions contained in the permit; (b) abide by the orders, directives, prohibitions and restrictions issued by the Forest Department in accordance with this Law; (c) pay the royalties, security deposits and advances due; (d) affix the mark after measuring in the manner prescribed or affix the property- mark which has been registered.
Chapter VII Removal of Forest Produce Section 23	a) Whoever is desirous of moving any forest produce from one township to another within the country shall apply for a removal pass from the Forest Officer empowered by the Director- General for this purpose. (b) The provision of sub-section (a) shall not apply to the following cases: - (i) moving forest produce within the area permitted for extraction thereof; (ii) moving minor forest produce not exceeding the prescribed quantity and not on a commercial scale; (iii) moving from one township to another in a City Development area.
Chapter IX Establishment of Wood-based Industry Section 30	A private entrepreneur who is desirous or establishing a sawpit, sawmill, tongue-and-groove mill, plywood mill, veneer mill or a wood-based industry with the exception of wood-based cottage industries and furniture industries has the right to establish the same only after obtaining a permit from the Forest Officer empowered for this purpose.

Chapter X Search, Arrest and Administrative Action Section 34	If a person who has obtained permission to extract forest produce or his agent or his labourer violates any condition of the permit, the person granting permission to extract forest produce may pass any of the following orders: - (a) causing the suspension of the whole or any portion of the work carried out under the permit; (b) causing payment of the prescribed penalty to be made and permitting the work to be carried on; (c) cancelling the permit; (d) cancelling the permit and confiscating the security deposit and advances; if it is considered necessary causing payment of the prescribed penalty.
Chapter XII Offences and Penalties Section 40	Whoever commits any of the following acts shall, on conviction, be punished with fine which may extend to kyats 5,000 or with imprisonment for a term which may extend to 6 months or with both: (a) trespassing and encroaching in a reserved forest; (b) pasturing domestic animals or permitting domestic animals to trespass in a reserved forest; (c) breaking up any land, clearing, digging or causing damage to the original condition of the land without a permit in a reserved forest; (d) causing damage to a water-course, poisoning the water, using chemicals or explosives in the water in a reserved forest; (e) catching animals, hunting or fishing in a reserved forest; (f) kindling, keeping and carrying any fire or leaving any fire burning which may set fire to the forests in a reserved forest; (g) moving forest produce without submitting to examination at the revenue station; (h) violating any provision of the rule, procedure, order, directive or notification issued under this Law

4.2.46. **National Land Use Policy, 2014 October**

Chapter I Basic Principles of the National Land Use Policy Section 8	In terms of the National Land Use Policy: (a) It shall use the land resources of the State sustainably and systematically by conserving and protecting them for the interest of all peoples of the State; (b)It shall enact the National Land Law which harmonize the existing laws relating to use of land resources and land tenures in the wholecountry including rural and urban areas and which may be implemented systematically; (c) It shall cause to decide the matters relating to land disputes arisen between the land users and the stakeholders transparently and truly in accord with the National Land Law;
Section 8	In implementing the continued entry of the foreign direct investments, sustainable economic development, effectiveness of the environmental conservation and protection, social harmonization, firmness of land tenures, immoveable property right and settlement of land dispute: (a) It shall increase responsible undertaking and respect the rule of law; (b)It shall strengthen the clean governance system by carrying out land use management, land tenure management in accord with law systematically and truly; (c) It shall establish modernized systems to enable to have access to correct information relating to land use management and land tenure management; (d)It shall establish the land dispute settlement mechanism which is easily implementable and impartial;

	(e) It shall arrange and carry out coordination process with the Stakeholder's transparently.
Chapter II The Situation of the Existing Land Management Mechanism Section 12	The State has arranged and carried out to expand agricultural land use by the State-owned organizations, cooperative societies, associate ons, joint ventures, other organizations which acquire agricultural land for businesses and individual agriculturalists after forming the Vacant, Fallow and Virgin Lands Management Central Committee under the Notification 44/91 dated 13th November, 1991.

4.2.47. **The Protection of Wildlife and Conservation of Natural Areas Law ,1994 (Amended in 2018)**

Chapter II Objectives Section 3	The objectives of this Law are as follows: - (a) to implement the Government policy for wildlife protection; (b) to implement the Government policy for natural areas conservation; (c) to carry out in accordance with the International Conventions acceded by the State in respect of the protection and conservation of wildlife, ecosystems and migratory birds; (d) to protect endangered species of wildlife and their natural habitats; (e) to contribute for the development of research on natural science; (f) to protect wildlife by the establishment of zoological gardens and botanical gardens.
Chapter V Protected Wildlife Section 15	The Director General shall, with the approval of the Minister: (a) determine and declare endangered species of wild animal which are to be protected according to the following categories: (i) completely protected species of wild animals; (ii) normally protected species of wild animals; (iii) seasonally protected species of wild animals; (b) determine and declare the endangered species of wild plants and their nature habitats thereof; (c) lay down and carry out measures for the preservation of protected wildlife species; (d) co-ordinate with the relevant department or organization if the wildlife which are to be determined for protection are under the administration of another Government department or Government organization.
Chapter X Appeal Section 33	A person dissatisfied with an administrative order passed by a Forest Officer may file an appeal to the Director General within 30 days from the date of such order.
Chapter XI Offences Arid Penalties Section 35	Whoever commits any of the following acts shall, on conviction be punished with imprisonment for a term which may extend to 3 years or with fine which may extend to kyats 10,000 or with both: - hunting without a licence; violation of any condition of the hunting licence; raising without permission, for commercial purpose normally protected wild animals and seasonally protected wild animals; causing water and air pollution, causing damage to a water-course or putting poison in the water in a natural area; possessing or disposing of pollutants or mineral pollutants in a natural area; stablishing and operating a zoological garden or a botanical garden without a licence.
Section 36	Whoever commits any of the following acts shall, on conviction be punished with imprisonment for a term which may extend to 5 years or with fine which may extend to kyats 30,000 or with both: -

	(a) killing, hunting or wounding a normally protected wild animal or seasonally protected wild animal without permission, possessing, selling, transporting or transferring such wild animal or any part thereof without permission; (b) extracting, collecting or destroying in any manner any kind of protected wild plants within the prescribed area without permission; (c) destroying ecosystem or any natural state in the natural area; (d) altering, removing, destroying or obliterating without permission. any boundary mark of a natural area or any boundary mark of a zoological garden or botanical garden administered by the Government or in which the Government has subscribed share capital.
Section 37	Whoever commits any of the following acts shall, on conviction be punished with imprisonment for a term which may extend to 7 years or with fine which may extend to kyats 50,000 or with both: - (a) killing, hunting or wounding a completely protected wild animal without permission, possessing, selling, transporting or transferring such wild animal or any part thereof without permission; (b) exporting without the recommendation of the Director General a completely protected wild animal or a protected wild plant or any part thereof.
Section 38	The provisions of section 36 sub-section (a) or section 37 sub-section (a) shall not apply to: - the possessing as a souvenir or wearing as a traditional custom of any part of normally protected wild animal or a seasonally protected wild animal; the possessing or wearing with a certificate of registration issued under section 27 subsection (b) of any pad of a completely protected wild animal; the possessing, use, sale, transport or transfer of a drug prepared from a part of a protected wild animal.

4.3. APPLICATION OF INTERNATIONAL GUIDELINES

Based on the Myanmar Environmental Guidelines and International Best Practices, the ultimate Scoping Report for YCP was developed and got approval from ECD. 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.

4.3.1. IFC Environmental, Health and Safety (EHS) Guidelines (2007)

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 (GIIP). 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. The General EHS Guideline contains information on crosscutting Environmental, Health, and Safety issues potentially applicable to all industry sectors. It should be used together with the relevant industry sector guideline(s). When the host country (Myanmar) regulations differ from the levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever is more stringent.

4.3.2. IFC Guidelines on Water and Sanitation, (2007)

The EHS Guidelines for Water and Sanitation include information relevant to the operation and maintenance of potable water treatment and distribution systems, and collection of sewage in centralized systems (such as piped sewer collection networks) or decentralized systems (such as

septic tanks subsequently serviced by pump trucks) and treatment of collected sewage at centralized facilities.

4.3.3. IFC Guidelines on Waste Management Facilities (2007)

The EHS Guidelines for Waste Management cover facilities or projects dedicated to the management of municipal solid waste and industrial waste, including waste collection and transport; waste receipt, unloading, processing, and storage; landfill disposal; physicochemical and biological treatment; and incineration projects. Industry-specific waste management activities applicable, for example, to medical waste, municipal sewage, cement kilns, and others are covered in the relevant industry-sector EHS Guidelines, as is the minimization and reuse of waste at the source.

4.3.4. WHO Guidelines for Drinking Water Quality (2011)

The WHO guideline on drinking water quality includes:

- Drinking-water safety, including minimum procedures and specific guideline values and how these are intended to be used;
- Approaches used in deriving the guidelines, including guideline values;
- Microbial hazards, which continue to be the primary concern in both developing and developed countries. Experience has shown the value of a systematic approach to securing microbial safety. It also builds on the preventive principles on ensuring the microbial safety of drinking water through a multiple-barrier approach, highlighting the importance of source water protection;
- Climate change, which results in changing the water temperature and rainfall patterns, severe and prolonged drought or increased flooding, and its implications for water quality and water scarcity, recognizing the importance of managing these impacts as part of water management strategies;
- Chemical contaminants in drinking water, including information on chemicals not considered previously, such as pesticides used for vector control in drinking water; revisions of existing chemical fact sheets, taking account of new scientific information; and, in some cases, reduced coverage in the Guidelines where new information suggests a lesser priority;
- Those key chemicals responsible for large-scale health effects through drinking water exposure, including arsenic, fluoride, lead, nitrate, selenium, and uranium, providing guidance on identifying local priorities and management;
- The important roles of many different stakeholders are essential in ensuring drinking-water safety. This edition furthers the discussion introduced in the third edition of the roles and responsibilities of key stakeholders in ensuring drinking-water safety;
- Guidance in situations other than traditional community supplies or managed utilities, such as rainwater harvesting and other non-piped supplies or dual piped systems.

4.3.5. WHO Protecting Groundwater for Health (2006)

Groundwater is the water contained beneath the surface in rocks and soil and is the water that accumulates underground in aquifers. Groundwater constitutes 97 percent of global freshwater and is an important source of drinking water in many regions of the world. In many parts of the world, groundwater sources are the single most important supply for the production of drinking water, particularly in areas with limited or polluted surface water sources. For many communities, it may be

the only economically viable option. This is in part because groundwater is typical of more stable quality and better microbial quality than surface waters. Groundwater often requires little or no treatment to be suitable for drinking whereas surface waters generally need to be treated, often extensively. There are many examples of groundwater being distributed without treatment. It is vital therefore that the quality of groundwater is protected if public health is not to be compromised.

4.4. NATIONAL ENVIRONMENTAL QUALITY (EMISSION) GUIDELINES

As specified in the EIA Procedure, all projects are obliged to use, comply with and refer to applicable national guidelines or standards or international standards adopted by the Ministry. As specified in the EIA Procedure, following project approval a project shall commence implementation strictly in accordance with the project EMP and any additional requirements set out in the project ECC, which will encompass conditions relating to emissions. While these Guidelines generally apply to all projects subject to the EIA Procedure, it is the prerogative of the Ministry to decide how the Guidelines should be applied to existing projects as referred to in the EIA Procedure.

According to the Environmental Conservation Law, MOECAF shall set standards of environmental qualities as agreed by the Union Government and the Environmental Conservation Committee to provide the basis for regulation and control of noise and vibration, air emissions and liquid discharges from various sources in order to prevent pollution for purposes of protection of human and ecosystem health.

4.4.1. IFC EHS Guidelines

The EHS Guidelines[1] by International Finance Cooperation (IFC) are technical reference documents with general and industry–specific examples of Good International Industry practice (GIIP), as defined in IFC's Performance Standard 3: Resources Efficiency and Pollution Prevention. 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.

There are two kinds of guidelines, General EHS Guidelines and Industry Sector Guidelines. The General EHS Guidelines contain information on cross-cutting environmental, health, and safety issues potentially applicable to all industry sectors in the following section: (1) Environment, (2) Occupational Health and Safety, (3) Community Health and Safety and (4) Construction and Decommissioning. Table 4-1shows the contents of the section of Community Health and Safety.

Table 4-1 Community health and safety contents

Contents	Brief Description
Water Quality and Availability	Drinking water sources should at all times be protected so that they meet or exceed applicable national acceptability standards or in their absence the current edition of WHO Guidelines for Drinking-Water Quality. Project activities should not compromise the availability of water for personal hygiene needs and should take account of potential future increases in demand. The overall target should be the availability of 100 liters per person per day.
Structural Safety of Project Infrastructure	Reduction of potential hazards is best accomplished during the design phase when the structural design, layout and site modifications can be adapted more easily. The following issues should be considered and incorporated as appropriate into the planning, siting, and design phases of a project (1) inclusion of buffer strips or other methods of physical separation around project sites to protect the public from major hazards associated with

Contents	Brief Description
	hazardous materials incidents or process failure (2) incorporation of siting and safety engineering criteria to prevent failures due to natural risks posed by earthquakes, tsunamis, wind, flooding, landslides and fire, and (3) application of locally regulated or internationally recognized building codes, standards and regulations, and mitigation measures.
Traffic Safety	Traffic safety should be promoted by all project personnel during displacement to and from the workplace, and during operation of project equipment on private or public roads. Prevention and control of traffic related injuries and fatalities should include the adoption of safety measures that are protective of project workers and of road users, including those who are most vulnerable to road traffic accidents.
Transport of Hazardous Materials	Projects should have procedures in place that ensure compliance with local laws and international requirements applicable to the transport of hazardous materials.
Disease Prevention	Recommended interventions against the communicable diseases at the project level include (1) providing surveillance and active screening and treatment of workers, (2) preventing illness among workers in local communities by undertaking health awareness and education initiatives, training health workers in disease treatment and conducting immunization programs for workers, and (3) providing treatment through standard case management in on-site or community health care facilities.
Emergency preparedness and Response	All projects should have an Emergency preparedness and Response Plan that is commensurate with the risks of the facility and that includes the following basic elements: (1) Administration (policy, purpose, distribution, definitions, etc.) (2) Organization of emergency areas (command centers, medical stations, etc. (3) Roles and responsibilities, (4) Communication systems, (5) Emergency response procedures, (6) Emergency resources, (7) Training and updating, (8) Checklists (role and action list and equipment checklist), and (9) Business Continuity and Contingency.

Source: IFC, Environmental, Health, and Safety (EHS) Guidelines, General EHS Guidelines: Community Health and Safety (April 30.20070)

4.5. MYANMAR GOVERNMENT INSTITUTIONAL FRAMEWORK

4.5.1. Arrangement at National and Sector Level

At national Level, Environmental Conservation Committee (ENCC) serves as a mechanism for inter-ministerial coordination. Authorities and functions of ENCC are prescribed in Articles 7 to 13 of the EC Rules of the Republic of the Union of Myanmar.

One of ENCC's main functions related to this project is to oversee the management of the EIA process by MOECAF through ECD. ECD will serve as a coordinator among various departments in relevant sectors to ensure that the EIA and implementation of EMP will address environment and social issues of concerns by departments in relevant sectors.

The EIA process for this project will be administered by the central ECD in coordination with the regional ECD and varies governmental organizations at the regional, township, and district levels.

CHAPTER 5
SURROUNDING ENVIRONMENT

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

There is no directly affected area due to the construction of Minhla Hydropower Project. So Naung Cho Township (consisting of six quarters and thirty-five villages) was selected for the detailed survey on present socio-economic situation of the area.

A clustered random sampling technique was used for 5-10% of the total household in the targeted villages. The survey was coordinated by the local social team. Key local village partners have been engaged to help carry out the household survey. Two different questionnaires set, one for village authority and the other for household representative were prepared for the KIIs (Key Informant Interviews).

5.1. PHYSICAL COMPONENT

5.1.1. Union of Myanmar

Myanmar is one of the largest countries on the main land of Southeast Asia. It occupies the total land area of 676577 km2 and shares the borders with five countries for about 6151 km. It shares 274 km with Bangladesh on the west, 1339 km with India on the North-west, 2205 km with China on the North-east, 225 km with Laos on the East and 2108 km with Thailand on the South-east. It also has total coastal-line 2229 km. (NCEA 2009) The population of Myanmar in the fiscal year 2005/2006 was estimated 55.4 million. There are many races in Myanmar and over one hundred languages and dialects.

5.1.2. Shan State

Most of the Shan State is a hilly plateau. It is traditionally divided into three sub-states: Northern Shan state, Southern Shan state and Eastern Shan state. It is officially divided into 11 districts: Taungyi District, Loilen District, Kyaukme District, Musai District, Launtkai District, Kyanlon District, Larshio Dirstrict, Kenglong Tung District, Minesat District, Minephat Hpayak District and Tachelik District. Shan State borders Kachin State and Sagaing Division to north-west, China to the north-east, Loas to the east, Thailand to the south east and Kayah State and Mon State to the south. It covers 155800 km2, almost a quarter of the total area of Myanmar. Generally speaking, the Shan State is composed of mountain regions and lowland flat plains. Those mountain regions are seen in a plain as a hoof. Although they are mountains, at a relative height, they exist as hills found as groups. The major drainage between Northern and Southern Shan States is the Dokhtawady River, locally known as Namtu River or Myint-nge River which is flowing from north to south and then turn to the west by dividing northern and southern Shan State and then flow from east to west as Myit-nge River and drains into the Ayawaddy. (Figure 5-1).

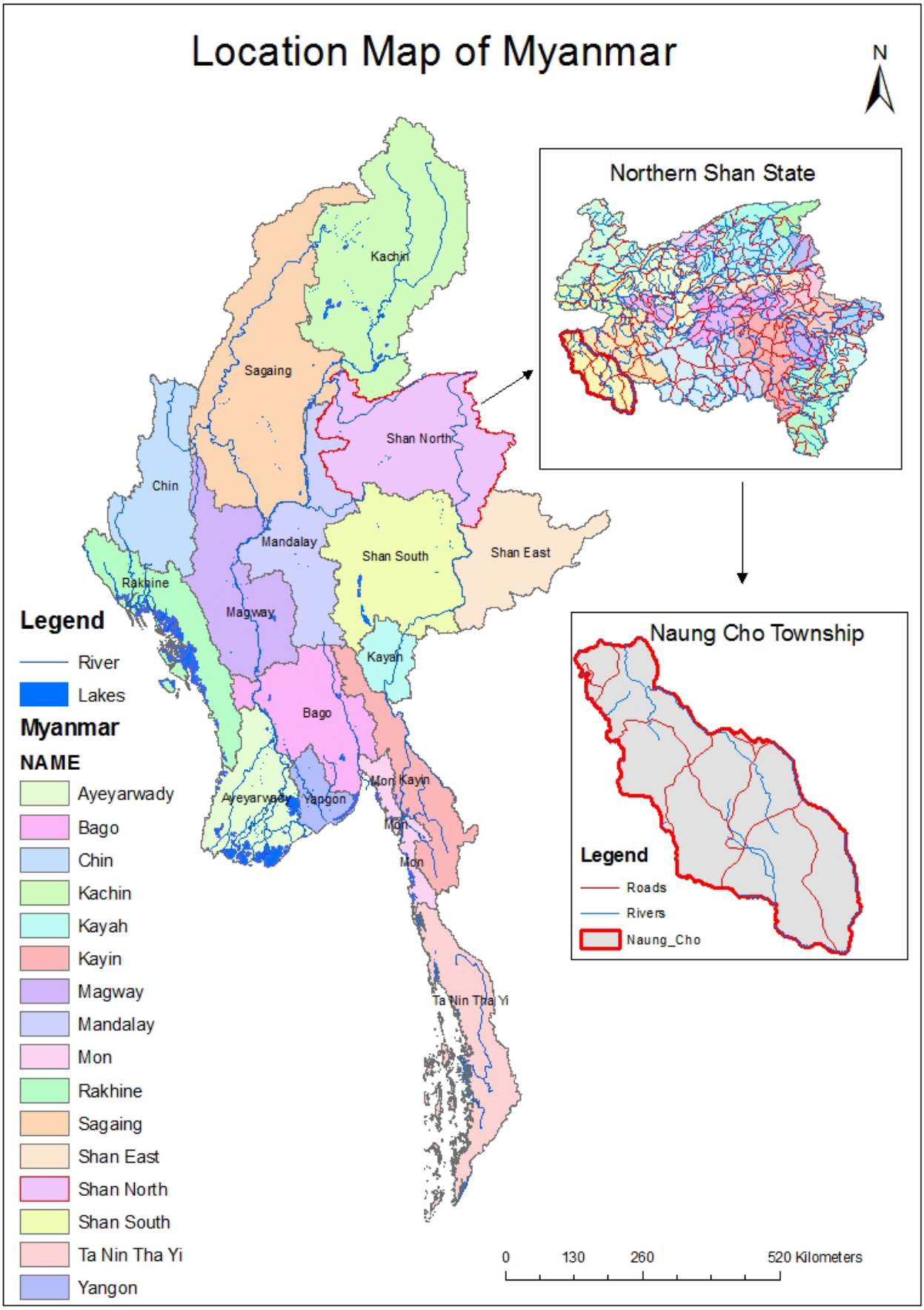
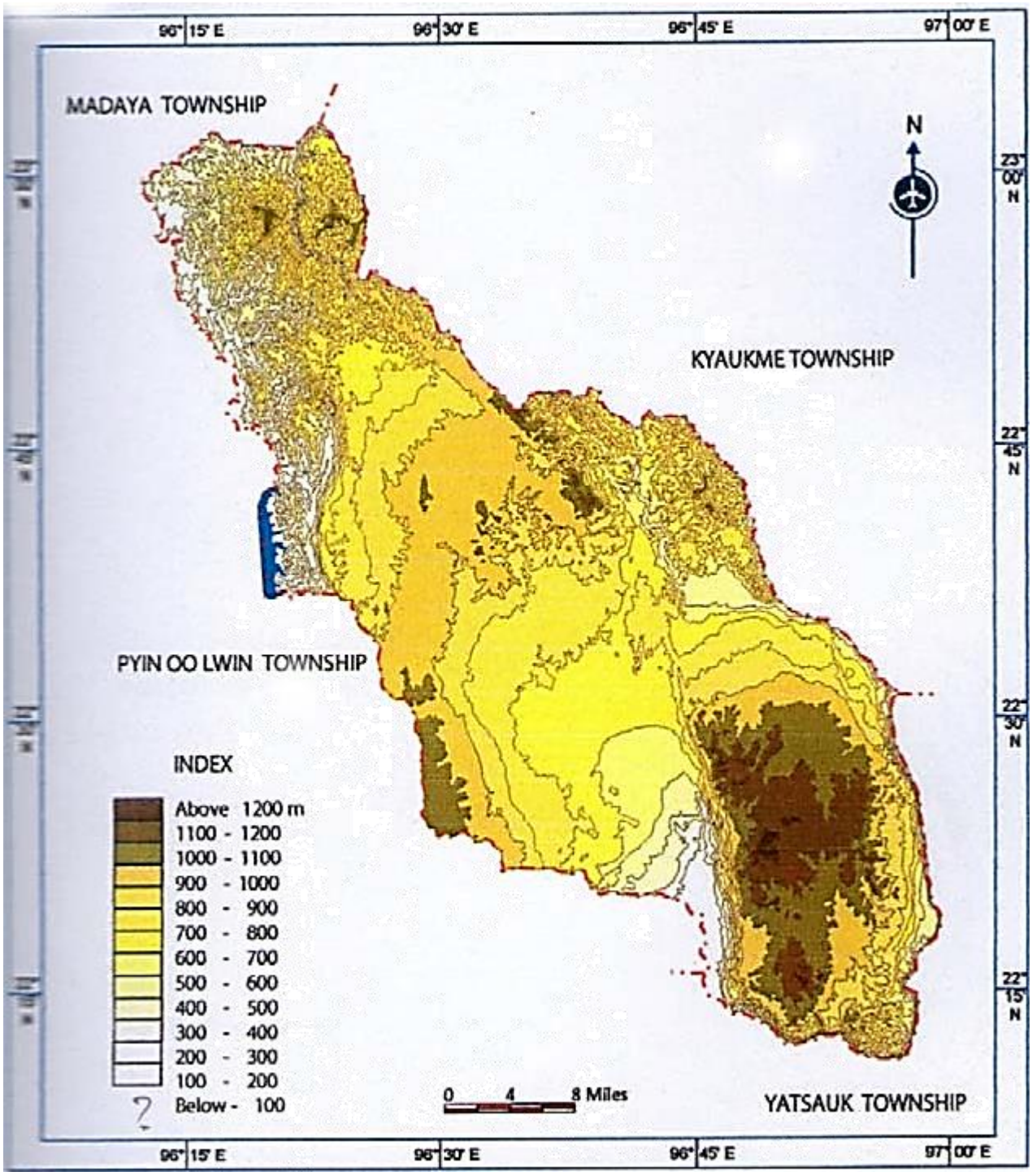


Figure 5-1 Myanmar Map

5.1.3. **Naung Cho Township**

Naung Cho township is located in the tropical zone lying in northern part of the Shan Yo-ma (Shan highland mountain range). The township has an area of 1265.61 square miles or 809992 acres, extending about 28 miles in southwest – northeast extreme length and about 73 miles in southeast – northwest extreme length. It is elongated in shape. It is composed of 6 wards and 35 village tracts formed by 255 villages. It was bounded by Kyaukme Township on north and on the northeast by Yatsuk Township on the south by Pyin-Oo-Lwin Township on southwest and Madaya Township on the northwest. The unique feature of the township is streams and river boundaries except on northeastern and southwestern boundaries. The south eastern portion is bounded by the Dokhtawady or Namtu River where as the northeastern portion is bounded by streams, running from North to South, namely Nam-Lun, Nam-myentai and Nampanse creeks. In the northwest part, the township is bounded by Nam-pon creek which flows into Sedawgyi Dam. (Figure 5-2)



Source: Based on UTM Maps, Department of Geography, University of Mandalay

Figure 5-2 Naung Cho Township Map

5.1.4. **Topography and Drainage**

Naung Cho is situated at 2750 feet (838m) above the sea level. Although it lies on the highland, no very high mountain and steeply sloped mountain occurs in the township. The relief features of the area are valleys and mountains. Sedawgyi valley lies in the northern part of the township and it is generally below 1300 feet (300 m) above the sea level. The high mountainis Nakawng Taung (1312 m) in the northern part and Naungpain Taung in the southern part. The central lowland Hsiphyu valley and southeastern valley (lower than 900m) form the major agricultural land of Naung Cho Township. Through this plain Neyalkyi Creek, Theekae Creek, Phaingaw Creek and

Chaungmagyi Creek and Ye-U Creek are flowing. There are many streams and creeks in the township. The major drainage is the Namtu River or Dokhtawady on the southern part and the Nampon Creek on the northern part of the township. (Figure 5-3)

Source: Based on UTM Maps, Department of Geography, University of Mandalay

Figure 5-3 Topography map of Naung Cho Township

The project area lies in the Northeastern part of the township. It is situated on the north of Bantbwe-kyin Village. There are four creeks namely Ban-bwe-kyin Creek, Min-hla Creek, Myay-thon-bon Creek and Has-byae-toe Creek flowing near the villages. These four creeks together form a common creek and drains into the Sedawgyi Dam. These four creeks and their common creek have hydropower potential. Total of six hydropower plants are intended to build by canal linkage system

between creeks (Map IV). The length of the canal network may be 290000 feet. The total intended power output may be 6 megawatts (36.4-million-kilowatt hour) per year. The total catchment area of the creeks may be 33 square miles (Map V). The unique feature of the project area is the limestone habitat. The natural geology of limestone is the existing of sink holes. Due to the presence of sink holes the creeks sometimes disappear somewhere in the upstream and reappear in the downstream. Sometimes the reappeared springs become wide enough to be seen as a lake. There are two large natural lakes named Has-byae-toe lakes along Has-byae-toe chaung. These lakes are about 1.61 hectare wide. Another unique feature is the existing of the natural wetland named In-ma in formed by the drainage of Lon-Khote-Chaung and other many small creeks. This wetland comprises 20.23 hectare. Some small creeks arise from this wetland and drains into the four major creeks

5.1.5. **Climatology**

It is impossible to install a climate station in the project area because of limited time frame for data collection. The prevailing climate characteristics were previewed and overviewed, after analyzing the available information at the climate stations of Department of Meteorology and Hydrology in Pyin Oo Lwin stations. The followings could be extracted from the study.

5.1.5.1. Rainfall

Through scanning the time series data sets on mean monthly rainfall at Pyin Oo Lwin Station, it could be learnt that the accumulated total from January to December whereas the progressive sums during the monsoon period (i.e. from May to October) was 50.34 inches with the carry over effect leading to 3.43 inches for the pre-monsoon period (i.e. from January to April) and 2.96 inches for the post-monsoon period (i.e. from November to December) as shown in Table (4.2). The annual rainfall pattern at Pyin Oo Lwin is shown in Figure 5-4 and the monthly rainfall pattern at Pyin Oo Lwin (Mean, Wet and Dry year) is shown in Figure 5-5.

5.1.5.2. Hydrology

Hsapyedoe, Minhla, Myaethonepone, Nyaung and Banbwekyin are the tributaries which flow Sedawgyi reservoir from the east. Its source naturally originates from the high land in Shan State, where the altitude above the Mean Sea Level (M.S.L) is 1100 m at the remotest point within a round shape drainage basin, having the catchment area of 90 square km at the proposed main forebay site.

In fact, the entire drainage system is well defined with high stream density and low bifurcation ratio and hence numerous perennial streamlets/rivulets are favorably configured to convey adequate stream flow so that there exists a possibility for developing a suitable hydropower generating scheme within the said demarcated area.

Since, there was not any reliable observed hydrologic data sets for the relevant streams up to October 2013, necessary arrangements had to be promptly undertaken to implement collection of principal hydrologic data elements namely river’s stage, stream flow, suspended sediment. Due to allowable time frame favoured by the client, more field observation could have been extended up to May 2015.

5.1.5.3. Plausibility of Hydrologic Data

Since, there was not any reliable observed hydrologic data sets for the relevant streams up to October 2013, necessary arrangements had to be promptly undertaken to implement collection of principal hydrologic data elements namely river's stage, stream flow, suspended sediment. Due to allowable time frame favoured by the client, more field observation could have been extended up to May 2015

5.1.5.4. Streams' Stage

The consecutive daily records on streams' staff gauge readings at the local standard time of six a.m, twelve noon and six p.m have been continuously collected by our hydrographer stationed at base camp, from 1/11/2013 to date covering for a complete year of two dry seasons and one wet season. Additionally, the simultaneous information of daily water levels at proposed weir and pondage sites has been recorded during the period from 1/11/2013 to date.

5.1.5.5. Stream flow

Stream flows have no reliable observed data sets for the five streams up to November 2013. It is most important and essential to have long term information on stream flow. It is fortunate to have a representative annual rainfall/runoff relationship, illustrating a good linear correlation between annual rainfall and annual inflow for Ayeyarwaddy upper Basin. Continuous data sets on precipitation time series at Pyin Oo Lwin station could have been obtained for generation of stream flow for five streams as shown in Table 5-1.

The observed stream flow calculated from observed staff's guage readings and rating equation from Dec 2013 to end of 2015 as mention in Table 5-2.

Table 5-1 Mean Monthly Rainfall and Cumulative Rainfall for Dry Season and Wet Season at Pyin Oo Lwin Station in Inches

Year	Dry Season (Pre-Monsoon)				Wet Season (Monsoon)						Dry Season (Post Monsoon)		Annual
	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	
Mean Year	0.06	0.38	0.50	2.49	8.17	6.47	7.62	9.32	10.37	8.39	2.53	0.43	56.73
Total	3.43				50.34						2.96		56.73
Wet Year	0.17	0.00	0.92	3.76	10.67	6.61	6.26	12.60	14.20	13.74	1.68	1.57	72.18
Total	4.85				64.08						3.25		72.18
Dry Year	0.01	0.37	0.31	1.86	7.20	7.97	3.24	4.24	5.09	8.99	0.33	0.00	39.61
Total	2.55				36.73						0.33		39.61

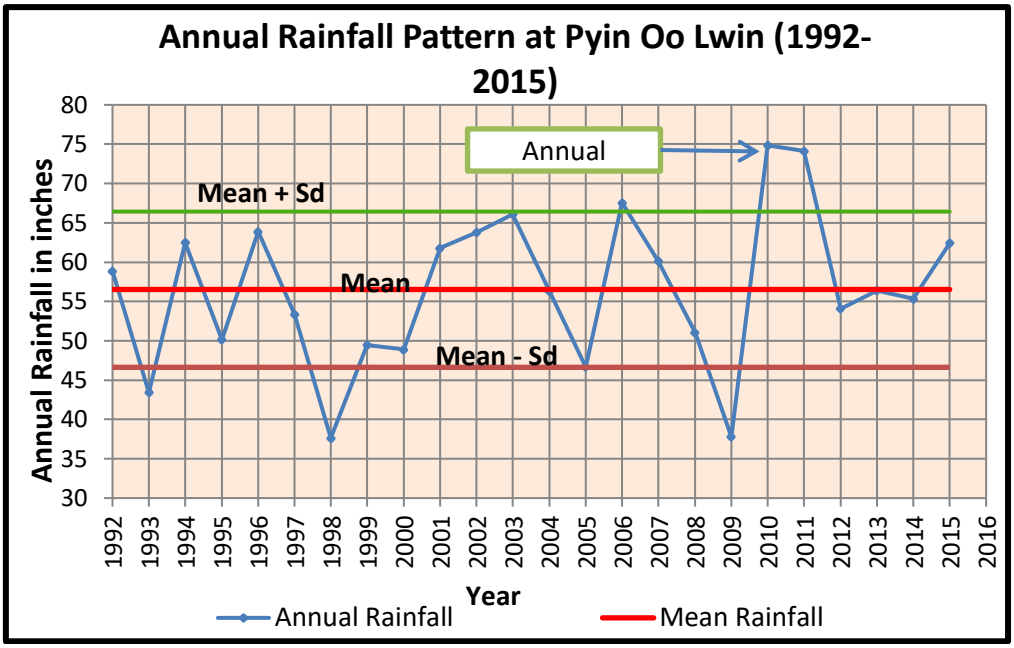


Figure 5-4 Annual Rainfall Pattern at Pyin Oo Lwin

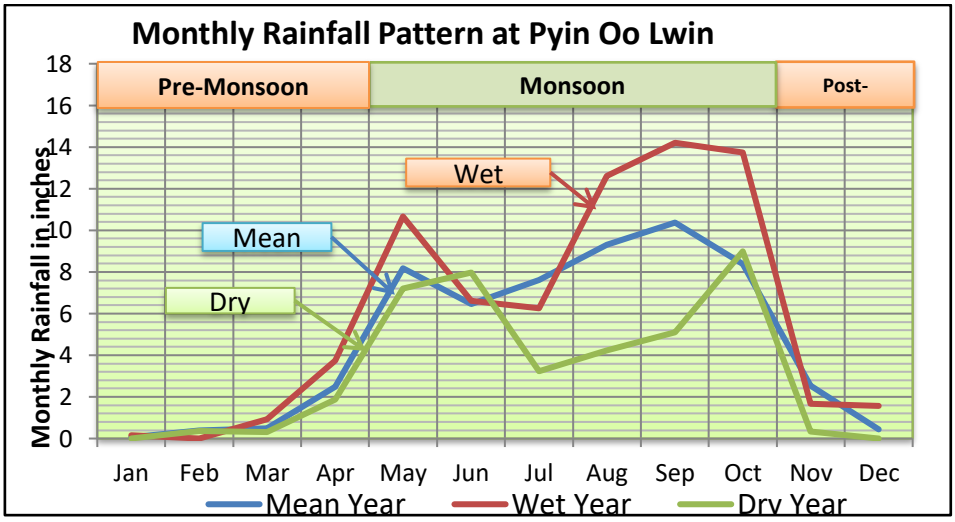


Figure 5-5 Monthly Rainfall Pattern at Pyin Oo Lwin (Mean, Wet and Dry Year)

Table 5-2 Monthly Inflow at Banbywegyin Chaung at Weir Site in Ac.ft

Catchment Area =7.94 sq.mls														
Sr No	**Year**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
1	1992	2148	1663	1350	1268	2275	1817	2868	2828	4047	4160	2453	2190	29068
2	1993	2148	1743	1387	1388	1228	3048	1747	2002	3258	4475	2198	2087	26710
3	1994	2148	1687	1407	1373	1783	2062	2541	5049	3609	3539	2463	2087	29749
4	1995	2148	1663	1350	1278	2088	1602	2074	2714	3317	4520	2938	2087	27781
5	1996	2148	1820	1634	1543	2028	3073	2063	3479	3801	3359	2348	2154	29451

Catchment Area =7.94 sq.mls														
Sr No	**Year**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
6	1997	2148	1670	1427	1368	2058	1822	2752	2790	3947	3649	2538	2147	28317
7	1998	2152	1677	1394	1248	2068	2032	2074	2720	2838	3489	2313	2087	26092
8	1999	2148	1663	1350	1809	3059	2017	1619	1996	3317	3704	2758	2087	27528
9	2000	2148	1783	1394	1663	2309	2098	2290	2416	3387	3694	2268	2087	27537
10	2001	2148	1663	1357	1253	3069	2428	2115	3128	3142	4370	2533	2087	29294
11	2002	2172	1707	1350	1448	2198	1802	3014	3817	2908	3924	3259	2104	29704
12	2003	2148	1760	1367	1568	2314	2198	3376	2439	4660	3904	2268	2087	30090
13	2004	2148	1667	1380	1774	2334	2368	2238	2253	4210	3874	2263	2114	28622
14	2005	2148	1663	1480	1638	1813	1987	2606	2200	3270	3384	2483	2427	27101
15	2006	2148	1663	1367	1663	2249	2273	1981	3140	4671	4255	2728	2087	30226
16	2007	2148	1710	1350	1438	2744	2773	3032	2749	2657	3719	2663	2087	29071
17	2008	2148	1663	1350	1603	2539	2047	1911	2521	3042	4640	2253	2087	27806
18	2009	2148	1663	1350	1638	3134	1877	1671	1768	2406	3934	2208	2087	25887
19	2010	2148	1663	1364	1248	1943	2223	2454	3712	4660	5171	2198	2374	31157
20	2011	2192	1663	1554	2085	3559	1946	2400	3359	3225	4287	2308	2198	30776
21	2012	2162	1663	1440	1774	1816	1969	1899	2883	3906	4040	2644	2106	28303
22	2013	2172	1663	1350	1343	1657	2162	2372	2779	4729	4270	2213	2097	28809
23	2014	2148	1748	1350	1576	1704	2247	2025	3025	4311	3796	2547	2095	28574
24	2015	2184	1663	1381	1367	2989	1855	3849	3425	2850	3479	2466	2087	29596
Mean		2154	1691	1395	1515	2290	2155	2374	2883	3590	3985	2471	2131	28635

Table 5-3 Monthly Inflow at Nyaung Chaung at Dam Site in Ac.ft

Catchment Area = 5.25 sq.mls														
Sr No	**Year**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
1	1992	123	66	0	53	726	337	1003	916	1359	1128	287	130	6127
2	1993	123	119	24	132	34	1150	262	370	839	1336	119	61	4569
3	1994	123	81	37	122	401	499	787	2383	1070	718	294	61	6577
4	1995	123	66	0	60	602	195	478	840	877	1366	608	61	5277
5	1996	123	169	187	235	563	1167	471	1346	1197	599	218	105	6380
6	1997	123	70	51	119	582	341	926	891	1294	791	344	101	5631
7	1998	125	75	29	40	589	479	478	844	561	685	195	61	4161
8	1999	123	66	0	410	1244	469	177	366	877	827	489	61	5110
9	2000	123	145	29	314	748	522	621	644	923	821	165	61	5116
10	2001	123	66	4	43	1250	741	505	1114	761	1267	340	61	6276
11	2002	138	94	0	172	675	327	1099	1569	607	973	820	72	6547
12	2003	123	130	11	251	751	588	1338	659	1764	960	165	61	6802
13	2004	123	68	20	387	764	701	586	536	1467	940	162	79	5832
14	2005	123	66	86	298	420	450	829	501	846	616	307	286	4828
15	2006	123	66	11	314	708	638	417	1122	1772	1191	469	61	6892
16	2007	123	97	0	165	1035	969	1111	864	441	837	426	61	6129
17	2008	123	66	0	274	900	489	370	713	696	1446	155	61	5293
18	2009	123	66	0	298	1293	377	212	216	275	979	125	61	4026
19	2010	123	66	9	40	506	605	729	1500	1764	1796	119	251	7507
20	2011	151	66	134	593	1574	422	694	1266	817	1212	192	135	7256
21	2012	132	66	59	387	422	437	362	952	1266	1049	414	74	5621
22	2013	138	66	0	102	317	565	675	883	1810	1201	129	68	5956
23	2014	123	122	0	256	349	621	446	1046	1534	888	350	67	5801
24	2015	146	66	20	118	1197	362	1651	1310	569	679	296	61	6476
Mean		127	84	30	216	735	561	676	952	1058	1013	299	90	5841

Table 5-4 Monthly Inflow at Minhla Chaung at Dam Site in Ac.ft

Catchment Area = 1.85 sq.mls														
Sr No	**Year**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
1	1992	184	183	150	137	367	238	538	486	578	619	297	270	4046

Catchment Area = 1.85 sq.mls														
Sr No	**Year**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
2	1993	184	202	158	165	123	525	277	293	394	692	238	246	3496
3	1994	184	189	163	162	252	295	462	1004	476	474	299	246	4205
4	1995	184	183	150	140	323	188	353	459	407	703	410	246	3746
5	1996	184	220	216	202	309	531	350	638	520	432	273	261	4136
6	1997	184	185	168	161	316	239	511	477	555	499	317	260	3871
7	1998	185	186	160	133	319	288	353	461	296	462	264	246	3352
8	1999	184	183	150	264	550	285	247	292	407	512	368	246	3687
9	2000	184	211	160	230	375	303	403	390	424	510	254	246	3689
10	2001	184	183	151	134	552	380	363	556	367	668	316	246	4099
11	2002	190	193	150	179	349	234	572	717	312	564	485	249	4195
12	2003	184	206	154	207	376	327	657	395	721	559	254	246	4285
13	2004	184	184	157	255	381	366	391	352	616	552	253	252	3942
14	2005	184	183	180	224	259	278	477	339	397	438	304	325	3588
15	2006	184	183	154	230	361	344	331	559	723	641	361	246	4316
16	2007	184	194	150	177	476	461	576	467	254	516	346	246	4047
17	2008	184	183	150	216	429	292	315	414	343	731	250	246	3752
18	2009	184	183	150	224	567	252	259	239	195	566	240	246	3305
19	2010	184	183	153	133	290	332	441	692	721	854	238	312	4534
20	2011	194	183	197	328	666	268	429	610	386	648	263	271	4445
21	2012	187	183	171	255	260	273	312	499	545	591	342	250	3868
22	2013	190	183	150	155	223	318	422	474	737	644	241	248	3986
23	2014	184	203	150	209	234	338	341	532	639	534	319	247	3931
24	2015	192	183	157	161	534	247	767	625	299	460	300	246	4170
Mean		186	190	160	195	371	317	423	499	471	578	301	256	3946

Table 5-5 Monthly Inflow at Myethonbon Chaung at Dam Site in Ac.ft

Catchment Area = 6.70 sq.mls														
Sr No	**Year**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
1	1992	307	166	93	186	994	549	1403	1214	2313	1373	334	210	9142
2	1993	307	234	124	288	110	1588	458	517	1648	1639	119	123	7153

Catchment Area = 6.70 sq.mls														
Sr No	**Year**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
3	1994	307	186	140	275	579	756	1127	3088	1944	849	343	123	9717
4	1995	307	166	93	195	836	368	733	1118	1698	1677	744	123	8056
5	1996	307	299	332	419	786	1609	724	1763	2106	697	245	179	9465
6	1997	307	172	157	271	811	554	1305	1182	2229	942	406	173	8509
7	1998	310	178	129	169	819	731	733	1123	1294	807	216	123	6632
8	1999	307	166	93	642	1655	718	349	512	1698	989	592	123	7843
9	2000	307	268	129	520	1022	786	916	866	1757	980	178	123	7851
10	2001	307	166	98	174	1664	1064	768	1467	1550	1550	402	123	9333
11	2002	327	203	93	338	929	537	1526	2048	1353	1174	1014	137	9679
12	2003	307	248	107	440	1026	870	1832	886	2830	1157	178	123	10004
13	2004	307	169	118	613	1043	1014	871	729	2451	1132	174	145	8766
14	2005	307	166	202	499	604	693	1182	684	1658	718	359	410	7483
15	2006	307	166	107	520	971	934	655	1477	2840	1453	566	123	10119
16	2007	307	206	93	330	1389	1356	1541	1147	1141	1001	511	123	9145
17	2008	307	166	93	469	1216	744	596	955	1466	1778	165	123	8077
18	2009	307	166	93	499	1719	600	394	320	929	1183	127	123	6458
19	2010	307	166	104	169	714	891	1054	1960	2830	2225	119	365	10904
20	2011	343	166	264	876	2077	658	1008	1661	1620	1480	212	216	10583
21	2012	318	166	168	613	607	677	586	1260	2195	1272	495	139	8496
22	2013	327	166	93	250	473	840	985	1172	2889	1466	132	131	8923
23	2014	307	238	93	446	512	912	692	1380	2536	1066	414	130	8725
24	2015	337	166	118	270	1596	581	2231	1718	1304	799	345	123	9588
Mean		312	190	130	395	1006	835	986	1260	1928	1225	350	160	8777

Table 5-6 Monthly Inflow at Hsabyedo Chaung at Dam Site in Ac.ft

Catchment Area = 0.50sq.mls														
Sr No	**Year**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
1	1992	92	92	92	97	158	124	187	173	216	176	108	99	1614
2	1993	92	97	94	105	92	201	117	121	166	196	92	92	1466
3	1994	92	94	96	104	127	140	167	313	188	137	109	92	1657

Catchment Area = 0.50sq.mls														
Sr No	**Year**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
4	1995	92	92	92	98	146	111	138	166	170	199	139	92	1533
5	1996	92	102	110	114	142	203	137	214	200	126	101	96	1638
6	1997	92	92	97	103	144	124	180	171	209	144	113	96	1567
7	1998	92	93	95	96	145	138	138	166	140	134	99	92	1427
8	1999	92	92	92	131	207	137	109	121	170	147	127	92	1517
9	2000	92	100	95	122	160	142	151	147	174	147	96	92	1518
10	2001	92	92	92	96	208	162	140	192	159	189	113	92	1628
11	2002	94	95	92	108	153	123	197	235	144	161	159	93	1654
12	2003	92	98	93	116	160	148	219	149	254	160	96	92	1678
13	2004	92	92	94	129	162	159	148	137	226	158	96	94	1586
14	2005	92	92	100	120	129	135	171	134	167	127	110	113	1491
15	2006	92	92	93	122	156	153	132	193	255	182	125	92	1687
16	2007	92	95	92	108	187	184	198	168	128	148	121	92	1614
17	2008	92	92	92	118	174	139	127	154	153	206	96	92	1535
18	2009	92	92	92	120	212	128	112	107	113	162	93	92	1414
19	2010	92	92	93	96	137	150	161	229	254	239	92	110	1745
20	2011	95	92	105	148	238	132	158	207	164	184	99	99	1721
21	2012	93	92	98	129	129	134	127	177	207	168	120	93	1566
22	2013	94	92	92	102	119	146	156	170	258	183	93	93	1598
23	2014	92	97	92	116	122	151	134	186	232	153	114	93	1583
24	2015	94	92	94	103	203	126	249	211	140	133	109	92	1647
Mean		92	94	95	113	159	145	156	177	187	165	109	95	1587

Table 5-7 Monthly Inflow at Hsabyedo Chaung at Weir Site in Ac. ft

Catchment Area = 10.87 sq. mls														
Sr No	**Year**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
1	1992	982	776	491	585	1924	1174	2814	2506	3584	2749	1062	755	19403
2	1993	982	886	541	749	491	2858	1280	1376	2505	3181	713	614	16176
3	1994	982	808	569	729	1251	1509	2366	5546	2984	1900	1076	614	20335
4	1995	982	776	491	598	1669	879	1727	2351	2585	3242	1726	614	17641

Catchment Area = 10.87 sq. mls														
Sr No	**Year**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
5	1996	982	991	879	961	1587	2893	1711	3397	3248	1653	918	705	19926
6	1997	982	785	596	722	1628	1181	2654	2454	3448	2051	1178	696	18375
7	1998	987	794	550	557	1642	1468	1727	2359	1930	1832	870	614	15330
8	1999	982	776	491	1324	2998	1448	1104	1368	2585	2126	1480	614	17295
9	2000	982	941	550	1126	1970	1557	2023	1943	2681	2112	809	614	17308
10	2001	982	776	500	564	3011	2009	1783	2918	2345	3037	1172	614	19712
11	2002	1014	836	491	831	1820	1153	3014	3861	2026	2427	2165	637	20273
12	2003	982	909	514	996	1977	1694	3509	1975	4423	2400	809	614	20801
13	2004	982	781	532	1276	2005	1927	1951	1719	3807	2359	802	650	18792
14	2005	982	776	669	1092	1292	1407	2454	1647	2521	1688	1103	1079	16711
15	2006	982	776	514	1126	1888	1797	1599	2934	4439	2879	1439	614	20987
16	2007	982	840	491	818	2566	2482	3038	2398	1682	2147	1350	614	19407
17	2008	982	776	491	1044	2285	1489	1504	2087	2209	3407	788	614	17675
18	2009	982	776	491	1092	3100	1256	1176	1056	1338	2441	726	614	15049
19	2010	982	776	509	557	1470	1728	2247	3717	4423	4133	713	1006	22262
20	2011	1041	776	769	1703	3681	1350	2173	3233	2460	2923	864	766	21740
21	2012	1001	776	614	1277	1296	1381	1487	2581	3391	2585	1323	640	18355
22	2013	1015	776	491	687	1079	1646	2135	2439	4518	2900	734	628	19047
23	2014	982	892	491	1006	1143	1762	1660	2776	3945	2251	1191	625	18726
24	2015	1031	776	533	720	2902	1225	4156	3324	1946	1818	1080	614	20126
Mean		990	815	552	923	1945	1636	2137	2582	2959	2510	1087	674	18810

Table 5-8 Observed Monthly Inflow at Gauge Station in Ac.ft (2014)

Stream	**C.A**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
Banbwegyin	3.15	2174	1675	1457	1333	1355	1336	1452	1603	11174	3837	2373	2125	31895
Nyaung	10.78	68	51	35	37	32	42	45	72	663	365	228	80	1719
Minhla	1.55	110	96	84	91	90	88	85	108	423	200	132	109	1616
MyaeThone Bon	6.46	206	151	117	185	133	178	138	271	1973	477	172	61	4062
Thapyedo	12.43	994	787	789	828	686	1034	771	1535	3800	1692	981	654	14549

Table 5-9 Observed Monthly Inflow at Gauge Station in Ac.ft (2015)

Stream	**C.A**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**
Banbwegyin	3.15	1925	1552	1520	1330	2986	2282	5013	10214	3097	3488	1986
Nyaung	10.78	57	31	26	18	631	220	470	831	352	423	184

Minhla	1.55	98	82	84	71	122	113	220	518	163	153	68
MyaeThone Bon	6.46	33	30	33	19							
Thapyedo	12.43	553	433	412	349	721	1185	2104	3578	2404	2768	1428

5.1.5.6. Previewing/ Overviewing on the Hydrological Aspects of Project Stream

To assist in a rapid development work programme to the client having with a dynamic attitude of an establishment for a run-off river type power plants of the project in Shan State, the group of engineering hydrologists/ hydrographers being led by the NEPS had tried their best to preliminarily formulate the efficient on-field data collection work programme covering the period from November 2013 to date.

5.1.6. **Flood Discharge**

In order to evaluate the design flood for different return periods (in years), HP11 Design Flood Calculation for rural Catchment for the Ayeyarwady upper basin had been referred for subsequent analysis. Obviously, the design flood estimators being corporate here would be conservative and sufficient enough for determining the surcharge effects against the run-off river type hydraulic structure that would be installed in the project area in near future. The design flood estimate for different return periods is as follows in Table 5-10.

Table 5-10 Design for 100 Years Flood Peaks in Cusecs

Stream	CA (Sq.mls)	100 Year	200 Year	500 Year
Banbwegyin	7.95	4070	4797	5801
Nyaung	5.63	2726	3213	3886
Minhla	1.85	1302	1539	1867
MyaeThone Bon	6.7	3704	4368	5284
Thapyedo	0.5	600	650	800

5.1.7. **Geology & Soil**

5.1.7.1. Regional Geology

The regional geology map covering the Project Area is shown in Figure 5-6. Minhla Hydropower Project mainly lies on bed rock of Silurium and, along the Banbwekyin stream, near the Myaethonebone camp, main fore-bay and around the Main Power House, Ordovician lime stone are found.

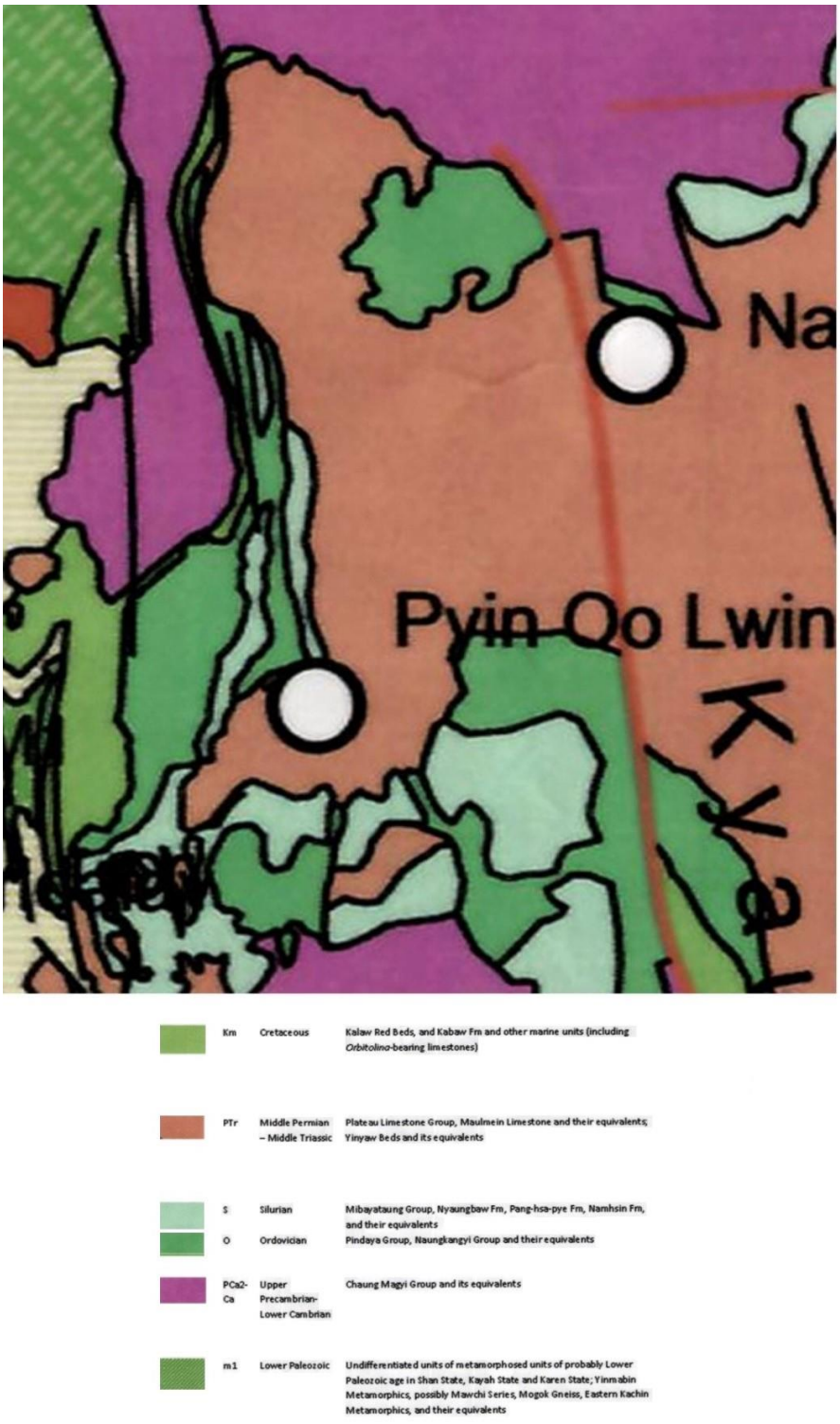


Figure 5-6 Geology map

5.1.7.2. Banbwekyin of Mini Power Houses

Foundation of mini power house No.1 to No.5 and embankments of pondage No. 1 to No.11 are placed on shale bed or Lateritic shale bed.

5.1.7.3. Geology of Forebays

Foundations of forebay are rested on lateritic shale bed.

5.1.7.4. Geology along the Power canal

Foundation soil along the power canals is lateritic shale.

5.1.7.5. Geology of Weirs

Foundation of Haspyedoe weir is located on thick and hard limestone.

5.1.7.6. Geology along the Main Penstock

The foundations along the main penstock are put on the travertine limestone bed.

5.1.7.7. Geology along the Small Penstocks

The foundations along the small penstocks are on the lateritic shale.

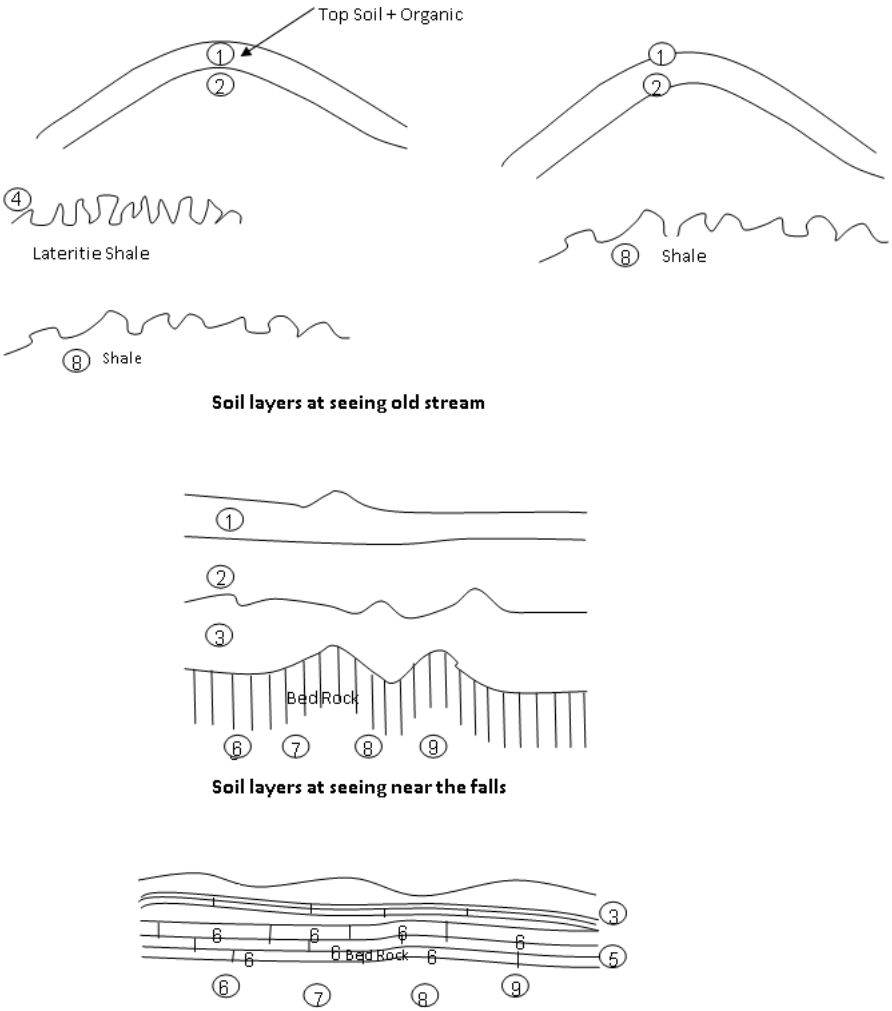


Figure 5-7 Soil layer of project area

5.1.7.8. Geology of Weir Site

The foundation of weir will be seated on hard and thick limestone. The bedrock is very strong type having unconfined compressive strength more than 200 MPa. The lowest bed levels in the

stream bed are not formed due to fractures or faults but due to erosion by the flow. The foundation of weir is firm and hard and impervious. The isolated boulders found in the weir site are not the same type of rock as foundation rock; they are the residual rock during the process of the project stream.

5.1.7.9. Geology of Power House (1)

The foundation of powerhouse and penstock will be on travertine limestone.

5.1.8. **Earthquake of Project Area**

The project area lies in strong earthquake zone of probable ground acceleration ranging from 0.2 g to 0.3 g according to the seismic zone map of Myanmar revised in December, 2005. Active faults are the source of earthquakes. (Figure 5-8).

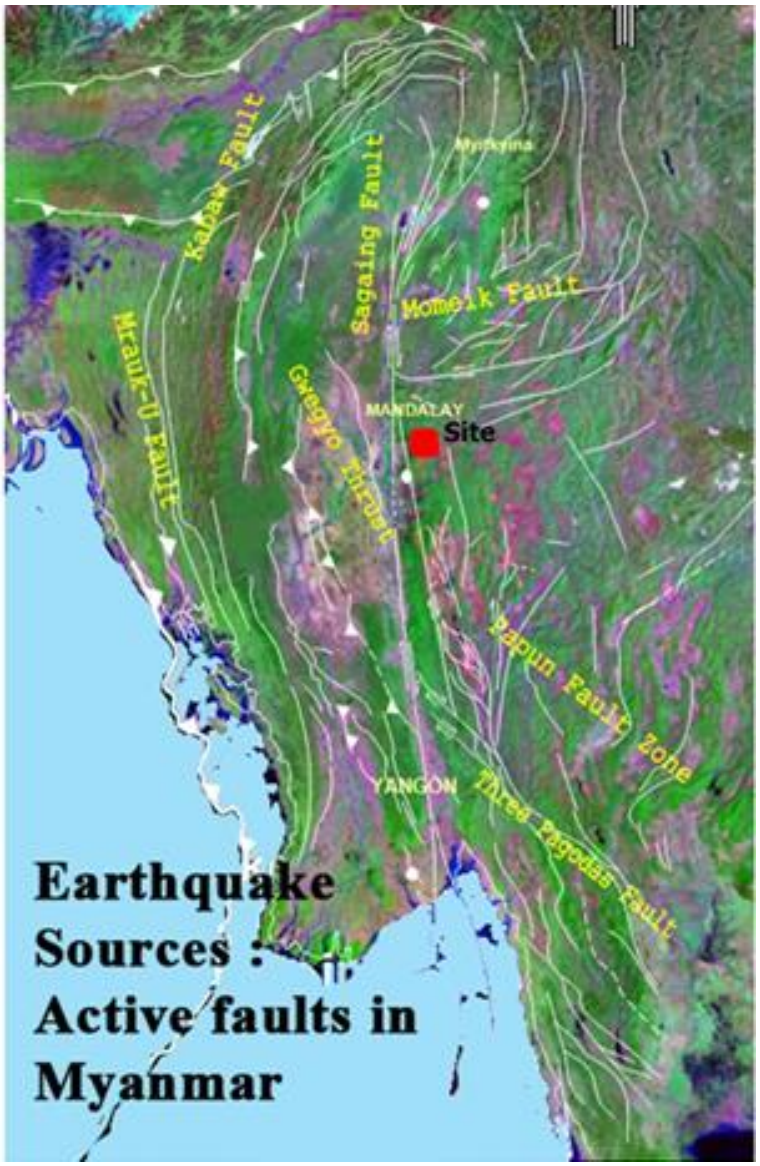


Figure 5-8 Seismic zone map

5.1.9. **SOIL**

According to soil types and characteristics of Myanmar, Ministry of Agriculture and Irrigation, the soils of the study area occur Red Earths and Yellow Earths (Acrisol) Figure 5-9. These soils are

the most dominating soils of Shan Plateau and of the Northern Mountainous region at the elevation of more than 3000ft above sea level. The Shan Plateau is about completely covered with these soils. The Yellow Earths occur on the lower slopes in the Shan Plateau. They occupy a relatively small area, changing the Red Earths down the slopes. The Red Earths have a very deep profile having the texture varying sandy and silty to silty clay loam with good structure. They are well drained and easy to plough. They are very suitable for cultivation of seasonal and perennial crops. However, due to relief and slopes erosion control measure are required. The Yellow Earths soils can only be utilized for gardens, flowers and forests.

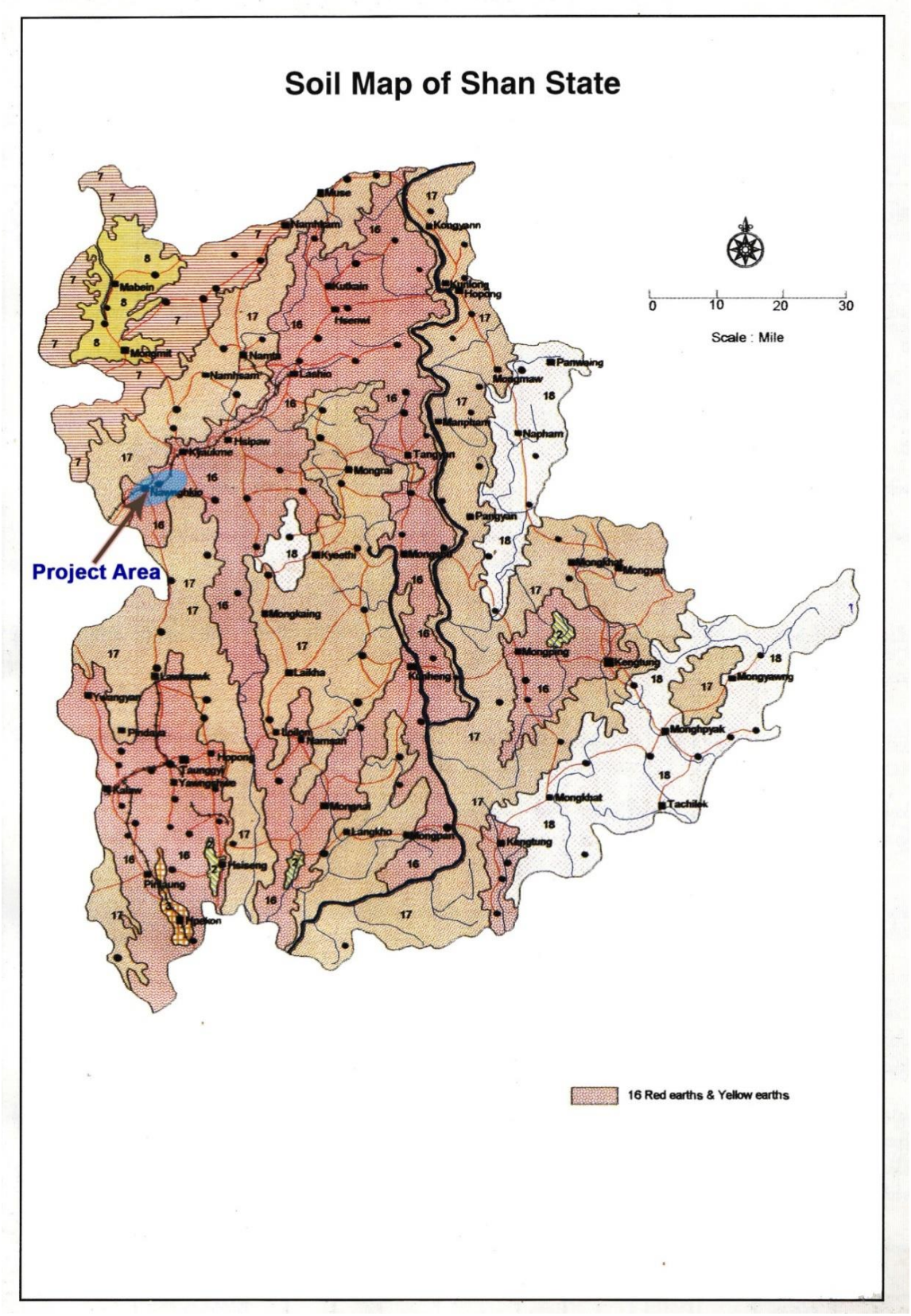


Figure 5-9 Soil map of Shan state

5.1.10. Land use

Area classified by type of land in Naungkhio Township

Net sown area	▪	169657 ac	(20.94 %)
Current fallow land	▪	48116 ac	(5.94 %)
Reserved forests	▪	146003 ac	(18.03 %)
Other wood land	▪	427589 ac	(52.79 %)
Virgin soil	▪	3043 ac	(0.38 %)
Unculturable land	▪	15584 ac	(1.92 %)
Grand Total	▪	809992 ac	(100 %)

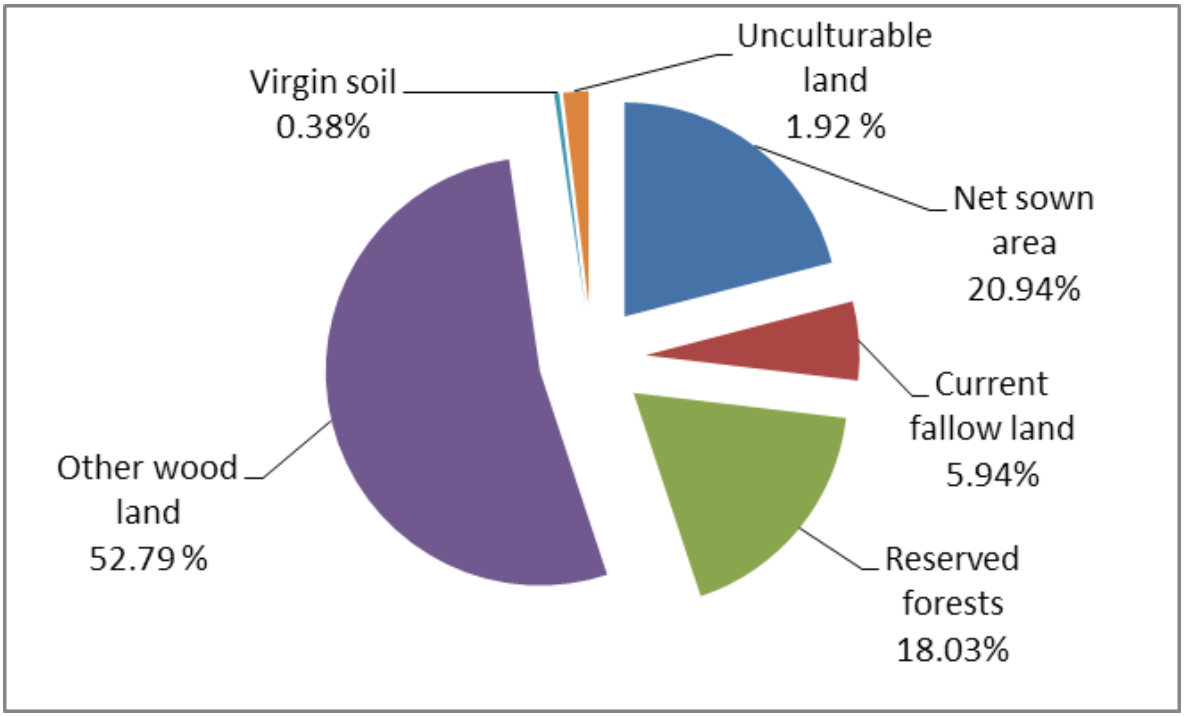


Figure 5-10 Area classified by type of land in Naungkhio Township (2014-2015)

5.1.11. Present Land Use

Most of the arable land is used for cultivation though there are considerable acreages of forests, thicket bushes and appreciable areas of waste land, hills and urban areas.

5.1.12. Land Use Types and Cropland

The following are different the land use types and cropland types.

1. Cp - Paddy land, on which only paddy is grown and the fields are left fallows for rough grazing in the off - season. This is extensive in the valley bottoms and on the lower flatter plain.
2. Cd - Dryland crops are grown on land which is better drained land or which is too slopping or undulating land. The preferred crops are groundnuts, soy bean corn, Ninga, Sunflower it is only mainly dryland.

3. Cs - Sugar cane land, which is generally fairly crops. Flat and at least moderately good field capacity. It is necessary for sugarcane in dry season.
4. Cm - Dry land crops are grown on the land but sugarcane is grown occasionally. The farmers preferred to grow the sugar cane due to good income. But they cannot provide the input for sugarcane.
5. P - Plantations. There are many plantations and all the villages have numerous fruit trees such as mangoes, papayas, banana ele. There are no commercial plantations at present.
6. T - Secondary Forest regrowth covers extensive areas on all hilly upper plateau, mostly on mountainous feral soils and crowded land. This land produces firewood and some poles on non-reserved forests. As a result, most of it consists of coppiced trees and bushes forming an open thicket with herb and grasses in between. The present use on this land is very wasteful. Some of it could be converted into productive sugar cane land. Apart from the waste, the present destructive exploitation is causing a very serious increase in erosion.
7. F - Forest land is practically confined to Shan Yoma. There are so-- one tall trees here but the more valuable species have been cut down, and the forest is now open with patches of bamboo, bushes, and tall grasses which are frequently burned. This land produces some timber and bamboo for local use. Much of it appears steep for commercial forest planting, but efforts should be made to protect for the natural growth in order to reduce erosion and the consequent severe flash floods.
8. U - Urband land covers quite a low proportion of the land as there are 253 villages and with scattered and roads. The population density of Naungkhio Township is 98.97 per square mile.

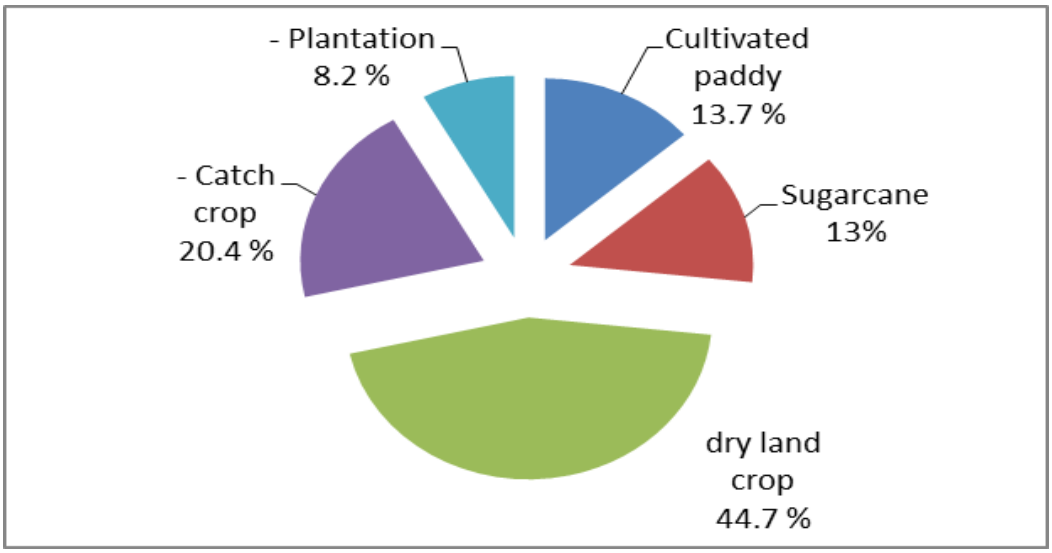
5.1.13. Present Land Use in Naungkhio Township

The major crop cultivated lands are available from Township Department of Agriculture for 2014 cropping season in Naungkhio Township. Cultivated crops are identified as follows:

Cp	▪ Cultivated paddy	▪ 25160 ac (13.7 %)
Cs	▪ Sugarcane	▪ 23996 ac (13 %)
Cd	▪ dry land crops	▪ 82449 ac (44.7 %)
Cc	▪ Catch crops	▪ 37620 ac (20.4 %)
P	▪ Plantation	▪ 15061 ac (8.2 %)
P	▪ Plantations include rubber, coffee, citrus, mango and tamarind, etc.	
Cc	▪ Catch crops. The farmer grown marketable crops such as onion, garlic, chili, gram, wheat, pepper and vegetable	
Cd	▪ dry land crops include maize, groundnut, sesame, sunflower and pigeon pea	

During the field observation period, NEPS team observed much sugarcane cultivation in almost many croplands. The soil is favorable for sugarcane cultivation. The farmers are getting good

yields of average 34.21 ton per acre which is more than national targeted yield of 30 ton per acre. Local farmers are interested to cultivate sugarcane because they can get proper net benefit from sugarcane cultivation.



Source: Township Department of Agriculture, Naungkhio Paddy cultivates on almost flat of low land.

Figure 5-11 Present Land Use in Naungkhio Township

Of the 184286 acres cultivated land about 25200 acres are paddy, 82000 acres are dryland crops such as maize, groundnut, sesame, sunflower and pigeon pea, 24000 acres are sugarcane, 37600 acres are catch crops (such as onion, garlic, chili, gram, wheat, pepper and vegetable and 15000 acres are plantation.

5.1.14. The Drinking Water Quality

The surface waters from Thabyetoe, Banbwegyin and Minhla creeks were taken during the dry and hot season. These samples were sent for analysis at Soil and Water Laboratory Irrigation Department, and Land Use Laboratory, Department of Agriculture, the Ministry of Agriculture and Irrigation.

The WHO drinking water standards were used as a guideline reference. The analytical results are shown in the following table.

5.1.15. The Surface Water Quality

5.1.15.1. For Irrigation Water Quality

According to USDA Diagram for Irrigation Water Quality, the surface water of ThaByeToe, BanBweKyin and MinHla creeks are C2 S1 Class (Figure 5-12). They are of good quality for irrigation. The downstream water from hydropower plant can be used as irrigation water on the almost flat plain, utilized by gravity, flow of pumping. The soils are medium to fine textured, well drained, and good structures. These are easy to plough. So, they are very suitable for seasonal and perennial crops. In this region, the agriculture section will be more developed. The farmer can cultivate double crops, or triple crops as well.

C2 - Medium Salinity Water (EC 250-750 μmhos/cm) It can be used if a moderate amount of leaching occurs. Plants with moderate salt tolerance can be grown in most instances without special practices for salinity control.

S1- Low sodium Water (SAR <10) It can be used for irrigation on almost all soils with little danger of the development of harmful levels of exchangeable sodium. However, sodium-sensitive crops may accumulate injurious concentrations of sodium.

5.1.15.2.For Ground Water Quality

The sub-surface Ground Water sample was taken from open well at Thabyetoe, Banbwegyin and MinHla. Also, this sample was analyzed at the relevant laboratories. The results are shown in the following Table 5-11. According to analyzed result show that water of Thapyetoe Village open well is chemically potable water except turbidity.

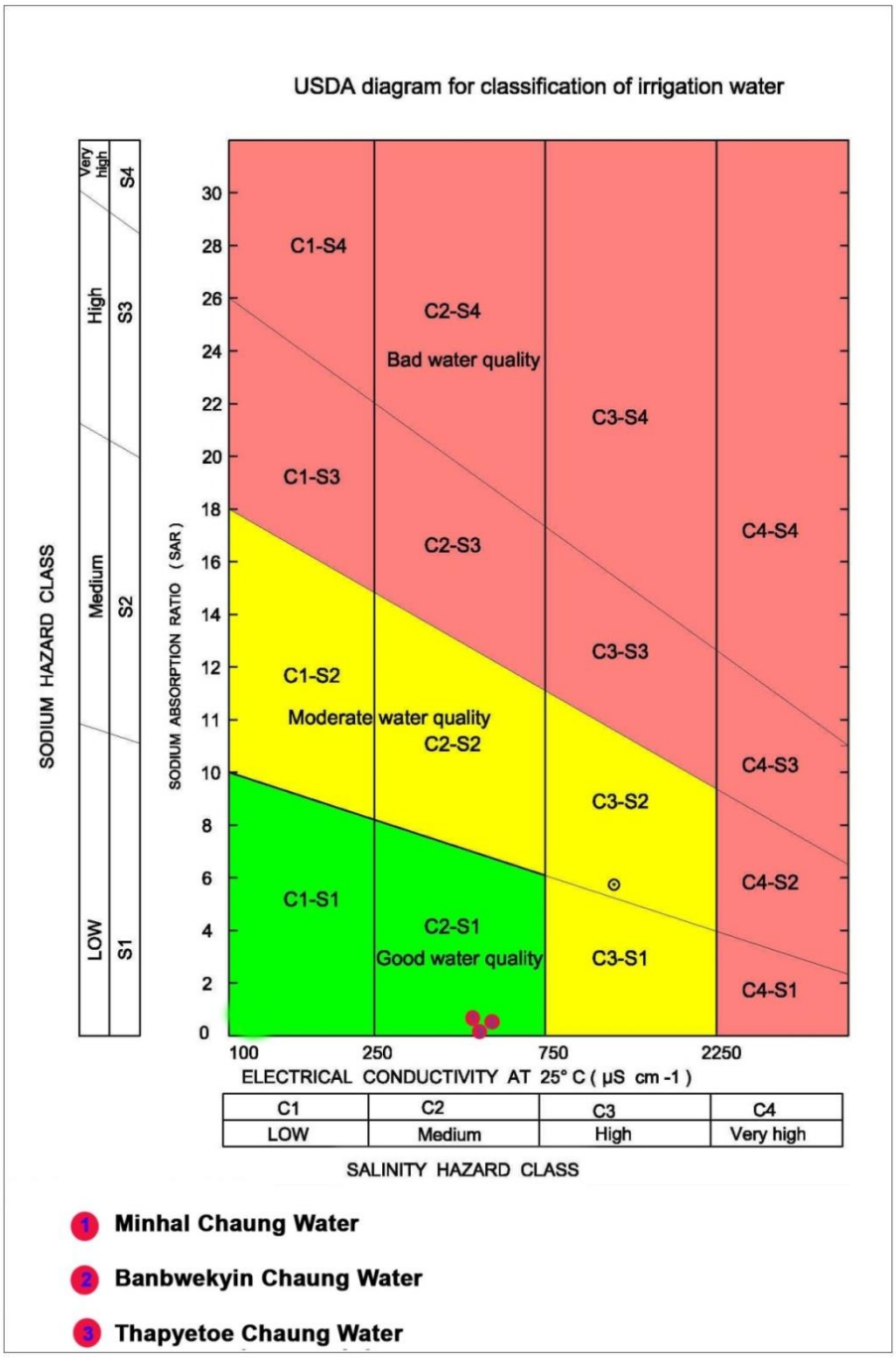


Figure 5-12 USDA Diagram for Classification of Irrigation Water

Table 5-11 MINHLA PROJECT AREA WATER SAMPLE

Characteristics	World Health Organization (WHO)		Analyzed Results		
	Highest desirable	Maximum permissible	Site 1	Site 2	Site 3
Physico-chemical					
Turbidity (J.T.U)	5.0	25.0	78	98	63
Colour (Pt-scale)	5.0	50.0			
Taste and Odour	Nothing	Disagreeable			
pH	7.0-8.5	6.5-9.2	7.43	7.38	7.20

Characteristics	World Health Organization (WHO)		Analyzed Results		
	Highest desirable	Maximum permissible	Site 1	Site 2	Site 3
Total Solids	500	1500	366.72	425.6	381.44
Total Hardness	100	500	246	292	256
Chloride	200	600	7.09	7.09	7.09
Sulphate (as SO_4)	200	400	0.48	0.48	44.19
Fluorides (as F)	1.0	1.5			
Nitrate (as NO_3)	45	45			
Calcium (as Ca)	75	200	69.74	60.09	57.72
Magnesium	30	150	17.57	34.16	27.33
Iron (as Fe)	0.1	1.0	0.10	0.03	0.05
Manganese (as Mn)	0.05	0.5			
Copper	0.05	1.0			
Zinc	5.0	15.0			
Phenolic compounds	0.001	0.002			
Detergents, anionic	0.2	1.0			
Mineral oil	0.01	0.30			
Arsenic	0.05	0.05			
Chromium (as Cr^{-6})	-	0.01			
Cyanide	-	0.05			
Lead	-	0.10			
Selenium	-	0.01			
Cadmium	-	0.01			
Mercury	-	0.001			
PCBs (µg/L)	-	0.2			
Gross alfa-activity (PCI/L)	-	3.0			
Gross beta-activity (PCI/L)	-	30.0			

Reference: P.K, Goel, Water Pollution Causes Effects and Controls

Note: all the values are in mg/l expect pH, otherwise stated.

Approximately, 1 NTU is equal to 1 JTU.

Note; Site 1 = Minhla Chaung Water
Site 2= Banbwegyin Chaung Water
Site 3= Thapyetoe Chaung Water

Table 5-12 Ground water Quality of Minhla Project

Characteristics	World Health Organization (WHO)		Analyzed Result
	Highest desirable	Maximum permissible	Thapyetoe Village
Physico-chemical			
Turbidity (J.T.U)	5.0	25.0	120

Characteristics	World Health Organization (WHO)		Analyzed Result
	Highest desirable	Maximum permissible	Thapyetoe Village
Colour (Pt-scale)	5.0	50.0	
Taste and Odour	Nothing	Disagreeable	
pH	7.0-8.5	6.5-9.2	7.27
Total Solids	500	1500	380.16
Total Hardness	100	500	244
Chloride	200	600	16.31
Sulphate (as SO_4)	200	400	44.19
Fluorides (as F)	1.0	1.5	
Nitrate (as NO_3)	45	45	
Calcium (as Ca)	75	200	34.47
Magnesium	30	150	38.55
Iron (as Fe)	0.1	1.0	0.05
Manganese (as Mn)	0.05	0.5	
Copper	0.05	1.0	
Zinc	5.0	15.0	
Phenolic compounds	0.001	0.002	
Detergents, anionic	0.2	1.0	
Mineral oil	0.01	0.30	
Arsenic	0.05	0.05	
Chromium (as Cr^{-6})	-	0.01	
Cyanide	-	0.05	
Lead	-	0.10	
Selenium	-	0.01	
Cadmium	-	0.01	
Mercury	-	0.001	
PCBs (µg/L)	-	0.2	
Gross alfa-activity (PCI/L)	-	3.0	
Gross beta-activity (PCI/L)	-	30.0	

Reference: P.K, Goel, Water Pollution Causes Effects and Controls

Note: all the values are in mg/l expect pH, otherwise stated.

Approximately, 1 NTU is equal to 1 JTU.

Open well of Thapyetoe village (depth of well 50ft)

5.2. BIOLOGICAL COMPONENT

5.2.1. Flora

The project area lies in the Northeastern part of the township. It is situated on the north of Bantbwe-kyin Village. There are four creeks namely Ban-bwe-kyin Creek, Min-hla Creek, Myay-thon-bon Creek and Has-byae-toe Creek flowing near the villages. These four creeks together form a common creek and drains into the Sedawgyi Dam. These four creeks and their common creek have hydropower potential. Total of six hydropower plants are intended to build by canal linkage system between creeks. The length of the canal network may be 290000 feet. The total intended power output may be 6 megawatts (36.4 million-kilowatt hour) per year. The total catchment area of the creeks may be 33 square miles (Figure 5-15).

The unique feature of the project area is the limestone habitat. The natural geology of limestone is the existing of sink holes. Due to the presence of sink holes the creeks sometimes disappear somewhere in the upstream and reappear in the downstream. Sometimes the reappeared springs become wide enough to be seen as a lake. There are two large natural lakes named Has-byae-toe lakes along Has-byae-toe chaung. These lakes are about 1.61 hectare wide.

Another unique feature is the existing of the natural wetland named In-ma in formed by the drainage of Lon-Khote-Chaung and other many small creeks. This wetland comprises 20.23 hectare. Some small creeks arise from this wetland and drains into the four major creeks.

Therefore, to maintain the study flow of water in the creeks the catchment area of this wetland must be conserved.

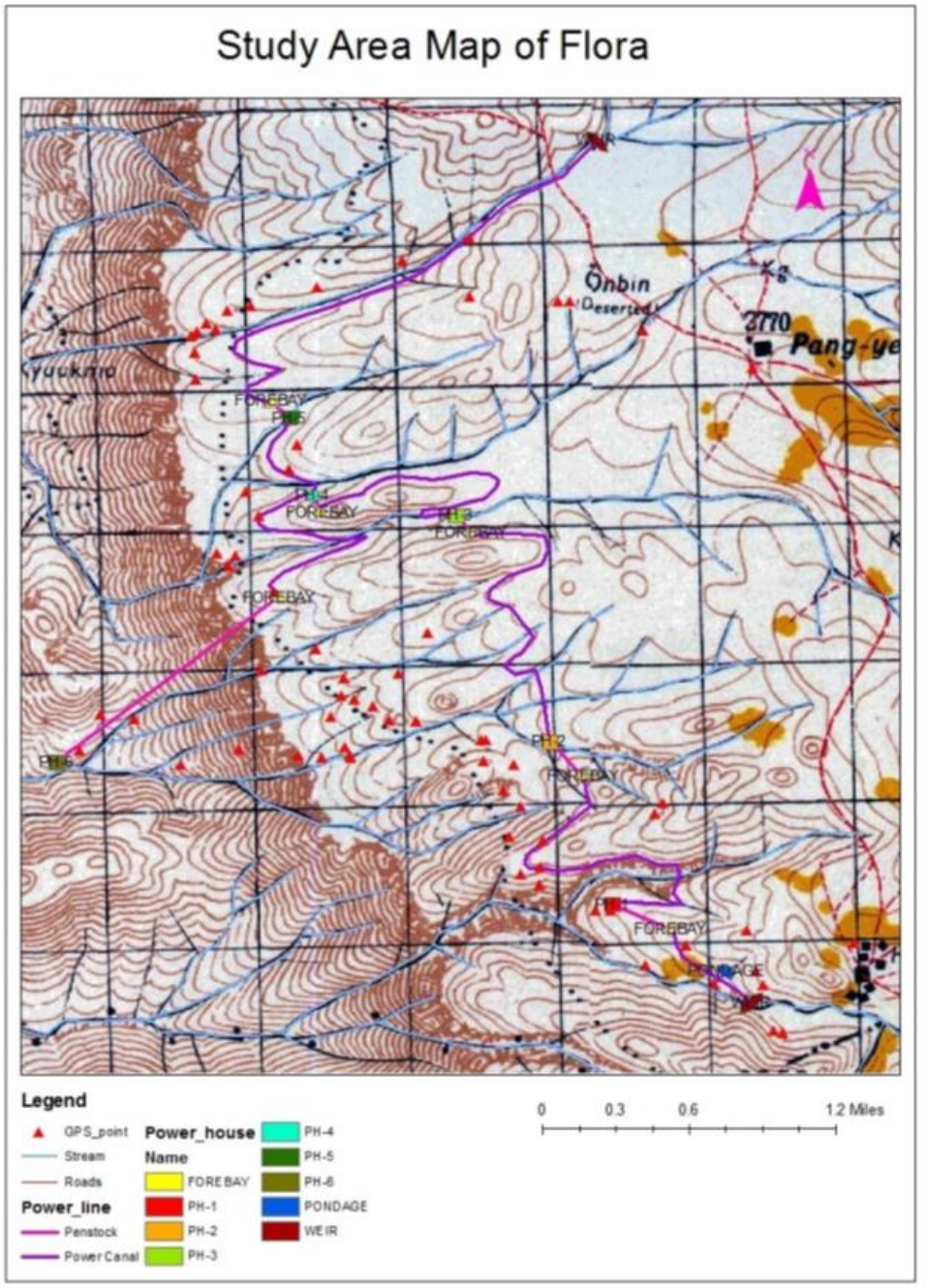


Figure 5-13 Surveying Area Map 1

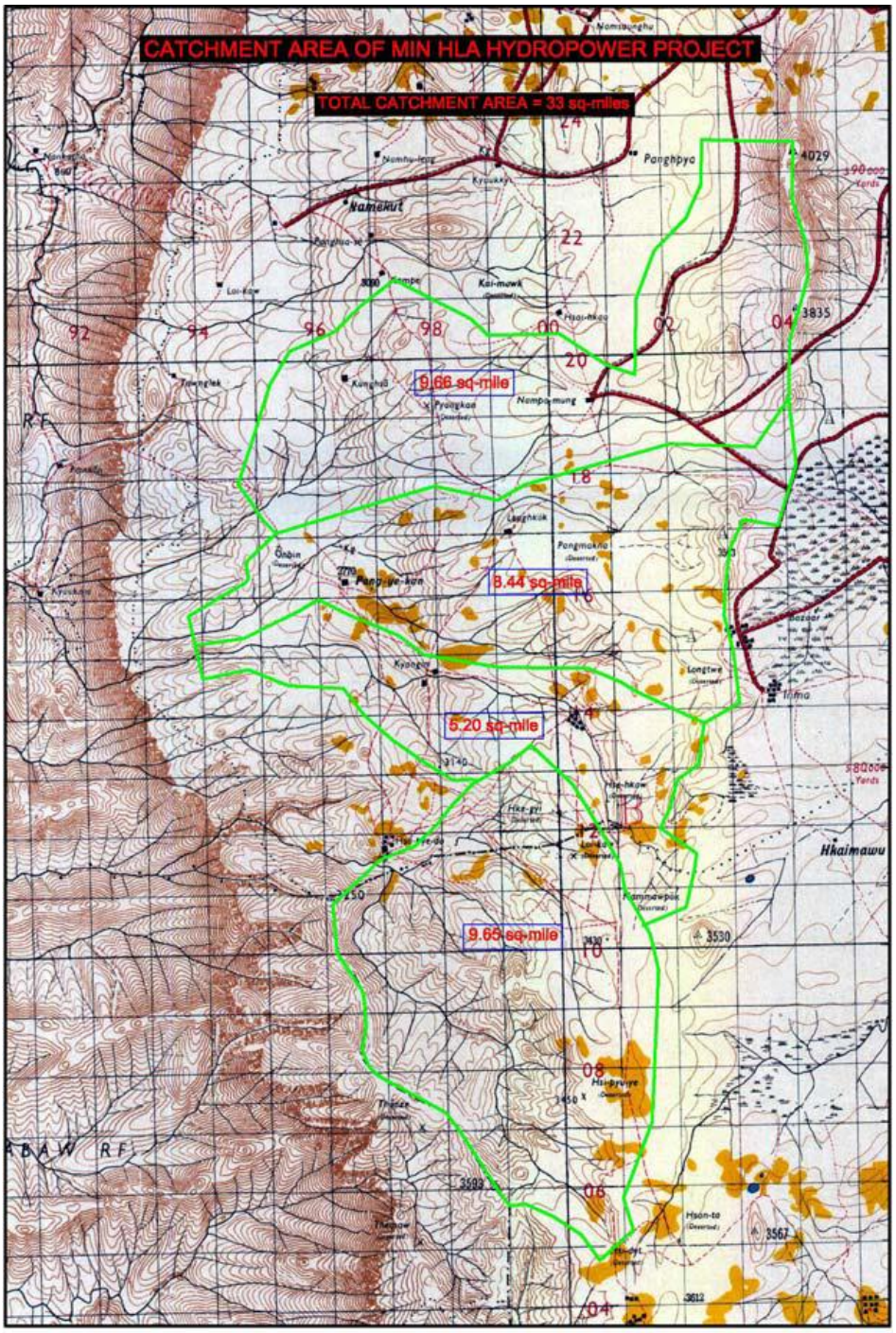


Figure 5-14 Surveying Area Map 2

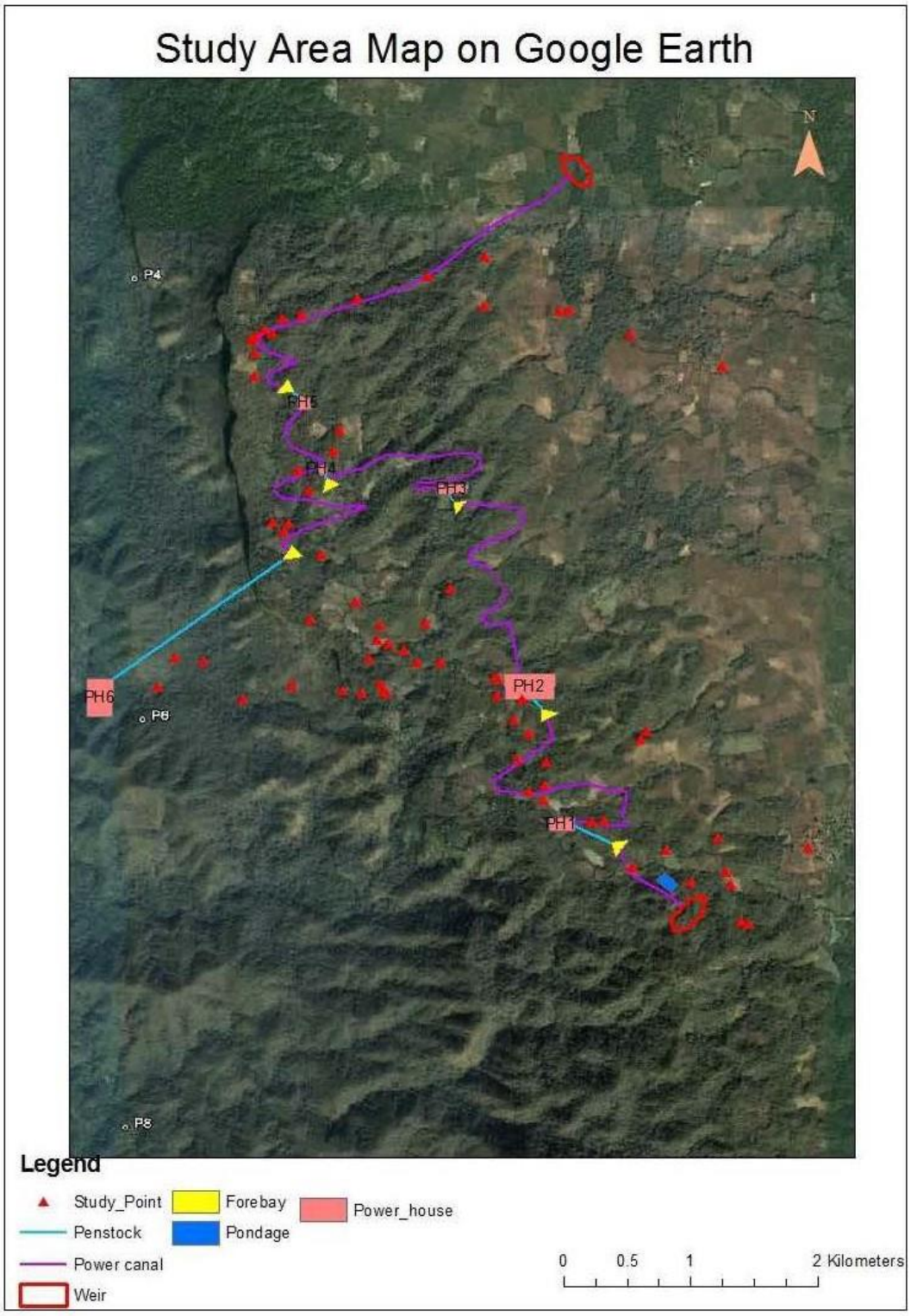


Figure 5-15 Study area map

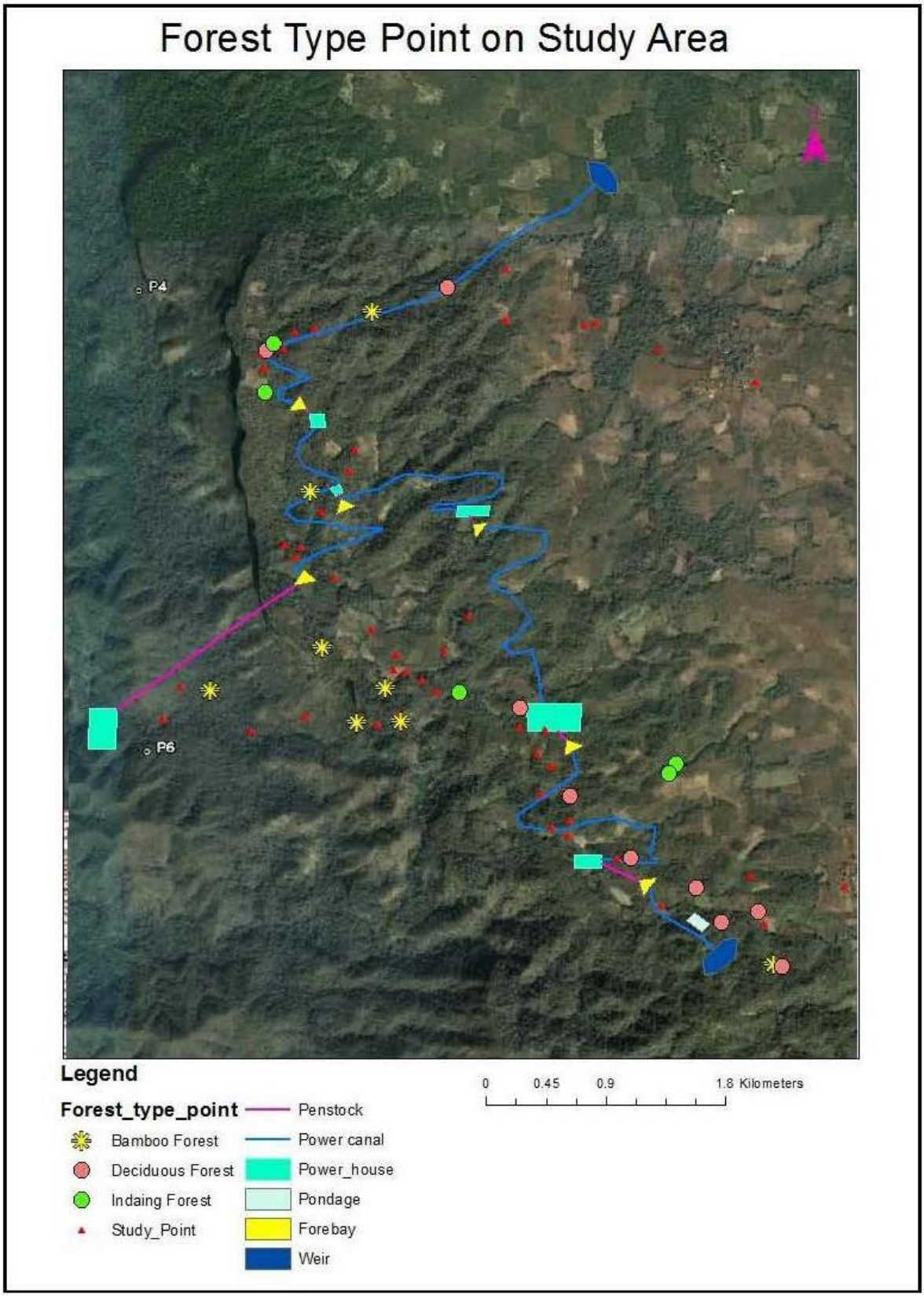


Figure 5-16 Survey point map

5.2.1.1. Aims and Objective

- To collect, identify and list the plant species in the area.
- To record the dominant tree species and evaluate the forest types.
- To identify the threats and environmental impact in the area.
- To collect the ecological data and evaluate the existing ecosystem.
- To identify and record the endangered species in the studied area.

5.2.2. **Materials and Methods**

5.2.2.1. Method

The floristic data and ecological data collection were conducted by the following methods in the study Area.

1. Sample Plotting

The Global Positioning System was used to navigate and mark the coordinates of the sample plots. In order to obtain essential data for predicting of tree species composition in the forest and vegetation types, 20x20 and 30x30 meter quadrants, were set up and tree species in the plot were collected and population of each species were also counted. For the Bamboo survey, 30x30 meter quadrants were set up and bamboo species were collected and number of clumps of each species were also counted. The species identification was carried out by using key to families of flowering plants and appropriate literature and confirmed by matching with herbarium specimens of Department of Botany, University of Yangon.

2. Random Transecting

To get representative checklists of the tree species and bamboo species, plant collection was also carried out by random transect lines along the road side and between one plot and another wherever possible. Specimen collection was made within 10 meters on either side of the transect line.

3. Mapping

Location maps are set by the method based on the UTM maps and UTM zone 47 N, WGS 84, coordinate system to determine the forests of the watershed areas.

5.2.2.2. Materials

Materials used for recording are strings for sample plotting and transecting, digital camera for recording, GPS, maps, heavy duty plastic bags, newspapers, alcohol, spray jug (for fixing specimens), 10x lens, permanent marker, field note books, field press, drying press and dryers.

5.2.2.3. Data Analysis

After field survey, data entry was carried out in excel work sheet. Analysis of population per hectare percentage was conducted using excel work 2007.

5.2.2.4. Population of Individual Species (per hectare)

The population of species will show not only the composition of species but also the richness of the species in the study area. According to R.He'dl, M Sva'tek, M. Dancak, Rodzay A.W., M. Salleh A.B., Kamariah A.S.(2009), population of individual species (per hectare) is determined by following formula.

$$Population\ of\ Individual\ Species\ = \frac{\text{Total Individual species}}{\text{Total Plots Area (m2)}}\ x10000m2(1ha)$$

5.2.2.5. Relative Density of Tree Species

The density of a species refers to the numerical representation of its individual and the availability of space in a unit area. The density index shows not only the richness of the texa but also the relative distribution of the individuals. According to Curtis (1959), the density indexis determined by the following formula.

$$Relative\ Density\ of\ Tree\ species = \frac{\text{No. of Individual species}}{\text{Total no. of all individual Species}}\ x100$$

5.2.2.6. Relative Frequency of Tree Species

The relative frequency of a species refers to the percentage occurrence of its individuals and shows the frequency of different species growing in the study area. The species which fall in high frequency class can be considered as the most common species in the study area. According to Curtis (1959), the relative frequency is determined by the following formula.

$$Relative\ frequency\ of\ Tree\ species = \frac{\text{No. of sample plot occurs}}{\text{Total no. of all speciesoccur}}\ x100$$

5.2.2.7. Species distribution by frequency class

According to Raunkiaer's Law of frequency (1934), each species was grouped into one of five frequency class (FC); Frequency range (1-20%) represents rare species, (20 - 40%) represents seldom species, (40 - 60%)represents often species, (60 - 80%)represents mostly species, and (80 - 100%)represents constantly present species. This frequency class will also clarify the homogeneity or heterogeneity of the floristic distribution in the study area.

5.2.2.8. Tree species in GBH class interval

Tree species in GBH class interval is calculated by

$$Population\ of GBH\ class\ interval = \frac{\text{No. of species}}{\text{Total no. of all species}}\ x100$$

Low GBH class interval shows the degraded and secondary forest height GBH class interval shows the primary forest.

5.2.2.9. Tree species in Height class interval

Tree species in Height class interval is calculated by

$$Population\ of Height\ class\ interval = \frac{\text{No. of species}}{\text{Total no. of all species}}\ x100$$

Low height class interval shows the degraded and secondary forest and high height class interval shows the primary forest.

5.2.3. **Daily Schedule**

No.	Date	Places	GPS points
1	20.4.2014	Yangon to Pyin-Oo-Lwin	
2	21.4.2014	Pyin-Oo-Lwin to Min Hla (Base Camp)	N22 23 12.5 E96 23 20.1 770 m
3	22.4.2014	Has-byae-toe(Weir, PH 1) morning	N22 22 26.5 E96 24 14.5 818 m
4	22.4.2014	Myay-thon-bon (PH 2) evening	N22 22 57.7 E96 23 57.0 791 m
5	23.4.2014	Lay-kaung-waing(1500ft)(PH 6)	N22 23 07.4 E96 22 35.9 304 m
6	24.4.2014	Ban-bwe-kyin (Weir, PH5)	N22 24 45.3 E96 23 33.2 769 m
7	24.4.2014	Wet land (evening)	N22 22 19.6 E96 25 09.9 840 m
8	25.4.2014	Min-hla (PH 3, PH 4)	N22 23 07.0 E96 23 36.2 N22 23 17.9 E96 23 02.9 715 m
9	26.4.2014	Min Hla to Nan Kan	

Forest Cover Along the streams

Deciduous Forest

Indaing Forest

Bamboo Forest

Charcoal Kiln

Fire Wood Collecting

Clearance for Construction Site

Illegal Logging

Timber cutting


Deciduous Forest

Figure 5-17 Flora Finding Result in Project Area

5.2.4. Floristic Composition

The total number of tree species collected in 9 representative sample plots in this area is 56 species belonging to 43 genera. The dominant tree species in this area are Wendlandia tinctoria DC.(Thit-ni) followed by Helicia erratica Hook. f.(Dauk-yet) Schima wallichii (DC.) Korth.(Lauk-ya),Careya arborea Roxb. (Ban-bwe).

5.2.5. Tree Species Population

No	Scientific Name	No. of individual	Total no. of individual/ha	Total no. of population/ha (%)
1	Adenanthera pavonina L.	7	8.641975309	1.994301994
2	Albizia chinensis (Osbeck) Merr.	2	2.469135802	0.56980057
3	Albizia lebbek (L.)Benth.	1	1.234567901	0.284900285
4	Anneslea fragrans Wall.	1	1.234567901	0.284900285
5	Anthocephalus morindaefolius Korth.	7	8.641975309	1.994301994
6	Artocarpus lakoocha	1	1.234567901	0.284900285
7	Bischofia javanica	5	6.172839506	1.424501425
8	Bombax anceps Pierre	3	3.703703704	0.854700855
9	Buchanania latifolia Roxb.	3	3.703703704	0.854700855
10	Careya arborea Roxb.	28	34.56790123	7.977207977
11	Castanopsis tribuloides A. DC.	7	8.641975309	1.994301994
12	Cordia grandis Roxb.	1	1.234567901	0.284900285
13	Dalbergia cultrata Grah.	5	6.172839506	1.424501425
14	Dalbergia rimosa Roxb.	1	1.234567901	0.284900285
15	Dillenia pentagyna Roxb.	12	14.81481481	3.418803419
16	Dipterocarpus tuberculatus Roxb.	4	4.938271605	1.13960114
17	Emblica officinalis Gaertn.	24	29.62962963	6.837606838
18	Engelhardtia spicata Blume	1	1.234567901	0.284900285
19	Erythrina stricta Roxb.	1	1.234567901	0.284900285
19	Ficus hispida L. f.	7	8.641975309	1.994301994
20	Ficus lacor Buch.-Ham.	3	3.703703704	0.854700855

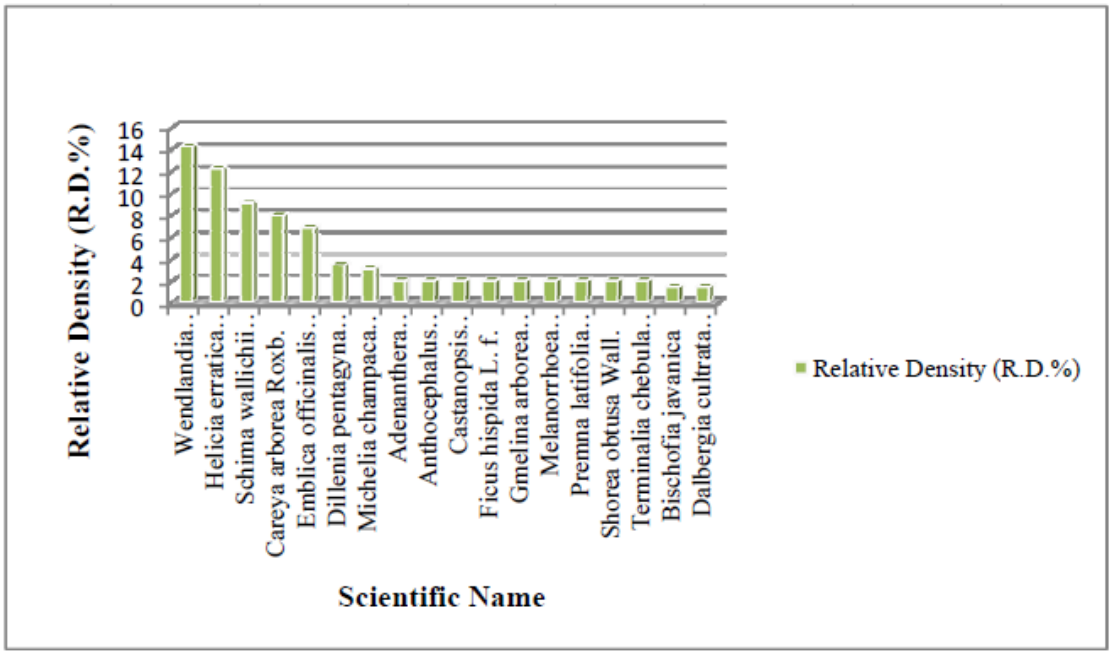
21	Ficus semicordata	2	2.469135802	0.56980057
22	Glochidion eriocarpum	1	1.234567901	0.284900285
23	Gmelina arborea Roxb.	7	8.641975309	1.994301994
24	Grewia eriocarpa Juss.	1	1.234567901	0.284900285
25	Grewia sclerophylla Roxb. ex G. Don	5	6.172839506	1.424501425
26	Helicia erratica Hook. f.	43	53.08641975	12.25071225
27	Lagerstroemia speciosa (L.) Pers.	1	1.234567901	0.284900285
28	Lannea coromandelica (Houtt.) Merrr.	1	1.234567901	0.284900285
29	Lithocarpus elegans (Blume) Hatusima ex Soepadmo	1	1.234567901	0.284900285
30	Lithocarpus lindleyanus (Wall.) A. Camus	5	6.172839506	1.424501425
31	Litsea monopetala (Roxb.)Pers			
32		2	2.469135802	0.56980057
33	Macaranga denticulata Muell. Arg.	2	2.469135802	0.56980057
34	Melanorrhoea usitata Wall.	7	8.641975309	1.994301994
35	Michelia champaca L.	11	13.58024691	3.133903134
36	Premna latifolia Roxb.	7	8.641975309	1.994301994
37	Quercus mespilifolia Wall.	1	1.234567901	0.284900285
38	Quercus sp.	3	3.703703704	0.854700855
39	Samadera indica Gaertn.	4	4.938271605	1.13960114
40	Saurauia napaulensis	1	1.234567901	0.284900285
41	Schima wallichii (DC.) Korth.	32	39.50617284	9.116809117
42	Schleichera oleosa (Lour.) Oken	1	1.234567901	0.284900285
43	Senna timoriensis (DC.) Irwin & Barne by	1	1.234567901	0.284900285
44	Shorea obtusa Wall.	7	8.641975309	1.994301994
45	Shorea siamensis (Kurz) Miq.	5	6.172839506	1.424501425
46	Spondias lakonensis	1	1.234567901	0.284900285
47	Spondias pinnata (L. f.) Kurz.	5	6.172839506	1.424501425
48	Sterculia urens var. thorelii	1	1.234567901	0.284900285
49	Syzygium grande (Wight) Walp	1	1.234567901	0.284900285
50	Syzygium kurzii (Duthie)N.P.Balakr.	1	1.234567901	0.284900285
51	Terminalia alata (Heyne) Roth	1	1.234567901	0.284900285
52	Terminalia bellirica (Gaertn) Roxb.	4	4.938271605	1.13960114
53	Terminalia chebula Retz.	7	8.641975309	1.994301994
54	Toona ciliata M. Roemer	4	4.938271605	1.13960114
55	Trema orientalis (L.) Blume	1	1.234567901	0.284900285
56	Wendlandia tinctoria DC.	50	61.72839506	14.24501425
	Total	351	433.3333333	100

5.2.6. **Relative Density**

Among the sample plots species density per hectare varied and the highest density was observed Wendlandia tinctoria DC.,Helicia erratica Hook. f., Schima wallichii (DC.) Korth.,followed by Careya arborea Roxb., Emblica officinalis Gaertn. and Dilleni pentagyna Roxb.This shows that these six species are abundant in this area.

No	Scientific Name	Density (D)	Relative Density (R.D.%)
1	Wendlandia tinctoria DC.	5.555555556	14.24501425
2	Helicia erratica Hook. f.	4.777777778	12.25071225
3	Schima wallichii (DC.) Korth.	3.555555556	9.116809117
4	Careya arborea Roxb.	3.111111111	7.977207977
5	Emblica officinalis Gaertn.	2.666666667	6.837606838
6	Dillenia pentagyna Roxb.	1.333333333	3.418803419
7	Michelia champaca L.	1.222222222	3.133903134
8	Adenanthera pavonina L.	0.777777778	1.994301994
9	Anthocephalus morindaefolius Korth.	0.777777778	1.994301994
10	Castanopsis tribuloides A. DC.	0.777777778	1.994301994
11	Ficus hispida L. f.	0.777777778	1.994301994
12	Gmelina arborea Roxb.	0.777777778	1.994301994
13	Melanorrhoea usitata Wall.	0.777777778	1.994301994
14	Premna latifolia Roxb.	0.777777778	1.994301994
15	Shorea obtusa Wall.	0.777777778	1.994301994
16	Terminalia chebula Retz.	0.777777778	1.994301994
17	Bischofia javanica	0.555555556	1.424501425
18	Dalbergia cultrata Grah.	0.555555556	1.424501425
19	Grewia sclerophylla Roxb. ex G. Don	0.555555556	1.424501425
20	Lithocarpus lindleyanus (Wall.) A. Camus	0.555555556	1.424501425
21	Shorea siamensis (Kurz) Miq.	0.555555556	1.424501425
22	Spondias pinnata (L. f.) Kurz.	0.555555556	1.424501425
23	Dipterocarpus tuberculatus Roxb.	0.444444444	1.13960114
24	Samadera indica Gaertn.	0.444444444	1.13960114
25	Terminalia bellirica (Gaertn) Roxb.	0.444444444	1.13960114
26	Toona ciliata M. Roemer	0.444444444	1.13960114
27	Bombax anceps Pierre	0.333333333	0.854700855
28	Buchanania latifolia Roxb.	0.333333333	0.854700855
29	Ficus lacor Buch.-Ham.	0.333333333	0.854700855
30	Quercus sp.	0.333333333	0.854700855

31	Albizia chinensis (Osbeck) Merr.	0.222222222	0.56980057
32	Ficus semicordata	0.222222222	0.56980057
33	Litsea monopetala (Roxb.)Pers	0.222222222	0.56980057
34	Macaranga denticulata Muell. Arg.	0.222222222	0.56980057
35	Albizia lebbek (L.)Benth.	0.111111111	0.284900285
36	Anneslea fragrans Wall.	0.111111111	0.284900285
37	Artocarpus lakoocha	0.111111111	0.284900285
38	Cordia grandis Roxb.	0.111111111	0.284900285
39	Dalbergia rimosa Roxb.	0.111111111	0.284900285
40	Engelhardtia spicata Blume	0.111111111	0.284900285
41	Lithocarpus elegalns (Blume) Hatusima ex Soepadmo	0.111111111	0.284900285
42	Lithocarpus lindleyanus (Wall.) A. Camus	0.111111111	0.284900285
43	Litsea monopetala (Roxb.)Pers	0.111111111	0.284900285
44	Macaranga denticulata Muell. Arg.	0.111111111	0.284900285
45	Quercus mespilifolia Wall	0.111111111	0.284900285
46	Samadera indica Gaertn.	0.111111111	0.284900285
47	Saurauia napaulensis	0.111111111	0.284900285
48	Schleichera oleosa (Lour) Oken	0.111111111	0.284900285
49	Senna timoriensis(DC) Irwin &Barneby	0.111111111	0.284900285
50	Sponsias lakonensis	0.111111111	0.284900285
51	Spondias pinnata (L. f.) Kurz.	0.111111111	0.284900285
52	Sterculia urens var.thorelii	0.111111111	0.284900285
53	Syzygium grande (Wight) Walp	0.111111111	0.284900285
54	Syzygium kurzii (Duthie) N.P Balakr	0.111111111	0.284900285
55	Terminalia alata (Heyne) Roth	0.111111111	0.284900285
56	Trema orientalis (L.) Blume	0.111111111	0.284900285



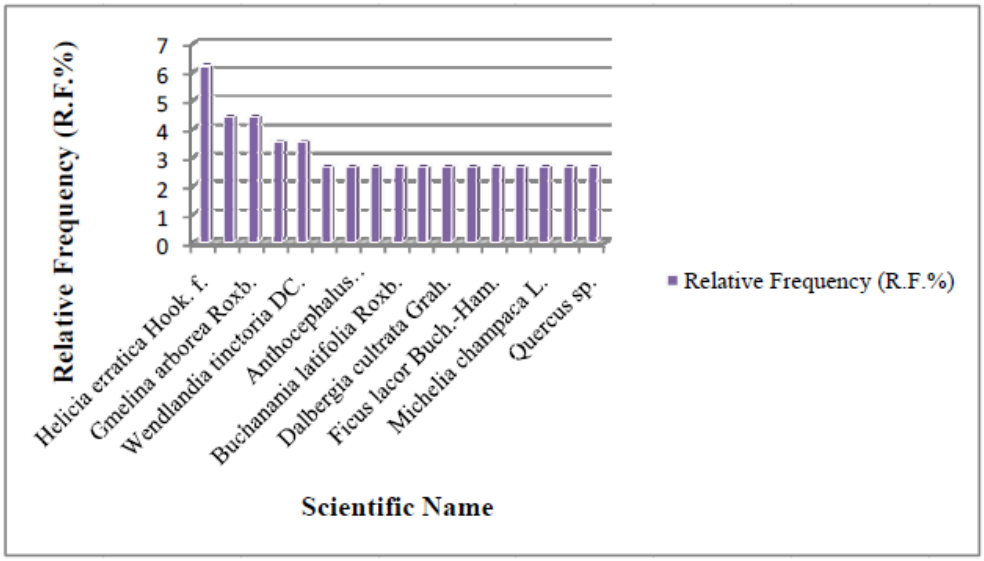
5.2.7. **Relative Frequency of Tree Species**

Relative frequency is the frequency of one species compared to the total frequency of all the species. According to the results, Helicia erratica Hook. f., high relative frequency value (6.195%) followed by Emblica officinalis Gaertn.and Gmelina arborea Roxb.(4.425%) are equally,Grewia sclerophylla Roxb. ex G. Don and Wendlandia tinctoria DC. (3.540%) are respectively. Therefore these species occur everywhere in the study area. The lowerfrequency of some species is such as Syzygium kurzii (Duthie) N.P.Balakr. Terminalia alat (Heyne) Rothand Trema orientalis (L.) Blumeare demarcated as rare species in the area.

No	Specific Name	Frequency (F)	Relative Frequency (R.F.%)
1	Helicia erratica Hook. f.	0.777777778	6.194690265
2	Emblica officinalis Gaertn.	0.555555556	4.424778761
3	Gmelina arborea Roxb.	0.555555556	4.424778761
4	Grewia sclerophylla Roxb. ex G. Don	0.444444444	3.539823009
5	Wendlandia tinctoria DC.	0.444444444	3.539823009
6	Adenanthera pavonina L.	0.333333333	2.654867257
7	Anthocephalus morindaefolius Korth.	0.333333333	2.654867257
8	Bombax anceps Pierre	0.333333333	2.654867257
9	Buchanania latifolia Roxb.	0.333333333	2.654867257
10	Castanopsis tribuloides A. DC.	0.333333333	2.654867257
11	Dalbergia cultrata Grah.	0.333333333	2.654867257
12	Dillenia pentagyna Roxb.	0.333333333	2.654867257
13	Ficus lacor Buch.-Ham.	0.333333333	2.654867257
14	Melanorrhoea usitata Wall.	0.333333333	2.654867257

15	Michelia champaca L.	0.333333333	2.654867257
16	Premna latifolia Roxb.	0.333333333	2.654867257
17	Quercus sp.	0.333333333	2.654867257
18	Schima wallichii (DC.) Korth.	0.333333333	2.654867257
19	Shorea siamensis (Kurz) Miq.	0.333333333	2.654867257
20	Terminalia bellirica (Gaertn) Roxb.	0.333333333	2.654867257
21	Terminalia chebula Retz.	0.333333333	2.654867257
22	Albizia chinensis (Osbeck) Merr.	0.222222222	1.769911504
23	Careya arborea Roxb.	0.222222222	1.769911504
24	Ficus semicordata	0.222222222	1.769911504
25	Shorea obtusa Wall.	0.222222222	1.769911504
26	Toona ciliata M. Roemer	0.222222222	1.769911504
27	Albizia lebbek (L.)Benth.	0.111111111	0.884955752
28	Anneslea fragrans Wall.	0.111111111	0.884955752
29	Artocarpus lakoocha	0.111111111	0.884955752
30	Bischofia javanica	0.111111111	0.884955752
31	Cordia grandis Roxb.	0.111111111	0.884955752
32	Dalbergia rimosa Roxb.	0.111111111	0.884955752
33	Dipterocarpus tuberculatus Roxb.	0.111111111	0.884955752
34	Engelhardtia spicata Blume	0.111111111	0.884955752
35	Erythrina stricta Roxb.	0.111111111	0.884955752
36	Ficus hispida L. f.	0.111111111	0.884955752
37	Glochidion eriocarpum	0.111111111	0.884955752
38	Grewia eriocarpa Juss.	0.111111111	0.884955752
39	Lagerstroemia speciosa (L.) Pers.	0.111111111	0.884955752
40	Lannea coromandelica (Houtt.) Merrr.	0.111111111	0.884955752
41	Lithocarpus elegans (Blume) Hatusima ex Soepadmo	0.111111111	0.884955752
42	Lithocarpus lindleyanus (Wall.) A. Camus	0.111111111	0.884955752
43	Litsea monopetala (Roxb.)Pers	0.111111111	0.884955752
44	Macaranga denticulata Muell. Arg.	0.111111111	0.884955752
45	Quercus mespilifolia Wall.	0.111111111	0.884955752
46	Samadera indica Gaertn.	0.111111111	0.884955752
47	Saurauia napaulensis	0.111111111	0.884955752
48	Schleichera oleosa (Lour.) Oken	0.111111111	0.884955752
49	Senna timoriensis (DC.) Irwin & Barneby	0.111111111	0.884955752
50	Spondias lakonensis	0.111111111	0.884955752
51	Spondias pinnata (L. f.) Kurz.	0.111111111	0.884955752

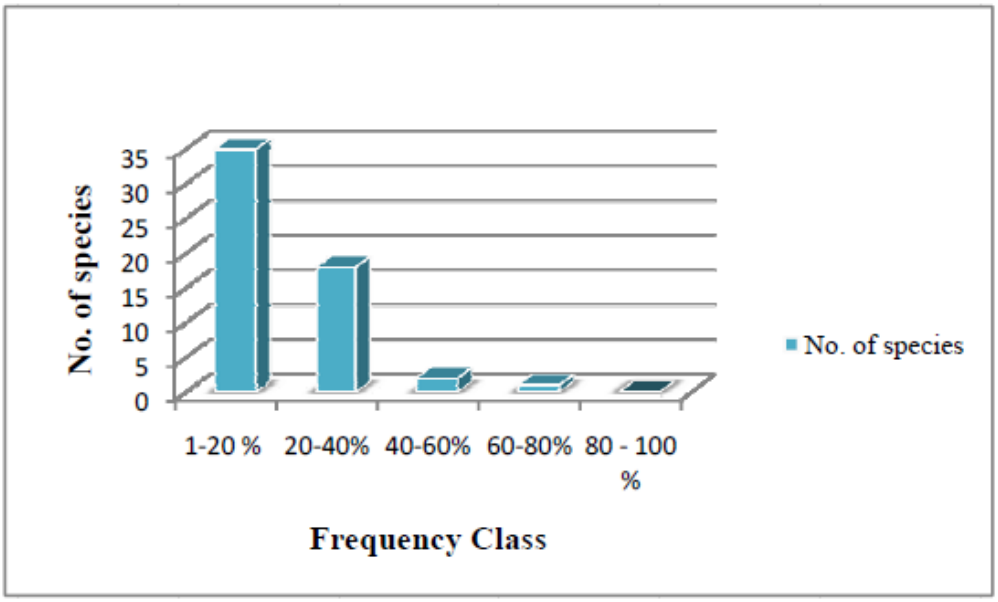
52	Sterculia urens var. thorelii	0.111111111	0.884955752
53	Syzygium grande (Wight) Walp	0.111111111	0.884955752
54	Syzygium kurzii (Duthie)N.P.Balakr.	0.111111111	0.884955752
55	Terminalia alata (Heyne) Roth	0.111111111	0.884955752
56	Trema orientalis (L.) Blume	0.111111111	0.884955752



5.2.8. **Species distribution by frequency class**

In order to clarify the homogeneity and heterogeneity of the floristic distribution in the area, the species distribution by frequency class was examined. According to the outcome of the frequency classes, only two species in high frequency class and 53% of the species are in low frequency class. This shows that this area is floristically high degree of the heterogeneity.

Frequency Class	No of Species
1- 20 %	35
20 - 40 %	18
40 – 60 %	2
60 – 80 %	1
80 – 100 %	0



5.2.9. Tree Species in GBH Class Interval

The distribution of GBH interval class reveals the dominant of small stem individuals in the area. 32.76% of the tree species are less than 40cm GBH. Large stem individuals with GBH more than 80cm are of 23.04 %. Majority of the trees are less than 40cm in diameter, which indicates that the forests are degraded and secondary types.

GBH Class	No. of species	Total number of individuals	% of total population
<40cm	115	141.9753086	32.76353276
41-60cm	93	114.8148148	26.4957265
61-80cm	61	75.30864198	17.37891738
81-100cm	20	24.69135802	5.698005698
>101cm	62	76.54320988	17.66381766
Total	351	433.3333333	100
GBH Class	No. of species	Total number of individuals	% of total population

5.2.10. Tree species in Height class interval

The distribution of Height shows that 314 individuals are less than 10 meters, comprising 72% and of the total population and 68 individuals are more than 15meter, comprising the 16%. Since most canopy height classes are not more than 10m, the forests in the area could be classified as lower secondary forests.

Height Class	No. of species	Total number of individuals	% of total population
<10m	254	313.5802469	72.36467236
11-15m	55	67.90123457	15.66951567
16-20m	42	51.85185185	11.96581197
21-25m	0	0	0
>26m	0	0	0
Total	351	433.3333333	100

5.2.11. Indaing Forest


Figure 5-18 Indaing Forest

5.2.12. Floristic composition

The total number of tree species collected in 6 representative sample plots in this area is 28 species belonging to 21 genera. The dominant tree species in this area are Dipterocarpus tuberculatus Roxb. (In) followed by Shorea siamensis (Kurz) Miq. (In-gyin) and Shorea obtusa Wall. (Thit-ya),Quercus mespilifolia Wall. (Yin-gu).

5.2.13. Tree Species Population

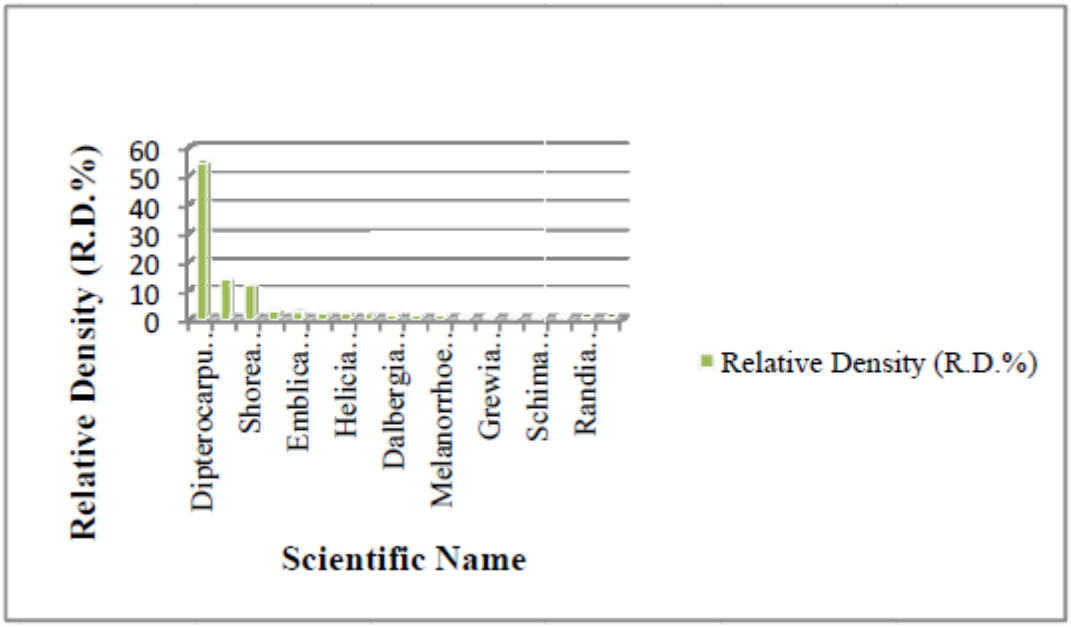
No.	Scientific Name	No. of individual	Total no. of individual/ha	Total no. of population/ha (%)
1	Albizia chinensis (Osbeck) Merr.	3	5.555555556	0.369458128
2	Albizia lebbek (L.)Benth.	10	18.51851852	1.231527094
3	Castanopsis tribuloides A. DC.	3	5.555555556	0.369458128
4	Cratoxylum polyanthumKorth.	1	1.851851852	0.123152709
5	Dalbergia cultrata Grah.	11	20.37037037	1.354679803
6	Dalbergia oliveri Gamble	5	9.259259259	0.615763547
7	Dillenia pentagyna Roxb.	15	27.77777778	1.84729064
8	Dipterocarpus tuberculatus Roxb.	442	818.5185185	54.43349754
9	Emblica officinalis Gaertn.	20	37.03703704	2.463054187
10	Ficus hirta Vahl.	3	5.555555556	0.369458128
11	Ficus semicordata	1	1.851851852	0.123152709
12	Gmelina arborea Roxb.	1	1.851851852	0.123152709
13	Gochnatia decora	1	1.851851852	0.123152709
14	Grewia laevigata Vahl	5	9.259259259	0.615763547
15	Grewia sclerophylla Roxb. ex G. Don	5	9.259259259	0.615763547
16	Helicia erratica Hook. f.	15	27.77777778	1.84729064
17	Melanorrhoea usitata Wall.	9	16.66666667	1.108374384
18	Premna latifolia Roxb.	1	1.851851852	0.123152709
19	Quercus mespilifolia Wall.	24	44.44444444	2.955665025
20	Quercus sp.	3	5.555555556	0.369458128
21	Randia uliginosa DC.	4	7.407407407	0.492610837
22	Schima wallichii (DC.) Korth.	5	9.259259259	0.615763547
23	Shorea obtusa Wall.	93	172.2222222	11.45320197
24	Shorea siamensis (Kurz) Miq.	112	207.4074074	13.79310345

25	Strychnos nux-blanda A.W. Hill	1	1.851851852	0.123152709
26	Terminalia alata (Heyne) Roth	5	9.259259259	0.615763547
27	Terminalia chebula Retz.	1	1.851851852	0.123152709
28	Wendlandia tinctoria DC.	13	24.07407407	1.600985222
	Total	812	1503.703704	100

5.2.14. Relative density

Among the sample plots species density per hectare varied and the highest density was observed Dipterocarpus tuberculatus Roxb., Shorea siamensis (Kurz) Miq., and Shorea obtuse Wall.,followed by Quercus mespilifolia Wall., Emblica officinalis Gaertn., and Dillenia pentagyna Roxb.. This shows that these six species are abundant in this area.

No.	Scientific Name	Density (D)	Relative Density (R.D.%)
1	Dipterocarpus tuberculatus Roxb.	73.66666667	54.43349754
2	Shorea siamensis (Kurz) Miq.	18.66666667	13.79310345
3	Shorea obtusa Wall.	15.5	11.45320197
4	Quercus mespilifolia Wall.	4	2.955665025
5	Emblica officinalis Gaertn.	3.333333333	2.463054187
6	Dillenia pentagyna Roxb.	2.5	1.84729064
7	Helicia erratica Hook. f.	2.5	1.84729064
8	Wendlandia tinctoria DC.	2.166666667	1.600985222
9	Dalbergia cultrata Grah.	1.833333333	1.354679803
10	Albizia lebbek (L.)Benth.	1.666666667	1.231527094
11	Melanorrhoea usitata Wall.	1.5	1.108374384
12	Dalbergia oliveri Gamble	0.833333333	0.615763547
13	Grewia laevigata Vahl	0.833333333	0.615763547
14	Grewia sclerophylla Roxb. ex G. Don	0.833333333	0.615763547
15	Schima wallichii (DC.) Korth.	0.833333333	0.615763547
16	Terminalia alata (Heyne) Roth	0.833333333	0.615763547
17	Randia uliginosa DC.	0.666666667	0.492610837
18	Albizia chinensis (Osbeck) Merr.	0.5	0.369458128
19	Castanopsis tribuloides A. DC.	0.5	0.369458128
20	Ficus hirta Vahl.	0.5	0.369458128
21	Quercus sp.	0.5	0.369458128
22	Cratoxylum polyanthumKorth.	0.166666667	0.123152709
23	Ficus semicordata	0.166666667	0.123152709
24	Gmelina arborea Roxb.	0.166666667	0.123152709
25	Gochnatia decora	0.166666667	0.123152709
26	Premna latifolia Roxb.	0.166666667	0.123152709
27	Strychnos nux-blanda A.W. Hill	0.166666667	0.123152709
28	Terminalia chebula Retz.	0.166666667	0.123152709

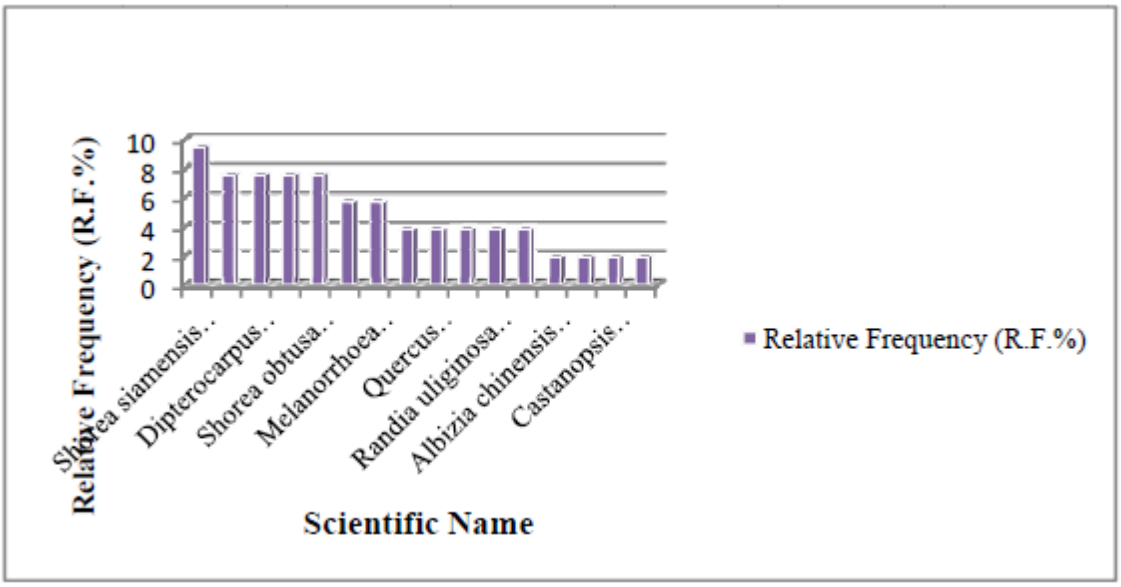


5.2.15. **Relative Frequency of Tree Species**

Relative frequency is the frequency of one species compared to the total frequency of all the species. According to the results, Shorea siamensis (Kurz) Miq., is high relative frequency value (9.434%) followed by Dalbergia cultrate Grah., Dipterocarpus tuberculatus Roxb., Emblica officinalis Gaeryn., and Shorea obtuse Wall., (7.547%) are equally, Helicia erratica Hook. F., and Melanoorrhoea usitata Wall., (5.660%) respectively. Therefore, these species occur everywhere in the study area. The lower frequency of some species, such as Albizia chinensis (Osbeck) Merr., Albiaia lebbek (L.) Benth., and Terminalia chebula Retz., are demarcated as rare species in the area.

No.	Scientific Name	Frequency (F)	Relative Frequency (R.F.%)
1	Shorea siamensis (Kurz) Miq.	0.833333333	9.433962264
2	Dalbergia cultrata Grah.	0.666666667	7.547169811
3	Dipterocarpus tuberculatus Roxb.	0.666666667	7.547169811
4	Emblica officinalis Gaertn.	0.666666667	7.547169811
5	Shorea obtusa Wall.	0.666666667	7.547169811
6	Helicia erratica Hook. f.	0.5	5.660377358
7	Melanorrhoea usitata Wall.	0.5	5.660377358
8	Dillenia pentagyna Roxb.	0.333333333	3.773584906
9	Quercus mespilifolia Wall.	0.333333333	3.773584906
10	Quercus sp.	0.333333333	3.773584906
11	Randia uliginosa DC.	0.333333333	3.773584906
12	Wendlandia tinctoria DC.	0.333333333	3.773584906
13	Albizia chinensis (Osbeck) Merr.	0.166666667	1.886792453
14	Albizia lebbek (L.)Benth.	0.166666667	1.886792453
15	Castanopsis tribuloides A. DC.	0.166666667	1.886792453
16	Cratoxylum polyanthumKorth.	0.166666667	1.886792453
17	Dalbergia oliveri Gamble	0.166666667	1.886792453
18	Ficus hirta Vahl.	0.166666667	1.886792453
19	Ficus semicordata	0.166666667	1.886792453

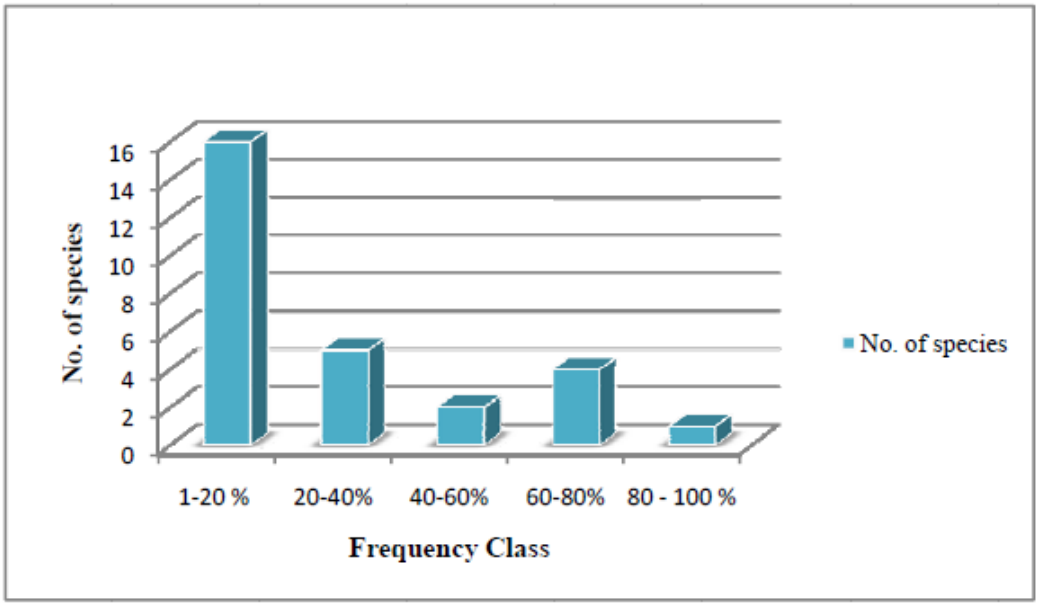
20	Gmelina arborea Roxb.	0.166666667	1.886792453
21	Gochnatia decora	0.166666667	1.886792453
22	Grewia laevigata Vahl	0.166666667	1.886792453
23	Grewia sclerophylla Roxb. ex G.	0.166666667	1.886792453
24	Premna latifolia Roxb.	0.166666667	1.886792453
25	Schima wallichii (DC.) Korth.	0.166666667	1.886792453
26	Strychnos nux-blanda A.W. Hill	0.166666667	1.886792453
27	Terminalia alata (Heyne) Roth	0.166666667	1.886792453
28	Terminalia chebula Retz.	0.166666667	1.886792453



5.2.16. **Species distribution by frequency class**

In order to clarify the homogeneity and heterogeneity of the floristic distribution in the area, the species distribution by frequency class was examined. According to the outcome of the frequency classes, only one speciesis in high frequency class and 16% of the species are in low frequency class. This shows that this area is floristically high degree of heterogeneity.

Frequency class	No. of species
1-20 %	16
20-40%	5
40-60%	2
60-80%	4
80 - 100 %	1



5.2.17. Tree species in GBH class interval

The distribution of GBH interval class reveals the dominant of small stem individuals in the area. 73.28 % of the tree species are less than 40cm GBH. Large stem individuals with GBH more than 80cm are of 1.72%. Majority of the trees are less than 40cm in dia meter, which indicates that the forests are degraded and secondary types.

GBH Class	No of Species	Total number f individual	% of total population
< 40cm	595	1101.851852	73.27586207
41-60 cm	149	275.9259259	18.34975369
61- 60 cm	54	100	6.650246305
81- 100 cm	8	14.81481481	0.985221675
>101cm	6	11.111111111	0.738916256
Total	812	1503.703704	100

5.2.18. Tree Species in Height Class Interval

The distribution of heightshows that 1492 individuals are less than 10 meters, comprising 99% and of the total population and 2 individuals are more than 15 meters, comprising the 0.12%. Since most canopy height classes are not more than 10m, the forests in the area could be classified as lower secondary forests.

Height Class	No. of species	Total number of	% of total population
<10m	806	1492.592593	99.26108374
11-15m	1	1.851851852	0.123152709
16-20m	5	9.259259259	0.615763547
21-25m	0	0	0
>26m	0	0	0
Total	812	1503.703704	100

5.2.19. Vegetation Type in the Area

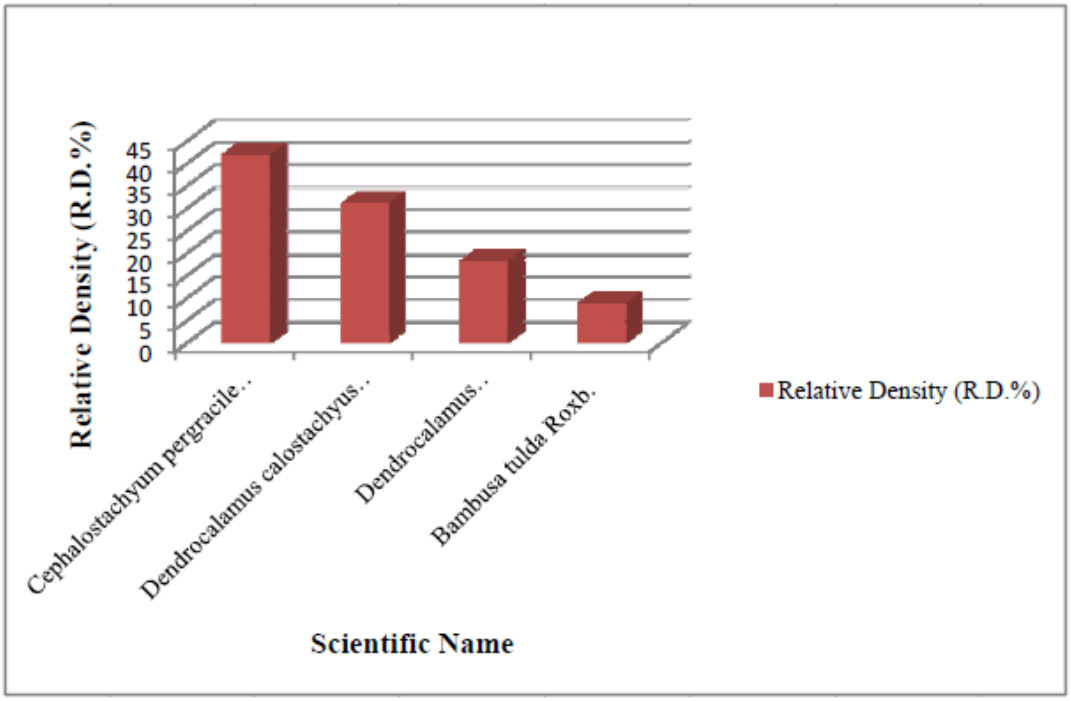
No.	Locality	Vegetation type	Latitude	Longitude	Altitude	Note
1	Q I	Deciduous Forest	N22 22 13.6	E96 24 48.9	862 m	Wendlandia tinctoria DC.,Helicia erratica Hook. f.,Schima wallichii (DC.) Korth.,Careya arborea Roxb.,Emblica officinalis Gaertn.,Dillenia pentagyna Roxb.,Michelia champaca L.,Adenanthera pavonina L.
2	Q II	Deciduous Forest	N22 22 00.4	E96 24 54.6	885 m	
3	Q III	Deciduous Forest	N22 22 26.6	E96 24 17.8	845 m	
4	Q IV	Deciduous Forest	N22 22 19.2	E96 24 33.8	862 m	
5	Q V	Deciduous Forest	N22 22 11.0	E96 24 40.0	861 m	
6	Q VI	Deciduous Forest	N22 22 41.5	E96 24 03.2	821 m	
7	Q VII	Deciduous Forest	N22 23 03.0	E96 23 51.0	778 m	
8	Q XI	Deciduous Forest	N22 24 45.3	E96 23 33.2	769 m	
9	Q XIII	Deciduous Forest	N22 24 30.0	E96 22 49.4	761 m	
10	Q VIII	Indaing Forest	N22 22 49.5	E96 24 28.8	847 m	Dipterocarpus tuberculatus Roxb.,Shorea siamensis (Kurz) Miq.,Shorea obtusa Wall.,Quercus mespilifolia Wall.,Emblica officinalis Gaertn.,Dillenia pentagyna Roxb.,Helicia erratica Hook. f.,Wendlandia tinctoria DC.,Dalbergia cultrata Grah.,Albizia lebbek (L.)Benth.,Melanorrhoea usitata Wall.
11	Q IX	Indaing Forest	N22 22 47.2	E96 24 27.2	858 m	
12	Q X	Indaing Forest	N22 22 23.6	E96 25 24.2	856 m	
13	Q XII	Indaing Forest	N22 24 19.8	E96 22 49.1	756 m	
14	Q XIV	Indaing Forest	N22 24 31.8	E96 22 51.2	764 m	
15	Q XV	Indaing Forest	N22 23 07.0	E96 23 36.2	850m	
16	BQ I	Bamboo Forest	N22 22 01.0	E96 24 52.7	879 m	Cephalostachyum pergracile Munro, Dendrocalamus calostachyus (Kurz) Kurz, Dendrocalamus membranaceus Munro, Bambusa tulda Roxb.
17	BQ II	Bamboo Forest	N22 22 59.7	E96 23 11.1	506 m	
18	BQ III	Bamboo Forest	N22 23 07.4	E96 22 35.9	304 m	
19	BQ IV	Bamboo Forest	N20 51 42.2	E96 23 54.8	356 m	
20	BQ V	Bamboo Forest	N20 51 37.0	E96 23 50.1	346 m	
21	BQ VI	Bamboo Forest	N20 51 32.2	E96 23 51.5	335 m	
22	BQ VII	Bamboo Forest	N20 51 30.9	E96 23 21.8	327 m	
23	Inma Wetland	Wet Land	N22 22 55.7	E96 28 19.0	1020 m	Alisma trivial, Monochoria hastaefolia Presl,Nymphaea sp., Polygonum aviculare L., Potamogeton opihydrus
24	Has-byae-toe	Spring I	N22 22 13.6	E96 24 48.9	862 m	
25	Has-byae-toe	Spring II	N22 22 00.4	E96 24 54.6	885 m	

5.2.20. Bamboo Species Population

No.	Scientific Name	No. of individual	Total no. of individual/ha	Total no. of population/ha (%)
1	Bambusa tulda Roxb.	30	47.61904762	8.797653959
2	Cephalostachyum pergracile Munro	143	226.984127	41.93548387
3	Dendrocalamus calostachyus (Kurz) Kurz	106	168.2539683	31.08504399
4	Dendrocalamus membranaceus Munro	62	98.41269841	18.18181818
		341	541.2698413	100

5.2.21. Relative density

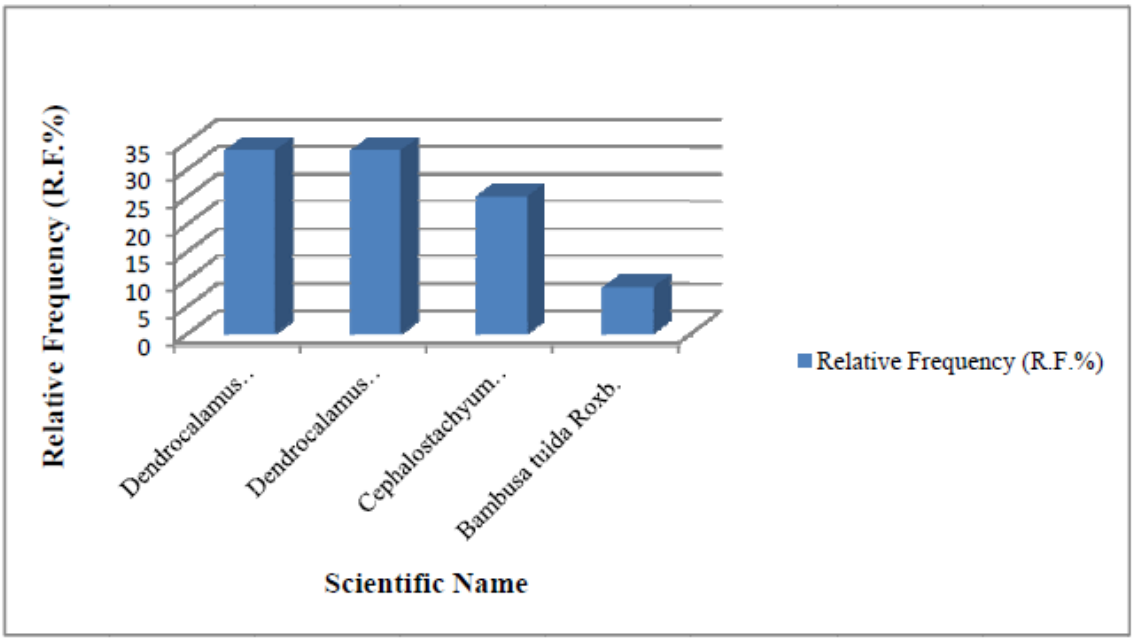
No.	Scientific Name	Density (D)	Relative Density (R.D.%)
1	Cephalostachyum pergracile Munro	20.42857143	41.93548387
2	Dendrocalamus calostachyus (Kurz) Kurz	15.14285714	31.08504399
3	Dendrocalamus membranaceus Munro	8.857142857	18.18181818
4	Bambusa tulda Roxb.	4.285714286	8.797653959



5.2.22. Specifies distribution

No.	Scientific Name	Frequency (F)	Relative Frequency (R.F.%)
1	Dendrocalamus calostachyus (Kurz) Kurz	0.571428571	33.33333333

2	Dendrocalamus membranaceus Munro	0.571428571	33.33333333
3	Cephalostachyum pergracile Munro	0.428571429	25
4	Bambusa tulda Roxb.	0.142857143	8.333333333



Endangered tree species in the catchment area according to IUCN list

No.	Scientific Name	Family Name	Vernacular Name	IUCN criteria
1	Dalbergia cultrata Grah.	Fabaceae	Yin-daik	EN A 1cd
2	Dalbergia oliveri Gamble	Fabaceae	Ta-ma-lan	EN A 1cd

5.2.23. Discussion of Flora finding

The project area is about 33 square miles and situated in Naung Cho Township, Northern Shan State. Naung Cho is mountainous township. It is situated on the Northern Shan highland, generally higher than 838 m (2750 feet). The two western and southeastern mountain regions and central lowland are distinct. No undulating lands occur in the region and the slopes of mountain and hills are mostly gentle.

Although limestone, that make up much of this mountainous eco-region, was deposited in a shallow marine environment more than 300 million years ago, the mountain themselves are much younger and ore the existence to the collision between the Indian and Eurasian continental plates that produce the Himalaya about 50 million years ago.

The forest types in the whole catchment area of the creeks are Deciduous Forest dominated by Wendlandia tinctoria (Thit-ni) followed by Helicia erratica (Dauk-yet), Schima wallichii (Lauk-ya) and Careya arborea (Ban-bwe) and Indine forests in limestone rich area, dominated by Dipterocarpus tuberculatus (In) follox wed by Shorea siamensis (Ingin) and Shorea obtuse (Thit-ya).

However, it is also confirmed that forest in the project area is degraded due to over exploiting and fire-wood cutting.

The present study also confirms that the type of vegetation in the project area is deciduous forest since the area is rich in limestone. Such area is dominated by Dipterocarpus tuberculatus and Shorea sp:, Such area usually favors the growth of Xylia xylocarpa (Pyin-ka-doe) and Tectona grandis (Teak). Therefore, present study suggests initiating teak plantation and Pyin-ka-doe plantation.

The following are the lists of Botanical Name of Flora within Minhla Hydropower Project Area, Naung Cho Township, Northern Shan Stae.

Table 5-13 Botanical Name of Flora within Minhla Hydropower Project Area, Naung Cho Township, Northern Shan State

No.	Common Name	Botanical Name
1	Taw-yon-padi	*Abelmoschus moschatus*
2	Ka-mon-chin	*Acacia concinna (Willd.) DC.*
3	Su-yit	*Acacia pennata (L.) Willd.*
4	Not known	*Acer sino-oblongum*
5	Taung-ma-gyi	*Adenanthera pavonina L.*
6	Not known	*Adiantum tenerum*
7	Hnaw	*Adina cordifolia Hook. f.*
8	Ok-shit	*Aegle marmelos (L.) Correa*
9	Khwe-thay-pan	*Ageratum conyzoides L.*
10	Bon-me-za	*Albizia chinensis (Osbeck) Merr.*
11	Kala-kokko	*Albizia lebbek (L)Benth.*
12	Not known	*Alisma triviale*
13	Kyet-thon	*Allium cepa L.*
14	Pein-yaing	*Alocasia macrorrhizos*
15	Sha-zaung-la-pet	*Aloe vera L.*
16	Padegaw-gyi	*Alpinia zerumbet (Pers.) B.L. Burtt & R.M. Sm.*
17	Taung-ma-yoe	*Alstonia scholaris (L.) R. Br.*
18	Wa-u	*Amorphophalluspaeoniifolius (Dennst.) Nicolson*
19	Na-net	*Ananas comosus (L.) Merr.*
20	Not known	*Angiopteris evecta*
21	Pan-ma	*Anneslea fragrans Wall.*
22	Yon	*Anogeissus acuminata Wall.*
23	Ma-u-let-tan-shae	*Anthocephalus morindaefolius Korth.*
24	Kin-pa-lin	*Antidesma montanum*
25	Eik-thara-muli	*Aristolochia indica L.*
26	Taung-pein-ne	*Artocarpus lakoocha*
27	Theik-wa	*Bambusa tulda Roxb.*
28	Min-ka-daw-ket- kyay-kite	*Bauhinia aculeata*
29	Swee-daw-nwee	*Bauhinia corymbosa*
30	Myauk-hle-kha	*Bauhinia ornata Kurz*

No.	Common Name	Botanical Name
31	Kya-ma-naing	*Bauhinia touranensis Gagnep.*
32	Ye-pa-done	*Bischofia javanica*
33	Phon-ma-thein	*Blumea balsamifera (L.) DC.*
34	Seik-phu	*Boesenbergia rotunda (L.) Mansf.*
35	Dedu/Gawhae(shan)	*Bombax anceps Pierre*
36	Let-pan	*Bombax ceiba L.*
37	Mon-la	*Brassica rapa L.*
38	Su-gyit	*Brucea mollis Wall.*
39	Thit-si-pho	*Buchanania latifolia Roxb.*
40	Not known	*Buddleja asiatica Lour*
41	Pauk-nwee	*Butea superba Roxb.*
42	Ma-yoe-gyi	*Calotropis gigantea (L) Dryand. Ex W.T. Aiton*
43	Not known	*Canavalia cathartica*
44	Kyauk-pan	*Canscora diffusa (Vahl) R.Br.*
45	Ban-bwe	*Careya arborea Roxb.*
46	Min-baw	*Caryota mitis Lour.*
47	Ngu	*Cassia fistula L.*
48	Kywet-thar-gi	*Castanopsis tribuloides A. DC.*
49	Tin-wa	*Cephalostachyum pergracile Munro*
50	Bi-zet	*Chromolaena odorata (L.) R.M. King & H Robinson*
51	Yin-ma	*Chukrasia velutina Roem.*
52	Da-yin-kauk	*Cibotium barometz (Linn.) J. Sm.*
53	La-haung	*Cinnamomum sp.*
54	Taw-pyin-taw-thein	*Clausena excavata var.villosa Hook. f.*
55	Sabe-ei	*Clerodendrum fragrans (Vebt.) Willd. Enem. Hort.*
56	Thin-gyan-pan	*Clerodendrum infortunatum Gaertn.*
57	Thin-gyan-pan	*Clerodendrum villosum Blume*
58	Not known	*Combretum alfredii Hance*
59	Tha-ma-ga-nwee	*Congea tomentosa Roxb.*
60	Not known	*Conocephalum conicum*
61	Hmike-kaw	*Cordia grandis Roxb.*
62	Pha-lan-taung- hmwe	*Costus speciosus Sm.*
63	Pan-zauk-htoe	*Crassocephalum crepidioides (Benth.) S. Moore*
64	Not known	*Craterellus cornucopioides (L.) Pers.*
65	Ka-det	*Crateva magna (Lour.) DC.*
66	Bae-bya	*Cratoxylum neriifolium Kurz*
67	Bae-bya	*Cratoxylum polyanthumKorth.*
68	Tha-yin-gyi	*Croton oblongifolius Roxb.*

No.	Common Name	Botanical Name
69	Na-sha-gyi	*Cryptolepis buchanani Roem. & Schult.*
70	Kywet-ma-lut-ohn	*Curculigo recurvata Dryand.*
71	Shwe-nwee	*Cuscuta australis*
72	Thit-tet-lin-nae	*Cymbidium aloifolium (L.) Sw.*
73	Yin-daik	*Dalbergia cultrata Grah.*
74	Thit-pa-gan	*Dalbergia muliflora Heyne*
75	Ta-ma-lan	*Dalbergia oliveri Gamble*
76	Dauk-ta-laung	*Dalbergia rimosa Roxb.*
77	Dauk-ta-laung	*Dalbergia volubilis Roxb.*
78	Not known	*Davallia denticulata*
79	Wa-bo-wa	*Dendrocalamus calostachyus (Kurz) Kurz*
80	Hmyin-wa	*Dendrocalamus membranaceus Munro*
81	Tha-byu	*Dillenia aurea Sm.*
82	Kyet-zinbyum	*Dillenia parviflora Griff.*
83	Zin-byun	*Dillenia pentagyna Roxb.*
84	Not known	*Diospyros dictyoneura Hiern.*
85	In	*Dipterocarpus tuberculatus Roxb.*
86	Zaw-sein	*Dracaena sanderiana*
87	Myauk-ngo	*Duabanga grandiflora*
88	Kyeik-hman	*Eclipta alba (L.) Hassk.*
89	Taung-pu-lu-lin	*Ehretia acuminata R.Br*
90	Kywe-pan-pin	*Elaeocarpus hainanensis Oliv.*
91	Myet	*Eleocharis sp.*
92	Zi-phyu/Shit-sha	*Emblica officinalis Gaertn.*
93	Pan-swe-le	*Engelhardtia spicata Blume*
94	Doe-nwee	*Entada phaseoloides (L.) Merr.*
95	Ka-thit	*Erythrina stricta Roxb.*
96	Not known	*Euonymus laxiflorus Champ. ex Benth.*
97	Tazaung-gyi	*Euphorbia antiquorum L.*
98	Say-pa-le	*Euphorbia bifida*
99	Not known	*Euphorbia cotonifolia*
100	Seik-noe-ma-htwet	*Euphorbia hypericifolia L.*
101	Nyaung-peinne	*Ficus altissima Blume*
102	Sin-tha-phan	*Ficus auriculata Lour.*
103	Kyasha-tha-phan	*Ficus hirta Vahl.*
104	Kha-aung	*Ficus hispida L. f.*
105	Nyaung-gyin	*Ficus lacor Buch-Ham.*
106	Ka-dut	*Ficus semicordata*

No.	Common Name	Botanical Name
107	Wet-shaw	*Firmiana colorata (Roxb.) R. Br.*
108	Yin-khat-gyi	*Gardenia coronaria Buch-Ham.*
109	Not known	*Gardenia gjellerupii*
110	Not known	*Geodorum attenuatum Griff.*
111	Kywet-nwee	*Getonia floribunda Roxb.*
112	Not known	*Glochidion eriocarpum*
113	Not known	*Glochidion sphaerogynum*
114	Pe-bok	*Glycine max (L.) Merr.*
115	Ye-ma-nae	*Gmelina arborea Roxb.*
116	Not known	*Gochnatia decora*
117	Pin-tayaw	*Grewia eriocarpa Juss.*
118	Ta-yaw	*Grewia laevigata Vahl*
119	Phet-shet	*Grewia sclerophylla Roxb. ex G. Don*
120	Dauk-yet	*Helicia erratica Hook. f.*
121	Not known	*Helixanthera parasitica*
122	Chin-baung-ni	*Hibiscus sabdariffa L.*
123	Khat-ta	*Hippeastrum hybrid*
124	Not known	*Hiptage benghalensisssp. candicans*
125	Let-htoke-kyi	*Holarrhena pubescens Wall. ex G. Don*
126	Myin-khwa	*Hydrocotyle rotundifolia Roxb.*
127	Not known	*Impatiens musicola*
128	Nga-shint-pin	*Itea sp.*
129	Taw-sa-be	*Jasminummultiflorum(Burm.f.)Andrews*
130	Chan-si-yoe-kyet- su	*Jatropha curcas L.*
131	Kunsa-gamon	*Kaempferia galanga L.*
132	Pyin-ma	*Lagerstroemia speciosa (L.) Pers.*
133	Not known	*Lagerstroemia villosa*
134	Na-be	*Lannea coromandelica (Houtt.) Merrr.*
135	Sein-na-pan	*Lantana camara L.*
136	Za-yit	*Lasia aculeata Lour.*
137	Naga-mauk-aphu	*Leea hirta Banks*
138	Not known	*Lithocarpus elegans (Blume) Hatusima ex Soepadmo*
139	Phet-kyan	*Lithocarpus lindleyanus (Wall.) A. Camus*
140	Not known	*Lithocarpus sp.*
141	On-don	*Litsea monopetala (Roxb) Pers*
142	Tha-but-kha	*Luffa aegyptiaca Mill.*
143	Kha-yan-chin	*Lycopersicon esculentum Mill.*
144	Not known	*Lygodium circinnatum*

No.	Common Name	Botanical Name
145	Pet-waing	*Macaranga denticulata Muell. Arg.*
146	Not known	*Macaranga gigantea*
147	Not known	*Macaranga kurzii*
148	Nga-nwa	*Maesa ramentacea A. DC.*
149	Not known	*Magnolia delavayi Franch.*
150	Not known	*Mallotus barbatus Muell. Arg.*
151	Sit-se	*Melanorrhoea usitata Wall.*
152	Say-o-pok	*Melastoma malabathricum*
153	Wa-nwee	*Melocalamus compactiflorus (Kurz) Benth.*
154	Sa-ga-wa	*Michelia champaca L.*
155	Not known	*Millettia championii*
156	Not known	*Millettia dielsiana Harms*
157	Win-u	*Millettia eriocalyx Dunn*
158	Win-u	*Millettia extensa Benth.*
159	Bin-ga	*Mitragyna rotundifolia (Roxb.) Kuntze*
160	Not known	*Moghania strobilifera (L)Aiton f.*
161	Le-padauk	*Monochoria hastaefolia Presl*
162	Ni-ba-sae	*Morinda tinctoria Roxb.*
163	Po-sa	*Morus alba L.*
164	Khwe-lae-ya	*Mucuna pruriens (L.) DC.*
165	Thi-hmwe-hngetpyaw	*Musa acuminata Simmonds*
166	Phi-gyan-nget- pyaw	*Musa malaccensis Ridl.*
167	Wet-ma-lut-nget- pyaw	*Musa sp.*
168	Pwint-tu-ywet-tu	*Mussaenda calycina Wall. ex Kurz*
169	Gwe-dauk-nwee	*Myriopteron extensum (Wight) K.Schum.*
170	Zadeik-pho/Ye- thay-kun-thi	*Myristica fragrans Houtt.*
171	Kyar	*Nymphaea sp.*
172	Kyaung-sha	*Oroxylum indicum (L.) Kurz.*
173	Hmo-chin	*Oxalis corniculata L.*
174	Not known	*Pandanus sp.*
175	Kyauk-pan	*Pentasacme caudatum Wall.*
176	Not known	*Pericampylus glaucus L.*
177	Bauk-thi-pin	*Physalis minima L.*
178	Peik-chin	*Piper cubebe L. f.*
179	A-kyaw-paung-ta- htaung	*Plantago major*
180	Knotweed	*Polygonum aviculare L.*
181	Kywe-hna-khaung- gate	*Polygonum barbatum L.*
182	Ma-ha-gar-kyan-sit	*Polygonumchinense L.*

No.	Common Name	Botanical Name
183	Pondweed	*Potamogeton opihydrus*
184	Yin-bya-phyu	*Premna amplectens Wall*
185	Kyun-na-lin/Pe-pok	*Premna latifolia Roxb.*
186	Taung-phet-wun	*Pterospermum acerifolium (L)Willd.*
187	Yin-gu	*Quercus mespilifolia Wall.*
188	Thit-ae	*Quercus sp.*
189	Hman-ni	*Randia uliginosa DC.*
190	Not known	*Richardia scabra*
191	Not known	*Rosa laevigata Michx.*
192	Not known	*Rubus alceifolius Poir.*
193	Not known	*Rubus moluccanus L.*
194	Kaing	*Saccharum spontaneum L.*
195	Ka-di	*Samadera indica Gaertn.*
196	Awle	*Sapium baccatum Roxb.*
197	Not known	*Saurauia napaulensis*
198	Not known	*Saurauia roxburghii*
199	Lauk-ya	*Schima wallichii (DC.) Korth.*
200	Kyo	*Schleichera oleosa (Lour.) Oken*
201	Sin-paik-chin	*Scindapsus officinalis (Roxb.) Schott*
202	Ka-thaw-hwe-htu	*Senna hirsuta (L) Irwin & Barneby*
203	Taw-me-za-li	*Senna timoriensis (DC.) Irwin & Barneby*
204	Thit-ya	*Shorea obtusa Wall.*
205	In-gyin	*Shorea siamensis (Kurz) Miq.*
206	Ta-byet-si-ywet- chon	*Sida acuta Burm f.*
207	Ta-byet-si-ywet- wine	*Sida rhombifolia L.*
208	Sein-na-baw	*Smilax aspericaulis Wall ex A. D.C.*
209	Sein-na-baw-gyi	*Smilax macrophylla Roxb.*
210	Kha-yan	*Solanum melongena L.*
211	Kha-yan-ka-zawt	*Solanum torvum Swartz*
212	Not known	*Solanum verbascifolium L.*
213	Not known	*Spondias lakonensis*
214	Taw-gwe	*Spondias pinnata (L. f.) Kurz.*
215	Not known	*Sterculia lanceolata*
216	Shaw	*Sterculia urens var. thorelii*
217	Shaw-phyu	*Sterculia versicolor Wall.*
218	Tha-tay	*Stereospermum colais (Buch-Ham.ex Dillwyn) Mabb.*
219	Kha-baung-ye-kyi	*Strychnos nux-blanda A.W. Hill*
220	Tha-bye	*Syzygium grande (Wight) Walp*

No.	Common Name	Botanical Name
221	Tha-byay-nyo	*Syzygium kurzii (Duthie)N.P.Balakr.*
222	Kyun	*Tectona grandis L. f.*
223	Htauk-kyant	*Terminalia alata (Heyne) Roth*
224	Thit-seik	*Terminalia bellirica (Gaertn) Roxb.*
225	Phan-kha	*Terminalia chebula Retz.*
226	Baing/Thit-pok	*Tetrameles nudiflora R.Br.*
227	Myauk-laung	*Tetrastigma planicaule*
228	Kyi-hnok-thi-nwee	*Thunbergia grandiflora Roxb.*
229	Kyi-hnok-thi-nwee	*Thunbergia laurifolia Lindl.*
230	Tha-net-wa	*Thyrsostachys oliveri Gamble*
231	Nay-kyar-yaing	*Tithonia diversifolia Gray*
232	Taung-ta-ma/Thit- tha-phwe	*Toona ciliata M. Roemer*
233	Khwe-sha	*Trema orientalis (L) Blume*
234	Hpaw	*Trevesia palmata (Roxb. ex Lindl.) Vis.*
235	Gyon	*Triticum durum Desf.*
236	Kat-se-nae	*Urena lobata L.*
237	Ma-gyi-bauk	*Vangueria spinosa Roxb.*
238	Not known	*Verbena officinalis L.*
239	Not known	*Vitex peduncularis Wall.*
240	Kyet-yo	*Vitex quinata (Lour) F.N.Will*
241	Thit-ni	*Wendlandia tinctoria DC.*
242	Pyin-ka-doe	*Xylia xylocarpa (Roxb.) Taub.*
243	Pyaung-phu	*Zea mays L.*
244	Zi-gaung-pye	*Ziziphus rugosa Lam.*

5.3. FAUNA

The project area, Minhla hydropower plant construction in the Naungcho Township, northern Shan State, is the northern tip of Tenasserim-South Thailand Semi-Evergreen Rain Forests which cover the transition zone from continental dry evergreen forests common in the north to semi-evergreen rain forests to the south.

The project area is in the limestone area, with limestone caves, known as karst and limestone habitats are important and fascinating features which much attract from biologist, geogiologist and archaeologist alike. Karst is formed through the dissolution of bedrock typicall through the dissolution of bedrock typically limestone, by ground water then preferentially flows, when these cavities are large enough to allow some form of access, they are known as caves. As a result, karstic landscapes are often relatively dry, with surface streas being seasonal on non- existent and most drainage therefore taking place underground. In addition, they can have a range of characteristic surface features,

including bare rock exposures such as crags and pavemens, dolines and poles. Ough (Devon Biodiversity Action Plan, Internet accessed dat 24/6/2014)

Caves provide a unique habitat and although there is no true specialist cave fauna in Devon, the very rare shrimp Niphargus glennei is widespread, apparently living in cracks in the limestone. Cave also ideal roosting sites for bats, which favour the stable environmental conditions and protection that these underground spaces provide. The caves appeared in the age of Devonian time, it is called as Devon caves. Several Devon caves are internationally important for the colonies of Greater Horseshoe Bat, which although not natural features, are excavated in limestone bedrock and do contain important bat colonies. Conclusively, this area is one of high fauna dverse areas in Myanmar.

The project area is rich in limestone with limestone caves, known as karst and limestone. Karst is formed through the dissolution of bedrock typically through the dissolution of bedrock typically limestone, by ground water then preferentially flows, when these cavities are larger enough to allow some form of access, they are known as caves. Caves provide a unique habitat and also ideal roosting sites for mammals such as bats which favor the stable environmental conditions and protection.

5.3.1. **Special species in the karst**

The following species of conservation concern are always associated with caves, karst and limestone habitat, in Devon. UK BAP (p) and UK Steering Group (c) Report list of species of conservation concern of the karsts. Four bat species of mammal of limestone caves are Greater horsehoe bat (p), Bechstein's bat (p), lesser househoe bat (p), Natterer's bat (c), Dabenton's bat (c); Crustaceans : Cave shrimp Niphargus glenniei; Beetles : water beetle Hydrochus nitidicolis (p; part of a grouped action plan).

According to Devon Biodiversity Action Plan (Internet accessed dat 24/6/2014), the cave bats are internationally important species with conservation aspect.

The project is intented to investigate the impact on the fauna of the MinHla Hydropower construction sites.

5.3.2. **Project Framework and Methods**

On the assessment on the animal fauna, 4 major animal froup, birds, fishes, insects and herpets fauna are investigated with following methods;

1. Specimen collection was conducted for insects, fishes,

2. Interview survey for mammals, and

3. Visual observation for the birds

Habitat preferences, relative abundances and diversity assessment were examined. Diversity of fauna species were presented in tabulated forms. Possible impacts were investigated and mitigation measures were proposed. Collected specimens were checked with the IUCN Red list and CITE appendices.

5.3.3. Fauna diversity, Status and the Impacts

According to survey record, there are a total of 245 fauna species recorded from Minhla Hydropower project area. The list of fauna is mentioned as follows:

Birds	63
Fish and invertebrates	25
Mammals	28
Herpets	14
Insects	115
Total	**245 species**

In conclusion, the project area is one of high fauna diversity areas in Myanmar.

5.3.3.1. Bird species

A total of 63 bird species under 32 families, 10 orders were observed. Amon then, most (35) species are regarded as rare species according to the observed frequency (once in the 4 survey days). In which, 8 species were found only one individual bird (Table 3 in Appendice). However, no critically endangerd species was recorded.

Flapship species: Milvus migrans (Black kite and Accipiter badius (Shikra) are endangered species although high flyers.

5.3.3.2. Fish, Prawn, Crab and Snail species

Total of 25 species representing 17 species of fish, 3 species of Decapods and 5 species of Gastropods under 13 families,3 fish orders, 1 prawn and crab order and 1 snail orders were recorded from the streams and ponds. Asian snake head fish Channa punctatus is locally rare species.

Among them, 6 fish species are ornanmental fish species, Danio kyathat is recently discovered from Myanmar and popular species in the international ornanmental fish market.

Flapship species: Danio kyathit is endemic species, recently discovered from Myanmar.

5.3.3.3. Mammal species

Total of 28 species under 18 families, nine orders were surveyed by interview and animal body parts.

Flapship species:

Bos guar Endangered species

Rhinolophus armiger limestone cave bat species

5.3.3.4. Herpet species

A total of 13 species under six families of three orders of amphibian and reptiles were observed. Four frog and toad species, 3 lizard species, 3 skink species 2 snake species and 1 tortoise

species included. Among them, one frog species was recorded as a tapole; it is not that of above-mentioned species, it could not be identified down to species level.

5.3.3.5. Flapship species

1No. Endangered, Endemic species and IUCN Red list categories were recorded.

5.3.3.6. Insect species

In the survey si te, a total of 114 insect species including two orders, Lepidoptera (79 butterfly species), Odonata (35 dragonfly and damselfly species) were collected. Most are common species. Absence of beetle species is the sign of the not good condition of the environment.

5.3.3.7. Flapship species

No flapship species of insect was recorded

Table 5-14 List of bird species collected from Minhla Hydropower Project Area

Sr. No.	Order	Family	Species	Common name	Local name
I.	Galliformes	Phasianidae	*Francolinus pintadeanus*	Chinese francolin	Khar
			Cotumix coromandelica	Rain quail	Ngon
			Gallus gallus	Red jungle fowl	Taw-kyet
II.	Ciconiiformes	Ardeidae	*Egretta alba*	Great egret	Byaing
			Egretta garzetta	Little egret	Byaing
III.	Falconiformes	Falconidae	*Milvus migrans*	Black kite	Son
			Accipiter badius	SHikra	Gyo thein
IV	Gruiformes	Rallidae	*Amaurornis phoeniourus*	White breasted waterhen	Yae-kyet-ma
			Gallinula chloropus	Common moorhen	Yae-kyet
V	Columbiformes	Columbidae	*Columba livia*	Rock pigeon	Kho
			Streptopelia tranquebarica	Red collared dove	Ggo-ni-pu
			Streptopelia chinensis	Spotted dove	Gyo-le-Byauk
			Treron sphenura	Wedge-tailed green pigeon	-
VI	Cuculiformes	Cuculidae	*Cacomantis merulinus*	Plaintive cuckoo	-
			Eudynamys scolopaceus	Asian koel	Oak-aw
			Rhopodytes tristis	Green billed-malkoha	-
			Centropus sinensis	Greater coucal	Bok
VII	Apodiformes	Apodidae	*Cypsiurus balasiencis*	Asian palm swift	Moe-sa
			Apus pacificus	Fork tailed swift	Pyan-hlwa

VIII	Coraciiformes	Coraciidae	*Coracias benghalensis*	Indian roller	Hnget- khar
		Alcedinidae	*Halcyon smyrnensis*	White-throated	Bein-nyin-yin-phyu
		Meropidae	*Nyctyornis athertoni*	Blue-bearded bee-eater	Pu-sin- htoe
			Merops orientalis	Green-bee-eater	Pu-sin- htoe
		Upupidae	*Upupa epops*	Common hoopoe	Taung-be-sue
IX	Paciformes	Ramphastidae	*Megalaima lineate*	Lineated barbet	
			Megalaima rafflesii	Red-crowned barbet	Boe-toe
			Megalaima asiatica	Blue-throated	Koak-ka-laung
		Picidae	*Dinopium javanense*	Common flameback	Thit-tauk-hnget
		Campephagidae	*Pericrocotus flammeus*	Scarlet minivet	Hnget- min-thar
X	Passeriformes	Oriolidae	*Oriolus tenuriostris*	Slender-billed oriole	Hnget-shwe-war
			Oriolus xanthomus	Black-hooded	Hnget-shwe-war
		Phipiduridae	*Rhipidura albicollis*	White-throated	-
		Dicruridae	*Dicrurus macrocercus*	Black drongo	Hnget-taw (or) Linn-
			Dicrurus remifer	Lesser racket-tailed	Hnget- taw-mee- shae
			Dicrurus aeneus	Bronzed-drango	Hnget-taw
			Dicrurus paradiseus	Greater racket-tailed	Hnget- taw-mee- shae
		Corvidae	*Corvus splendens*	House crow	Kyi-gan
			Corvus macrorhynchos	Large-billed crow	Taw-kyi-gan
		Laniidae	*Lanius cristatus*	Brown shrike	Hnget-ta-zet
		Nectariniidae	*Cinnyris asiaticus*	Purple sunbird	Hnan-pyi-sote
		Chloropseidae	*Chloropsis aurifrons*	Golden fronted	Hnget- sein
X	Passeriformes	Irenidae	*Irena puella*	Asian fairy bluebird	Hnget-pyar-sate
		Passeridae	*Passer montanus*	Eurasian tree sparrow	Sar
		Motacillidae	*Dendronanthus indicus*	Forest wagtail	Myee-nyaunt
			Motacilla flava	Yellow wagtail	Myee-nyaunt

		Sturnidae	*Acridotheres fuscus*	Jungle Myna	Taw-za- yet
			Acridotheres tristis	Common hill myna	Za yet
			Sturnus-nigricollis	Black collared	Zayet-le-net
			Gracula religiosa	Common hill	Thar-li- kar
		Turdidae	*Turdus merula*	Eurasian blackbird	
		Muscicapidae	*Saxicola caprata*	Pied bushchat	Le-char (or) Hnget kya
			Copsychus saularis	Oriental magpie robin	Tha-pate-lwe
			Copsychus malaricus	White-rumped	Taw-thar-tha-pate-
X	Passeriformes	Irenidae	*Ficedula parva*	Red-throated flycatcher	-
			Melanochlora sultanea	Sultan tit	-
		Pycnonotidae	*Pycnonotus atriceps*	Black-headed	Bock
			Pycnonotus melanicterus	Black-crested	Bock
			Pycnonotus jocosus	Red-whiskered	Bock-ka-lone
			Pycnonotus cafer	Red-vented bulbul	Bock- phin-ni
			Pycnonotus aurigaster	Sooty-headed	Bock
		Phylloscopidae	*Pycnonotus fuscatus*	Dusky warbler	-
		Acrocephalidae	*Garrular monileger*	Lesser-neck laced	War- yaung
		Cisticolidae	*Orthotomus sutorius*	Common tailorbird	Hnan-pyi-swap

Table 5-15 Population estimates and data source of recorded birds' species from Min Hla

Sr. No.	Species	Estimated No.	Data Source	Remark
1.	*Francolinus pintadeanus*	4	voice, sight	
2.	*Cotumix coromandelica*	1	Sight	
3.	*Gallus gallus*	2	voice, sight	
4.	*Egretta alba*	1	sight	
5.	*Egretta garzetta*	8	Sight	
6.	*Milvus migrans*	1	Sight	
7.	*Accipiter badius*	2	Sight	
8.	*Amaurornis phoeniourus*	1	Sight	
9.	*Gallinula chloropus*	4	Sight	
10.	*Columba livia*	10	Sight	
11.	*Streptopelia tranquebarica*	3	Sight	

12.	*Streptopelia chinensis*	9	voice, sight	
13.	*Treron sphenura*	1	Sight	
14.	*Cacomantis merulinus*	3	voice, sight	
15.	*Eudynamys scolopaceus*	4	voice, sight	
16.	*Rhopodytes tristis*	1	Sight	
17.	*Centropus sinensis*	3	voice, sight	
18.	*Cypsiurus balasiensis*	3	Sight	
19.	*Apus pacificus*	3	Sight	
20.	*Coracias benghalensis*	4	Sight	
21.	*Halcyon smyrnensis*	1	Sight	
22.	*Nyctyornis athertoni*	2	Sight	
23.	*Merops orientalis*	3	Sight	
24.	*Upupa epops*	2	Sight	
25.	*Megalaima lineate*	1	voice, sight	
26.	*Megalaima rafflesii*	4	voice, sight	
27.	*Megalaima asiatica*	1	voice, sight	
28.	*Dinopium javanense*	1	voice, sight	
29.	*Pericrocotus flammeus*	2	Sight	
30.	*Oriolus tenuriostris*	4	Sight	
31.	*Oriolus xanthomus*	8	voice	
32.	*Rhipidura albicollis*	1	Sight	
33.	*Dicrurus macrocercus*	9	voice	
34.	*Dicrurus aeneus*	1	Sigh	
35.	*Dicrurus remifer*	4	Sight	
36.	*Dicrurus paradiseus*	2	Sight	
37.	*Corvus splendens*	6	voice	
38.	*Corvus macrorhynchos*	5	voice	
39.	*Lanius cristatus*	1	Sight	
40.	*Cinnyris asiaticus*	1	voice	
41.	*Chloropsis aurifrons*	1	Sight	
42.	*Irena puella*	1	Sight	
43.	*Passer montanus*	1	voice	
44.	*Dendronanthus indicus*	9	Sight	
45.	*Motacilla flava*	4	Sight	
46.	*Acridotheres fuscus*	1	voice	
47.	*Acridotheres tristis*	1	voice	
48.	*Sturnus-nigricollis*	2	Sight	
49.	*Gracula religiosa*	1	Sight	
50.	*Turdus merula*	5	Sight	
51.	*Saxicola caprata*	1	Sight	
52.	*Copsychus saularis*	3	voice	
53.	*Copsychus malabaricus*	2	Sight	
54.	*Ficedula parva*	1	Sight	
55.	*Melanochlora sultanea*	3	Sight	
56.	*Pycnonotus atriceps*	8	voice	
57.	*Pycnonotus melanicterus*	8	voice	
58.	*Pycnonotus jocosus*	1	voice	
59.	*Pycnonotus cafer*	1	voice	
60.	*Pycnonotus aurigaster*	1	voice	
61.	*Pycnonotus fuscatus*	1	Sight	
62.	*Garrular monileger*	1	Sight	
63.	*Orthotomus sutorius*	2	Sight	

Table 5-16 Frequency of Recorded bird species from Min Hla Hydropower Project

Sr. No.	Species	No. in survey 1	No. in survey 2	No. in survey 3	No. in survey 4	Total No.	Observed Frequency
1.	*Francolinus pintadeanus*	-	-	2	2	4	4
2.	*Cotumix coromandelica*	-	-	-	1	1	1
3.	*Gallus gallus*	2	-	-	-	2	1
4.	*Egretta alba*		-	-	1	1	1
5.	*Egretta garzetta*	8	-	-	-	8	1
6.	*Milvus migrans*	1	-	-	-	1	1
7.	*Accipiter badius*	2	-	-	-	2	1
8.	*Amaurornis phoenicurus*	1	-	-	-	1	1
9.	*Gallinula chloropus*	4	-	-	-	4	1
10.	*Columba livia*	10	-	-	-	10	1
11.	*Streptopelia tranquebarica*	-	-	4	-	4	1
12.	*Streptopelia chinensis*	2	-	4	3	9	3
13.	*Treron sphenura*	-	-	-	1	1	1
14.	*Cacomantis merulinus*	2	-	-	1	3	2
15.	*Eudynamys scolopaceus*	1	-	1	2	4	3
16.	*Rhopodytes sinensis*	1	-	-	-	1	1
17.	*Centropus sinensis*	-	-	1	2	3	2
18.	*Cypsiurus balasiencis*	-	-	-	3	3	1
19.	*Apus pacificus*	-	-	-	3	3	1
20.	*Coracias benghalensis*	1	1	1	1	4	4
21.	*Halcyon smyrnensis*	-	-	1	-	1	1
22.	*Nyctyornis athertoni*	-	-	2	-	2	1
23.	*Merops orientalis*	-	3	-	-	3	1
24.	*Upupa epops*	-	-	1	1	2	2
25.	*Megalaima lineate*	-	-	1	-	1	1
26.	*Megalaima rafflesii*	-	1	1	2	4	3
27.	*Megalaima asiatica*	-	-	-	1	1	1
28.	*Dinopium javanense*	-	-	-	1	1	1
29.	*Pericrocotus flammeus*	-	-	-	2	2	1
30.	*Oriolus tenuriostris*	-	2	2	-	4	2
31.	*Oriolus xanthomus*	-	6	-	2	8	2
32.	*Rhipidura albicollis*	-	1	-	-	1	1
33.	*Dicrurus macrocercus*	5	-	2	2	9	3
34.	*Dicrurus aeneus*	-	-	-	1	1	1
35.	*Dicrurus remifer*	1	2	1		4	3
36.	*Dicrurus paradiseus*	-	-	1	-	1	1
37.	*Corvus splendens*	5	-	1		6	2
38.	*Corvus macrorhynchos*	2	-	2	1	5	3
39.	*Lanius cristatus*	-	-	1	-	1	1
40.	*Cinnyris asiaticus*	-	1	-	-	1	1
41.	*Chloropsis aurifrons*	2	4	9	2	1	4

42.	*Irena puella*	-	-	1	-	1	1
43.	*Passer montanus*	8	-	5	6	1	3
44.	*Dendronanthus indicus*	-	7	-	2	9	2
45.	*Motacilla flava*	-	4	-	-	4	1
46.	*Acridotheres fuscus*	4	-	7	6	1	3
47.	*Acridotheres tristis*	4	-	6	-	1	2
48.	*Sturnus nigricollis*	-	-	-	2	2	1
49.	*Gracula religiosa*	3	2	4	4	1	4
50.	*Turdus merula*	-	-	4	1	5	2
51.	*Saxicola caprata*	4	1	5	5	1	4
52.	*Copsychus saularis*	-	-	2	1	3	2
53.	*Copsychus malabaricus*	-	-	2	-	2	1
54.	*Ficedula parva*	-	-	1	-	1	1
55.	*Melanochlora sultanea*	-	-	3	-	3	1
56.	*Pycnonotus atriceps*	2	4	2	-	8	3
57.	*Pycnonotus melanicterus*	-	3	3	2	8	3
58.	*Pycnonotus jocosus*	-	-	2	8	1	2
59.	*Pycnonotus cafer*	-		7	8	1	2
60.	*Pycnonotus aurigaster*	-	2	6	4	1	3
61.	*Pycnonotus fuscatus*	-	-	1	-	1	1
62.	*Garrular monileger*	-	-	-	-	1	1
63.	*Orthotomus sutorius*	-	-	-	-	2	1
Total Species		2	16	3	1	**63**	
Total No.		7	44	9	7	**292**	

Survey 1 – Thabye Toe and Myay-Thon Bon Chaung

Survey 2 – Slope of Bambwe Kyin and Lay Kaung Wine Camp

Survey 3 – Along the Bambwe Kyin Chaung

Survey 4 – Min Hla 1 and Min Hla 2 Chaung

Table 5-17 Survey sites and Habitat types of Recorded Bird Species from Min Hla Hydropower Project

Sr. No.	Species	No. in Survey Site 1	No. in Survey Site 2	No. in Survey Site 3	No. in Survey Site 4	Habitat type
1.	*Francolinus pintadeanus*			2	2	scrub
2.	*Cotumix coromandelica*				1	ground
3.	*Gallus gallus*				2	scrub
4.	*Egretta alba*				1	Marshes
5.	*Egretta garzetta*				8	marshes, wetland
6.	*Milvus migrans*	1				open area
7.	*Accipiter badius*	2				open area, cultivations
8.	*Amaurornis phoeniourus*	1				ingrass near water of wetland
9.	*Gallinula chloropus*	4				In water
10.	*Columba livia*	10	-	-	-	cultivated area
11.	*Streptopelia tranquebarica*			4		scrub, cultivations
12.	*Streptopelia chinensis*	2		4	3	scrub, tree, cultivations
13.	*Treron sphenura*				1	fruiting trees
14.	*Cacomantis merulinus*	2	-	-	1	cultivated area

15.	*Eudynamys scolopaceus*	1		1	2	open woodland, cultivated areas
16.	*Rhopodytes tristis*	1				broad leaved trees
17.	*Centropus sinensis*			1	2	scrub
18.	*Cypsiurus balasiencis*				3	near palm trees
19.	*Apus pacificus*	-	-	-	3	open area
20.	*Coracias benghalensis*	1	1	1	1	fired field, dry woodlands
21.	*Halcyon smyrnensis*			1		trees near water
22.	*Nyctyornis athertoni*			2		on trees along forested roads
23.	*Merops orientalis*		3			dry open woodland
24.	*Upupa epops*			1	1	trees, cultivated fields
25.	*Megalaima lineate*			1		open woodlands with scrub
26.	*Megalaima rafflesis*		1	1	2	broad leaved trees, fig trees
27.	*Megalaima asiatica*				1	broad leaved trees
28.	*Dinopium javanense*				1	dry trees
29.	*Pericrocotus flammeus*				2	tall trees
30.	*Oriolus tenuriostris*		2	2		scatter trees
31.	*Oriolus xanthomus*		6		2	dry leaved trees, open woodlands
32.	*Rhipidura albicollis*		1			middle branches of broad leaved trees
33.	*Dicrurus macrocercus*	5		2	2	on trees along rode sides, scrub
34.	*Dicrurus aeneus*				1	On tree
35.	*Dicrurus remifer*	1	2	1		middle branches of broad leaved trees
36.	*Dicrurus paradiseus*			1		broad leaved trees
37.	*Corvus splendens*	5		1		trees, cultivations
38.	*Corvus macrorhynchos*	2		2	1	open area, wood land, cultivations
39.	*Lanius cristatus*			1		Cultivations
40.	*Cinnyris asiaticus*		1			Scrub, deciduous woodlands
41.	*Chloropsis aurifrons*	2	4	4	2	fig trees, deciduous forest
42.	*Irena puella*			1		fig trees
43.	*Passer montanus*	8		5	6	Ground

44.	*Dendronanthus indicus*		7		2	deciduous forest Ground near water
45.	*Motacilla flava*		4			mud flats near water
46.	*Acridotheres fuscus*	4		7	6	cultivations, open field
47.	*Acridotheres tristis*	4		6	1	cultivated areas
48.	*Sturnus-nigricollis*				2	cultivations
49.	*Gracula religiosa*	3	2	4	4	on branched of dead trees and forest
50.	*Turdus merula*			4	1	open woodlands, cultivated areas
51.	*Saxicola caprata*	4	1	5	5	scrub, cultivated areas
52.	*Copsychus saularis*			2	11	cultivated areas, tree
53	*Copsychus malabaricus*			2		deciduous woodlands
54.	*Ficedula parva*			1		ground near plantations
55.	*Melanochlora sultanea*			3		broad leaved trees, high in trees
56.	*Pycnonotus atriceps*	2	4	2		forest edge, fruiting trees
57.	*Pycnonotus melanicterus*		3	3	2	broad leave trees, figs trees, tamarine
58.	*Pycnonotus jocosus*			2	8	scrub, cultivations
59.	*Pycnonotus cafer*			7	8	scrub, cultivations
60.	*Pycnonotus aurigaster*		2	6	4	scattered trees, cultivations
61.	*Pycnonotus fuscatus*			1		Bush
62.	*Garrular monileger*			1		bamboo
63.	*Orthotomus sutorius*			2		trees, bush

Survey 1 – Thabye Toe and Myay-Thon Bon Chaung

Survey 2 – Slope of Bambwe Kyin and Lay Kaung Wine Camp

Survey 3 – Along the Bambwe Kyin Chaung

Survey 4 – Min Hla 1 and Min Hla 2 Chaung

Table 5-18 List of fish and invertebrate species collected from Min Hla Hydropower project

Sr. No.	Order	Family	Species	Common name	Local name

1.	Perciformes	Balitoridae	*Schistura cincticauda*	ray-finned fish	Nga kyar
2.	Perciformes	Balitoridae	*Neonoemacheilus labeosus*	Loach	Nga kyar
3.	Perciformes	Channidae	*Channa harcourtbutleri*	Inlay channa	Nga yant
4.	Perciformes	Cobitidae	*Lepidocephalichthys berdmorei*	Berdmorei loach	Nga the le Doe
5.	Siluriformes	Claridae	*Clarias batrachus*	Walking cat fish	Nga khu
6.	Cypriniformes	Cyprinidae	*Danio sondhii*	Fire line Devario	Danio
7.	Cypriniformes	Cyprinidae	*Microrasbora rubescens*	Red dwarf rasbora	Yaepawe Nga
8.	Cypriniformes	Cyprinidae	*Pungio oblonga*	Java loach	
9.	Cypriniformes	Cyprinidae	*Burbus hexastichus*	Nga kyaung	Nga kyoung
10.	Cypriniformes	Cyprinidae	*physoschistura pseudobrunneana*	Loach	Nga kyar
11.	Cypriniformes	Cyprinidae	*Danio kyathit*	Kyathit barb	Nga pyat
12.	Cypriniformes	Cyprinidae	*Puntius amphibius*	Pool barb	Yay Pawe Nga
13.	Cypriniformes	Cyprinidae	*Devario browni*	Danio browni	Nga pyat
14.	Cypriniformes	Cyprinidae	*Danio kerri*	Hikari Danio	Nga pyat
15.	Cypriniformes	Cyprinidae	*Puntius padamya*	Odessa barb	Nga khone ma
16.	Cypriniformes	Cyprinidae	*Danio aequipinnatus*	Giant Danio	Yaypawe Nga
17.	Cypriniformes	Cyprinidae	*Puntius oligolipis*	Checker barb	Nga khone ma
18.	Decapoda	Palaemonidae	*Cryphiops caementarius*	Changallo shrimp	King Puzon
19.	Decapoda	Palaemonidae	*Troglocubanus gibarensis*	-	Puzon sate
20.	Decapoda	Portunidae	*Charybdis annulata*	Byar-ka-nan	Kanan lone
21.	Gastropoda	Thiaridae	*Melanoides tuberculata*	Red-rimmed melania	Khyu me shay
22.	Gastropoda	Pomatiopsidae	*Pomatiopsis lapidaria*	Slender Walker	Khyu chon
23.	Gastropoda	Planorbidae	*Biomphalaria havanensis*	Ghost Rams hom	Khyu khyae-phyu
24.	Gastropoda	Megascolecidae	*Perionyx fulvus*	-	Khyu yit
25.	Gastropoda	Melanoidae	*Melanoides sp.*	-	Khyu htate phyu

Table 5-19 Population estimates of fish and invertebrate from Min Hla Hydropower project,

Sr. No.	Species	Estimated No.	Data sourc	Remarks
1.	*Schistura cincticauda*	10	VS	Commonly
2.	*Neonoemacheilus labeosus*	4	VS	uncommonly encountered
3.	*Channa harcourtbutleri*	20	VS	Endemic
4.	*Lepidocephalichthys berdmorei*	7	VS	Endemic
5.	*Clarias batrachus*	2	Is	Endemic
6.	*Danio sondhii*	12	VS	Endemic
7.	*Microrasbora rubescens*	11	VS	Endemic
8.	*Pungio oblonga*	3	VS	uncommonly encountered

9.	*Burbus hexastichus*	3	Is	Endemic
10.	*physoschistura pseudobrunneana*	1	VS	rarely species
11.	*Danio kyathit*	10	VS	rarely species
12.	*Puntius amphibious*	12	VS	Endemic
13.	*Devario browni*	14	VS	Endemic
14.	*Danio kerri*	10	VS	Endemic
15.	*Puntius padamya*	10	VS	Endemic
16.	*Danio aequipinnatus*	15	VS	Endemic
17.	*Puntius oligolipis*	12	VS	Endemic
18.	*Cryphiops caementarius*	10	VS	Prawn Commonly seen in the stream
19.	*Troglocubanus gibarensis*	20	VS	Prawn
20.	*Charybdis annulata*	7	VS	Crustacean commonly seen in the stream
21.	*Melanoides tuberculata*	20	VS	Mollusk commonly seen in the stream
22.	*Pomatiopsis lapidaria*	10	VS	Mollusk commonly seen in the stream
23.	*Biomphalaria havanensis*	2	VS	Mollusk near the stream, rarely
24.	*Perionyx fulvus*	1	VS	Mollusk near the stream, rarely
25.	*Melanoides sp.*	250	VS	Mollusk in the stream, Endemic

VS = Voucher Specimen / IS = Interview Survey

Table 5-20 Frequency of fish and invertebrate from Min Hla Hydropower Project

Sr. No.	Species	No. in survey 1	No. in survey 2	No. in survey 3	No. in survey 3	Total No.	Observed frequency
1.	*Schistura cincticauda*	3	4	-	3	10	3
2.	*Neonoemacheilus labeosus*	1	-	-	3	4	2
3.	*Channa harcourtbutleri*	9	1	-	10	20	3
4.	*Lepidocephalichthys berdmorei*	2	1	1	3	7	4
5.	*Clarias batrachus*	2	-	-	-	2	1
6.	*Danio sondhii*	4	2	1	5	12	4
7.	*Microrasbora rubescens*	6	1	-	4	11	3
8.	*Pungio oblonga*	1	-	-	2	3	2
9.	*Burbus hexastichus*	3	-	-	-	3	1
10.	*physoschistura pseudobrunneana*	-	1	-	-	1	1
11.	*Danio kyathit*	2	3	1	4	10	4
12.	*Puntius amphibius*	3	4	1	4	12	4
13.	*Devario browni*	5	1	2	6	14	4
14.	*Danio kerri*	2	1	1	6	10	4
15.	*Puntius padamya*	5	1	-	4	10	3

16.	*Danio aequipinnatus*	7	2	2	4	15	4
17.	*Puntius oligolipis*	6	1	-	5	12	3
18.	*Cryphiops caementarius*	3	3	-	4	10	3
19.	*Troglocubanus gibarensis*	10	1	1	8	20	4
20.	*Charybdis annulata*	2	2	1	2	7	4
21.	*Melanoides tuberculata*	8	1	2	9	20	4
22.	*Pomatiopsis lapidaria*	3	1	3	3	10	4
23.	*Biomphalaria havanensis*	-	-	1	1	2	2
24.	*Perionyx fulvus*	1	-	-	-	1	4
25.	*Melanoides sp.*	100	25	25	100	250	4

Survey No. 1 – Min Hla Stream

Survey No. 2 – Thapyay Toe Stream

Survey No. 3 – Myay Thone Pone Stream

Survey No. 4 – Banbywe Kyin Stream

Table 5-21 Collection sites and Habitat types of fish and invertebrate from Min Hla Hydropower Project, Naung Cho Township

Sr. No.	Species	Site 1	Site 2	Site	Site 4	Habitat type
1.	*Schistura cincticauda*	3	4	-	3	hillstream with gravel bottom
2.	*Neonoemacheilus labeosus*	1	-	-	3	rocky rapids and hillstream
3.	*Channa harcourtbutleri*	9	1	-	10	stream and lake with dense vegetation
4.	*Lepidocephalichthys berdmorei*	2	1	1	3	rocky and sandy bottom
5.	*Clarias batrachus*	2	-	-	-	marsh land
6.	*Danio sondhii*	4	2	1	5	forested stream
7.	*Microrasbora rubescens*	6	1	-	4	Riparian areas of lake and stream
8.	*Pungio oblonga*	1	-	-	2	sandy and rocky
9.	*Burbus hexastichus*	3	-	-	-	rocky stream
10.	*physoschistura pseudobrunnea*	-	1	-	-	rocky rapids and hill streams
11.	*Danio kyathit*	2	3	1	4	Forested stream and marshland
12.	*Puntius amphibius*	3	4	1	4	stream and lake with dense
13.	*Devario browni*	5	1	2	6	forested stream and flooded
14.	*Danio kerri*	2	1	1	6	well planted and upper level of
15.	*Puntius padamya*	5	1	-	4	slow flow & well planted of
16.	*Danio aequipinnatus*	7	2	2	4	sandy and gravel beds in
17.	*Puntius oligolipis*	6	1	-	5	slow flow & well planted of
18.	*Cryphiops caementarius*	3	3	-	4	marsh land and sandy & rocky
19.	*Troglocubanus gibarensis*	10	1	1	8	marsh land and sandy & rocky

20.	*Charybdis annulata*	2	2	1	2	marsh land and sandy & rocky
21.	*Melanoides tuberculata*	8	1	2	9	sandy and rocky stream
22.	*Pomatiopsis lapidaria*	3	1	3	3	sandy and rocky stream
23.	*Biomphalaria havanensis*	-	-	1	1	near the stream
24.	*Perionyx fulvus*	1	-	-	-	near the stream
25.	*Melanoides sp.*	10	25	25	100	rocky and sandy bottom
16.	*Danio aequipinnatus*	7	2	2	4	sandy and gravel beds in
17.	*Puntius oligolipis*	6	1	-	5	slow flow & well planted of
18.	*Cryphiops caementarius*	3	3	-	4	marsh land and sandy & rocky
19.	*Troglocubanus gibarensis*	10	1	1	8	marsh land and sandy & rocky
20.	*Charybdis annulata*	2	2	1	2	marsh land and sandy & rocky
21.	*Melanoides tuberculata*	8	1	2	9	sandy and rocky stream
22.	*Pomatiopsis lapidaria*	3	1	3	3	sandy and rocky stream
23.	*Biomphalaria havanensis*	-	-	1	1	near the stream
24.	*Perionyx fulvus*	1	-	-	-	near the stream
25.	*Melanoides sp.*	10	25	25	100	rocky and sandy bottom

Table 5-22 List of Mammal species collected from Min Hla, Hydropower Project, Naung Cho Township, Northern Shan State

Sr. No.	Order	Family	Species	Common Name	Local Name
I.	Scadentia	Tupaiidae	1.*Tupaia belangeri*	Northern Tree Shrew	Thit swate
II.	Insectivora	Erinaceidae	2. *Echinosor*	Moonrat	Le-kywet
		Talpidae	3.*Talpa micrura*	Eastern Mole	Pwae
III.	Primate	Cercopithecidae	4. *Macaca nemestrina*	Pig-tailed-macaque	Myauk-pa -tee
			5. *Macaca multta*	Rhesus-macaque	Myauk-nyo
			6. *Macaca fascicular*	Long-tailed macaque	Myauk- tan-ngar
		Hylobatidae	7. *Hylobate lar*	White-handed Gibbon	Myauk-hlawe-kyaw
IV.	Pholidota	Manidae	8.*Manis pentadactyla*	Chinese Pangolin	Thin-khwe- chup

V.	Largomorpha	Leporidae	9.*Lepus Peguensis*	Siamese Hare	Taw-yon
VI.	Rodentia	Sciuridae	10.*Callosciurus*	Pallas's-Squirrel	Shint-nga-paw
			11.*Callosciurus finalysonii*	Phayre's Squirrel	Shint-sa-yawat
			12.*Rutafa bicolor*	Black Giant Squirrel	Thit-khwe
			13*Tamiopa mcclelland ii*	Myanmar Striped Squirrel	Shint-kyar
			14.*Petauris ta elegans*	Lesser Giant Flying Squarrel	Shoo- pyan-nge
		Rhizoyidae	15.*Rhizomys sumatrensis*	Large-bamboo-rat	War-boe-kywet
		Histricidae	16.*Hystrix brychyu*	East-Asian-porcupine	Phyu- kaung gyi
VII.	Carnivora	Canidae	17.*Cuon alpinus*	Dhole	Taw-khwe
		Ursidae	18.*Ursus thibetanus*	Asiatic-Black-Bear	Wet-won gyi .
		Mustelidae	19.*Arcton yx*	Hog Badger	Khwe-tu- wet-tu
		Viveridae	20 .*Prionnodo*	Banded linseng	Myauk-poe-long
		Herpestidae	21.*Herpesties urva*	Crab-Eating-Moongoose	Mwe -per
		Felidae	22.*Felis chaus*	Jungle Cat	Taw-kyaung
			23.*Prionailurus*	Fishing Cat	Kayaung-tan-hnga
		Suidae	24.*Sus scrofa*	Wild Pig	Taw-wet
VIII.	Tragulidae	Cervidae	25.*Muntiacus muntjak*	Red Muntjac	Gyi
			26.*Capriconis Sumatraensis*	Southern Serow	Taung-sate
			27.*Cervus unicolor*	Samber	Sat
IX.	Chiroptera	Rhinolophidae	*28.Rhinolophus armiger*	-	Lin-not

Table 5-23 Population estimates and data source of Recorded Mammal Species from Min Hla, Hydropower Project, Naung Cho Township, Northern Shan State.

Sr. No.	Species	Estimated No.	Data source	Remark
1.	*Tupaia belangeri*	3	IS	-
2.	*Echinosorex gymnurus*	11	IS	-
3.	*Talpa micrura*	5	IS	-
4.	*Macaca nemestrina*	11	IS	-
5.	*Macaca multta*	5	VS	-
6.	*Macaca fascicularis*	1	IS	-
7	*Hylobate lar*	1	IS	-
8	*Manis pentadactyla*	1	IS	-
9	*Lepus Peguensis*	1	IS	Seen
10	*Callosciurus erythraeus*	6	VS	-
11.	*Callosciurus finalysonii*	2	-	Seen
12.	*Rutafa bicolor*	1	IS	-
13.	*Tamiopa mcclellandii*	4	IS	-
14.	*Petaurista elegans*	2	IS	-
15.	*Rhizomys sumatrensis*	2	IS	-
16.	*Hystrix brychyura*	2	V	Spine
17.	*Cuon alpinus*	1	IS	-
18.	*Ursus thibetanus*	2	IS	-
19.	*Arctonyx collarsis*	1	IS	-
20.	*Prionodon linsang*	2	IS	-
21.	*Herpesties javanicus*	1	-	Seen
22.	*Felis chaus*	2	V	Skin
23.	*Prionailurus viverinnus*	1	IS	-
24.	*Sus scrofa*	1	IS	
25.	*Muntiacus muntjak*	3	VS	Horn/Skin
26.	*Cervus unicolor*	1	VS	Horn
27.	*Capriconis Sumatraensis*	1	VS	Horn
28.	*Rhinolophus armiger*	200	VS	

VS. Voucher specimen, IS. Interview survey

Table 5-24 Frequency of Recorded Mammal Species from Min Hla, Hydropower Project, Naung Cho Township, Northern Shan State.

Sr. No.	Species	No.in Survey 1	No.in Survey 2	No.in Survey 3	No.in Survey 4	Total No.	Observed Frequency
1.	*Tupaia belangeri*	2	1	-	-	3	2
2.	*Echinosorex gymnurus*	3	3	5	-	11	3
3.	*Talpa micrura*	-	5	-	-	5	1
4.	*Macaca nemestrina*	-	-	4	7	11	2
5.	*Macaca multta*			2	3	5	2
6.	*Macaca fascicularis*	-	-	-	1	1	1
7.	*Hylobate lar*	-	-	-	1	1	1

8.	*Manis pentadactyla*	1	-	-	-	1	1
9.	*Lepus Peguensis*	1	-	-	-	1	1
10.	*Callosciurus erythraeus*	-	4	-	2	6	2
11.	*Callosciurus finalysonii*	1	-	-	1	2	2
12.	*Rutafa bicolor*	1	-	-	-	1	1
13.	*Tamiopa mcclellandii*	1	3	-	-	4	2
14.	*Petaurista elegans*	1	1	-	-	2	2
15.	*Rhizomys sumatrensis*	-	1	1	-	2	2
16.	*Hystrix brychyura*	-	-	1	1	2	2
17.	*Cuon alpinus*	1	-	-	-	1	1
18.	*Ursus thibetanus*	1	-	1	-	2	2
19.	*Arctonyx collarsis*	1	-	-	-	1	1
20.	*Prionnodon linsang*	1	1	-	-	2	2
21.	*Herpesties urva*	-	1		-	1	1
22.	*Felis chaus*	-	2	-	-	2	2
23.	*Prionailurus*	-	1	-	-	1	1
24.	*Sus scrofa*	-	1	-	-	1	1
25.	*Muntiacus muntjak*	-	2	1	-	3	2
26.	*Cervua unicolor*	-	-	1	-	1	1
27.	*Capriconis sumatraensis*	-	-	1	-	1	1
28.	*Rhinolophus armiger*	-	-	-	200	200	1
Total Species		12	13	9	7	**28**	
Total Number		15	26	17	216	**274**	

Survey 1= Tha PyaeToe Chaung;
Survey 2= Myay Thone Pon Chaung;
survey 3 = Lay kaung Wine,
Survey 4= Min Hla 2, Lime stone cave

Table 5-25 Collection Site and Habitat types of Recorded Mammal from Min Hla, Hydropower Project, Naung Cho Township, Northern Shan State.

Sr. No.	Species	Arboreal	Forssorial	Cave	bushes	forest	Rice field
1.	*Tupaia belangeri*	√	-	-	-	-	√
2.	*Echinosorex gymnurus*	-	-	-	-	√	-
3.	*Talpa micrura*	√	-	-	-	-	-
4.	*Macaca nemestrina*	√	-	-	-	-	-
5.	*Macaca multta*	√	-	-	-	-	-
6.	*Macaca fascicularis*	√	-	-	-	-	-
7.	*Hylobate lar*	√	-	-	-	-	-
8.	*Manis pentadactyla*	-	-	-	-		√
9.	*Lepus Peguensis*	-	-	-	-	√	-
10.	*Callosciurus erythraeus*	√	-	-	-	-	-
11.	*Callosciurus finalysonii*	√	-	-	-	-	-
12.	*Rutafa bicolor*	√	-	-	-	-	-
13.	*Tamiopa mcclellandii*	√	-	-	-	-	-
14.	*Petaurista elegans*	√	-	.-		-	-

15.	*Rhizomys sumatrensis*	-	-	-	-	√	-
16.	*Hystrix brychyura*	-	-	-	-	√	-
17.	*Cuon alpinus*	-	-	-	-	√	-
18.	*Ursus thibetanus*	-	-	-	-	√	-
19.	*Arctonyx collarsis*	-	-	-	-	√	-
20.	*Prionnodon linsang*	-	-	-	-	√	-
21.	*Herpesties urva*	-	-	-	√	-	-
22.	*Felis chaus*	-	-	-	-	√	
23.	*Prionailurus*	-	-	-	-	√	-
24.	*Sus scrofa*	-	-	-	-	√	-
25.	*Muntiacus muntjak*	-	-	-	-	√	-
26	*Cervus unicolor*	-	-	-	-	√	-
27.	*Capriconis sumatraensis*	-	-	-	-	√	-
28.	*Rhinolophus armiger*	-	-	√	-	-	-

Table 5-26 List of Herpetofauna collected from Min Hla, Hydropower Project, Naung Cho Township, Northern Shan State.

Sr. No.	Order	Family	Species	Common Name	Local Name
I.	Anura	Ranidae	1. *Rana limnocharis*	Paddy Frog	Sar -phar
			2. *Rana nigrovittata*	Dark-Sided Frog	Sar -phar
		Bufonidae	3. *Bufo melanostitatus*	Common Toad	Phar-pyoke
		-	4. -	Tapole of Frog	Phar-long
II.	Squamata	Agamidae	5. *Calotes htunwini*		Poat-thin-nyo
			6. *Calotes mystaceus*	Blued-Crested, lizard	Tat-too
			7. *Calotes versicolor*	Garden Fence Lizard	
		Scincidae	8. *Mabuya longicaudata*	Long-tail Sun Skink	Kin-late-shaw
			9. *Mabuya multifasciata*	Many-Lines sun skink	Kyal-pyar-Kin-late-shaw
			10. *Lygosoma quadrupes*	Short-limbed Supple Skink	-
		Colubridae	11. *Amphiasia* sp	Striped Keelback	Myat-shaw
			12. *Ptyas mucosus*	Common Rat Snake	Lin-mwe
III.	Chelonia	Testudinidae	14. *Indotestudo elongata*	Yellow-Tortoise	Taung-lait

Table 5-27 Population estimates and data source of recorded Herpetofauna Species from Min Hla, Hydropower Project, Naung Cho Township, Northern Shan State.

Sr. No.	Species	Estimated No.	Data source	Remark
1.	*Rana limnocharis*	5	VS	-
2.	*Rana nigrovittata*	3	VS	-
3.	*Bufo melanostitatus*	200	VS	-
4.	Tapoles of frog -	250	VS	-
5.	*Calotes htunwini*	8	VS	-
6.	*Calotes mystaceus*	10	VS	
7.	*Calotes versicolor*	9	VS	-
8.	*Mabuya longicaudata*	8	VS	-
9.	*Mabuya multifasciata*	3	VS	-
10.	*Lygosoma quadrupes*	1	VS	-
11.	*Amphiasia* sp	1	VS	-
12.	*Ptyas mucosus*	-	IS	-
13.	*Indotestudo elongata*	2	S	-

VS. Voucher Specimen; IS. Interview Survey; SK. Skin; S. Shell; FT. Foot Track; H.Horn

Table 5-28 Frequency of Recorded Herpetofauna Species from Min Hla, Hydropower Project, Naung Cho Township, Northern Shan State.

Sr No.	Species	No.in Survey 1	No.in Survey 2	No.in Survey 3	No.in Survey 4	Total No.	Observed Frequency
1.	*Rana limnocharis*	2	3	1	-	6	3
2.	*Rana nigrovittata*	2	1	2	-	5	3
3.	*Bufo melanostitatus*	1	-	1	1	3	3
4.	Tapole of frogs	50	250	-	-	300	2
5.	*Calotes htunwini*	2	2	3	2	9	4
6.	*Calotes mystaceus*	3	4	3	3	13	4
7.	*Calotes versicolor*	2	3	1	3	9	4
8.	*Mabuya longicaudata*	5	3	4	2	14	4
9.	*Mabuya multifasciata*	2	3	2	2	9	4
10.	*Lygosoma quadrupes*	-	1	-	-	1	1
11.	*Amphiasia* sp	-	1	-	-	1	1
12.	*Ptyas mucosus*	?	-	-	?	-	-
13.	*Indotestudo elongata*	-	-	1	-	1	1
	Total species	9	12	10	7	**13**	-
	Total number	69	271	18	13	**371**	-

Survey 1 = Tha PyaeToe Chaung;
Survey 2 = Myay Thone Pon Chaung;
Survey 3 = Lay kaung Wine
Survey 4= Min Hla 2, Lime stone cave

Table 5-29 Collection Site and Habitat types of Recorded Herpetofauna from Min Hla, Hydropower Project, Naung Cho Township, Northern Shan State.

Sr. No.	Species	collection Site 1	collection Site 2	collection Site 3	collection Site 4	Observed Frequency
1.	*Rana limnocharis*	Forest	-	Near the	Forest	3
2.	*Rana nigrovittata*	Forest	Grass	Stream	-	3
3.	*Bufo melanostitatus*	Near the Pond		Road Side	Road Side	3
4.	Tapole of frogs	Pond	-	Pond	-	2
5.	*Calotes htunwini*	Tree	Tree	Tree	Tree	4
6.	*Calotes mystaceus*	Tree	Tree	Tree	Tree	4
7.	*Calotes versicolor*	Fence	Tree	Bushes	Fence	4
8.	*Mabuya longicaudata*	Bushes	Bushes	Bushes	Bushes	4
9.	*Mabuya multifasciata*	Bushes	Bushes	Bushes	Bushes	4
10.	*Lygosoma quadrupes*	-	-	Forest	-	1
11.	*Amphiasia* sp	-	Grass	-	-	1
12.	*Ptyas mucosus*	?	-	-	-	-
13.	*Indotestudo elongata*	-	-	Rice field	-	1

Table 5-30 List of insect species recorded from Min Hla Hydropower Project Area, Naung Cho Township, Northern Shan States

Order	Family	Species
I. Lepidoptera	1. Papilionidae	1. *Papilio bootes*
		2. *Papilio alemon publilius*
		3. *Papilio demolion demolion*
		4. *Papilio polytes romulus*
		5. *Papilio iswara iswara*
		6. *Triodes helena cerberus*
		7. *Chilasa paradoxa telearchus*
		8. *Graphium agamemnon agamemnon*
		9. *Graphium euryplus cheronus*
		10. *Graphium sarpedon sarpedon*
		11. *Atrophaneura varuna astorion*
		12. *Pachliopta aristolochiae goniopeltis*
	2. Pieridae	13. *Appias lyncida elonora*
		14. *Appias lalassis lalassis*
		15. *Catopsilia scylla cornelius*
		16. *Catopsilia pomona pomona*
		17. *Catopsilia pyranthe pyranthe*
		18. *Eurema hecabe contubernalis*
		19. *Eurema laeta sikkima*
		20. *Eurema laeta psedolaeta*
		21. *Eurema andersonii inouei*
		22. *Gandaca harina assamica*
		23. *Delias descombi descombi*
	3. Danaidae	24. *Danaus genutia genutia*
		25. *Danaus limniace limniace*
		26. *Euploea crameri bremeri*

		27. *Euploea algae limborgi*
		28. *Euploea algae deione*
		29. *Euploea core core*
		30. *Euploea core gordartii*
		31. *Euploea modesta modesta*
		32. *Euploea klugii klugii*
		33. *Ideopsis vulgaris macrina*
	4. Satyridae	34. *Lethe confusa confusa*
		35. *Lethe euripi niladona*
		36. *Ypthima baldus baldus*
		37. *Ypthima nareda sarcaposa*
		38. *Mycalesis lepcha kohimensis*
	5. Nymphalidae	39. *Pseudergolis wedah wedah*
		40. *Junonia hierta*
		41. *Junonia iphita ocyale*
		42. *Junonia lemonia lemonias*
		43. *Junonia atlites*
		44. *Kallima knyvetti*
		45. *Kallima limborgii limborgii*
		46. *Pantoporia hordonia hordonia*
		47. *Neptis soma shania*
		48. *Neptis sappho astola*
		49. *Neptis clinia susruta*
		50. *Neptis hylas kamarupa*
		51. *Euthalia adonia beata*
		52. *Bassarona recta recta*
		53. *Polyura schreiber assamensis*
		54. *Laringa horsfieldi glaucescens*
		55. *Chersonensis risa risa*
		56. *Argyronome laodice*
		57. *Hypolimnas bolina jacintha*
		58. *Cethosia penthesilea methypsea*
	5. Nymphalidae	59. *Cethosia cyane auanthus*
		60. *Ariadne ariadne pallidor*
		61. *Tanaecia lepidea sthavara*
		62. *Tanaecia godarti asoka*
		63. *Lexias dirtea*
		64. *Lebadea martha*
		65. *Phalanta phalanta*
	6. Lycaenidae	66. *Jamides caeruleus caeruleus*
		67. *Jamides philatus subditus*
		68. *Jamides cunilda nisanca*
		69. *Syntarucus plinius*
		70. *Tarucus ananda*
		71. *Everes argiades diporides*
		72. *Neocheritra amrita amrita*
		73. *Pseudotujuria donatana*
		74. *Suasa lisids lisids*
		75. *Zeltus amasa amasa*
	7. Hesperiidae	76. *Gerosis Iimax dirae*
		77. *Potanthus* sp.
		78. *Caltoris* sp.

		79. *Telicota* sp.
	1.Libellulidae	1. *Neurothemis tullia tullia*
		2. *Neurothemis inquirendae*
		3. *Neurothemis fulvia*
		4. *Neurothemis atlanta*
		5. *Neurothemis intermedia atlanta*
		6. *Rhyothemis plutonia*
		7. *Rhodothemis rufa*
		8. *Brachythemis contaminate*
		9. *Trithemis aurora*
	5. Nymphalidae	59. *Cethosia cyane auanthus*
		60. *Ariadne ariadne pallidor*
		61. *Tanaecia lepidea sthavara*
		62. *Tanaecia godarti asoka*
		63. *Lexias dirtea*
		64. *Lebadea martha*
		65. *Phalanta phalanta*
	6. Lycaenidae	66. *Jamides caeruleus caeruleus*
		67. *Jamides philatus subditus*
		68. *Jamides cunilda nisanca*
		69. *Syntarucus plinius*
		70. *Tarucus ananda*
		71. *Everes argiades diporides*
		72. *Neocheritra amrita amrita*
		73. *Pseudotujuria donatana*
		74. *Suasa lisids lisids*
		75. *Zeltus amasa amasa*
	7. Hesperiidae	76. *Gerosis Iimax dirae*
		77. *Potanthus* sp.
		78. *Caltoris* sp.
		79. *Telicota* sp.
II. Odonata	1.Libellulidae	1. *Neurothemis tullia tullia*
		2. *Neurothemis inquirendae*
		3. *Neurothemis fulvia*
		4. *Neurothemis atlanta*
		5. *Neurothemis intermedia atlanta*
		6. *Rhyothemis plutonia*
		7. *Rhodothemis rufa*
		8. *Brachythemis contaminate*
		9. *Trithemis aurora*
II. Odonata	1.Libellulidae	10. *Trithemis festiva*
		11. *Trithemis kirbyi kirbyi*
		12. *Orthetrum sabina*
		13. *Orthetrum triangulare*
		14. *Orthetrum pruinosum neglectum*
		15. *Orthetrum lineostigma*
		16. *Diplacodes trivialis*
	2. Gophidae	17. *Melligomphus* sp.
		18. *Ictinogomphus* sp.
	3. Coenagrionidae	19. *Agriocnemis femina*
		20. *Agriocnemis rubescens rubeola*
		21. *Aciagrion pallidum*

		22. *Ceriagrion indochinense*
		23. *Ceriagrion auranticum*
		24. *Ceriagrion fallax*
		25. *Ceriagrion melanurum*
	4. Platycnemididae	26. *Calicnemia imitans*
		27. *Copera ciliate*
		28. *Coeliccia cyanomelas*
		29. *Coeliccia didyma*
		30. *Coeliccia marginipes*
	5. Agriidae	31. *Agrion atratum*
		32. *Mnais icteroptera*
	6. Calopterygidae	33. *Neurobasis chinensis*
		34. *Matrona nigripectus*
	7. Lestidae	35. *Platycnemis foliacea*

Table 5-31 Different survey sites and observed frequency of recorded insect species from Min Hla Hydropower Project Area, Naung Cho Township, Northern Shan States

Sr. No.	Species	No. in survey 1	No. in survey 2	No. in survey 3	No. in survey 4	Total No.	Observed frequency
1	*Papilio bootes*	5	-	-	3	8	2
2	*Papilio alemon publilius*	-	2	-	-	2	1
3	*Papilio demolion demolion*	1	-	1	-	2	2
4	*Papilio polytes romulus*	2	-	2	-	4	2
5	*Papilio iswara iswara*	-	-	1	-	1	1
6	*Triodes helena cerberus*	1	-	1	-	2	2
7	*Chilasa paradoxa telearchus*	-	2	1	-	3	2
8	*Graphium agamemnon agamemnon*	1	-	-	-	1	1
9	*Graphium euryplus cheronus*	-	-	1	-	1	1
10	*Graphium sarpedon sarpedon*	-	-	1	2	3	2
11	*Atrophaneura varuna astorion*	-	-	1	-	1	1
12	*Pachliopta aristolochiae goniopeltis*	-	-	-	1	1	1
13	*Appias lyncida elonora*	2	-	-	3	5	2
14	*Appias lalassis lalassis*	-	1	-	2	3	2
15	*Catopsilia scylla cornelius*	2	-	2	-	4	2
16	*Catopsilia pomona pomona*	-	3	-	-	3	1
17	*Catopsilia pyranthe pyranthe*	-	-	3	1	4	2
18	*Eurema hecabe contubernalis*	-	-	2	-	2	1
19	*Eurema laeta sikkima*	5	5	3	-	13	3
20	*Eurema laeta psedolaeta*	-	-	2	-	2	1
21	*Eurema andersonii inouei*	5	5	-	5	15	3

22	*Gandaca harina assamica*	-	2	-	-	2	1
23	*Delias descombi descombi*	-	-	3	-	3	1
24	*Danaus genutia genutia*	5	1	5	3	14	4
25	*Danaus limniace limniace*	-	-	7	-	7	1
26	*Euploea crameri bremeri*	3	-	-	-	3	1
27	*Euploea algae limborgi*	-	2	-	2	4	2
28	*Euploea algae deione*	-	-	10	-	10	1
29	*Euploea core core*	1	-	10	1	12	3
30	*Euploea core gordartii*	-	2	-	-	2	1
31	*Euploea modesta modesta*	-	-	7	-	7	1
32	*Euploea klugii klugii*	-	-	5	2	7	2
33	*Ideopsis vulgaris macrina*	-	-	3	-	3	1
34	*Lethe confusa confusa*	2	-	-	3	5	2
35	*Lethe euripi niladona*	-	3	-	5	8	2
36	*Ypthima baldus baldus*	3	3	-	5	11	3
37	*Ypthima nareda sarcaposa*	-	-	3	-	3	1
38	*Mycalesis lepcha kohimensis*	-	3	2	2	7	3
39	*Pseudergolis wedah wedah*	3	2	1	-	6	3
40	*Junonia hierta*	5	-	3	5	13	3
41	*Junonia iphita ocyale*	1	-	-	10	11	2
42	*Junonia lemonia lemonias*	-	5	-	-	5	1
43	*Junonia atlites*	-	3	-	2	5	2
44	*Kallima knyvetti*	1	1	-	-	2	2
45	*Kallima limborgii limborgii*	-	-	1	-	1	1
46	*Pantoporia hordonia hordonia*	2	1	-	1	4	3
47	*Neptis soma shania*	1	-	-	-	1	2
48	*Neptis sappho astola*	1	1	-	-	2	2
49	*Neptis clinia susruta*	-	-	2	3	5	2
50	*Neptis hylas kamarupa*	-	1	-	1	2	2
51	*Euthalia adonia beata*	-	1	1	-	2	2
52	*Bassarona recta recta*	-	-	2	-	2	1
53	*Polyura schreiber assamensis*	1	-	2	2	5	3
54	*Laringa horsfieldi glaucescens*	-	-	1	-	1	1
55	*Chersonensis risa risa*	-	-	1	-	1	1
56	*Argyronome laodice*	-	5	2	1	8	3
57	*Hypolimnas bolina jacintha*	-	-	2	-	2	1

58	*Cethosia penthesilea methypsea*	1	-	-	-	1	1
59	*Cethosia cyane auanthus*	-	1	-	5	6	2
60	*Ariadne ariadne pallidor*	-	-	2	10	12	2
61	*Tanaecia lepidea sthavara*	1	1	-	-	2	2
62	*Tanaecia godarti asoka*	-	1	-	-	1	1
63	*Lexias dirtea*	-	2	1	1	4	3
64	*Lebadea martha*	-	1	-	-	1	1
65	*Phalanta phalanta*	-	1	-	1	2	2
66	*Jamides caeruleus caeruleus*	4	-	-	-	4	1
67	*Jamides philatus subditus*	-	-	1	10	11	2
68	*Jamides cunilda nisanca*	-	-	-	5	5	1
69	*Syntarucus plinius*	-	20	-	-	20	1
70	*Tarucus ananda*	2	20	1	5	28	4
71	*Everes argiades diporides*	5	25	-	10	40	3
72	*Neocheritra amrita amrita*	-	-	3	-	3	1
73	*Pseudotujuria donatana*	-	-	2	5	7	2
74	*Suasa lisids lisids*	-	-	2	-	2	1
75	*Zeltus amasa amasa*	-	-	1	-	1	1
76	*Gerosis Iimax dirae*	-	-	2	-	2	1
77	*Potanthus* sp.	1	1	-	1	3	3
78	*Caltoris* sp.	-	1	-	2	3	2
79	*Telicota* sp.	-	1	2	-	3	2
80	*Neurothemis tullia tullia*	3	-	-	-	3	1
81	*Neurothemis inquirendae*	-	-	3	2	5	2
82	*Neurothemis fulvia*	5	2	-	-	7	2
83	*Neurothemis atlanta*	-	-	2	3	5	2
84	*Neurothemis intermedia atlanta*	-	3	-	-	3	1
85	*Rhyothemis plutonia*	2	-	-	2	4	2
86	*Rhodothemis rufa*	-	-	3	-	3	1
87	*Brachythemis contaminate*	2	-	1	-	3	2
88	*Trithemis aurora*	5	5	5	5	20	4
89	*Trithemis festiva*	3	2	2	3	10	4
90	*Trithemis kirbyi kirbyi*	-	1	2	-	3	2
91	*Orthetrum sabina*	5	1	1	2	9	4
92	*Orthetrum triangulare*	3	4	5	-	12	3
93	*Orthetrum pruinosum neglectum*	4	-	1	1	6	3
94	*Orthetrum lineostigma*	1	1	-	-	2	2

95	*Diplacodes trivialis*	-	2	2	2	6	3
96	*Melligomphus* sp.	1	-	-	1	2	2
97	*Ictinogomphus* sp.	1	1	-	-	2	2
98	*Agriocnemis femina*	3	-	2	3	8	3
99	*Agriocnemis rubescens rubeola*	-	1	1	-	2	2
100	*Aciagrion pallidum*	-	2	-	5	7	2
101	*Ceriagrion indochinense*	2	-	2	-	4	2
102	*Ceriagrion auranticum*	-	1	5	-	6	2
103	*Ceriagrion fallax*	2	-	-	3	5	2
104	*Ceriagrion melanurum*	3	1	1	-	5	3
105	*Calicnemia imitans*	-	-	2	1	3	2
106	*Copera ciliate*	1	2	-	2	5	3
107	*Coeliccia cyanomelas*	2	-	3	-	5	2
108	*Coeliccia didyma*	1	4	-	3	8	3
109	*Coeliccia marginipes*	-	2	2	-	4	2
110	*Agrion atratum*	-	1	2	2	5	3
111	*Mnais icteroptera*	2	-	2	-	4	2
112	*Neurobasis chinensis*	4	5	5	2	16	4
113	*Matrona nigripectus*	2	3	3	1	9	4
114	*Platycnemis foliacea*	1	1	1	2	5	4
No. of individual		125	174	168	165	632	
No. of species		51	55	68	53		

Survey 1 - Thabye Toe and Myay Thon Bon Chaung
Survey 2 - Slope of Bambwe Kyin and Lay Kaung Wine Camp
Survey 3 - Along the Bambwe Kyin Chaung
Survey 4 – Min Hla 1 and Min Hla 2 Chaung

Rhyothemis plutonia

Trithemis aurora

Trithemis festiva

Neurothemis fulvia

Coeliccia cyanomelas

Neurobasis chinensis

Calotes htuniwi

Mabuya Longicaudata

Lycosoma quadrupes

Skin of Snake

Amphisia stolata

Indotestudo elongata

Rana limnocharis

Rana nigrovittata

Rana sp

Kaloura pulchara

Calotes versicola

Calotes mystaceous

Macaca mulatta

Skin of Red Muntjac

Horn of Red Muntjac

Horn of Red Sambar Dear

Spine of Porcupine

Tadarida plicata

Puntius amphibious

Devario browni

Troglocubanus gibarensis

Charybdis annlata

Melanoides sp.

Evidence of fishing

Schistura cincticauda

Neonoemacheilus labeosus

Lepidocephalichthys berdmorei

Danio sondhii

Microrasbora rubescens

Danio kyathit

Gallinula chloropus

Treron sphenura

Pericrocotus flammeus

Oriolus xanthomus

Copsychus saularis

Ficedula parva

Danaus limniace limniace

Euploea modesta modesta

Lexias dirtea

Kallima limborgii

Eurema andersoni inouei

Zeltus amasa amasa

Figure 5-19 Fauna Species near the Project Area

5.4. SOCIO-ECONOMIC COMPONENT

5.4.1. Objective

The purpose of Socio-Economic Study for Minhla Hydropower Project is to survey the existing social and economic condition of the project area before commencement of the proposed project. Both potential positive and negative impacts and their nature on the project area will then be identified. It is anticipated that this information will serve as a project baseline for poverty and living standards as well as a range of other social and economic data for subsequent project monitoring.

5.4.2. Methodology, Scope and Limitations

The Socio-economic survey works were carried out by a team comprising of experienced team leaders. Project was first disclosed and explained by the team to the various stakeholders concerned so that they could clearly visualize the project. Scoping is defined as a procedure for determining the extent of and the approach to an EIA.

The study area has low population density. Since Minhla Hydropower Project is a diversion type project involving without any reservoir, no resettlement issue is involved and no significant direct negative impact due to the project is foreseen. (But there are some long term and cumulative impacts on the surrounding areas of the project.)

The Socio – economic data were collected for Naung Cho Township comprising of 6 quarters and 35 villages, which situated in the vicinity of the project area. The Survey team had visited two villages and had carried out KII (Key Informant Interviews) with the village heads and village households using random sampling method, some additional secondary data were also collected from the relevant local administrative offices and government departments of Naung Cho Townships. These acquired data will help as baseline ones to compare with those obtained from future monitoring works.

5.4.3. Existing Socio-Economic Condition of the Naung hkio Township

5.4.3.1. Population and Ethnic Group

The study team carried out the works in two villages of Naung Cho Township. According to 2013 records, the population of Naung Cho Township is 119974. The population of survey area is as shown in Table.

Table 5-32 Population of Age Group and Sex (2013), Naung Cho Township

Sr.no	Description	Age above (18)			Age under (18)			Total		
		male	female	total	male	female	total	male	female	total
1	Town dweller	5316	5651	10967	1943	1974	3917	7259	7625	14884
2	Rural dweller	34459	34742	69201	18018	17871	35889	52477	52613	105090
Total		39775	40393	80168	19961	19845	39806	59736	60238	119974

Source: Township General Administration Book.

Population by ethnic group is listed in Table 5-33. It can be seen that Da-nu is the most populated ethnic group having 37% of total population in Naung Cho Township while Shan is about 31% and Bamar is about 21%.

Table 5-33 Population by Ethnic Group in Naung Cho Township (2013)

Sr.no	National races	Population	Township population	Percentage of Township population
1	Kachin	1911		1.59 %
2	Kaya	4		0.003 %
3	Kayin	267		0.22 %
4	Chin	355		0.29 %
5	Bamar	25469		21.26 %
6	Mon	40		0.03 %
7	Rakhine	173		0.14 %
8	Shan	37480		31.28 %
9	Inn-tha	-		-
10	Da-nu	44884		37.5 %
11	Pa-laung	-		-
12	Pa-aing	-		-
13	La-hoo	-		-
14	Li-su	-		-
15	Others	9225		7.69 %
Total		119808	119974	100 %

5.4.3.2. Livelihood

63.6 % of the total population of Naung Cho Township depends upon agricultural works for their livelihood, 4.97 % on other works, 8.11% on casual labour, 1.89 % on government services and 5.09% on livestock breeding. Population by livelihood is shown in Table.

The number of livestock in the Township is shown in Table 5-34. Commercial fishery works are also not seen in the area. Since these works can raise the income significantly, people in the area should be encouraged to extend their livelihood in livestock breeding.

Table 5-34 Livelihood in Naung Cho Township

Sr. No.	Livelihood	Percentage	Remarks
1.	Agricultural Farming	63.60	
2.	Government Services	1.89	
3.	Servicing	6.45	
4.	Livestock Breeding	5.09	
5.	Market Retailing Worker	8.25	
6.	Home (Cottage) Industries	1.59	
7.	Casual Labour	8.11	
8.	Others (Landless households)	4.97	
	Total	100	

Source: Township General Administration Book.

Table 5-35 Livestock in Naung Cho Township

Sr.no	Year	Buffalo	Cattle	Pig	Chicken	Duck	Sheep/Goat
1	2010- 2011	-	4919	17584	89923	680	1552
2	2011 - 2012	-	5291	18530	97193	685	1636

Source: Township General Administration Book.

5.4.4. Agriculture

In Naung Cho Township the main Livelihood is also agriculture. But it still lacks modern technology and facilities with very low-level farm inputs such as seeds, fertilizers, pesticide etc. Agricultural loan also does not meet the farm expenditure so that, cultivators cannot use the farm machineries extensively due to lack of budget. The following Table 5-36 shows of the availability of farm equipment of Naung Cho Township. The targeted yields and local market prices of crops grown in the area are shown in Table.

Table 5-36 Farm Equipment in Naung Cho Township (2012)

Sr. No	Government					Private				
	Tractor	Hand tractor	Seeding Machine	Harvester	Water pump	Tractor	Hand tractor	Seeding machine	Harvester	Water pump
1	15	-	-	-	-	74	816	-	13	346

Source: Township General Administration Book.

Table 5-37 Targeted yields and Local Market Prices of Crops

Crop	Targeted Yield (metric ton /ha)	Local Market Price (kyats / ton)
Paddy	4.58	213800
Groundnut	1.54	560000
Sesame	0.85	1472600
Sunflower	0.8	573800
Sugarcane	111	30000
Maize	4.59	285000

Source: Township General Administration Book.

5.4.5. Health

Public health facilities and staff for health services in Naung Cho Township as shown in Table 5-38.

Table 5-38 Public Health Facilities (2012)

Sr. No.	Description	Naung Cho Township
1.	Township Hospital	1
2.	Station Hospital	2
3.	Rural Health Centre	25
4.	Doctor	6
5.	Health Assistant	5

6.	Nurse	16

Source: Township General Administration Book.

According to 2012 record, it is known that the ratio of medical doctor to population is 1 to 21,642 and for nurse to population is 1 to 8,656 in Naung Cho Township. Rural health centers are the only facility for health in these areas.

Malaria and Cholera are the most frequently found diseases in Naung Cho Township. Diseases under National Surveillance for 2012 record are shown below Table 5-39

Table 5-39 Diseases under National Surveillance (2014)

Sr. No.	Name of Diseases	Naung Cho Township	
		Case	Death
1	Malaria	1222	-
2.	Cholera	1065	1
3.	TB	-	-
5.	Dysentery	261	1
6.	Hepatitis	21	-
	Total	2569	2

Source: Township General Administration Book.

5.4.6. Education

Basic education in Myanmar, from kindergarten to tenth standard, takes eleven years and higher education takes additional four to seven years. Present education facilities of the project area are shown in Table 5-40.

Table 5-40 Facilities for Education

Type of School	Naung Cho Township			
	No. of Schools	No. of Students	No. of Teachers	Ratio of Teachers to Students
Primary School	151	10730	280	1:38
Middle School	10	3541	111	1:32
High School	6	6383	172	1:37

Source: Township General Administration Book.

5.4.7. Roads and Communication

The mean of transportation in the project area is only by road. Telecommunication system in the Project area is shown in Table 5-41.

Table 5-41 Communication Systems (2012-13)

Township	Post Office	Telegraph	Telephone

			Auto	Mobile	Manual	Internet
Naung Cho	4	1	707	5604	-	370

Source: Township General Administration Book.

5.4.8. Electricity Supply

Electricity for Naung Cho is supplied by Myanmar Electric Power Enterprise. Electric power is supplied at present 24 hours a day generally.

5.4.9. Household, Population and Ethnic Group

The study team inspected the affected area within time limit allowed and found the household, population and ethnic group as follows.

Among the total 93 households, 1% is Bamar, 94% is Shan in the Thapyaedoe Village. There are totally households are 90, 100% is Bamar in the Banbwaykyin Village. The details are shown in Table 5-42 and Table 5-43. This shows that ethnic groups normally gather together to reside among themselves.

Table 5-42 Household and Population

Sr. No.	Villages	Household	Population		
			Male	Female	Total
	Naung Cho Township				
1.	Thapyaedoe	93	215	185	400
2	Banbwaykyin	90	216	208	424
Total		183	431	393	824

Table 5-43 Ethnic Group

Sr.no	National races	Percentage of Banbwaykyin population	Percentage of Thapyaedoe population
1	Kachin	-	-
2	Kaya	-	-
3	Kayin	-	-
4	Chin	-	-
5	Bamar	100	1
6	Mon	-	-
7	Rakhine	-	-
8	Shan	-	94
9	Inn-tha	-	-
10	Da-nu	-	-
11	Pa-laung	-	-
12	Pa-aing	-	-
13	La-hoo	-	-
14	Li-su	-	-

15	Others	-	-
Total		100	95

5.4.10. Religion

100% of the households are Buddhist in the survey area of Minhla Hydropower Project area Table 5-44.

Table 5-44 Religion Naung Cho Township

Sr.no	Township	buddhism	christian	hindu	islam	deva	others	total
	Thapyaedoe	385	-	-	-	-	-	385
	Banbwaykyin	500	-	-	-	-	-	500

5.4.11. Livelihood

99% of the people in the survey area work in farming, while 1% of the population is occupied in trading. Table 5-45 in the survey area. 55% of livestocks breeding is poultry, 22% are buffalo, 22% are pigs and 1% is cattle in the survey area Table. There is only one small fish farm in the project area. Table 5-47.

Table 5-45 Livelihood Naung Cho Township

Villages	Farming	Agro-forestry	Trading	Employment	Fishing	Other
Thapyaedoe	91	-	4	-	-	-
Banbwaykyin	90	-	-	-	-	-
Total	181	-	4	-	-	-

Table 5-46 Livestock Breeding

Village	Buffalo	Cattle	Pig	Chicken	Duck	Sheep/Goat
Thapyaedoe	40	20	100	350	-	-
Banbwaykyin	100	-	50	30	-	-

Table 5-47 Farm Implements

	Private						
Village	Cart	Plough/ Harrow	Hand tractor	Tractor	Harvester	Water Pump	Sprayer
Thapyaedoe	5	80	5	-	2	1	5
Banbwaykyin	18	180	5	1	3	5	40
	23	260	10	1	5	6	45

5.4.12. Agricultural Land and Farm Implements

In study area of Thapyaedoe and Banbwaykyin Villages, there are a total of 4,615 acres.

5.4.13. Household Appliances

In Thapyaedoe and Banbwaykyin villages, there are two motor cars, six bicycles, thirteen trawlagyti, ten generators, 153 private motorbikes, 90 televisions, 90 videos, 30 radios and 30 solar electric panals. Table 5-48.

Table 5-48 Household Appliances Naung Cho Township

Sr. No.	Villages	Trawlagyi	Bicycle	Motorbike	Generator	Car	TV	Video	Radio	Solar Electricity
1.	Thapyaedoe	6	1	63	-	1	20	20	30	-
2.	Banbwaykyin	7	5	90	10	1	70	70	-	30
Total		**13**	**6**	**153**	**10**	**2**	**90**	**90**	**30**	**30**

5.4.14. Infrastructure and Public Services

With reference to the infrastructure list in Table 5-49 to Table 5-51, there is one preschool and two primary schools. There is a fair amount of educational infrastructures with enough teachers in each primary school. But in health sector, health care services are insufficient in the study area.

Table 5-49 Infrastructures (Education) Naung Cho Township

Sr. No.	Villages	High School	Middle School	Primary School	Pre-School	Library	Police Station	Fire Station
1	Thapyaedoe	-	-	1	1	-	-	-
2	Banbwaykyin	-	-	1	-	-	-	-
Total		0	0	2	1	0	0	0

Table 5-50 Infrastructures (Health) Naung Cho Township

Sr. No.	Villages	Township Hospital	Station Hospital	Sub Rural Health Centre	Monastery	Shop	Cemetery	Rice Mill
1	Thapyaedoe			-	1	4	1	5
2	Banbwaykyin			1	1	5	1	7
Total				1	2	9	2	12

Table 5-51 Health & Education Services Naung Cho Township

Sr. No.	Villages	Doctors	Health Assistants	Nurses	Midwife	High School Teachers	Middle School Teachers	Primary School Teachers
1	Thapyaedoe	-	-	-	-	-	-	4
2	Banbwaykyin	-	-	-	-	-	-	3
Total		0	0	0	0	0	0	7

5.4.15. Energy Consumption

According to the Table 5-52, fuel wood is mainly utilized for energy in the area. Naung Cho Town gets electricity supply from Township Electricity Power Enterprise in 24 hours per day. In the villages, local electricity is provided by private with small scale hydropower plants. It is necessary to decrease utilization of fuel wood.

Table 5-52 Energy Consumption

Sr. No.	Villages	Fuel Wood ton/month	Charcoal Kg/month	Kerosene Gal/month	Electricity KWh/ month
	Naung Cho Township				
1.	Thapyoedoe	1350	-	-	-
2	Banbwaykyin	1000	-	-	-
Total		2350	0	0	0

5.4.16. Archaeology and Cultural Heritage

No significant religious and cultural heritage structures and items have been affected by the construction of hydropower project. There are some religious buildings in Naung Cho in Table 5-53.

Table 5-53 Religious Building

Sr. No.	Villages	Pagoda	Monastery	Nun	Church	Mosque
1	Thapyoedoe	-	1	-	-	-
2	Banbwaykyin	1	1	-	-	-
Total		1	2	0	0	0

5.4.17. Public Response

There is a question in the questionnaire set which asks for any comment on the Minhla Hydropower Project. 17 persons are interviewed in the study area and summary of their response is described as below:

- Nobody objects to the implementation of Minhla Hydropower Project.
- After completion of the project, they like to get more electricity for use.
- They expect that more job opportunities due to the project.
- There is some concern for the safety of the existing road due to possible damage cause by construction vehicles.

5.4.18. Household Budget

The income and expenditure of each household are surveyed in the interview and analysed. Most of the household earned their living from farming works. Average annual income and expenditure on each selected household was taken and analysed to study household budget. The maximum income was found to be about 10 million Kyats per year while the minimum is about 0.75 million Kyats.

Among 17 random samples, deficit of budget is found in some household ranging from one to four hundred thousand. Statistics of yearly income and expense of the 17 random samples is shown below. Most of them have just balanced budget between income and expenditure but household budget deficits are frequently found and they are presently solving it by the loan from others with a high interest rate.

Table 5-54 Statistic of Yearly Income and Expense

Class Interval (Kyats)	Class size	
	Income	Expense
< 250000	-	-
250000 - 500000	-	-
500000 - 750000	-	-
750000 - 1000000	2	-
1000000 - 2000000	4	9
2000000 - 3000000	8	6
3000000 - 4000000	2	1
4000000 - 5000000		
6000000 - 7000000		
> 10000000	1	1
Total	17	17

CHAPTER 6
IMPACT ASSESSMENT AND MITIGATION MEASURE

6.1. METHODOLOGY FOR THE ASSESSMENTS

The assessment of each impact based on consideration of the magnitude, duration, spatial and frequency of activities, which are going to carry out during three phases and characteristics of the project site. The assessment is qualitative and the significance of each impact is been classified into five categories in overall.

The following methodology have been applied to assess the environmental impacts of the factory mainly on air, water, land, biodiversity, including human beings. Each source of impact had assessed by four parameters, magnitude, duration, extent and probability and each assess point have five scales as mentioned in Table 6-1:

Table 6-1 Impact assessment parameters and its scale

Assessment	Scale				
	1	**2**	**3**	**4**	**5**
Magnitude (M)	Insignificant	small and will have no effect on working environment	Moderate and will result in minor changes on working environment	High and will result in significant changes on working environment	Very high and will result in permanent changes on working environment
Duration (D)	0 - 1 year	2 - 5 year	6 - 15 year	Life of operation	Post Closure
Extent (E)	Limited to the site	Limited to the local area	Limited to the region	National	International
Probability (P)	Very improbable	Improbable	Probable	Highly probable	Definite

Then, the Significant Point (SP) calculated by following formula.

Significant Point (SP) = (Magnitude + Duration + Extent) * Probability

Impact Significance: Based on calculated significant point, impact significance is able to categorize as follows:

Significant Point (SP)	Impact Significance
<15	Very Low
15-29	Low
30-44	Moderate
45-59	High
60	Very high

Following from the establishment of the baseline, an environmental impact assessment was conducted. The impact assessment considers the main potential issues associated with project development and also takes in to account the project cycle. The assessment is carried out prior to

any mitigation or management measures being applied, thus impacts that are indicated as significantly negative may be minimised or reduced by effective mitigation strategies applied subsequently.

The identification of impacts and the determination of their significance, according to the four parameters for the construction and operation of this project are summarised as follows:

Table 6-2 Impact assessment matrix for construction phase

Ref.	Issue	Project activities	Impact	E	D	M	P	SP	IS
Bio-Physical & Chemical									
BPC/1	Changes in surface water quality	Soil excavation works affects the surface water quality	Significance mostly in direct impact area during construction period. Higher turbidity due to breaking of ground.	3	2	3	2	16	low
BPC/2	Changes in groundwater quality	Risk of disturbance to underground water resources due to dam / weir construction	Selection of project site is avoiding limestone area and good geological soil condition for dam construction, so negligible impact by pollutants into the ground water.	3	2	3	2	16	low
BPC/3	Changes to drainage patterns	Alteration of the natural drainage system due to dam construction	Alteration of the natural drainage system	3	2	3	3	24	low
BPC/4	Changes in rates of erosion and siltation	Significant erosion and siltation due to soil excavation works	Significant erosion and siltation due to soil excavation works	3	2	3	2	16	low
BPC/5	Changes to air quality	Air quality will be changed because of dust, particulate matter during construction works	Air quality will be impacted through dust and particulate matter during construction works.	3	2	3	2	16	low
BPC/6	Changes to ambient noise levels	Noise levels will be significant during construction disturbing the biota in the environment	Noise levels will be affected by construction machinery etc.	3	2	2	2	14	Very low
BPC/7	Changes to aquatic biota	Change in aquatic biota due to construction works	Mainly due to the construction works, affects to the aquatic biota is expected.	3	2	3	3	24	low
BPC/8	Changes to terrestrial biota	Significant changes expected in terrestrial biota and habitation due to excavation of soil masses	Due to construction works terrestrial ecosystem may be changed.	3	2	3	3	24	Low
BPC/9	Changes to disease vector populations	Health risk to construction laborers during construction period (water borne / dust)	During construction there might be some health risk to construction laborer.	3	2	2	2	14	Very low
BPC/10	Changes to land cover	Significant change in land cover due to excavation works	Original land cover will be totally changed.	3	2	3	2	16	low

Ref.	Issue	Project activities	Impact	E	D	M	P	SP	IS
BPC/11	Changes to areas of natural habitat	Due to the changes in vegetation in land and water, natural habitat may change to a certain extent	Natural Habitat may change to a certain extent.	3	2	3	2	16	low
BPC/12	Change in Hydrology	Movement of water in the natural environment over time	Changes in how also cause water level changes, which have direct implications for agricultural production, navigation, infrastructure, human safety and ecosystems.	3	4	3	3	30	moderate
Socio-Economic & Cultural									
SEC/1	Changes involving loss of private assets	No significant private asset disturbed due to dam construction works	No significant loss of paddy land and habitation from farmers at project site.	3	2	2	1	7	Very low
SEC/2	Changes involving loss of cultural heritage	No significant cultural heritage at proposed project area	No significant cultural heritage	3	2	2	1	7	Very low
SEC/3	Changes involving displacement of people	No Displacement of inhabitants.	No displacement of inhabitants in the project area.	3	2	2	1	7	Very low
SEC/4	Changes to local traffic patterns	may change traffic pattern to a certain extent.	Simultaneous construction works may change traffic pattern to a certain extent.	3	2	3	2	16	low
SEC/5	Changes to fisheries	Some changes in fishery expected at Minhla and nearby streams	Water quality and physical changes may have localized effects on fisheries.	3	2	3	3	24	low
SEC/6	Changes in local wage labour incomes/livelihood opportunities	Laborers are employed.	Some employment opportunities generated.	3	2	4	3	27	Moderate
SEC/7	Changes in visual amenity	No significant amenity to vision during construction period; disturbed soil appears instead of natural beauty of landscape.	Some changes due to vegetation clearance etc.	3	2	2	1	7	Very low
SEC/8	Changes to public infrastructure/community resources	Change in infrastructure due to construction works	Changes in infrastructure due to construction works	3	2	3	2	16	low

Table 6-3 Impact assessment matrix for operation phase

Ref.	Issue	Activities of project	Impact	E	D	M	P	SP	IS
Bio-Physical & Chemical									
BPC/1	Changes in surface water quality	Risk of changes in water quality at Minhla and nearby streams after dam construction	After dam construction river flow regime is totally changed so that original surface water quality along the stream will be disrupted.	3	4	3	3	30	Moderate
BPC/2	Changes in groundwater quality	No significant potential pollution to ground water sources because of project site selection to avoid Karst / limestone area.	Due selection of project site to avoid limestone area (karst) for dam / weir construction there is no significance affect to natural groundwater quality.	3	4	2	2	18	Low
BPC/3	Changes to drainage patterns	Risk of drainage pattern changed due to operation of run off river dam	Risk of drainage pattern due to operation of run-off river dam / weir.	3	4	2	3	27	Moderate
BPC/4	Changes in rates of erosion and siltation	Risk of Soil erosion and siltation at upstream of dam	Siltation may be deposited flowing from upstream due to dam operation.	3	4	2	2	18	low
BPC/5	Changes to air quality	Potential gas emission from decayed plants at watershed area	Possible gas emission from decayed plants at watershed area	2	4	2	2	16	low
BPC/6	Changes to ambient noise levels	No significant change in Noise level	No significant change in noise levels	2	4	2	2	16	low
BPC/7	Changes to aquatic biota	Some disturbance to aquatic biota due to impounding of water	Some disturbance in aquatic biota due to impounding of water.	2	4	2	2	16	low
BPC/8	Changes to terrestrial biota	Impounding water upstream might affect terrestrial biota	Due to impounding of water, changes to terrestrial biota is expected at water shed area.	2	4	2	2	16	low

Ref.	Issue	Activities of project	Impact	E	D	M	P	SP	IS
BPC/9	Changes to disease vector populations	No significant Occupational health risk	Minor impacts only.	2	4	1	2	14	Very low
BPC/10	Changes to land cover	No further land cover change during operational phase	No further definite impact after construction phase.	2	4	1	2	14	Very low
BPC/11	Changes to areas of natural habitat	No further significant impact in project area	No further impact in project area after construction phase.	2	4	1	2	14	Very low
Socio-Economic & Cultural									
SEC/1	Changes involving loss of private assets	No potential impact	No impacts anticipated.	0	0	0	0	-	-
SEC/2	Changes involving loss of cultural heritage	No impact in operational phase.	No impact in operational phase.	0	0	0	0	-	-
SEC/3	Changes involving displacement of people	No potential social impact	No impacts anticipated.	0	0	0	0	-	-
SEC/4	Changes to local traffic patterns	No potential changes in traffic patterns	No potential changes in traffic pattern during operation phase	0	0	0	0	-	-
SEC/5	Changes to fisheries	Water, air, pollution may interfere with fish migration.	Some effect on fish migration.	3	4	2	3		low
SEC/6	Changes in local wage labour incomes/livelihood opportunities	Possibility of Increased income and livelihood opportunities due to the project.	Some increase in income and livelihood opportunities due to dam operation.	3	4	4	3	33	moderate
SEC/7	Changes in local trade/commercial incomes/opportunities	Possibility of Increased income and livelihood opportunities due to the project.	Some Increase in income and livelihood opportunities due to dam operation.	3	4	4	3	33	moderate
SEC/8	Changes in visual amenity	Enhanced infrastructure appears with natural landscape.	Enhance infrastructure appears with natural landscape.	3	4	4	3	33	moderate

Ref.	Issue	Activities of project	Impact	E	D	M	P	SP	IS
SEC/9	Changes to public infrastructure/community resources	Expected infrastructure development	Development infrastructure may be some beneficial impact of the project.	3	4	4	3	33	moderate
SEC/10	Social Support	Operation of hydropower project	The project proponent has CSR (Corporate Social Responsibility) initiative commitment to: 1) support matriculated students with job opportunities in the project activities 2) Daily wages employment for local inhabitants 3) conserve the entire project area for its biodiversity and build a eco-tourism site 4) provide a health clinic for local population 5) upgrade the existing primary school to higher primary school in nearby village These social activities will be budgeted from the 2% of net profit from the proposed project when implemented.						

6.2. ENVIRONMENTAL MITIGATION MEASURE

EMPs outline the mitigations, monitoring, and institutional measures to be taken during Project implementation and operation to avoid or control adverse environmental (and social) impacts and the actions needed to implement these measures. Priority measures that may be necessary in addition or as a focus of the EMP are listed below.

6.3. CONSTRUCTION PHASE MITIGATION MEASURE

6.3.1. Bio-Physical

BPC/1 Changes in surface water quality

- Minimize runoff by minimizing vegetation clearing activities.
- Put in place a set of procedures for the stockpiling and removal of waste materials (particularly liquid, hydrocarbon, and human wastes).
- Mobile equipment should be serviced off site.
- Sub-contractors should be penalized for incorrect disposal of waste.
- Water pollution control measures such as sewage treatment plants or enforcement of industrial regulations may be needed to improve reservoir water quality
- Selective forest clearing within the impoundment area should be completed before reservoir filling to mitigate poor water quality resulting from decay of flooded biomass.

BPC/2 Changes in groundwater quality

- Ensure toxic compounds are not located at water accumulation points.
- Chemically contaminated run-off should be intercepted and discharged where it will not leak to and contaminate groundwater.

BPC/3 Changes to drainage patterns

- Ensuring any alteration of drainage patterns does not increase the risk of localised flooding

BPC/4 Changes in rates of erosion and siltation

- Effectively implemented water shed management can minimize sedimentation and extend the reservoir's useful physical life by controlling road construction, mining, agriculture and other land use in the upper catchment area. For this reason, "protected areas" should be established in the upper catchments to reduce sediment flows into the reservoirs of the weirs, dams of the proposed project.
- Minimum clearing of vegetation in low fire risk areas
- Dispose of any spoil material away from water courses and stabilize appropriately
- New access roads should be sited in corridors that incur the least environmental and social damage. Forest and other environmentally sensitive areas along the selected road corridor should receive legal and physical protection.
- Road engineering should ensure drainage to protect waterways and minimize erosion. Environmental rules for contractors should cover construction camp siting, gravel extraction, waste disposal, water pollution, worker behavior (e.g. no hunting) and other good practices for construction.

BPC/5 Changes to air quality

- Ensure vehicle exhausts fully operational
- Water the construction roads to prevent excess dust
- Avoid burning vegetation or waste

BPC/6 Changes to ambient noise levels

- Ensure vehicle exhausts fully operational
- Avoid operating heavy machinery from 7pm to 7am
- Ensure material delivery between 7am and 7pm
- Route construction traffic away from residential areas / villages

BPC/7 Changes to aquatic biota

- No discharge of oil or chemicals in to surface water
- Managed water release may be needed for the survival of certain fish species in and below the reservoir. Fish passage facilities (fish ladders, elevators or trap, etc.) aim to help migratory fish move upriver past a dam / weir) ensuring downriver passage
- Fish hatcheries can be useful for maintaining populations of native species that can survive but not successfully reproduce within the reservoir. Also fish hatcheries are often used for stocking the reservoir with economically desired species; introducing non-native fish is not ecologically desirable because of the catastrophic effects on native species
- Fishing regulations are essential to maintain viable populations of commercially valuable species, especially in the waters immediately below a dam where migratory fish species concentrate in high numbers and are unnaturally easy to catch.
- Preserve existing stream ecosystem as far as possible without compromising construction or operational site safety

BPC/9 Changes to disease vector populations

- Store all food and organic waste in sealed containers
- Ensure regular refuse collection and disposal
- Avoid creating areas of standing water to discourage mosquito breeding
- Educate workforce on personal hygiene
- Provide sanitation facilities for construction workers on site

BPC/10 Changes to land cover

- Minimising vegetation clearance in areas not designated for operational use

BPC/11 Changes to areas of natural habitat

- Preserve existing flora and fauna as far as possible without compromising construction or operational site safety
- Power Lines should be sited to minimize concerns and built using good environmental practices. Where concentrations of vulnerable bird species exist, the top (grounding) wire should be made more visible with plastic devices

BPC/ 12 Change in Hydrology

- Estimating how helps water resource managers to judge how much water may be available for different uses, including in-stream uses, such the water needed by aquatic ecosystems, and power generation; as well as off-stream ones, such as irrigation and domestic water supply.

6.3.2. Socio-Economic

SEC/4 Changes to local traffic patterns

- Adherence to all speed limits for construction traffic
- Avoid road use at night and at peak times if possible
- Consider passing bays on single track roads
- Route construction traffic away from residential areas if possible

SEC/5 Changes in local wage labor incomes/livelihood opportunities

Benefit enhancement:

- Consider priority hiring of local labour

SEC/7 Changes in local trade/commercial incomes/opportunities

Benefit enhancement:

- Consider priority sourcing of goods and services from local suppliers

SEC/8 Changes in visual amenity

- Effective waste management plan
- Rehabilitation of disturbed areas. Strengthen ground protection and management
- Landscaping and replanting of trees at suitable areas for ecological quality to offset the natural area lost due to the project

SEC/9 Changes to public infrastructure/community resources

- Consider allowing community connections to utilities extended towards the project site

6.4. OPERATIONAL PHASE MITIGATION MEASURE

6.4.1. Bio-Physical

BPC/1 Changes in surface water quality

- Mobile equipment should be serviced off site.
- Establish sewerage facilities on site and enforcement of industrial regulations to improve reservoir water quality
- Prevent contaminated storm water running off the site.
- Ensure forest clearing within the impoundment area before reservoir filling to mitigate poor water quality resulting from decay of flooded biomass

BPC/2 Changes in groundwater quality

- Ensure toxic compounds are not located at water accumulation points.
- Chemically contaminated run-off should be intercepted and discharged where it will not leak to and contaminate groundwater.

BPC/3 Changes to drainage patterns

- Ensure drainage in access roads to protect waterways and minimize erosion
- Monitor run-off water from the turbine to be discharged back to the natural stream course

BPC/4 Changes in rates of erosion and siltation

- Minimize sedimentation by implementing watershed management by prohibiting mining, agriculture and other land use in the upper catchment area of the proposed project.
- Establish protected areas in the upper catchments of the weir and dams of the project.

BPC/5 Changes to air quality

- Ensure vehicle/ship exhausts fully operational
- Avoid burning vegetation or waste

BPC/6 Changes to ambient noise levels

- No mitigation required beyond adherence to the EMP

BPC/7 Changes to aquatic biota

- No discharge of oil or chemicals in to surface water
- Preserve existing riparian stands as far as possible without operational site safety
- Monitor the functioning of installed fish passage facilities (fish ladders, elevators or traps, etc.) and ensure protection of fish migration and survival of another aquatic biota is not hindered

BPC/9 Changes to disease vector populations

- Store all food and organic waste in sealed containers
- Ensure regular refuse collection and disposal
- Avoid creating areas of standing water to discourage mosquito breeding
- Educate workforce on personal hygiene
- Provide sanitation facilities for workers on site

BPC/10 Changes to land cover

- Manage protected areas of the project and replant trees at suitable places
- Landscaping work to aesthetic beauty at project premises

BPC/11 Changes to areas of natural habitat

- Monitor Power transmission lines especially their top (grounding) wire to be visible with plastic devices for preventing bird species being electrocuted especially in areas where concentrations of vulnerable species exist.
- Replanting of local tree species and vegetation in suitable areas for favorable natural biota habitation.

6.4.2. **Socio-Economic Impacts**

SEC/1 Changes involving loss of private assets

- No mitigation required

SEC/2 Changes involving loss of cultural heritage

- No mitigation required

SEC/3 Changes involving displacement of people

- No mitigation required

SEC/4 Changes to local traffic patterns

- Adherence to all speed limits for tanker traffic

- Avoid road use at night and at peak times if possible
- Consider passing bays on single track roads

SEC/5 Changes in local wage labor incomes/livelihood opportunities

Benefit enhancement:

- Consider priority hiring of local labour

SEC/7 Changes in local trade/commercial incomes/opportunities

Benefit enhancement:

- Consider priority sourcing of goods and services from local suppliers

SEC/8 Changes in visual amenity

- Effective waste management plan
- Landscaping and replanting of trees at suitable places

SEC/9 Changes to public infrastructure/community resources

- Consider allowing community connections to utilities extended towards the project site

SEC/10 Social Support

The project proponent has CSR (Corporate Social Responsibility) initiative commitment to:

1) support matriculated students with job opportunities in the project activities

2) Daily wages employment for local inhabitants

3) conserve the entire project area for its biodiversity and build a eco-tourism site

4) provide a health clinic for local population

5) upgrade the existing primary school to higher primary school in nearby village

These social activities will be budgeted from the 2% of net profit from the proposed project when implemented.

6.5. RECOMMENDATION AND MITIGATION MEASURE OF FLORA

- To take some measure to reduce fire-wood collection. As an example, the local communities should be encouraged to use less fire-wood consumption stove by supplying less fireweed consumption stove to every families.
- To establish a plan for teak plantation and reforestation
- To take measure to restore forest law and order in the whole area.
- To take some measure to mountain the natural water resource so that the hydropower plants are sustained.
- To sustain a plant to maintain the wetlands in the area so as to keep study discharge of water into the creeks.

6.5.1. Immediate Compensatory Measure

There is a responsibility to the investor who utilizes the natural resource of the area. These responsibilities are to conserve the environment and to develop the socio-economy of the local peoples. These should be carried out by following prioritized action.

- Prioritized Action I

Create and implement a plan to reforest the whole area especially the bare hills in the area. The investor is responsible for arising fund as “Conservation Fund”. Approximately 0.5% of annual proceeds from the sale of electricity will full-fill the fund annually.

This fund should be managed by local forest department and representative of the company.

- Prioritized Action II

Create and implement the socio-economic development of the local people. This is done by socially responsible ethic of the investor. On this regard, the investor should raise a fund named “Socio-economic Development Fund” as benefit sharing to local people. This fund should be managed by local representatives and financial department of the company. Approximately 0.5% of annual proceeds from sale of electricity will fulfill the fund annually.

6.6. IMPACTS AND MITIGATION MEASURE ON THE FAUNA SPECIES

There are no local hunters who totally rely on the hunting for their livelihoods. There is definitely habitat fragmentation and habitat destruction for all kinds of species, fishes, herpets, birds, mammals, and insects and Arachnida. Erosion can decrease the quality of waters in the streams and lakes that affect on the fish. Sweeping all plants in the project area is driving out all amphibians, reptiles, birds, mammals, and insects away and killed all terrestrial, arboreal and fossoreal species. The species breathing air living outside the project area can face with breathing problem due to the spread of dusts and other aerosols in the air. Conclusively, the possible impacts,

- **Hunting impacts**

  It affects bird living on both direct and indirect zones by hunting

- **Forest fire**

  All species will be killed except birds will be sweeping out

- **Habitat loss, changes and fragmentation**

  Affect on fauna inhabiting in the project area

- **Deforestation due to logging:**

  Direct impacts on the foraging and roosting

- **Noise- Construction and Traffic**

  Direct affect on the breeding and roosting

6.6.1. Mitigation measures

1. Regrow the plants around the project area that can reduce the soil erosion and air pollution
2. Avoid the changes of land scaping
3. Control the spread of the dusts from the project area
4. Stop the bird hunting

6.6.2. Discussion on Funa

Limestone area is fragile habitats that have many holes and poles in the underground. It cannot maintain the ground water If surface of the ground is made to be holes. No plants can grow in the limestone area and all animals including herbivores, insectivores depending on the plants directly and indirectly cannot survive. Originally, this area is assumed to be high diversity area in the past. However large mammals have been disappeared first, it may be due to several causes, anthropogenic impacts by hunting for their income.

The following species of conservation concern are associated with caves, karst and limestone habitat, in Devon. Species marked (p) are priority UK BAP species and as such have full national action plans prepared. Species marked (c) are on the UK Steering Group Report list of species of conservation concern.

6.7. CUMULATIVE IMPACTS

By implementation of Minhla Hydropower Project, it is expected to get electricity supply to the Naung Cho Township in the vicinity of the project. By this Project, the living standard of the people will become significantly high. Better road conditions will give much support to health and education of the people in the area. The people of the area could also gain knowledge and job opportunities due to the Minhla Hydropower Project.

Although Minhla water was used for hydropower generation, environmental flow is not affected due to constructing weir. The main negative impact in the area will be deforestation. Deforestation occurs not only due to Hydropower Projects but mainly due to legal and illegal logging in the area. The deforestation will make great cumulative impacts on the environment of the area.

CHAPTER 7
ENVIRONMENTAL MANAGEMENT PLAN

7.1. OBJECTIVE

An Environment Management Plan (EMP) is a framework that helps an organization achieves its environmental goals through consistent review, evaluation, and improvement of its environmental performance. The assumption is that this consistent review and evaluation will identify opportunities for improving and implementing the environmental performance of the organization. The EMS itself does not dictate a level of environmental performance that must be achieved; each organizations EMS is tailored to its own individual objectives and targets.

An EMS encourages an organization to continuously improve its environmental performance. The system follows a repeating cycle Figure 7-1. The organization first commits to an environmental policy, then uses its policy as a basis for establishing a plan, which sets objectives and targets for improving environmental performance. The next step is implementation. After that, the organization evaluates its environmental performance to see whether the objectives and targets are being met. If targets are not being met, corrective action is taken. The results of this evaluation are then reviewed by top management to see if the EMP is working. Management revisits the environmental policy and sets new targets in a revised plan. The company then implements the revised plan. The cycle repeats, and continuous improvement occurs.

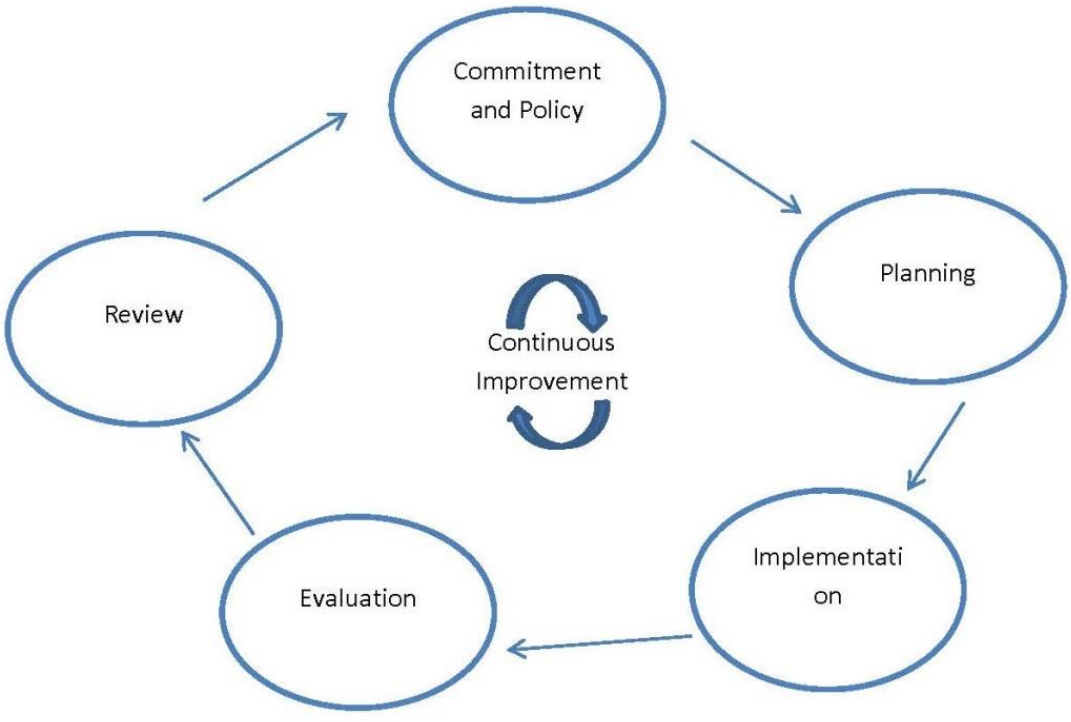


Figure 7-1 Continuous Improvement Circle

- **Commitment and Policy** – Top management commits to environmental improvement and establishes of the organization environmental policy. The policy is the foundation of the EMS.

- **Planning** – An organization first identifies environmental aspects of its operations. Environmental aspects are those items, such as air pollutants or hazardous waste that can have negative impacts on people and the environment. An organization then determines which aspects are significant by choosing criteria considered most important by the organization. For example, an organization may choose worker health and safety, environmental compliance, and cost as its criteria. Once significant environmental aspects are determined, an organization sets objectives and targets. An objective is an overall environmental goal (e.g., minimize use of chemical X). A target is a detailed, quantified requirement that arises from the objectives (e.g., reduce use of chemical X by 25% by September 1998). The final part of the planning stage is devising an action plan for meeting the targets. This includes designating responsibilities, establishing a schedule, and outlining clearly defined steps to meet the targets.
- **Implementation** – An organization follows through with the action plan using the necessary resources (human, financial, etc.). An important component is employee training and awareness for all employees. Other steps in the implementation stage include documentation, following operating procedures, and setting up internal and external communication lines.
- **Evaluation** – A company monitors its operations to evaluate whether targets are being met. If not, the company takes corrective action.
- **Review** – Top management reviews the results of the evaluation to see if the EMS is working. Management determines whether the original environmental policy is consistent with the organization's values. The plan revised to optimize the effectiveness of the EMS. The review stage creates a loop of continuous improvement for a company.

7.2. EMP ORGANIZATION

This section defines the organization set up by the EMP for the proponent and the Construction Contractors for the implementation of the EMP and the roles and responsibilities devoted to each position involved in the process. General organization is presented in the following Figure 7-2: Three levels of organization, fully complementary, are set-up by the EMP.

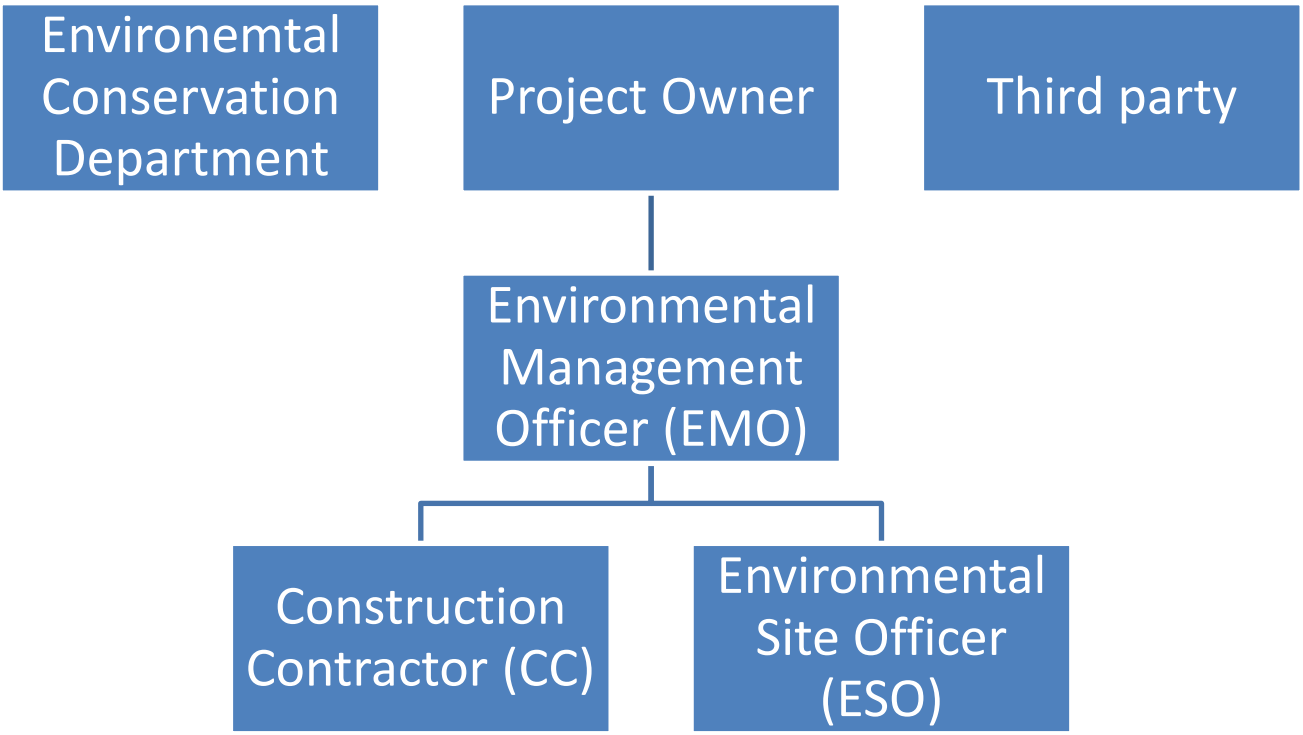


Figure 7-2 Organization chart of EMP

7.2.1. Roles & Responsibilities

The organization should be responsible for monitoring, reviewing and verifying compliance with the EMP by the Construction Contractor. The ESO should also ensure compliance (as per the construction contractor). The EMO's duties in this regard, and working with the CE, who will have day-to-day interaction through supervisory staff, should include the following:

- Ordering the removal of person(s) and/or equipment not complying with the specifications;
- Verifying Environmental Compliance
- The issuing of penalties for contraventions of the EMP;
- Taking decisions in case of severe non-compliances to the EMP are detected;
- Providing input for on-going internal review of the EMP
- Stopping works in case of emergency or if significant environment impacts are apparent or imminent.

The EMO ensures the CC has all plans, procedures, approvals, and documentation in place to ensure EMP compliance prior to commencement of any work. The EMO's duties here include the following:

- Supervising updating and maintenance of the EMP;
- Monitoring and verifying that the EMP is adhered to at all times and taking action if the specifications are not followed;
- Monitoring and verifying that environmental impacts are kept to a minimum
- Sampling sites and surrounding areas regularly with regard to compliance with the EMP;
- Recommending to stop work in emergencies or if significant environmental impacts are apparent or imminent;
- Preparing the background information for the Reports

- Participating, upon request in meetings with the environmental authorities as requested.

7.2.2. **ESO Roles & Responsibilities**

The ESO(s) has the principal responsibility for observing construction activities and ensuring that those activities are in compliance with the EMP requirements. To accomplish this, each ESO should be familiar with the EMP and contract specifications.

The specific responsibilities of the ESO are to:

1. Monitor implementation of environmental measures by CC construction staff against contractual obligations by:
2. Performing regular monitoring activities;
3. Detecting non-conformance and approving corrective action (with advice from EMO if necessary)
4. Evaluating CC environmental efforts and effectiveness; and
5. Identifying circumstance requiring management decisions to evaluate variance or compliance issues.
6. Compile documentation of monitoring observations by:

Collecting any specific date that the ESO is assigned to monitor;

- Interface with EO to assist in field interpretation of environmental requirements, provide advice regarding corrective actions and resolving non-compliance situations, and issue specific formal instructions to the CC workforce;
- Interface with CC manager to help communicate requirements, obtain a hands-on view of special problems so that implementation difficulties can be communicated to the EMO to aid in problem resolution especially in situations where adjustment of compliance requirements may be necessary;
- Communicate to EMO by:

Interaction with EMO as needed to define corrective action recommendation for any identified non-compliance situation.

- Implementation for environmental controls and measures specified in the EMP, Sub-Plans.
- Ensuring measures to protect project staff health are implemented.

7.3. SITE SPECIFIC ENVIRONMENTAL MANAGEMENT PLAN

The following section presents environmental management plans specified for the project to be implemented in two years. As it was mentioned above, the Minhla SHP was examined and included in the ESIA report prepared in June 2013. The specific project environmental impact categories and mitigation recommendations were identified during site visits completed by the team of Environmentalist in August 2013. The proposed mitigation measures are in line with common recommendations outlined in the ESIA.

The Minhla Small Hydro Power (SHP) is the first level of the hydro power plant located on Hsapyedoe, Myaethonebone, Banbwekyin, Minhla Stream, in the Naungcho district of the Shan State in Myanmar.

The construction of the Minhla SHP started in 2014. The project plans to install the 10,000 kW generation capacities.

The project envisages the construction of a low head diversion dams and weirs, the intakes, and power canals, silt tanks, pondages, forebays, penstocks, powerhouses, tailraces, hydro-mechanical units and electric equipment.

Civil works associated with the full-scale construction of the above structures include the following activities:

- De-watering the intake pool using gabions or soil embankments. This action will allow drying of the section of the weir for the construction works;
- Removing debris from the de-watered section;
- On-site concrete mixing, forming; and gravel preparation; stone masonry work;
- Constructing wooden forms for concrete and adding steel bars as required by the design;
- Removing wooden forms after concrete is dry and set;
- Testing the concrete using special testing equipment;
- Rehabilitating the intake and emergency spillway gates;
- Collecting and disposing all debris, construction waste, and scrap remaining construction materials in designated disposal sites.

The above-listed works shall be completed within the targeted timeframe. This measure will assure that, in the event of flooding, the system will be able to absorb and divert the flood flow.

When all construction works are completed, the entire hydro system will be re-watered and monitored for a period of time specified in the design to identify and repair leaks.

- Installation of electrical equipment: The Minhla SHP project envisages the installation of new power distribution and control panels. The following works are planned to be conducted:
- Installing a thermo control system on both turbine bearings; flywheel, governor, draft tube and base plate;
- Installing wiring;
- Installing control and automation systems;
- Installing transformers, feeders, bus bars, transmission poles, and power lines;
- Securing the territory of the powerhouse with proper fencing and safety signs indicating types of potential hazards;
- Equipping the settling basin and tailrace with safety handrails or netting fences;
- Posting high voltage signs to indicate a threat of electrocution in the powerhouse and on the powerhouse and switch yards.

Table 7-1 Environmental Management Plan for Construction Phase

Ref.	Categories	Project activities	Impact	Mitigation measure	Frequency	Type of Check	Responsible member	Estimate Cost (MMK)
BPC/1	Changes in surface water quality	Soil excavation works affects the surface water quality	Significance mostly in direct impact area during construction period. Higher turbidity due to breaking of ground.	• Minimize runoff by minimizing vegetation clearing activities. • Put in place a set of procedures for the stockpiling and removal of waste materials (particularly liquid, hydrocarbon, and human wastes). • Mobile equipment should be serviced off site. • Sub-contractors should be penalized for incorrect disposal of waste. • Water pollution control measures such as sewage treatment plants or enforcement of industrial regulations may be needed to improve reservoir water quality • Selective forest clearing within the impoundment area should be completed before reservoir filling to mitigate poor water quality resulting from decay of flooded biomass.	Monthly	Regular	Construction contractor or Hydropower and solar energy development co., ltd.	1,000,000 Kyats
BPC/2	Changes in groundwater quality	Risk of disturbance to underground water resources due to dam / weir construction	Selection of project site is avoiding limestone area and good geological soil condition for dam	Ensure toxic compounds are not located at water accumulation points. Chemically contaminated run-off should be intercepted and discharged where it will not leak to and contaminate groundwater.	Monthly	Regular	Construction contractor or Hydropower and solar energy development co., ltd.	200,000 Kyats

Ref.	Categories	Project activities	Impact	Mitigation measure	Frequency	Type of Check	Responsible member	Estimate Cost (MMK)
			construction, so negligible impact by pollutants into the ground water.					
BPC/3	Changes to drainage patterns	Alteration of the natural drainage system due to dam construction	Alteration of the natural drainage system	Ensuring any alteration of drainage patterns does not increase the risk of localised flooding	Biannual	Regular	Construction contractor or Hydropower and solar energy development co., ltd.	300,000 kyats
BPC/4	Changes in rates of erosion and siltation	Significant erosion and siltation due to soil excavation works	Significant erosion and siltation due to soil excavation works	Effectively implemented water shed management can minimize sedimentation and extend the reservoir's useful physical life by controlling road construction, mining, agriculture and other land use in the upper catchment area. For this reason, "protected areas" should be established in the upper catchments to reduce sediment flows into the reservoirs of the weirs, dams of the proposed project. Minimum clearing of vegetation in low fire risk areas Dispose of any spoil material away from water courses and stabilize appropriately New access roads should be sited in corridors that incur the least environmental and social damage. Forest and other environmentally	Biannual	Regular	Construction contractor or Hydropower and solar energy development co., ltd.	200,000 kyats

Ref.	Categories	Project activities	Impact	Mitigation measure	Frequency	Type of Check	Responsible member	Estimate Cost (MMK)
				sensitive areas along the selected road corridor should receive legal and physical protection. Road engineering should ensure drainage to protect waterways and minimize erosion. Environmental rules for contractors should cover construction camp siting, gravel extraction, waste disposal, water pollution, worker behavior (e.g. no hunting) and other good practices for construction.				
BPC/5	Changes to air quality	Air quality will be changed because of dust, particulate matter during construction works	Air quality will be impacted through dust and particulate matter during construction work	• Ensure vehicle exhausts fully operational • Water the construction roads to prevent excess dust • Avoid burning vegetation or waste	Annual	Regular	Construction contractor or Hydropower and solar energy development co., ltd.	1,500,000 Kyats
BPC/6	Changes to ambient noise levels	Noise levels will be significant during construction disturbing the biota in the environment	Noise levels will be affected by construction machinery etc.	Ensure vehicle exhausts fully operational Avoid operating heavy machinery from 7pm to 7am Ensure material delivery between 7am and 7pm Route construction traffic away from residential areas / villages	Biannual	Regular	Construction contractor or Hydropower and solar energy development co., ltd.	600,000 Kyats
BPC/7	Changes to aquatic/terrestrial biota	Significant changes expected in	Due to construction works	No discharge of oil or chemicals in to surface water	Annual	Regular	Construction contractor or Hydropower	

Ref.	Categories	Project activities	Impact	Mitigation measure	Frequency	Type of Check	Responsible member	Estimate Cost (MMK)
		terrestrial biota and habitation due to excavation of soil masses	terrestrial ecosystem may be changed.	Managed water release may be needed for the survival of certain fish species in and below the reservoir. Fish passage facilities (fish ladders, elevators or trap, etc.) aim to help migratory fish move upriver past a dam / weir) ensuring downriver passage Fish hatcheries can be useful for maintaining populations of native species that can survive but not successfully reproduce within the reservoir. Also, fish hatcheries are often used for stocking the reservoir with economically desired species; introducing non-native fish is not ecologically desirable because of the catastrophic effects on native species Fishing regulations are essential to maintain viable populations of commercially valuable species, especially in the waters immediately below a dam where migratory fish species concentrate in high numbers and are unnaturally easy to catch. Preserve existing stream ecosystem as far as possible without compromising construction or operational site safety			and solar energy development co., ltd.	
BPC/8	Changes to disease vector populations	Health risk to construction laborers during construction	During construction there might be some health risk to	Store all food and organic waste in sealed containers Ensure regular refuse collection and disposal	Monthly	Regular	Construction contractor or Hydropower and solar energy	500,000 Kyats

Ref.	Categories	Project activities	Impact	Mitigation measure	Frequency	Type of Check	Responsible member	Estimate Cost (MMK)
		period (water borne / dust)	construction laborer.	Avoid creating areas of standing water to discourage mosquito breeding Educate workforce on personal hygiene Provide sanitation facilities for construction workers on site			development co., ltd.	
BPC/9	Changes to land cover	Significant change in land cover due to excavation works	Original land cover will be totally changed.	Minimising vegetation clearance in areas not designated for operational use	Annual	Regular	Construction contractor or Hydropower and solar energy development co., ltd.	20,000,000 Kyats
BPC/10	Changes to areas of natural habitat	Due to the changes in vegetation in land and water, natural habitat may change to a certain extent	Natural Habitat may change to a certain extent.	Preserve existing flora and fauna as far as possible without compromising construction or operational site safety Power Lines should be sited to minimize concerns and built using good environmental practices. Where concentrations of vulnerable bird species exist, the top (grounding) wire should be made more visible with plastic devices	Annual	Regular	Construction contractor or Hydropower and solar energy development co., ltd.	5,000,000 Kyats
BPC/12	Change in Hydrology	Movement of water in the natural environment over time	Changes in how also cause water level changes, which have direct implications for agricultural	Estimating the how helps water resource managers to judge how much water may be available for different uses, including in-stream uses, such the water needed by aquatic ecosystems, and power generation; as well as off-stream	Annual	Regular	Construction contractor or Hydropower and solar energy development co., ltd.	1,000,000 Kyats

Ref.	Categories	Project activities	Impact	Mitigation measure	Frequency	Type of Check	Responsible member	Estimate Cost (MMK)
			production, navigation, infrastructure, human safety and ecosystems.	ones, such as irrigation and domestic water supply.				
SEC/4	Changes to local traffic patterns	may change traffic pattern to a certain extent.	Simultaneous construction works may change traffic pattern to a certain extent.	Adherence to all speed limits for construction traffic Avoid road use at night and at peak times if possible Consider passing bays on single track roads Route construction traffic away from residential areas if possible	Monthly	Regular	Construction contractor or Hydropower and solar energy development co., ltd.	200,000 Kyats
SEC/7	Changes in visual amenity	No significant amenity to vision during construction period; disturbed soil appears instead of natural beauty of landscape.	Some changes due to vegetation clearance etc.	Effective waste management plan Rehabilitation of disturbed areas. Strengthen ground protection and management Landscaping and replanting of trees at suitable areas for ecological quality to offset the natural area lost due to the project	Monthly	Regular	Construction contractor or Hydropower and solar energy development co., ltd.	2,000,000 Kyats

Table 7-2 Operation phase

Ref.	Issue	Activities of project	Impact	Mitigation Measure	Responsible member	Type of check	Frequency	Estimate Cost (MMK)
BPC /1	Changes in surface water quality	Risk of changes in water quality at Minhla and nearby streams after dam construction	After dam construction river flow regime is totally changed so that original surface water quality along the stream will be disrupted.	Mobile equipment should be serviced off site. Establish sewerage facilities on site and enforcement of industrial regulations to improve reservoir water quality Prevent contaminated storm water running off the site. Ensure forest clearing within the impoundment area before reservoir filling to mitigate poor water quality resulting from decay of flooded biomass	ESO of Hydropower and solar energy development co., ltd.	Regular Check	Monthly	1,000,000 Kyats

Ref.	Issue	Activities of project	Impact	Mitigation Measure	Responsible member	Type of check	Frequency	Estimate Cost (MMK)
BPC /2	Changes in groundwater quality	No significant potential pollution to ground water sources because of project site selection to avoid Karst / limestone area.	Due selection of project site to avoid limestone area (karst) for dam / weir construction there is no significance affect to natural groundwater quality.	Ensure toxic compounds are not located at water accumulation points. Chemically contaminated run-off should be intercepted and discharged where it will not leak to and contaminate groundwater.	ESO of Hydropower and solar energy development co., ltd.	Regular Check	Monthly	200,000 Kyats
BPC /3	Changes to drainage patterns	Risk of drainage pattern changed due to operation of run off river dam	Risk of drainage pattern due to operation of run-off river dam / weir.	Ensure drainage in access roads to protect waterways and minimize erosion Monitor run-off water from the turbine to be discharged back to the natural stream course	ESO of Hydropower and solar energy development co., ltd.	Regular Check	Monthly	300,000 Kyats
BPC /4	Changes in rates of erosion and siltation	Risk of Soil erosion and siltation at upstream of dam	Siltation may be deposited flowing from upstream due to dam operation.	Minimize sedimentation by implementing	ESO of Hydropower and solar energy	Regular Check	Monthly	200,000 Kyats

Ref.	Issue	Activities of project	Impact	Mitigation Measure	Responsible member	Type of check	Frequency	Estimate Cost (MMK)
				watershed management by prohibiting mining, agriculture and other land use in the upper catchment area of the proposed project. Establish protected areas in the upper catchments of the weir and dams of the project.	development co., ltd.			
BPC /5	Changes to air quality	Potential gas emission from decayed plants at watershed area	Possible gas emission from decayed plants at watershed area	Ensure vehicle/ship exhausts fully operational Avoid burning vegetation or waste	ESO of Hydropower and solar energy development co., ltd.	Regular Check	Monthly	1,500,000 Kyats
BPC /7	Changes to aquatic/terrestrial biota	Some disturbance to aquatic biota due to impounding of water	Some disturbance in aquatic biota due to impounding of water.	No discharge of oil or chemicals in to surface water Preserve existing riparian stands as far as possible	ESO of Hydropower and solar energy development co., ltd.	Regular Check	Monthly	2,000,000 Kyats

Ref.	Issue	Activities of project	Impact	Mitigation Measure	Responsible member	Type of check	Frequency	Estimate Cost (MMK)
				without operational site safety Monitor the functioning of installed fish passage facilities (fish ladders, elevators or traps, etc.) and ensure protection of fish migration and survival of another aquatic biota is not hindered				

7.4. ENVIRONMENTAL MONITORING AND REPORTING

7.4.1. The environmental monitoring cell members responsible may conduct daily, weekly, or monthly general inspections of the project area and facilities. The objectives are to identify non-compliances to EMP. Construction phase:

The Contractor must be responsible for implementation of environmental mitigation measures included in the bidding documents and the budget for implementation is included in the construction contract. Before commencing the construction, the contractor will review and update existing data on relevant baseline environmental condition, particularly at locations expected to be affected by the construction.

Table 7-3 and Table 7-4 are mentioning the environmental monitoring schedule for Minhla Hydropower Project.

7.4.2. Construction phase:

The Contractor must be responsible for implementation of environmental mitigation measures included in the bidding documents and the budget for implementation is included in the construction contract. Before commencing the construction, the contractor will review and update existing data on relevant baseline environmental condition, particularly at locations expected to be affected by the construction.

Table 7-3 Environmental monitoring schedule for construction phase

Monitoring Parameters	Monitoring Indicator	Monitoring Location	Monitoring Method	Monitoring Frequency	Monitoring Responsibility	Monitoring Cost (MMK)
Air quality	TSP, PM 10 & PM 2.5	Main dam and reregulating site, Powerhouse site	NEQG, Air quality standard	Two times a year during dry and wet seasons (24 hrs sampling)	Construction contractor or Hydropower and solar energy development co., ltd.	800,000 (one station, one time)
Water quality	Temperature, Conductivity pH, DO, Turbidity, BOD, COD, TDS, SS, Total hardness, Oil & grease, Manganese, Arsenic, Mercury	Upstream Dam and downstream of the main and reregulating dams	NEQG water quality standard	Two times a year for the remaining of construction phase	Construction contractor or Hydropower and solar energy development co., ltd.	500,000 (one station, one time)
Noise level	dBA	Main dam, reregulating dam & power house site	NEQG sound level standard	Two time a year or during construction activities (24 hrs sampling)	Construction contractor or Hydropower and solar energy development co., ltd.	2,000,000
Faunal and floral diversity	Status of faunal and floral diversity	All remaining forest after forest clearance	Field survey	Two time a year during the construction phase	Construction contractor or Hydropower and solar energy development co., ltd.	1,000,000/ sampling session

Monitoring Parameters	Monitoring Indicator	Monitoring Location	Monitoring Method	Monitoring Frequency	Monitoring Responsibility	Monitoring Cost (MMK)
Aquatic ecology	Fish types available	Monitoring locations as per Baseline survey EIA report	Field survey	Two time a year during the construction phase	Construction contractor or Hydropower and solar energy development co., ltd.	1,000,000/ sampling session
Public and Occupational Health (Ambulance, medical doctor, first aid, PPE)	Outbreak of epidemic disease in the village, in the construction camps, Number of workers reporting sickness, no of workers injured, Number of construction accident, Number of fatal incidents etc.	All surrounding villages, construction camps	Direct observation, consultation with local people/communities and health workers, managers of camps and construction workforce, health care facilities of the construction camps and sites	Every month throughout the project construction phase	Construction contractor or Hydropower and solar energy development co., ltd.	150,000/month
Sanitation	Toilets, Practice of sanitation, solid waste disposal,	Dam site, Camp site, Internal access road and ancillary facility sits	Field survey and documentation, Photographs	Monthly basis, throughout construction phase	Construction contractor or Hydropower and solar energy development co., ltd.	Including construction budget

7.4.3. Operational phase:

During the operation and maintenance phase, the Proponent / Owner shall maintain budget for implementation of mitigation measures and environmental monitoring as well as for capacity strengthening and staff salary.

Table 7-4 Environmental monitoring schedule for operation phase

Monitoring Parameters	Monitoring Indicator	Monitoring Location	Monitoring Method	Monitoring Frequency	Monitoring Responsibility	Monitoring Cost (MMK)
Mitigation Measures	All mitigation actions listed in EMP and Environmental Mitigation management for operation phase	All structural sites and facility sites and their surroundings	Direct supervision and documentation	Yearly (3 years after operation)	Hydropower and solar energy development co., ltd.	Including EMP budget
Air quality	TSP, PM 10 and PM 2.5	Dam site	NEQG, Air quality standard	Two times a year during dry and wet seasons (24 hrs sampling)	Hydropower and solar energy development co., ltd.	800,000 (one station, one time)
Water quality in stream	Temperature, Conductivity pH, DO, Turbidity, BOD, COD, TDS, SS, Total hardness, Oil & grease, Manganese, Arsenic, Mercury	Upstream dam and downstream tailrace	NEQG water quality standard	Two times a year for the remaining of construction phase	Hydropower and solar energy development co., ltd.	500,000 (one station, one time)
Aquatic ecology	Fish types available	Upstream dam and downstream tailrace	Field survey	Two time a year	Hydropower and solar energy development co., ltd.	1,000,000/ sampling session

Monitoring Parameters	Monitoring Indicator	Monitoring Location	Monitoring Method	Monitoring Frequency	Monitoring Responsibility	Monitoring Cost (MMK)
Sanitation	Toilet, solid waste disposal	Dam site, powerhouse site, camp sites and internal access	Field survey and documentation, Photographs	Monthly	Hydropower and solar energy development co., ltd.	Including operation budget

7.5. MONITORING REPORTS

Two types of monitoring reports will be generated in the environmental monitoring and site inspections. The first type is generated for internal use to provide feedback to the EMO. The second type is report generated for submission to environmental conservation department (ECD) not less frequently than every six (6) months, as provided in a schedule of environmental monitoring plan.

7.6. TRAINING AND AWARENESS

Each CC must ensure that its employees are adequately trained in the requirements of the EMP; environmental legal requirements and other obligations. All employees should have an induction presentation on environmental awareness, to be conducted in the language relevant to the employee.

- Three levels of training should be implemented:
- General Environmental Awareness programmed to all workers employed by the Construction Contractor or its Sub-contractors, raising environmental issues related to general issues as environmental conservation, waste management, health, hygiene and safety, social behavior in camps, cultural resources protection;
- Health and Safety Awareness programmed;
- Job Specific Environmental Training of workers affected to particularly sensitive environmental activities such as vehicle maintenance, waste management, pesticides management, refueling operations, etc.
- Training should be conducted through short, focused and systematic site seminars / meetings.

7.6.1. Environmental Awareness Programmed

This training programmed should be presented to all construction workers on commencement of their work, and include:

- Worker's obligation regarding basic environmental and social protection measures;
- General measures to follow throughout the construction period, such as the prohibitions on gathering and harvesting valued plants and trees, etc.
- Housecleaning and waste management in worker camps, in construction sites, along roads, nearby villages;
- Pollution control during construction activities;
- Ban of all kinds of narcotic drugs for all employee of the CC
- Attending works while under the influence of alcohol
- Measures for preserving health and the dissemination of vectors and transmissible diseases, including basics on hygiene;
- Disciplinary consequences for violation of the measures presented as part of the Environmental awareness Programmed. The consequences should be important to add accountability to the EMP;
- The preparation of posters in the relevant language to be posted wherever justified and practical: camps entrance, buildings, toilet entrances, etc.

7.6.2. Health & Safety Awareness Programme

General Occupational Health and Safety issues should be addressed under the implementation of the contractor. The issues addressed under the present awareness programme should complement those in the occupational health and safety.

7.7. EMERGENCY / INCIDENT RESPONSE PROCEDURES

The Project should develop emergency or incident response procedures during construction and operation.

The construction phase should ensure:

i. Emergency Response Team (ERT) of the Construction Contractor as initial responder;
ii. The District and City fire and police departments, emergency medical service, the Department of Public Health (DPH), Port Authority, etc. collectively referred to as the External Emergency Response Team (EERT), as ultimate responders.

The Contractor will provide and sustain the required technical, human and financial resources for quick response during construction.

Table 7-5 Roles and Responsibilities in Emergency / Incident Response

Entity	Responsibilities
Contractor Team (ERT)	Communicates / alerts the EERT. Prepares the emergency site to facilitate the response action of the EERT, e.g., vacating, clearing, restricting site. When necessary & requested by the EERT, lends support / provides assistance during EERT's response operations
External Emergency Response Team (EERT)	Solves the emergency / incident
Contractor Resources	Provide and sustain the people, equipment, tools & funds necessary to ensure Project's quick response to emergency situations. Maintain good communication lines with the EERT to ensure prompt help response & adequate protection, by keeping them informed of Project progress.

7.8. RESETTLEMENT BUDGET AND FINANCING PLAN:

MinHla hydropower plans to procure 100 acres of Government barren land for the project. The project would not result in physical and displacement as these lands are all barren and vacant. For any involuntary resettlement impacts resulting from the use of private land for the construction of transmission line towers which will require of land, has adopted the Resettlement.

1. The ROW and tower locations will be screened for involuntary resettlement impacts and any use or acquisition of private land will follow the principles in the Resettlement Framework
2. Procedure for damage tree compensation is in place with standard format.
3. In case of land used for the establishment of transmission line towers and to be possessed by H & S with mutual and voluntary consent of the affected people, compensation will be paid on estimated market price as decided by the revenue department (District Collector)/ competent authority. If there is a difference between the replacement value and the price decided by the

District Collector, H & S will pay as resettlement assistance. Any fees, taxes, and other related charges will be borne by H & S.

4. Additionally, the budget includes costs relating to the hiring of the staff, coordination, site visits by the expert and other logistic support for the disbursement of compensation. H & S will ensure that the budget outlined in the assessment should be kept ready in advance for the timely payment of compensation. The tentative budget has been calculated and is given in Table 7-6.

Table 7-6 Resettlement budget

Item	Estimate Amount (MMK)
Compensation of loss trees	9,000 / small tree 25,000 / medium tree
Provision for unanticipated impact due to construction of transmission lines towers	100,000 / Transmission lines tower

7.9. GRIEVANCE REDRESS MECHANISM (GRM)

People who live near the project affected area or stakeholders can complain respect with the potential problems and impacts that they are suffering; they can complain though Grievance Committee, which includes the responsible persons of Hydropower and Solar Energy Development Company Limited and General Administration Department of Naung Cho Township. Small issues will be solved at the Grievance Committee stage and other unsolved problems will be submitted to higher responsible authorities and finally the responsible person decided by the court in legal terms. The following diagram (Figure 7-3) show steps of Grievance Redress Mechanism of Proposed Project.

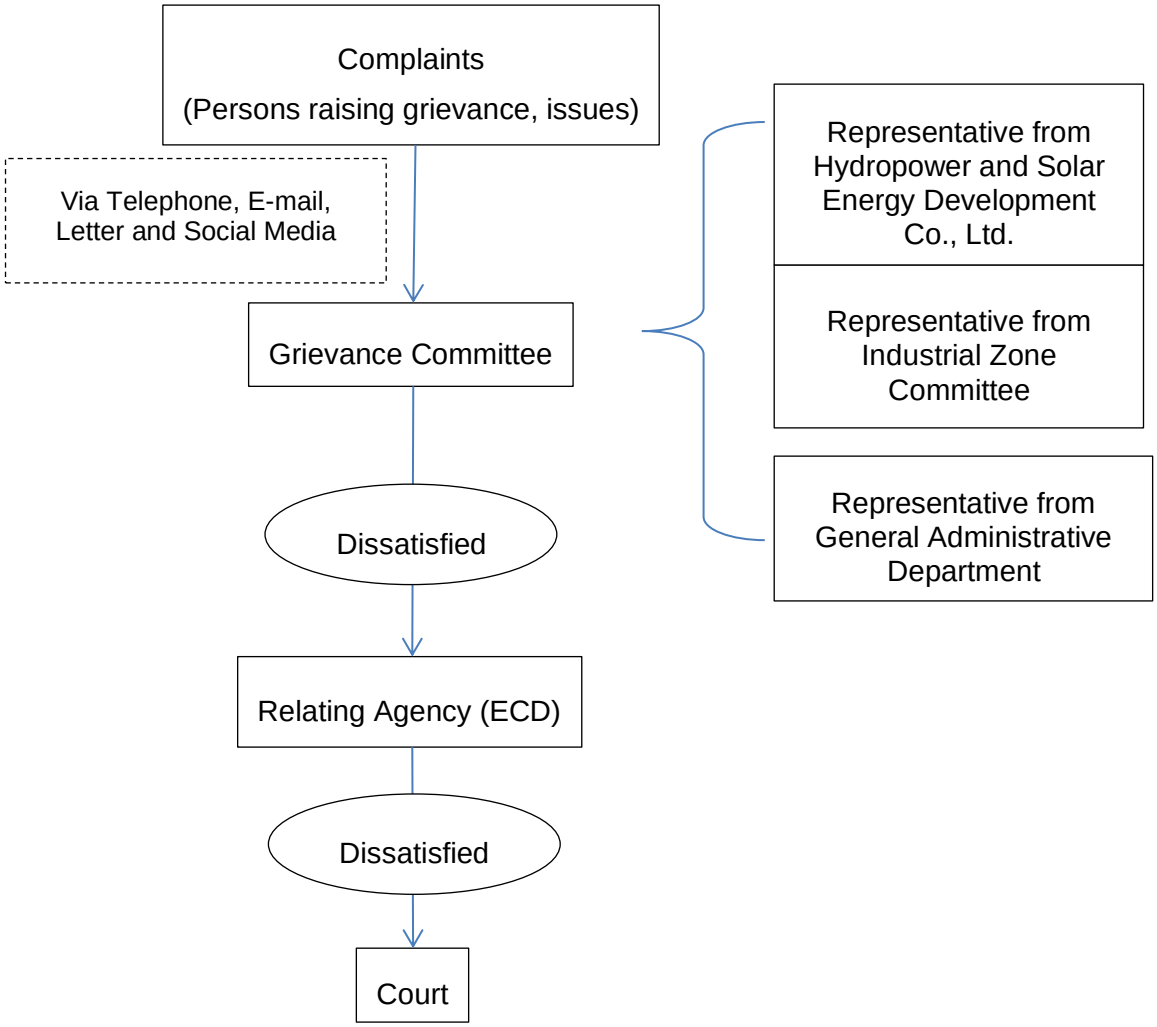


Figure 7-3 Grievance Redress Mechanism flow diagram

7.10. CORPORATE SOCIAL RESPONSIBILITY (CSR) PLAN

The project proponent has CSR (Corporate Social Responsibility) initiative commitment to:

1) support matriculated students with job opportunities in the project activities
2) Daily wages employment for local inhabitants
3) conserve the entire project area for its biodiversity and build a eco-tourism site
4) provide a health clinic for local population
5) upgrade the existing primary school to higher primary school in nearby village

These social activities will be budgeted from the 2% of net profit from the proposed project when implemented.

Along with EMP, Corporate Social Responsibility (CSR) Plan is also formulated to be implemented by H & S during the 50-years operation period. The project proponent strongly believed that a hotel/resort and tourism business can achieve sustainable profits, only by minimizing environmental footprint caused by itself and sharing the benefits with employees and local community. The aim of CSR is to ensure social well-being of the employees and their family members, better living condition and transparent and friendly relationship with the communities nearby H & S has allocated 2% of its net profit for CSR plan.

Table 7-7 Corporate Social Responsibility Plan

No	Activity	Responsibility	Timing	Estimated Budget
1.	Provide free emergency medical care. Annual medical checkup and vaccination for all employees	H & S	Annually	2,000,000 Kyats
2.	Social and environmental assistance to nearest villages of Min Hla Hydropower project, Naung Cho Township (provide teaching materials to school, basic medicines to clinic, conduct environmental education program, tree planting program, contribute for local pagoda festival)	H & S	Annually	1,500,000 Kyats
3.	Cooperation with nearby businesses and concerned authorities for local environmental safety and sanitation (contribution to Naung Cho Township Municipality for collective sewage/waste water disposed system, cleaning and maintenance of drainages, roads, power lines)	H & S	Annually	1,500,000 Kyats
4.	Contributions to local infrastructure development (for better development of power supply, water supply, roads, health and sanitation facilities in the area in cooperation with nearby villages)	H & S	Annually	1,000,000 Kyats

7.11. COVID-19 SAFETY PLAN

Coronavirus disease (COVID-19) is an infectious disease caused by a newly discovered corona virus. COVID-19 most commonly spreads between people who are in close contact through respiratory droplets or small particles produced when an infected person coughs, talks, or breathe. Growing evidence shows that droplets can remain suspended in the air and travel distances beyond six feet, according to the CDC. Indoor environments with poor ventilation increase the risk of transmission.

In proposed factory, preventive measures as hand sanitizers, hand washing basin, masks and social distancing are need to follow in protecting the COVID-19 Pandemic. If the disease is intensive within the factory compound, the factory may face to close- down or stop for an interval.

7.11.1. Prevention guideline by WHO

To prevent infection and to slow transmission of COVID-19, do the following:

- Wash your hands regularly with soap and water, or clean them with alcohol-based hand rub.
- Maintain at least 1-meter distance between you and people coughing or sneezing.
- Avoid touching your face.
- Cover your mouth and nose when coughing or sneezing.
- Stay home if you feel unwell.
- Refrain from smoking and other activities that weaken the lungs.
- Practice physical distancing by avoiding unnecessary travel and staying away from large groups of people.

7.11.2. Symptoms of Corona Virus Disease- 2019

COVID-19 affects different people in different ways. Most infected people will develop mild to moderate illness and recover without hospitalization.

Most common symptoms:

- Fever.
- Dry cough.
- Tiredness.

Less common symptoms:

- Aches and pains.
- Sore throat.
- Diarrhea.
- Conjunctivitis.
- Headache.
- Loss of taste or smell.
- A rash on skin, or discoloration of fingers or toes.

Serious symptoms:

- Difficulty breathing or shortness of breath.
- Chest pain or pressure.
- Loss of speech or movement.

Seek immediate medical attention if you have serious symptoms. Always call before visiting your doctor or health facility. People with mild symptoms who are otherwise healthy should manage their symptoms at home. On average it takes 5–6 days from when someone infected with the virus for symptoms to show, however it can take up to 14 days.

CHAPTER 8
SOCIAL ECONOMIC STUDY AND PUBLIC DISCLOSURE

8.1. PUBLIC CONSULTATION PROCESS AND INFORMATION DISCLOSURE

As there is no significant human habitation inside the proposed project area, there is no issue of resettlement planning. However, community awareness should focus on activities below.

Table 8-1 Summary of Consultation Required

Activity	Expected Result	Schedule	Cost
Consult local managerial levels about conditions of construction sites	Information about the areas where may exist toxic substances, cultural heritages and underground structures	During deign period	PMU Cost
Disseminate information to local community via appropriate means	Informing communities about construction activities, works schedules, potential health and safety issues and how to engage with the project for any grievances	During the construction phase	PMU Cost
Community redress mechanism is established.	PMU/ESMU and Contractors shall have to reply to all complaints, questions or concerns of local communities about the works.	During the construction phase.	
Community redress mechanism is established by the works operation and management unit	Replying to questions, complaints or concerns of the communities on operation	During the operation phase	PMU Cost
Consult the local authorities	Agreeing with EMP mitigation measures	From the project operation	PMU Cost

8.1.1. KII (Key Informant Interview) Notes

KIIs (Key Informant Interview) was carried out by the Consultant Team during the March - Aug 2016. The summary notes from these interviews with project proponent and key stakeholders are as follows:

Table 8-2 Summary Notes from KII (Key Informant Interviews)

Item	Name of Key Informant / Stakeholder	Designation / Organization	Summary Notes
1	U Than Aung	Project Manager, Minhla Hydropower Project	The seven main creeks from which the proposed project develop hydropower are: 1. BanBweGyin Creek 2. LoneKok Creek 3. Minhla Creek 4. MyayThonBon Creek 5. ShweTaung Creek 6. Hsapyaydo 2 Spring 7. Hsapyayado Creek During monsoon, the runoff water from all seven creeks combined is maximum 150 cusecs. From Ban Bwe Gyin Creek, during the dry season the runoff is 10 cusec Lone

Item	Name of Key Informant / Stakeholder	Designation / Organization	Summary Notes
			Kok Creek water is much during the monsoon, but is little in the dry season and nearly dry for 3 weeks. The Minhla Creek water is about 2 cusec during dry season and 5 cusec during monsoon. there are many rocks in the area with springs flowing into the creek. Myay Thon Bon Creek has much runoff water (40-60 cusec) during the monsoon. However, during the dry season it is only 1 cusec. The Shwe taung Creek has spring but only 0.5 cusec of water. The Hsapyaydo Creek has two (2) springs and a small dam constructed gives 2 cusec of water during dry season and 4 cusec during the monsoon. In the north of this area is the Inma Wet Land, a swampy area about 3000 ft above mean sea level. The project site is about 2500 ft above mean sea level and is about 300 - 400 ft away from Inma Wet Land. The Hsapyaydo Creek has minimum 6 cusec and generally 40-60 cusec of runoff water.
2	U Ye Zaw Myint	Deputy General Manager, Myanmar Hydropower Development Company Ltd.	The project proponent has CSR (Corporate Social Responsibility) initiative commitment to: 1) support matriculated students with job opportunities in the project activities 2) Daily wages employment for local inhabitants 3) conserve the entire project area for its biodiversity and build a eco-tourism site 4) provide a health clinic for local population 5) upgrade the existing primary school to higher primary school in nearby village These social activities will be budgeted from the 2% of net profit from the proposed project when implemented.
3	U Aung Htwe Chit	Naung Cho Township Deputy Administrator	The proposed project lies in Naung Cho Township. The status of Naung Cho Township for its overall social and environmental situation is described in its Township Administrative Annual Report.
4	U Ohn Kyaing	Representative, Banbwe Gyin Village	I wholly agree to the implementation of this proposed hydropower project. The reason being: 1) There is great improvement in transportation as now, there is access road constructed to our village at Banbwe Gyin. 2) Right now we are using solar energy to get light. When this proposed project is implemented, we will have enough electricity during the monsoon, when the sky is cloudy. 3) Although we lose our paddy-land because of this project, the MHD company has compensated genuinely to all those whose land has been disturbed by the project.
5	U Kyaw Swe	Village Head, Hsapyedo Village	I certainly agree to the implementation of this proposed hydropower project. The reason being: 1) There is great improvement in transportation nowadays as already there is an access road constructed to our village at Hsapayedo.

Item	Name of Key Informant / Stakeholder	Designation / Organization	Summary Notes
			2) Currently, we depend solely on solar energy to get light. When this proposed project is completed, we will have sufficient electricity even during cloudy days. 3) Although we have to give up some of our paddy-land because of this project, the MHD company has compensated sufficiently to us.

8.2. SUMMARY NOTES ON THE PUBLIC CONSULTATION MEETING

The Public Consultation Meeting for the IEE on Minhla Hydropower Project held on 16 August 2016:

Venue : Presentation Hall, Naung Cho Township Administrative Office.

Date : 16 August 2016

Time : 13:00 - 16:00

Number of Participants : 81 participants (Naung Cho Township Local Government staff 65, Parliament 1, Myanmar Hydropower development Company Assistant engineers 3, Ban Bwe Gyin Village representative 2, Minhla Hydropower station representative 2, NEPS 7, Minhla Hydropower Project Director 1)

Organized by : NEPS (National Engineering and Planning Services)

Table 8-3 Summary Notes on Public Consultation Meeting on 16 August 2016

Item	Name of Participant at FGD	Designation/Organization	Discussion Notes
1	U ThiHa Win Pe	Naung Cho Township Administrator	The purpose of this proposed project is: 1) To generate electrical power for our environmental resources. 2)To ensure that this development project is sustainable both environmentally and socially, this PCM (Public Consultation Meeting) is held. Thank you all for coming from government body and local representatives in participating in this important event. We hope to have a vibrant discussion and gain knowledge by all participants in this meeting so that whenever development projects are implemented, we will be able to discuss extensively regarding environment conservation for sustainable development.
2	U Aye Myint	Team Leader, Environmental Team, NEPS	1) I'm happy to see many stakeholders present in this PCM (Public Consultation Meeting) for the Minhla Hydropower Project. Our country is working for the successful nationwide access to electrical energy through all kinds of technological methods. This project is to generate electricity from the natural water resources. It is important that these development projects be implemented sustainably.

Item	Name of Participant at FGD	Designation/Organization	Discussion Notes
			2) NEPS (National Engineering and Planning Services) deals with water and soil management so that it includes environmental and social impact assessments as they are correlated to human nature and well-being. We have carried out EIA and SIA since 15 years ago; for example the Htamanythi and Myitsone hydropower projects. Since 2012, the MOECAF (Ministry of Environmental Conservation and Forest) had enacted the Environmental Conservation Law and then in 2014, the rules and regulation and then in 2015, the EIA procedure notification being enacted, we have been getting the necessary guidance from the ECD (Environmental Conservation Department) to abide to these rules and regulation in all our practical assignments. 2) All development projects for Myanmar are essential for progress and we are catching up with neighboring countries. There are impacts (adverse or beneficial) due to development projects. However, NEPS carries out the mitigation measures for the potential negative impacts so that the bio physical, chemical, socio-economic and cultural aspects have less impacts due to the development projects. 3) The baseline study, which is the present status of the project area for different parameters are studied (e.g. land, water, air, noise, social status, etc.) and based on these aspects, and afterward potential impacts are identified. 4)NEPS is the third party (not the project proponent or the project affected persons) that is carrying out the IEE (Initial Environmental Examination) on this proposed project and is coordinating with all stakeholders for the successful environmental and social considerations for sustainability of this project in future. 5) Now, we will continue to present our finding s from the ESIA works on the Minhla Hydropower Project. We assessed the negative and positive impacts in four parameters: extent, duration, magnitude and probability and determine its significance of impacts; concerning its bio physical, chemical, socio-economical and cultural aspects.
3	U Than Aung	Project Director, (Hydropower and Solar Energy Development Co. ltd.)	The main objective of the MHD (Myanmar Hydropower Development) Co. Ltd. is to: 1) Enhance Human Resources and regional development 2) Ensure the least negative impact to the environment in implementing this proposed project. 3) We had studied the seven (7) creeks in the project area and plan to build small weirs and

Item	Name of Participant at FGD	Designation/Organization	Discussion Notes
			dams to supply electricity to the neighboring communities: Kyaukkyi, Kone Gyi, Hsapyedo, Haw Gone and Banbwe Gyin villages. 3) With the support from the local communities, we will also strife to upgrade the education status of the local communities by upgrading the present primary school. We will be doing all we can to help develop the region through this proposed project. Thank you.
4	Daw Haymar Hnin	Environmental Engineer, NEPS	1) The power-point presentation is from our socio-economic survey carried out on site. We studied the biophysical, socio economic status of the locality. 2) We find out the existing status of the natural water, soil, hydrology, aquatic and terrestrial biota. The soil is red earth and yellow soil which is good for agriculture and construction. Naung Cho township inhabitants' livelihood is generally growing maize and raising chicken and cattle. 3) The results of the surface and ground water quality, the ambient noise levels measures are as shown in the slides. Based on the baseline study, we identify the potential environmental impacts and find measures to mitigate them in two phases: the construction phase and the operation phase. 4) The social study shows the economic status of the sample respondents from the nearby villages. The income of the household respondents are generally 2-3 lakhs kyats per month. Their water resource is river water. 5) The potential impacts on the surface water is moderate, change in fishery is moderate as shown in the impact matrix here. There is no impact on private asset and no resettlement issue as there are no inhabitants in the project area. 6) Since the proposed project is a 10 MW hydropower project, and a runoff the river type, the negative impacts are less. However, as described in our EMP (Environmental Management Plan), it is important to monitor the downstream water of the creeks and the transmission lines to prevent any undesirable harm or danger to the inhabitants. 7) It is important for the project proponent to compensate any grievances due to the implementation of the project. For example, compensation with reforestation (replanting of local trees) due to cutting of trees for the construction of access road, accessory of dams and weirs, diversion channels, and any cutting trees in the catchment area and to prevent soil erosion. The "Inma Wet Land" which lies near the project area needs to be conserved and it is important to carry out awareness campaign among the nearby villagers to make initiatives to maintain the ecosystem there.

Item	Name of Participant at FGD	Designation/Organization	Discussion Notes
Any queries and discussions from the participants are welcomed.			
5	U Ye Lin Kyaw	Representative from Electrical Department, Naung Cho Township	When will this project finished? How much will be the tariff of access to electricity.
6	Daw Mya Sandar	Representative from Planning Department, Naung Cho Township	Which organization will do the monitoring and evaluation of the proposed project regarding carryout the EMP (Environmental Management Plan)? It is good to know this so as to prevent any misunderstanding regarding the implementation of the project.
7	U Aung Htwe Chit	Staff Officer, Naung Cho Township Administration Office	I would like to know if the decision for sending the developed electrical power from the Minhla Hydropower to the Sedawgyi is final decision.
8	Daw Sein Sein	Representative, Customs Department, Naung Cho Township	We would like to suggest that the project proponent would deposit the trade tax of the proposed project to NaungCho Township and not to other custom departments in other places.
9	U Hein Kyaw Aung	Representative, Immigration Office, Naung Cho Township	Naung Cho Township being located at the rear end of the National Grid line, we in Naung Cho get only a weak (small) intensity of electrical power supply from this National Grid. Therefore, since the proposed project lies within the Naung Cho Township, I, on behalf of all the local inhabitants would like to suggest that the developed electrical supply be sent to the Naung Cho substation. Thank you.
10	Daw Aye Aye Kyu	Representative, Agricultural Department	Please let us know whether the proposed project would benefit the agricultural sector of the locality.
Answers to questions from participants			
11	U Aye Myint	Team Leader, Environmental Team, NEPS	Answer to 6. Daw Mya Sandar: As there is auditor general for the audit of funds in companies, for environmental issues there is environmental audit work in developed nations. Myanmar is in the early stage of carrying out environmental conservation work. Therefore, project monitoring will be done by the project proponent but project EM (environmental management) work reports will be submitted to the ECD (Environmental Conservation Department) of the Ministry of Natural Resources and Environmental Conservation (MONREC), Myanmar. Monitoring will be done by the relevant Regional ECD officials.
12	U Than Aung	Project Director, (Hydropower and Solar Energy Development Co. ltd.)	Answer to 5. U Ye Lin Kyaw: Now we have completed three seasons (1year). There will be at least 3 years more to complete the project. The first year is mainly acquiring the purchase of the right Daynamo, Turbines and other machinery. Answer to 10. Daw Aye Aye Kyu: We would like the inhabitants of the locality to grow crops that need the least water quantity to flourish. We on our part could not stop running the turbines when

Item	Name of Participant at FGD	Designation/Organization	Discussion Notes
			they are running. They use 5 KW, However, we plan a risk buffer zone by constructing ponds and will connect with PVC pipes to convey the water to the villages. Step cultivation, appropriate cropping patterns would upgrade the agricultural sector. Here the most cultivated crop is rice during the monsoon season. The sprinkling system could help grow cauliflower, and cabbage in dry season. The Hsapyedo village has 20 acres of crop land and surface water is diverted to reach this place for agriculture. We anticipate that after implementation of the proposed project, the agriculture land will increase from 20 to 200 acres, having access to water supply. The Agriculture Department also has plans for appropriate cropping patterns for the area. Therefore, this project will benefit the agricultural sector of the locality and so upgrade the economical status of the local inhabitants. Thank you.
13	U Ye Zaw Myint	Deputy General Manager, (Hydropower and Solar Energy Development Co. ltd.)	Thank you for your questions. Myanmar is in its developing stage. Only about 16% of our country has access to electricity. The rest of the county also need to get electricity. We have cooperated with the local authorities and committees to help get electrical energy access in the project area's nearby villages. We had submitted our plans to the Forest Department regarding the project and have put thousands of fish species into the nearby creeks and also monitored their breeding and survival in the water. We strive to get win-win status regarding the proposed project and abide to the instructions from the Forestry Department. We have plans to initiate the reforestation activities in the project area and its environs. That is why we get permission to carry out the EIA works for this project. Answer to 5. U Ye Lin Kyaw: The tariff rate will be carefully discussed with relevant local authorities and will be according to the nearby "Banbon" village system tariff and hopefully will be the least rate. Answer to 7. U Aung Htwe Chit: After discussion with the Minister of Electrical Power, it had been advised by the Minister to send the electrical energy to Pyin Oo Lwin substation, which is about 20-30 miles away. However, since the Sedawgyi is only about 10 miles from the project area, we prefer to send it to Sedawgyi instead. We aim to supply electricity to nearby villages such as Hawkon, Kyaukkyi, Pongyi and BanbweGyin villages. This will help for successful local trades such as various home industries. Initially, two nearby villages will be supplied with 11 KW of electrical supply. Based on the electrical consumption of these two villages, we will provide the remaining two villages with the same capacity of power and also use for our own project. The

Item	Name of Participant at FGD	Designation/Organization	Discussion Notes
			total output is estimated to be 0.8 MW for the local villages. Thanks for all your contributions and suggestions from this PCM. We will surely forward all of your concerns to the relevant authorities for consideration and decision making. Thank you.

Public consultation meeting was hold with the villagers in neighboring villages in Nung Cho Township. Participants are expressed in Appendix H.

Detailed record of meeting minutes in Myanmar language, PowerPoint and its Photos Record are also attached as Appendix H of this report.

8.2.1. Key Informant interview

This activity was carried out through a semi structured questionnaire to institutional stakeholders to gather their views and solicit recommendation to improve project planning. Two key informants comprising various sectoral groups of (1) U Thi Ha, Rubber Factory Owner, Kyaikhto Township and (2) U Soe Aung, Rubber Plantation Expert, Kyaikhto Township) were interviewed to afford a level of cross-check and comparison on 9 July 2014 (Appendix).

8.2.2. Focus Group Discussions

Similarly, a semi structured survey topical questionnaire was administered through Focus Group Discussion (FGDs) among the factory workers living in the vicinity of the project site. Consultations and meetings have been done within the factory workers as indicated in the minutes of the FGD meetings and the list of participants are as attached in Appendix.

8.2.3. Socio-economic Survey of Households

The socio-economic survey was carried out in order to gain an understanding of the living condition of the IP (Indigenous People) Households (8-10 July 2014). The survey instrument data incorporated 20 respondents from the two (2) villages of “Awingyi” and “Shweyaungbya”.

A clustered random sampling technique allowed for about 6 % of the settlement in the target villages. The survey was coordinated by the social survey team using local enumerators in gathering the data. Key local village partners have been engaged to help carry out the Household Survey, along with a team of trained interviewers.

A total of 20 households were interviewed representing households in the study area. Household size is 116 having an average of about 5.8 members per household. Of the total members 50% (58) are male and 50% (58) are female. Majority of the respondents are Kayin (95%) which are predominant in both villages of “Awingyi” and “Shweyaungbya” Vllages.

8.2.4. Education

Of the 116 household members, 48% have Primary units (education) and 25% have secondary grades, but only 27% have never been to school.

Overall, the socioeconomic survey results indicate that there are more male respondents as well as household members that have at least basic education, but a low percentage of male than female that has never been to school.

8.2.5. **Household Income and Expenses**

Sources of income are varied and contributed by household members. There are households with one or more sources of income. However, the majority (40%) are casual labors, followed by farming (45%), animal husbandry (2%), vendor (9%), Government staff (2%) and others (not specified) 2%.

8.2.6. **Result of Household Survey**

Each of the above mentioned two nearest villages are about 3 kilometers (2 miles) away from the project site. There is no anticipated displacement of households, loss of land or productive assets that will be affected by the proposed project. Most of the surveyed participants agree / have no objection to the implementation of the proposed project. Detailed documentation in regard to this social survey is as attached in Appendices.

CHAPTER 9
CONCLUSION AND RECOMMENDATION

9.1. CONCLUSION

9.1.1. Social Findings

During the socio-economic survey carried out in March 2016, the consultant team met with local inhabitants from the “Hsapyedo” and “Ban Bwe Gyin” Villages at the environs of the project site. About 30 persons from the two villages were interviewed to study their social and economical status. The detail of the social study report is as described in Appendix C: Baseline Report

All of the respondents have no objection to the implementation of the proposed project and had welcomed it as it will be beneficial to them in providing the basic necessity of reliable electricity in their respective homes.

The Consultation Meeting was held in 16 August 2016. Participants from the local government body, various officials from different departments and local community representatives attended the meeting and expressed their desire that the developed hydropower from the proposed project be sent to the Nauang Cho Township substation and not to the National Grid in Sedaw Gyi or the Pwin Oo Lwin substation so that the local inhabitants would enjoy better capacity of electrical power and sufficiently meet their needs. Moreover, the tax should be deposited directly to the Naung Cho Township rather than any other regional custom department. Generally, the participants are agreeable to the implementation of the proposed project, being a green energy project and would be satisfying the overall goals of the Nation to give electrical access to all regions of Myanmar.

9.1.2. Environmental Findings

The major impacts are loss of 1.85 square miles of forest that will be cleared to obtain the catchment area for the proposed project. However, the local communities have been logging the trees for firewood needs for the past many years and have rendered the area with hardly any IUCN (International Union for Conservation of Nature) endangered species. During the site visit in March 2016, the consultant team observed the project area as limestone habitat. The natural geology of limestone is the existence of sink holes. However, the design team has prepared a technically sound project site selection to avoid these limestone areas and properly designed small hydro schemes for the proposed project for easy integration into the local ecosystem. Based on the topography and geomorphology, the chosen site selection gives sound foundation for the run-off the river scheme; in which not more than 10% of the runoff flow from the stream is diverted and is regulated for developing hydropower. Moreover, no amount of water quantity is lost as it would pass through hydraulic turbines and then would discharge back into the stream's natural course.

Since the proposed project is a SHP (Small Hydropower Plant) and is also a run-off the river type, there should also be a fish ladder so that the fish will be protected from entering intake canal to the turbines. Installing fish screen at the intake to the canal where the water would be diverted from the stream's natural course would also ensure prevention of possible loss of fish being caught by the turbine during the operation phase.

Maintaining a minimum sustainable stream flow (minimum ecological flow) is necessary to sustain fish spawning and assure the preservation of the hydrological continuity of the stream and the consequent conservation of natural habitat and ecological life.

CHAPTER 10
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APPENDIX A
Company Registration

0722

ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော်အစိုးရ

စီမံကိန်းနှင့် ဘဏ္ဍာရေးဝန်ကြီးဌာန

ကုမ္ပဏီမှတ်ပုံတင်လက်မှတ်

အမှတ် ၁၄၀၁ / ၂၀၁၄-၂၀၁၅

မြန်မာနိုင်ငံ ကုမ္ပဏီများ အက်ဥပဒေအရ ရေအားလျှပ်စစ် နှင့် ဆိုလာစွမ်းအင် ဖွံ့ဖြိုးမှု ကုမ္ပဏီ လီမိတက် အား ပေးရန်တာဝန် ကန့်သတ်ထားသော လီမိတက် ကုမ္ပဏီအဖြစ် ၂၀၁၄ နှစ်၊ ဇွန် လ၊ ၁၇ ရက်နေ့တွင် မှတ်ပုံတင်ခွင့်ပြုလိုက်သည်။

ညွှန်ကြားရေးမှူးချုပ်(ကိုယ်စား)
(မျိုးမင်း၊ ညွှန်ကြားရေးမှူး)
ရင်းနှီးမြှုပ်နှံမှုနှင့်ကုမ္ပဏီများညွှန်ကြားမှုဦးစီးဌာန

THE GOVERNMENT OF THE REPUBLIC OF THE UNION OF MYANMAR
MINISTRY OF PLANNING AND FINANCE

CERTIFICATE OF INCORPORATION

NO. 1401 of 2014-2015

I hereby certify that HYDROPOWER & SOLAR ENERGY DEVELOPMENT COMPANY LIMITED is this day incorporated under the Myanmar Companies Act and that the company is Limited.

Given under my hand at Yangon this SEVENTEENTH day of JUNE, TWO THOUSAND AND FOURTEEN.

This new name has been changed from
" Myanmar Hydro power Development "
held on 8-11-2016

For Director General
(Myo Min , Director)
Directorate of Investment and Company Administration

မှတ်ချက်။ (၁) ဤကုမ္ပဏီမှတ်ပုံတင်လက်မှတ်သည် (၁၇-၆-၂၀၁၄) မှ (၁၆-၆-၂၀၁၉) ရက်နေ့ အထိ (၅)နှစ်သက်တမ်းအတွက်သာ ဖြစ်သည်။ သက်တမ်း မကုန်ဆုံးမီ (၃)လအလိုတွင် သက်တမ်းတိုးရန် ရင်းနှီးမြှုပ်နှံမှု နှင့် ကုမ္ပဏီများ ညွှန်ကြားမှုဦးစီးဌာနသို့ လျှောက်ထားရမည်။

(၂) ကုမ္ပဏီအနေဖြင့် သင်းဖွဲ့မှတ်တမ်းတွင် အဆိုပြုတင်ပြထားသော လုပ်ငန်းရည်ရွယ်ချက်များကိုသာ လုပ်ကိုင်ရမည်။

(၃) သင်းဖွဲ့မှတ်တမ်းပါ ရည်ရွယ်ချက်များသည် သက်ဆိုင်ရာ ပြည်ထောင်စုဝန်ကြီးဌာန၏ တည်ဆဲဥပဒေ၊ နည်းဥပဒေ၊ လုပ်ထုံးလုပ်နည်းများနှင့်အညီ ခွင့်ပြုချက်ရရှိမှသာ ဆောင်ရွက်ခွင့်ရှိမည်ဖြစ်ပါသည်။

(၄) လုပ်ငန်းရည်ရွယ်ချက် ပြောင်းလဲလုပ်ကိုင်လိုပါက ပြောင်းလဲလုပ်ကိုင်လိုသည့် လုပ်ငန်းရည်ရွယ်ချက်များအား သင်းဖွဲ့မှတ်တမ်းတွင် ပြင်ဆင်မှတ်ပုံတင်ရန်အတွက် ဒါရိုက်တာအဖွဲ့(BOD) ၏ အထူးအစည်းအဝေး ဆုံးဖြတ်ချက်မှတ်တမ်းနှင့်အတူ ရင်းနှီးမြှုပ်နှံမှုနှင့်ကုမ္ပဏီများ ညွှန်ကြားမှုဦးစီးဌာနသို့ လျှောက်ထားရမည်။

လာရောက်ထုတ်ယူသည့်ရက်စွဲ

(၈-၁၁-၂၀၁၆)

ညွှန်ကြားရေးမှူးချုပ်(ကိုယ်စား)
(မျိုးမင်း၊ ညွှန်ကြားရေးမှူး)

THE GOVERNMENT OF THE REPUBLIC OF THE UNION OF MYANMAR
MINISTRY OF PLANNING AND FINANCE
OFFICE OF THE REGISTRAR OF JOINT STOCK COMPANIES REGISTRATION
CERTIFICATE OF REGISTRATION OF DOCUMENTS

No. **2910** of **2015 – 2016 (YGN)**

IN THE MATTER OF **HYDROPOWER & SOLAR ENERGY DEVELOPMENT COMPANY LIMITED.**

I do hereby certify that pursuant to the Myanmar Companies Act.

- Change Of Company's Name from Myanmar Hydropower Development Co., Ltd. To Hydropower & Solar Energy Development Co., Ltd made on 8-11-2016

Has / Have been this day duly filed and registered in this office

Dated Nay Pyi Taw, this **EIGHTH** day of **NOVEMBER ,**

Two Thousand and **SIXTEEN.**

MEMORANDUM OF FEES PAID

Registering For .....filing

		K.	P.
1.	Memorandum of Association	.....	.....
2.	Article of Association	.....	.....
3.	Notice of situation of registered Office and changes therein	.....	.....
4.	Return of allotments	.....	.....
5.	Annual list of members and summary of share Capital	.....	.....
6.	Balance sheet	.....	.....
7.	Special or extraordinary resolution	.....	.....
8.	Particular of mortgages and charges	.....	.....
9.	Copy of Register of Directors, Managers, or Managing Agents and changes therein	.....	.....
10.	Return of persons authorized to accept Services of process and changes therein	.....	.....
11.	----------	.....	.....
	Total:		

FOR DIRECTOR GENERAL
(MYO MIN – DIRECTOR)

Name Change(CRD).doc 1 - 63 -

The Government of the Republic of the Union of Myanmar
Ministry of Commerce
Department of Trade

CERTIFICATE OF EXPORTER/IMPORTER REGISTRATION

1. Enterprise Name (မြန်မာ/အင်္ဂလိပ်) HYDROPOWER & SOLAR ENERGY DEVELOPMENT COMPANY LIMITED.
2. Registration No: 33987(07-07-14)
3. Registration Term: FIVE YEAR
4. Start Date : 07-07-2014
5. End Date : 16-06-2019
6. Address : (မြန်မာ/အင်္ဂလိပ်) Room (4), Block (3), Mingalar Mandalay Condominium, Between Thazin Street & Ngu Shwe War Street, 73th Street, Chan Mya Thar Si Township, Mandalay Region,Myanmar
7. Business Registration No : 1401/2014-2015(17-6-2014)
8. Type of Business : (မြန်မာ/အင်္ဂလိပ်)
   - ☐ Sole Proprietorship(တစ်ဦးတည်းပိုင်)
   - ☐ Partnership(အစုအစပ်)
   - ☑ Limited Company(လီမိတက်ကုမ္ပဏီ)(Myanmar/~~Foreign~~)
   - ☐ Co-operative Society(သမဝါယမအသင်း)
   - ☐ Others(Please specify)အခြား(ဖော်ပြရန်) သင်းဖွဲ့မှတ်တမ်းပါလုပ်ငန်း( )မျိုး ဆောင်ရွက်ခွင့်ရှိသည်။
9. Type of Service : ◉ New ○ Extension ☑ Amendment
10. Contact No :

Telephone No.	Fax No.	e-mail
02-78978	(95-2) 78978	myanmarhydropowerdevelopment@gmail.com

11. Remarks :
ACCORDING TO EICC-212/2016(15-11-2016) FROM MYANMAR HYDRO POWER DEVELOPMENT COMPANY LIMITED. TO HYDROPOWER & SOLAR ENERGY DEVELOPMENT COMPANY LIMITED.

12. Terms and Conditions : စည်းကမ်းချက်များ
I hereby register the above mentioned enterprise as Exporter/Importer subject to the following terms and conditions: (အောက်ဖော်ပြပါစည်းကမ်းချက်များဖြင့် ပို့ကုန်သွင်းကုန် လုပ်ငန်းရှင်အဖြစ် မှတ်တမ်းတင်ခွင့်ပြုသည်)
(a) Line of goods permitted - all items except prohibited and restricted items.
ခွင့်ပြုသည့်ကုန်ပစ္စည်း-အမျိုးအမည် - တားမြစ်ကန့်သတ်ထားသော ကုန်ပစ္စည်းအမယ်များမှလွဲ၍ ကျန်ကုန်ပစ္စည်းများအားလုံး
(b) The enterprise must abide by the Export/Import rules and Regulations prescribed for the registered Exporters/Importers.(လုပ်ငန်းရှင်သည် မှတ်ပုံတင် ပို့ကုန်သွင်းကုန်လုပ်ငန်းလုပ်ကိုင်သူများ လိုက်နာရမည့်စည်းကမ်းချက်များကို လိုက်နာရမည်)

Stamp 11.11.16

For Director General
ဒုတိယဒါရိုက်တာဦးစီးဌာနမှူး

EIREG0714291EIREGEX12130012

APPENDIX B
Consultant Registration Certificate

REPUBLIC OF THE UNION OF MYANMAR
Ministry of Natural Resources and Environmental Conservation
CERTIFICATE FOR TRANSITIONAL CONSULTANT REGISTRATION
(ကြားကာလအကြံပေးလုပ်ကိုင်သူမှတ်ပုံတင်ခြင်းအထောက်အထားလက်မှတ်)

No. 10048 Date

The Ministry of Natural Resources and Environmental Conservation, hereby, issues this certificate to the person under Environmental Impact Assessment Procedure, Notification No. 616/2015.
(ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း၊ အမိန့်ကြော်ငြာစာအမှတ်၊ ၅၁၆/၂၀၁၅ အရ သယံဇာတနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာနသည် ဤအထောက်အထားလက်မှတ်ကို လူပုဂ္ဂိုလ်အားထုတ်ပေးလိုက်သည်။)

(a)	Name of Consultant (အကြံပေးပုဂ္ဂိုလ်အမည်)	U Lin Htet Sein
(b)	Citizenship (နိုင်ငံသား)	Myanmar
(c)	Identity Card / Passport Number (မှတ်ပုံတင်/နိုင်ငံကူးလက်မှတ် အမှတ်)	7/ Tha Ka Na (N) 101377
(d)	Address (ဆက်သွယ်ရန်လိပ်စာ)	No.54, Room No.704, Waizayantar Tower, Waizayantar Road, Thingangyun Township, Yangon. lin.tbs@gmail.com , 09 421137569
(e)	Organization (အဖွဲ့အစည်း)	Total Business Solution Co., Ltd.
(f)	Type of Consultancy (အကြံပေးလုပ်ကိုင်မှုအမျိုးအစား)	Person
(g)	Duration of validity (သက်တမ်းကုန်ဆုံးရက်)	31 March 2018

EXTENSION
သက်တမ်းတိုးမြှင့်ခြင်း
The VALIDITY of this certificate is extended for one year from (1.4.2018) to (31.3.2019)
ဤလက်မှတ်အား (၁-၄-၂၀၁၈) ရက်နေ့မှ (၃၁.၃.၂၀၁၉) ရက်နေ့အထိ တစ်နှစ်သက်တမ်း တိုးမြှင့်သည်။
For Director General
(Soe Naing, Director)
Environmental Conservation Department

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

Areas of Expertise Permitted
(ခွင့်ပြုသည့် ကျွမ်းကျင်မှုနယ်ပယ်များ)

1. **Facilitation of meeting,**
2. Land use,
3. Legal analysis,
4. Geology and soil,
5. Occupational Safety and Health,
6. Public Health

ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ဦးစီးဌာန

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

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

THE REPUBLIC OF THE UNION OF MYANMAR

Ministry of Natural Resources and Environmental Conservation

Environmental Conservation Department

CERTIFICATE FOR TRANSITIONAL CONSULTANT REGISTRATION

(ကြားကာလအကြံပေးလုပ်ကိုင်သူမှတ်ပုံတင်ခြင်းအထောက်အထားလက်မှတ်)

No. 00068 Date 24 MAY 2019

The Ministry of Natural Resources and Environmental Conservation, hereby, issues this certificate to the organization under Environmental Impact Assessment Procedure, Notification No. 616/2015.

(ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း၊ အမိန့်ကြော်ငြာစာအမှတ်၊ ၆၁၆/၂၀၁၅ အရ သယံဇာတနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာနသည် ဤအထောက်အထားလက်မှတ်ကို ထုတ်ပေးလိုက်သည်။)

(a)	Name of Organization (အဖွဲ့အစည်းအမည်)	Myanwei Consulting Co., Ltd.
(b)	Name of the representative in the organization (အဖွဲ့အစည်းကိုယ်စားလှယ်၏အမည်)	U Nyan Lynn Aung
(c)	Citizenship of the representative in the organization (အဖွဲ့အစည်းကိုယ်စားလှယ်၏နိုင်ငံသား)	Myanmar
(d)	Identity Card /Passport Number of the representative person in the organization (အဖွဲ့အစည်းကိုယ်စားလှယ်၏ မှတ်ပုံတင်/ နိုင်ငံကူးလက်မှတ် အမှတ်)	12/Sakhana(N)056196
(e)	Address of organization (ဆက်သွယ်ရန်လိပ်စာ)	No. 28, Myay nu street, Sanchaung Township, Yangon, Myanmar. Mobile phone: 09440251888 E mail: ceo@myanweiconsulting.com
(f)	Type of Consultancy (အကြံပေးလုပ်ကိုင်မှုအမျိုးအစား)	Organization
(g)	Duration of validity (သက်တမ်းကုန်ဆုံးရက်)	31 December 2019

ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ဦးစီးဌာန

Director General

Environmental Conservation Department

Ministry of Natural Resources and Environmental Conservation

Areas of Expertise Permitted
(ခွင့်ပြုသည့် ကျွမ်းကျင်မှုနယ်ပယ်များ)

1. Geology and Soil

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

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

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

APPENDIX C
Environmental Quality Result

Noise result

Project Name: Min Hla Hydroelectric Project

Site Address: Kyukmel Township, Shan North.

Start Date & Time: 22-2-2020 / 14:10

Noise					
L_{eq} in dBA			L_{max} in dBA		
Day	Night	Total	Day	Night	Total
49	45	48	33.2	33.5	33.3

Reference Value

Receptor	One Hour LAeq (dBA)a	
	Day Time 07:00 – 22:00 (10:00 -22:00 for Public holidays)	Night Time 22:00 – 07:00 (22:00 -10:00 for Public holidays)
Residential, institutional educational	55	45
Industrial, commercial	70	70

National Environmental Quality (Emission) Guidelines

Instruments : Sound Level Meter (Extech)

Air Quality Result

Project Name: Min Hla Hydroelectric Project

Site Address: Kyukmel Township, Shan North.

Start Date & Time: 22-2-2020 / 14:10

Air

Parameter	Reference Value	Result	Guideline	Remark
PM_{10} (24 Hr) $\mu g/m^3$	50 $\mu g/m^3$	91.8	WHO	
$PM_{2.5}$ (24 Hr) $\mu g/m^3$	25 $\mu g/m^3$	69.4	WHO	
NO_2 (1 Hr) $\mu g/m^3$	200 $\mu g/m^3$	35.9	WHO	
SO_2 (24 Hr) $\mu g/m^3$	20 $\mu g/m^3$	0	WHO	
O_3 (8 Hr) $\mu g/m^3$	100 $\mu g/m^3$	36.6	WHO	
CO (8 Hr) ppb	9000 ppb	763	US.EPA	
VOCS (1 Hr) ppb	44 ppb	79.6	California EPA	
HC ppm		558		
CH_4 ppm		19784		
RH %		37		

Instruments : Hazscanner

APPENDIX D
Social Survey Questionnaires

Survey Questionnaires (Village Authority)

Questionnaires for Socio - Economic Survey

(Village Authority)

Village Name ..... Village Tract ..... Sr. No. ( )

Township / District / Region / State.....

1/ Household / Population Data

Year	No. of House	No. of Household	Population			Ethic Group		Religion %	
			Male	Female	Total		%		

2/ Livelihood

	Farming	Agro forestry	Selling / Trading	Employer	Daily worker	Fishery	Others
No.							
%							

3/ Number of Households moving in or out of the Village

Year	In	Out
2008		
2009		
2010		
2011		
2012		

4/ Communication System

☐ Cell Phone ☐ Telephone ☐ Post office ☐ Others ----------

5/ Means of Transportation

5-1 By Vehicle ☐ Summer ☐ Monsoon ☐ Winter ☐ Bus / Train

5-2 By Stream ☐ Summer ☐ Monsoon ☐ Winter ☐ Jetty ship/Jetty boat

5-3 By air ☐ Summer ☐ Monsoon ☐ Winter ☐ Aeroplane

6/ Agricultural Land (Acre)

Paddy	Upland Crop	Hill side cultivation	Fruit / orchards	Other	Total

7/ Farm Implements

Cart	Harrow / plough	Hand Tractor	Tractor	Pump	Threshing machine	Sprayer	Others

8/ Cropping Calendar

Crops	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Paddy												

9/ Mechanism / Household Appliances

Tawlagyi	Bicycle	Motor Bike	Genera-tor	Motorcar	TV	Video	Radio	Refrigerator

10/Priority needs for Livelihood

(A) ----------

(B) ----------

(C) ----------

11/ Livestock Breeding

Buffalo	Cattle	Cow	Goat	Sheep	Pig	Chicken	Duck	Others

12/ Infrastructures

B.E.H.S	B.E.M.S	B.E.P.S	Monastery Education	Nursery	Library	Police Station	Fire Station	Market

Station Hospital	Rural Health Centre	Maternity and Child	Village Tract Office	Cemetery	Access Road	Pipe Water	Township Hospital

13/ Village Facilities

Saw Mill	Rice Mill	Repair Shop	Restaurant		

14/ Religious / Cultural Heritage

Pagoda	Monastery	Num	Church	Mosque	Dama House

15/ Health / Education Service

Doctor	Health Assistant	Nurse	Midwife	High School		Middle School		Primary School	
				Teacher	Pupil	Teacher	Pupil	Teacher	Pupil

16/ Fishery (per month)

Fish Culture	Selling viss (Yearly)	Food (viss)

17/ Energy / Electric Consumption

Fuel Wood (ton)	Charcoal (Viss)	Kerosene (gal)	Electricity (KWh)

18/ Needs for Electrification

☐ urgent want ☐ want ☐ if not

19/ Development Projects

Sr. No.	Past Project	Government	NGO	Completed year	Up to date effect	
					Yes	No

20/ Water Resources for Drinking and Domestic Use

Sr. No.	Utilization	Resources	Sufficient Yes / No
(A)	Drinking		
(B)	Domestic		
(C)	Livestock		
(D)	Agriculture		
(E)	Others		

21/ Electricity Supply for Village

☐ 24 hour ☐ 12 hour ☐ 6 hour ☐ 3 hour ☐ nothing

22/ If yes, How many hour get electricity per day from hour

23/ Which is source of electricity you get?

☐ Government Unit rate ————

☐ Private Unit rate ————

☐ Others Unit rate ————

Interviewer	Respondent
Signature	Signature .....
Name	Name .....
Date /	Date / .....

Survey Questionnaires (Household)

Questionnaire for Socio - Economic Survey

(Household)

District / Township..... Village / Quarter ..... Sr. No. ( )

1/ Household Particulars

Sr.No.	Name	Relationship	Age	Nationality/ Religious	Occupation	Education

2/ How many years have you been living here? Year ☐

3/ Does one of your familyworks away from home.

3-1 Who ☐ husband ☐ wife ☐ son ☐ daughter ☐ other---------

3-2 Where ☐ Capital ☐ NearestDistrict ☐ Oversea ☐ other ----------

4/ Property

4-1 Housing

Bamboo + Thatch ☐ Bamboo + CGI ☐ Timber + CGI ☐ Brick / Concrete ☐

4-2 Implements

Cart ☐ Boat ☐ Bicycle ☐ Motorbike ☐ Farm Truck ☐ Car ☐

4-3 Home Property

☐ Refrigerator ☐ TV ☐ Radio ☐ other ----------

5/ Paddy Land

5-1 FarmLand.....AcreUpland.....AcreHill Side Cultivation .....Acre

5-2

Crop	Paddy	Maize					
Acre							
Production							
Selling Unit Price							

6/ Livestock

Kind	Cow	Buffalo	Goat	Sheep	Chicken	Duck	Pig	
Nos.								

7/ Income (Average per year)

Sr.No.	Works	Income
(a)	Agriculture	
(b)	Vegetable	
(c)	Livestock	
(d)	Fishing	
(e)	Agro - Forestry	
(f)	Selling (Particular)	

Sr.No.	Works	Income
(g)	Government Staff	
(h)	Private Staff	
(i)	Daily worker/ work charge	
(j)	Others	
	Total	

8/ Expenses (Average per year)

Sr.No.	Particular	Expenses
(a)	Food	
(b)	Education	
(c)	Health	
(d)	Social / Religion	
(e)	House repair	

Sr.No.	Particular	Expenses
(f)	Farm Inputs	
(g)	Domestic use and cloths, etc.	
(h)	Others	
	Total	

9/ Drinking Water

☐ River/Stream ☐ Open Well ☐ Lake ☐ Tube Well ☐ Pipe Line

10/ Electricity

☐ 24 hour ☐ 12 hour ☐ 6 hour ☐ 3 hour ☐ None

11/ If Electricity is not available what are the current energy sources?

(a) Lighting ----------
(b) Fuel ----------
(c) Others ----------

12/ Where youget electricity?

☐ Government Unit rate----------
☐ Private Unit rate ----------
☐ Village Lighting Committee Unit rate ----------

13/ Average electricityuse per month Total Unit----------

14/ The use of present electric appliances

☐ Lighting ☐ TV ☐ Video ☐ Radio ☐ Cassette ☐ Refrigerator
☐ Fan ☐ Ironing ☐ Stove ☐ Electric Motor
☐ Home industry ☐ others ----------

15/ If you can use electricity in future, what kind of productive activities will you start by using electricity

☐ Agriculture ☐ Chicken farm ☐ Handicraft ☐ Restaurant
☐ Home industry ☐ No idea ☐ Others----------

16/ For new electricity Services

16-1 For initial cost ☐ Yes ☐ No
16-2 For monthly charge ☐ Yes ☐ No

Interviewer	**Respondent**
Signature	Signature .....
Name	Name .....
Date / /.....	

APPENDIX E
Social Survey Data

Survey Data of Indirected Affected Area (Household)

Sr. No	Township/ Village	Interviewer	Respondent	Q-1												Q-2
				Household Particular												How many year have you been living here?
				Name	Relation-ship	Age	Nationality/Religious	Occupation					Education			
								Farmer	Casual Labour	Selling	Carpenter	Others	Primary	Second-ary	Univer-sity	
1		Daw Haymar Hnin	U Sar Aung	U Sar Aung	Husband	35	Shan/Buddhist	√	-	-			-	√	-	35(year)
2				Daw Aye Pone	Wife	33	‖	-	-	√		-	-	√	-	
3				Mg Min Khine	Son	15	‖	-	-	-		√	-	√	-	
4				Ma Thae Su Aung	Daughter	6	‖	-	-	-		√	√	-	-	
5				Mg Thar Lay	Son	1	‖	-	-	-		√	-	-	-	
6		U Thike Tun	U Gan Da Mar	U Gan Da Mar	Husband	55	Shan/Buddhist	√	-	-		-	√	-	-	55(year)
7				Daw Kwel	Wife	54	‖	√	-	-		-	√	-	-	
8				Ma Khin Myine	Daughter	23	‖	√	-	-		-	√	-	-	
9				Mg Pyin Nyar	Son	21	‖	√	-	-		-	√	-	-	
10				Mg Eike Moo	Son	17	‖	√	-	-		-	√	-	-	
11				Ma Mu Aye	Daughter	18	‖	√	-	-		-	√	-	-	
12				Mg Lay	Son	8m	‖	-	-	-		√	-	-	-	
13		Daw Tin Nwe Nwe Oo	U Kyaw Soe Win	U Zay Ya	Husband	50	Shan/Buddhist	√	-	-			√	-	-	50(year)
14				Daw Khan Zar	Wife	51	‖	√	-	-			√	-	-	
15				Mg Kyaw Soe Win	Son	20	‖	√	-	-			-	√	-	
16		Daw Haymar Hnin	U War Yama	U War Yama	Husband	32	Shan/Buddhist	√	-	-			√	-	-	32(year)
17				Daw Mya Eain	Wife	31	‖	√	-	-			√	-	-	
18				Ma Khin Oo	Daughter	13	‖	-	-	-		√	√	-	-	
19				Ma Hnin Htet Htet Zaw	Daughter	4	‖	-	-	-		√	√	-	-	

Sr. No	Township/ Village	Interviewer	Respondent	Q-1												Q-2
				Household Particular												How many year have you been living here?
				Name	Relation-ship	Age	Nationality/Religious	Occupation					Education			
								Farmer	Casual Labour	Selling	Carpenter	Others	Primary	Second-ary	Univer-sity	
20		Daw Haymar Hnin	U Tun Shwe	U Tun Shwe	Husband	25	Shan/Buddhist	√	-	-		-	√	-	-	25(year)
21				Daw Khin Win Yi	Wife	24	||	√	-	-		-	√	-	-	
22				Ma Ngin Lounge	Daughter	8	||	-	-	-		√	√	-	-	
23				Mg Ainoo Pazai	Son	10m	||	-	-	-		√	-	-	-	
24		Daw Haymar Hnin	U Pyoune Cho	U Pyoune Cho	Husband	23	Bamar/Buddhist		-	-	√	-	√		-	3(year)
25				Daw Aye Say	Wife	22	Shan/Buddhist	√	-	-		-	√		-	
26				Mg Phoe Pyae	Son	2	Bamar/Buddhist	-	-	-	√	-	-	-	-	
27		U Than Shwe	U Win	U Kaw San Hla	Husband	42	Shan/Buddhist	√	-	-		-	√	-	-	42(year)
28				Daw Tin Hla	Wife	42	||	√	-	-		-	√	-	-	
29				Mg Myint Wai	Son	24	||	√	-	-		-	-	√	-	
30				Mg Win	Son	20	||	√	-	-		-	√	-	-	
31				Ma Ohn Mar Tun	Daughter	14	||	√	-	-		-	√	-	-	
32				Mg Thein Zaw	Son	10	||	-	-	-		√	√	-	-	
33				Mg Than Zaw	Son	8	||	-	-	-		√	√	-	-	
34		U Thike Tun	U Sein Maung	U Sein Maung	Husband	35	Shan/Buddhist	√	-	-		-	√	-	-	35(year)
35				Daw Saw Ohn	Wife	23	||	√	-	-		-	√	-	-	
36				Mg Wi Lar Tha	Son	8	||	-	-	-		√	√	-	-	
37				Ma Saw Owne	Daughter	1	||	-	-	-		√	-	-	-	

Sr. No	Township/ Village	Interviewer	Respondent	Q-1												Q-2
				Household Particular												How many year have you been living here?
				Name	Relation-ship	Age	Nationality/Religious	Occupation					Education			
								Farmer	Casual Labour	Selling	Carpenter	Others	Primary	Second-ary	Univer-sity	
38		U Thike Tun	U Kaw Lein Da	U Kaw Lein Da	Husband	54	Shan/Buddhist	√	-	-		-	√	-	-	54(year)
39				Daw Hla Yin	Wife	54	〃	√	-	-		-	√	-	-	
40				Mg Win Myint Than	Son	13	〃	-	-	-		√	-	√	-	
41		U Thike Tun	U Min Aung	U San Oo	Husband	52	Shan/Buddhist	√	-	-		-	√	-	-	
42				Daw Aye Khine	Wife	48	〃	√	-	-		-	√	-	-	
43				Mg Min Aung	Son	28	〃	√	-	-		-	√	-	-	28(year)
44				Ma Thin Thin Mon	Daughter inlaw	32	〃	-	-	-		√	√	-	-	
45				Ma Nadi Oo	Grand Daughter	6	〃	-	-	-		√	√	-	-	
46				Ma Su Mon Oo	Grand Daughter	2	〃	-	-	-		√	-	-	-	
47				Ma Seik Myat Noe	Grand Daughter	5m	〃	-	-	-		√	-	-	-	
48		Daw Haymar Hnin	U Than Tun	U Than Tun	Husband	45	Shan/Buddhist	√	-	-		-	√	-	-	45(year)
49				Daw Tin Oo	Wife	35	〃	-	-	-		√	√	-	-	
50				Ma San Lei Lei Oo	Daughter	14	〃	-	-	-		√	√	-	-	
51				Mg Sein Linn	Son	12	〃	-	-	-		√	√	-	-	
52				Mg Nay Zin	Son	8	〃	-	-	-		√	√	-	-	

Sr. No	Township/ Village	Interviewer	Respondent	Q-1												Q-2
				Household Particular												How many year have you been living here?
				Name	Relation-ship	Age	Nationality/Religious	Occupation					Education			
								Farmer	Casual Labour	Selling	Carpenter	Others	Primary	Second-ary	Univer-sity	
53		Daw Tin Nwe Nwe Oo	U Kyaw Win	U Kyaw Win	Husband	40	Shan/Buddhist	√	-	-		-	√	-	-	
54				Daw Khin Sein	Wife	45	‖	√	-	-		-	√	-	-	40(year)
55				Ma Yin Yin Htet	Daughter	13	‖	√	-	-		-	√	-	-	
56				Ma May Zin Htet	Daughter	7	‖	-	-	-		√	√	-	-	
57				Ma Thanzin Pyo	Daughter	5	‖	-	-	-		√	√	-	-	
58		Daw Haymar Hnin	U San Shwe	U San Shwe	Husband	56	Bamar/Buddhist	√	-	-		-	√	-	-	56(year)
59				Daw Khin Toke	Wife	55	‖	√	-	-		-	√	-	-	
60				Mg Ye` Lin Naing	Son	20	‖	√	-	-		-		√	-	
61		Daw Theint Thu Thu Moe	Daw Hla Hla Win	U Zaw Oo	Husband	33	Bamar/Buddhist	-	-	-	√	-	-	√	-	31(year)
62				Daw Hla Hla Win	Wife	31	Shan/Buddhist	√	-	-		-	√	-	-	
63				Ma Kyi Wai Oo	Daughter	9	Bamar/Buddhist	-	-	-		√	√	-	-	
64				Ma Hay Man Oo	Daughter	5	‖	-	-	-		√	-	-	-	
65				Ma Pyae Sone Oo	Daughter	2	‖	-	-	-		√	-	-	-	
66		Daw Haymar Hnin	Daw Tin Hlaing	U Than Htay	Husband	40	Shan/Buddhist	√	-	-			√	-	-	40(year)
67				Daw Tin Hlaing	Wife	49	‖	-	-	√		-	√	-	-	
68				Ma Win Win Khine	Daughter	24	‖	√	-	-			√	-	-	
69				Ma Ei Ei Khine	Daughter	18	‖	-	-	-		√	-	√	-	
70				Mg Nayzin Wine	Son	16	‖	-	-	-		√	-	√	-	

Sr. No	Township/ Village	Interviewer	Respondent	Q-1												Q-2
				Household Particular												How many year have you been living here?
				Name	Relation-ship	Age	Nationality/Religious	Occupation					Education			
								Farmer	Casual Labour	Selling	Carpenter	Others	Primary	Second-ary	Univer-sity	
71		Daw Phyo Wai Lwin	U Tin Zaw Lat	U Hla Phe	Husband	70	Bamar/Buddhist	√	-	-			-	-	√	60(year)
72				Daw Tin Aye	Wife	65	〃	√	-	-			√	-	-	
73				Mg Tin Zaw Lat	Son	31	〃	√	-	-			-	-	√	
74				Mg Tin Kyaw Lat	Son	28	〃	√	-	-			-	√	-	
75				Ma Nyein Aye Lat	Daughter	20	〃	√	-	-			√	-	-	
76				Ma Nyein Htwe Myat	Daughter	18	〃	√	-	-			√	-	-	
77		Daw Tin Nwe Nwe Oo	Daw Win Myaing	U Shwe	Husband	38	Shan/Buddhist	√	-	-		-	√	-	-	30(year)
78				Daw Win Myaing	Wife	38	〃	√	-	-		-	√	-	-	
79				Ma Cho Cho Oo	Daughter	20	〃	√	-	-		-	√	-	-	
80				Ma Ei Ei Phyo	Daughter	17	〃	√	-	-		-	√	-	-	
81				Mg Kyaw Kyaw Aung	Son	13	〃	-	-	-		√	-	√	-	
82				Mg Kyaw Zin Aung	Son	11	〃	-	-	-		√	√	-	-	
83				Mg Aung Zin Win	Son	7	〃	-	-	-		√	√	-	-	
84	Indirect Affected Area							**47**	**1**	**2**	**2**	**2**	**60**	**12**	**2**	

Sr. No	Township/ Village	Q-3									Q-4													
		Does one of your familyworks away from home.																						
		Who					Where				Housing				Implements						Home Property			
		husband	wife	son	daugh-ter	other	capital	nearest district	over sea	other	Bamboo-Thatch	Bamboo-CGI	Timber-CGI	Brick-Concrete	Cart	Boat	Bicycle	Motor bike	Farm Truck	Car	Refrige-rator	TV	Radio	Other
1		-	-	-	-	-	-	-	-	-	-	-	-	√	-	-	-	√	-	√	-	√	√	-
2		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6		-	-	-	-	-	-	-	-	-	-	√	-	-	-	-	-	√	-	-	-	-	-	-
7		-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8		-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9		-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10		-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11		-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	√	-	-	-	-	-	-
12		-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	√	-
13		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	√	-	-	-	-	√	-
14		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16		-	-	-	-	-	-	-	-	-	-	-	√	-	-	-	-	√	-	-	-	√	-	-
17		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Sr. No	Township/ Village	Q-3									Q-4													
		Does one of your familyworks away from home.																						
		Who					Where				Housing				Implements						Home Property			
		husband	wife	son	daugh-ter	other	capital	nearest district	over sea	other	Bamboo-Thatch	Bamboo-CGI	Timber-CGI	Brick-Concrete	Cart	Boat	Bicycle	Motor bike	Farm Truck	Car	Refrige-rator	TV	Radio	Other
20		-	-	-	-	-	-	-	-	-	-	√	-	-	-	-	-	√	-	-	-	√	-	-
21		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24		-	-	-	-	-	-	-	-	-	-	√	-	-	-	-	-	-	-	-	-	-	-	-
25		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27		-	-	-	-	-	-	-	-	-	-	-	-	√	-	-	-	√	-	-	-	√	-	-
28		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
34		-	-	-	-	-	-	-	-	-	√	-	-	-	-	-	-	√	-	-	-	-	√	-
35		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
36		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
37		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Sr. No	Township/ Village	Q-3									Q-4													
		Does one of your familyworks away from home.																						
		Who					Where				Housing				Implements						Home Property			
		husband	wife	son	daugh-ter	other	capital	nearest district	over sea	other	Bamboo-Thatch	Bamboo-CGI	Timber-CGI	Brick-Concrete	Cart	Boat	Bicycle	Motor bike	Farm Truck	Car	Refrige-rator	TV	Radio	Other
38		-	-	-	-	-	-	-	-	-	-	-	√	-	-	-	-	√	-	-	-	√	-	-
39		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
41		-	-	-	-	-	-	-	-	-	-	-	√	-	√	-	-	√	√	-	-	√	√	√
42		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
43		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
44		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
47		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48		-	-	-	-	-	-	-	-	-	-	√						√				√		-
49		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
51		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
52		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Sr. No	Township/ Village	Q-3									Q-4													
		Does one of your familyworks away from home.																						
		Who					Where				Housing				Implements						Home Property			
		husband	wife	son	daugh-ter	other	capital	nearest district	over sea	other	Bamboo-Thatch	Bamboo-CGI	Timber-CGI	Brick-Concrete	Cart	Boat	Bicycle	Motor bike	Farm Truck	Car	Refrige-rator	TV	Radio	Other
53		-	-	-	-	-	-	-	-	-	√	-	-	-	-	-	-	√	-	-	-	√	-	-
54		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
55		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
56		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
57		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
58		-	-	-	-	-	-	-	-	-	-	√	-	-	-	-	-	√	-	-	-	√	√	-
59		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
60		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
61		-	-	-	-	-	-	-	-	-	-	√	-	-	-	-	-	√	-	-	-	-	-	-
62		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
63		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
64		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
65		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
66		-	-	-	-	-	-	-	-	-	-	√	-	-	√	-	-	-	-	-	-	√	√	-
67		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
68		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
69		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Sr. No	Township/ Village	Q-3									Q-4													
		Does one of your familyworks away from home.																						
		Who					Where				Housing				Implements						Home Property			
		husband	wife	son	daugh-ter	other	capital	nearest district	over sea	other	Bamboo-Thatch	Bamboo-CGI	Timber-CGI	Brick-Concrete	Cart	Boat	Bicycle	Motor bike	Farm Truck	Car	Refrige-rator	TV	Radio	Other
71		-	-	-	-	-	-	-	-	-	-	-	-	√	-	-	-	√	-	-	-	-	√	√
72		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
73		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
74		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
75		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
76		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
77		-	-	-	-	-	-	-	-	-	-	√	-	-	-	-	-	√	-	-	-	√	-	-
78		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
79		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
80		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
81		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
82		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
83		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
84											**2**	**8**	**3**	**3**	**2**		**1**	**15**	**1**	**1**		**14**	**8**	

Sr. No	Township/ Village	Q-5									Q-6							Q-7										
		Farming									Livestock							Income (Average per year x 1000)										
		Crop (acre)			Production (Bsk)			Price (Kyats)x1000			Cow	Buf-falo	Goat	Sheep	Chic-ken	Duck	Pig	Agri-culture	Vege-table	Live-stock	Fish-ing	Agro-Fore-stry	Selling (Particular)	Gover-nment Staff	Priva-te Staff	Daily worker/ work charge	Other	Total
		Paddy	Maize	Other	Paddy	Maize	Other	Pad-dy	Mai-ze	Other																		
1		-	25	-	-	438		-	3000	-	-	-	-	-	-	-	-	3000	-	-	-	-	-	-	-	-	-	3000
2		-		-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-
3		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-
4		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6		3	3	2	60	115	12	920	450	60	-	-	-	-	-	-	2	1600	-	-	-	-	-	-	-	500	-	2100
7		-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13		3	4	-	40	150	-	-	1350	-	-	1	-	-	25	-	-	1350	-	30	-	-	-	-	-	-	300	1680
14		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16		3	3	-	75	125	-	-	900	-	-	-	-	-	10	-	-	900	-	-	-	-	-	-	-	-	-	900
17		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Sr. No	Township/ Village	Q-5									Q-6							Q-7										
		Farming									Livestock							Income (Average per year x 1000)										
		Crop (acre)			Production (Bsk)			Price (Kyats)x1000			Cow	Buf-falo	Goat	Sheep	Chic-ken	Duck	Pig	Agri-culture	Vege-table	Live-stock	Fish-ing	Agro-Fore-stry	Selling (Particular)	Gover-nment Staff	Priva-te Staff	Daily worker/ work charge	Other	Total
		Paddy	Maize	Other	Paddy	Maize	Other	Pad-dy	Mai-ze	Other																		
20		1	2	-	20	125	-	-	900	-	2	2	-	-	5	-	2	900	-	300	-	-	-	-	-	-	-	1200
21		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24		-	3	-	-	125	-	-	800	-	-	-	-	-	21	-	1	800	-	100	-	-	-	-	450	-	-	1350
25		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27		5	10	5	80	400	6	780	3600	108	-	-	-	-	35	-	4	4308	-	-	-	-	-	-	-	-	-	4308
28		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
32		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
34		2	5	2	24	100	3	-	900	50	-	-	-	-	-	-	1	950	-	-	-	-	-	-	-	-	-	950
35		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
36		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
37		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Sr. No	Township/ Village	Q-5									Q-6							Q-7										
		Farming									Livestock							Income (Average per year x 1000)										
		Crop (acre)			Production (Bsk)			Price (Kyats)x1000			Cow	Buf-falo	Goat	Sheep	Chic-ken	Duck	Pig	Agri-culture	Vege-table	Live-stock	Fish-ing	Agro-Fore-stry	Selling (Particular)	Gover-nment Staff	Priva-te Staff	Daily worker/ work charge	Other	Total
		Paddy	Maize	Other	Paddy	Maize	Other	Pad-dy	Mai-ze	Other																		
38		2	7	1	80	300	4	-	2400	36	-	5	-	-	-	-	3	2436	-	-	-	-	-	-	-	-	-	2436
39		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
41		2	100	48	190	1500	-	-	13500	240	2	4	-	-	-	-	1	13740	-	-	-	-	-	-	-	-	400	14140
42		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
43		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
44		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
47		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48		-	7	-	-	200	-	-	1600	-	2	4	-	-	-	-	-	1600	-	-	-	-	-	-	-	-	-	1600
49		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
51		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
52		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Sr. No	Township/ Village	Q-5									Q-6							Q-7										
		Farming									Livestock							Income (Average per year x 1000)										
		Crop (acre)			Production (Bsk)			Price (Kyats)x1000			Cow	Buf-falo	Goat	Sheep	Chic-ken	Duck	Pig	Agri-culture	Vege-table	Live-stock	Fish-ing	Agro-Fore-stry	Selling (Particular)	Gover-nment Staff	Priva-te Staff	Daily worker/ work charge	Other	Total
		Paddy	Maize	Other	Paddy	Maize	Other	Pad-dy	Mai-ze	Other																		
53		2	3	2	40	40	5	320	320	80	-	-	-	-	-	-	2	720	-	-	-	-	-	-	-	-	2780	3500
54		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
55		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
56		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
57		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
58		4	10	4	40	150	19	-	1200	120	2	5	-	-	-	-	1	1320	-	150	-	-	-	-	-	-	-	1470
59		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
60		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
61		1	4	2	4	100	3	-	800	32	-	-	-	-	-	-	1	832	-	-	-	-	-	-	-	-	1800	2632
62		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
63		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
64		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
65		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
66		5	10	6	30	200	30	-	900	250	2	-	-	-	-	-	3	1150	-	450	-	-	-	-	-	-	700	2300
67		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
68		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
69		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Sr. No	Township/ Village	Q-5									Q-6							Q-7										
		Farming									Livestock							Income (Average per year x 1000)										
		Crop (acre)			Production (Bsk)			Price (Kyats)x1000			Cow	Buf-falo	Goat	Sheep	Chic-ken	Duck	Pig	Agri-culture	Vege-table	Live-stock	Fish-ing	Agro-Fore-stry	Selling (Particular)	Gover-nment Staff	Priva-te Staff	Daily worker/ work charge	Other	Total
		Paddy	Maize	Other	Paddy	Maize	Other	Pad-dy	Mai-ze	Other																		
71		2	6	2	25	200	7	-	1600	112	3	5	-	-	1	-	3	1712	-	500	-	-	-	-	-	-	-	2212
72		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
73		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
74		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
75		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
76		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
77		4	6	2	36	175	7	-	1400	126	-	-	-	-	-	-	1	1526	-	-	-	-	-	-	-	-	1286	2812
78		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
79		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
80		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
81		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
82		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
83		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
84		**39**	**208**	**76**	**744**	**4005**	**96**	**2020**	**35620**	**1214**	**13**	**26**			**97**		**27**	**38844**		**1530**		**0**			**450**	**500**	**7266**	**48590**

Sr. No	Township/ Village	Q-8									Q-9					Q-10					Q-11		
		Expenses (Average per year x1000)									Drinking Water					Electricity					If electricity is not available what are the current energy sources?		
		Food	Educat-ion	Health	Social/ Religion	House repair	Farm Inputs	Domestic use and cloths, etc.	Others	Total	River/ Stream	Open Well	Lake	Tube Well	Pipe Line	24 hour	12 hour	6 hour	3 hour	None	Lightion	Fuel	Others
1		1080	144	60	60	-	1500	60	-	2904	√	-	-	-	-	√	-	-	-	-	Candle	Fire wood	-
2		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6		1800	-	100	100	-	200	150	-	2350	√	-	-	-	-	-	-	-	-	√	Solar	Fire wood	-
7		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11		-	-	-	-	-	-	-	-	-	-	-	√	-	-	-	-	-	-	√	-	-	-
12		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13		720	-	48	200	-	680	60	-	1708	√	-	-	-	-	-	-	-	-	√	Solar	Fire wood	-
14		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16		360	240	40	60	-	400	30	-	1130	-	-	-	-	√	-	-	-	-	√	Solar	Fire wood	-
17		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Sr. No	Township/ Village	Q-8									Q-9					Q-10					Q-11		
		Expenses (Average per year x1000)									Drinking Water					Electricity					If electricity is not available what are the current energy sources?		
		Food	Educat-ion	Health	Social/ Religion	House repair	Farm Inputs	Domestic use and cloths, etc.	Others	Total	River/ Stream	Open Well	Lake	Tube Well	Pipe Line	24 hour	12 hour	6 hour	3 hour	None	Lightion	Fuel	Others
20		540	36	60	60	-	400	60	-	1156	-	-	-	-	√	-	-	-	-	√	Solar	Fire wood	-
21		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24		900	-	60	60	-	300	36	-	1356	√	-	-	-	√	-	-	-	√	√	Candle	Fire wood	-
25		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27		1080	11	30	100	-	780	300	6	2307	√	-	-	-	-	-	-	-	√	-	Solar Light	Fire wood	-
28		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
34		360	20	40	150	50	315	100	-	1035	√	-	-	-	-	-	-	-	-	√	Solar Light	Fire wood	-
35		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
36		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
37		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Sr. No	Township/ Village	Q-8									Q-9					Q-10					Q-11		
		Expenses (Average per year x1000)									Drinking Water					Electricity					If electricity is not available what are the current energy sources?		
		Food	Educat-ion	Health	Social/ Religion	House repair	Farm Inputs	Domestic use and cloths, etc.	Others	Total	River/ Stream	Open Well	Lake	Tube Well	Pipe Line	24 hour	12 hour	6 hour	3 hour	None	Lightion	Fuel	Others
38		840	90	30	100	-	450	60	-	1570	√	-	-	-	-	-	-	-	-	√	Solar	Fire Wood	-
39		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
41		1500	300	1200	400	-	9000	300	-	12700	√	-	-	-	-	-	-	-	-	√	Solar	Fire Wood	-
42		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
43		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
44		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
47		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48		900	60	36	60	60	400	60	-	1576	-	-	-	-	√	-	-	-	-	√	Solar	Fire wood	-
49		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
51		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
52		-	-	-	-	-	-	-	-	-	√	-	-	-	-	-	-	-	-	-	-	-	-

Sr. No	Township/ Village	Q-8									Q-9					Q-10					Q-11		
		Expenses (Average per year x1000)									Drinking Water					Electricity					If electricity is not available what are the current energy sources?		
		Food	Educat-ion	Health	Social/ Religion	House repair	Farm Inputs	Domestic use and cloths, etc.	Others	Total	River/ Stream	Open Well	Lake	Tube Well	Pipe Line	24 hour	12 hour	6 hour	3 hour	None	Lightion	Fuel	Others
53		1296	200	300	100	100	770	300	150	3216	√	-	-	-	-	-	-	-	-	√	Solar	Fire wood	-
54		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
55		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
56		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
57		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
58		360	-	10	100	-	800	40	-	1310	-	-	-	-	√	-	-	-	-	√	Candle	Fire wood	-
59		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
60		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
61		1980	2	300	20	-	80	120	286	2788	√	-	-	-	-	-	-	-	-	√	Solar	Fire wood	-
62		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
63		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
64		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
65		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
66		900	800	50	100	-	800	100	-	2750	√	-	-	-	-	-	-	-	-	√	Solar	Fire wood	Coal
67		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
68		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
69		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Sr. No	Township/ Village	Q-8									Q-9					Q-10					Q-11		
		Expenses (Average per year x1000)									Drinking Water					Electricity					If electricity is not available what are the current energy sources?		
		Food	Educat-ion	Health	Social/ Religion	House repair	Farm Inputs	Domestic use and cloths, etc.	Others	Total	River/ Stream	Open Well	Lake	Tube Well	Pipe Line	24 hour	12 hour	6 hour	3 hour	None	Lightion	Fuel	Others
71		1095	-	200	200	50	700	200	250	2695	-	-	-	-	√	-	-	-	-	√	Solar	Fire wood	-
72		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
73		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
74		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
75		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
76		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
77		1336.4	260	530	50	170	457	30	210	3043.4	√	-	-	-	-	-	-	-	-	√	Solar	Fire wood	Coal
78		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
79		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
80		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
81		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
82		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
83		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
84		**17047.4**	**2163**	**3094**	**1920**	**430**	**18032**	**2006**	**902**	**45594.4**	13		**1**		**6**	**1**			**2**	**17**			

Sr. No	Township/ Village	Q- 12			Q-13	Q-14							Q-15						Q-16			
		Where you get electricity?			Average electricty use per month total unit	The use of present electric appliances							If you can electricity in future, what kind of productive activities will you start by using electricity						For new electricity Services			
		Government	Private	Village Lighting Committee		Lighting	TV	Video	Radio	Refrige-rator	Electric Motor	Other	Agricul-ture	Chicken farm	Handi-craft	Restau-rant	No idea	Others	For initial cost		For monthly charge	
		Unit rate (Kyat)	Unit rate (Kyat)	Unit rate (Kyat)															Yes	No	Yes	No
1		-	-	-	-	√	√	-	√	-	-	-	-	-	-	-	-	-	√	-	√	-
2		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	√	√	-	√	-
7		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11		-	-	-		√	-	-	-	-	-	-	√	-	-	-	-	-	-	-	-	-
12		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13		-	-	-	-	√	-	-	-	-	-	-	√	-	-	-	-	-	-	√	-	√
14		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16		-	-	-	-	√	√	-	-	-	-	-	√	-	-	-	-	-	√	-	√	-
17		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Sr. No	Township/ Village	Q- 12			Q-13	Q-14							Q-15						Q-16			
		Where you get electricity?			Average electricty use per month total unit	The use of present electric appliances							If you can electricity in future, what kind of productive activities will you start by using electricity						For new electricity Services			
		Government	Private	Village Lighting Committee		Lighting	TV	Video	Radio	Refrige-rator	Electric Motor	Other	Agricul-ture	Chicken farm	Handi-craft	Restau-rant	No idea	Others	For initial cost		For monthly charge	
		Unit rate (Kyat)	Unit rate (Kyat)	Unit rate (Kyat)															Yes	No	Yes	No
20		-	-	-		√	√	-	-	-	-	-	-	-	-	-	-	√	√	-	√	-
21		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	√	√	-	√	-
25		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27		-	-	-		√	√	-	-	-	-	-	-	-	-	-	√	-	√	-	√	-
28		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
34		-	-	-		-	-	-	-	-	-	-	-	-	-	-	√	-	√	-	√	-
35		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
36		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
37		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Sr. No	Township/ Village	Q- 12			Q-13	Q-14							Q-15						Q-16			
		Where you get electricity?			Average electricty use per month total unit	The use of present electric appliances							If you can electricity in future, what kind of productive activities will you start by using electricity						For new electricity Services			
		Government	Private	Village Lighting Committee		Lighting	TV	Video	Radio	Refrige-rator	Electric Motor	Other	Agricul-ture	Chicken farm	Handi-craft	Restau-rant	No idea	Others	For initial cost		For monthly charge	
		Unit rate (Kyat)	Unit rate (Kyat)	Unit rate (Kyat)															Yes	No	Yes	No
38		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	√	√	-	√	-
39		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
41		-	-	-		√	√	√	-	-	-	-	-	-	-	-	-	√	√	-	√	-
42		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
43		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
44		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
47		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48		-	-	-		√	√	√	-	-	-	-	-	-	-	√	-	-	√	-	√	-
49		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
51		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
52		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Sr. No	Township/ Village	Q- 12			Q-13	Q-14							Q-15						Q-16			
		Where you get electricity?			Average electricty use per month total unit	The use of present electric appliances							If you can electricity in future, what kind of productive activities will you start by using electricity						For new electricity Services			
		Government	Private	Village Lighting Committee		Lighting	TV	Video	Radio	Refrige-rator	Electric Motor	Other	Agricul-ture	Chicken farm	Handi-craft	Restau-rant	No idea	Others	For initial cost		For monthly charge	
		Unit rate (Kyat)	Unit rate (Kyat)	Unit rate (Kyat)															Yes	No	Yes	No
53		-	-	-		√	√	-	-	-	-	-	-	-	-	-	-	-	√	-	√	-
54		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
55		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
56		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
57		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
58		-	-	-		-	-	-	-	-	-	-	-	-	-	-	√	-	√	-	√	-
59		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
60		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
61		-	-	-		√	-	-	-	-	-	-	-	-	-	-	-	√	√	-	√	-
62		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
63		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
64		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
65		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
66		-	-	-		√	√	-	√	-	-	-	-	-	-	√	-	-	√	-	√	-
67		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
68		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
69		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Sr. No	Township/ Village	Q- 12			Q-13	Q-14							Q-15						Q-16			
		Where you get electricity?			Average electricty use per month total unit	The use of present electric appliances							If you can electricity in future, what kind of productive activities will you start by using electricity						For new electricity Services			
		Government	Private	Village Lighting Committee		Lighting	TV	Video	Radio	Refrige-rator	Electric Motor	Other	Agricul-ture	Chicken farm	Handi-craft	Restau-rant	No idea	Others	For initial cost		For monthly charge	
		Unit rate (Kyat)	Unit rate (Kyat)	Unit rate (Kyat)															Yes	No	Yes	No
71		-	-	-		-	-	-	√	-	-	√	-	-	-	-	-	√	√	-	√	-
72		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
73		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
74		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
75		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
76		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
77		-	-	-		√	√	-	-	-	-	-	-	-	-	√	-	-	√	-	√	-
78		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
79		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
80		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
81		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
82		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
83		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
84						**5**	**9**	**2**	**3**			**1**	**3**			**3**	**3**	**7**	**16**	**1**	**16**	**1**

APPENDIX F
Feedback and Agreement of Public consultation

Hydropower & Solar Energy
Block (3), Unit (4) , Mingalar Mandalay Shop House, 73th Street,
Chan Mya Thar Si Township, Mandalay.
Phone : 02-2000125, 02-2000126, 09250848310, 011201635
E-mail : mmhydropower@mandalay.net.mm

“ တိကဝတ်ပြုခြင်း ”

°မိတို့ Hydropower & Solar Energy Development Co.,Ltd သည် ရှမ်းပြည်နယ်မြောက်ပိုင်း၊ နောင်ချိုဦနယ်တွင် တည်ရှိသည့် ငါးလှရေအားလျှပ်စစ် စီမံကိန်း၏ ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း အစီရင်ခံစာပါ ပတ်ဝန်းကျင်ထိခိုက်မှု လျော့နည်းရေးလုပ်ငန်းများနှင့် အစီအစဉ်များကို အပြည့်အဝ အစဉ်အမြဲ လိုက်နာ ဆောင်ရွက်မည် ဖြစ်ပါကြောင်း ကတိကဝတ်ပြုအပ်ပါသည်။

လေးစားစွာဖြင့်

F:\MHD\H&S Letter.docx

အုပ်ချုပ်မှုဒါရိုက်တာ၊
မြန်မာရေအားလျှပ်စစ်ဖွံ့ဖြိုးမှုကုမ္ပဏီလီမိတက်၊
ရွှေလေးမြို့၊

ရက်စွဲ - 19.10.2016

အကြောင်းအရာ။ ။ ရေအားလျှပ်စစ်ထုတ်လုပ်ခြင်းအတွက် သဘောတူကြောင်း၊

အထက်ပါကိစ္စနှင့်ပတ်သက်၍ လုပ်ငန်းခွင်တွင်ဆွေးနွေးပါရှိသော တောင်သူများမှ သဘောတူညီကြောင်း သိရှိရပါသည်။ သို့ပါ၍ တောင်သူများ၏ သဘောတူလက်မှတ်ရေးထိုးထားသောစာရွက်စာတမ်းများအား ပူးတွဲတင်ပြတောင်းခံအပ်ပါသည်။

အုပ်ချုပ်ရေးမှူး
ဘန်းမွေးကျွန်းကျေးရွာအုပ်စု၊ နောင်ချိုမြို့နယ်

ထောက်ခံချက်

ရက်စွဲ။ ။ ၇-၃-၂၀၁၇

နောင်ချိုမြို့နယ် ဘန့်ဘွေးကျင်းကျေးရွာ အုပ်စု ဘန့်ဘွေးကျင်း ကျေးရွာမှ တောင်သူများအား မြေယာ နစ်နာကြေး ပေးချေပြီး ဖြစ်သည်မှာ မှန်ကန်ကြောင်း ထောက်ခံပါ အသိသက်သေများ ရှေ့တွင် လက်မှတ်ထိုးပြီး ဖြစ်ပါသည်။

အသိသက်သေများ

၁။ ဦးကျော်ဝင်း ၁၃/နခတ(နိုင်) ၀၂၉၄၄၂

၂။ ဦးထွန်းအေး ၁၃/နခတ(နိုင်) ၀၃၉၇၈၅

၃။ ဦးရွှေ ၁၃/နခတ(နိုင်) ၀၃၉၇၃၅

၄။ ဦးအုံးကြိုင် ၁၃/နခတ(နိုင်) ၀၃၉၇၂၅

၅။ ဦးကျော်လှိုင် ၁၃/နခတ(နိုင်) ၀၃၉၆၈၉

၆။ ဦးအုံးကျော် NKO ၀၀၆၉၀၄

၇။ ဦးသိုင်းရှိ NKO ၀၃၃၄၉၀

၈။ ဒေါ်ခိုင်ဦး ၁၃/နခတ(နိုင်) ၀၆၄၅၈၇

အုပ်ချုပ်ရေးမှူး
ဘန့်ဘွေးကျင်းကျေးရွာအုပ်စု၊နောင်ချိုမြို့

ထောက်ခံချက်

ဘန့်ကွေးကျွန်းကျေးရွာအုပ်စု သပြေဦးကျေးရွာမှ

အသိသက်သေများ

၁။ ဦးဆန်းအောင် ၁၃/နဒတ(နိုင်) ၀၆၄၆၆၀၄ ကျော်

၂။ ဦးဆိုင်ကံအောင် ၁၃/နဒတ(နိုင်) ၀၇၃၈၃၂

၃။ ဦးဝင်းမြင့် ၁၃/နဒတ(နိုင်) ၁၈၁၉၈၆ ဝင်း

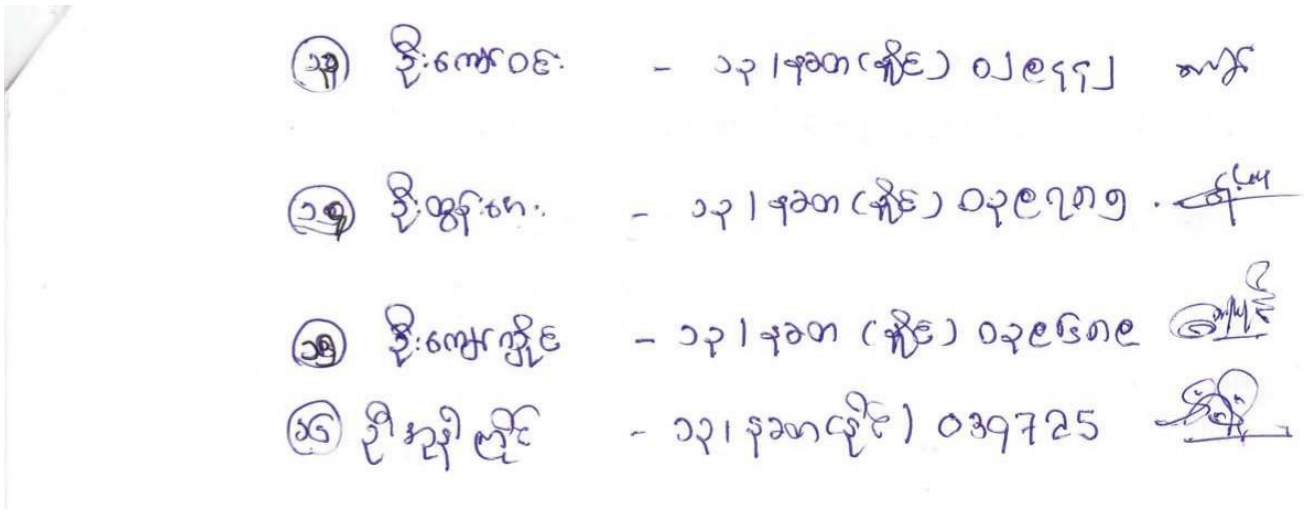
၄။ ဦးဥတ္တမ ၁၃/နဒတ(နိုင်) ၀၃၉၆၈၆

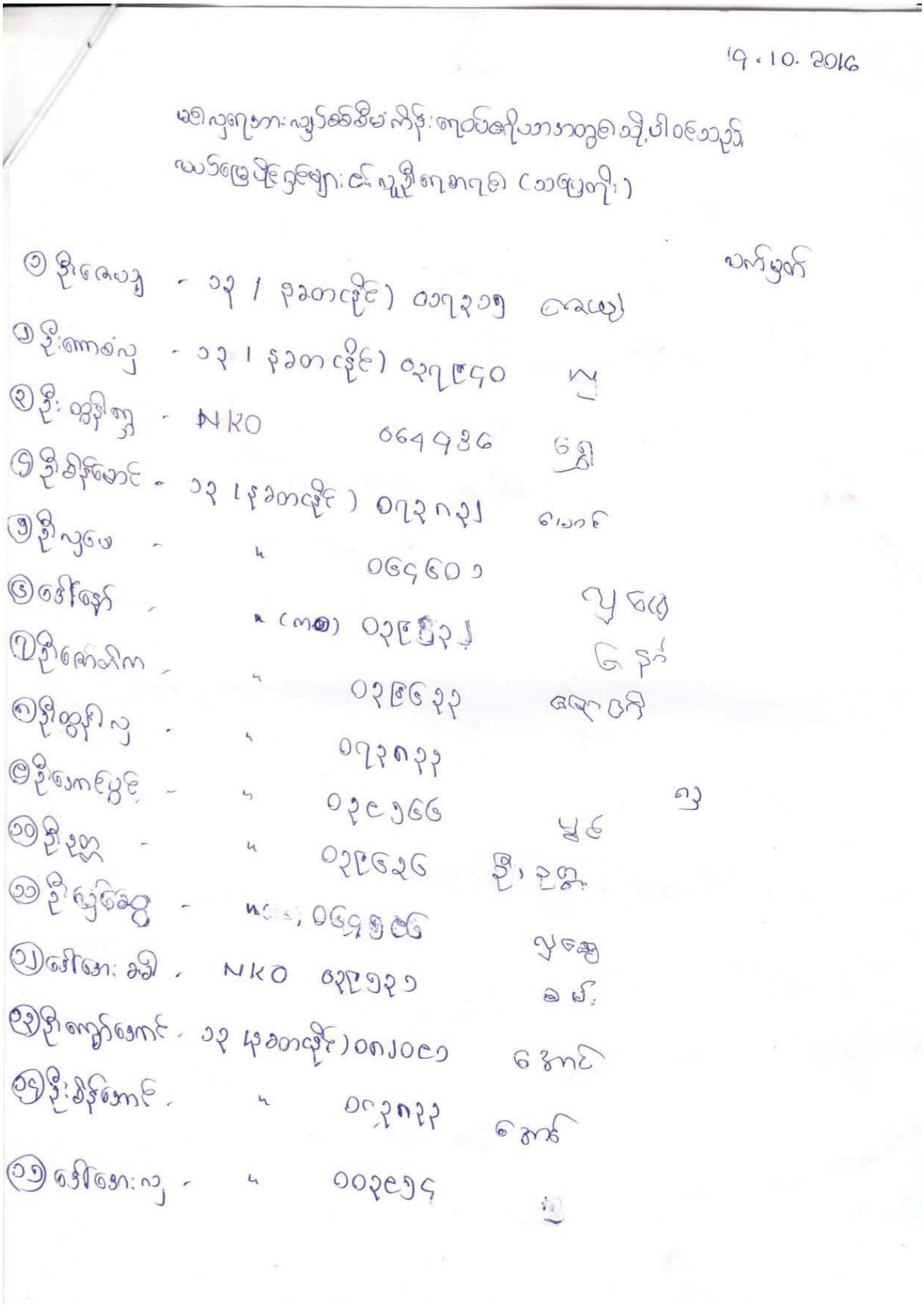
၅။ ဒေါ်ခင်ဝင်းကြည် ၁၃/နဒတ(နိုင်) ၀၆၈၄၀၆

Date . 18.10.2016

မင်းကျရေကား ကျွဲပဖက် ဒြိမ်ကိန်း ရေဝပ်ဧရိယာကျွေး သို့
ပါဝင်သည့် (ဥဩဖာ) ကပေဒေ လာသောသောမြေ ပိုင်ရှင်များ
ဖြစ် ဦးရေတရင်း (တိုက်ကျေး ကျူဓ)

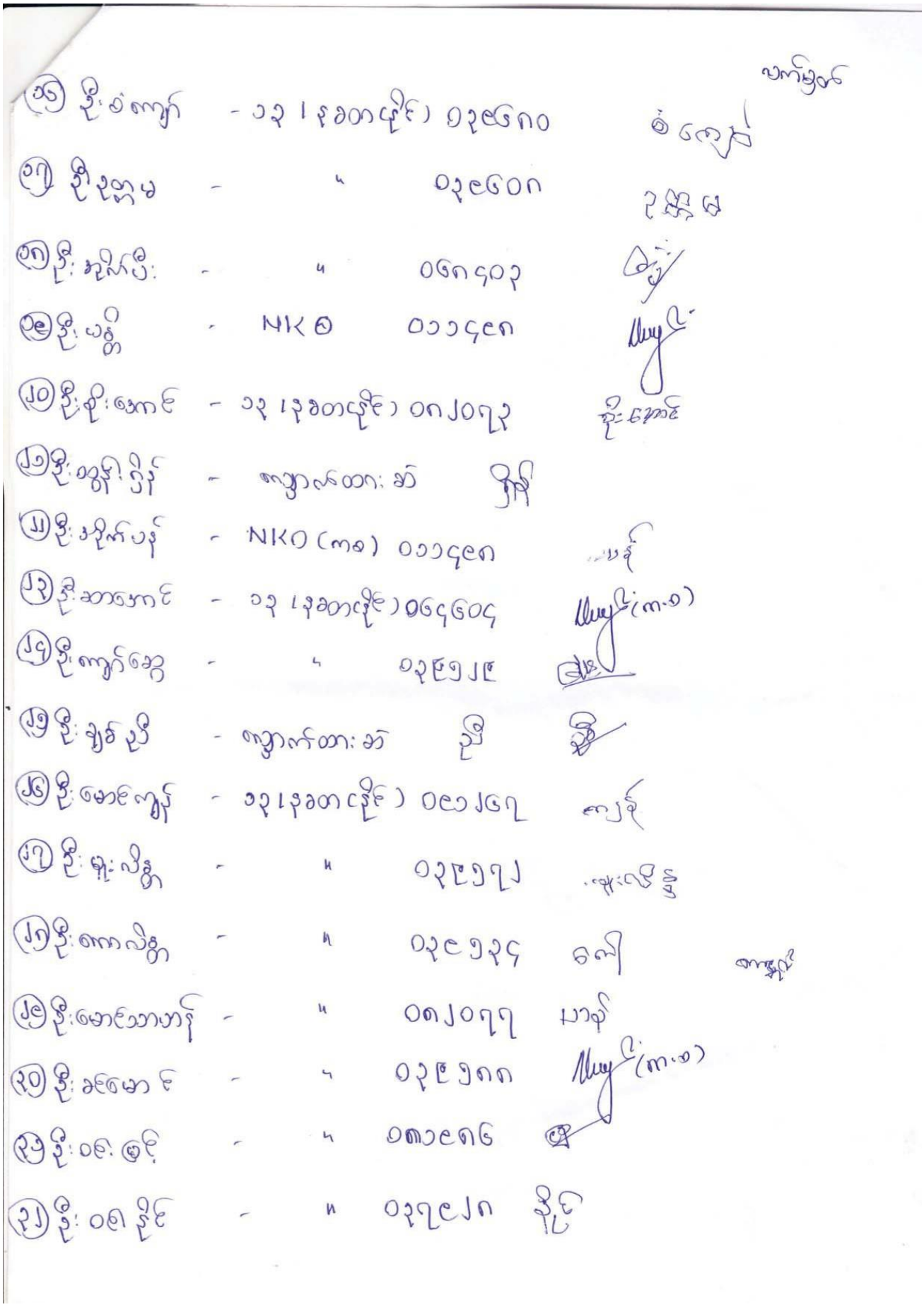
			လက်မှတ်
၁	ကိုနိုင်မင်း	- ၉/နတက(နိုင်)၁၀၂၃၀၃	နိုင်မင်း
၂	ဦးအုန်းမြင့် + ဒေါ်စိန်ကြည်	- ၁၃/နဓတ(နိုင်)၀၇၃၈၂၃	အုန်းမြင့်
၃	ဦးကျော်ဦး + မသန်းသန်းနိုင်	- ၁၃/နဓတ(နိုင်)၀၉၁၂၈၅	သန်းနိုင်
၄	ဒေါ်မြရင်(ကခ) ဒေါ်ဆိုဆိုမာ	- ၁၃/နဓတ(နိုင်)၀၆၄၆၅၉၀	ဒေါ်မြရင်
၅	ဦးကျော်ဝင်း	- ၁၃/နဓတ(နိုင်)၀၂၉၄၄၂	ကျော်
၆	ဦးဖေဝင်း(နိုင်)	- ၁၃/နဓတ(နိုင်)၀၃၇၃၉၆	ဖေဝင်း
၇	ဦးစိုးမောင်	- ၁၃/နဓတ(နိုင်)၀၃၉၆၉၃	ဦးစိုးမောင်
၈	ဦးစိုးမြ	- ၁၃/နဓတ(နိုင်)၀၃၉၇၇၂	စိုး
၉	ဦးအောင်သူ	- ၁၃/နဓတ(နိုင်)၁၀၉၄၀၅	အောင်သူ
၁၀	ဦးထွန်းရင်	- ၁၃/နဓတ(နိုင်)၀၃၉၇၇၇	ထွန်းရင်
၁၁	ဦးပိုးလှ	- ၉/မမန(နိုင်)၀၅၂၈၁၁	ပိုးလှ
၁၂	ဦးငွေ	- ၁၃/နဓတ(နိုင်)၀၃၉၇၃၅	ဦးငွေ

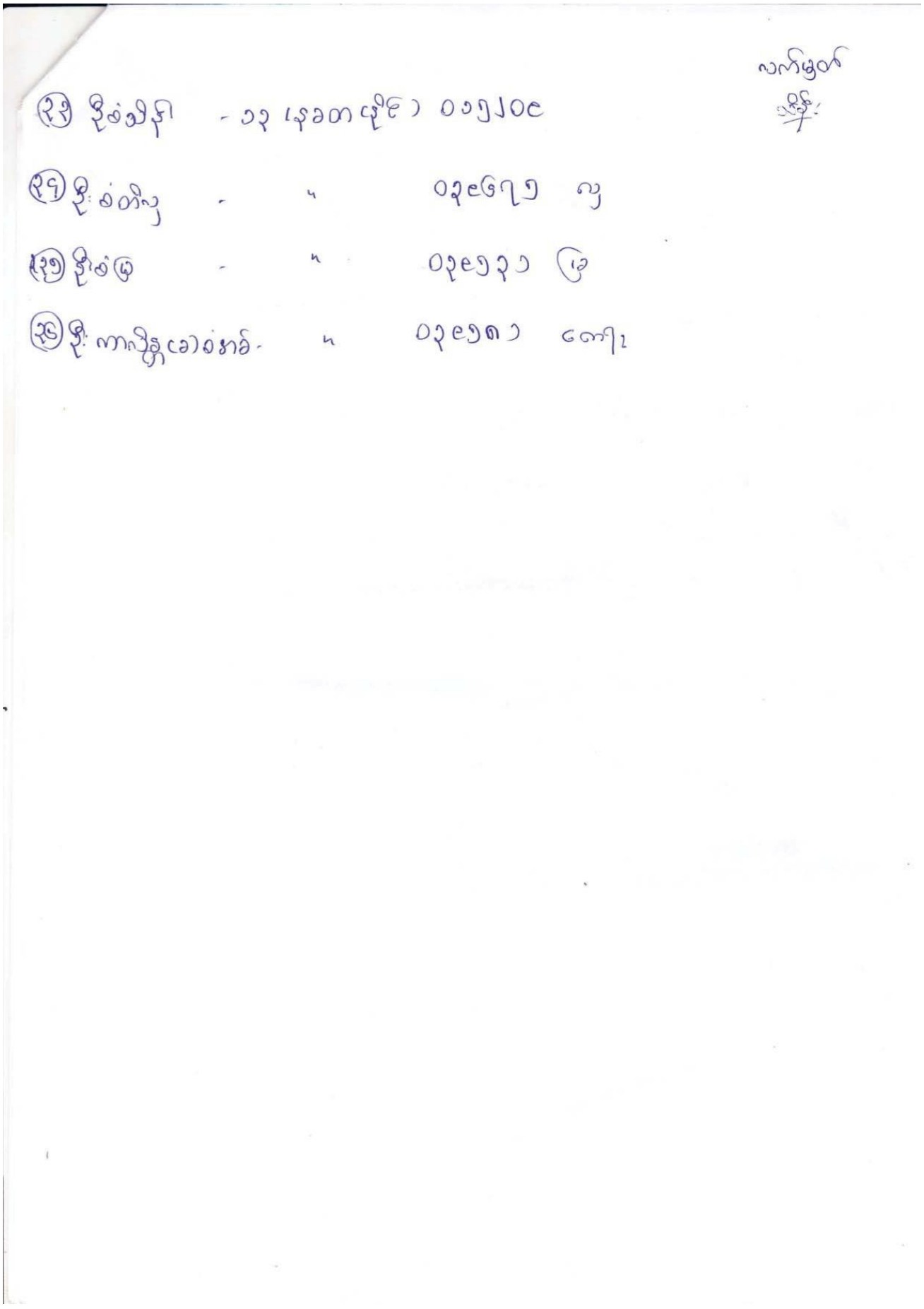




19.10.2016

မတ်မှတ်





APPENDIX G
Social Survey Photos

Weir Site of Project Area

One of Construction Site

Soil Profile of Cutting

Line Stone in Project Area

Social Survey in Project Area

Social Survey in Project Area

Social Survey in Project Area

Social Survey in Project Area

Forest Fire in Project Area

Deforestation in Project Area

Sampling of Water in Min Hla Chaung

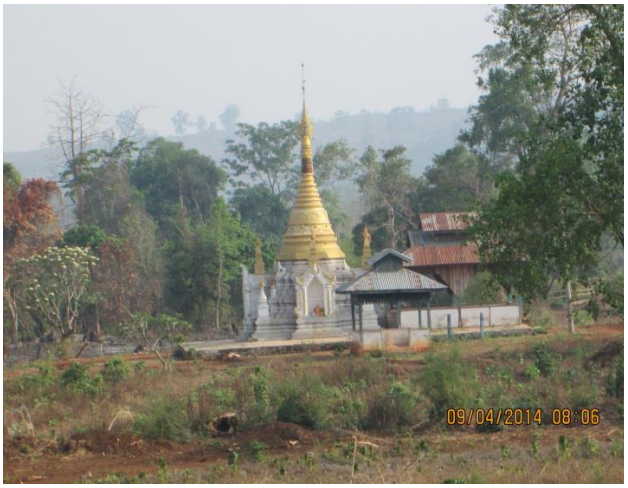
Thapye Doe Chaung

Primary School in Thapyae Doe Village

Primary School in BanbweKyin Village

Monastery in Thapye Doe Village

Monastery in Babbwekyin Village



Pagoda in Banbwekyin Village

Crop Growing in Banbwekyin Village

Grocery in Banbwekyin Village

Collection of Firewood in Village

Buffalo in Village

Farm Truck in Village

Forest Fire in Project Area

Water Facilities in Village

Sub- Rural Health Center in Banbwekyin Village

Paddy Land Project Area

Water Fall of Min Hla Chaung

Forest Fire in Project Area

APPENDIX H
Public Consultation Meeting Photos (16.8.2016)








Meeting Minute (Burmese Language)

ရှမ်းပြည်နယ် မြောက်ပိုင်း၊ နောင်ချိုမြို့ နယ်၊ Myanmar Hydropower Development Co., Ltd ၏

မင်းလှ ရေအားလျှပ်စစ်လုပ်ငန်းအတွက်

ပတ်ဝန်းကျင်နှင့် လူမှုရေးအကျိုးသက်ရောက်မှု အကဲဖြတ်ခြင်း အလုပ်ရုံဆွေးနွေးပွဲ

(မှတ်တမ်း)

၁။ ဦးသီဟဝမ်းဖေ (ထွေ/အုပ်၊နောင်ချိုမြို့)
အဖွင့်အမှာစကား

မင်းလှစီမံကိန်းနှင့်ပတ်သက်ပြီး သဘာဝပတ်ဝန်းကျင်ထိခိုက်မှု ဇီဝမျိုးစိတ် တိရစ္ဆာန်မျိုးသုန်းပျောက်ကွယ်မှုထိန်းချုပ်ရေးနှင့် အခြားကျန်းမာရေးနှင့်ဆိုင်သော အကျိုးသက်ရောက်မှု ရှိမှုမရှိမှုအတွက် လာရောက်ရှင်းလင်းတင်ပြခြင်းဖြစ်ပါသည်။ တက်ရောက်လာကြသော သက်ဆိုင်ရာကုမ္ပဏီ ၊ အကြံပေးအဖွဲ့ပညာရှင်များ ၊ လွှတ်တော်ကိုယ်စားလှယ် ၊ စည်ပင်သာယာရေးဥက္ကဋ္ဌ၊ ဌာနဆိုင်ရာအကြီးကဲ၊ ရပ်ကွက်ကျေးရွာ အုပ်ချုပ်ရေးမှူးများ အခမ်းအနားကို စိတ်ပါဝင်စားစွာဖြင့် တက်ရောက်ပေးတဲ့အတွက် အထူးကျေးဇူးတင်ပါတယ်။ ဒီနေ့ကတော့ စီမံကိန်းဆောင်ရွက်မည့် နေရာမှာ ပျက်စီးမှု ယိုယွင်းမှု ရှိမရှိကို ရေအားလျှပ်စစ်စီမံကိန်းနေရာ ချပြဆွေးနွေးသွားမှာ ဖြစ်ပါတယ်။ ခုလိုဆောင်ရွက်ရာမှာလည်း သက်ဆိုင်ရာပညာရှင်များက နိုင်ငံတော်အဆင့်၊ ကမ္ဘာ့ကျန်းမားရေးအဖွဲ့က ကျန်းမာရေးထိခိုက်မှုတွေ၊ သဘာဝပတ်ဝန်းကျင်ကို ထိန်းသိမ်းမှုလုပ်ငန်းများကို ကျွန်တော်တို့က ချပြရှင်းလင်းတင်ပြမှာဖြစ်ပါတယ်။

၂။ ဦးအေးမြင့် (NEPS Co.,Ltd)

ကျွန်တော်တို့ ဒီနေ့ ပတ်ဝန်းကျင် ထိန်းသိမ်းရေးနှင့်ပတ်သက်လို့ EIA, SIA လုပ်ငန်းတွေအပေါ် အားလုံးစုံစံညီညီ သက်ဆိုင်ရာ နောင်ချိုမြို့နယ် တာဝန်ခံအရာရှိများနှင့်အတူ သက်ဆိုင်ရာဒေသ ကျေးရာလူတွေ စုံစည်ညီတွေ့ရတဲ့အတွက် ကျွန်တော်တို့ကုမ္ပဏီက ဝမ်းမြောက်ဝမ်းသာ ဖြစ်မိကြောင်း ပထမအနေနဲ့ပြောကြားလိုပါတယ်။ ကျွန်တော်တို့ နိုင်ငံအနေနဲ့ တော်တော်လေးကို ခြေလှမ်းသွားနေရတဲ့အနေထားမှာ အားလုံးသိကျတဲ့အတိုင်း ကျွန်တော်တို့က အထူးသဖြင့် လျှပ်စစ်မီးဟာ နိုင်ငံဖွံ့ဖြိုးရေးအတွက် လုပ်ဆောင်ရမည့်အချက်ဖြစ်နေပါတယ်။ နိုင်ငံတော်အတွက် လျှပ်စစ်မီးရရှိရေးဆောင်ရွက်သည့် နေရာမှာ နိုင်ငံတော်အဆင့် လျှပ်စစ်အကြီးစားစီမံကိန်း၊ ဓာတ်ငွေ့စီမံကိန်း၊ လျှပ်စစ်ကို နည်းမျိုးစုံနဲ့ ရအောင်ဖန်တီးဆောင်ရွက်နေကျသလို ဒေသအလိုက် လိုအပ်ချက်အရ ဒေသဖွံ့ဖြိုးရေးအတွက် ဒေသမှာရှိတဲ့ ချောင်း၊ရေမြေတွေကို အခြေခံပြီး ဆောင်ရွက်နေတဲ့ ရေအားလျှပ်စစ်စီမံကိန်းတေရှိကြပါသည်။ အားလုံးသိကျသည့်အတိုင်း ရေအားလျှပ်စစ်လုပ်ပြီဆိုတာနဲ့ ရေကိုအသုံးချရပါတယ်။ လျှပ်စစ်အနည်းအများဆိုတာလဲ ရေစီးအားပေါ် မူတည်ပါတယ်။ အလျားလိုက်ရေစီးရုံနဲ့မရပါဘူ

အထက်နဲ့အောက် အပေါ်ကနေ စီးလာတဲ့ရေ Level နဲ့ လျှပ်စစ်ထုတ်မည့်ရေ Level အမြင့် ဒီအပေါ်မှာမှုတည်ပြီ လျှပ်စစ်ဓာတ်အား ထုတ်ယူရရှိတာပါ။ လျှပ်စစ်ထုတ်ယူရာမှာ ယနေ့ကြုံတွေ့နေရတဲ့ မြစ်ဆုံစီမံကိန်းဆိုရင် ရေလှောင်တမံ အကြီးကြီး လုပ်ရပါတယ်။

ကျွန်တော်တို့ မင်းလှစီမံကိန်းဟာဆိုရင် ရေလှောင်တမံမဟုတ်ပါဘူး ရေလွှဲဆည်မျိုးလေး နဲ့လုပ်ပါတယ်။ ပြောရမယ်ဆိုရင် ကျွန်တော်တို့နိုင်ငံအခြေအနေက အရှေ့တောင်အာရှမှာ ရေမြေ၊သဘာဝသယံဇာတ ပေါကြွယ်တဲ့နိုင်ငံဆိုတာ အားလုံးသိပြီးဖြစ်ပါတယ်။ ဒီလိုပေါကြွယ်တဲ့ ရေမြေ၊သယံဇာတတွေကို အသုံးချပြီးတော့ နိုင်ငံဖွံ့ဖြိုးရေးအတွက် အရင်အစိုးရအဆက်ဆက်၊ ယခုအစိုးရရော လုပ်နေကျတာဖြစ်ပါတယ်။ ဒီလိုလုပ်ကျတဲ့အခါ အားလုံးသိကျတဲ့အတိုင်း သဘာဝပတ်ဝန်းကျင်ကို ဆန့်ကျင်ပြီး လုပ်ရတာဖြစ်ပါတယ်။ သဘာဝကိုဆန့်ကျင်ပြီး လုပ်ရတာဖြစ်တဲ့ အတွက် တစ်စုံတစ်ရာတော့ ထိခိုက်မှု၊အကျိုးသက်ရောက်မှု၊ အကျိုးသက်ရောက်မှုမှာလည်း အကောင်း၊ အဆိုးတွေရှိပါတယ်။ ကျန်တော်တို့နိုင်ငံမှာ တစ်ကြိမ်တစ်ခါမှ မရှိခဲ့တဲ့ သဘာဝပတ်ဝန်းကျင် ဥပဒေဆိုတာ ၂၀၁၂ခုနှစ်မှာ ပေါ်လာပါတယ်။ သဘာဝပတ်ဝန်းကျင်ဥပဒေ ပေါ်ပေါက်လာပြီး နောက်မှာတော့ စည်းကမ်းဥပဒေ ပေါ်လာပါတယ်၊ ပေါ်လာတဲ့အခါမှာတော့ အရင်လိုတော့ လွယ်လွယ်ကူကူ လုပ်လို့မရတော့ပါဘူ။

ကျွန်တော်တို့နိုင်ငံ သဘာဝပတ်ဝန်းကျင်နှင့်သစ်တောထိန်းသိမ်းရေး ဝန်ကြီးဌာန အောက်မှာ ရှိတဲ့ သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန အသစ်ဖွဲ့တဲ့အဖွဲ့အနေဖြင့် ဒီဘာသာရပ်ဟာ ကျွန်တော်တို့နိုင်ငံအနေနဲ့ အသစ်ဆန်းဖြစ်နေပါတယ်။ အိမ်နီးချင်းနိုင်ငံ အာဆီယံနိုင်ငံတွေမှာတော့ ထမင်းစား ရေသောက်ဖြစ်နေပါပြီး။ ကျွန်တော်တို့စလုပ်တဲ့အပိုင်းမှာ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ဦးစီးဌာနဆိုရင် တော်တော်လေးအလုပ်လုပ်ပါတယ်။ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနဆိုရင် သစ်တောဌာနလက်အောက်ကပါ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးအလုပ်ဆိုရင်နယ်ကျယ်ပါတယ်။ သူတို့မသိတဲ့ဟာဆရင် နိုင်ငံခြား ကမ္ဘာ့ဘဏ်၊ ADB၊ အာရှဖွံ့ဖြိုးရေး စသည့်အကူအညီတောင်းပြီးတော့ တော်တော်လေးကိုလုပ်ဖြစ်ပါတယ်။ ဘယ်လောက်ထိလုပ်ဖြစ်လည်းဆိုရင် ကျွန်တော်တို့ ၂၀၁၂ ပတ်ဝန်းကျင်ဥပဒေပေါ်ပေါက်ပြီးနောက်ပိုင်း ပတ်ဝနးကျင်ထိန်းသိမ်းရေး နည်းဥပဒေတွေ ထွက်လာပါတယ်။ ပြီးခဲ့တဲ့ ၂၀၁၅ ဆိုရင် ကျွန်တော်တို့ ကုမ္ပဏီတွေ အဖွဲ့တွေအတွက် အပြင်အဖွဲ့စည်း အတွက်လည်း လုပ်လို့ကိုင်လို့ကောင်းသွားပါတယ်။ နိုင်ငံအတွက်လဲ ကောင်းသွားပါတယ်။ ဆိုလိုတာကတော့ ကျွန်တော်တို့ နိုင်ငံအနေနဲ့ လုပ်ထုံးလုပ်နည်းတွေ၊ နည်းဥပဒေတွေ ရှိလာပြီဆိုတာ ပြောပြတာပါ။ မင်းလှရေအားလျှပ်စစ်လုပ်ငန်းဆိုရင် သက်ဆိုင်ရာ ကုမ္ပဏီက ကျွန်တော်တို့ကို လုပ်ငန်းအပ်နှံတဲ့အတွက်ကြောင့် ကျွန်တော်တို့ဒီလုပ်ငန်းကို သွားရောက်လေ့လာပြီးနောက် ပတ်ဝန်းကျင်နဲ့ပတ်သက်လို့ ထိခိုက်မှု၊ရိုက်ခတ်မှုအကြိုလေ့လာခဲ့တာ လွန်ခဲသော ၂နှစ်၊ ၃နှစ် လောက်ရှိပါပြီ။ ခုဒါနောက်ဆုံးအဆင့်ပါ စောစောပိုင်းကတော့ ခုနက ကျွန်တောပြောတဲ့ ဥပဒေ၊ နည်းဥပဒေ မပီပြင်သေးခင်ကတော့ ကျွန်တော်တို့ တက်သလောက် မှတ်သလောက် လုပ်ခဲ့ပါတယ်။ ဒီဘက်မှာ ပီပြင်လာတဲ့အခါတော့ နိုင်ငံတော်လုပ်ထုံးလုပ်နည်း ပြဋ္ဌာန်းချက်တွေမှာ ဘာစီမံကိန်းပဲ လုပ်လုပ် စီမံကိန်းဒေသမှာရှိတဲ့ ဒေသခံပြည်သူတွေ ဒီစီမံကိန်းအကြောင်းသိဖို့လိုမယ်၊ သိအောင် လုပ်ရမည်ဆိုတဲ့ပြဋ္ဌာန်းချက်တစ်ခုက လုံးဝပါပါတယ်။ ပါတဲ့အတွက်ကြောင့်ပြဋ္ဌာန်းချက်အရ ကျွန်တော်တို့အဖွဲ့ နောက်ဆုံးအနေနဲ့လာပြီးတော့ ကျွန်တော်တို့ ဆောင်ရွက်နေတဲ့အပိုင်းတွေကို ဒေသခံပြည်သူလူထု သိအောင်လာရောက် ရှင်လင်းတင်ပြခြင်း ဖြစ်ပါတယ်။ မင်းလှရေအားလျှပ်စစ် စီမံကန်းဆိုရင် ၁၀ မီဂါဝပ် အသေးစားရေအားလျှပ်စစ်ထုတ်လုပ် စီစဉ်ဆောင်ရွက်နေပြီးတော့ ချောင်း(၇)ချောင်း ကနေပြီးတော့ ဆင်းလာသောရေတွေကို ရေလွှဲဆည်အဆင့်ဆင့်နဲ့ ရေလှောင်ကန် အသေးစားလေးတွေ အနိမ့်ဆည်လေးတွေ တစ်ဆင့်ပြီးတစ်ဆင့် သိလှောင်ပြီးတော့ နောက်ဆုံးမှာ

လျှပ်စစ်တာဘိုင်နဲ့ ၁၀မီဂါဝပ် ထုတ်ပြီးတော့ သက်ဆိုင်ရာ ကျေးရွာတွေလဲပေးမယ်၊ နိုင်ငံတော်
ဓာတ်အားလိုင်းထဲထည့်ပေးမယ နိုင်ငံတော်အတွက်လုပ်နေတာပါ။ ကျွန်တော်တို့ တာဝန်ကတော့
တတိယကြားခံအဖွဲ့စည်း တစ်ခုအနေနဲ့ ကုမ္ပဏီအတွက်လည်းမဟုတ်ဘူး ဒီဘက် အတွက်လည်း
ဘက်လိုက်ဖို့မဟုတ်ပါဘူ။ ကုမ္ပဏီကလုပ်တာတွေလည်းစောင့်ကြည့်ပြီးတော့ ကျွန်တော်တို့မြင်တာ၊
တွေ့တာတွေကို ကုမ္ပဏီကိုလည်းပြပါတယ်။ ဒေသခံတွေလည်းပြပါတယ်။ ကျွန်တော်
စောစောကတင်ပြခဲသလို ကျွန်တော်တို့က ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးလုပ်ပြီးဆိုတာနဲ့ ထိခိုက်မှု၊
ရိုက်ခတ်မ အနည်းအများတော့ရှိကြမှာပါ။ နည်းတာ များတာပဲကွာပါတယ်။ ဒါကို
ကျွန်တော်တလေ့လာပါတယ်၊ စီမံကိန်းလုပ်ပြီဆိုတာနဲ့ လက်ရှိစီမံကိန်းနေရာမှာ ဘာဖြစ်နေပြီလဲ
ဆိုတာကြည့်ရပါတယ်။ ပကတိအနေအထားကြည့်ရပါတယ်။ ပတ်ဝန်းကျင်ဆိုတဲ့အတိုင်းပဲ ကျယ်ပြန့်
ပါတယ်။ သဘာဝပတ်ဝန်းကျင်အပိုင်းမှာ ရုပ်သဘာဝ ပတ်ဝန်းကျင် နှင့် ဇီဝပတ်ဝန်းကျင်ဆိုပြီး
နှစ်ပိုင်းရှိပါတယ်။ ဇီဝပတ်ဝန်းကျင်ဆိုရင် သက်မဲ့ပစ္စည်းတွေဖြစ်တဲ့ အပင်တွေ၊ရေနေသတ္တဝါတွေ
ကုန်းနေသတ္တဝါတွေ ရှိပါတယ်။ဒါကို ဇီဝပတ်ဝန်းကျင်လို့သတ်မှတ်ပါတယ်။ ပြီးရင် ရုပ်ပတ်ဝန်းကျင်
အပိုင်းကိုလေ့လာပါတယ်။ ရေမြေလေတွေကိုလေ့လာပါတယ်။ စီမံကိန်းမလုပ်ခင်မှာ
လေ့လာထားပါတယ်။ စီမံကိန်းမလုပ်ခင်လေ့လာထားမှ စီမံကိန်းလုပ်ရင် ဘာဖြစ်သွားမလဲဆိုတာ
ပြောလို့ရမှာပါ။ ပုံမှန်အလုပ်ရိုးလုပ်စဉ်ဆိုရင် အဲဒီအတိုင်းလုပ်ရပါတယ်။ ခုလည်းကျွန်တော်တို့
ဒီလိုပဲလုပ်နေပါတယ်။ ကျွန်တော်တို့ ကုမ္ပဏီအနေနဲ့ သက်ဆိုင်ရာ မင်းလှဒေသမှာရှိတဲ့ ရေမြေလေ
ဒီဟာတွေရဲ့ဂုဏ်သတ္တတွေ အခြေအနေတွေ ဖြစ်ပျက်နေတာတွေကို ကျွန်တော်တို့လေ့လာပါတယ်။
နောက်တစ်ခါ ဇီဝပတ်ဝန်းကျင် အနေအထားနဲ့ ဒီမှာရှိတဲ့ ရေနေ၊ကုန်းနေသတ္တဝါတွေ ဘာတွေ
ရှိတယ်ဆိုတာကျွန်တော်တို့လေ့လာပါတယ်။ နောက်တစ်ခါ အရေးကြီးတဲ့အချက်တစ်ချက်ဖြစ်တဲ့
သက်ရှိပတ်ဝန်းကျင်ဖြစ်တဲ့လူမှုပတ်ဝန်းကျင် ဒီစီမံကိန်းလုပ်တဲ့ အတွက်ကြောင့် ပြည်သူလူထုတွေ
ဒီစီမံကိန်းကြောင့် အကျိုးသက်ရောက်မှု ဆိုးကျိုး၊ ကောင်းကျိုးတွေကိုလေ့လာပါတယ်။ ဒါတွေ
လေ့လာပြီးမှ လက်ရှိပကတိ စားဝတ်နေရေး၊ လူနေမှုဘဝ ဘယ်လိုများရှိနေမလဲ ဒီစီမံကိန်း
လုပ်လိုက်ခြင်းအားဖြင့် ဘယ်လိုအကျိုးသက်ရောက်မှု တွေ့ရှိမလဲစသည်ဖြင့် ကျွန်တော်တို့
လေ့လာပါသည်။ လေ့လာပြီးတော့မှ စီမံကိန်းကြောင့်ဖြစ်လာမည့် အကျိုးသက်ရောက်မှု
အကျိုး၊အပြစ် နှစ်မျိုးစလုံးလေ့လာပါတယ်။ အဲဒီအခါမှာ အကျိုး၊အပြစ် ဆိုတဲ့ နှစ်ပိုင်းမှာ များတာ၊
နည်းတာ ၊ တစ်ချို့ကသာမန် တစ်ချို့ကရှိကိုမရှိတာ စသည့် အဆင့်ထိလေ့လာပါတယ်။
တစ်ချို့စီမံကိန်းဆိုရင် ရုပ်ပတ်ဝန်းကျင်၊ ဇီဝပတ်ဝန်းကျင်၊ လူမှုပတ်ဝန်းကျင်ရော ရစရာမရှိအောင်
ပြန်ပြင်လို့မရတဲ့အပိုင်းရှိတတ်ပါတယ်။ ဒါမျိုးဆိုရင်တော့ လွယ်ပါတယ် မလုပ်ယုံပဲရှိပါတယ်။
နိုင်ငံတိုင်လည်း ဒစနစ်ကိုသုံးပါတယ်။ ကျွန်တော်တို့ နိုင်ငံလည်း ဒီစနစ်အတိုင်းသွားမယ်ထင်ပါတယ်။
အဲဒီလိုဖြစ်တဲ့အတွက်ကြောင့် မင်းလှကိုလည် ဆိုးကျိုး၊ကောင်းကျိုးတွေ ဒီနည်းနဲ့ကြည့်ပါတယ်။
တစ်ချို့ဟာတွေဆိုရင် ဖြစ်လာတဲ့ရိုက်ခက်မှု အကျိုးသက်ရောက်မှုတွေကို လျော့အောင်လုပ်လို့ရတဲ့
နည်းလမ်းတွေရှိပါတယ်။ ကျွန်တော်တို့အဖွဲ့အနေနဲ့ ရှာပေးပါတယ်။ တွေ့ရှိတဲ့သက်ရောက်မှုတွေ
လျော့ပါးအောင် ဘယ်လိုလုပ်မလဲဆိုတာကို တာဝန်တစ်ရပ်အနေနဲ့ ရှာပေးပါတယ်။
တစ်ချို့ကိစ္စဆိုရင် လျော့အောင်လုပ်လို့ရတယ်၊ တစ်ချို့ကိစ္စဆိုရင်ပျောက်သွားအောင်လုပ်လို့ရပါတယ်။
ဒီနည်းနဲ့ ကျွန်တော်တို့သွားတာဖြစ်ပါတယ်။ ကျွန်တော်တို့ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးမှာဆိုရင်
ဘယ်လောက်ထိလုပ်သလဲဆိုတော့ ကျွန်တော်တို့လုပ်နေတဲ့အဖွဲ့စနစ်ပါ။ စီမံကိန်းကြောင့်ဖြစ်တဲ့
ဧရိယာမှာ Direct Area တိုက်ရိုက်အကျိုးသက်ရောက်ဧရိယာ ထိခိုက်မှုရှိသလား၊ Indirect Area
သွယ်ဝိုက်ပြီးတော့ အကျိုးသက်ရောက်မှုရှိတဲ့ဧရိယာ အထူသဖြင့် National Gird
ထဲ့လိုက်ပြီးဆိုကတည်းက ဒီဒေသမှာ မီးရနေပြီးဖြစ်ပါတယ်။

တစ်ချို့သက်ရောက်မည် Impact ထိခိုက်မှုဟာဘယ်လောက် ကာလအတိုင်းအဆထိ ဖြစ်မလဲ ဆိုတာကိုလည်း ကျွန်တော်တို့ကြည့်ပါတယ်။ ထိခိုက်မှုဟာခုလုပ်လို့ချက်ချင်းဖြစ်ပြီ ပြီးသွားမလား၊ ဒါမှမဟုတ် ရေရှည်ဖြစ်မှာလား အဲဒီလောက်ထိသုံးသက်ပါတယ်။ နောက်တစ်ခါထိခိုက်မှုပမာဏ ဘယ်လောက်များမှာလဲ၊ ဒါလဲခန့်မှန်းလို့ရပါတယ်။ဖြစ်နိုင်ခြေရှိတဲ့ဟာများကိုလည် မှန်းဆပြီးသုံးသပ်ပါတယ်။ အဲဒီအပေါ်မူတည်ပြီးတော့ သဘာဝ ရေ၊ မြေ၊ လေပေါ်မှာ ထိခိုက်မည့်ကိစ္စတေ၊ လူမှုပတ်ဝန်းကျင်ထိခိုက်မည့်ကိစ္စတွေ ကောင်ကျိုး၊ဆိုကျိုးတွေ ဒါတွေကိုကျွန်တော်တို့က နည်းတယ်၊ များတယ် မှုတည်ပြီးတော့ရှိတဲ့အပေါ်မှာ ဘယ်လိုဆက်လုပ်မလဲ။ အားလုံးပြီးသွားသောအခါမှာ ကျွန်တော်တို့ကတော့ Plan, Program နဲ့တော့ဆွဲပေးလိုက်ပါတယ်။ ဒီအပေါ်မှာ တကယ်လုပ်မလုပ်ဆိုတာ၊ Monitoring ဆိုတဲ့စောင့်ကြည့်ဖို့အတွက်ပါ ကျွန်တော်တို့ ကုမ္ပဏီအနေနဲ့ အသေးစိတ်ဖော်ထုတ်ပေးပါတယ်။ အစီရင်ခံစာ ရေးပြီးတော့သက်ဆိုင်ရာ ကုမ္ပဏီကိုပေးပါတယ်။ ကုမ္ပဏီကတဆင့် နိုင်ငံတော်ကိုတင်ပြပြီး ဆက်လုပ်သွားတာပါ။ ကျွန်တော်တို့ကုမ္ပဏီအနေနဲ့ ဒီလိုလုပ်နေတာဖြစ်ပါတယ်။ မင်းလှဆည်လုပ်ငန်းတွေ လုပ်တဲ့အခါမှာ ရေအားလျှပ်စစ်ထုတ်တဲ့အခါ ဆည်ဆောက်ပြီးတော့ ရေအားလျှပ်စစ်ထုတ်တာရှိသလို၊ ရေလှောင်တာကို အကုန်အပြည့်မလှောင်ပဲနဲ့ လျှပ်စစ်ထုတ်ဖို့ ရေလောက်ပဲထိန်းထားပြီးတော့ ကျန်သောရေကို လွှတ်ချတဲ့နည်းနဲ့ run of type လိုသလောက်ရေကိုထုတ်ပြီးသုံးတဲ့နည်းလရပါတယ်။ နောက်တစ်ခါ ရေလှောင်ကန်ကြီးတွေ ဆောက်ပြီးတော့ အမြင့်ယူပြီးဆောက်တာလဲရှိပါတယ်။ ဒီနှစ်မျိုးရှိပါတယ်။ မင်းလှဆည် အားလုံးသိရအောင်ပြောရရင်တော့ ရေကိုအကုန်မယူပဲနဲ့ လိုသလောက်ယူပြီး လျှပ်စစ် ၁၀မီဂါဝပ် ထုတ်သုံးတဲ့အတွက်ကြောင့် သဘာဝပတ်ဝန်းကျင် ထိန်းသိမ်းရေးမှာ ဆိုးဆိုးရွားရွားထိခိုက်မည့် Impact သိပ်ပြီးမတွေ့ပါဘူး ကျန်တဲ့အပိုင်းအနည်းအကျင်းတွေ့တာလေးပဲရှိပါတယ်။ အားလုံးခုလို ကျေးရွာရပ်ကွက် စုံစုံညီညီ ရောက်လာတဲ့အတွက်ကြောင့် ကျွန်တော်တို့နိုင်ငံတွေနဲ့ ဆောင်ရွက်နေတဲ့ ပတ်ဝန်းကျင်ထိန်းထိမ်းရေးလုပ်ငန်း ဘယ်လောက်ထိလုပ်နေတယ်ဆိုတာ အားလုံးသိအောင် အများရှေ့မှာ ပြောခွင့်ရတဲ့အတွက်ကြောင့် ကျွန်တော်အနေနဲ့ ကျေးဇူးတင်တဲ့အကြောင်း ပြောရင်နိဂုံးချုပ်ပါတယ်။

၃။ ဦးသန်းအောင် (Project Director, Myanmar Hydropower Development Co., Ltd.)

အားလုံးပဲမင်္ဂလာပါလို့ နှုတ်ခွန်းဆက်သပါတယ်။ ကျွန်တော်ကတော့ မြန်မာ့ရေအားလျှပ်စစ်ဖွံ့ဖြိုးတိုးတက်ရေး ကုမ္ပဏီလီမိတက် (Myanmar Hydropower Development Co., Ltd) ရဲ့ Project Director ဦးသန်းအောင် ဖြစ်ပါတယ်။ ကျွန်တော့်အနေနဲ့ ပထမဦးစွာ ပြောကြားလိုတာကတော့ ကျွန်တော်တို့ ကုမ္ပဏီအနေနဲ့ ဒီလုပ်ငန်းကြီးကို ၂၀၁၄ ခုနှစ် ဇွန်လမှာ လာရောက်လေ့လာခဲ့ပါတယ်။ အဲ့ဒီလို လေ့လာပြီးတဲ့နောက်မှာပဲ ကျွန်တော်တို့ လုပ်ငန်းကို ဆက်လက်လုပ်ဆောင်ခဲ့ပါတယ်။ လုပ်ဆောင်တဲ့အခါမှာလည်း ကျွန်တော်တို့ ကုမ္ပဏီက အဲ့ဒီလမှာပဲ ကုမ္ပဏီမှတ်ပုံတင်တယ်။ အဲ့ဒီနောက်မှာ လူအင်အားတစ်ရာ စက်ယန္တရား သုံးဆယ်လောက်နဲ့ ဒီလုပ်ငန်းကြီးစတင်ပါတယ်။ ပထမဦးဆုံး (Approach Road) လို့ခေါ်တဲ့ လမ်းတွေထိုး(ဖောက်)တယ်။ ကျွန်တော်တို့ ဒီလုပ်ငန်းကြီး လုပ်ဆောင်ရတဲ့ ရည်ရွယ်ချက်အနေနဲ့က -

(၁) ကျေးလက်ဒေသဖွံ့ဖြိုးတိုးတက်ရေး

(၂) လူ့စွမ်းအားအရင်းအမြစ် ဖွံ့ဖြိုးတိုးတက်ရေး

(၃) သဘာဝပတ်ဝန်းကျင်ကို ထိခိုက်မှုအနည်းဆုံးနဲ့ လျှပ်စစ်မီးရရှိအောင် ရေးအားလျှပ်စစ်ထုတ်လုပ်ရေးကို ရည်ရွယ်လုပ်ဆောင်ပါတယ်။

နိုင်ငံတော်ရဲ့လိုအပ်ချက်ကို တစ်ဖက်တစ်လမ်းကနေ ပံ့ပိုးကူညီတဲ့အနေနဲ့ ဆောင်ရွက်ခြင်းဖြစ်ပါတယ်။ ကျွန်တော်တို့ရဲ့ လုပ်ငန်းဆောင်ရက်ချက်အနေနဲ့ကတော့ လုပ်ငန်းထဲမှာပါတဲ့ ချောင်း (၇) ချောင်းကို လေ့လာစမ်းစစ်မှုအနေနဲ့ ပထမ စူးစမ်းလေ့လာမှု အကြိုလုပ်ငန်းတွေလုပ်တယ်။ အဲ့လိုအကြိုလုပ်ငန်းတွေလုပ်တဲ့နေရာမှာ လမ်းဖေါက်ခြင်း၊ ဆည်အသေးလေးတွေဆောက်ခြင်း၊ တမံအသေးလေးတွေ တည်ဆောက်ခြင်း စတဲ့လုပ်ငန်းတွေကို အထိက်အလျောက် လုပ်ဆောင်ပြီးပါပြီ။ အဲဒီလုပ်ငန်းတွေ အားလုံး ပြီးပြည့်စုံစွာ ဆောင်ရွက်ပြီးစီးခြင်းတော့ မရှိသေးပါဘူး။ စက်ရုံအသေးတစ်လုံး တည်ဆောက်ရာမှာလည်း ပြီးပြည့်စုံခြင်းမရှိသေးပါဘူး။ အဲ့ဒါကြောင့် ကျွန်တော်တို့လိုချင်တဲ့ အဆင့်ထိ မရောက်သေးတဲ့အတွက် အားလုံးဟာပြီးပြည့်စုံခြင်းတော့ မရှိသေးပါဘူး။ နောက်ဆုံးအနေနဲ့ ကျွန်တော်ပြောချင်တာကတော့ ကျွန်တော်တို့ အခုလိုလုပ်တဲ့နေရာမှာ ကျေးလက်ဖွံ့ဖြိုးမှုအနေနဲ့ ကျေးရွာချင်းဆက်လမ်းတွေကို ကူနိုင်သမျှကူပြီးတော့ ဖေါက်လုပ်ပေးပြီးပါပြီ။ အုပ်စုတွေအနေနဲ့ ပြောမယ်ဆိုရင် ဟိုပိုအုပ်စု၊ ကျောက်ကြေးအုပ်စု၊ ကုန်ကြီးအုပ်စု၊ ဘန်ဘွေးကျင်းအုပ်စု ဒါဟာ ကျွန်တော်တို့ လုပ်ပေးခဲ့တဲ့ အုပ်စုကျေးရွာတွေပါ။ ဒါဟာ လမ်းပန်းဆက်သွယ်ရေး၊ နောက်ပိုင်းမှာ ကျွန်တော်တို့ လျှပ်စစ်မီးရရှိရေး၊ ပညာရေး၊ ကျန်းမာရေး စတဲ့လုပန်ငန်းစဉ်တွေ ဆက်လက်လုပ်ဆောင်သွားမှာ ဖြစ်ပါတယ်။ အဲ့လိုလုပ်ဆောင်ရာမှာ ကျွန်တော်တို့ကို ရပ်မိရပ်ဖတွေ ကျေးရွာလူကြီးတွေကို ကျွန်တော်တို့နဲ့ ညှိနှိုင်းတိုင်ပင်ပြီးတော့ ဆောင်ရွက်သွားမှာဖြစ်ပါတယ်။ အဲလိုပဲ ကျွန်တော်တို့ရဲ့ လိုအပ်နေတဲ့ ကျွန်တော်တို့ မျက်စိနဲ့ မမြင်ဖူးဆိုရင်လည်း ကျန်တဲ့သူတွေအနေနဲ့ ကျွန်တော်တို့ကို လမ်းညွှန်မှုပေးပါ၊ အကြံဉာဏ်ပေးပါ။ ပြီးရင်လည်းပဲ လိုအပ်တဲ့အကူအညီများလည်း ကူညီဆောင်ရွက်ပေးပါလို့ မေတ္တာရပ်ခံရင်းနဲ့ နဂိုးချုပ်အပ်ပါတယ်။

၄။ ဒေါ်ဟေမာနှင်း (NEPS Co.,Ltd)

ဒေါ်ဟေမာနှင်းမှ IEE ဆောင်ရွက်မှုကို Power Point ဖြင့်ရှင်းလင်းတင်ပြခဲ့ပါသည်။

၅။ ဦးရဲလင်းကျော် (လျှပ်စစ်ဌာန)

ဒီစီမံကိန်းက ဘယ်နှစ်ခုနှစ်မှာ ပြီးစီးနိုင်မှာပါလဲ။

၆။ ဦးသန်းအောင် (MHD Co., Ltd)

ကျွန်တော်တို့ ဒီလုပ်ငန်းလုပ်တာ အကြမ်းဖျဉ်းအားဖြင့် ၂၀၁၄ ကနေ ၂၀၁၆ ထိ ရှိပါပြီ။ တွက်ချက်မှုအရ ကျွန်တော်တို့ လုပ်ငန်းရာသီ (၃) ရာသီ ရှိပါပြီ။ အောက်ကဟာပါ လုပ်မယ်ဆရင်တော့ နောက်ထပ်အနည်းဆုံး (၃) နှစ်လိုပါတယ်။ အခု ကျွန်တော်တို့ အင်းကြီးအပေါ်ကနေ စက်ရုံသေးသေးလေး မီးထွက်ဖို့ လုပ်တာ (၁)နှစ်ခွဲ ရှိပါပြီ။ စက်ရုံတည်ဆောက်ခြင်း၊ ပက်လိုင်းသွယ်တန်းခြင်း၊ Hydro မှာတယ်၊ တာဘိုင်မှာတယ်၊ အစရတဲ့ ပစ္စည်းတွေမှာပြီး လုပ်ငန်းတွေ လုပ်နေပါတယ်။ ခေတ်နဲ့လိုက်လျောညီထွေ ဖြစ်တဲ့၊ ကျွန်တော်တို့စိတ်တိုင်းကျတဲ့ စက်ရုံ မကြာမီ ဖြစ်လာနိုင်ပါတယ်။ နောက်တစ်ခုက နောင်ချုပ်မြို့နယ်မှာ စီမံကိန်းတွေ လာရောက်လုပ်ကိုင်မှာ ဖြစ်ပါတယ်။

၇။ ဦးရဲလင်းကျော် (လျှပ်စစ်ဌာန)

ပတ်ဝန်းကျင် ရွာတွေကို မီးပေးမယ်ဆိုရင် ဘယ်နှစ်မိုင်အထိ ပေးမှာပါလဲ။ ကျေးရွာဓာတ်အားလိုင်းတွေကို ကုမ္ပဏီကပဲ အကုန်အကျခံ တည်ဆောက်ပေးမလား။ (၁) ယူနစ်ကို ဘယ်လောက်နဲ့ရောင်းမှာလဲ။ အဲဒီ plan လေးကို သိလိုပါတယ်။

၈။ ဦးသန်းအောင် ၊ ဦးရဲဇော်မြင့် (MHD Co.,Ltd)

Tanko မှာဆို ဦးစိုင်းထွန်းက မီးပေးတာဝန်ယူတယ်။ ကျွန်တော်တို့က သူ့စနစ်အတိုင်း ကောက်ခံသွားပါမယ်။ ကျွန်တော်တို့ အပြောင်းအလဲ ဘာမှမလုပ်ပါဘူး။ အောက်မှာ စက်ရုံ (၁)ရုံ ရှိပါတယ်။ အပေါ်မှာ စက်ရုံ (၅)ရုံ တည်ဆောက်မယ်လို့ စီစဉ်ထားပါတယ်။ အောက်ကစက်ရုံကို မဟာဓာတ်အားလိုင်းထဲကို 10 MW တိုက်ရိုက်ထည့်ပါမယ်။ အပေါ်က စက်ရုံတွေကို ကျွန်တော်တို့က ဒေသဖွံ့ဖြိုးဖို့အတွက်၊ မီးပေးဖို့ စတင်စမ်းသပ် လည်နေပါတယ်။

နိုင်ငံတော်ကို ကျွန်တော်တို့က တစ်ဖက်တစ်လမ်းကနေ ထောက်ပံ့သလို ကုမ္ပဏီရဲ့ ရည်ရွယ်ချက်ဖြစ်တဲ့ ကျေးလက်ဒေသဖွံ့ဖြိုးဖို့အတွက်ကျတော့ အပေါ်ကနေ စက်ရုံတွေဆောက်မယ်။ ပြီးရင် ကျွန်တော်တို့က အနီးစပ်ဆုံးရွာတွေ ဖြစ်တဲ့ သပြေတိုးနဲ့ ဘန့်ဘွေးကျင်း၊ (၃) မိုင်ပတ်လည်ပဲ ရှိပါတယ်။ အဲဒီ ကျေးရွာတွေကို စပေးပါမယ်။ ပြီးတော့ ကျွန်တော်တို့ စက်ရုံတည်ဆောက်တဲ့ ကုန်ကျစရိတ်၊ အရင်းအနှီးကာလတွေကို အနည်းဆုံး ခန့်မှန်းတွက်ချက်ပြီးမှ ကြေးတစ်ခု သတ်မှတ်ပြီး ရောင်းမှာပါ။ ဒါကလည်း အများလက်ခံတဲ့ နှုန်းဖြစ်ပြီး၊ ကျွန်တော်တို့ ကုမ္ပဏီ အနေနဲ့လည်း နစ်နာမှု မရှိနိုင်တဲ့ သင့်တင့်မျှတတဲ့ နှုန်းနဲ့ ကောက်ခံသွားဖို့ စီစဉ်ထားပါတယ်။

၉။ ဦးရဲလင်းကျော်

တစခုက ကျွန်တော် အကြံပြုချင်တာကတော့ ကျွန်တော်တို့နောင်ချိုကလည်း ကျေးရွာတွေလည်း နည်းနည်းများလာပါတယ်။ ကျွန်တော်တို့ NEP Plan နဲ့ပါဆို စီမံကိန်းကာလ ပြီးလောက်မယ်ဆိုရင် ရွာပေါင်းတော်တော် ကျွန်တော်တို့မီးသုံးတဲ့ အနေအထားကလည်း အနီးစခန်း ကနေယူရတဲ့အခါ ကျွန်တော်တို့က နောက်ဆုံးရောက်နေတယ်။ နောက်ဆုံး ရောက်နေတော့ ပြင်ဦးလွင်ကပျက်ရင် ကျွန်တော်တို့ မီးမရတော့ဘူး။ စက်ရုံကထွက်တဲ့ ၁၀ မဂ္ဂါဝပ်ကလည်း အပြည့်အဝ ထွက်ချင်မှထွက်မယ်။ တစ်နှစ်ပတ်လုံး ၆ မဂ္ဂါဝပ်လည်း ဖြစ်ချင်ဖြစ်မယ်၊ ၇ မဂ္ဂါဝပ်လည်း ဖြစ်ချင်ဖြစ်မယ်။

၃၃ လိုင်းဆွဲပြီးတော့ ကျွန်တော်တို့မြို့နယ်ထဲမှာ ချိတ်ပြီးတော့ သုံးလိုက်ရင် ပိုပြီးအဆင်မပြေနိုင်ဘူးလား။ ကျွန်တော်ကတော့ အစ်ကို တို့စက်ရုံကလည်းယူမယ်၊ အစ်ကိုတို့စက်ရုံ maintenance လုပ်မယ်ဆိုရင် ပြင်ဦးလွင်ကယူမယ်။ နောင်ချိုကထွက်ရင် နောင်ချိုကိုပို့မယ်။ အဲ့ဒါလေးကို အကြံပြုချင်ပါတယ်။

၁၀။ ဦးရဇော်မြင့် (MHD Co.,Ltd)

အဲ့ဒါက ကျွန်တော်တို့ လားရှိုးက လျှပ်စစ်ဦးစီးဌာနကို သွားခဲ့ပါတယ်။ ကျွန်တော်တို့ ကုမ္ပဏီ အနေနဲ့ ဘယ်လိုစဉ်းစားလည်းဆိုတော့ အောက်ကဟာက ဆည်တော်ကြီးနဲ့ကျတော့ မိုင်နီးတော့ လိုင်းကြိုးဆွဲရတာ သက်သာပါတယ်။ ပြင်ဦးလွင်ဘက်ကနေ ထည့်ဖို့ကတော့ ကျွန်တော်တို့ ကိုယ့်သဘောနဲ့ကိုယ် လုပ်လို့မရပါဘူး။ အစိုးရရဲ့ ခွင့်ပြုချက်ရှိမှ ဖြစ်မှာပါ။ ကျွန်တော်တို့က ဆည်တော်ကြီးကို ထည့်ဖို့ စီစဉ်ထားပေမယ့် အစိုးရက နောင်ချိုနဲ့တော့နီးလို့ နောင်ချိုမြို့နဲ့ ချိတ်ပေးပါဆိုရင် ကျွန်တော်တို့က ချိတ်ပေးမှာပါ။

၁၁။ ဦးရဲလင်းကျော်

ကျွန်တော်တို့ ၃၃ လိုင်းကလည်း national grid ပါပဲ။ ကိုယ့်မြို့နယ်ထဲမှာ ရေအားလျှပ်စစ်လုပ်တော့ နီးတော့ မီးအားလည်းပိုကောင်းမယ်လို့ထင်တာပါ။ ကျွန်တော်အကြံပြုတာပါ။

၁၂။ ဦးရဲဇော်မြင့် (MHD Co.,Ltd)

ကျွန်တော်ကလည်း အစ်ကိုတို့ အကြံပြုတာကို မှတ်သားထားပြီးတော့ လျှပ်စစ်ဝန်ကြီးဌာနက တာဝန်ရှိသူနဲ့တွေ့တဲ့အခါ တင်ပြလိုက်ပါမယ်။

၁၃။ ဒေါ်မြစန္ဒာ

ကျွန်မတစ်ခုသိချင်တာက ခုနကညီမလေး တင်ပြသွားတာရှိပါတယ်။ ဒီစက်ရုံတည်ဆောက်လိုက်တဲ့အခါ အလယ်အလတ်ထိခိုက်တာက၊ ထိခိုက်မှုနည်းတာတွေ၊ ထိခိုက်မှုမရှိတာတွေ၊ ရှိတာတွေ၊ စီမံကိန်းတစ်ခုကို ဆောင်ရွက်တဲ့အခါမှာ ခုနကပြောတဲ့ Monitoring and Evaluation စောင့်ကြည့်လေ့လာ အကဲဖြတ်တာတွေရှိမယ်။ သဘာဝသစ်တောတွေ၊ သစ်ပင်တွေ ဒီစက်ရုံအတွက် ပျက်စီးသွားတဲ့ဟာတွေကို ဘယ်အဖွဲ့အစည်းကနေ တရားဝင် Monitoring လုပ်သလဲ၊ Evaluation လုပ်သလဲဆိုတာကို သိချင်ပါတယ်။ ဘာလို့လဲဆတော့ ဒီရေအားလျှပ်စစ်စီမံကိန်းက

ပတ်ဝန်းကျင်ကို စက်ရုံဆောက်တဲ့အခါမှာ ခုနကပြောတဲ့ သတ္တုကုမ္ပဏီပဲဖြစ်ဖြစ်၊ ရွှေအုန်းပွင့် ကျောက်မီးသွေး ကုမ္ပဏီနဲ့ပဲဖြစ်ဖြစ် ဒီလိုမျိုးမြေအောက်ကနေ သယံဇာတကို တူးဖော်တဲ့ ကုမ္ပဏီတွေ နောင်ချိုမြို့နယ်မှာ အများကြီးရှိပါတယ်။ အဲလိုရှိတဲ့အခါ ဒီကုမ္ပဏီတွေ ထုံးကျောက်တောင်တွေ ကျောက်မီးသွေးတွေတူးတဲ့အတွက်ကြောင့် သဘာဝသစ်တောတွေ ပျက်စီးပါတယ်။

ဒီလိုပျက်စီးမှုတွေအတွက် recover ဖြစ်အောင်ပြန်ပြီးတော့လုပ်ပါမယ်ဆိုတာကို Monitoring လုပ်ဖို့က ဘယ်အဖွဲ့အစည်းက တာဝန်ယူဆောင်ရွက်ပါသလဲ။ ဆရာတို့ဒီကုမ္ပဏီကနေပြီး ငှားရမ်းထားတဲ့ အဖွဲ့အစည်းကပဲ ဆက်လက်ဆောင်ရွက်တာပါလား။ ကျွန်မတို့ နိုင်ငံတော်အစိုးရကနေ အဖွဲ့အစည်းတစ်ခု သတ်မှတ်ပြီးဆောင်ရွက်တာလား။ ရင်းနှီးမြှုပ်နှံမှု ကော်မတီများ ညွှန်ကြားမှုအဖွဲ့ကပဲ ဆောင်ရွက်တာလား ဆိုတာကို ကျွန်မတို့အနေနဲ့ သိချင်ပါတယ်။ အဲလိုသိမှလည်း ကျေးရွာက ရယက အဖွဲ့အစည်းတွေနဲ့ ကော်မတီတွေအပေါ် အထင်အမြင်လွဲမှားမှုတွေ လျော့နည်းသွားမှာဖြစ်ပါတယ်။

နောက်တစ်ခုက ကျွန်မက ဆရာတို့အပေါ် တောင်းဆိုချင်တာရှိပါတယ်။ အခုတက်ရောက်လာတဲ့ ရပ်ကွက် ကျေးရွာ အုပ်ချုပ်ရေးမှူးတွေကို ဒီစီမံကိန်းတွေကို ပုဂ္ဂလိက ကုမ္ပဏီတွေကသော်လည်းကောင်း၊ နိုင်ငံတော်အနေနဲ့သော်လည်းကောင်း ဆောင်ရွက်တဲ့အခါ သဘာဝပတ်ဝန်းကျင်ထိခိုက်မှုဟာ အရေးကြီးတဲ့အတွက်ကြောင့် ဒီအခွေလေးကို မြို့နယ် အုပ်ချုပ်ရေးမှူးရုံးကနေတစ်ဆင့် လက်ဆင့်ကမ်းပေး စေလိုပါတယ်။ ရပ်ကွက်အုပ်ချုပ်ရေးမှူး အနေနဲ့ကလည်း ကိုယ့်ရဲ့ကျေးရွာမှာ ဒီလိုစီမံကိန်းတွေလာလပ်မယ်ဆိုရင် ဒီလိုအချက်အလက်တွေကို အနည်းငယ်နားလည် သဘောပေါက်ထားသင့်ပါတယ်။ သို့မှသာ စီမံကိန်းဆောင်ရွက်တဲ့ ကုမ္ပဏီနဲ့ ရာသူရွာသားတွေကြားမှာ အငြင်းပွားမှုများလျော့နည်းပြီး ကျေးရွာရဲ့ တိုးတက်မှုလုပ်ငန်းတွေကို ဆောင်ရွက်နိုင်မှာဖြစ်ပါတယ် ဆိုတာကို ကျွန်မအနေနဲ့ အကြံဉာဏ်ပေးတယ်။

၁၄။ ဦးအေးမြင့် (NEPS Co.,Ltd)

ကျွန်တော်တို့ အစည်းအဝေး လုပ်ရတဲ့ ရည်ရွယ်ချက်က (Public Disclosure) အများပြည်သူ သိရအောင်လုပ်ရတဲ့ ပွဲဖြစ်ပါတယ်။ ဒီတော့မှ မိမိတို့ မသိတာ၊ မရှင်းတာတွေကို ဆွေးနွေးနိုင်မှာဖြစ်ပါတယ်။ ခုနကပြောတဲ့ Monitoring နဲ့ပတ်သက်လို့ကတော့ ကျွန်တော်တို့ ဘက်က ကြားခံအဖွဲ့အစည်းဖြစ်တဲ့အတွက် ဘာလုပ်သင့်တယ်ဆိုတဲ့ အချက်အလက် Guideline တွေကို ကုမ္ပဏီအနေနဲ့ ဆက်လက်ဆောင်ရွက်ရမှာတွေကို အစီရင်ခံစာမှာ ထည့်သွင်းတင်ပြသွားမှာ ဖြစ်ပါတယ်။ ဒါကို ဘယ်လိုလုပ်မလဲဆိုတဲ့ အပိုင်းမှာ လုပ်ငန်း project ရဲ့ အကြီးအသေး အတိုင်းအဆ investment ဘတ်ဂျက်အပေါ် မူတည်ပါတယ်။ Normally ကျွန်တော်တို့က ဒီလုပ်ငန်းတွေက မြန်မာနိုင်ငံမှာ စလုပ်ခါစပဲရှိပါသေးတယ်။

ကျွန်တော်တို့နိုင်ငံမှာ လုပ်ငန်းအကြီးစားတွေ လုပ်ကိုင်တဲ့အခါ အခြားနိုင်ငံကြီးတွေ ဘယ်လို ဘယ်ပုံ လုပ်ကိုင်တယ်ဆိုတာကို အရင်လေ့လာရပါတယ်။ ကျွန်တော်တို့နိုင်ငံမှာ ငွေစာရင်းရုံးဆိုတာ သပ်သပ်ရှိခဲ့ပါတယ။ အစိုးရဌာနတွေမှာ ငွေရေး ကြေးရေးနဲ့ပတ်သက်လာရင် ငွေစာရင်းဦးစီးရုံးကစစ်တယ်။ နောက်ပိုင်း လုပ်ငန်းတွေများလာတဲ့အခါ သက်ဆိုင်ရာ ဝန်ကြီးဌာနအလိုက် ရုံးတွေပေါ်လာကြတယ်။ နိုင်ငံကြီးတွေမှာတော့ Environmental audit ဗဟိုကနေကိုင်တဲ့ audit ရုံးကနေ ဆင့်ကဲဆင့်ကဲ လုပပါတယ်။ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ဦးစီးဌာန audit အောက်မှာရှိရပါမယ်။ ကျွန်တော်တို့က Guideline အနေနဲ့ပြပါတယ်။ Project Monitoring မှာ

Monitoring လုပ်မဲ့ engineer ဝန်ထမ်းတွေ လုပ်ကိုင်ရမဲ့ လုပ်ပိုင်ခွင့်၊ တာဝန်ဝတ္တရားတွေကအစ ဖော်ပြပေးပါတယ်။

ဘယ်သူကလုပ်မလဲဆိုတော့ လက်ရှိအနေအထားက ကျွန်တော်တို့သိသလောက် ကုမ္ပဏီတော်တော်များများက သူတို့ကိုယ်တိုင် အဖွဲ့အစည်းဖွဲ့ပြီးတော့ လုပ်တယ်။ ဒါပေမယ့် ကိုယ့်ဟာကိုယ်လုပ်ပြီး ကိုယ်ဘာသာ ကိုင်ထားလို့မရပါဘူး။ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနပေါ်လာတဲ့အတွက် ဒေသခံ၊ ပြည်နယ်၊ တိုင်းအဆင့်ကို ကျွန်တော်တို့ တင်ပြရပါတယ်။ အဲ့ဒီအခါ သက်ဆိုင်ရာရုံးတွေက လိုအပ်သလို ဆင်းပြီးစစ်ဆေးတယ်။ အခု ကျွန်တော်တို့ မင်းလှ Project ကို ပထမ initial process, initial investigation လုပ်ပြီးတင်လိုက်တဲ့အခါ မပြည့်စုံလို့ သက်ဆိုင်ရာဗဟိုရုံးချုပ် နေပြည်တော်ကနေ လိုအပ်တဲ့ Guideline တွေပေးပါတယ်။ ပထမစလုပ်တဲ့ အချိန်မှာ Law ထွက်စ၊ Regulation မရှိသေးပါဘူး။ Rule မရှိသေးပါဘူး။ အခုကျတော့ ရှိလာပါပြီ။ မရသေးခင်က ကျွန်တော်တို့ နိုင်သလောက်လုပ်ခဲ့ပါတယ်။ နားလည်သလောက်လုပ်ခဲ့ပါတယ်။ သို့သော်လည်း ဒီဘက်ပိုင်းမှာ ပီပီပြင်ပြင် ဖြစ်လာတဲ့ ဥပဒေအရ ကျွန်တော်တို့ဆက်လုပ်တယ်။ အဲ့ဒီလို လုပ်ခဲ့တဲ့အတွက်ကြောင့် ခုနက Monitoring အရ လောလောဆယ် ကုမ္ပဏီကနေဆက်လုပ်တယ်။ အဖွဲ့တွေဖွဲ့တယ်။ ဒါက ကျွန်တော်တို့ တည်ဆောက်ဆဲကာလ (Construction Phase) မှာပဲရှိသေးတယ်။ နောက်တစ်ခါ တည်ဆောက်ပြီးလို့ လျှပ်စစ်ထုတ်လုပ်တဲ့ အချိန် (operational phase) ကုမ္ပဏီအနေနဲ့ ကိုယ့်ဝန်ထမ်းအင်အားနဲ့ အဖွဲ့ ဖွဲ့ပြီး အဲ့ဒီနည်းနဲ့ ဆော်ရွက်ပါမယ်။

၁၅။ ဦးရဲဇော်မြင့် (MHD Co.,Ltd)

အစ်မ ခုနကဆွေးနွေးသွားတာကို ကျေးဇူးတင်ပါတယ်။ ကျွန်တော်တို့ ကုမ္ပဏီက လုပ်ငန်းစတင်လုပ်ကိုင်စဉ်က လုပ်ထုံးလုပ်နည်း၊ မူဝါဒတွေ မရှိခဲ့ပါဘူး။ ဒါပေမယ့် ကျွန်တော်တို့ ကုမ္ပဏီက စပြီးတည်ထောင်ရတဲ့ ရည်ရွယ်ချက်က ကျွန်တော်နိုင်ငံမှာက လျှပ်စစ်မာတ်အား ၁၆% ပဲရှိပါတယ်။ ကျွန်တော်တို့ ကုမ္ပဏီ ဘာ project လုပ်ရင် ကောင်းမလဲဆိုတာ လေ့လာကြည့်တော့ ကျွန်တော်တို့နိုင်ငံ မဖွံ့ဖြိုးရတဲ့အကြောင်းရင်းတွေ၊ Invest တွေမလာရတဲ့ အကြောင်းရင်းတွေက မီးကြောင့်ပဲဆိုတာ သိလာရပါတယ်။ ဒါကြောင့် ကျွန်တော်တို့ မီးရအောင်လုပ်မယ်။ ဒါပေမယ့် ကျွန်တော်တို့ မီးရအောင်လုပ်တဲ့နေရာမှာ ထိခိုက်နစ်နာမှု အနည်းဆုံးဖြစ်အောင် လုပ်မယ်ဆိုတဲ့ ရည်ရွယ်ချက် ချမှတ်ထားတဲ့ အတွက်ကြောင့် ကျွန်တော်တို့ လမ်းစဖောက်တဲ့ အချိန်တည်းက ရွာကိုတိုင်ပင်တယ်။ ရွာကကျေးရွာကော်မတီ ဖွဲ့ခိုင်းတယ်။ ကျေးရွာကော်မတီရဲ့ ညှိနှိုင်းချက်အရ လျော်ကြေးပေးသင့်တာတွေကိုပေးတယ်။ ကျွန်တော်တို့သဘောနဲ့မလုပ်ပဲ ကျေးရွာကော်မတီ အဖွဲ့တွေဖွဲ့ပြီးမှ အဲ့ဒီကိစ္စတွေကိုရှင်းတယ်။

နောက်ပြီး ကျွန်တော်တို့က ဆည်ဆောက်ပြီး လက်လွတ်စပယ် လုပ်လို့မရပါဘူး။ အဲ့ဒီဆည်မှာလည်း ငါးမျူးစိတ်တွေသာင်းနဲ့ချီပြီး ထည့်ပါတယ်။ ဒါတွေ ကျွန်တော်တို့က စီမံချက်တွေကို ဝန်ကြီးဌာနကို တင်ပေးရပါတယ်။ ငါးမျိုးစိတ်တွေကို ကျွန်တော်တို့ မွေးရပါတယ်။ မနှလေးကငါးတွေသယ်လာပြီး ငါးတွေထည့်ရပါတယ်၊ နောက် ငါးတွေရဲ့ ရှင်သန်မှုကိုကြည့်၊ နောက်ပြီး ကျွန်တော်တို့ကြောင့် ထိခိုက်သွားတဲ့ ဒေသခံတွေ ကျေနပ်မှုရှိအောင်၊ ကျွန်တော်တို့အနေနဲ့လည်း အဆင်ပြေမှုရှိအောင် ၂ ဦး ၂ ဖက် ညှိနှိုင်းပြီး ရှင်းလင်းပါတယ်။

ပြီးတော့ ကျွန်တော်တို့ကြောင့် သစ်တောသစ်ပင်တွေ ပြုန်းသွားပြီဆိုတာနဲ့ ဒီဒေသနဲ့ကိုက်ညီမယ့် သစ်ပင်တွေ ဘာတွေရှိလဲဆိုတာကို သစ်တောဦးစီးဌာနရဲ့

ညွှန်ကြားချက်တွေယူပြီးတော့ အပင်စိုက်၊ ပျိုးထောင်ပြီးပြီဆိုတာနဲ့ သစ်တောစိုက်ခင်း ပြန်လည်ပျိုးထောင်ခြင်း လုပ်ဆောင်ပါမယ်။ ကျွန်တော်တို့က ဒီမှာဆိုရင် အဲ့ဒီအချက် အလက်တွေလုပ်၊ သစ်တောစိုက်ခင်းတွေလုပ်ပြီးမှ စီမံချက်ဆိုပြီး ဝန်ကြီးဌာနကိုပို့ရတယ်။ ပို့မှလည်း ဒီ NEPS ဆိုတဲ့ တတိယ အဖွဲ့အစည်းရဲ့ ညွှန်ကြားမှုနဲ့ ကျွန်တော်တို့က ပတ်ဝန်းကျင်ထိခိုက်မှု လျော့နည်းစေတဲ့ နည်းလမ်းများနဲ့ လုပ်ဆောင်သွားမှာဖြစ်ပါတယ်။ ကျေးဇူးတင်ပါတယ်။

၁၆။ ဒေါ်အေးအေးကြူ (စိုက်ပျိုးရေးဌာန)

ကျွန်မကတော့ စိုက်ပျိုးရေးအရာရှိ ဒေါ်အေးအေးကြူ ဖြစ်ပါတယ်။ ကျွန်မသိချင်တာကတော့ ဒီလျှပ်စစ်ကို ယူတဲ့အခါ ရေလွှဲဆည်က ယူရတာလား၊ ကျွန်မတို့ရဲ့ စိုက်ပျိုးမြေတွေကို ဘယ်လိုအကျိုးပြုနိုင်မှာပါလဲ သိချင်ပါတယ်။

၁၇။ ဦးသန်းအောင် (MHD Co.,Ltd)

အခု ကျွန်တော်တို့ လုပ်တဲ့ ရေလျှောင်တမံ အလယ်ကို ကျွန်တော်တို့ outlet လုပ်မယ်လို့ ရည်ရွယ်ထားပါတယ်။ ကျွန်တော်ရဲ့ ရည်ရွယ်ချက်ကတော့ ရေအနည်းဆုံးသုံးနိုင်မယ့် သီးနှံကို စိုက်စေချင်ပါတယ်။ ကျွန်တော်တို့တည်ဆောက်ပြီးတာတွေအတွက် လျှပ်စစ်တွေသုံးမယ်၊ စက်ရုံကထုတ်တာတွေကို ကျေးရွာတွေကသုံးမယ်။ ညသန်းခေါင်မှာ ရေမသုံးတဲ့ အချိန်ရှိမယ်။ ဒါပေမယ့် စက်ရုံကပိတ်လို့မရဘူး။ ဥပမာ ၁၀၀ ကီလိုဝပ် လည်နေရင် ၂၀ ကီလိုဝပ်လောက်ပဲသုံးရင် ၈၀ ကီလိုဝပ်လောက် ပိုနေတယ်။ ပိုနေရင် အဲဒီရေကို စုပ်မယ်၊ အပေါ်မှာ ဂါလံ ၃၀၀၀၀ ဆုံကန် (၃)ခု လုပ်မယ် ရည်ရွယ်ထားပါတယ်။ အခု လမ်းဖောက်ပြီးတော့ ဆယ်ထားပြီးပါပြီ။ ကန်တွေလုပ်ပြီးရင် ၈ လက်မ (သို့) ၁ ပေ PVC ပိုက်တွေနဲ့ အဲဒီကန်တွေကို ဆက်ထားမယ်၊ ပြီးတော့မှ အဲဒီကနေ Tag Cultivation လိုမျိုး စိုက်ပျိုးရေးလုပ်ဖို့ ရည်ရွယ်ထားပါတယ်။ ကျွန်တော်တို့လူတွေက နွေရောက်ရင် ရေမရှိပါဘူး။ တကယ်လည်း ကျွန်တော်တို့ဒေသက မြေတွေက ကြေမွနေတဲ့ ကျောက်မဖြစ်တစ်ဖြစ် မြေတွေဖြစ်တဲ့အတွက် ရေဆုံးရှုံးမှုများပါတယ်။ နွေရာသီရောက်ရင် စိုက်ပျိုးလို့မရပါဘူး။ စိုက်ရာသီထက်နောက်ကျတဲ့ သီးနှံတွေတိုရင် မအောင်မြင်ပါဘူး။ အဲဒါကြောင့် ကျွန်တော်က အပေါ်ကနေ ပိုက်နဲ့လုပ်မယ်၊ ပြီးရင် ပြင်ဦးလွင်မှာ sprinkler နဲ့ လုပ်သလိုမျိုး ကျွန်တော်တို့ လုပ်ဖို့ရည်ရွယ်ထားတယ်။ ကျွန်တော်တို့ တမံပေါ်မှာ မြက်စိုက်ပြီး sprinkler နဲ့ရှင်အောင်လုပ်ခဲ့ပြီးပါပြီ။ အဲ့ဒီလိုပဲ ပန်းမုန်လာ၊ မုန်လာထုပ် စသည်ဖြင့် စားဖို့ဆောင်သီးနှံနဲ့ အဓိက ကျွန်တော်တို့လုပ်စေချင်တာက မိုးစပါးပါ။ စပါးပျိုးထောင်တဲ့ အချိန်မှာ မိုးမရွာပဲ စိုက်ပြီးမှ မိုးရွာတာဟာ အဓိကပြဿနာပါ။ ကျွန်တော်တို့က plantation လုပ်ဖို့ အရင်လုပ်ပေးရပါမယ်။ ပြီးမှရွှေ့စိုက်ရပါမယ်။ ဦးကျော်ဆွေတို့ သပြေတိုးမှာ ၈က (၂၀) လောက် လက်တွေ့လုပ်ဆောင်နေပါတယ်။

အဲ့ဒါကြောင့် ကျွန်တော်တို့ တည်ဆောက်ပေးတဲ့ဆည်သည် ကျွန်တော်တို့ ရေအားလျှပ်စစ်တင်မဟုတ်ပါဘူး၊ စိုက်ပျိုးလို့ပိုတဲ့ရေတွေဟာလည်း သဘာဝချောင်းထဲကိုပဲ ပြန်သွားမှာ ဖြစ်ပါတယ်။ ကျွန်တော်တို့က ရေတံခွန်တွေကိုလည်း အပျက်အစီး မခံပါဘူး။ မူလရည်ရွယ်ချက်က လျှပ်စစ်လည်းထုတ်လို့ရမယ်၊ ရေတံခွန်တွေလည်း အပျက်အစီးမရှိစေပဲ မြေရှင်နဲ့တွဲယူတဲ့ စနစ်လိုမျိုး ရေအားလျှပ်စစ်ထုတ်ယူမှာ ဖြစ်ပါတယ်။ စိုက်ပျိုးရေးအတွက်လည်း အထိုက်အလျောက် အကျိုးရှိလာနိုင်ပါတယ်။ အခုအခြေအနေအရကတော့ ကျွန်တော်တို့ လုပ်ဆောင်ဆဲဖြစ်ပါတယ်။ မပြီးပြတ်သေးပါဘူး။ ကျေးဇူးတင်ပါတယ်။

၁၈။ ဒေါ်အေးအေးကြူ (စိုက်ပျိုးရေး)

ကျွန်မတို့ အနေနဲ့ကတော့ plan လေးရှိစေချင်ပါတယ်။ ဘယ်လောက်ကို ပေးနိုင်မယ်၊ ဘယ်လိုပေးနိုင်မယ် ဆိုတာမျိုးတွေကိုပါ။ ကျွန်မလည်း လာရောက်ဆွေးနွေးပါမယ်။ အဲ့ဒီလိုမျိုး အစီအမံများလည်း သိထားချင်ပါတယ်။

၁၉။ ဦးသန်းအောင်(MHD Co.,Ltd)

ကျွန်တော်မှန်းထားတာကတော့ project လက်စ မပြတ်သေးတဲ့အတွက် ကျွန်တော်ရည်ရွယ်ချက်ကတော့ မူလက ၈က (၂၀) ရှိတယ်၊ နောက်ပိုင်း ၈က (၁၀၀) ဖြစ်အောင်လုပ်မယ်၊ ၈က (၂၀၀) ဖြစ်အောင်လုပ်မယ်ရည်ရွယ်ထားပါတယ်။

ဥပမာပြောရရင် မုန်လာထုပ်၊ ပန်းမုန်လာစိုက်တာကလည်း irrigation system ပဲ၊ လယ်လုပ်တာလည်း irrigation system ပဲ၊ ဒါပေမယ့် လယ်လုပ်ရင်း၊ ကိုင်းသီးနှံစိုက်ရင် စိုက်ပျိုးရင် စိုက်တဲ့သူရဲ့ ဝင်ငွေစီးပွားရေး ကောင်းမွန်လာနိုင်ပါတယ်။ ဒါကတော့ မြေစမ်းခရမ်းပျိုး အခြေအနေပဲ ရှိပါသေးတယ်။ လက်ရှိကိုယ်လူတွေက ပြောင်းပဲလုပ်နေပါသေးတယ်။ ပြောင်းဆိုတာ ရေသိပ်ပြီး မလိုပါဘူး။ အကယ၍များ မိုးခေါင်လို့ရေမရရင်တော့ ရေထပ်ဖြည့်ပေးနိုင်တဲ့ အခြေအနေမှာ ရှိပါတယ်။

၂၀။ ဒေါ်အေးအေးကြူ (စိုက်ပျိုးရေး)

ကျေးဇူးတင်ပါတယ်ရှင့်။

ကျွန်မတို့ အကြံပြုချင်တာက ကျွန်မတို့ကတော့ ကုမ္ပဏီကို သဘာဝပတ်ဝန်းကျင်နဲ့ ပတ်သက်ပြီး ဒီလိုလုပ်ရမယ်၊ ဒီလိုထိန်းသိမ်းရမယ်ဆိုပြီးတော့ လုပ်ပိုင်ခွင့် ချထားပေးခဲ့ပါတယ်။ ကုမ္ပဏီဘက်က တာဝန်ယူမှု၊ တာဝန်ခံမှုအပိုင်းနဲ့ ပတ်သက်၍ သေသေချာချာလေး ဆောင်ရွက်စေချင်ပါတယ်။ ဒေသခံတွေက အသိပညာနဲ့ စနစ်ကျမှု အားနည်းတဲ့အတွက် တာဝန်ယူမှု၊ တာဝန်ခံမှုအပိုင်းတွေကို စနစ်တကျ လက်ဆင့်ကမ်းစေချင်ပါတယ်။

၂၁။ ဦးရဲဇော်မြင့် (MHD Co.,Ltd)

စိတ်ချပါ၊ ကျွန်တော်တို့ဆောင်ရွက်မှာကတော့ ရေအားလျှပ်စစ် စီမံကိန်းတင် မဟုတ်ပါဘူး၊ အောက်က ၈က (၂၀၀) မှာ သဘာဝပတ်ဝန်းကျင် ထိန်းသိမ်းတဲ့နယ်မြေပုံစံမျိုး ပြုလုပ်ပြီး၊ ပြည်တွင်းပြည်ပ ခရီးသွားများအတွက် resort တစ်ခုလိုမျိုး သစ်တောရေးရာဌာနနဲ့ ညှိနှိုင်းပြီး ဆောင်ရွက်ရန် ရည်ရွယ်ထားပါတယ်။ ဒါကြောင့် ရေအားလျှပ်စစ်ကို အရင်လုပ်မှဖြစ်မှာပါ။ လျှပ်စစ်ရှိမှ ဆောင်ရွက်နိုင်မှာ ဖြစ်ပါတယ်။ ဒါကြောင့် ကျွန်တော်တို့က အောက်မှာ ချောင်းလေးတွေ၊ မြောင်းလေးတွေ၊ သူတို့ဘေးမှာ ခါတော်မီအပင်တွေ၊ နောက်ပြီးတော့ ဒီဒေသနဲ့ ကိုက်ညီမှုရှိတဲ့ မျိုးစိတ်တွေကို သစ်တောနဲ့ တိုင်ပင်ပြီး အခုကတည်းက လုပ်ဆောင်နေပြီဖြစ်ပါတယ်။

၂၂။ ဦးအောင်ဆွေချစ် (ဒမြို့နယ်အုပ်ချုပ်ရေးမှူး)

ကျွန်တော်ကတော့ နောင်ချိုမြို့နယ် အထွေထွေ အုပ်ချုပ်ရေးဦးစီးဌာနက ဒုမြို့နယ်အုပ်ချုပ်ရေးမှူး ဦးအောင်ထွေးချစ် ဖြစ်ပါတယ်။ အခုလိုမျိုး အလုပ်ရုံဆွေးနွေးပွဲဆိုတာက

ဒီရေအားလျှပ်စစ်လုပ်ငန်းနဲ့ပတ်သက်ပြီး ပွင့်ပွင့်လင်းလင်း အားနည်းချက်၊ အားသာချက်တွေကို ဝေဖန်အကြံပြုလို့ရမယ်၊ ဆွေးနွေးလို့ရမယ်ဆိုတဲ့အတွက် ဒီလိုမျိုး အလုပ်ရုံဆွေးနွေးပွဲ ကျင်းပပေးတဲ့ အတွက် ကျေးဇူးတင်ပါတယ်။ ဒေသဖွံ့ဖြိုးမှုအတွက် လုပ်ပေးသောကြောင့် အထူကျေးဇူးတင်ပါတယ်

၂၃။ ဦးဟိန်းကျော်အောင် (လဝက)

ကျွန်တော်တင်ပြချင်တာကတော့ ခုနက လျှပ်စစ်ဦးစီးမှူး တင်ပြသွားတဲ့ ဆည်တော်ကြီးကို လိုင်းသွားခြိတ်မယ်ဆိုတဲ့ အနေအထားက၊ ဒီဘက်ကိုခြိတ်ချင်မှလည်း ခြိတ်မယ်ဆိုတဲ့ အနေအထားက ဆုံးဖြတ်ချက်ချပြီးပြီလား သိချင်ပါတယ်။

၂၄။ ဦးသန်းအောင် (MHD Co.,Ltd)

ကျွန်တော်တို့က လျှပ်စစ်ဝန်ကြီးနဲ့ ဆွေးနွေးတဲ့အခါ တစ်ဖွဲ့ကို ပြင်ဦးလွင် ခွဲရုံကို ပို့ခိုင်းပါတယ်။ ကျွန်တော်တို့အနေနဲ့က ပြင်ဦးလွင်ခွဲရုံကိုသွားရင် မိုင် (၂၀) ကျော် (၃၀) လောက်သွားရပါမယ်။ ဆည်တော်ကြီးဆိုရင် (၁၀) မိုင်လောက်ပဲ သွားရပါတယ်။ ဒါကြောင့် ကျွန်တော်တို့ရဲ့ ရင်းနှီးမြှုပ်နှံမှုစရိတ်က စက်ရုံဆောက်တာနဲ့ transmission line နဲ့က ကုန်ကျစရိတ်ချင်း တူနေပါတယ်။ transmission line က safe guard တွေ၊ တာဝါတိုင်တွေ၊ Cable တွေ အပြည့်အစုံ ထည့်ရတဲ့အတွက် ကုန်ကျစရိတ် မြင့်မားပါတယ်။ နောက်ပြီး ကျွန်တော်တို့ မှန်းထားတာက ဟော်ကုန်းအုပ်စု၊ ကျောက်ကြီးအုပ်စု၊ ပုန်းကြီးအုပ်စု၊ ဘန့်ဘွေးကျင်းအုပ်စု၊ ဒီ (၄)ရွာလောက်ကိုတော့ လျှပ်စစ်ပေးဖို့ ရည်မှန်းချက်ထား ထားပါတယ်။ ကျွန်တော်တို့ ထုတ်လုပ်တဲ့လျှပ်စစ်သည် အပေါ်က အိမ်ခြေ (၁၀၀၀) ခန့်ကို လျှပ်စစ်ပေးရန် ဖြစ်ပါတယ်။ အထွေထွေလုပ်ငန်းအားလုံးအတွက် ဖြစ်ပါတယ်။ အခု ၁၁ ကီလိုဝပ်ကို ရွာ (၂) ရွာ အရင်စပြီးပေးပါမယ်။ အဲ့ဒီရွာ ဘယ်လောက်သုံးတယ်ဆိုတဲ့ အပေါ်မှာ မူတည်ပြီးတော့ ကျွန်တော်တို့ လျှပ်စစ်ပေးရန် ရည်ရွယ်ထားပါတယ်။ ကျွန်တော်တို့ ၁၅၀ ကီလိုဝပ် ထုတ်ပြီး ၁၁ ကီလိုဝပ် ပို့ပါမယ်။ ကျွန်တော်တို့ လုပ်ငန်းအတွက် လိုအပ်တဲ့ နေရာတွေမှာသုံးနေရင်း အနီးအနားက ကျေးရွာတွေကို ပို့ပါမယ်။ အဲ့ဒီလိုနဲ့ ကျွန်တော်တို့က ထွက်လာတဲ့ လျှပ်စစ်ဓာတ်အားတွေကို စုပေါင်းပြီးမှ ဒီအပေါ်ကို ဖြန့်မှာဖြစ်ပါတယ်။ ကျွန်တော်တို့အားလုံးပေါင်း ဝ.၈ မဂ္ဂါဝပ်လောက် ထွက်မယ်လို့ မှန်းထားပါတယ်။ သို့သော်လည်း ဒီကိစ္စဟာ ကျွန်တော်တို့ မြေစမ်းခရမ်းပျုံးကာလပဲ ရှိပါသေးတယ်။ တရားသေ စွဲမှတ်ထားဖို့ မဟုတ်ပါဘူးလို့ အားလုံးကို ပြောပြချင်ပါတယ်။

၂၅။ ဦးရဲလင်းကျော် (လျှပ်စစ်၄၁၁၆)

ဟုတ်ကဲ့ပါ။ နောက်တစ်ခု မရှင်းတာကတော့ ပြင်ဦးလွင်နဲ့ ဆည်တော်ကြီးက မန္တလေးတိုင်းထဲမှာ ရှိပါတယ်။ အခုလုပ်တဲ့ စီမံကိန်းကတော့ ရမ်းပြည်နယ်ထဲမှာရှိပါတယ်။ ရှမ်းပြည်နယ်ရဲ့ ဒေသဖွံ့ဖြိုးမှုကို လေ့လာကြည့်ရင် ချင်းပြည်နယ်၊ ကချင်ပြည်နယ် တို့ပြီးရင် ဖွံ့ဖြိုးမှု၊ တိုးတက်မှု၊ အနည်းဆုံးထဲမှာ ရှိပါတယ်။ သို့ဖြစ်ပါ၍ လိုင်းဆွဲမှုနဲ့ ပတ်သက်ပြီးတော့ ပြင်ဦးလွင်နဲ့ ဆည်တော်ကြီးအပြင် ကျွန်တော်တို့ရှမ်းပြည်နယ်အတွင်းမှာ ချိတ်ပေးရန်တင်ပြပေးနိုင်မလား သိချင်ပါတယ်။ အကြောင်းကတော့ ကျွန်တော်တို့ အစိုးရအဖွဲ့ဆိုတာ ရှမ်းပြည်နယ်ဆိုရင် ရှမ်းပြည်နယ် အစိုးရအဖွဲ့က အခွန်ငွေကောက်ခံပါတယ်။ သို့သော်လည်း ရတဲ့အခွန်ငွေကို ရှမ်းပြည်နယ်ဖွံ့ဖြိုးအတွက် အကုန်သုံးလို့မရပါဘူး။ မန္တလေးတိုင်းလဲ ထိုနည်ငင်းပဲ။ နိုင်ငံတော်ကိုလည်း ပြည်လည်ပေးဆောင်ရပါတယ်။ ထို့ကြောင့် ရှမ်းပြည်နယ်အတွင်းက ဒေသဖွံ့ဖြိုးရေး

ဆောင်ရွက်မှုကြောင့် ရရှိလာတဲ့ အကျိုးအမြတ်ကို ရှမ်းပြည်နယ်အတွက် အသုံးပြုသင့် မပြုသင့်ကို စဉ်းစားဆောင်ရွက်စေလိုကြောင်း တင်ပြလိုပါတယ်။

ကျွန်တော်တို့က ရေအားလျှပ်စစ်ဆောင်ရွက်ပြီး နိုင်ငံတော်ကို မဟာဓာတ်အား လိုင်းထဲ ထည့်ပြီးရောင်းပါတယ်။ သို့ပါသော်လည်း ကျွန်တော်တို့က ရှမ်းပြည်နယ် အစိုးရနဲ့ ပူးတွဲပြီးလုပ်တဲ့ သဘောပါ။ ကျွန်တော်တို့ ကုမ္ပဏီက အကုန်အကျခံတယ်၊ ဒါပေမယ့် ရှမ်းပြည်နယ် အစိုးရဲ့ အုပ်ချုပ်မှုအောက်မှာပဲရှိပါတယ်။ မဟာဓာတ်အားလိုင်းထဲ ထည့်တယ်ဆိုတာကလည်း အဲ့ဒီရဲ့အခွန်တွေက ပြည်တောင်စုအစိုးရထဲ ရောက်သွားတာမဟုတ်ပါဘူး၊ မွန္တလေးတိုင်းထဲ သွားတာလည်း မဟုတ်ပါဘူး၊ ရှမ်းပြည်နယ်အစိုးရထဲပဲ သွားတာဖြစ်ပါတယ်။ အဲ့ဒါကလည်း ကျွန်တော်တို့ ရှမ်းပြည်နယ်အစိုးရနဲ့ MOU ထိုးထားတဲ့အထဲမှာ ဘယ်လောက် % ဆိုတာတွေပါ။ ဒါကိုလည်း ရှမ်းပြည်နယ် အစိုးရက သဘာဝပတ်ဝန်းကျင် စမ်းစစ်မှု ပြီးသွားတဲ့ အခါကျရင် ချပြမယ်လို့ ထင်ပါတယ်။ ဒီတော့ အခွန်ကိုလည်း ရှမ်းပြည်နယ်အစိုးရကပဲ ရမှာဖြစ်ပြီး ကျွန်တော်တို့ ဒီအပေါ်မှာ စက်ရုံဆောက်တာကလည်း ဒီဒေသကလူတွေကို လျှပ်စစ်ပေးဖို့ပဲ ဖြစ်ပါတယ်။

၂၅။ ဒေါ်စိန်စိန် (အခွန်ဦးစီးဌာန)

ကျွန်မပြောချင်တာကတော့ ဝန်ဆောင်မှု လုပ်ငန်းကရတဲ့ ဝင်ငွေခွန်ကို ကုမ္ပဏီမှာပဲ ထမ်းဆောင်တာကို လက်ခံပါတယ်။ ကုန်သွယ်ခွန်ကတော့ မည်သည့် အခွန်ရုံးမှာမဆို ပေးဆောင်နိုင်တဲ့အတွက် ကျွန်မတို့ ရှမ်းပြည်နယ် နောင်ချိုမှာပဲ ပေးဆောင်စေချင်ပါတယ်။ ကျွန်မကတော့ ကိုယ့်မြို့နယ်ကို အကျိုးအမြတ်ရစေချင်တဲ့ ရည်ရွယ်ချက်နဲ့ တင်ပြရခြင်းဖြစ်ပါတယ်။

ကျွန်တော့် အနေနဲ့ကတော့ နောင်ချို မြို့သူ၊ မြို့သားတွေရဲ့ လိုလားချက်ကို တင်ပြလိုပါတယ်။ အခုလက်ရှိရတဲ့ လျှပ်စစ်ဓာတ်အားက မဟာဓာတ်အားလိုင်းက ဖြစ်တဲ့အတွက်၊ အစွန်အဖျား ဖြစ်တဲ့အတက် ရရှိတဲ့ ဓာတ်အားလိုင်းက နည်းနေပါတယ်။ ကျွန်တော်တို့ မြို့နယ်မှာလုပ်တဲ့ လုပ်ငန်းကနေ လျှပ်စစ်ဓာတ်အားရမယ်ဆိုရင် ကျွန်တော်တို့မြို့နယ်ဟာ အစွန်အဖျား မဟုတ်တော့ပါဘူး။ ကျွန်တော်တို့ မြို့သူ၊ မြို့သားတွေအနေနဲ့ကတော့ ဓာတ်အားအသစ် ရချင်ပါတယ်။ ဖြစ်နိုင်ရင် ကူညီပေးဖို့ ပြောလိုပါတယ်။ ထည့်သွင်းစဉ်းစားလို့ ရရင်လည်း စဉ်းစားပေးဖို့ မြို့သူ၊ မြို့သားတွေ ကိုယ်စား ပြောလိုပါတယ်။

၂၆။ ဦးရဲဇော်မြင့်(MHD Co.,Ltd)

ကျွန်တော်တို့အနေနဲ့ ဒီကိစ္စကို မှတ်တမ်းတင်ထားပြီး ဌာနဆိုင်ရာများနဲ့ ဆွေးနွေးတဲ့အခါ ထည့်သွင်းဆွေးနွေး စဉ်းစားပေးမည်ဖြစ်ကြောင်း ပြောလိုပါတယ်။

လဝက မျူးကြီးနဲ့က ဒုမြို့နယ်အုပ်ချုပ်ရေးမှူး ပြောသွားတဲ့ ကိစ္စတော့ လက်ရှိ ကျွန်တော်တို့ဆီကို အနီးစခန်း ပင်မဓာတ်အားခွဲရုံကနေ မီးယူတာပါ။ ပြင်ဦးလွင်ခွဲရုံနဲ့ ပဒေသာခွဲရုံ ရှိပါတယ်။ ကျွန်းတစ်ပင်ခွဲရုံလည်း ရှိပါတယ်။ ကျွန်းတစ်ပင်အထိကို (၁၆)မိုင်၊ ကျွန်တော်တို့ဘက်ကို (၁၄)မိုင်၊ အဲဒီကနေ ကောင်းခမ်းအထိ ကို (၃၂)မိုင် ဝေးပါတယ်။ ခွဲရုံတွေ ဆင့်ကဲဆင့်ကဲ ပေးလာရတဲ့အခါမှာ ကျွန်တော်တို့မြို့နယ်မှာ မီးမရတော့ပါဘူး။ ဒါကြောင့် ကိုယ့်မြို့နယ် အတွင်းမှာ မီးရရှိလိုတဲ့ သဘောဖြစ်ပါတယ်။

ကျွန်တော်တောင်းဆိုချင်တာကတော့ မြို့နယ် EPC ကလည်း ပံ့ပိုးစေချင်ပါတယ်။ ဥပမာအားဖြင့် ကျွန်တော်က သိန်း (၁၀၀၀) စိုက်ရင် ကျွန်တော်တို့ဘက်က ကြေပ်တည်းနေတဲ့အခါ

မြို့နယ် EPC ဘက်က သိန်း (၁၀၀)လောက်စိုက်ပေးရင် အလုပ်ဖြစ်သွားနိုင်ပါတယ်။ EPC ရဲ့ အားထုတ်မှုကို ဝန်ကြီးကိုသော်လည်းကောင်း၊ ကုမ္ပဏီပိုင်ရှင်ကိုသော်လည်းကောင်း ပြပြီး ရွာသားတွေရဲ့ လိုအပ်ချက်ကို ဖြည့်ဆည်းပေးနိုင်ပါတယ်။ နှစ်ဦးနှစ်ဖက် အဆင်ပြေစေနိုင်တဲ့ နည်းလမ်းတွေနဲ့ ဖွံ့ဖြိုးရေးလုပ်ငန်းများ လုပ်ဆောင်နိုင်ပါတယ်။ ကျွန်တော်တောင်းဆိုချင်တာကတော့ ဌာနဆိုင်ရာများကို ကျွန်တော်တို့ကို ကူညီပံ့ပိုးပေးရန်ဖြစပါတယ်။

၂၇။ ဒေါ်ဖြူဖြူအေး (NEPS Co.,Ltd)

အထက်ပါ အလုပ်ရုံဆွေးနွေးပွဲရလဒ်များရှင်းလင်တင်ပြခဲ့ပါသည်။

၂၈။ ဦးသီဟဝမ်းဖေ (ထွေ/အုပ်၊နော်ချီမြို့) နိဂုံးချုပ်အမှာစကားပြောကြားခြင်း

အားလုံးစိတ်ရှည်ရှည်နားထောင်ပေးတဲ့အတွက် ကျေးဇူးတင်ပါတယ်။ စိတ်ပါဝင်စားစွာ ဆွေးနွေးပေးတဲ့အတွက်ကို ရှင်းလင်းခဲ့တဲ့ ကုမ္ပဏီ ၊ တာဝန်ရှိတဲ့လူများ၊ ရပ်မိရပ်ဖများ၊ ရပ်ကွပ် အုပ်ချုပ်ရေးမှူးများ အားလုံးကျေးဇူးတင်ပါတယ်။ အဓိက ထပ်ပြီးပြောချင်တာက လျှပ်စစ်ဌာန၊ မြို့နယ်အုပ်ချုပ်ရေးမှူး တို့တင်ပြသလိုပဲ ဖြစ်နိုင်ရင်တော့ အခွန်ကတော့ နိုင်ငံတော်ကိုပဲ ဆောင်ရမှာပါ။ နောက်ပြီး ရှမ်းပြည်ဖြစ်တဲ့အတွက် ရှမ်းပြည်ကိုလဲဆောင်ရပါမယ်။ ကျွန်တော် မြို့နယ်ထဲမှာဖြစ်တဲ့အတွက် ပွင့်လင်းစွာဆောင်ချင်ပါတယ်။ အဲဒါလေးတော့ ကုမ္ပဏီဘက်ကနေပြီး တင်ပြပြီးဆောင်ရွက်ပေးပါ။ ဆည်တော်ကြီးပြင်ဦးလွင်တို့ ဓာတ်အားခွဲရုံပိုလဲ နိုင်ငံတော်ကဆီက ပိုက်ဆံရမှာပါပဲ။ ကျွန်တော်တို့ဆီပို့လဲ ပိုက်ဆံရမှာပါပဲ အတူတူပဲဖြစ်ပါတယ်။ဖြစ်နိုင်ရင်တော့ တင်ပြစေချင်ပါတယ် အားလုံးကျေးဇူးတင်ပါတယ်။

Participation List

ရှမ်းပြည်နယ်(မြောက်ပိုင်း)၊ နောင်ချိုမြို့နယ်၊ Myanamr Hydropower Development Co.,Ltd ၏
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တက်ရောက်သူများစာရင်း

ခ.၂၀၁၆

စဉ်	အမည်	ရာထူး	ဌာန/နေရပ်	လက်မှတ်	ဖုန်း/အီးမေးလ်
၁	[illegible]	[illegible]	[illegible]		[illegible]
၂	[illegible]	[illegible]	[illegible]		09782810509
၃	[illegible]	[illegible]	[illegible]		082. 85480
၄	[illegible]	[illegible]	[illegible]		09-797500331
၅	[illegible]	[illegible]	MPI, [illegible]		09-526000[illegible]
၆	[illegible]	[illegible]	[illegible]		09-49873540
၇	[illegible]	[illegible]	[illegible]		09-403768[illegible]445
၈	[illegible]	[illegible]	[illegible]		25400153[illegible]
၉	[illegible]	[illegible]	[illegible]		256464555[illegible]
၁၀	[illegible]	[illegible]	[illegible]		09259011640
၁၁	[illegible]	[illegible]	[illegible]		09-971763[illegible]1
၁၂	[illegible]	[illegible]	[illegible]		09-403709963
၁၃	[illegible]	[illegible]	[illegible]		09-791710304
၁၄	[illegible]	[illegible]	[illegible]		09-7904[illegible]606
၁၅	[illegible]	[illegible]	[illegible]		09-451922655
၁၆	[illegible]	[illegible]	[illegible]		09.403749108
၁၇	[illegible]	[illegible]	[illegible]		09 3[illegible]5883

ရှမ်းပြည်နယ်(မြောက်ပိုင်း)၊ နောင်ချိုမြို့နယ်၊ Myanamr Hydropower Development Co.,Ltd ၏
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တက်ရောက်သူများစာရင်း

၂၈.၅.၂၀၁၆

စဉ်	အမည်	ရာထူး	ဌာန/နေရပ်	လက်မှတ်	ဖုန်း/အီးမေးလ်
၁.	[illegible]		[illegible]	[illegible]	
၂.	[illegible]			[illegible]	

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.၈.၂၀၁၆

စဉ်	အမည်	ရာထူး	ဌာန/နေရပ်	လက်မှတ်	ဖုန်း/အီးမေးလ်
၁	ဦးသန်းအောင်	[illegible]	[illegible]	[signature]	09259120130
	ဦးကျော်[illegible]		"	[signature]	၀၉-၄၅၂၃၇၀၆၀၉
၂	ဦးရဲကျော်မြင့်	[illegible]	MHD	[signature]	09 250648310
	ဦးအောင်မှူးမြင့်	လက်ထောက်အင်/ယာ	MHD	[signature]	09421137469
	ဒေါ်မေသူကျော်	လက်ထောက်အင်/ယာ	MHD	[signature]	09402785488
	~~[illegible]~~				

ရှမ်းပြည်နယ်(မြောက်ပိုင်း)၊ နောင်ချိုမြို့နယ်၊ Myanamr Hydropower Development Co.,Ltd ၏
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တက်ရောက်သူများစာရင်း

.၈.၂၀၁၆

စဉ်	အမည်	ရာထူး	ဌာန/နေရပ်	လက်မှတ်	ဖုန်း/အီးမေးလ်
	ဦးဖြတ်သူ	Computer Technician	NEPS Co., Ltd	[signature]	09-420224878
	ဦးကျော်ခင်ဇော်	Economic Survey	NEPS Co., Ltd	[signature]	09-250370407
၁	ဦးနေဆန်းမြင့်	Engineer	NEPS Co., Ltd	[signature]	09-5300772
၂	ဦးကျော်ကျော်ဝင်း	"	NEPS Co., Ltd	[signature]	09-448539292
၃	ဒေါ်ဖြူဖြူအေး	"	NEPS Co., Ltd	[signature]	0973232939
၄	ဒေါ်အေးသက်ဝေ	GIS Analyst	NEPS Co., Ltd	[signature]	09-450025450
၅	ဒေါ်ဖောကျော့ခိုင်	Engineer	NEPS Co., Ltd	[signature]	09-798360847

ရှမ်းပြည်နယ်(မြောက်ပိုင်း)၊ နောင်ချိုမြို့နယ်၊ Myanamr Hydropower Development Co.,Ltd ၏
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တက်ရောက်သူများစာရင်း

၈.၂၀၁၆

စဉ်	အမည်	ရာထူး	ဌာန/နေရပ်	လက်မှတ်	ဖုန်း/အီးမေးလ်
၁.					
၂					
၃			NEPS		09752324334
၄					
၅					
၆					09.265984030
၇					
၈					
၉					09.260462756
၁၀					
၁၁					09.455964104
၁၂					09.776405277.
၁၃					
၁၄					09-453931464
၁၅					
၁၆					09403708361
၁၇					

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၁၈	[illegible]	[illegible]	[illegible]	[signature]	၀၉ ၄၀၂၂၅၄၂၂
၁၉	ဦးမြင့်မောင်	[illegible]	[illegible]	[signature]	09-798955340
၂၀	[illegible]	[illegible]	[illegible]	[signature]	09 777582991
၂၁	[illegible]	[illegible]	[illegible]	[signature]	09-403737590
၂၂	[illegible]	[illegible]	[illegible]	[signature]	09-7525412783
၂၃	[illegible]	[illegible]	[illegible]	[signature]	[illegible]
၂၄	[illegible]	[illegible]	[illegible]	[signature]	[illegible]
၂၅	[illegible]	[illegible]	[illegible]	[signature]	[illegible]
၂၆	[illegible]	[illegible]	[illegible]	[signature]	[illegible]
၂၇	[illegible]	〃	[illegible]	[signature]	09-443374?0?3
၂၈	[illegible]	〃	[illegible]	dopaing	09 796134350
၂၉	[illegible]	[illegible]	[illegible]	[signature]	09 1257084833
၃၀	[illegible]	[illegible]	[illegible]	[signature]	09-257933742
၃၁	[illegible]	[illegible]	[illegible]	[signature]	09 2689983248
၃၂	[illegible]	[illegible]	[illegible]	[signature]	09 40345906?
၃၃	[illegible]	[illegible]	[illegible]	[signature]	09 970461619
	[illegible]		〃	[signature]	

ရှမ်းပြည်နယ်(မြောက်ပိုင်း)၊ နောင်ချိုမြို့နယ်၊ Myanamr Hydropower Development Co.,Ltd ၏

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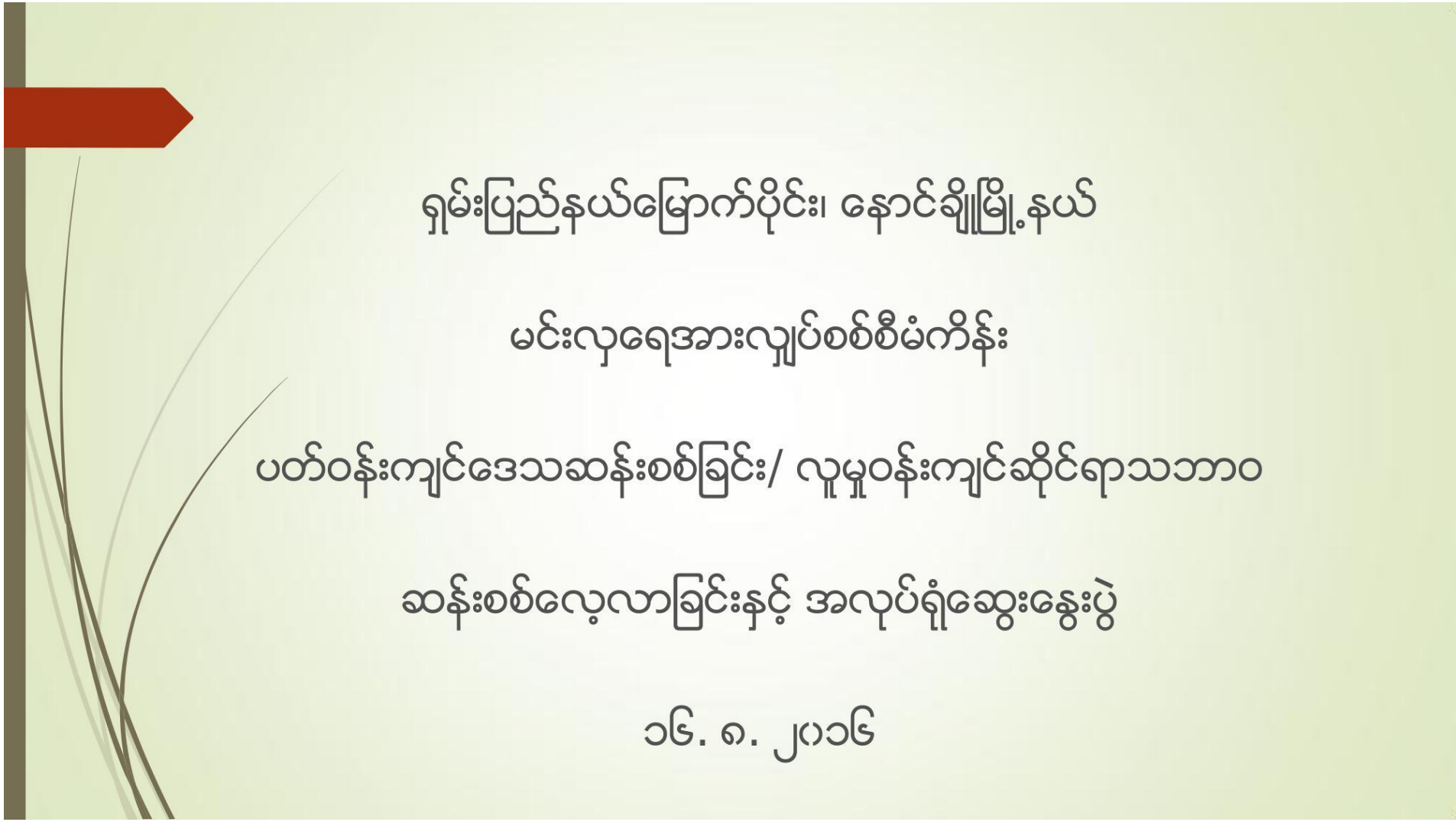
စဉ်	အမည်	ရာထူး	ဌာန/နေရပ်	လက်မှတ်	ဖုန်း/အီးမေးလ်
၃၄	ဦးစောအောင်	နှုန်ပူစူခေ့ရွာ	ကွန်/နောင်		09-970463436
၃၅	ဦး[illegible]	။	။		09 976324051
၃၆	ဦးခင်မောင်	။	။		09-458135278
၃၇	ဦးတင့်ဆွေနိုင်	ကွန်ဟုတ်ရွာ	ကွန်/နောင်		09-787450570
၃၈	ဦးသိန်းဇော်မြင့်	။	။		09-970464482
၃၉	ဦးဇော်မျိုး	။	။		09-798823004
၄၀	ဦးမင်းကျော်နိုင်	ကုန်ကွက်ရွာ	မြို့ပေါ်ရပ်ကွက်/နောင်		09797540552
၄၁	ဦးကျော်မင်းထွန်း	နှုန်ပူ[illegible]	။		09-256551454
၄၂	ဒေါ်ဖိုးဖိုးနိုင်	။	။		၀၉-၄၅၃၇၃၅၃၅၅
၄၃	ဒေါ်မေဝင်းလတ်	။	။		၀၉.၄၀၃၇၂၅၅၁၀၉
၄၄	ဒေါ်လှလှသန်း	။	။		၀၉၊၄၀၄၇၃၇၅၉၂
၄၅	ဒေါ်ခင်မြဝင်း	။	။		၀၉.၅၈၁၂၆၈၅၀၈
၄၆	ဦးသိန်းနိုင်	။	။		၀၉-၂၅၆၅၉၉၈၇၈၀
၄၇	ဦးဝင်းသိန်း	။	။		၀၉.၅၉၄၈၉၈၀၁၈၀
၄၈	ဦးအောင်ဦး	။	။		09.798918061
၄၉	ဦးအောင်ဇော်	။	။		—
၅၀	ဦးကျော်ကျော်ထွန်း	ဟယ်ဝှန်းဘော[illegible]	။		

ရှမ်းပြည်နယ်(မြောက်ပိုင်း)၊ နောင်ချိုမြို့နယ်၊ Myanamr Hydropower Development Co.,Ltd ၏
လျှပ်စစ်ဓာတ်အားတည်ဆောက်ခြင်းလုပ်ငန်းအတွက်
ပတ်ဝန်းကျင်နှင့် လူမှုရေးအကျိုးသက်ရောက်မှုအကဲဖြတ်ခြင်း အလုပ်ရုံဆွေးနွေးပွဲ
တက်ရောက်သူများစာရင်း

.၈.၂၀၁၆

စဉ်	အမည်	ရာထူး	ဌာန/နေရပ်	လက်မှတ်	ဖုန်း/အီးမေးလ်
၅၁	ဦးနေဇော်ထွေး	ဒုဥက္ကဌ	မြို့နယ်ဘ ဌေး၂ ၁၃၅	(signature)	၀၉-၄၉၃၂၉၉၅၁၄

PowerPoint Presentation

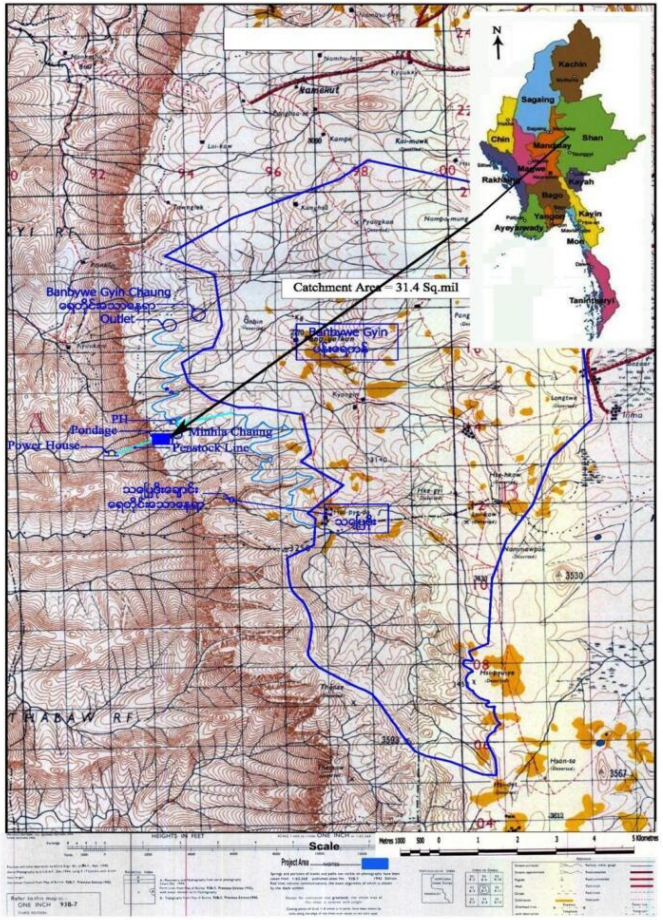


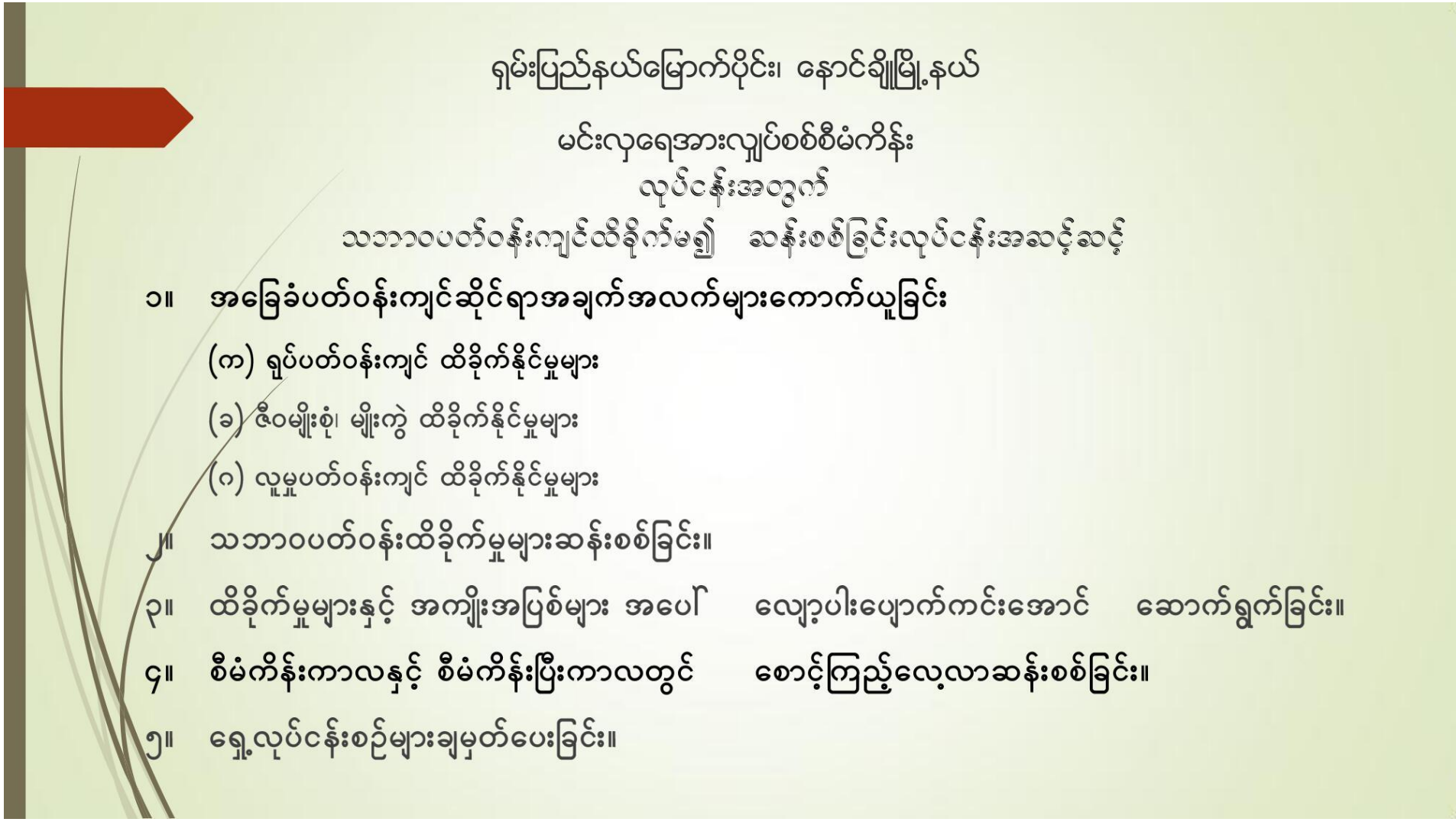
ရှမ်းပြည်နယ်မြောက်ပိုင်း၊
နောင်ချိုမြို့နယ်

မင်းလှ
အသေးစားရေအားလျှပ်စစ်စီမံကိန်း

မြေပုံ

Fig1 Location Map of Proposed Project Area
(Minhla Hydropower Project) Naung Cho Township




ရှမ်းပြည်နယ်မြောက်ပိုင်း၊ နောင်ချိုမြို့နယ်
မင်းလှရေအားလျှပ်စစ်စီမံကိန်း
လုပ်ငန်းအတွက်
သဘာဝပတ်ဝန်းကျင်ထိခိုက်မှု၍ ဆန်းစစ်ခြင်းလုပ်ငန်းအဆင့်ဆင့်
၁။ အခြေခံပတ်ဝန်းကျင်ဆိုင်ရာအချက်အလက်များကောက်ယူခြင်း
(က) ရုပ်ပတ်ဝန်းကျင် ထိခိုက်နိုင်မှုများ
(ခ) ဇီဝမျိုးစုံ၊ မျိုးကွဲ ထိခိုက်နိုင်မှုများ
(ဂ) လူမှုပတ်ဝန်းကျင် ထိခိုက်နိုင်မှုများ
၂။ သဘာဝပတ်ဝန်းထိခိုက်မှုများဆန်းစစ်ခြင်း။
၃။ ထိခိုက်မှုများနှင့် အကျိုးအပြစ်များ အပေါ် လျော့ပါးပျောက်ကင်းအောင် ဆောက်ရွက်ခြင်း။
၄။ စီမံကိန်းကာလနှင့် စီမံကိန်းပြီးကာလတွင် စောင့်ကြည့်လေ့လာဆန်းစစ်ခြင်း။
၅။ ရှေ့လုပ်ငန်းစဉ်များချမှတ်ပေးခြင်း။

ရှမ်းပြည်နယ်မြောက်ပိုင်း၊ နောင်ချိုမြို့နယ် မင်းလှရေအားလျှပ်စစ်စီမံကိန်း လုပ်ငန်းအတွက်

သဘာဝပတ်ဝန်းကျင်နှင့် လူမှုရေးအကျိုးသက်ရောက်မှုများကို အန်အီးပီအက်စ် ကုမ္ပဏီလီမိတက်မှ လေ့လာခဲ့ပါသည်။

(က) ရုပ်ပတ်ဝန်းကျင် ထိခိုက်နိုင်မှုများ

၁။ မြေ၏အရည်အသွေး၊
၂။ ရေ၏အရည်အသွေး စမ်းသပ်ခြင်းလုပ်ငန်း၊
၃။ ဇလဗေဒ

(ခ) ဇီဝမျိုးစုံ၊ မျိုးကွဲ ထိခိုက်နိုင်မှုများ

၁။ သစ်ပင်သစ်တော
၂။ ကုန်းနေရေနေသတ္တဝါများ

(ဂ) လူမှုပတ်ဝန်းကျင် ထိခိုက်နိုင်မှုများ

၁။ သောက်သုံးရေ၏အရည်အသွေးစမ်းသပ်ခြင်း
၂။ လေထုညစ်ညမ်းမှု
၃။ အသံညစ်ညမ်းမှု

ရေအရည်အသွေး မင်းလှရေအားလျှပ်စစ်စီမံကိန်းမှ မြစ်ရေအရည်အသွေးဓါတ်ခွဲစမ်းသပ်ချက်အဖြေဖြစ်ပါသည်။

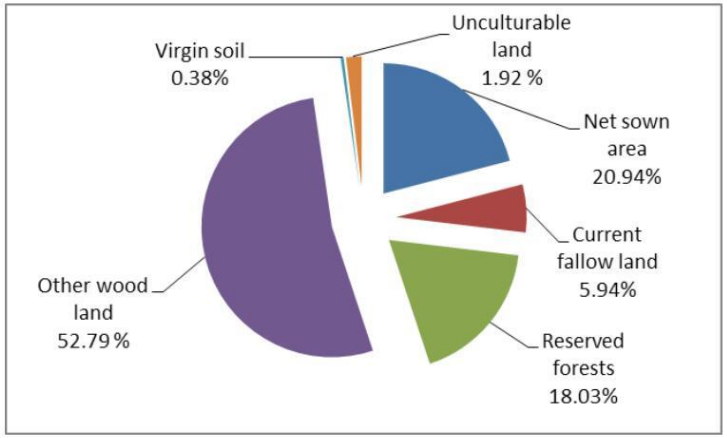
Characteristics	World Health Organization (WHO)		Analyzed Results		
	Highest desirable	Maximum permissible	Site 1	Site 2	Site 3
Physico-chemical					
Turbidity (J.T.U)	5.0	25.0	78	98	63
Colour (Pt-scale)	5.0	50.0			
Taste and Odour	Nothing	Disagreeable			
pH	7.0-8.5	6.5-9.2	7.43	7.38	7.20
Total Solids	500	1500	366.72	425.6	381.44
Total Hardness	100	500	246	292	256
Chloride	200	600	7.09	7.09	7.09
Sulphate (as SO_4)	200	400	0.48	0.48	44.19
Fluorides (as F)	1.0	1.5			
Nitrate (as NO_3)	45	45			
Calcium (as Ca)	75	200	69.74	60.09	57.72
Magnesium	30	150	17.57	34.16	27.33
Iron (as Fe)	0.1	1.0	0.10	0.03	0.05
Manganese (as Mn)	0.05	0.5			
Copper	0.05	1.0			
Zinc	5.0	15.0			
Phenolic compounds	0.001	0.002			
Detergents, anionic	0.2	1.0			
Mineral oil	0.01	0.30			
Arsenic	0.05	0.05			
Chromium (as Cr^{-6})	-	0.01			
Cyanide	-	0.05			
Lead	-	0.10			
Selenium	-	0.01			
Cadmium	-	0.01			
Mercury	-	0.001			
PCBs (µg/L)	-	0.2			
Gross alfa-activity (PCI/L)	-	3.0			
Gross beta-activity (PCI/L)	-	30.0			

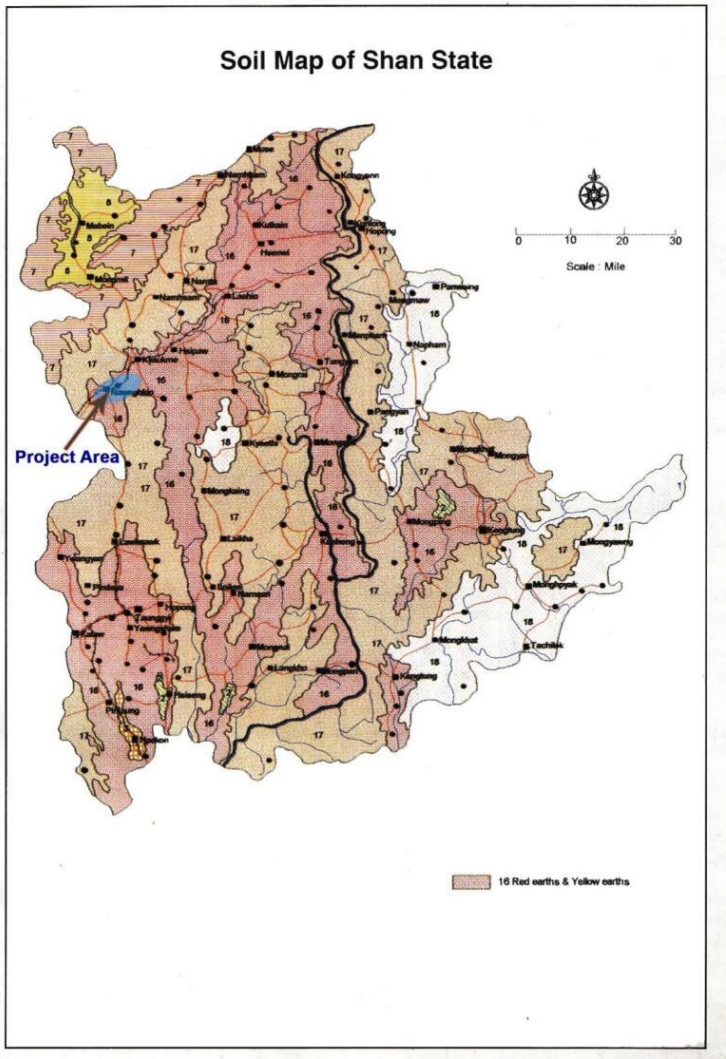
မင်းလှရေအားလျှပ်စစ်စီမံကိန်းမှ မြေအောက်ရေအရည်အသွေးစံတ်ခွဲစမ်းသပ်ချက်အဖြေဖြစ်ပါသည်။

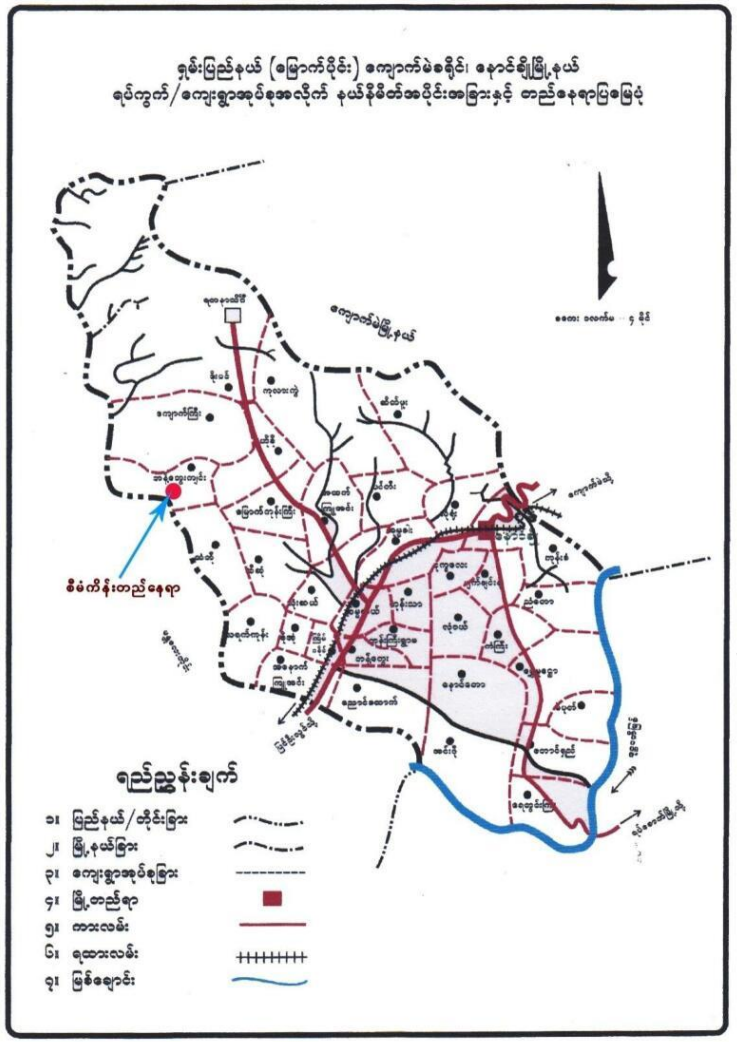
Characteristics	World Health Organization (WHO)		Analyzed Result
	Highest desirable	Maximum permissible	Thapyetoe Village
Physico-chemical			
Turbidity (J.T.U)	5.0	25.0	120
Colour (Pt-scale)	5.0	50.0	
Taste and Odour	Nothing	Disagreeable	
pH	7.0-8.5	6.5-9.2	7.27
Total Solids	500	1500	380.16
Total Hardness	100	500	244
Chloride	200	600	16.31
Sulphate (as SO_4)	200	400	44.19
Fluorides (as F)	1.0	1.5	
Nitrate (as NO_3)	45	45	
Calcium (as Ca)	75	200	34.47
Magnesium	30	150	38.55
Iron (as Fe)	0.1	1.0	0.05
Manganese (as Mn)	0.05	0.5	
Copper	0.05	1.0	
Zinc	5.0	15.0	
Phenolic compounds	0.001	0.002	
Detergents, anionic	0.2	1.0	
Mineral oil	0.01	0.30	
Arsenic	0.05	0.05	
Chromium (as Cr^{-6})	-	0.01	
Cyanide	-	0.05	
Lead	-	0.10	
Selenium	-	0.01	
Cadmium	-	0.01	
Mercury	-	0.001	
PCBs (µg/L)	-	0.2	
Gross alfa-activity (PCI/L)	-	3.0	
Gross beta-activity (PCI/L)	-	30.0	

နောင်ချိုမြို့နယ် မြေအမျိုးအစားနှင့် အခြေအနေ

Red Earths and Yellow Earths (Acrisol)






ရုန်းပြည်နယ် (ဧရာက်ဝိုင်း) ကျောက်မဲခရိုင်၊ နောင်ချိုမြို့နယ်
ရေပ်ကွက်/ကျေးရွာအုပ်စုအလိုက် နယ်နိမိတ်အပိုင်းအခြားနှင့် တည်နေရာပြမြေပုံ
စီမံကိန်းတည်နေရာ
ရည်ညွှန်းချက်
၁။ ပြည်နယ်/တိုင်းခြား
၂။ မြို့နယ်ခြား
၃။ ကျေးရွာအုပ်စုခြား
၄။ မြို့တည်ရာ
၅။ ကားလမ်း
၆။ ရထားလမ်း
၇။ မြစ်ချောင်း

နောင်ချိုမြိုနယ်အတွင်းရှ နေထိုင်လူဦးရေစာရင်း

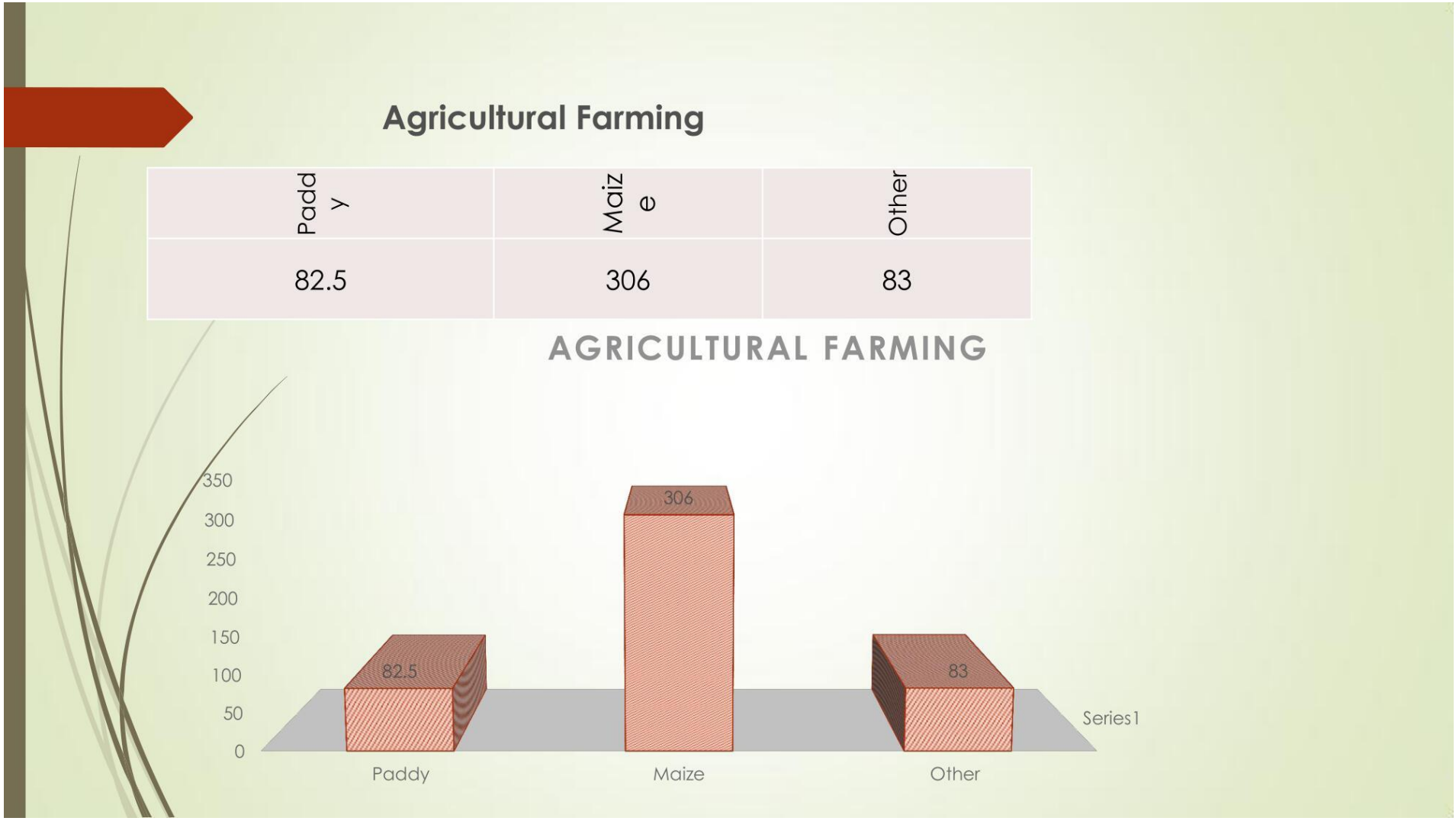
Sr.no	Description	Age above (18)			Age under (18)			Total		
		male	female	total	male	female	total	male	female	total
1	Town dweller	5316	5651	10967	1943	1974	3917	7259	7625	14884
2	Rural dweller	34459	34742	69201	18018	17871	35889	52477	52613	105090
Total		39775	40393	80168	19961	19845	39806	59736	60238	119974

Livelihood Situation အသက်မွေးဝမ်းကြောင်းအခြေအနေ

Affected Area	Farmer	Casual Labour	Selling	Carpenter	Others
Total	103	1	2	3	41

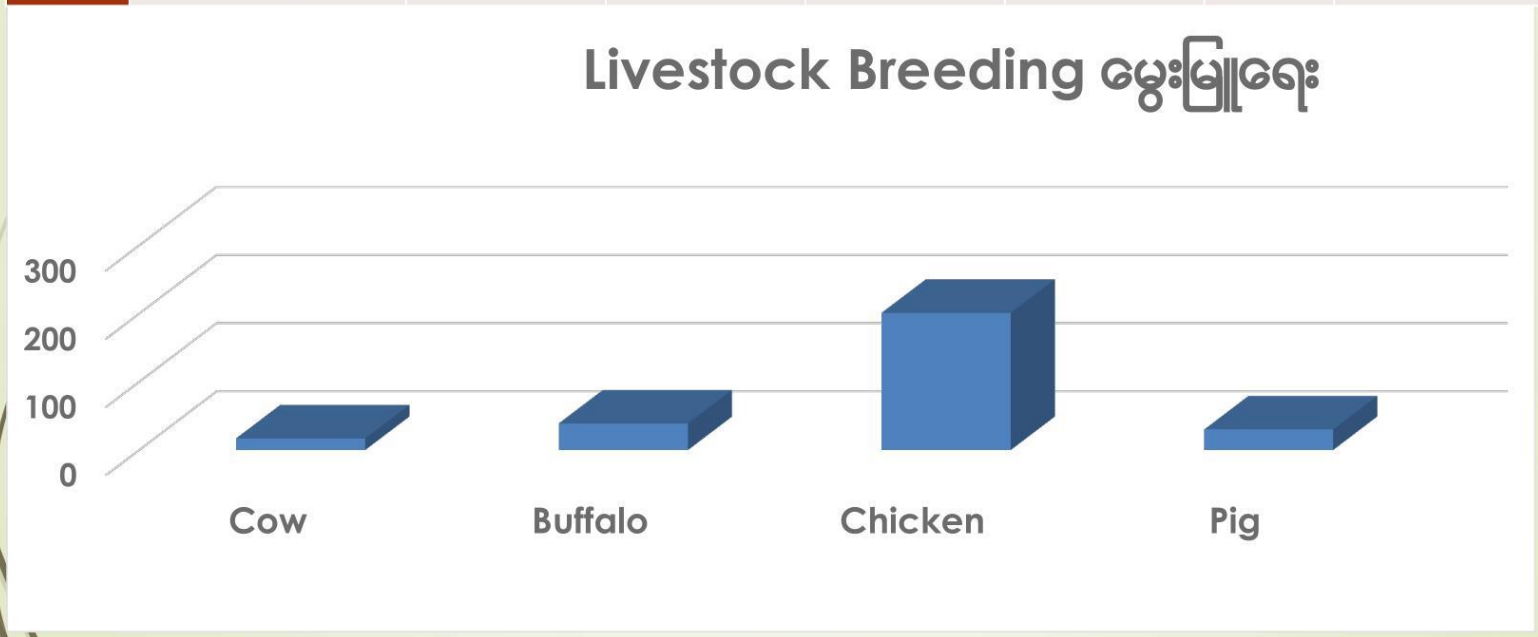
Agricultural Farming

Paddy	Maize	Other
82.5	306	83



Livelihood Situation မွေးမြူရေးအခြေအနေ

Sr.no	Village	Buffalo	Cattle	Pig	Chicken	Duck	Sheep/Goat
1	Thapyaedoe	40	20	100	350	-	-
2	Banbwaykyin	100		50	30		

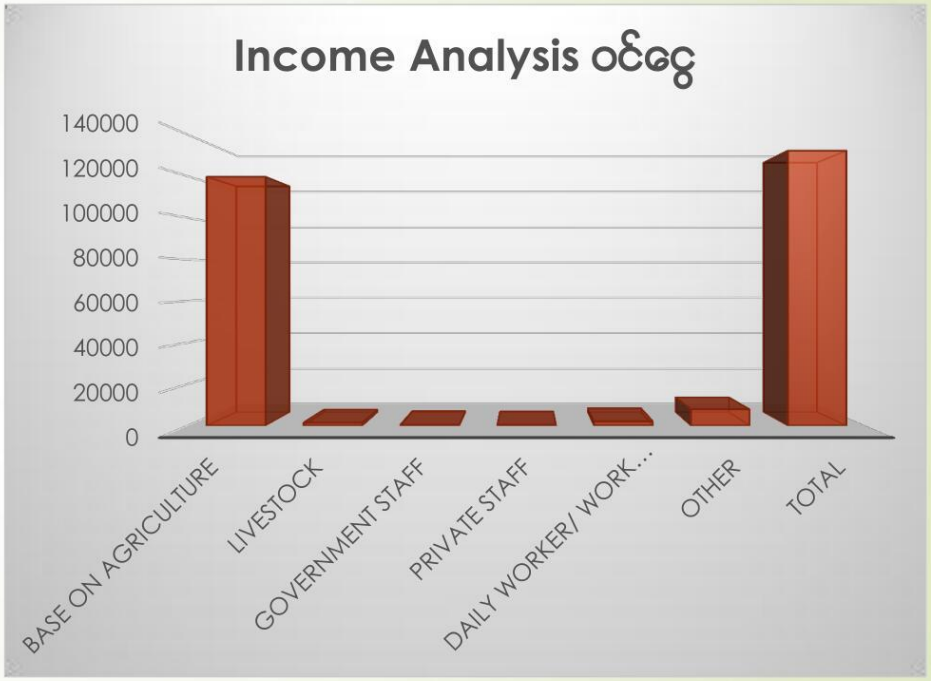


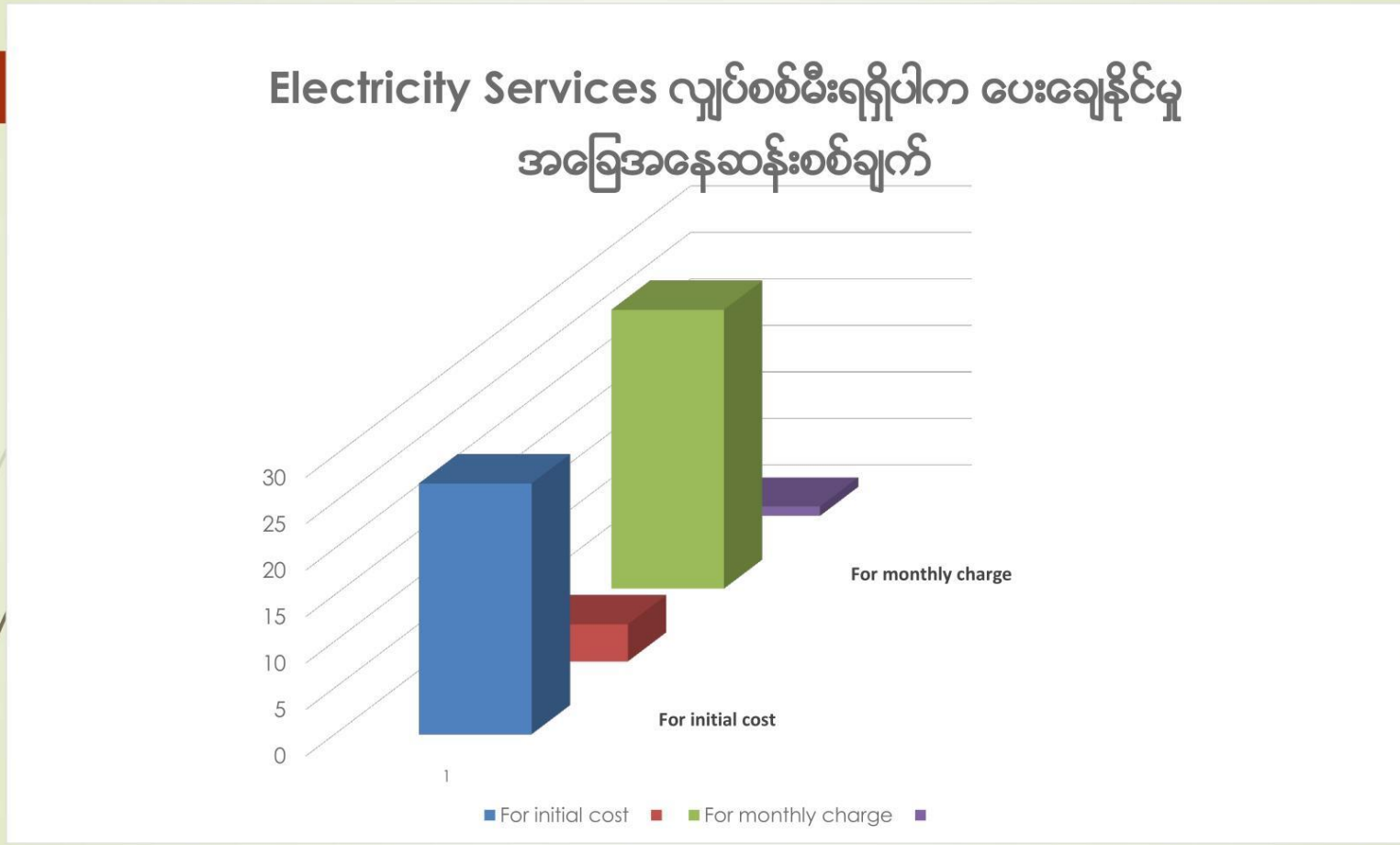
စီမံကိန်းအနီးပတ်ဝန်းကျင်ရှိ ကျေးရာသားအချို့၏ ဝင်ငွေဆန်းစစ်ခြင်း

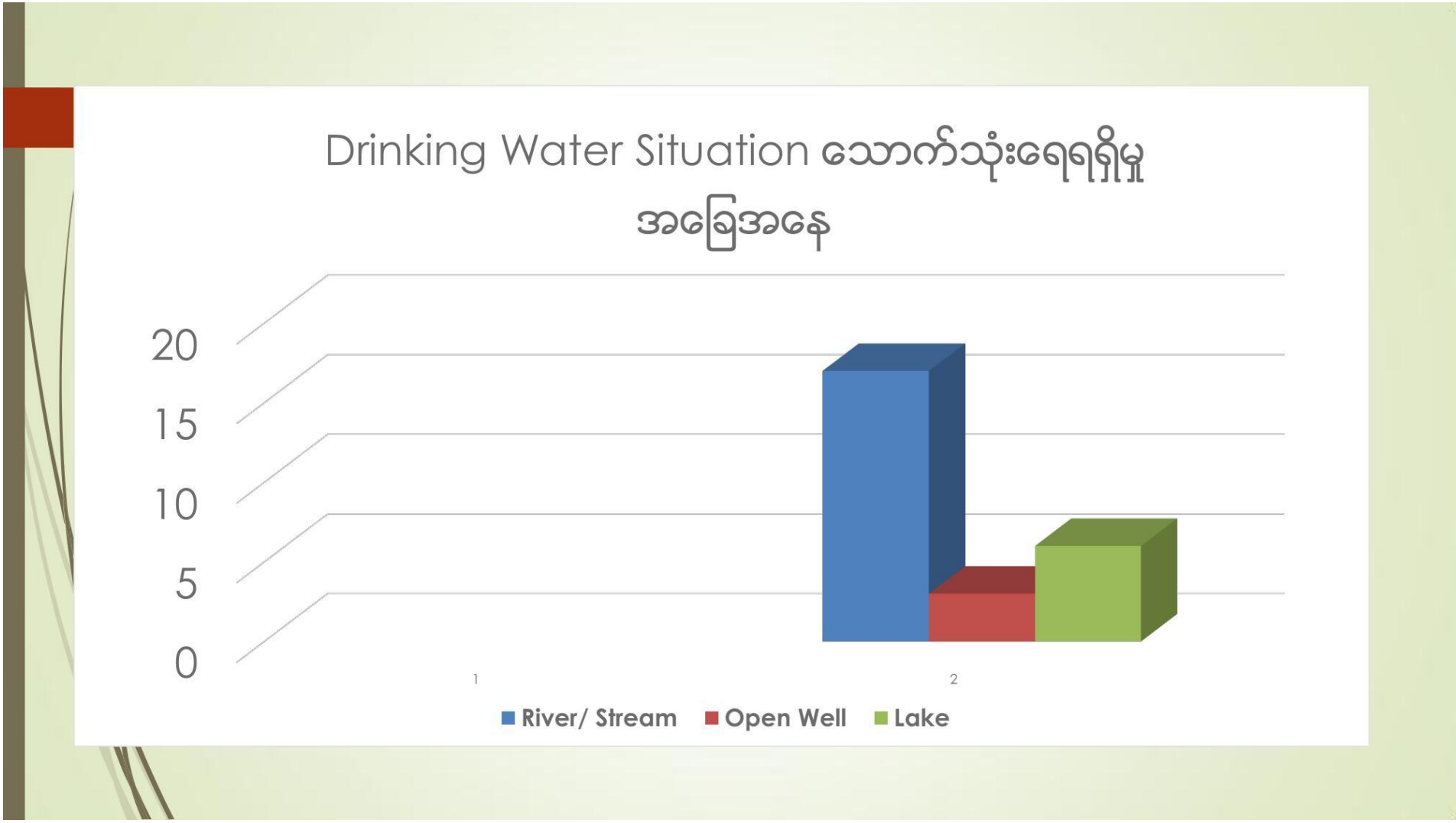
Statistic of Yearly Income and Expense

Random Sample Households

Income / Expenditure Range (Kyats)			Class size	
			Income No of HHs	Expenditure No of HHs
< 250000			-	-
250000	-	500000	-	-
500000	-	750000	-	-
750000	-	1000000	2	-
1000000	-	2000000	4	9
2000000	-	3000000	8	6
3000000	-	4000000	2	1
4000000	-	5000000		
6000000	-	7000000		
> 10000000			1	1
Total			17	17




Electricity Services လျှပ်စစ်မီးရရှိပါက ပေးချေနိုင်မှု အခြေအနေဆန်းစစ်ချက်
30
25
20
15
10
5
0
1
For initial cost
For monthly charge
For initial cost
For monthly charge


Drinking Water Situation သောက်သုံးရေရရှိမှု အခြေအနေ
20
15
10
5
0
1
2
River/ Stream
Open Well
Lake

Summary Impact Assessment Matrix for Minhla Hydropower Project, NaungCho Township.
သဘာဝပတ်ဝန်းကျင်ထိခိုက်မှုများ ဆန်းစစ်လေ့လာခြင်း တွေ့ရှိချက်

စီမံကိန်းတည်ဆောက်အကောင်အထည်ဖော်ခြင်း ကာလ			စီမံကိန်းလည်ပတ်အကောင်အထည်ဖော်ခြင်း ကာလ		
Ref.	ထိခိုက်နိုင်မှုလေ့လာဆန်းစစ်ချက်များ	ထိခိုက်နိုင်မှု အခြေအနေ	Ref.	ထိခိုက်နိုင်မှုလေ့လာဆန်းစစ်ချက်များ	ထိခိုက်နိုင်မှု အခြေအနေ
ဇီဝရူပပိုင်းဆိုင်ရာနှင့် ဓါတုဗေဒဆိုင်ရာ ပြောင်းလဲမှုများ			ဇီဝရူပပိုင်းဆိုင်ရာနှင့် ဓါတုဗေဒဆိုင်ရာ ပြောင်းလဲမှုများ		
BPC/1	မြစ်ရေ အရည်အသွေးပြောင်းလဲခြင်း	နည်း	BPC/1	မြစ်ရေ အရည်အသွေးပြောင်းလဲခြင်း	အလယ်အလတ်
BPC/2	မြေအောက်ရေ ရေအရည်အသွေးပြောင်းလဲခြင်း	နည်း	BPC/2	မြေအောက်ရေ ရေအရည်အသွေးပြောင်းလဲခြင်း	နည်း
BPC/3	ရေသွယ်မြောင်း ပုံစံ ပြောင်းလဲခြင်း	အလယ်အလတ်	BPC/3	ရေသွယ်မြောင်း ပုံစံ ပြောင်းလဲခြင်း	နည်း
BPC/4	တို့ကိစားမှုနှုန်းနှင့် နုန်းမြေအနည်ထိုင်မှုနှုန်း ပြောင်းလဲခြင်း	အလယ်အလတ်	BPC/4	တို့ကိစားမှုနှုန်းနှင့် နုန်းမြေအနည်ထိုင်မှုနှုန်း ပြောင်းလဲခြင်း	အလယ်အလတ်
BPC/5	လေထုအရည်အသွေး ပြောင်းလဲမှု	အလယ်အလတ်	BPC/5	လေထုအရည်အသွေး ပြောင်းလဲမှု	နည်း
BPC/6	ပတ်ဝန်းကျင်အသံညစ်ငြိမ်းမှု	နည်း	BPC/6	ပတ်ဝန်းကျင်အသံညစ်ငြိမ်းမှု	နည်း
BPC/7	ရေနေသတ္တဝါများ	အလယ်အလတ်	BPC/7	ရေနေသတ္တဝါ	အလယ်အလတ်
BPC/8	ကုန်းနေသတ္တဝါ	အလယ်အလတ်	BPC/8	ကုန်းနေသတ္တဝါ	
BPC/9	နေထိုင်လူဦးရေ ရောဂါကူးစက်နိုင်မှု	နည်း	BPC/9	နေထိုင်လူဦးရေ ရောဂါကူးစက်နိုင်မှု	နည်း
BPC/10	မြေမျက်နှာပြင် ပြောင်းလဲမှု	အလယ်အလတ်	BPC/10	မြေမျက်နှာပြင် ပြောင်းလဲမှု	နည်း
BPC/11	သဘာဝ သက်ရှိများ ပြောင်းလဲမှု	အလယ်အလတ်	BPC/11	သဘာဝ သက်ရှိများ ပြောင်းလဲမှု	နည်း

Summary Impact Assessment Matrix for Minhla Hydropower Project, NaungCho Township.
သဘာဝပတ်ဝန်းကျင်ထိခိုက်မှုများ ဆန်းစစ်လေ့လာခြင်း တွေ့ရှိချက်

ယဉ်ကျေးမှုနှင့် လူမှုစီးပွားအခြေအနေ ပြောင်းလဲမှုများ		
SEC/1	ပို့ဆောင်မှု ဆုံးရှုံးခြင်းများ ပြောင်းလဲခြင်း	နည်း
SEC/2	သမိုင်းဝင်ယဉ်ကျေးမှုများ ဆုံးရှုံးမှု ပြောင်းလဲခြင်း	နည်း
SEC/3	လူမှုပြောင်းရွှေ့နေထိုင်ရမှု	နည်း
SEC/4	ယာဉ်သွားယာဉ်လာပုံစံပြောင်းလဲမှု	နည်း
SEC/5	ငါးလုပ်ငန်းအသက်မွေးမှု ပြောင်းလဲခြင်း	အလယ်အလတ်
SEC/6	နေထိုင်လူဦးရေအလုပ်အကိုင်အခွင့်အလမ်းနှင့် အသက်မွေးဝမ်းကြောင်း ပြောင်းလဲမှု	အလယ်အလတ်
SEC/7	ဒေသတွင်း ကုန်သွယ်မှု၊ ကုန်သွယ်ဝင်ငွေနှင့် အခွင့်အလမ်းများ ပြောင်းလဲမှု	နည်း
SEC/8	အမြင်အာရုံတင့်တယ်မှု	နည်း
SEC/9	အမှုးပို့ဆောင်အဆောက်အဦးများ၊ အပွဲ့အစည်းအရင်းအမြစ်များ ပြောင်းလဲမှု	နည်း

ယဉ်ကျေးမှုနှင့် လူမှုစီးပွားအခြေအနေ ပြောင်းလဲမှုများ		
SEC/1	ပို့ဆောင်မှု ဆုံးရှုံးခြင်းများ ပြောင်းလဲခြင်း	နည်း
SEC/2	သမိုင်းဝင်ယဉ်ကျေးမှုများ ဆုံးရှုံးမှု ပြောင်းလဲခြင်း	နည်း
SEC/3	လူမှုပြောင်းရွှေ့နေထိုင်ရမှု	နည်း
SEC/4	ယာဉ်သွားယာဉ်လာပုံစံပြောင်းလဲမှု	နည်း
SEC/5	ငါးလုပ်ငန်းအသက်မွေးမှု ပြောင်းလဲခြင်း	နည်း
SEC/6	နေထိုင်လူဦးရေအလုပ်အကိုင်အခွင့်အလမ်းနှင့် အသက်မွေးဝမ်းကြောင်း ပြောင်းလဲမှု	နည်း
SEC/7	ဒေသတွင်း ကုန်သွယ်မှု၊ ကုန်သွယ်ဝင်ငွေနှင့် အခွင့်အလမ်းများ ပြောင်းလဲမှု	နည်း
SEC/8	အမြင်အာရုံတင့်တယ်မှု	အလယ်အလတ်
SEC/9	အမှုးပို့ဆောင်အဆောက်အဦးများ၊ အပွဲ့အစည်းအရင်းအမြစ်များ ပြောင်းလဲမှု	အလယ်အလတ်

သုံးသပ်ချက်နှင့် အကြံပြုချက်များ
လူမှုပတ်ဝန်းကျင်ဆိုင်ရာ ရှာဖွေတွေ့ရှိချက်များ

၁. အဆိုပြုထားသော စီမံကိန်း ၁၀မီဂါဝပ် (အသေးစားရေအားလျှပ်စစ်စက်ရုံ)မှာ ရုပ်ပိုင်းဆိုင်ရာဇီဝ ထိခိုက်မှုများ နည်းပါး၍ မင်းလှချောင်းအားဖြတ်ကာ "run-off the river type dam" အဖြစ် တည်ဆောက်မည့် ဖွံ့ဖြိုးတိုးတက်သော စီမံကိန်းတစ်ခုဖြစ်ပါသည်။ သို့ပါသော်လည်း အစီရင်ခံစာတွင် လေထု၊ မြေထု၊ ရေထု ညစ်ငြမ်းမှုလျော့ပါးစေခြင်းများနှင့် နှုန်းမြေဝင်ရောက်မှု ထိန်းချုပ်ရေး၊ သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်း စောင့်ရှောက်ခြင်း၊ စောင့်ကြည့်လေ့လာခြင်းတို့ပါဝင်သော (သဘာဝ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်) အကြံပြုချက်ကို ကျိုးကြောင်းစီလျော်စွာဖော်ပြကာ စီမံကိန်း ဆောက်လုပ်ရေးနှင့် လုပ်ငန်းလည်ပတ်မှုအဆင့်ဆင့်ကို သဘာဝပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်ဖြင့်ဆောင်ရွက်သင့်ပါသည်။

၂။ မြစ်အောက်ပိုင်းရေစီးဆင်းမှု ရေဏ္ဍအရည်အသွေးကို စောင့်ကြည့်လေ့လာ သင့်ပါသည်။ စီမံကန်းနှင့် ထုတ်လွှတ်မှုအပိုင်းတို့တွင် အန္တရာယ်ကင်းရှင်းရေး အသိပညာပေးနှင့် စည်းရုံးလှုံ့ဆော်ရေး အဆိုပြုထားသော အကြံပြုချက်များကို လုပ်ဆောင်သင့်ပါသည်။

၃။ စီမံကိန်းအကောင်အထည်ဖော်သူများမှ အဆိုပါစီမံကိန်းကြောင့် ထိခိုက်ဆုံးရှုံးဖြစ်ပေါ်သော ဒေသခံများအတွက် လျော်ကြေးပေးရန်နှင့် ဆုံးရှုံးသွားသောသစ်ပင်များအတွက် ကျွန်းသစ်စိုက်ခင်းများပြန်လည် ထူထောင်ပေးခြင်းများကို အစီအစဉ်တစ်ခုအဖြစ် ဆောင်ရွက်သင့်ပါသည်။

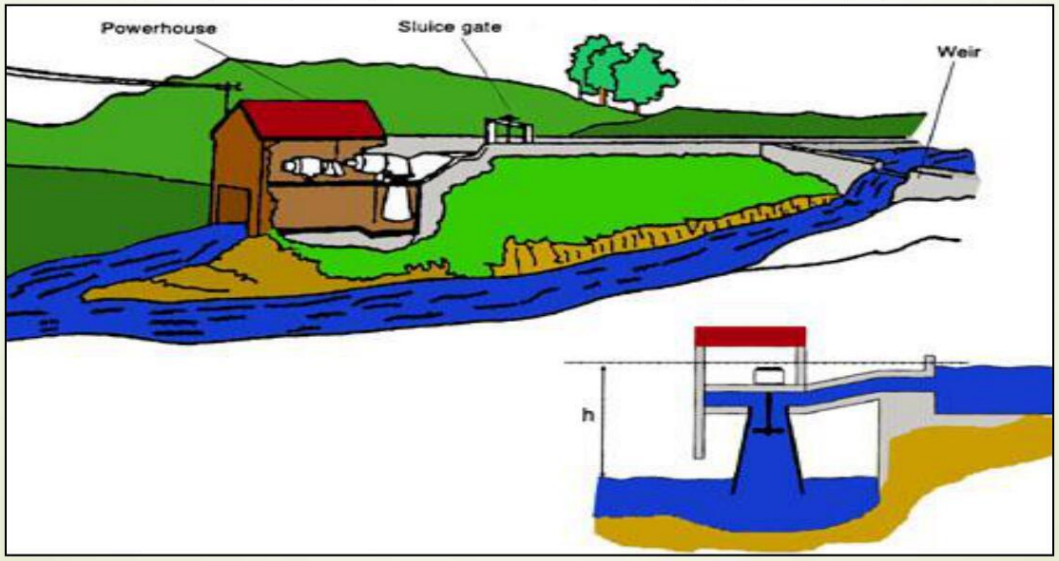
၄။ စီမံကိန်းနယ်မြေဧရိယာတွင် အမျိုးသားသစ်တောဥပဒေနှင့် အမိန့်ကို လိုက်နာဆောင်ရွက်ရန်နှင့် စီမံကိန်း (အသေးစားရေအားလျှပ်စစ်စီမံကိန်း) ရေရှည်တည်တံ့စေရန် သဘာဝသယံဇာတများ ဆက်လက် ထိန်းသိမ်းစောင့်ရှောက်ခြင်းမှာ အရေးကြီးပါသည်။ ထို့အပြင် မြေဆီလွှာတိုက်စားမှုနှင့် လေထုညစ်ငြမ်းမှုများအား ကာကွယ် တားဆီးရန် စီမံကိန်းဧရိယာနှင့် ဆက်စပ်ဧရိယာများတွင် သစ်ပင်စိုက်ပျိုးခြင်းများကို အမျိုးသား တာဝန်တစ်ရပ်အဖြစ် ဆောင်ရွက်သင့်ပါသည်။

၅။ လောင်ခုတ်ချောင်းနှင့် အခြားချောင်းလက်တက်များစွာကြောင့် ဖြစ်ပေါ်လာသော သဘာဝစိုစွတ်မြေ အင်းမအား ဆက်လက်ထိန်းသိမ်းစောင့်ရှောက်ရန်အတွက် စီမံကိန်းအကောင်အထည် ဖော်ဆောင်သူ များအား အကြံပြုအပ်ပါသည်။ အဆိုပြုထားသော သဘာဝစိုစွတ်မြေသည် စီမံကိန်းဧရိယာ၏ မြောက်ဖက်တွင် တည်ရှိပြီး ၂၀.၂၃ဟက်တာ ရှိပါသည်။

၆။ အဆိုပြုထားသော စီမံကိန်းအပေါ် နှိုးစပ်ရာကျေးလက်ဒေသလျှပ်စစ်မီးထောက်ပံ့နိုင်ရန်နှင့် အမျိုးသားလျှပ်စစ်ဓါတ်အားလိုင်းသို့ ယုံကြည်စိတ်ချရသော လျှပ်စစ်ဓါတ်အားထောက်ပံ့မှုများ ပေးနိုင်မည်ဟု မျှော်လင့်ထားပါသည်။

သုံးသပ်ချက်

ယခုနှစ်တွင် ပညာရှင်များကလည်း သဘာဝပတ်ဝန်းကျင်အပေါ် ဆိုးကျိုးသက်ရောက်မှု နည်းနိုင်သမျှ နည်းစေသော ရေအားလျှပ်စစ်စက်ရုံများ တည်ဆောက်နိုင်ရန် နည်းလမ်းများကို စဉ်ဆက်မပြတ်ရှာဖွေနေကြပီ ဖြစ်ပါသည်။ One way low head hydropower plantများသည် low head ဖြစ်လေ သဘာဝပတ်ဝန်းကျင်အပေါ် ထိခိုက်မှု လျော့နည်းလေ ဖြစ်သည်။ မင်းလှအသေးစားရေအားလျှပ်စစ်စီမံကိန်းသည်လည်း Low Head Hydropower Plant ဖြစ်သောကြောင့် သဘာဝပတ်ဝန်းကျင်အပေါ် ထိခိုက်မှုအနည်းဆုံးသော စီမံကိန်းတစ်ခု ဖြစ်ပါသည်။



Land Compensation

Land Compensation

Land Compensation

သုံးသပ်ချက်

မင်းလှအသေးစားလျှပ်စစ်စက်ရုံသည် အောက်ပါ ဖော်ပြထားသော သဘာဝပတ်ဝန်းကျင် ထိခိုက်နိုင်မှုများကို အဓိကထား စဉ်းစားဆောင်ရွက်ထားသော စီမံကိန်းတစ်ခုဖြစ်ပါသည်။

- မြစ်ရေ စီးဆင်းမှု
- ရေ အရည်အသွေး
- ရေအရင်းအမြစ် ကာကွယ်မှု
- ငါးမျိုးစိတ်များနှင့် ရေနေသတ္တဝါများ ဖြတ်သန်းသွားလာခြင်းနှင့် ကာကွယ်မှု
- ယဉ်ကျေးမှု အမွေအနှစ်ဆိုင်ရာ အရင်းအမြစ်များ ကာကွယ်မှု
- ပြန်လည်ဖန်တီးဆန်းသစ်မှု
- သစ်တောစိုက်ခင်းများ ပြန်လည်ထူထောင်မှု

စသည့် သဘာဝပတ်ဝန်းကျင်နှင့် လူမှုဝန်းကျင်ဆိုင်ရာ ထိခိုက်နိုင်မှုများကို အဓိကထား စဉ်းစားဆောင်ရွက်ထားသော သဘာဝ ပတ်ဝန်းကျင်နှင့် ရင်းနှီးကျွမ်းဝင်သော စီမံကိန်းတစ်ခုဖြစ်ပါသည်။


မင်းလှအသေးစားရေအားလျှပ်စစ်စီမံကိန်းသည် သဘာဝပတ်ဝန်းကျင်နှင့် ရင်းနှီးကျွမ်းဝင်စွာ
တည်ဆောက်ထားသော စီမံကိန်းတစ်ခုအဖြစ် ရပ်တည်နိုင်မည်ဖြစ်ပါသည်
တက်ရောက်လာသော လူကြီးမင်းများကို
ကျေးဇူးအထူးတင် ရှိပါသည်

APPENDIX I
Corporate Social Responsibility

နိဒါန်း

၁။ မိမိတို့ Hydropower & Solar Energy Development ကုမ္ပဏီသည် အသေးစား ရေအားလျှပ်စစ် စီမံကိန်းများ၊ ဆိုလာစွမ်းအင်လျှပ်စစ်ထုတ်လုပ်ခြင်းများ၊ သဘာဝခရီး သွား အပန်းဖြေစခန်းများ စသည်တို့ တွင် ရင်းနှီးမြုပ်နှံ၍ ကျေးလက်ဒေသ ဖွံ့ဖြိုးရေးကို ရည်ရွယ်လုပ်ဆောင်နေသော ကုမ္ပဏီဖြစ်ပါသည်။

၂။ ထို့ကြောင့် လူမှုအကျိုးပြု Corporate Social Responsibility (CSR) လုပ်ငန်းများကို ကျေးလက်ဒေသခံ လူထု ဗဟိုပြု၍ စနစ်တကျ ဆောင်ရွက်လျက်ရှိပါသည်။

ရည်မှန်းချက်များ

၃။ မိမိတို့ ကုမ္ပဏီ၏ လက်ရှိဆောင်ရွက်လျက်ရှိသော လူမှု အကျိုးပြု Corporate Social Responsibility (CSR) လုပ် ငန်းများနှင့် အနာဂတ် စီမံချက်များမှာ အောက်ပါအတိုင်း ဖြစ်ပါသည်။

(၁) ကျေးလက်နေပြည်သူများ လမ်းပန်းဆက်သွယ်ရေး ကောင်းမွန်စေရန် ကျေးရွာ ချင်းဆက် လမ်းများ ဖောက်လုပ်ဆောင်ရွက်ပေးခြင်း။

(၂) သာသနာတော် ဖွံ့ဖြိုးတိုးတက်ရေးအတွက် သာသနာရေးလုပ်ငန်းစဉ်များတွင် ထောက်ပံ့ကူညီ လှူဒါန်း ခြင်း။

(၃) ပြည်သူများ အသိပညာဗဟုသုတများ တိုးလာစရန် အတွက် လူစွမ်းအားအရင်း အမြစ်များ ဖွံ့ဖြိုးတိုးတက် လာစေရန် ထောက်ပံ့ ကူညီပေးခြင်း။

(၄) စိုက်ပျိုးရေး ကဏ္ဍဖွံ့ဖြိုးတိုးတက်၍ လူမှုစီးပွား ထုတ်ကုန်လုပ်ငန်းများ တိုးတက်လာစေရန် ခေတ်မှီစိုက်ပျိုးရေးနည်းစနစ်များကို သင်တန်းပို့ချခြင်း၊ စက်မှုလယ်ယာ လုပ်ကိုင်ဆောင်ရွက်နိုင်စေရန် လယ်ယာမြေဖော်ထုတ်ပေးခြင်း၊ ထောက်ပံ့ ကူညီပေး ခြင်း။

(၅) ဒေသဖွံ့ဖြိုးတိုးတက်ရေးအတွက် လိုအပ်သော နေရာများတွင် သီးခြား ထောက်ပံ့လှူဒါန်းခြင်း။

Corporate Social Responsibility (CSR) လုပ်ငန်း ဆောင်ရွက်နေမှုများ

၄။ ကျေးလက်နေပြည်သူများ လမ်းပန်းဆက်သွယ်ရေး ကောင်းမွန်စေရန် ကျေးရွာချင်းဆက်လမ်း များ ဖောက်လုပ် ဆောင် ရွက်ပေးခြင်း။

မိမိတို့ ကုမ္ပဏီသည် ဒေသခံများ စီးပွားရေး၊ လူမှုရေး၊ ပညာရေး ဖွံ့ဖြိုးတိုးတက်မှုကို ရှေးရှု၍ အဆင်ပြေစွာ သွားလာနိုင်ရေးအတွက် ပြင်ဦးလွင်-မိုးကုတ် လမ်းမှ လွယ်လိတ်ကျေး ရွာအထိ (၁)မိုင်ခန့်၊ လွယ်လိတ် ကျေးရွာမှ သပြေဒိုးကျေးရွာ အထိ (၃) မိုင်ခန့်၊ သပြေဒိုး ကျေးရွာမှ ဘန်ဘွေးကျင်းကျေးရွာ အထိ (၃) မိုင်ခန့်၊ ဘန်ဘွေးကျင်းကျေးရွာမှ လုံခုတ် ကျေးရွာ အထိ (၂)မိုင်ခန့်၊ ဘန်ဘွေးကျင်းကျေးရွာမှ ရွာသစ်ကျေးရွာ အထိ (၁) မိုင်၊ ရွာသစ်ကျေးရွာမှ လုတ်လောင်ကျေးရွာအထိ (၂ မိုင်၊ လုတ်လောင်ကျေးရွာမှ သဲခေါ်ကျေးရွာအထိ (၅) မိုင်၊ သဲခေါ်ကျေးရွာမှ ကျောက်ကြီးကျေးရွာအထိ (၃) မိုင်၊ သဲခေါ်ကျေးရွာမှ ဟိုခိုကျေးရွာအထိ (၅) မိုင်၊ စုစုပေါင်း (၂၅) မိုင်ခန့် ရှိသော ကျေးရွာချင်းဆက် လမ်းများကို ကျေးရွာလူထု များနှင့်အတူ ပူးပေါင်းကာ လမ်းသစ်ဖောက်ခြင်း၊ သဲ

လမ်းခင်းပေးခြင်း၊ ကျေးရွာတွင်း မြေသားလမ်းများ ပြုပြင်ပေးခြင်း စသည်တို့ကို ဦးဆောင်ကာ လှူဒါန်း ဆောင်ရွက်ခဲ့ ပါသည်။

၅။ သာသနာတော်ဖွံ့ဖြိုးတိုးတက်ရေးအတွက် သာသနာရေးလုပ်ငန်းစဉ်များတွင် ထောက်ပံ့ လှူဒါန်းခြင်း။

ဘာသာရေးကိုင်းရှိုင်းသော ကျေးရွာဒေသခံများ ၏ သာသနာရေးလုပ်ငန်းစဉ်များ အောင်မြင်အောင် ဆောင်ရွက်နိုင်ရန် အတွက် ဒေသခံဆရာတော်ကြီး များနှင့် တိုင်ပင်၍ ဘုရားဝတ္ထုကမြေများ လှူဒါန်းခြင်း၊ သိမ် ဆောက်လုပ်လှူဒါန်းရာတွင် မတည်ငွေ လှူဒါန်း ခြင်း၊ ဘုရားမုဒ်ဦး ဆောက်လုပ်ရာတွင် ဒေသခံများ နှင့်အတူ ပါဝင်လှူဒါန်းခြင်း၊ ကထိန် အလှူများ တွင် အားတက်သရော ဦးဆောင် ပါဝင်ခြင်း၊ ကျေးရွာဒေသခံ များအား ရဟန်းခံပေးခြင်း စသည့် အလှူများကို ဆောင်ရွက် လှူဒါန်းခဲ့ ပါသည်။

ခြင်း၊ သင်တန်းများ ပို့ချခြင်း၊ စက်မှုလယ်ယာ လုပ်ကိုင် ဆောင်ရွက်စေ နိုင်ရန် လယ်ယာမြေ ဖော်ထုတ်ပေးခြင်း၊ ထောက်ပံ့ကူညီပေးခြင်း လုပ်ငန်းများကို လုပ်ဆောင်နိုင်ရန် စီစဉ် ဆောင်ရွက် လျက်ရှိပါသည်။

၈။ မိမိတို့ ကုမ္ပဏီသည် ဒေသခံကျေးရွာလူထု၏ ပညာရေး၊ ကျန်းမာရေး၊ လူမှုရေး၊ သာသနာရေးကိစ္စ များအတွက် လိုအပ်နေသည့်အချိန်များတွင် သီးခြားလှူဒါန်းခြင်းမျိုး ဆောင်ရွက်နေသည့်အပြင် ရေရှည် ဖွံ့ဖြိုးတိုးတက်ရေးအတွက်လည်း စီမံချက်များ ရေးဆွဲ၍ စီစဉ်ဆောင်ရွက်သွားမည်ဖြစ်ပါကြောင်း လေးစားစွာ တင်ပြအပ်ပါသည်။

၆။ ပြည်သူများ အသိပညာဗဟုသုတများ တိုးလာစရန် အတွက် လူစွမ်းအားအရင်းအမြစ်များ ဖွံ့ဖြိုးတိုးတက် လာစေရန် ထောက်ပံ့ ကူညီပေးခြင်း။

ဒေသခံများ အလုပ်အကိုင် အဆင်ပြေစေရန်နှင့် ကျွမ်းကျင်လုပ်သားများ ဖြစ်လာစေရန် အတွက် ဒေသခံများအား ကုမ္ပဏီတွင် သင့်တော်သောနေရာ များ၌ အမြဲ တမ်းဝန်ထမ်းများအဖြစ် ခန့်အပ်ပေးခြင်း၊ နေ့စား ဝန်ထမ်းများအဖြစ် ခန့်ထားခြင်းများကို ဆောင်ရွက် ပေးလျက် ရှိပါသည်။

၇။ စိုက်ပျိုးရေး ကဏ္ဍဖွံ့ဖြိုးတိုးတက်လာစေရန် ထောက်ပံ့ကူညီပေးခြင်း။

ဒေသ၏ စိုက်ပျိုးရေးကဏ္ဍ ဖွံ့ဖြိုးတိုးတက်လာစေ၍ လူမှုစီးပွား ကုန်ထုတ်လုပ်ငန်းများ တိုးတက်လာစေရန်ရည်ရွယ်၍ မိမိတို့ ကုမ္ပဏီသည် တောင်သူများအား စိုက်ပျိုးရေး စက်ယန္တယားများ ငှား ရမ်းပေးခြင်းနှင့် စိုက်ပျိုးရေးပညာရှင် တစ်ဦးအား အမြဲ တမ်းဝန်ထမ်းအဖြစ် ခန့်ထား၍ ခေတ်မှီ စိုက်ပျိုးရေး ဆိုင်ရာ အသိပညာများ ဖြန့်ဝေပေး