ENVIRONMENTAL MANAGEMENT PLAN (EMP) REPORT for

MYANMAR KYEEONKYEEWA SOLAR POWER PLANT PROJECT

connected to Kyeeonkyeewa Substation

Proposed By

MYANMAR KYEEONKYEEWA SOLAR POWER COMPANY LIMITED

MYANMAR KEEONKYEEWA SOLAR POWER COMPANY LIMITED

Prepared By

E Guard Environmental Services Co., Ltd

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Summary: EMP Report This document represents Environmental Management Plan (EMP) report as required for construction and operation of 30 MW ground mounted solar power plant project.	**Approved by: U Soe Min** 

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Data analysis, impact assessment, devising mitigation measures and report formulation were carried out based on the information/plan/processes provided by the project proponent, available secondary data and information, and onsite observation and measurement of E Guard's environmental study team in line with the relevant national and international guidelines and standards. While we do take effort to ensure that the information contained in this report is reliable and accurate, we disclaim no responsibility for errors and omissions which might occur despites of our reasonable skill and care.

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List of Abbreviations

%	: Percentage
µg/m^3	: Micro Gram per Cubic Meter
BOD	: Biochemical Oxygen Demand
CO	: Carbon Monoxide
CO_2	: Carbon Dioxide
COD	: Chemical Oxygen Demand
CSR	: Corporate Social Responsibility
dB (A)	: Decibel Unit
ECD	: Environmental Conservation Department
EMoP	: Environmental Monitoring Plan
EMP	: Environmental Management Plan
HSE	: Health, Safety and Environment
Km	: Kilometer
kV	: Kilovolt
kWh	: Kilo Watt Hour
mg/l	: Milligram per Liter
MOEE	: Ministry of Electricity and Energy
MONREC	: Ministry of Natural Resources and Environmental Conservation
MWh	: Mega Watt Hour
NO_2	: Nitrogen Dioxide
°C	: Degree Celsius
pH	: Pond us Hydrogenium
PM	: Particulate Matter
ppm	: Part per Million
PV	: Photovoltaic
TSP	: Total Suspended Particulates
WHO	: World Health Organization

အကျဉ်းချုပ်အစီရင်ခံစာ

ဤပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီရင်ခံစာသည် Myanmar Kyeeonkyeewa Solar Power Co., Ltd. မှ အကောင်အထည်ဖော် ဆောင်ရွက်မည်ဖြစ်သော ကြီးအုံကြီးဝမ်ဘတ်အားခွဲရုံသို့ လျှပ်စစ်မဘတ်အား ဖြန့်ဖြူးမည့် ၃၀ မဂ္ဂါဝပ် နေရောင်ခြည်စွမ်းအင်သုံး လျှပ်စစ်မဘတ်အား ထုတ်လုပ်ခြင်းစီမံကိန်းအတွက် ပြင်ဆင် ရေးဆွဲထားခြင်း ဖြစ်သည်။ စီမံကိန်း အကောင်အထည်ဖော်သူသည် လျှပ်စစ်နှင့်စွမ်းအင် ဝန်ကြီးဌာနမှ ခေါ်ယူသော တင်ဒါအား အောင်မြင်ခဲ့သဖြင့် အဆိုပြုစီမံကိန်းအတွက် တည်ဆောက်ရန် နှင့်လုပ်ငန်းလည်ပတ်ရန် ခွင့်ပြုမိန့်ရရှိခဲ့သည်။ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန၏ သဘောထား မှတ်ချက်များအရ အဆိုပြုစီမံကိန်းသည် ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှုအစီရင်ခံစာတင်ပြရန် လိုအပ်ပြီး E Guard Environmental Services Co., Ltd. သည် အဆိုပြု စီမံကိန်းအတွက် ပတ်ဝန်းကျင်ဆိုင်ရာ လေ့လာမှုများပြုလုပ်ခဲ့ပြီး သုံးသပ်အကြံပေးခဲ့ပါသည်။ ဤအစီရင်ခံစာ တွင် လေ့လာမှုများသည် နေရောင်ခြည်စွမ်းအင်သုံးလျှပ်စစ်မဘတ်အား ထုတ်လုပ်ခြင်းစီမံကိန်း တည်ဆောက် ခြင်းနှင့် မဘတ်အားဖြန့်ဖြူးရန် ကောင်းကင်မဘတ်အားလိုင်းသွယ်တန်းခြင်း၊ စီမံကိန်းမှ နေရောင်ခြည်စွမ်းအင် အသုံးပြု၍ လျှပ်စစ်မဘတ်အားထုတ်လုပ်ခြင်းနှင့် ကြီးအုံကြီးဝမ်ဘတ်အားခွဲရုံသို့ ၃၃ ကေဗွီ နှင့် ၁၃၂ ကေဗွီ ကောင်းကင်မဘတ်အားလိုင်းဖြင့် လျှပ်စစ်မဘတ်အားပို့ဆောင်ခြင်း လုပ်ငန်းများအတွက် ပြုလုပ်ခဲ့ခြင်း ဖြစ်သည်။ လေ့လာမှုနယ်ပယ်အား စီမံကိန်းဗဟိုမှ ၁ ကီလိုမီတာ အချင်းဝက် ရှိသောဧရိယာ အတွင်းအဖြစ်သတ်မှတ် လေ့လာခဲ့ခြင်းဖြစ်ပြီး ထိုဧရိယာသည် စီမံကိန်းကြောင့်ဖြစ်ပေါ်လာနိုင်သည့် ပတ်ဝန်းကျင်နှင့် လူမှုစီးပွားဆိုင်ရာ သက်ရောက်မှုများအတွက် လုံလောက်မှုရှိပါသည်။

အဆိုပြုစီမံကိန်းသည် မဲဇလီကျေးရွာအုပ်စု၊ ပွင့်ဖြူမြို့နယ်၊ မင်းဘူးခရိုင်၊ မကွေးတိုင်းဒေသကြီး၊ မြန်မာနိုင်ငံ တွင်တည်ရှိသည်။ စီမံကိန်း၏ တည်နေရာမှာ မြောက်လတ္တီကျူ ၂၀ ဒီဂရီ ၁၅၉.၉၀ စက္ကန့်နှင့် ၂၀ ဒီဂရီ ၂၀၁၇.၅၉ စက္ကန့် ကြား၊ အရှေ့လောင်ဂျီကျူ ၉၄ ဒီဂရီ ၂၅၇.၈ စက္ကန့် နှင့် ၉၄ ဒီဂရီ ၂၆ မိနစ် ၂၀ စက္ကန့် ကြား ဖြစ်ကာ ပင်လယ်ရေမျက်နှာပြင်အမြင့် ၈၂ မီတာတွင်တည်ရှိသည်။ အဆိုပြုစီမံကိန်း၏ တည်ဆောက်ခြင်း လုပ်ငန်းများတွင် box-type transformer များ၊ ဆိုလာပြားများ တပ်ဆင်ရန်ဒေါက်တိုင်များ တပ်ဆင်ခြင်း၊ ဘက်စုံသုံးအဆောက်အဦ တည်ဆောက်ခြင်း၊ လျှပ်စစ်မဘတ်အားထုတ်လုပ်ရန်နှင့် ဖြန့်ဖြူးရန် စက်ကိရိယာများ တပ်ဆင်ခြင်းနှင့် လျှပ်စစ်မဘတ်အားပို့ဆောင်ရန် ၃၃ ကေဗွီ နှင့် ၁၃၂ ကေဗွီ ကောင်းကင်မဘတ်အားလိုင်း သွယ်တန်းခြင်း လုပ်ငန်းများ ပါဝင်သည်။ Box-type transformer ၆ လုံးဖြင့် လျှပ်စစ်မဘတ်အား ထုတ်လုပ် သွားမည်ဖြစ်သည်။ စီမံကိန်းအဆိုပြုသူသည် စီမံကိန်းအတွက် မြေနေရာအား တရားဝင်ဝယ်ယူပြီးဖြစ်ကာ စီမံကိန်းအတွက် စုစုပေါင်းမြေဧရိယာ ၁၄၅ ဧက (၅၈.၆၇ ဟတ်တာ) လိုအပ်သည်။ စီမံကိန်းအဆိုပြုသူများ သည် စီမံကိန်းတွင် ဆိုလာပြား ၆၇၂၀၀ ခု၊ box-type transformer ၆ လုံး၊ ဆိုလာပြားများတပ်ဆင် ရန်ဒေါက်တိုင် ၂၄၀၀ ခုအား နေရောင်ခြည်စွမ်းအင်မှ လျှပ်စစ်မဘတ်အားထုတ်လုပ်ရန် တပ်ဆင်သွားမည်ဖြစ်ပြီး

တည်ဆောက်ခြင်းလုပ်ငန်းများ ဆောင်ရွက်ရန် ၈ လ ကြာမြင့်မည်ဖြစ်သည်။ ***(အသေးစိတ်အား အခန်း ၂ တွင် ဖတ်ရှုပါရန်)***

အဆိုပြုစီမံကိန်းအား Myanmar Kyeeonkyeewa Solar Power Co., Ltd. မှ အကောင်အထည်ဖော်ဆောင်ရွက်မည်ဖြစ်သည်။ တည်ဆောက်ခြင်းလုပ်ငန်းများပြီးစီးပါက အဆိုပြုစီမံကိန်းသည် နေရောင်ခြည်စွမ်းအင်အသုံးပြု၍ လျှပ်စစ်ဓာတ်အားထုတ်လုပ်မည်ဖြစ်ပြီး ကျီးအုံကျီးဝဓာတ်အားခွဲရုံသို့ ၃၃ နှင့် ၁၃၂ ကေဗီ ကောင်းကင်ဓာတ်အားလိုင်း များဖြင့် လျှပ်စစ်ဓာတ်အားပို့ဆောင်သွား မည်ဖြစ်ကာ လုပ်ငန်းလည်ပတ်ရန် ကာလမှာ နှစ် ၂၀ ဖြစ်သည်။ အဆိုပြုစီမံကိန်းသည် BOO စနစ်ကိုအခြေခံဆောင်ရွက်သောကြောင့် နှစ် ၂၀ ပြီးဆုံးပါက စီမံကိန်းအကောင်အထည်ဖော်သူသည် လုပ်ငန်းလည်ပတ်ရန်ကာလအား သက်ဆိုင်ရာထံတွင် သက်တမ်းတိုးမြှင့်ပြီး စီမံကိန်းလုပ်ငန်းများ ဆက်လက်ဆောင်ရွက်သွားမည်ဖြစ်သည်။ သက်ဆိုင်ရာ စီမံကိန်းအကောင်အထည်ဖော်သူများ၏ ဒါရိုက်တာအဖွဲ့ဝင်များနှင့် ဖွဲ့စည်းပုံများ၊ အဆိုပြုစီမံကိန်း၏ ဖွဲ့စည်းပုံနှင့် ရင်းနှီးမြှုပ်နှံမှုအစီအစဉ်များအား ဖော်ပြထားသည်။ ***(အသေးစိတ်အား အခန်း ၃ တွင် ဖတ်ရှုပါရန်)***

ဤပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီရင်ခံစာ ပြင်ဆင်ရာတွင် ပါဝင်သော ကျွမ်းကျင်ပညာရှင်များနှင့် ၎င်းတို့၏ တာဝန်များနှင့်ကျွမ်းကျင်မှုများအား ***အခန်း ၄*** တွင် ဖော်ပြထားသည်။ အဆိုပြုစီမံကိန်း တည်ဆောက်ခြင်းနှင့် လုပ်ငန်းလည်ပတ်ခြင်းတို့တွင် ပတ်ဝန်းကျင်အား ထိခိုက်မှု ကာကွယ်ရန် လိုက်နာရမည့် နိုင်ငံတော်၏ တည်ဆဲဥပဒေနှင့် စည်းမျဉ်းစည်းကမ်းများအား ဖော်ပြထားသည်။ ***(အသေးစိတ်အား အခန်း ၅ တွင် ဖတ်ရှုပါရန်)***

လက်ရှိစီမံကိန်းအခြေအနေကို ကွင်းဆင်းလေ့လာခြင်းနှင့် ယခင်လေ့လာပြီးသော အချက်အလက်များ ရယူခြင်းသည် ပတ်ဝန်းကျင်ထိခိုက်မှုများ ဆန်းစစ်ခြင်းအတွက် အလွန်အရေးပါသည်။ ထို့ကြောင့် လက်ရှိစီမံကိန်း၏ ပတ်ဝန်းကျင်ဆိုင်ရာအခြေအနေများအား ကွင်းဆင်းလေ့လာခြင်းသည် ပတ်ဝန်းကျင်ဆိုင်ရာ လေ့လာမှုများ ပြုလုပ်ရာတွင် အရေးပါသော နေရာတွင်ပါဝင်သည်။ ထို့ကြောင့် E Guard Environmental Services Co., Ltd. သည် စီမံကိန်း၏ လေအရည်အသွေး၊ ရေအရည်အသွေးနှင့် ဆူညံသံပမာဏတို့အား ၂၀၂၂ ခုနှစ်၊ မေလ ၂၆ ရက်နှင့် ၂၇ ရက်တို့တွင် ၂၄ နာရီဆက်တိုက် စောင့်ကြပ်ကြည့်ရှုသည့်နည်းဖြင့် တိုင်းတာခဲ့သည်။ တိုင်းတာရရှိသော ရလဒ်များအား အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များနှင့် အခြားသက်ဆိုင်ရာလမ်းညွှန်ချက်များဖြင့် နှိုင်းယှဉ်လေ့လာခဲ့သည်။ လေထုအတွင်း ဓာတ်ငွေ့ပါဝင်မှုရလဒ်များအား နှိုင်းယှဉ်လေ့လာခြင်းအရ ဆာလဖာဒိုင်အောက်ဆိုဒ် (၀.၀၄၄ $\mu g/m^3$)၊ နိုက်ထရိုဂျင်ဒိုင်အောက်ဆိုဒ် (၂၅.၅၅ $\mu g/m^3$)၊ ကာဗွန်မိုနောက်ဆိုဒ် (၀.၀၀၈ ppm)နှင့် ကာဗွန်ဒိုင်အောက်ဆိုဒ် (၄၀၀.၉၉ ppm) တို့သည် သက်ဆိုင်ရာ လမ်းညွှန်ချက်တန်ဖိုးများအတွင်း ရှိကြောင်းလေ့လာတွေ့ရှိရသည်။ လေထုအတွင်းအမှုန် ပါဝင်မှုလေ့လာခြင်း ရလဒ်များအရ PM_{10} (၂၀.၆၂ $\mu g/m^3$) နှင့် $PM_{2.5}$ (၉.၀၁ $\mu g/m^3$) တို့သည် အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်တန်ဖိုးများအတွင်း ရှိကြောင်း လေ့လာတွေ့ရှိရသည်။

ထို့ကြောင့် စီမံကိန်း ဝန်းကျင်လေထုအရည်အသွေးသည် စီမံကိန်းမစတင်မီ အချိန်တွင် ကောင်းမွန်လျှက်ရှိကြောင်းတွေ့ရသည်။ ရေအရည်အသွေးတိုင်းတာချိန်တွင် စီမံကိန်းသည် တည်ဆောင်ရေးလုပ်ငန်းများ စတင်နေချိန်ဖြစ်ပြီး အဝီစိရေတွင်း တူးဖော်ပြီးစီးခြင်းမရှိသေးပါ။ ထို့ကြောင့် ရေအရည်အသွေးတိုင်းတာရန် စီမံကိန်းအနီးအနားတွင်ရှိသော စီမံကိန်းအတွက် အသုံးပြုနေသည့် (ကျွဲခြံကျေးရွာ) ရှိ ရေတွင်းအား E Guard အဖွဲ့မှ ရွေးချယ်ခဲ့သည်။ ထိုရေတွင်းမှရေအား ရေအရည်အသွေးတိုင်းတာရန် ကိရိယာဖြင့်တိုင်းတာခြင်းနှင့် ရေနမူနာကောက်ယူခြင်း တို့ဖြင့်ဆောင်ရွက်ခဲ့သည်။ ရေအရည်အသွေး တိုင်းတာမှုရလဒ်များအရ တိုင်းတာသော Parameters အများစုသည် ကမ္ဘာ့ကျန်းမာရေး အဖွဲ့အစည်း၏ လမ်းညွှန်ချက်တန်ဖိုးများ အတွင်းရှိပါသည်။ ဆူညံသံပမာဏတိုင်းတာမှုအား စီမံကိန်းအတွင်း (ဆူညံသံထွက်ပေါ်ရာနေရာ) နှင့် စီမံကိန်းပြင်ပ (ဆူညံသံလက်ခံမည့်နေရာ) တို့တွင် တိုင်းတာခဲ့ပြီး စီမံကိန်းအတွင်း (ဆူညံသံထွက်ပေါ်ရာနေရာ) တွင် နေ့အချိန်တိုင်းတာရရှိမှု ရလဒ်များ (၅၆.၁၂ dBA) နှင့် ညအချိန်တိုင်းတာရရှိမှု ရလဒ်များ (၅၀.၃၂ dBA) သည် လမ်းညွှန်ချက်တန်ဖိုးများအတွင်းရှိကြောင်း လေ့လာတွေ့ရှိရသည်။ စီမံကိန်းပြင်ပ (ဆူညံသံလက်ခံမည့်နေရာ) တွင် နေ့အချိန်တိုင်းတာရရှိမှု ရလဒ်များ (၄၇.၂၆ dBA) နှင့် ညအချိန်တိုင်းတာရရှိမှု ရလဒ်များ (၄၃.၁၂ dBA) သည်လည်း လမ်းညွှန်ချက်တန်ဖိုးများအတွင်းရှိကြောင်း လေ့လာတွေ့ရှိရသည်။ ထို့ကြောင့် စီမံကိန်းဝန်းကျင် ဆူညံသံပမာဏသည် စီမံကိန်းမစတင်မီအချိန်တွင် အမျိုးသား ပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များအတွင်းရှိကြောင်း တွေ့ရသည်။ စီမံကိန်းတည်ဆောက်ခြင်းကာလတွင် တည်ဆောက်ရေးလုပ်ငန်းများကြောင့် စီမံကိန်း၏ ဝန်းကျင်လေထုအရည်အသွေး လျော့နည်းလာနိုင်ကြောင်းနှင့် ဆူညံသံပမာဏမြင့်လာနိုင်ကြောင်း ခန့်မှန်းတွေ့ရှိရသည်။ ထို့ပြင် ယခင်လေ့လာပြီးသော အချက်အလက် များဖြစ်သည့် ရာသီဥတုဆိုင်ရာအချက်အလက်များ၊ စီမံအုပ်ချုပ်မှုဆိုင်ရာအချက်အလက်များ၊ လူမှုစီးပွား ဆိုင်ရာအချက်အလက်များ၊ မြေအသုံးချမှုနှင့် အခြားလေ့လာပြီးသောအချက်အလက်များအား ဤအစီရင်ခံစာ တွင် ဖော်ပြထားသည်။ ***(အသေးစိတ်အား အခန်း ၆ တွင် ဖတ်ရှုပါရန်)***

စီမံကိန်းတည်ဆောက်ခြင်းနှင့် လုပ်ငန်းလည်ပတ်ခြင်းတို့ကြောင့် ပတ်ဝန်းကျင်ဆိုင်ရာ အရင်းအမြစ်များ၊ ဂေဟစနစ်များ၊ လူသားများနှင့် စွန့်ပစ်ပစ္စည်းစွန့်ပစ်မှုတို့အပေါ် ထိခိုက်နိုင်သော ဖြစ်နိုင်ခြေရှိသည့် သက်ရောက်မှုများအား ခွဲခြားခဲ့ပြီး ထိုသက်ရောက်မှုများအား International Association for Impact Assessment (IAIA) ၏ သက်ရောက်မှုဆန်းစစ်ခြင်းနည်းလမ်းကို အသုံးပြု၍ဆန်းစစ်ခဲ့သည်။ သက်ရောက်မှုများဆန်းစစ်လေ့လာရာတွင် အဆိုပြုစီမံကိန်းအတွက် တည်ဆောက်ခြင်းကာလနှင့် ဓာတ်အား ထုတ်လုပ်သည့် ကာလဟူ၍ ကာလနှစ်ခု ခွဲခြားလေ့လာခဲ့သည်။

တည်ဆောက်ခြင်းကာလတွင် ဓာတ်အားစတင်ဖြန့်ဖြူးရန်နေရာနှင့် ဘက်စုံသုံးအဆောက်အဦ တည်ဆောက်ခြင်း၊ ဆိုလာပြားများ၊ ဆိုလာပြားများတပ်ဆင်ရန် ဒေါက်တိုင်များ၊ box-type transformer များတပ်ဆင်ခြင်း၊

ကျီးအုံကျီးဝဓာတ်အားခွဲရုံသို့ လျှပ်စစ်ဓာတ်အား ဖြန့်ဖြူးပို့ဆောင်ရန် ကောင်းကင်ဓာတ်အားလိုင်း၏ ဓာတ်တိုင်များစိုက်ထူခြင်းနှင့် ဓာတ်အားလိုင်းသွယ်တန်းခြင်းတို့ ပါဝင်သည်။ တည်ဆောက်ခြင်းကာလမှာ ၈ လ ဖြစ်သည်။

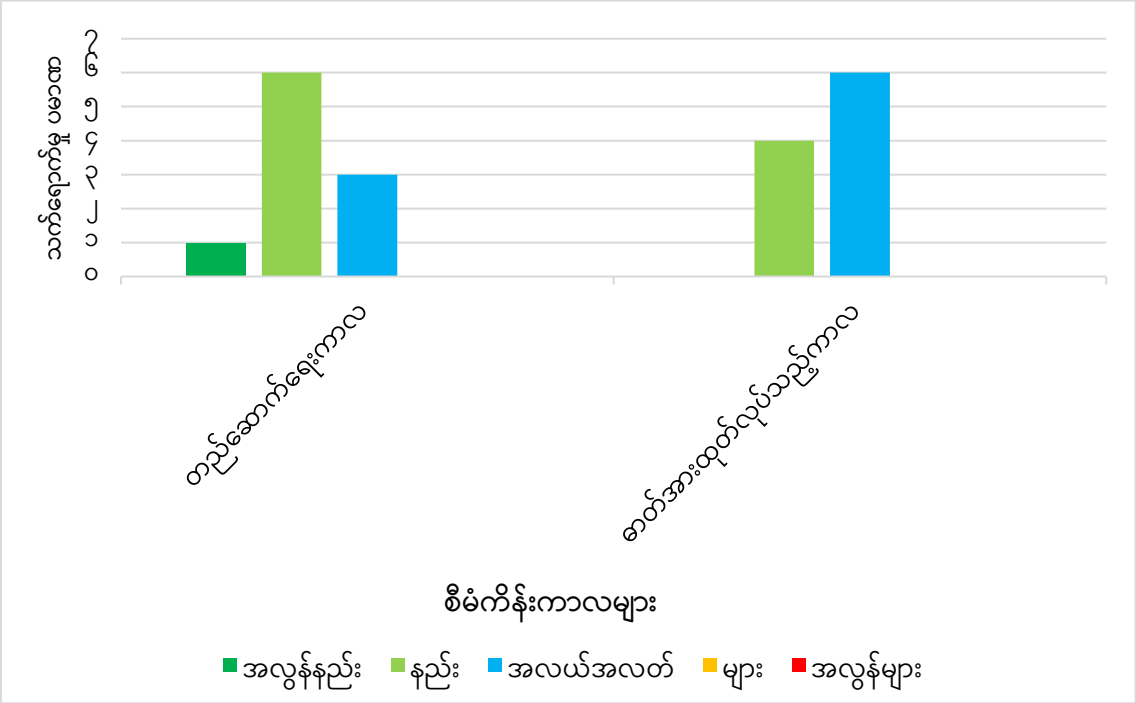
ဓာတ်အားထုတ်လုပ်သည့်ကာလတွင် နေရောင်ခြည်စွမ်းအင်မှ လျှပ်စစ်ဓာတ်အားထုတ်လုပ်ပြီး ကျီးအုံကျီးဝဓာတ်အားခွဲရုံသို့ ၃၃ နှင့် ၁၃၂ ကေဗီဓာတ်အားလိုင်းများဖြင့် လျှပ်စစ်ဓာတ်အား ဖြန့်ဖြူးပို့ဆောင်ခြင်းတို့ ပါဝင်ပြီး လုပ်ငန်းလည်ပတ်သည့်ကာလမှာ နှစ် ၂၀ ဖြစ်သည်။

လုပ်ငန်းဖျက်သိမ်းသည့်ကာလတွင် လုပ်ငန်းလည်ပတ်သည့်ကာလပြီးဆုံးပါက အဆိုပြုစီမံကိန်းသည် BOO စနစ်ကိုအခြေခံဆောင်ရွက်သောကြောင့် စီမံကိန်းအကောင်အထည်ဖော်သူသည် လုပ်ငန်းလည်ပတ်ရန်ကာလအား အကြိမ်များစွာသက်တမ်းတိုးမြှင့်ပြီး နေရောင်ခြည်စွမ်းအင်မှ လျှပ်စစ်ဓာတ်အား ထုတ်လုပ်ခြင်းလုပ်ငန်းများ ဆက်လက်ဆောင်ရွက်သွားမည်ဖြစ်သည်။ ထို့ကြောင့် အဆိုပြုစီမံကိန်း၏ လုပ်ငန်းဖျက်သိမ်းသည့်ကာလနှင့် သက်ဆိုင်သော သက်ရောက်မှုများအားခွဲခြားခြင်း၊ ဆန်းစစ်လေ့လာခြင်းနှင့် မကောင်းသော သက်ရောက်မှုများအား လျှော့ချရန်နည်းလမ်းများ ရေးဆွဲခြင်းတို့အား ဤအစီရင်ခံစာတွင် ထည့်သွင်းထားခြင်းမရှိပါ။ သို့သော် စီမံကိန်းပိုင်ရှင် အနေဖြင့် စီမံကိန်းပိတ်သိမ်းခြင်းမပြုမီ စီမံကိန်းပိတ်သိမ်းခြင်း အစီအစဉ်အား ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဌာနသို့ ကြိုတင်တင်ပြရမည် ဖြစ်ကြောင်းကို တတိယအဖွဲ့အစည်းအနေဖြင့် အကြံပြု ဆွေးနွေးထားပါသည်။

တည်ဆောက်ခြင်းကာလတွင် လေအရည်အသွေးအပေါ် သက်ရောက်မှု၊ မြေအရည်အသွေးအပေါ် သက်ရောက်မှုနှင့် မီးဘေးအန္တရာယ်ကြောင့် သက်ရောက်မှုများသည် **အလယ်အလတ်အဆင့် သက်ရောက်မှုများ** အဖြစ် ဆန်းစစ်လေ့လာ တွေ့ရှိရသည်။ အခြားသက်ရောက်မှုများ ဖြစ်သည့် ရေအရည်အသွေးအပေါ် သက်ရောက်မှု၊ ဆူညံသံနှင့် တုန်ခါမှုဆိုင်ရာ သက်ရောက်မှု၊ လုပ်ငန်းခွင် ကျန်းမာရေးနှင့် ဘေးအန္တရာယ် ကင်းရှင်းရေးဆိုင်ရာ သက်ရောက်မှု၊ လူထုကျန်းမာရေးနှင့် ဘေးအန္တရာယ် ကင်းရှင်းရေးဆိုင်ရာ သက်ရောက်မှု၊ အစိုင်အခဲ စွန့်ပစ်ပစ္စည်းများကြောင့် သက်ရောက်မှု နှင့် အန္တရာယ်ရှိ စွန့်ပစ်ပစ္စည်းကြောင့် သက်ရောက်မှုများ သည် **နည်းသည့်အဆင့်သက်ရောက်မှုများ** အဖြစ်တွေ့ရှိရပြီး အရည်စွန့်ပစ်ပစ္စည်းကြောင့် သက်ရောက်မှုသည် **အလွန်နည်းသည့်အဆင့် သက်ရောက်မှု**အဖြစ် ဆန်းစစ်တွေ့ရှိရသည်။

ဓာတ်အားထုတ်လုပ်သည့်ကာလတွင် ရေအရည်အသွေးအပေါ် သက်ရောက်မှု၊ လုပ်ငန်းခွင်ကျန်းမာရေးနှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေးဆိုင်ရာ သက်ရောက်မှု၊ လူထုကျန်းမာရေးနှင့် ဘေးအန္တရာယ် ကင်းရှင်းရေးဆိုင်ရာ သက်ရောက်မှု၊ မီးဘေးအန္တရာယ် သက်ရောက်မှု၊ အရည်စွန့်ပစ်ပစ္စည်းနှင့် အန္တရာယ်ရှိစွန့်ပစ်ပစ္စည်းကြောင့် သက်ရောက်မှုများသည် **အလယ် အလတ်အဆင့် သက်ရောက်မှုများ** အဖြစ် ဆန်းစစ်တွေ့ရှိရသည်။ အခြားသက်ရောက်မှုများ ဖြစ်သည့် လေအရည်အသွေးအပေါ် သက်ရောက်မှု၊ မြေအရည်အသွေး အပေါ် သက်ရောက်မှု၊ ဆူညံသံ သက်ရောက်မှု နှင့် အစိုင်အခဲစွန့်ပစ်ပစ္စည်းကြောင့်သက်ရောက်မှုများသည်

နည်းသည့်အဆင့် သက်ရောက်မှုများ အဖြစ် ဆန်းစစ်လေ့လာခြင်းရလဒ်များအရ ဆန်းစစ်တွေ့ရှိရသည်။ အောက်ဖော်ပြပါပုံတွင် စီမံကိန်းကြောင့် ဖြစ်ပေါ် လာနိုင်သော မကောင်းသောသက်ရောက်မှုများ၏ အသေးစိတ်အဆင့်များအား ဖော်ပြထားသည်။



မကောင်းသော သက်ရောက်မှုများအား သက်ရောက်မှုလျော့ချရန်အတွက် လျော့ချရန်နည်းလမ်းများ သည် အရေးကြီးပါသည်။ ထိုလျော့ချရန်နည်းလမ်းများအား ဆောင်ရွက်ရန်လိုအပ်သော ဆောင်ရွက်ချက်များနှင့် နည်းပညာများအား သက်ရောက်မှုအမျိုးအစားပေါ် မူတည်ပြီး ဖော်ပြထားပါသည်။ အဆိုပြုစီမံကိန်းသည် အလုပ်အကိုင်အခွင့်အလမ်းများ ဖန်တီးပေးနိုင်ခြင်း၊ စီးပွားရေးအခွင့်အလမ်းများ ဖန်တီးပေးနိုင်ခြင်း၊ အခွန်ငွေရရှိနိုင်ခြင်း၊ လူမှုစီးပွားတာဝန်ယူမှု အစီအစဉ်များကြောင့် ဒေသတွင်းဖွံ့ဖြိုးတိုးတက်ခြင်း၊ ကာဗွန်ထုတ်လုပ်မှု လျော့ချခြင်း၊ သယံဇာတများထိန်းသိမ်းခြင်းနှင့် ပတ်ဝန်းကျင်နှင့်လိုက်လျောညီထွေသော စီးပွားရေးများ အစပြုနိုင်ခြင်းစသည့် ကောင်းသောသက်ရောက်မှုများကိုလည်း ဖြစ်ပေါ်စေနိုင်သည်။ ***(အသေးစိတ်အား အခန်း ၇ တွင် ဖတ်ရှုပါရန်)***

လျော့ချရန်နည်းလမ်းများနှင့် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်များအား အကောင်အထည်ဖော် ဆောင်ရွက်ရာတွင် လိုအပ်သော အခြေခံလိုအပ်ချက်များနှင့် တာဝန်ရှိသူများအား ဤအစီရင်ခံစာတွင် ဖော်ပြထားသည်။ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်အား သက်ရောက်မှုများ လေ့လာဆန်းစစ်ချက်များနှင့် သက်ရောက်မှုအဆင့်များကိုအခြေခံ၍ စီမံကိန်း၏ တည်ဆောက်ခြင်းကာလနှင့် လုပ်ငန်းလည်ပတ် သည့်ကာလတို့အတွက် ကျန်းမာရေးနှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေးမူဘောင်များနှင့် ရေးဆွဲထားခြင်း ဖြစ်သည်။

စီမံကိန်းအကောင်အထည်ဖော်သူသည် အဆိုပြုစီမံကိန်းအား အောက်ဖော်ပြပါ အစီအစဉ်များပါဝင်သော ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်နှင့်အညီ အကောင်အထည်ဖော် ဆောင်ရွက်ရ မည်။

- ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်
- ပတ်ဝန်းကျင်စောင့်ကြပ်ကြည့်ရှုမှုအစီအစဉ်
- လူမှုစီးပွားတာဝန်ယူမှုအစီအစဉ်
- မီးဘေးအန္တရာယ်ကင်းရှင်းရေးအစီအစဉ်
- အရေးပေါ်ကိစ္စများအတွက်တုံ့ပြန်ရေးနှင့် ကြိုတင်ပြင်ဆင်ရေးအစီအစဉ်
- မကျေလည်မှုများကိုဖြေရှင်းပေးမည့်အစီအစဉ်

ထို့အပြင် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်နှင့် ပတ်ဝန်းကျင်စောင့်ကြပ်ကြည့်ရှုမှု အစီအစဉ်များ ဆောင်ရွက်ရန် ခန့်မှန်းကုန်ကျစရိတ်ကိုလည်း ထည့်သွင်းဖော်ပြထားသည်။ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်သည် စီမံကိန်း၏ မကောင်းသောသက်ရောက်မှုများ၊ သက်ရောက်မှုရင်းမြစ်များ၊ လျှော့ချရန်နည်းလမ်းများ၊ ကျန်ရှိသောသက်ရောက်မှုများနှင့် တာဝန်ယူဆောင်ရွက်မည့်ပုဂ္ဂိုလ်တို့အား တည်ဆောက်ခြင်းကာလနှင့် လုပ်ငန်းလည်ပတ်သည့်ကာလတို့အတွက် ဖော်ပြထားခြင်းဖြစ်သည်။ ပတ်ဝန်းကျင်စောင့်ကြပ်ကြည့်ရှုမှုအစီအစဉ်သည် လေနှင့်ရေအရည်အသွေး၊ ဆူညံသံပမာဏနှင့် ပတ်ဝန်းကျင်ဆိုင်ရာစစ်ဆေးခြင်းများအား စောင့်ကြပ်ကြည့်ရှုရန်အမျိုးအစား၊ အကြိမ်အရေအတွက်နှင့် တာဝန်ယူဆောင်ရွက်မည့်ပုဂ္ဂိုလ်တို့အား ဖော်ပြထားခြင်းဖြစ်သည်။ လူမှုစီးပွားတာဝန်ယူမှုအစီအစဉ်သည် ဒေသခံပြည်သူများတွက် ဖွံ့ဖြိုးမှုလုပ်ငန်းများ ဆောင်ရွက်ပေးရန်နှင့် အဆိုပြုစီမံကိန်းသည် စီမံကိန်းအကောင်အထည်ဖော်သူကိုသာမက ဒေသခံပြည်သူများအတွက်လည်းအကျိုးရှိကြောင်း ဖော်ပြရန်ဖြစ်သည်။ မီးဘေးအန္တရာယ် ကင်းရှင်းရေးအစီအစဉ်သည် အဆိုပြုစီမံကိန်း၏ မီးဘေးအန္တရာယ်များ လျှော့ချရန်အတွက် ဖော်ပြထားခြင်းဖြစ်သည်။ အရေးပေါ်ကိစ္စများအတွက် တုံ့ပြန်ရေးနှင့် ကြိုတင်ပြင်ဆင်ရေးအစီအစဉ်သည် အရေးပေါ်ကိစ္စရပ်များဖြစ်ပေါ်ပါက မည်သို့ဆောင်ရွက်ရ မည်ကိုဖော်ပြထားခြင်းဖြစ်သည်။ မကျေလည်မှုများကိုဖြေရှင်းပေးမည့် အစီအစဉ်သည် အဆိုပြုစီမံကိန်းနှင့် ပတ်သက်သော မကျေလည်မှုများကို မည်သို့ဖြေရှင်းပေးမည်ဖြစ်ကြောင်း ဖော်ပြထားခြင်းဖြစ်သည်။ ***(အသေးစိတ်အား အခန်း ၈ တွင် ဖတ်ရှုပါရန်)***

ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီရင်ခံစာ ပြင်ဆင်ရေးဆွဲရာတွင် စီမံကိန်းအကြောင်းအရာများကို ရှင်းလင်းတင်ပြခြင်းသည် အရေးကြီးပြီး သက်ဆိုင်သူများ၏ အကြံဉာဏ်နှင့်အမြင်များကို အစီရင်ခံစာတွင် ထည့်သွင်းစဉ်းစားရေးဆွဲရမည်ဖြစ်သည်။ ထို့ကြောင့် အဆိုပြုစီမံကိန်းအတွက် အများပြည်သူသဘောထားရယူခြင်းအခမ်းအနားကို ၂၀၂၂ ခုနှစ်၊ မေလ (၂၇) ရက်နေ့တွင် ဗုဒ္ဓဝိဟာရဘုန်းတော်ကြီးကျောင်း၊ လယ်မကျေးရွာ၊ မဲဇလီကျေးရွာအုပ်စု၊ ပွင့်ဖြူမြို့နယ်တွင် ကျင်းပခဲ့သည်။ အခမ်းအနားကို နေ့လည် ၁ နာရီခွဲ တွင် စတင်ခဲ့ပြီး နေ့လည် ၄ နာရီခွဲတွင် ပြီးဆုံးခဲ့သည်။ အများပြည်သူသဘောထား ရယူခြင်းအခမ်းအနား၏ ရည်ရွယ်ချက်မှာ

စီမံကိန်းအကြောင်းအရာများ၊ စီမံကိန်းကြောင့်ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများ၊ လျှော့ချရန်နည်းလမ်းများဖော်ပြရန်နှင့် ဒေသခံပြည်သူများ၏ အကြံဉာဏ်နှင့်သုံးသပ်ချက်များရယူရန်ဖြစ်သည်။ စီမံကိန်းအကောင်အထည်ဖော်သူသည် အခမ်းအနားသို့တက်ရောက်ရန် ဒေသခံပြည်သူများအား ကျေးရွာအုပ်ချုပ်သူများမှ တင်ဆင့်ဖိတ်ကြားခဲ့သည်။ လယ်မကျေးရွာနှင့် ကျွဲခြံကျေးရွာမှ ဒေသခံပြည်သူများ၊ စီမံကိန်းအကောင်အထည်ဖော်သူ၏ ကိုယ်စားလှယ်များနှင့် E Guard Environmental Services Co., Ltd. မှ ကိုယ်စားလှယ်များပါဝင်သည့် တက်ရောက်သူ စုစုပေါင်း ၄၈ ယောက် ရှိခဲ့ပြီး အချို့တက်ရောက်သူများသည် သိရှိလိုသည်များကို မေးမြန်းဆွေးနွေးအကြံပြုခဲ့ကြသည်။ စီမံကိန်းဆိုင်ရာအချက်အလက်များနှင့် ဤပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီရင်ခံစာကို အဆိုပြုစီမံကိန်း၊ E Guard Environmental Services Co., Ltd. ၏ရုံး နှင့် အောက်ပါ website link https://tinyurl.com/solar-kyeaokyeewa တွင် အများပြည်သူများနှင့် စီမံကိန်းနှင့်သက်ဆိုင်သူများ ဖတ်ရှုလေ့လာနိုင်ရန် ဖော်ပြထားပါသည်။ ***(အသေးစိတ်အား အခန်း ၉ တွင် ဖတ်ရှုပါရန်)***

နိဂုံးချုပ်အားဖြင့် အဆိုပြုစီမံကိန်းသည် အလုပ်အကိုင်အခွင့်အလမ်းများ ဖန်တီးပေးနိုင်ခြင်း၊ စီးပွားရေးအခွင့်အလမ်းများ ဖန်တီးပေးနိုင်ခြင်း၊ အခွန်ငွေရရှိနိုင်ခြင်း၊ လူမှုစီးပွားတာဝန်ယူမှုအစီအစဉ်များကြောင့် ဒေသတွင်းဖွံ့ဖြိုးတိုးတက်ခြင်း၊ ကာဗွန်ထုတ်လုပ်မှုလျှော့ချခြင်း၊ သယံဇာတများထိန်းသိမ်းခြင်းနှင့် ပတ်ဝန်းကျင်နှင့်လိုက်လျောညီထွေသော စီးပွားရေးများအစပြုနိုင်ခြင်းစသည့် ကောင်းသောသက်ရောက်မှုများကို ဖြစ်ပေါ်စေသည်။ တည်ဆောက်ခြင်းကာလနှင့် လုပ်ငန်းလည်ပတ်သည့်ကာလတို့တွင် ဖြစ်ပေါ်နိုင်သော မကောင်းသောသက်ရောက်မှုများကိုလည်း လျှော့ချရန်နည်းလမ်းများနှင့် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်များကို အသုံးပြု၍လျှော့ချနိုင်သည်။ ပတ်ဝန်းကျင်စောင့်ကြပ်ကြည့်ရှုမှုအစီအစဉ်အား စီမံကိန်းပတ်ဝန်းကျင်အရည်အသွေးများအား စောင့်ကြပ်ကြည့်ရှုရန် အကောင်အထည်ဖော်ဆောင်ရွက်ပါမည်။ ဤအစီရင်ခံစာအား ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနမှ စိစစ်သုံးသပ်ပြီးပါက ပေးပို့လာမည့် သဘောထားမှတ်ချက်များနှင့် အကြံပြုချက်များကို လိုက်နာပါမည်။ ဤအစီရင်ခံစာကို သက်ဆိုင်ရာမှ အတည်ပြုပြီးပါက ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်များအား အကောင်အထည်ဖော် ဆောင်ရွက်ခြင်းသည် စီမံကိန်းအား ပတ်ဝန်းကျင်အပေါ်ထိခိုက်မှုအနည်းဆုံးဖြစ်အောင် လည်ပတ်ဆောင်ရွက်ပါမည်။ ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော်၏ ပတ်ဝန်းကျင်ဆိုင်ရာတည်ဆဲ ဥပဒေ၊ နည်းဥပဒေ၊ မူဝါဒများနှင့် လမ်းညွှန်ချက်များကို စီမံကိန်းလည်ပတ်စဉ်ကာလတစ်လျှောက်လုံး လိုက်နာဆောင်ရွက်မည်ဖြစ်ပါသည်။ ***(အသေးစိတ်အား အခန်း ၁၀ တွင် ဖတ်ရှုပါရန်)***

CHAPTER 1 - EXECITIVE SUMMARY

This Environmental Management Plan (EMP) report is prepared for 30 MW ground mounted solar power plant project connected to Kyeeonkyeewa Substation, proposed by Myanmar Kyeeonkyeewa Solar Power Co., Ltd., which is formed by the consortium of China ITS (Holding) Co., Ltd. The project proponent won tender from the Ministry of Electricity and Energy and obtained permit for construction and electricity generation from solar energy of the proposed project. According to the instructions from Environmental Conservation Department (ECD), this proposed project requires to submit Environmental Management Plan (EMP) report and E Guard Environmental Services Co., Ltd. consulted for EMP report and carried out environmental studies for the proposed project. In this EMP, a study was made to cover construction of solar power plant and overhead transmission line as well as operation of solar power plant to generate electricity from solar energy and distribute to the Kyeeonkyeewa Substation with 33 kV and 132 kV overhead transmission line. The scope of the study area for the proposed project is roughly defined to be the area within 1 km radius from the center of the project and this area would be large enough to cover for most environmental and socio-economic impacts of the project.

The proposed project is located at Mezali Village Tract, Pwint Phyu Township, Minbu District, Magway Region, Myanmar. Its coordinate points are between 20° 0' 1598.90" N and 20° 0' 2017.59", between 94° 0' 257.8" E and 94° 26' 20"E and the average altitude of the site is 82 m. The construction of the proposed project includes box-type transformers, supporting bracket, multiple-use building and outdoor equipment foundation construction as well as construction and stringing of 33 kV and 132 overhead transmission line. The installed capacity of PV power generation project is 36.288MWp, and the installed capacity of AC side is 30MWac. The project proponent has acquired the land slot to construct the proposed project and total land requirement for the project is 145 acres (58.67 hectares). The proposed project will install 67,200 PV modules, 6 box-type transformers and 2400 horizontal single tracking

brackets to generate electricity from solar energy and construction phase of the project will take nine months. ***(See details in Chapter 2).***

After construction period, proposed project will generate electricity from solar energy and distribute to the Kyeeonkyeewa Substation via 33 kV and 132 kV overhead transmission line and proposed operation period is 20 years. As the proposed project is a BOO basis project, project proponent will extend operation period at relevant authorities and continue operation activities after 20 years. List of directors and organizational structure of respective project proponent, organizational structure and detail investment plan of the proposed project are also described. ***(See details in Chapter 3).***

The responsible persons of study team for this EMP report preparation are described in ***Chapter 4.*** National laws and regulations for environmental protection applicable for construction and operation of proposed project are compiled and presented. ***(See details in Chapter 5).***

Primary data and secondary data collections are very important to assess environmental impacts. Primary data collection for environmental quality monitoring plays an important role for environmental studies. Therefore, E Guard Environmental Services conducted air quality, water quality and noise level measurements at project site on 26th and 27th May, 2022 (24 hours continuous monitoring system). The observed values are compared with National Emissions Quality (Emission) Guidelines and other guideline values. According to the comparison results of gaseous emissions, the observed values of SO_2 (0.044 µg/m^3), NO_2 (25.55 µg/m^3), CO (0.008 ppm) and CO_2 (400.99 ppm) are lower than the respective guideline values. For dust emissions, the observed values of PM_{10} (20.62 µg/m^3) and $PM_{2.5}$ (9.01 µg/m^3) are also within the guideline values of NEQEG. Therefore, it can be considered that the ambient air quality of the proposed project is quite good before the implementation of the project. The project has just started construction and wells are not finished to dug yet at the time of water quality measurement. Therefore, E Guard Survey Team chose one well in the near village (Kywal Chan Village) which is located at nearby from the project for groundwater quality testing and currently the required water for project has been taken from there. The existing groundwater quality in that well was measured by two methods: on-site measurement and sampling water. For groundwater quality, most of the parameter measured are within the WHO guideline value for drinking water. For noise level, monitoring was done at two points: within the project (source) and outside the project (receptor), results at source are lower than standard value not only at day time (56.12 dBA) but also at night time (50.32 dBA). With regards to noise level at receptor, the results are lower than standard value not only at day time (47.26 dBA) but also at night time (43.12 dBA). Therefore, it can be considered that the noise level at the proposed project is within the guideline value of NEQEG before the implementation of the project. It is anticipated that ambient air quality will be decreased and noise level will be increased during the construction phase of the proposed project because of construction activities implementation. In addition, secondary data like climate data, administrative structure, socio-

economic data, land use and other secondary data are described in this report. ***(See details in Chapter 6).***

Potential impacts, such as impacts on environmental resources, ecological resources, human and waste disposal due to construction and operation processes were identified, and their significance was assessed by using International Association for Impact Assessment (IAIA)'s impact assessment methodology. Potential impacts for the proposed projects are differentiated into two main phases namely; Construction phase and Operation phase.

Construction Phase: includes construction of switchyard and multiple-use building, installation of PV modules, tracking brackets, inverters, transformers, poles of overhead transmission line and stringing cables of overhead transmission line, which will connect to the Kyeeonkyeewa Substation. The construction period of the proposed project is 8 months.

Operation Phase: includes generating electricity from solar energy and distributing to the Kyeeonkyeewa Substation through 33 and 132 kV overhead transmission lines. The proposed operation period of the proposed project is 20 years.

Decommissioning Phase: after operation period, the project proponent will extend operation period of the project many times to generate electricity from solar energy because the proposed project is a BOO basis project. Therefore, impacts identification, impacts assessment and mitigation measures formulating for decommissioning phase of the project is excluded in this Environmental Management Plan Report. But, as third-party organization, E Guard Environmental Services Co., Ltd has consulted that the project owner must report project decommission plan to Environmental Conservation Department before decommission of proposed project.

During the ***construction phase***, impacts on air, soil and fire hazards impacts are assessed as **Moderate Impacts** and other impacts such as impacts on water, noise and vibration, occupational health and safety, community health and safety, solid waste generation and hazardous waste generation impacts are categorized as **Low Impacts** as well as liquid waste generation impact is considered as **Very Low Impact** as per the results of assessments.

During the ***operation phase***, impacts on water, occupational health and safety, community health and safety, fire hazard impacts, liquid waste generation and hazardous waste generation impacts are assessed as **Moderate Impacts** and other impacts like impacts on air, soil, noise impacts and solid waste generation impacts are categorized as **Low Impacts** according to the results of assessments. The following figure illustrates detail impact significances of potential adverse impacts of the proposed project.

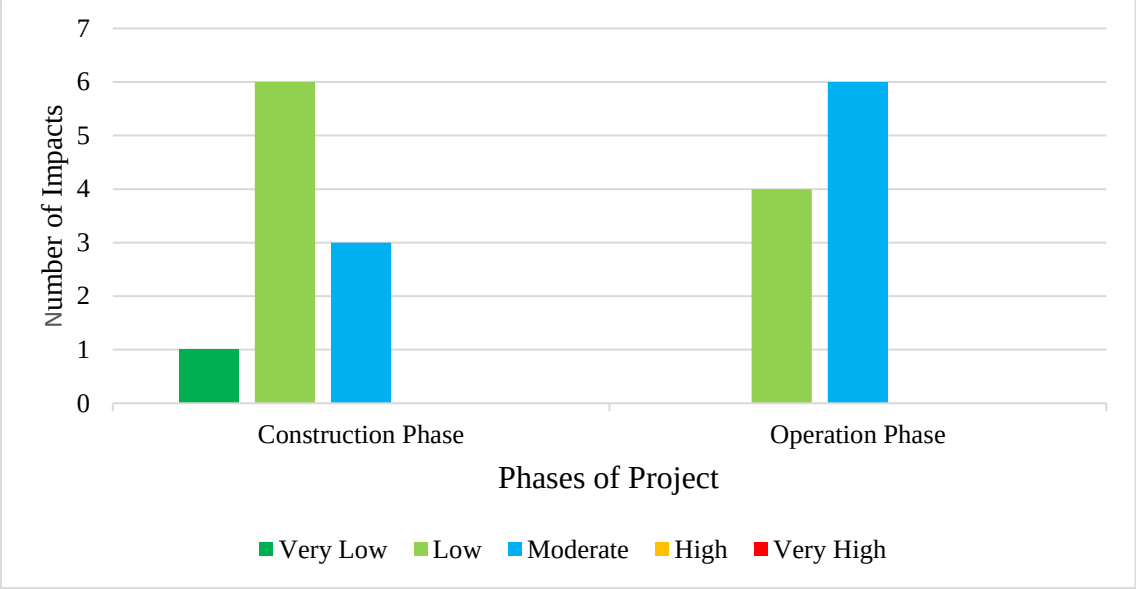


Figure 1.1Impact Significance of Potential Adverse Impacts of 30 MW Ground Mounted Solar Power Plant Project

Mitigation measures are important to minimize and reduce these potential negative impacts. They are also described requirements of impacts mitigation tasks and technologies according to the types of impacts scales. However, the proposed project can ensure some positive impacts such as providing job opportunities, business opportunities, revenue to government, CSR development, carbon emission reduction, resources conservation and green economy. ***(See details in Chapter 7).***

Institutional requirements and responsible persons for implementing mitigation measures and EMP are also described in this report. The Environmental Management Plan (EMP) was prepared based on findings of impacts and its significance and designed with the framework of health and safety for all two phases; construction phase and operation phase of the proposed project. The project proponent must manage the development of the proposed project by implementing the EMP, which is composed of five parts as follows:

- Environmental Management Plan
- Environmental Monitoring Plan
- Corporate Social Responsibility (CSR) Plan
- Firefighting Plan
- Emergency Response and Preparedness Plan and
- Grievance Redress Mechanism

Moreover, cost estimation for EMP and EMoP were also described in this report. The **Environmental Management Plan (EMP)** identifies potential negative environmental impacts, source of impacts, how to mitigate these impacts and residual impacts after mitigation and responsible persons for construction and operation phases. The **Environmental Monitoring Plan (EMoP)** identifies parameters, frequency, and responsible persons to monitor for air quality, water quality, noise level and environmental auditing. The **Corporate**

Social Responsibility (CSR) Plan aims to create social welfare for local community and to prove that the implementation of the proposed project is beneficial for not only the project proponent but also for the local community. The **Firefighting Plan** aims to protect fire hazards of the proposed project. The **Emergency Preparedness and Response Plan** identify how to overcome emergency cases effectively. The **Grievance Redress Mechanism (GRM)** identifies the steps to solve complaints related with the proposed project. ***(See details in Chapter 8).***

It is important to disclose the information about the project during the preparation of EMP report and the opinions of all stakeholders should be considered in the finalization of the EMP report. So, public consultation meeting for the proposed project was held on 27th May, 2021 at Budda Wihara Monastery, Lema Village, Mezali Village Tract, Pwint Phyu Township. The staring time was 1:30 pm and finished at 4:30 pm. The objective of the meeting is to disclose information of the project, potential impacts of project activities and mitigation measures and to receive public recommendations and feedbacks for the proposed project. The project proponent invited local people by negotiating with village administrators. Totally, 48 persons including local people from Lema Village and Kywal Chan Village, representatives of project proponent and E Guard Environmental Services attended public consultation meeting and some attendees discussed with regards to the project. The project information and this Environmental Management Plan (EMP) report can be accessible via the link of https://tinyurl.com/solar-kyeaokyeewa and at the project site and E Guard Environmental Service Co., Ltd.'s Office for disclosure to public and stakeholders. ***(See details in Chapter 9).***

In conclusion, the proposed project can ensure some positive impacts such as providing job opportunities, business opportunities, revenue to government, CSR development, carbon emission reduction, resources conservation and green economy. All the negative impacts during construction and operation phases can be minimized by using mitigation measures and implementing Environmental Management Plan (EMP). Environmental Monitoring Plan (EMoP) must need to implement for monitoring the environmental quality of the proposed project. Finally, the comments and suggestions that will be given by ECD will be followed reviewing this EMP report. Once EMP report is approved by concerned authorities, effective implementation of EMP will be implemented for the project environmental soundly. Environmental policy, laws, rules, and instructions of the Republic of the Union of Myanmar will be abided throughout the lifespan of project. ***(See details in Chapter 10).***

CHAPTER 2 – PROJECT DESCRIPTION

This Environmental Management Plan (EMP) report is for the 30 MW Ground Mounted Solar Power Plant Project Connected to Kyeeon Kyeewa Substation, which is proposed by Myanmar Kyeeon Kyeewa Solar Power Co., Ltd. The project proponent, by Myanmar Kyeeon Kyeewa Solar Power Co., Ltd is formed by the consortium of ITS Holding (China) International Co., Ltd for the proposed project. The project proponent won tender (Bid No. EPGE PV 02/2021-2022) from the Ministry of Electricity and Energy and obtained permit for construction and electricity generation from solar energy of the proposed project. The proposed project will contribute to fulfill a goal for achieving universal access to electricity by 2030 as per Myanmar National Electrification Plan (NEP). Myanmar has one of the lowest rates of electrification in Southeast Asia, development of electricity generation projects, especially for electricity generation from renewable energy projects are urgently required in Myanmar. According to the Environmental Conservation Law (2012), it is the requirement of every development project in the country, to submit an Environmental Management Plan (EMP) or Initial Environmental Examination (IEE) or Environmental Impact Assessment (EIA) report to Ministry of Natural Resources and Environmental Conservation (MONREC) depending on the criteria for specific kind of economic activity, which was enacted in the Environmental Impact Assessment Procedure (2015). According to the instructions from Environmental Conservation Department (ECD), this proposed project requires to submit Environmental Management Plan (EMP) report to meet the environmental assessment requirements of the Environmental Policy, Environmental Conservation Law and other environmental related rules and procedures. Therefore, Myanmar Kyeeon Kyeewa Solar Power Co., Ltd was made consultations with E Guard Environmental Services Co., Ltd. for conducting the environmental studies for the proposed project.

The specific objectives of this study are:

(1) Identify the major impacts that may arise from the activities of the proposed project on natural environment and socio-economic environment of the project area,
(2) Describe the mitigation measures to minimize these impacts,
(3) Prepare and implement Environmental Management Plan and Environmental Monitoring Plan for the proposed project,
(4) Make sure that EMP is developed sufficiently and soundly for the proposed project and
(5) Implement the Corporate Social Responsibility Plan (CSR Plan), which plays an essential part for the improvement of the social welfare of community as well as development of the region.

2.1 Scope of the Project

The scope of the study for EMP will vary on the scale and type of the development project. In this EMP, a study was made to cover construction of solar power plant and overhead

transmission line as well as operation of solar power plant to generate electricity from solar energy and distribute to the Kyeeon Kyeewa Substation with 132 kV overhead transmission line. This EMP is based on consideration of terrestrial and aquatic resources conservation, pollutant abatement on air quality, water quality and soil quality, noise level reduction, safe working environment ensuring for the workers. The site survey and baseline environmental quality measurement were carried out by a study team from E Guard Environmental Services, which has experiences in conducting assessments on environmental concerns for various kinds of development projects in Myanmar.

A study team from E Guard Environmental Services conducted site survey on 26th May, 2022 for all site-related issues and baseline environmental data were also collected from possible sources of pollution by using appropriate environmental measuring devices. Data interpretation and analysis were made based on those collected data for the current and future conditions. In this EMP report, recommended mitigation and monitoring measures were also include to mitigate environmental impacts due to the activities of the proposed project. It is estimated that there will be not much significant impacts on the environmental and socio-economic factors due to implementation of the proposed project during construction phase, operation phase and decommissioning phase because the proposed project will utilize renewable energy to generate electricity and distributing to Kyeeon Kyeewa Substation. Therefore, the scope of the study area for the proposed project is roughly defined to be the area within 1 km radius from the center of the project and transmission line study area is 200 m. These areas would be large enough to cover for most environmental and socioeconomic impacts of the project. Within this defined area, available secondary information and primary information collected from site survey were used for the consideration of cumulative impacts. The following figure illustrates the scope of the study area for the proposed project.

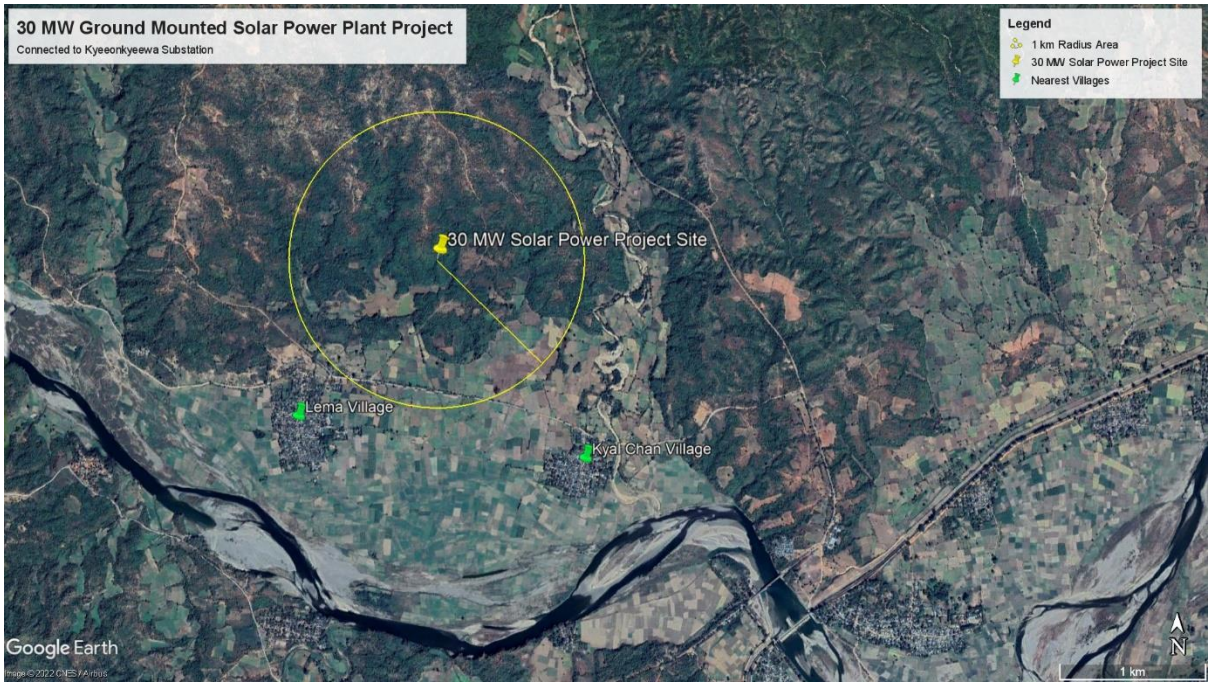


Figure 2.1 Scope of Study Area

2.2 Project Size and Location

The proposed project is located at Mezali Village Tract, Pwint Phyu Township, Minbu District, Magway Region, Myanmar. Its coordinate points are 20° 20' 19.8996" N, 94° 28' 6.3804" E and the average altitude of the site is 167 m. The construction of the proposed project includes box transformer foundation, supporting bracket and foundation of solar power station, multiple-use building and outdoor equipment foundation construction as well as construction and stringing of 132 kV overhead transmission line. The total capacity of capacity of AC side of the proposed project is 31.45 MW and DC side is 37.27 MW, including five photovoltaic power generation units. The photovoltaic power station is connected to the 33 kV bus side of the 132 kV main transformer in the Kyeeonkyeewa Substation. Total land area of solar power plant is 145 acres (58.67 hectare).

The annual average total solar radiation in Magway Region is 6400MJ/m2~6900MJ/m2, and the annual average sunshine hours are over 2300h. The distribution of solar energy resources in Magway Region and its surrounding areas is shown in Figure.

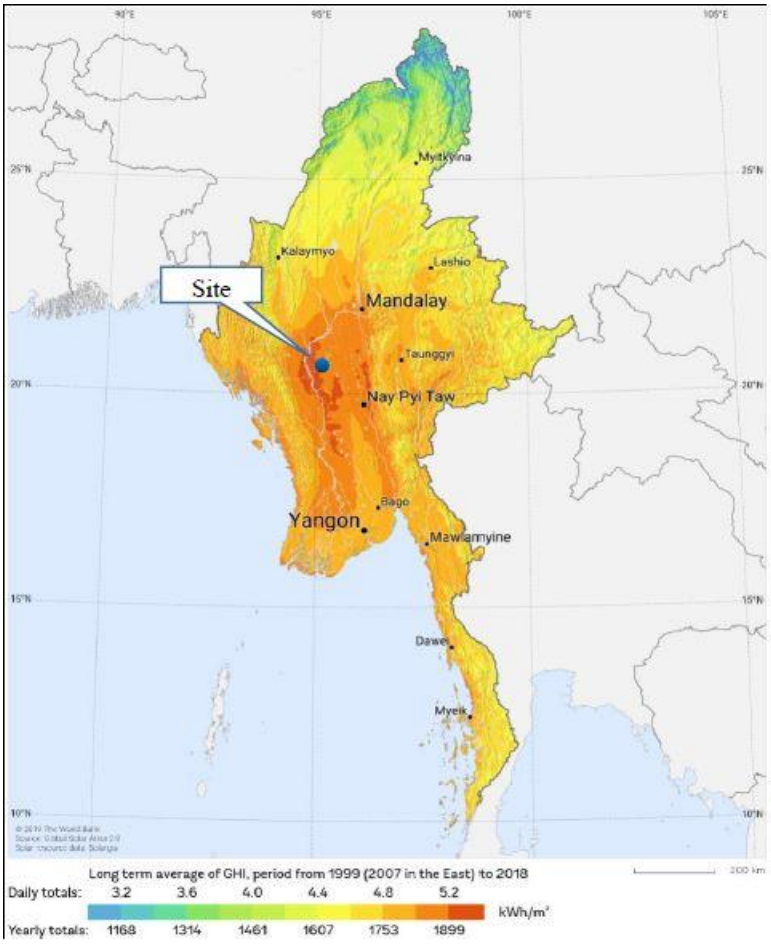


Figure 2.2 Distribution of Solar Energy Resource in Myanmar

The total solar radiation in the horizontal plane of the site is 6728.1 MJ/m^2, the inclination angle of fixed bracket is 24, and the corresponding total solar radiation in the inclined plane is 7150.4 MJ/m^2. Therefore, total solar radiation level of the project site is rich. The direct radiation amount takes a large proportion of the total radiation and the project site has a good development prospect, where is suitable for the construction of large-scale grid connected photovoltaic power station. The following figure describes total solar radiation level of the project site.

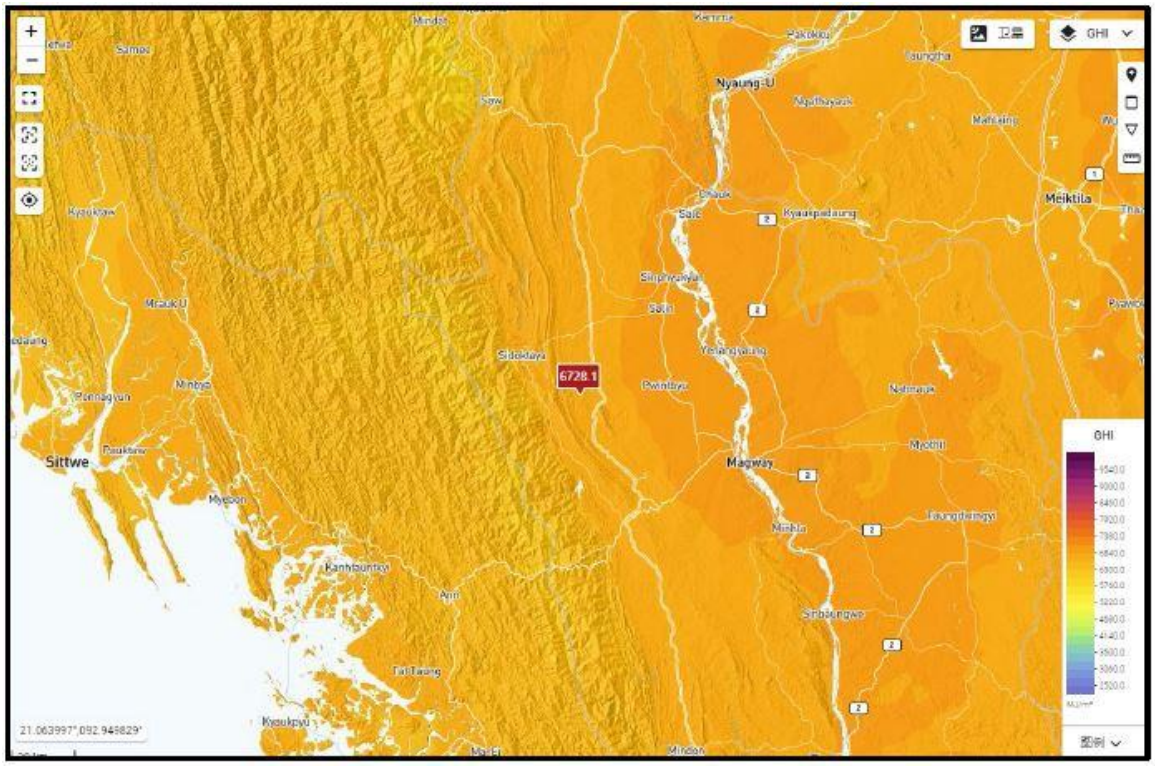


Figure 2.3 Total Solar Radiation in the Horizontal Plane of the Site

2.3 History of Land

The project proponent has acquired the land slot to construct the 30 MW ground mounted solar power plant and total land requirement for the project is 145 acres (58.67 hectares). China ITS (Holdings) Co., Ltd. leased the land owned by Super One Holdings Company Limited with long-term land lease agreement (LLA) for the proposed project. The land of the project is covered with small trees and bushes, which is almost flat.

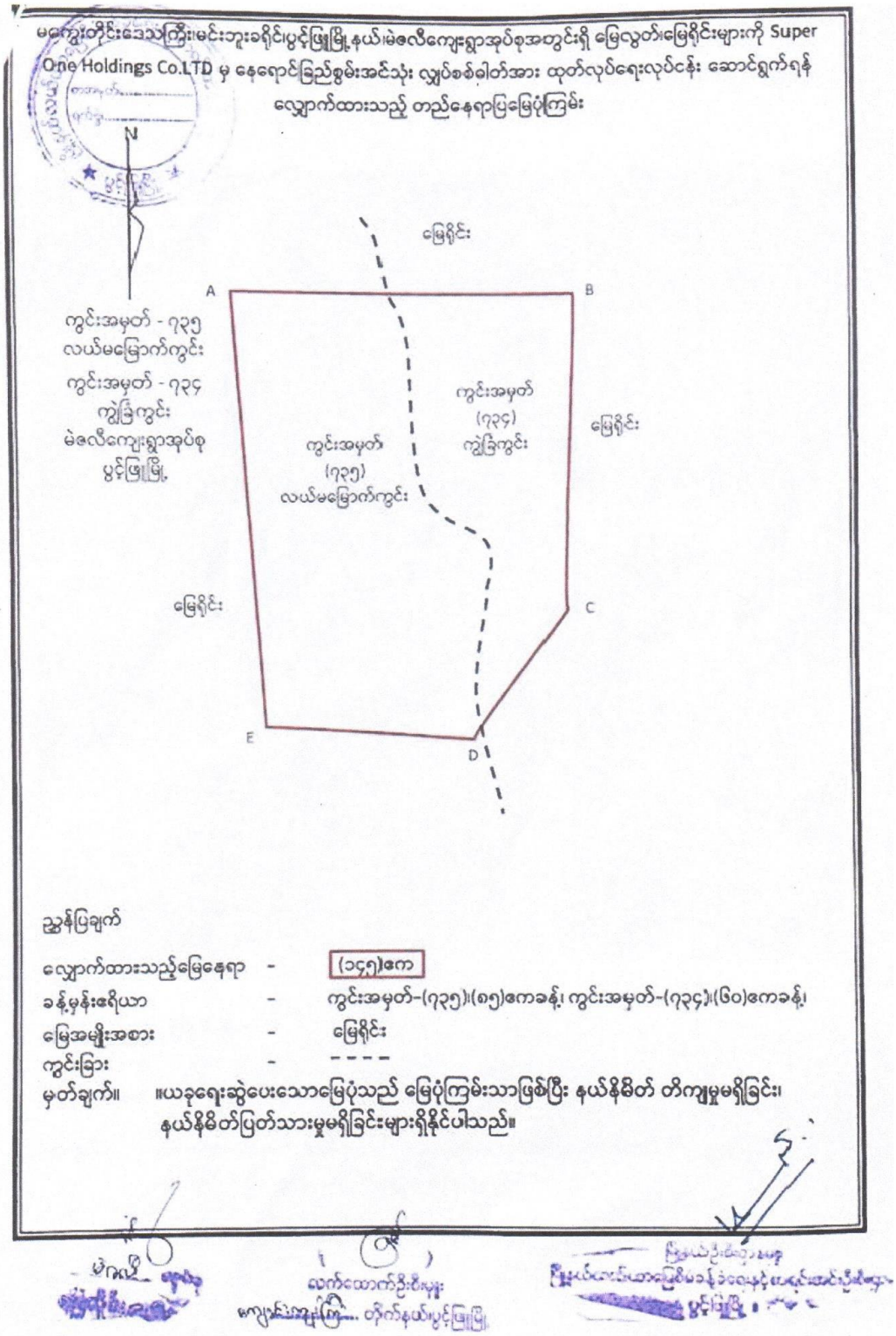


Figure 2.4 Plot of Proposed Project Site

2.4 Project Description

2.4.1 Proposed Layout Plan

Kyeeonkyeewa PV power station project has a scale of 30MWac, which was completed and put into operation at one time, with a total area of 0.58 km2. According to the land use situation, landform conditions and preliminary access system scheme of the site, a 132kV booster station is planned to be built in the north of the site, and six 5MWac PV power generation subarray are arranged on the gentle slope.

There is a road in the south of the site, with a width of about 4m~4.5m, which meets the transportation requirements of PV power plant equipment. It is proposed to enter the site for reconstruction and expansion of the part of the access road that does not meet the requirements. The roads in the site should avoid hillsides with large gullies as much as possible to reduce digging and filling and avoid destroying natural gullies, and approach or pass through more PV arrays as much as possible along the route. The total length of the construction road is about 4km, the road surface width is 3.5m, and the roadbed width is 4.5m. clay-bound macadam is adopted, and a shunting platform is set at the end of the road.

The PV array should be arranged according to the land use range and terrain conditions to avoid the great difference between the length and width of the sub-squares to achieve the best layout scheme with better land use, saving connecting cables and shorter routine inspection lines.

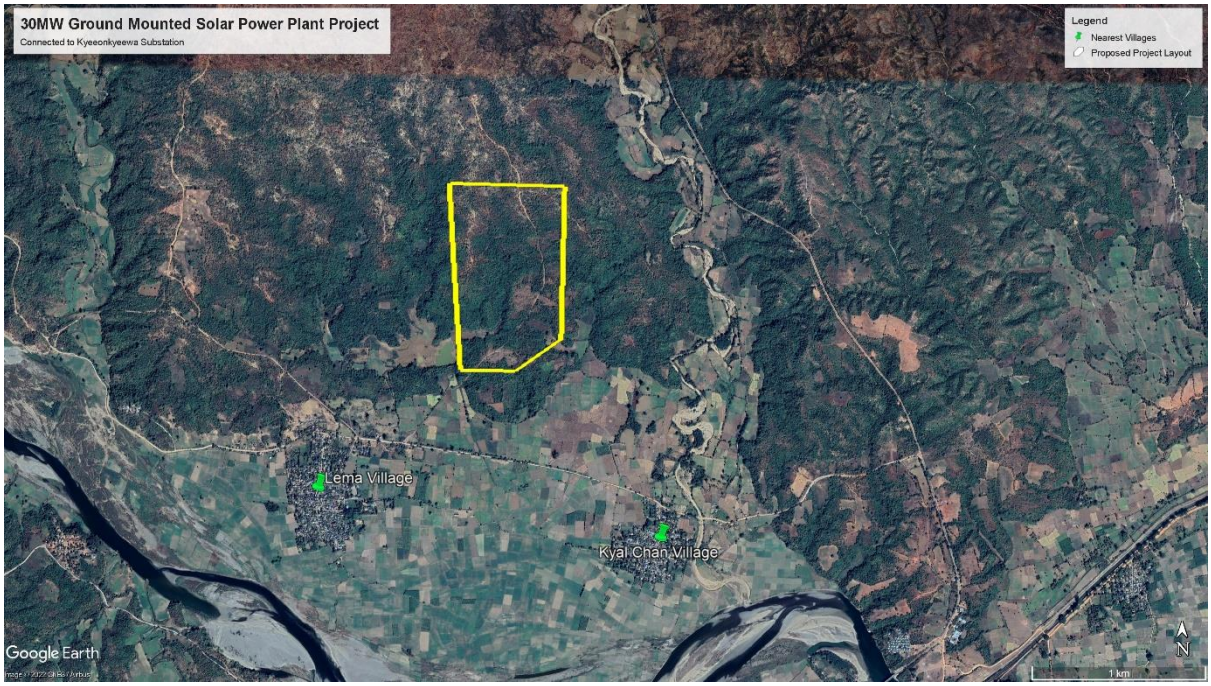


Figure 2.5 Layout of Proposed Project

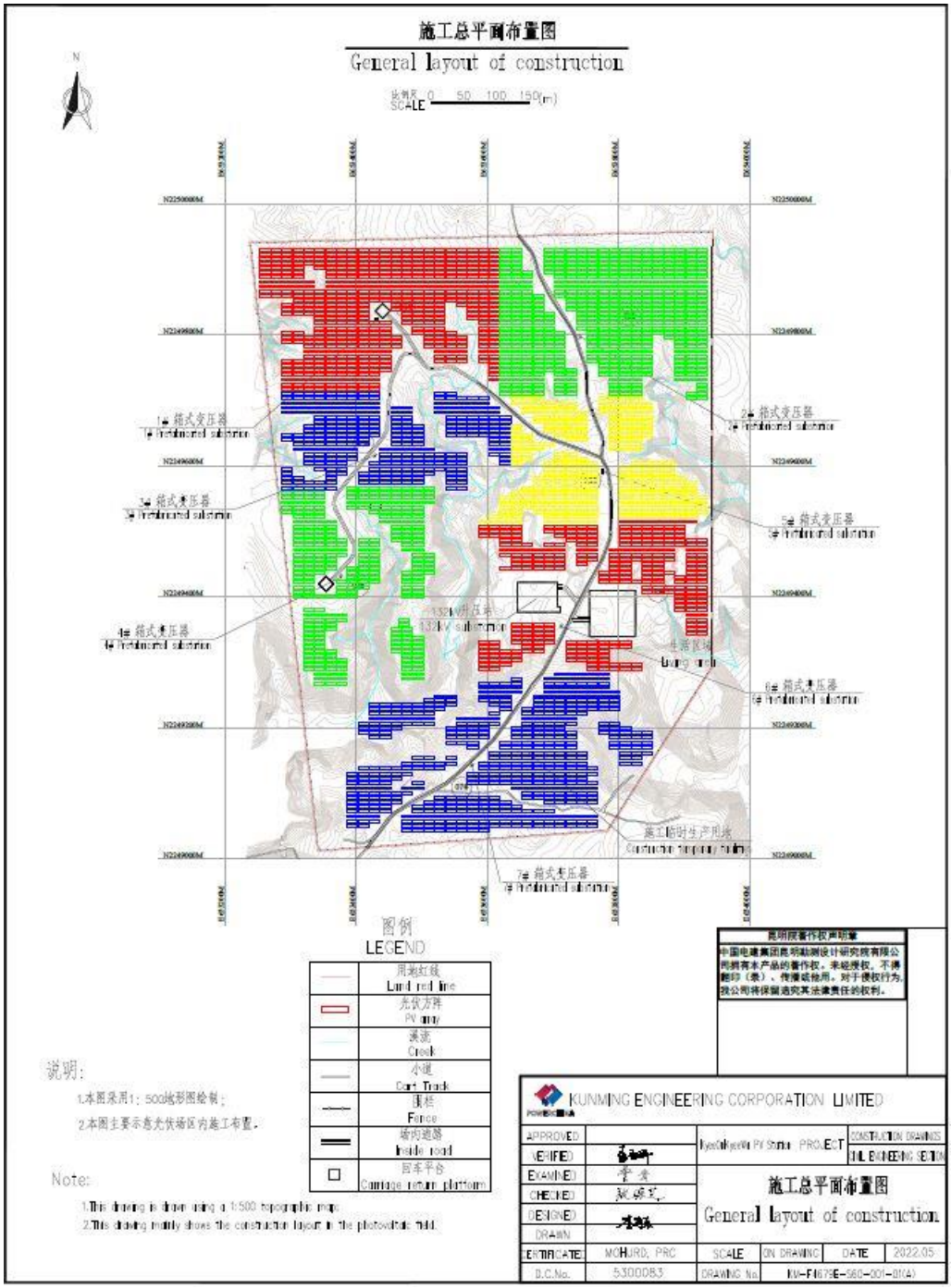


Figure 2.6 Proposed Layout of Kyeeonkyeewa PV Power Station

2.5 Design Scheme of PV Power Generation System

The PV power generation project of this project adopts monocrystalline silicon PV module for development, and selects 540Wp monocrystalline silicon double-sided PV module made in China; The PV module adopts fixed inclination angle installation mode, and the inclination angle of the PV module is 24; The capacity of PV sub-array is 6.0480MWp.

A 5000kVA box transformer and 20 sets of 250kW series inverters are adopted, each inverter is connected with 20 PV series, and each PV series is connected with 28 PV modules. the output electric energy is boosted to 33kV by the box transformer and then sent to the booster station.

The box transformer is arranged in the middle of the array near the road. In this project, a total of 6 PV sub-arrays of 6.0480MWp are arranged, and a total of 67200 monocrystalline silicon double sided PV modules with a capacity of 540Wp are adopted. The installed capacity of PV power generation project is 36.288MWp, and the installed capacity of AC side is 30MWac. The system efficiency of this PV power generation project is considered as 81.5%. The power generation gain of the back of the double-sided module is 4.5%, and the double-sided module attenuates by 2% in the first year and then by 0.45% every year. The annual total solar radiation of the project site is 6728.1MJ/m2. After calculation, the average on-grid power of this project in the 20-year operation period is 57530MWh, and the average annual equivalent utilization hour is 1585.

2.6 PV Modules and Inverters

PV Modules

The proposed project will use double-sided monocrystalline silicon PV modules of 540Wp peak power. The following table and figure show the details specification of PV modules.

Table 2.1 Detail Specifications of PV Modules

Manufacturer	Longji, Jinko, GCL, China
Model number	540W LR5-72HBD
Power output	M10 wafer with gallium-doped technology P-PERC cell technology Half-cut cell with multi-busbars
Module efficiency	Voc: 49.5V Imp: 13.0A Power temperature coefficient: -0.35%/°C
Component size (height/ width)	2,256 × 1,133 mm
Weight	32.3 kg
Cell orientation	72 cells

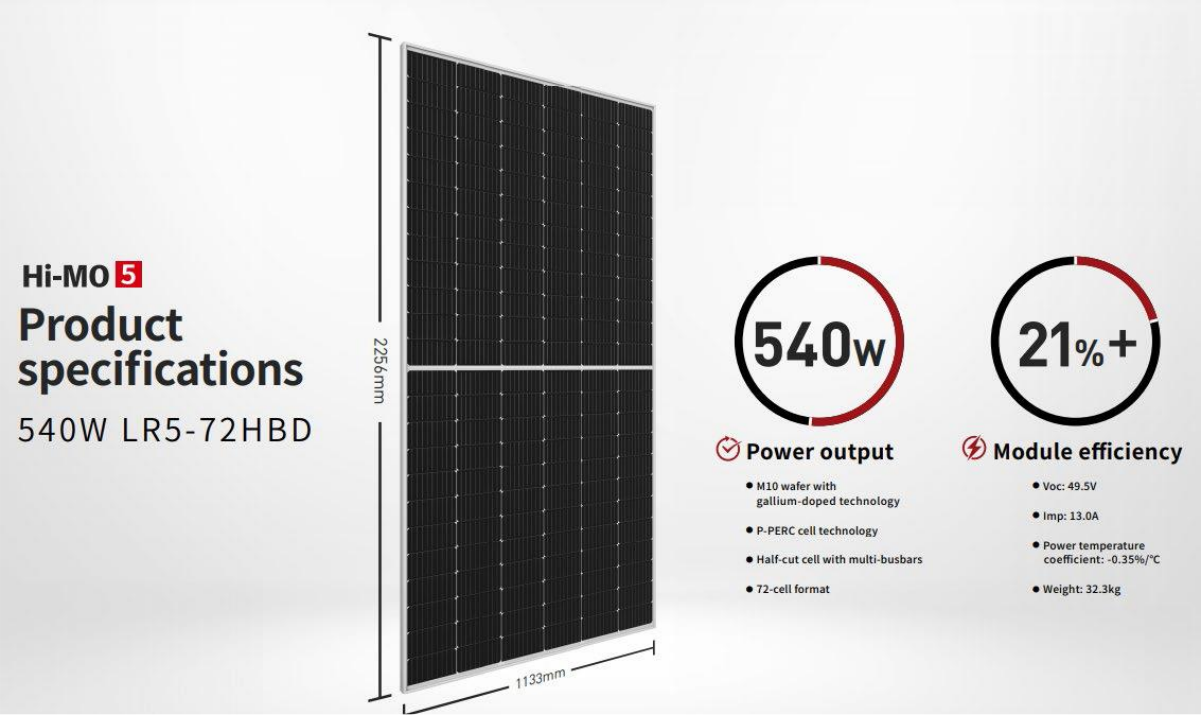


Figure 2.7 Specification of 540wp PV Module

Efficiency and Degradation of PV Modules

The efficiency of 540Wp monocrystalline silicon double-sided PV module to be selected in this project is 21%, and the power attenuation of double-sided monocrystalline silicon PV module is less than 2% in the first year and 0.45% from the second year.

String Inverters

250kW series inverters (origin: Chinas primary manufacturer: Sungrow, Huawei) are proposed as inverters in this project. Because PV modules are easily affected by sunlight shading, the optimal operating point of each PV module strings is not matched with the inverter, which will affect the efficiency of the inverter and the power generation of the whole system. In order to solve the above problems, inverters generally adopt the mode of input grouping and parallel connection. The following table describes product specifications of 250kW inverters.

Table 2.2 Detail Specifications of Inverters

Manufacturer	Sun grow, Huawei, China
Type	String inverter
Type designation	SG250HX
Input (DC)	
Max. PV input voltage	1500 V
Min. PV input voltage/ Startup input voltage	500V/500V
Nominal PV input voltage	1160V
MPP voltage range	500 V – 1,500 V

MPP voltage range for nominal power	860 V – 1,300 V
No. of independent MPP inputs	12
Max. number of input connector per MPPT	2
Max. PV input current	30A*12
Max. DC short-circuit current	50A*12
Output (AC)	
AC output power	250kVA @30°C/225kVA @40°C/200kVA @50°C
Max. AC output current	180.5A
Nominal AC voltage	3/PE,800V
AC voltage range	680-880V
Nominal grid frequency/Grid frequency range	50Hz/45-55Hz, 60Hz/55-65Hz
THD	<3% (at nominal power)
DC current injection	<0.5% In
Power factor at nominal power/Adjustable power factor	>0.99/0.8 leading-0.8 lagging
Feed-in phases/connection phases	3/3
Efficiency	
Max. efficiency	99.0%
European efficiency	98.8%
Protection	
DC reverse connection protection	Yes
AC Short Circus Protection	Yes
Leakage current protection	Yes
Grid monitoring	Yes
Ground fault monitoring	Yes
DC switch	Yes
AC switch	No
PV string current monitoring	Yes
Q at night function	Yes
Anti PID and PID Recovery Function	Yes
Overvoltage Protection	DC Type 2/AC Type 2
General Data	
Dimensions (W*H*D)	1051*660*363 mm
Weight	99kg
Isolation method	Transformer less
Night power consumption	<2W

Operating ambient temperature range	30 to 60 °C
Allowable relative humidity range (non-condensing)	0-100 %
Cooling method	Smart forced air cooling
Max. operating altitude	5000 m (>4000 m derating)
Display	LED, Bluetooth + App
Communication	RS485/PLC
DC connection type	MC4-Evo2 (Max 6mm^{2,} optional 10 mm^2)
AC connection type	OT/DT terminal (Max 300 mm^2)
Compliance	IEC 62109, IEC 61727, IEC 6211, IEC 60068, IEC 61683, VDE-AR-N 4110:2018, VDE-A-R-N 4120:2018, EN 505-49-1/2, UNE 206007-1:2013, PO 123, UTE C15-712-1:2013
Grid Support	Q at night function, LVRT, HVRT, active and reactive power control and power ramp rate control

2.7 Box Type Transformer Design

In this project, each 5MWac PV power generation unit system adopts the unit connection mode of one 5000kW step-up transformer (boosted to 33kV).

Table 2.3 Detail Specification of Box Type Transformer

Rated capacity	5000kVA
Rated Voltage	33kV (8x1.25%/0.8kV)
Rated frequency	50 Hz
Voltage regulation mode	No excitation tap-changer is set on the high voltage side
Rated transformer ratio	33±8×1.25%/ 0.8 kV-0.8 kV
Impedance voltage	~ 7.5%
Cooling method	ONAN
Connection group	D, yn11
Neutral grounding mode	The neutral point on the 33kV side is not grounded
Number of phases	3 phases
Quantity	6 sets

2.8 Civil Engineering Design

PV Support Design and Bracket System

In this project, 540Wp monocrystalline silicon PV modules are used. The PV support bracket consists of 28 monocrystalline silicon PV modules arranged in 2 (rows) ×14 (columns) to form a support unit. The inclination angle of the support bracket is 24, and the lowest point of the support is 0.5m above the ground. (a fixed bracket is adopted in the bidding document, and it can be adjusted to a tracking bracket in the later stage as an alternative to the technical solution). In this project, there are 2400 support brackets with installed capacity of 36.288MWp.

The PV support bracket is supported by q355 steel diagonal beams and crossbeams. Each support unit consists of five frames and four crossbeams. The front column, the rear column, the diagonal beams, and the diagonal braces form one frame. The inclined beam span is 2.8m (vertical projection), and the cross beam span is 3.6m. C80×40×15×2.5mm hot-dip galvanized cold-formed thin-walled rolled channel steel is used for inclined beams, and c90×45×15×2.0mm hot-dip galvanized cold-formed thin-walled rolled channel steel is used for crossbeams.u50×35×2.0mm hot-dip galvanized cold-formed thin-walled hemmed channel steel is adopted for diagonal braces, and φ φ60×2.5mm hot-dip galvanized steel pipe is adopted for columns. The PV module is connected with the beam by bolts, and each PV panel is fixed on the beam by 4 bolts. The cross beam is connected with the inclined beam through the purlin. The upper end of the upright column is connected with the inclined beam through a rotary connector, and the lower end is inserted into the foundation steel pipe for socket fastening.

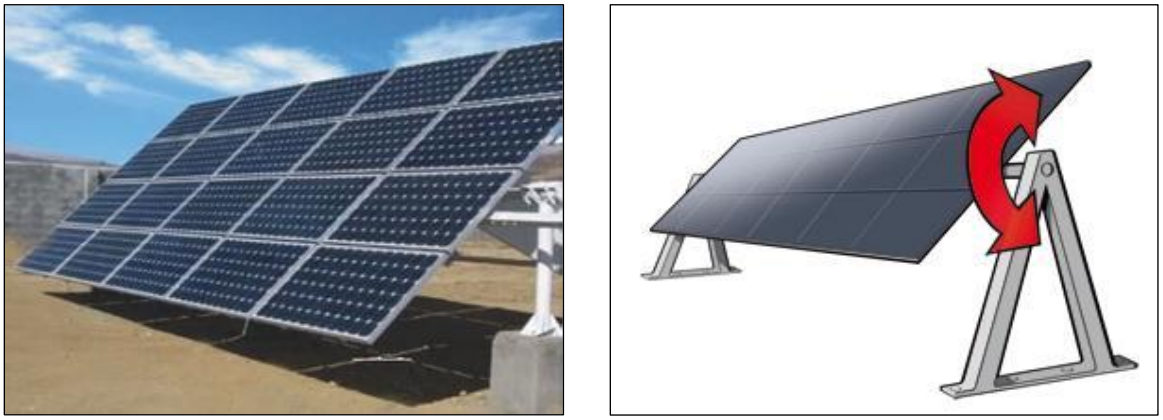


Figure 2.8 Horizontal Single-Axis Bracket Type

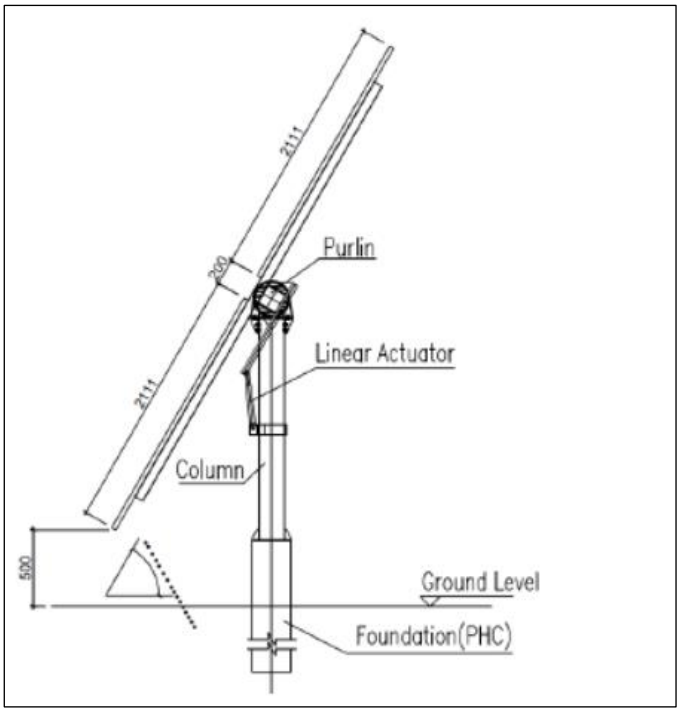


Figure 2.9 Layout of Horizontal Single-axis Bracket

According to the site geology and bracket layout, each bracket is provided with 10 bored steel pipe cast-in-place pile foundations (arranged in front and back double rows). According to calculation, the steel pipe cast-in-place pile is proposed to have a pile length of 1.75m, a pile top with a height of 0.25m above the ground, a pile foundation drilling diameter of 200mm and a drilling depth of 1.5m. The steel pipe pile is formed by welding three 1.2m long φ 14 ribbed steel bars with φ φ76×4mm specifications. After drilling pile foundation, insert steel pipe pile, straighten steel pipe pile, and pour c25 fine stone concrete into drilling gap.

Design of Support Bracket Foundation

According to the site geology and bracket layout, each bracket is provided with 10 bored steel pipe cast-in-place pile foundations (arranged in front and back double rows). According to calculation, the steel pipe cast-in-place pile is proposed to have a pile length of 1.75m, a pile top with a height of 0.25m above the ground, a pile foundation drilling diameter of 200mm and a drilling depth of 1.5m. The steel pipe pile is formed by welding three 1.2m long φ 14 ribbed steel bars with φ Φ76×4mm specifications. After drilling pile foundation, insert steel pipe pile, straighten steel pipe pile, and pour C25 fine stone concrete into drilling gap.

Design of Infrastructures

(1) Design of Transformer Foundation and Facilities

One 33kV box-type transformer is installed near the road in every two array centers, and the foundation is box-type brick-concrete foundation. According to the needs of electrical layout, a cable tap box is installed beside some 33kV box inverter integrated machines, and the foundation is box-type brick foundation. In this project, the box transformer to booster station

adopts the form of directly buried cable, and the excavation size is 1.6m in top width, 1m in bottom width and 1m in depth. Place cables after laying sand cushion, then spread a layer of fine sand and cover it with red bricks, and then backfill it. For the convenience of management, a wire mesh fence with a height of 1.8m is set along the outside of the PV farm array.

(2) Design of Booster Station

Building design - The comprehensive building is a one-story building with a floor height of 3.6m, with a total construction area of 340m2. There are dormitories, restaurants, kitchens, spare parts rooms, offices, tea room, conference rooms, activity rooms and public rooms for the convenience of employees' lives, each dormitory has its own bathroom. The comprehensive control building is 180m2 in building area. It is a single-storey building with high and low spans. The height of power distribution room is 5.7m, and that of main control room, protection screen room, communication room and instrument room is 3.6m. The main entrance and exit of the comprehensive control building are set at both ends of the middle corridor.

Other facilities - There is a water pump room and a fire pool in the station, and the domestic water tank and fire pump are mainly placed in the pump room. The cable trench in the station is made of brick, and its clear width is generally 0.6m~1m. In order to bear the vehicle load, the cable trench passing through the road locally adopts the cast-in- place reinforced concrete type. Precast ditch cover plate shall be laid on cable trench, and angle steel shall be used around cover plate.

(3) Heating and Ventilation Facilities

Myanmar is a non-heating area with comfortable temperature all year round. There is no central heating equipment in the booster station, and air conditioners and other equipment are arranged in each room of the comprehensive building to cool down as required. Cabinet air conditioners are set in the power distribution room and protection room to adjust indoor humidity and temperature according to the working requirements of electrical equipment. Emergency smoke exhaust and mechanical ventilation equipment shall be set in the power distribution room, and the smoke exhaust amount shall be 8050m3based on the calculation of air changes not less than 10 times per hour. Two axial fans shall be set near the bottom of the beam, with the flow rate of a single fan being q = 5000m267)/h. The public toilet adopts natural air intake and mechanical air exhaust ventilation, and the ventilation frequency is 7 times/hour. The side wall of the toilet is equipped with an exhaust fan to exhaust the air outdoors. The dormitory toilet adopts natural air intake and mechanical air exhaust ventilation, and the ventilation frequency is 7 times/hour. The toilet is equipped with ventilator and air duct inside the toilet to exhaust the air outdoors. Other buildings can be ventilated naturally.

(4) Water Supply and Drainage

In this project, a new well is built, which is initially planned to be arranged in the booster station. Deep well pumps are used to pump water to the 150m3fire fighting pool in the booster station as the water source for firefighting, gardening, and PV module cleaning.

Regular cleaning of PV modules can improve the power generation efficiency of modules to a certain extent. There are few pollution sources in this project, so cleaning once every six months can be considered. The water consumption for cleaning PV modules is estimated as 1.6L/m^2, and the total water consumption for each cleaning is about 523m^3. The cleaning water is taken from the pool by tanker and transported to each water point area, and pressurized by small diesel pump to clean PV panels.

The booster station adopts rain and sewage diversion drainage mode. Sewage will flow into septic tank after collection, and will be discharged into sewage treatment equipment after clarification and filtration in septic tank. After treatment, it will be used for greening irrigation or discharge, and the discharge requirements will meet the first-class standard. Setting intercepting ditch along the slope opening line in booster station can prevent foreign exchange water from entering booster station.

Sprinkler and drainage ditch are set around the buildings in booster station, which are combined with site drainage ditch. Rainwater is collected by site drainage ditch and then discharged into road drainage ditch outside the station.

(5) Fire Protection System

The fire protection design implements the fire protection policy of "prevention first and combining prevention with elimination". The design ensures that the fire fighting, fire prevention spacing, safety exit, accident smoke exhaust and lighting meet the requirements of relevant specifications. The main electromechanical equipment adopts ammonium phosphate dry powder fire extinguishing method; Ammonium phosphate dry powder fire extinguishers are used for main building firefighting.

The water consumption of outdoor fire hydrant is 15L/s, the fire duration is 2h, and the maximum fire water consumption for one fire extinguisher is 108m^3. 150$m^3$is set in the booster station, and the fire pool meets the fire water consumption. Outdoor fire hydrant system adopts annular pipe network to supply water. Outdoor fire hydrants are set up in the site, and the distance between fire hydrants is less than 120m.

2.9 Overhead Transmission Line Design

The installed capacity of this project is 30MWac. The outgoing line is connected to the nearby Kyeeonkyeewa substation by a primary 132kV line, with a total length of 6 km, and the whole line is erected in a single loop JL/GLA240/30 steel core aluminum stranded wire. The whole line is designed according to the ice thickness of 0mm and the basic wind speed of 30m/s.

In this project, it is proposed to adopt 35b19 module in 35kV tower catalogue module of typical design of power transmission and transformation project of state grid corporation of China with corresponding voltage grade. The module is a single-loop tower with an altitude of less than 1000m, a design wind speed of 35m/s, a conductor model of JL/GLA-240/30 and a ground wire of gj-50, which is designed according to the mountain planning. The straight tower and tension tower in the form of tower adopt "Up"-shaped iron tower.

Figure 2.10 Transmission Line Map

Table 2.4 Details Numbers of Poles Used for Overhead Transmission Line

No.	Content	Indicators
1.	Line length (km)	6
2.	Number of towers (base)	10
3.	Average span (m)	217
4.	Tensile ratio (%)	45.6
5.	Wire (kg/km)	1132
6.	Insulator (piece/km)	245
7.	Cross section conductor (mm^2)	240

2.10 Electrical Design

Access System Scheme

The scale of this project is 30MWac, and a 132kV booster station will be built in the middle of the PV field. After the booster station collects the power of PV power generation project, the booster station will be connected to the 132kV side of Kyeeonkyeewa substation about 6km away from the site with a conductor cross section of 240mm2. The final design of access system shall prevail.

Electrical Main Wiring

(1) The main electrical wiring of PV field

The scale of this project is 30MWac, and the installed capacity is 36.288MWp. It is planned to adopt 540Wp monocrystalline silicon battery module and 5000kW box-type transformer, with 5MWac as a subarray, with a total of 6 subarrays. In this grid-connected PV power station, 400 parallel PV strings are connected to 20 sets of 250kW string inverters in a 5MWac PV sub-

array, and each inverter is connected to a maximum of 20 PV strings, and the connected capacity of DC side is 302.4kWp. The inverter is connected to the bus bar on the low voltage side of the box transformer, which has a small voltage drop. The average voltage drop of DC cable between PV group and inverter and AC cable between inverter and AC bus box is less than 2%, and the total efficiency of the system is high. The output voltage of every 5MWac PV sub-array of this PV power station is 33kV after inversion and boost. In the PV field, the electric energy collected by the box transformer through the 33kV cable tap box is transmitted to the 132kV booster station through the power collection line. In this project, two circuits of collection lines are used to collect electric energy and send it to the booster station, and each power collection line collects about 15MWac PV power respectively.

(2) Main wiring of 132kV booster station

132kV outgoing line side: a 132kV outgoing line will be built in this project to Kyeeonkyeewa substation.

33kV distribution equipment: single-bus configuration type, with one bus PT interval, two PV incoming intervals, one outgoing interval, one dynamic reactive power compensation interval and one station grounding transformer interval.

Substation transformer: 33kV bus is equipped with a 1250kVA substation grounding transformer, and another 11kV transformer with a capacity of 315kVA is connected to the external power supply as the main substation transformer. *Reactive power compensation:* 1 set of dynamic reactive power compensation device with capacity of ±7.5Mvar is configured for 33kV bus. It will be subject to the approved requirements on the access system design.

Cable and Channel Design

(1) Cable Design

(1) PV1-F 1800V 1×4mm2 special PV cable is selected as the cable from PV panel to DC bus box.

(2) The maximum input DC voltage of inverter is 1500V, which is connected by 3kV flame retardant crosslinked polyethylene insulated jacket power cable.

According to the distance between the series inverter and the box-type step-up transformer, the voltage drops of the farthest PV module is controlled at about 2%, so that the model and specification of AC cable from each inverter to the box-type step-up transformer can be determined, and the specification of Zr-YJLHV22-1.8/3 kV-3× 120 mm2is preliminarily adopted.

(3) According to the wiring situation of each group of box transformer, 33kV collector line adopts the following 4 forms, Zr-YJV22-26/35-3× 70 mm2, Zr-YJV22-26/35-3×120 mm2, ZRYJV22- 26/35-3×185mm2、ZR-YJV22-26/35-3×240mm2 .

(4) The model of 33kV reactive power compensation incoming high voltage power cable is Zryjv22- 26/35-3× 95mm2.

The model of high voltage power cable for 33kV station and grounding transformer connection is Zr-yjv22-26/35-3× 70mm2.
The model of high voltage power cable for incoming line of 11kV standby transformer is Zryjv22- 8.7/11-3× 70mm2.
The model of low-voltage power cable for 33kV station and 11kV standby transformer is Zryjv22- 0.6/1-3× 300+1× 150mm2.
Selection of control cables in booster station: ZR-KVVP2-22 with various cross sections.

(2) Channel Design

(1) All power cables with flame retardant crosslinked polyethylene insulation sheath are used in PV field, and cables in PV plant area are laid in trough box or directly buried way, while cables passing through roads are laid in buried pipes.
(2) There are two laying modes of DC output cables of PV array. The cables in the east-west direction directly enter the series inverter along the mounting bracket of PV module, and the cables in the north-south direction are laid into the series inverter by means of cable box. The AC output cable of group series inverter is laid in cable trough box mode and enters the low voltage side of box transformer. Cable tray box can be supported by the bracket and ground foundation of PV array string nearby.
(3) The electric energy of each PV array is connected to the power collection line along the cable trench through the cable tap box through the primary 33kV cable, and the secondary power collection lines of this project respectively enter the 33kV distribution room of the booster station along the directly buried trench.
(4) The 33kV cable trench of the whole station is set along the road in the whole project area. After the main trench penetrates the fence of the booster station at an appropriate position, it is connected to the cable trench in the station and enters the 33kV distribution cabinet of the booster station.
(5) Anti-static floor is set in control room, protection room and communication room, and cable bracket is set in the static floor.

2.11 Electrical Equipment Design

2.11.1 Electrical Equipment Design in PV Field

The series inverter is arranged in the PV array, fixed on the PV bracket locally and installed outdoors. The 33kV box-type substation and the 33kV cable tap box are centrally arranged locally, and the cables are directly buried.

2.11.2 Booster Station Design

The booster station is arranged in a rectangular shape with a length of about 50m and a width of about 50m. The booster station is equipped with a production complex building, which is arranged in the middle of the booster station, and the 33kV distribution room is arranged in the

north of the booster station. The complex building includes a main control room, a protection screen room, a communication room, an office, and a living room.

An independent lightning rod with a height of 35m is set in the booster station, which is arranged beside the 33kV reactive power compensation device.

One set of 33kV reactive power compensation device is set up in the booster station, which is arranged outdoors in the north side of the booster station, and one set of 33kV substation and grounding transformer is arranged in the 33kV distribution room of the booster station.

The 33kV distribution equipment adopts KYN-40.5kV armored removable metal enclosed switchgear, which is arranged in a single row in the 33kV distribution room.

The electrical secondary equipment of booster station is arranged in the protection room, and the communication equipment is arranged in the communication room.

The booster station is provided with a circular road as a channel for equipment transportation, patrol, and firefighting.

2.11.3 DC and UPS Power Supply

DC System

In order to open/close the circuit breaker, microcomputer integrated automation system, communication and emergency lighting in booster station, a set of 220V intelligent microcomputer high-frequency switching power supply DC complete set device is set in booster station, which contains two sets of 200Ah lead-acid maintenance-free batteries and two sets of high-frequency switching power supply charging templates. The battery capacity can meet the discharge capacity of the whole station after 2 hours of power failure.

AC uninterruptible power supply

The booster station is equipped with AC uninterruptible power supply to meet the requirements of automation equipment such as monitoring system, automatic fire alarm system and remote viewing system. The AC uninterruptible power supply system is not equipped with a separate battery, and one set is set in the whole station, with redundant configuration and capacity of 2×8kVA. Two UPS modules are adopted, which are mutually connected as standby, and each UPS module is connected with a bus. Two sections of bus run independently. when any UPS module fails, the other UPS module is manually switched to this section of bus. Ac uninterruptible power supply system uses RS485 interface to communicate with substation computer monitoring system.

2.11.4 Power Quality Monitoring Equipment

The booster station is equipped with a set of power quality monitoring device, which is used for real-time monitoring of voltage deviation, frequency deviation, three-phase unbalanced current, negative sequence current, harmonics, flicker, voltage fluctuation and continuous recording of other power quality indicators, to accurately evaluate the impact of grid connected PV power station project on power quality of the power grid. According to the measured results, it is determined whether the filter device needs to be installed.

2.11.5 Microcomputer Five Prevention System

The booster station of PV power station is equipped with a microcomputer five-prevention installation system, which is in communication connection with the monitoring system of booster station. The five-prevention system obtains the status information of electrical equipment from the monitoring system through the communication interface and locks the operation of the monitoring system.

The microcomputer five-prevention system mainly includes: five-prevention workstation, computer key, electric code lock, line electroscope, grounding pile, intelligent grounding line manager, intelligent unlocking key manager, high-voltage bus live display locking device, etc.

2.11.6 GPS Time Synchronization System

The booster station is equipped with a unified time synchronization system to receive the standard timing signals provided by the global positioning system and Beidou II satellite signals.

The GPS master clock adopts dual clock redundancy configuration, and the corresponding expansion device is configured according to the scale in the station. The time synchronization system provides the time synchronization function of all secondary equipment such as station control layer equipment, protection equipment, measurement and control equipment, fault recording, automatic devices, and other intelligent equipment in the booster station.

2.11.7 Fire Alarm System

A set of fire alarm system is set up in the booster station area, including detection device (point or cable detector, manual alarm), centralized alarm device, power supply device and linkage signal device, etc. The centralized alarm device is arranged in the main control room of the booster station, and the detection points are directly connected to the centralized alarm device. In case of fire in equipment and rooms in booster station area, sound and light signals shall be sent out immediately on the centralized alarm device, and the address and time of fire alarm shall be recorded. After confirmation, the corresponding firefighting facilities can be manually started to organize firefighting. The linkage control mode is adopted to control the ventilator and air conditioner in the main control room and distribution room in the area, and monitor the feedback signals.

2.11.8 Total Efficiency of Power Generation System

The energy conversion of grid-connected PV power generation system mainly includes: energy source link, energy conversion link, energy output link and so on. There are different energy losses in all the above links. The main losses in the energy source link are the unavailable solar radiation loss (including the loss caused by shading in the morning and evening, and the reflection and refraction loss of light passing through glass), dust shading loss and so on. The main losses in energy conversion are the losses caused by the quality defects or mismatches of battery components, and the losses caused by temperature influence, etc. The main losses in the energy output link are ohmic losses (DC and AC lines, protection diodes, cable joints, etc.), inverter efficiency losses, transformer efficiency losses, field power losses (including box

inverter power consumption, main transformer, booster station lighting, etc.), system failures and maintenance losses, etc. For grid-connected PV power generation systems in different regions, different climatic environments and different construction schemes, the above losses are different. See Table 9.1 for the evaluation of the above losses in this project in combination with the local climatic conditions and the proposed construction scheme.

Table 2.5 Value table of system efficiency evaluation

No.	Loss factor	Generation loss (%)
1.	Unavailable light loss	2.00
2.	Component mismatch loss	1.50
3.	Temperature influence loss	9.50
4.	Dust shielding loss	2.00
5.	Low voltage cable confluence loss	0.45
6.	Inversion loss	0.75
7.	Loss of collecting line	0.98
8.	Field power loss	1.20
9.	System failure and maintenance loss	1.00
10.	Power grid dispatching loss	0.50
11.	Comprehensive efficiency of sytem	81.5

2.12 Estimated Annual On-Grid Power Generation

The power generation capacity of double-sided monocrystalline silicon PV cell module will be attenuated to some extent due to the aging of the cell module after working for a period. The operation period of this project is calculated as 20 years. The power generation gain of double-sided module is 4.5%, and the power attenuation of PV module in the first year is 2%, and then the power attenuation of PV module is 0.45% every year. According to the above calculation principle, the annual average power generation of Kyeeonkyeewa PV power station is 57530MW·h, and the annual power generation is shown in following table.

Table 2.6 Annual Power Generation of Kyeeonkyeewa PV Power Station

Running period	Attenuation coefficient	Annual attention rate	Annual power generation (MW.h)
Year 1	0.98	2%	54139
Year 2	0.9755	0.45%	53890
Year 3	0.971	0.45%	53642
Year 4	0.9665	0.45%	53393
Year 5	0.962	0.45%	53144
Year 6	0.9575	0.45%	52896
Year 7	0.953	0.45%	52647

Running period	Attenuation coefficient	Annual attention rate	Annual power generation (MW.h)
Year 8	0.9485	0.45%	52399
Year 9	0.944	0.45%	52150
Year 10	0.9395	0.45%	51901
Year 11	0.935	0.45%	51653
Year 12	0.9305	0.45%	51404
Year 13	0.926	0.45%	51156
Year 14	0.9215	0.45%	50907
Year 15	0.917	0.45%	50658
Year 16	0.9125	0.45%	50410
Year 17	0.908	0.45%	50161
Year 18	0.9035	0.45%	49913
Year 19	0.899	0.45%	49644
Year 20	0.8945	0.45%	49416
Annual Average			**57530**

2.13 Electrical Primary

The total installed capacity on the AC side of the project is 31.45 MW and the installed capacity on the DC side is 37.27 MWp as well as 5 groups of 6.3 MW PV sub-arrays are included in the project. All box-type transformers are on-load tap-changer, which voltage range is 33 kV ± 10% and it meets the requirements of Electric Power Generation Enterprise (EPGE) system voltage. String inverter is also selected for the proposed project with rated frequency of 50 Hz and power factor adjustment range is ± 0.8, with power factor meeting the range of 0.85 (lagging) to 0.9 (leading). System frequency is 50 Hz in normal condition and above 51 Hz takes 90 minutes running time and below 48.5 Hz takes 25 minutes running time.

Single Line Diagram

6.3 MW PV square single line diagram: in the proposed project, 445 Wp bifacial monocrystalline silicon PV module will be used in each 6.3 MW PV sub-array. A string includes 29 blocks and totally 578 strings are converted from DC to AD through 34 inverters and connected to the 0.8 kV side of the 6,300 kVA box-type transformer and then boosted to 33 kV. Five box-type transformers of the proposed project are connected in parallel through cables and finally connected to the 33 kV switchgear in the newly-built 33 kV switchyard through two 33 kV cable loops.

Single line diagram of switchyard: A 33 kV switchyard and its 33 kV high voltage switchgear will be built in the proposed project. Single bus connection is used in the 33 kV switchyard and the newly-built 33 kV switchgear includes two incoming lines, one outgoing line, one Pt and

one earthing and station transformer. The following figure shows the details single line diagram of the proposed project.

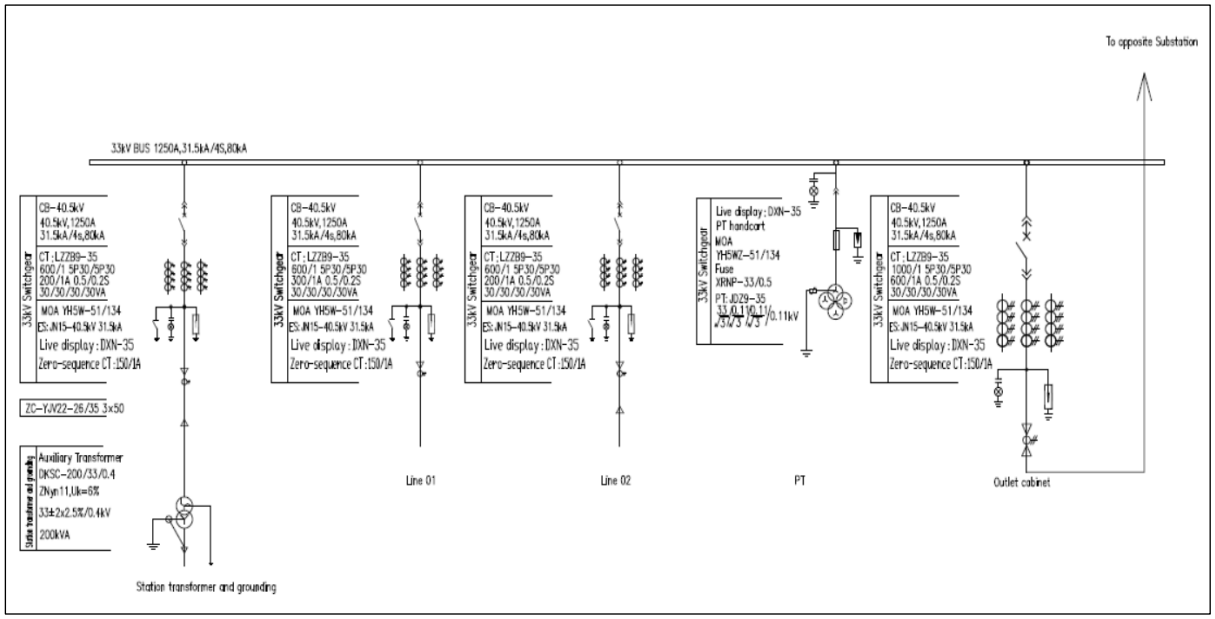


Figure 2.11 Detail Single Line Diagram

33 kV High Voltage Power Distribution Equipment

Indoor metal-clad withdrawable switchgear, model: KYN-40.5 high voltage power distribution equipment (33 kV) will be used in the proposed project. Its rated voltage is 40.5 kV, rated frequency is 50 Hz, rated current is 1,250 A, rated short-circuit breaking current is 31.5 kA and rated dynamic current (peak) is 80 kA.

Grounding Transformer and Station Transformer Complete Set

The 33 kV switchyard is a neutral-point solid ground system. The grounding transformer, which is arranged outdoors, is directly grounded at the high voltage side and the low voltage side is also used as the power supply of the power station and the station power capacity is 200 kVA.

Cable

All cables shall be XLPE, PVC inner sheathed, steel tape armored and PVC outer flame-retardant aluminum and copper core power cables. After considering temperature correction coefficient, soil thermal resistance coefficient and laying coefficient, H1Z2Z2-K-1×4 DC cable is selected from components to DC combiner box, ZC-YJLV22-1.0kV-3×120 (or 3×150) cable is selected from the string inverter to the box-type transformer and then ZC-YJLV22-26/ 35-3×70 (3×150 or 3×240) cable is selected for 33 kV collecting line.

PV Grid Collecting Line

Five box-type transformers are connected in parallel by cables and finally connected to the 33 kV switchgear of the newly-built switchyard by two 33 kV buried power cable lines.

Lightning Protection Grounding and Earthing

The frame of the PV module is made is aluminum alloy. The battery panels are fixed with steel materials such as angle steel, channel steel and so on. They are all metal materials with good connectivity and can be used as a good lightning connection device and they can be electrically

connected reliably and grounded. Besides, there is lightning protection device in the inverter already to separate lightning protection measures cannot be considered in PV area. In the proposed project, a general grounding grid device is used for protective grounding, working grounding and overvoltage protection grounding. The grounding grid is mainly composed of horizontal equalizing grid and part of vertical grounding electrode, which forms a composite annular closed grounding grid. The horizontal grounding wire is made of 50×5mm^2 hot-dip galvanized flat steel and the vertical grounding electrode is made of 150×50×5 hot-dip galvanized angle steel with L=2.5 m. The grounding resistance of the grounding grid is not more than 4Ω.

Cable Laying and Fire-Retardant Measures

The 1.5 kV DC part chooses H1Z2Z2-K-1×4mm^2 for PV system and the 1.0 kV power cable adopts flame retardant aluminum core cable, the 33 kV power cable adopts flame-retardant aluminum core cable and some directly buried cables use steel tape armor.

The internal wiring part of the PV component string on the bracket unit: the PV special cable that is provided by the component is directly connected by the plug-in connection and the cable is bound and fixed in the groove of bracket purlin.

Cable laying of PV module strings in the same string inverter: the overhead mode is used when the cable is laid horizontally along the North-South module bracket, the pipe protection is carried out when the adjacent bracket units are connected horizontally. When the cable is laid in the East-West direction, it is directly buried and it is protected by the pipe at the entrance and exit of the ground. PV modules in different columns with the inverter should be laid directly in the same path.

The outlet part of the inverter: combined with the distribution position of the invertor, the cable shall be directly buried in the same path with the same trunk cable trench, to minimize the amount of directly buried cables on the branch direction and avoid crossing with PV module string converging cable. All the road-crossing cables must be protected by a metal tube. All buried laying cables should be laid underground at 0.8 m. Moreover, fire-proof, and flame-retardant separation measures should be set on the main passage of the main passage of the cable such as fire-resistant partitions, fire-proof packages etc. Fire proof sealing shall be

adopted at wall holes, openings at the bottom of cabinets and entrance of buildings at both ends of cable ducts. The following figures show the PV collection system and PV wire diagram of the proposed project.

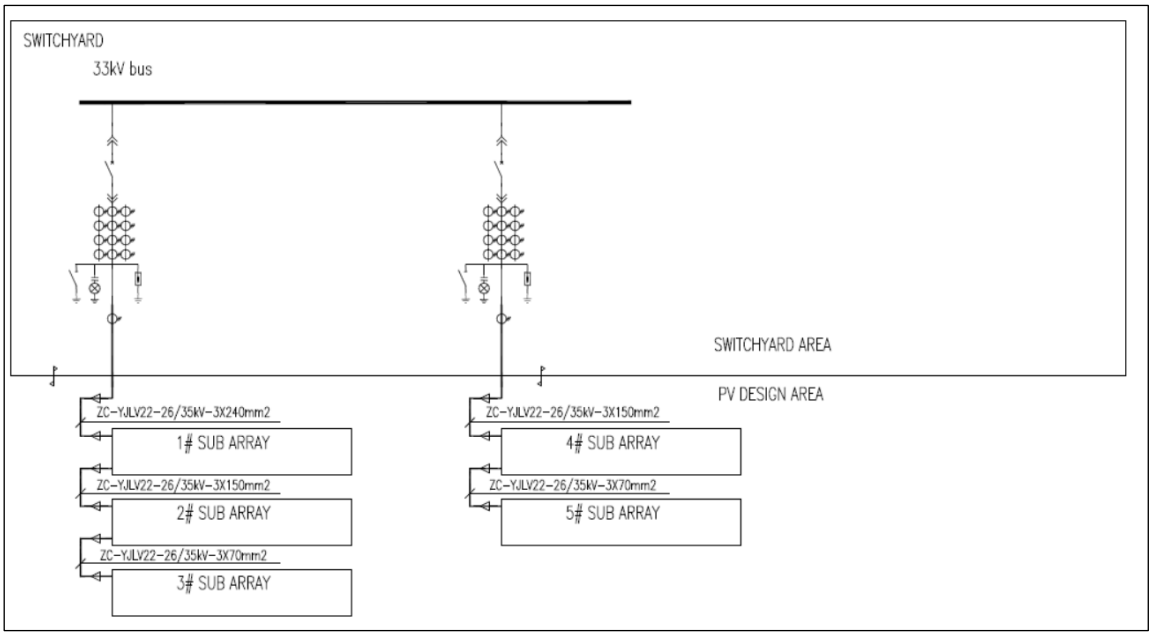


Figure 2.12 PV Collection System

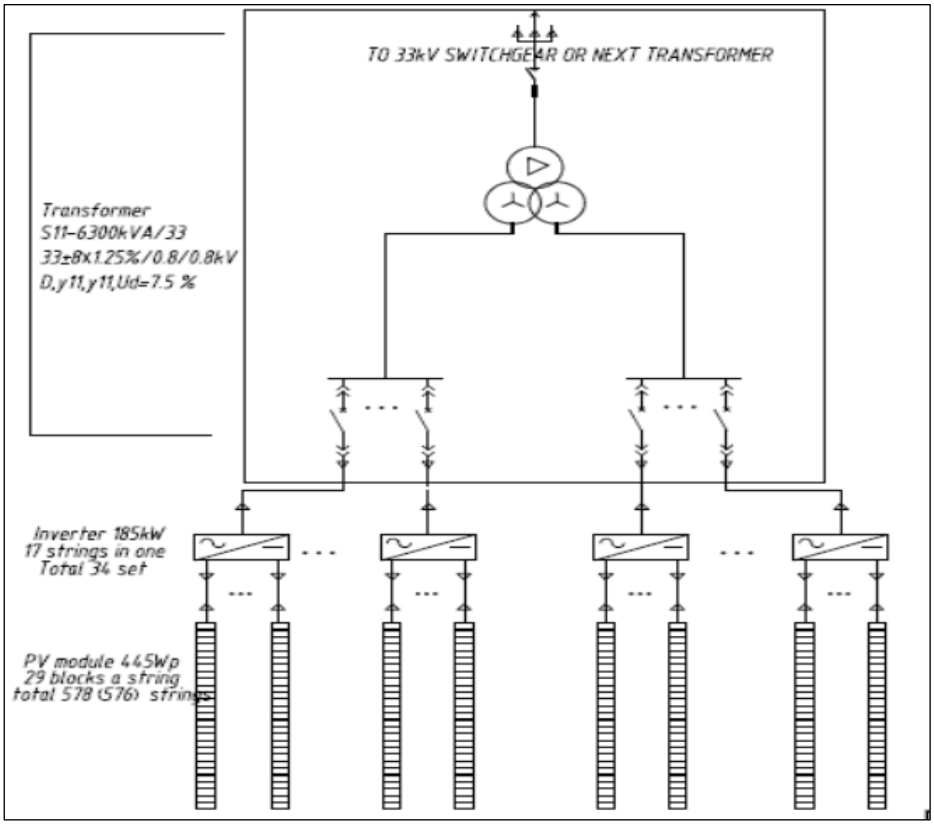


Figure 2.13 PV Wire Diagram

2.14 Electric Secondary

The proposed project will be equipped with a set of SCADA system. Monitoring panels are set up according to the final scale of the system. The computer monitoring system of the switchyard is relatively independent from PV field computer monitoring system. The computer monitoring system of the switchyard is used to monitor grounding transformer, switch gear and other equipment in the switchyard. Whereas, the computer monitoring system of the PV field is used to monitor PV sub-array devices such as inverters, box-type transformers etc. The two sets of computing monitoring system achieve information exchange by means of data communication. The outgoing line protection adopts the same optical differential protection with the Kyeeonkyeewa Substation and the brands are products of ABB, Siemen, Ge, SEL etc. The PV power station is equipped with a set of optical fiber communication system and the telephone system adopts PABX.

The Functions of SCADA System

The SCADA system should implement functions such as real-time data collection, security monitoring and control, screen display and operation, operation records, tabulation printing and screen copying, local and remote operation control of the substation and it should also interface with microcomputer protection to achieve integrated automation of the whole station. The following are the details of the SCADA system.

- Data acquisition and security monitoring
- Substation main wiring diagram and flow diagram
- Real-time display of various switch states and dynamic data
- System cycle and system clock
- Main transformer and line load, temperature, and current monitoring
- Remote signal status monitoring, sound, and light information for displacement
- Display real-time and hourly data in a table
- Display analog quantities such as voltage and load in the form of bar graphs and curves
- Monitoring and alerting on voltage, current, power flow and the limits can be manually modified
- Alarm and push accident screen automatically
- Provide a variety of numerical calculation functions and the relevant quantity can be stored in full
- Abnormal alarm of telecontrol equipment
- Manually set the switch for maintenance
- Control operations include switching of capacitor banks
- Remote control of line switches may be prohibited/ opened by specially authorized personnel
- Provide accident signal return function

Moreover, the SCADA system can keep the following operating records.

- Power station accident records: including switch state change records, accident sequency records etc.
- Power system anomaly records: including various limit measurements of telemetry, time records of telemetry that is occurring or has been restored under various abnormal conditions etc.

The following table shows the main technical indicators of the SCADA system.

Table 2.7 Main Technical Indicator of SCADA System

Comprehensive error of analog measurement	±0.5%
Grid frequency measurement error	0.02 Hz
Analog updated in the database	3s
Switching updated in the database	1s
Event recording resolution	2ms
Incident correct recording rate	100%
MTBF of the monitoring system	30,000 Hours
Remote communication telemetry transmission time	5 seconds
Remote communication remote signal transmission time	3 seconds
Remote signal transportation local response time	1 second
Picture response time	2 seconds
Screen update time	2 to 255 seconds adjustable (less than 5 seconds)
System availability	99.8%

Interface with microcomputer protection device: the microcomputer monitoring system in the station can receive the relevant signals of the microcomputer protection device through I/0 unit and CAN network, check the protection setting value and put on/ off the protection device.

Interface with other intelligent devices: the microcomputer monitoring system in the station should provide enough RS232/ RS485/ RS422 ports to interface with other intelligent devices. The entire station uses an integrated platform and runs on the monitoring host, which consists of a basic platform, public services, and a unified access interface. It can access third-party extension application modules through standardized interfaces to jointly complete power grid monitoring and equipment monitoring. Various operation management and maintenance services have the characteristics of open platform, extensibility, easy maintenance, and configuration on demand.

Anti-misoperation blocking: the anti-misoperation blocking function of the whole station is realized by the microcomputer five-proof system and the blocking circuit of this interval is connected in series in the operation circuit of the controlled equipment. The operation lock of this station is completed by the microcomputer-based anti-misoperation locking system. The station control layer realizes the comprehensive operation locking function for the whole station equipment, the bay layer realizes the operation locking function of each electrical unit equipment. The 33 kV circuit breakers, disconnecting switches, earthing switches and 33 kV switchgears are realized by their own electrical locking circuits and the rest of the sporadic equipment is implemented by computer keys and locks.

RTU Equipment Configuration Scheme

The substation automation system adopts an integrated monitoring system. The configuration of telecontrol equipment should be considered in conjunction with the integrated monitoring system of the substation and configured in active and standby redundancy. The RTU equipment is provided by the monitoring system.

Energy Metering System

The proposed project adopts the electric energy meter supporting IEC61850 interface to measure each outgoing line and configures one set of electrical energy information collection terminals to collect the entire station's electrical energy information. Electric energy information is transmitted via GPRS channel or dedicated line channel. The power information transmission method is mainly implemented by the power dispatch data network transmission method. The transmission protocol adopts the IEC60870 protocol and the transmission rate of the transmission channel is 2 Mbps. The configuration of the meter must meet the requirements of the Myanmar local power grid. For the system substation connection of 33 kV outgoing line of PV power station, it is a metering gateway for trade settlement to collect on-grid electricity; two main and auxiliary 0.2 s high-stable multi-function electronic energy meters are set. For the 33 kV current collecting line and the grounding transformer switch, as the energy assessment point, set up a multifunctional electronic energy meter with active power 0.5 and reactive power 2.0.

Relay Protection

33 kV overhead transmission line optical difference protection: a 33 kV overhead transmission line is newly built to connect to the Kyeeonkyeewa Substation. The length of the line is about 3 km. On both sides a set of optical fiber current differential protection is configured and the protection channel uses a dedicated fiber core. Line protection also has three-stage phase-to-phase, grounding distance, direction zero-sequence current protection, three-phase one-time reclosing check same period and other functions and has a tripping operation circuit. The line optical difference protection shall meet the requirements of EPGE.

Digital disturbance recorder: the proposed project is equipped with a set of digital disturbance recorder to achieve the fault recording function of 33 kV electrical equipment. The device has

the functions of recording for analog quantity and switching quantity, remote transmission function and satellite timing interface.

33 kV grounding transformer protection: the 33 kV grounding transformer protection adopts an integrated protection, measurement, and control device, equipped with current quick-break protection, over-current protection, zero-sequence over-current protection and ontology protection. The protection action trips the circuit breakers on all sides and the device has an operating circuit. The following figure shows the general diagram of protection of the proposed project.

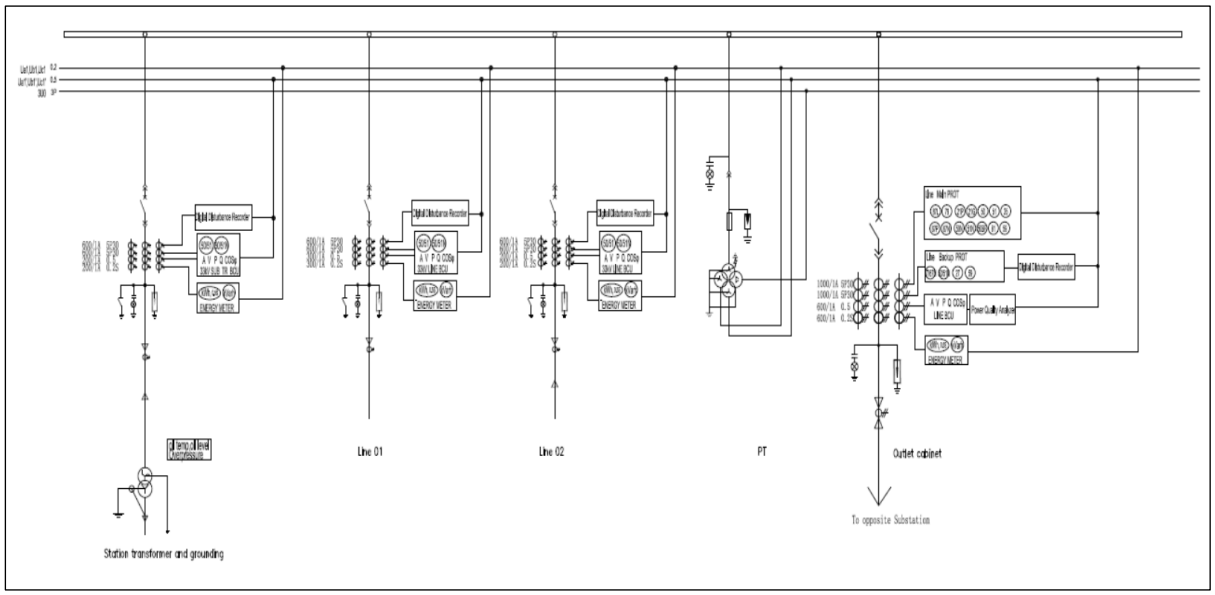


Figure 2.14 General Diagram of Protection

AC/DC Integrated Power System

The AC/DC integrated power supply system is composed of station AC power supply, DC power supply, inverter power supply and battery pack. The system adopts integrated design, integrated configuration and integrated monitoring, its operating conditions and information data can be displayed through the integrated monitoring unit and connected to the substation automation system through the IEC61850 standard model data. The system's operating conditions and information are uploaded to the general monitoring device of the AC/DC integrated power system. The device is connected to the SCADA system according to the communication standard to achieve remote control, maintenance, and management of the integrated power supply system. A set of high frequency switch charging device, which rated current of 4×20A is adopted in the proposed project. The communication DC power is obtained by DC/ DC transformation from the DC bus feeder line. Moreover, one group of 200 Ah batteries is composed of 104 batteries and each battery's rated voltage is 2 V. A set of 5 kVA inverter power supply system is configured with modular configuration to supply power for monitor system, five-anti-latch up system, fire alarm system and image monitoring system etc.

Video Surveillance and Security System

The equipment of image surveillance and security guard system equipment includes video servers, multi-screen splitters, video recording equipment's cameras, access control system, encoders, and electronic fences around the substation fence. Set up electronic fences on the fence and set up ad defense zone around 100 meters on each side of the fence. A host box can be set up every two to three zones and the host box is equipped with pulse host, transformer, terminal block, and other equipment. The box is arranged on the appropriate position of the enclosure. The electronic fence adopts a six-wire system and when a short circuit or an open circuit occurs, the pulse host can send an alarm and send the alarm signal to the auxiliary system integrated monitoring platform. The platform can automatically open the camera in the station to start recording. At the prominent place of the electronic fence, a warning sign is usually installed every 10 meters and the warning sign is installed on the top edge of the fence. The following are the technical requirements of video surveillance and security system.

Monitoring range: all weather image monitoring of the main station's main electrical equipment, buildings, and surrounding environment to meet the requirements of safety and inspection of production and operation.

Equipment monitoring: utilize cameras installed in the surveillance target area such as high-voltage power distribution rooms are used to monitor the main equipment in the substation in all directions. The camera supports multiple resolution, adjustable from 720x576, 352x288, 176x144.

Surrounding environmental monitoring: through the electronic fence of the target area, all-round surveillance of the substation walls and gates is carried out without leaving dead corners and blind spots. If it crosses the fence, the alarm will be dealt with, if there are people and cars entering or leaving the gate, a bell will be sent to notify the operator.

Secondary equipment room: monitor secondary equipment indoor and the surrounding environment and install indoor cameras in each room. It will have linkage function with fire alarm system.

Transmission method: the video surveillance and security system are connected to the dedicated network port of the integrated distribution frame of the communication equipment by ethernet and uploaded to the dispatcher through the communication channel.

Dispatching Automation System

The proposed project sets up a dispatch automation system, including the following functions.

- Achieve the collection and transmission of telecontrol information of the project, so that the dispatching and operating personnel can complete the monitoring of the operation status of the PV power station and grasp the operation conditions in time.
- Achieve the electric energy collection and transmission of the project

- The dispatching data transmission mode meets the requirements of EPGE.

The dispatching automation equipment configured in the proposed project is described as follows.

- Configure a remote-control system
- Configure a set of electrical energy metering plant and station system
- Configure a set of power dispatch data network access equipment

Station communication: the automatic telephone is installed in the office, rest room and meeting room etc., which is used for internal telephone communication in the switchyard. For the voice communication method between the PV array and the control room, the wireless intercom and public network mobile phone communication methods are used.

System Communication

According to the current status of the surrounding communication system, comprehensive consideration of factors such as operational safety, stability, reliability and network flexibility, the project's system communication scheme will mainly use optical fiber communication as the main communication method, supplemented by public network communication. The proposed project's system communication scheme shall meet the requirements of EPGE.

Optical cable construction: construct one OPGW optical cable between the PV solar power project and the Kyeeonkyeewa Substation, which length is about 6 km. The inbound optical cable adopts ordinary non-metallic optical cable. The optical fiber core adopts G.652.

Device configuration: PV solar power station is configured one SDH optical transmission equipment, one set of integrated distribution frame (ODF36/ DDF64/ MDF 100) and one set of PCM equipment. The Kyeeonkyeewa Substation is configured two optical port boards and one optical fiber distribution module (ODF24). Dispatching side is configured one set of PCM access board.

Telephone system with PABX: dispatching sends dispatching calls to PV solar power station through the communication equipment. The power station applies to the local public communication equipment. The power station apples to the local public network for 1 local telephone access station to meet the communication between the power station and relevant departments such as for government, security, and fire protection.

Communication power supply: the DC power supply system of the PV solar power station provides communication power through the DC/ DC conversion device.

The following figure shows the details PV area power monitoring system network of the proposed project.

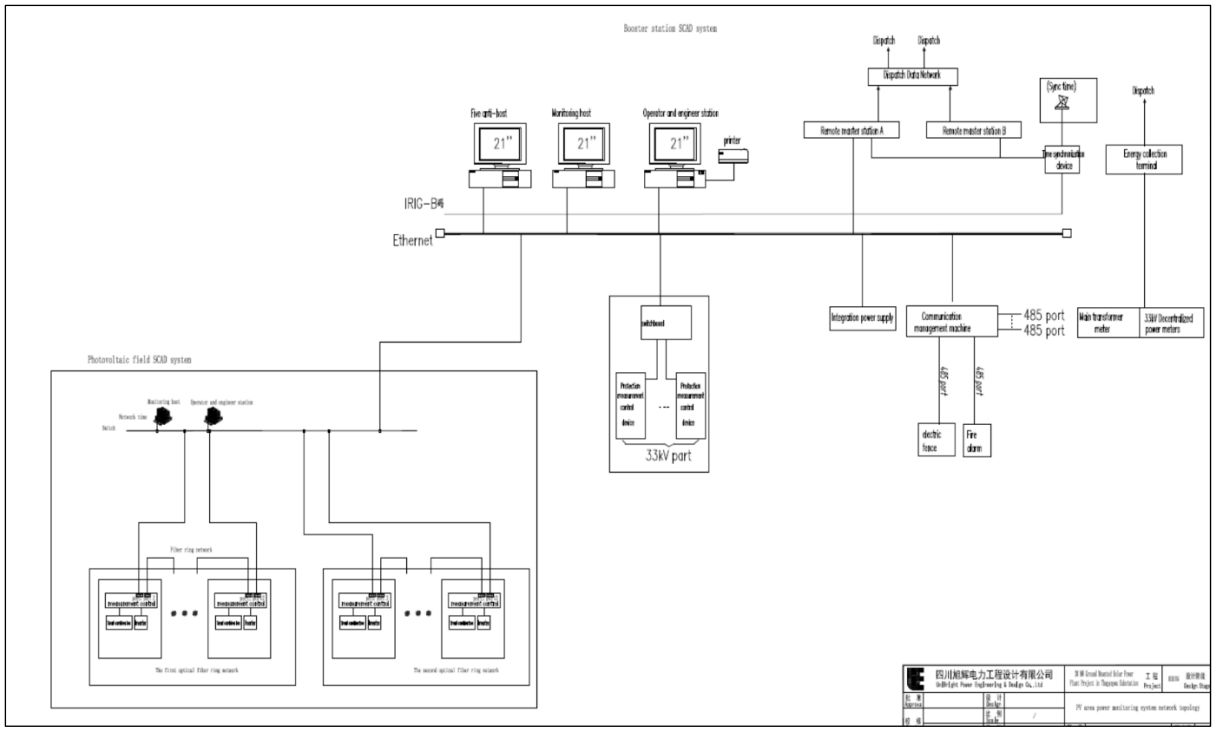


Figure 2.15 Detail PV Area Power Monitoring System Network

2.15 Construction Schedule and Current Condition

According to MOEE, it is initially planned to start construction and installation on March 15th, 2022 and will finish on November 15th, 2022 with a total construction and installation period of 8 months. The scale of this project is 30MWac, and the preparatory work for construction has to begin in March. The current status of the project area is starting some preliminary activities.

The following figure illustrates the details implementing schedules and current conditions of this project.

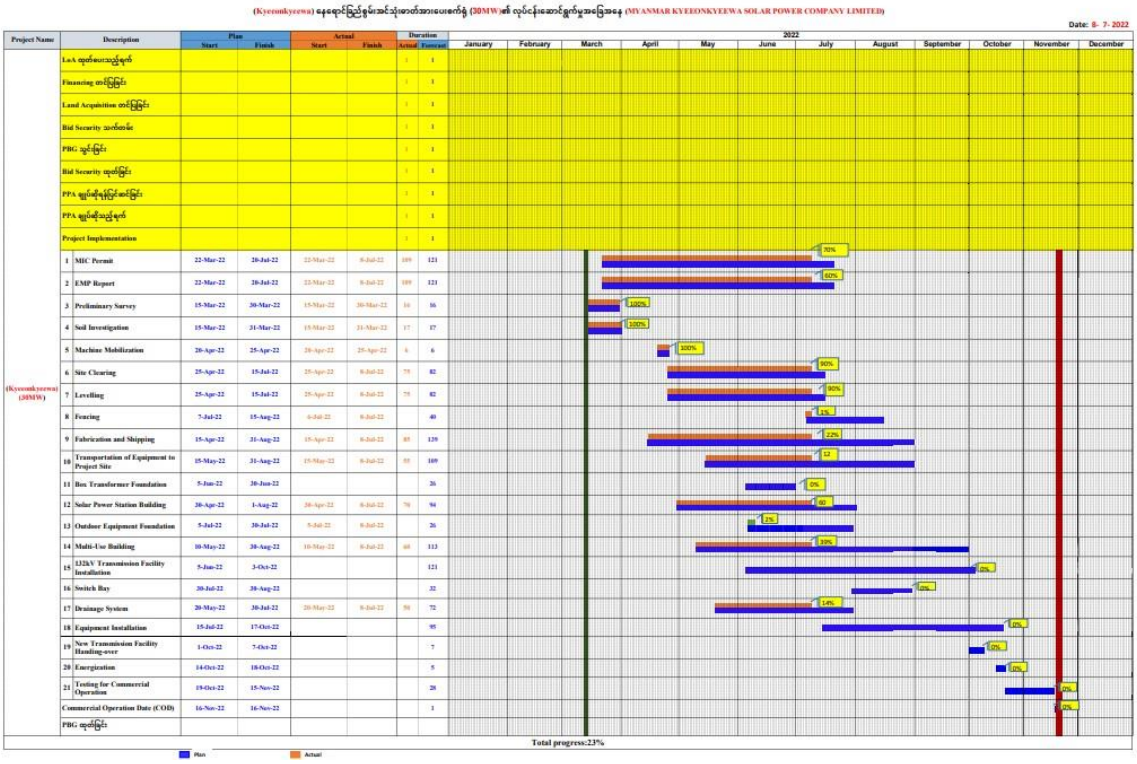


Figure 2.16 Construction Schedule

Figure 2.17 Current Conditions of Project Site

2.16 Utilities

2.16.1 Construction Material and Machinery Requirement

With regards to construction materials, cement, gravel, steel, wood, and chain link will be exported as well as purchased from local providers for the proposed project. Estimated construction materials requirement are 1,450 tons (cement), 5,800 tons (gravel), 420 tons (steel) and 20,900 cubic feet (water) for construction phase.

Different types of construction machines and vehicles will be used for construction processes of the project. These include bulldozers, excavators, wheel loaders, motor graders, single drum vibrating rollers, crawler drills, mobile cranes, transporters, water bowers and dump trucks. The following table describes detail construction machines and vehicles used for proposed project.

Table 2.8 List of Machinery

No.	Type of Machines and Vehicles	Number of Machines and Vehicles
1.	Bulldozer	4
2.	Excavator	4
3.	Wheel loader	1
4.	Motor grader	3
5.	Single drum vibrating roller	1
6.	Crawler drill	2
7.	Mobile crane (25T)	2
8.	Transporter	5
9.	Water bowser	2
10.	Dump truck	6
Total		**30**

Wheel Loader

Motor Grader

Crane

Crawler Drill

Mobile Crane

Transporter

Figure 2.18 Construction Machineries

2.16.2 Water Requirement

Estimated water requirement for construction processes are 240,000 gallons per month and domestic water requirement is 50,000 gallons per month. Water have been bought from the tube well of near village, Kywal Chan. The two tube wells will be established in project site for multiple water usage in operation phase.

In operation phase, the water consumption of booster station is 200L/ person, and the daily water consumption is 2.0m3/d for 10 people. The domestic water quality must meet the drinking water quality standard, and a purification treatment system is set for treatment. After treatment, it is stored in a 4m3water tank. Domestic water is pressurized by variable frequency pump and supplied to each water point of booster station by branch pipe network. The water consumption for cleaning PV modules is estimated as 1.6L/m^2, and the total water consumption for each cleaning is about 523m^3.

2.16.3 Electricity and Fuel Requirement

Electricity for construction phase will be obtained from generators and estimated electricity requirement is 20 MWh per month. Three generator, capacity of 65 kVA, and one generator of 3 kVA have been installed for electricity requirement.

Electricity for operation phase will be obtained from national grid line and estimated electricity requirement is 10 MWh per month. One generator, capacity of 3 kVA, will also install for emergency cases.

Diesel will be mainly used for construction processes and estimated requirement is 240,000 gallons per month. Diesel will be purchased from nearby fuel station and stored with portable fuel tanks in the project site.

Diesel will be also used for operation processes such as machinery uses, generator operation etc.... Estimated requirement is 100 gallons per month. Diesel will be purchased from nearby fuel station and stored with portable fuel tanks in the project site.

2.16.4 Human Resource Requirement

Totally, 150 workers are required for construction phase of the project, including 146 local workers and 4 foreign workers. Working hours is 8 hours per day and working days is 30 days per month. Working hours is from 9:00 am to 5:00 pm and there is usually one working shift, but two shifts for busy days from 9:00 am to 5:00 pm and 5:00 pm to 8:00 am in construction phase. There is a construction worker camp for migrant workers in the project site as well as some local workers will also be employed.
Totally, 60 workers are required for operation phase of the project and working hours is 24 hours per day. Total working day is 30 days per month. The project proponent will provide accommodation for the workers in project site.

2.17 Waste Generation

2.17.1 Solid Waste Generation

During the construction phase, rejected components and packaging materials of electrical equipment and building materials, surplus materials, papers, containers, broken bricks, solvent containers are main sources of solid wastes generation from the proposed project. These solid wastes can be injurious to the environment through blockage of drainage systems because these wastes may contain hazardous substances such as residue of cement, adhesive, and cleaning solvents bottles. Construction soil wastes will be also excavated mainly from site preparation, access road construction and leveling activities as well as vegetable debris will be generated at the time of land clearance for PV modules, switchyard, multiple-use building and right of way for overhead transmission line. Domestic solid wastes such as garbage and organic waste from construction workers camp are other sources of solid waste generation.

During operation, there is no operation solid waste which are disposed of from the proposed project’s operation processes. However, domestic solid waste such as garbage, rejected office materials and food waste from kitchen are common solid wastes generation.

2.17.2 Liquid Waste Generation

During the construction phase, cleaning construction machines and construction vehicles within the project site will generate liquid waste. Domestic liquid waste such as waste water from toilets used by construction workers and waste water from basins and bathrooms in construction workers camp will be also discharged from the proposed project.

During the operation phase, main source of operation liquid waste is waste water from cleaning activities of PV modules to promote their efficiency for electricity generation. Domestic liquid waste such as waste water from toilets and basins and bathrooms within the project site will be discharged.

2.17.3 Hazardous Waste Generation

During the construction phase, damaged PV modules due to improper installation are common hazardous waste generation of the proposed project because PV modules contain toxic chemicals. Used oil disposed of from repair and maintenance of construction machines and construction vehicles, oil spills and leakage from refueling, fuel storage area and machineries maintenance area within the project site are also common hazardous waste.

During the operation phase, damaged PV modules due to improper handling during cleaning activities and maintenance activities are common hazardous wastes generation. Uninstalled lifespan-expired PV modules due to exchanging new PV modules at the time of extending operation period of the project are also common hazardous wastes. Heavy metals of lead and cadmium can be come out from solar panel defects. Other hazardous wastes are used oil from transformers, oil spills and leakages from maintenance activities, vehicle refueling and fuel storage area.

CHAPTER 3 - IDENTIFICATION OF THE PROJECT PROPONENT

The proposed 30 MW solar power plant project is proposed by Myanmar Kyeeonkyeewa Solar Power Co., Ltd. formed by China ITS (Holdings) Co., Ltd., which is a China-based company and a successful bidder for EPGE solar Tender PV (Bid No.: EPGE PV 02/2021-2022). The project is located at Mezali Village Tract, Pwint Phyu Township, Minbu District, Magway Region, and Myanmar. The proposed project's construction will take about 8 months and then operation processes to generate electricity from solar energy and distribute to the Kyeeonkyeewa Substation will take 20 years. After the operation period, the project proponent will extend operation period of the project many times because the proposed project is a BOO basis project.

3.1 Information of the Project Proponent

The following table describes the management employment list of Myanmar Kyeeonkyeewa Solar Power Co., Ltd.

Table 3.1 – Mangement list of Myanmar Kyeeonkyeewa Solar Power Co., Ltd

No.	Name	Position	National Registration Card Number/ Passport and Nationality	Company Address
1.	Mr. Jiang Xingcheng	Director	PE2174891	Corner of Malikha Street and Pathonemar 5th Street, A-031 Shwe Kyar Pin Quarter, Zabuthiri Township, Nay Pyi Taw, Myanmar

Table 3.2 Mangement Employment List of Myanmar Kyeeonkyeewa Solar Power Co., Ltd

No.	**Rank**	**Number**		**Total**
		Local	**Foreign**	
1.	Senior Management (Manager/Senior Official)	1	1	2
2.	Professionals	2	1	3
3.	Technicians	2	1	3
4	Skilled Labors	1	1	2
5	Workers	7	2	9
Total		**13**	**6**	**19**

3.2 Bidder Information

China Intelligent Transportation System (Holdings) Co., Ltd. is a company based in China and is doing railway business, civil aviation business, sustainable business, and overseas business and investor relations. The following table describes the shareholders and the following figure shows the organizational chart of China ITS (Holdings) Co., Ltd.

Table 3.3 – Shareholders of Myanmar Kyeeonkyeewa Solar Power Co., Ltd

No.	Name	Country	Registration Number	Percentage	Address
1.	Hytrust Energy (Singapore) Investment Pte. Ltd.	Singapore	20220979	100%	250, North Bridge Road, #36-01 A, Raffles City Tower, Singapore (179101)

Table 3.4 Bidder of Proposed Project

Name of Bidder	China ITS (Holdings) Co., Ltd.	
Head office address	Building 204, Jia 10 Courtyard, Jiuxianqiao North Road, Chaoyang District, Beijing, China.	
Telephone/Contact	+959770437886	Zhang Zhitao
E-mail/Alternative E-mail	Zhitao1024@hotmail.com	Phyu.kiec@gmail.com
Place and Year of incorporation/registration	Cayman Islands	2008

The following is the organizational chart of China ITS (Holdings) Co., Ltd.

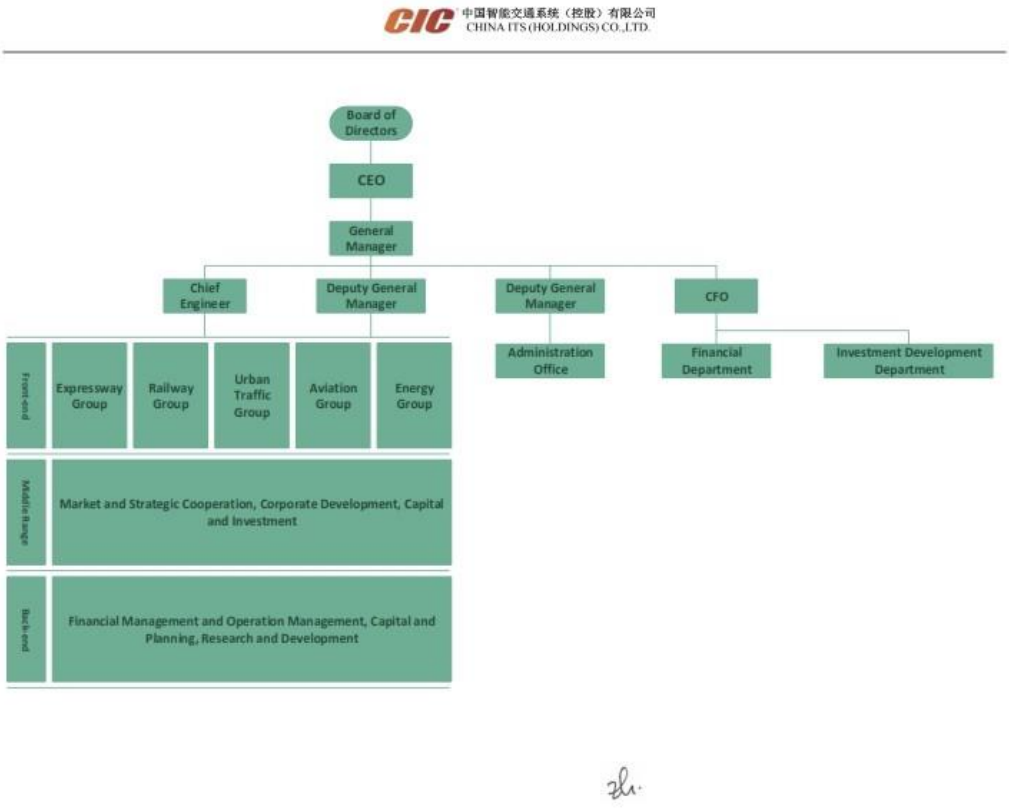


Figure 3.1 Organizational Chart of China ITS (Holdings) Co., Ltd

3.3 Organizational Structure of 30 MW Ground Mounted Solar Power Plant

The following figure shows the organization chart of Myanmar Kyeeonkyeewa Solar Power Co., Ltd.

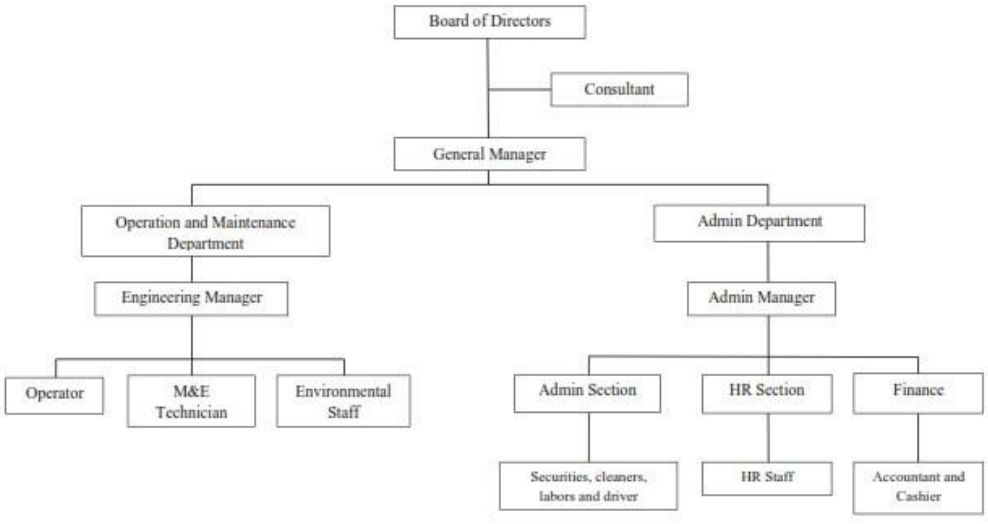


Figure 3.2 Organizational Chart of Myanmar Kyeeonkyeewa Solar Power Co., Ltd

3.4 Investment Plan

The total investment amount for the proposed project is 28.184 million USD and it includes investment for financing, materials, equipment, infrastructure and land lease cost. The following table describes detail investment plan for the proposed project.

Table 3.5 – Investment Plan of the Proposed Project

No.	Category	Investment Amount (Million USD)
1.	Materials and Equipment	26.83
2.	Infrastructure and Land lease cost	0.49
3.	Investment for financing	0.864
Total		**28.184**

CHAPTER 4 - IDNETIFICATION OF THE EMP EXPERTS

The Environmental Management Plan (EMP) for the proposed 30 MW Ground Mounted Solar Power Plant Project Connected to Kyeeonkyeewa Substation is consulted by E Guard Environmental Services Co., Ltd. The environmental study was carried out by the study team and the following is a summary of team member's responsibilities.

U Soe Min (Lead Consultant)

U Soe Min had worked as a civil, water resources and environmental engineer in public and private organizations. He had involved in water resources development projects from investigation and feasibility studies to planning, design and construction, and environmental impact assessments. He has experiences of local and international practices on construction management, contractual documentations, environmental equipment sales and environmental consulting services. Taking the role of a local environmental consultant, he is leading the local team and collaborating with international consultant firms in implementing EIA projects in Myanmar. He had provided and shared local knowledge to international consultants and supporting capacity building projects to strengthen environmental safeguard systems in Myanmar.

Dr. Myint Oo (Advisor)

Dr. Myint Oo, Rector (Retired) of University of Forestry and Environmental Science, Yezin, Ministry of Natural Resources and Environmental Conservation, worked for the Ministry for 35 years from 1984 to 2019. He obtained M. Sc. and Ph. D. Degrees from Göttingen University, Germany with special reference to tropical forest resources assessment using remotely sensed data and geographic information system. As a government employee he was involved in forest management planning and implementation, organizing, and conducting forestry research studies, training, international relation, administration and teaching of forestry and environment-related subjects at the University. After retirement in 2019 he joined E Guard Environmental Services Co. Ltd. as an advisor, attended the training course on 'Principles of Environmental Impact Assessment Review' organized by AIT Center in Vietnam, and has been involved in internal review process of EIA studies implemented by project teams of the company, as well as providing advice to project team members regarding project implementation and report preparation. He is also responsible for review and revision of existing technical documents relevant to his expertise, supporting ongoing implementation of company's governance policies and procedures and providing advice for improvement when required.

U Htet Aung (Assistant Consultant, Team Leader)

U Htet Aung is a Project Associate, received Master Degree with Petroleum Geology from Yangon University in 2015. He has three years experiences in data collections and report writing. He is currently preparing environmental reports, conducting public

consultation and information gathering processes. He was participated in the preparation of Environmental Impacts Assessment (EIA) Report of Yangon Outer Ring Road (YORR) Construction Project and Nyaungdon Bank Protection and Rehabilitation Project. He was responsible for Data Analysis and Impact Assessment, Stakeholder engagement and Public Consultation Meeting and Technical Report Writing of this EMP report.

U Aung Si Thu Thein (Consultant)

U Aung Si Thu Thein is an Assistant Consultant, who received his Bachelor Degree in Forestry from the University of Forestry in September, 2015. He also received Post Graduate Diploma in Geographic Information Systems from the Dagon University in February, 2018. Moreover, he pursued his Master of Science Degree in Natural Resources Management from the Asian Institute of Technology, Thailand in May, 2020. He has almost four years-experience in preparation of Environmental Management Plan and Initial Environmental Examination Reports for various development projects as a Lead Consultant and in participation many Environmental Impact Assessment and Resettlement Action Plan projects for development projects in Myanmar. On the other hand, he has two years-experience in research conducting with regards to impacts assessment of natural resources management systems on livelihood of local people. Moreover, he has many experiences in communication with clients, government authorities and local people, stakeholder engagements and public consultation meetings conduction and socio-economic survey.

U Zaw Ye Naung (Project Assistant)

U Zaw Ye Naung, a project assistant, received Bachelor Degree in Civil Engineering from Technological University (Thanlyin) in 2020. Bachelor degree research papers, “Solid Waste Management System for Technological University (Thanlyin)” and “Drainage Design for Downtown Yangon Region”, were accomplished. He also has foreign training of “Mini Hydro power Design” at Anan Institute of Technology, Tokushima, Japan in 2016. He has experiences in environmental impact assessment, social and environmental impact analysis, stakeholder engagements and public negotiations, social and resettlement survey. He has also participated in the activities of the assist to the EIA process and Resettlement Action Plan. U Zaw Ye Naung is contributed for report preparation, impact assessment and data analysis for this EMP Project.

Contact – 09795402012, Email – zawyenaung@eguardservices.com

Daw Thein Mwe Khin (Consultant)

Daw Thein Mwe Khin is an Associate Consultant, who received her Master Degree in Regional and Rural Development Planning from Asian Institute of Technology in 2019 and Bachelor Degree in Forestry from the University of Forestry in 2013. She is currently

working as a social expert in Yangon Outer Ring Road Construction Project, Hanthawaddy New international Airport Development Project and Wataya bridge Construction project. She had experience in working as a survey team leader for YCRL Updating Project and Dry zone Water Supply Project in 2014, 2015 and 2016 respectively. She had her experiences in working as a core team member of the social team who did the preparation of RAP for Construction of Kyarkalay Bypass and 2 Bridges and RAP for Construction of Thaton Bypass and 2 Bridges in 2014. In addition, she has a project leader role in the preparation of four IEE reports for various types of projects, tender preparation, many social surveys, FGDS for various EIA/IEE/EMP projects during around five years of working life in EIA field. She also studied the socioeconomic impact of rural electrification on the well-being of rural households in central dry zone, Myanmar as her master thesis in 2018. Daw Thein Mwe Khin has contributed in social sector and public consultation for this EMP Report.

Daw Htet Shwe Sin Aung (Assistant Consultant)

Daw Htet Shwe Sin Aung is an environmental specialist at E Guard Environmental Services Co., Ltd. She graduated since 2017 with the Master of Science specialized in Zoology from Yangon University. She has three years experiences in surveying the fauna, writing report and good experience in lab works. Now she is responsible for surveying fauna data and report writing, gathering information for the environmental reports, conducting socioeconomic surveys, cooperating with clients including NGOs, Local and Governmental agencies for the projects, assisting and cooperating in writing of environmental reports. Her responsibilities are surveying fauna data analyzing and writing report.

Daw Shwe Ya Min Bo (Assistant Consultant)

Daw Shwe Ya Min Bo is an Environmental Specialist, who received her Bachelor Degree in Forestry from the University of Forestry and Environmental Sciences in November, 2016. She also received Post Graduate Diploma in Geographic Information System and Remote Sensing and Post Graduate Diploma in Environmental Studies from University of Yangon in December, 2019. She has almost five years-experiences in preparation of Environmental Management Plan and Initial Environmental Examination reports for various development projects and in participation many Environmental Impact Assessment and Resettlement Action Plan projects including Japan's ODA loan projects. She also participates in the activities of socio-economic survey, biodiversity survey, and reviewing the reports. She was responsible for Planning and Identifying, Coordinating, Data Analysis and Impact Assessment, Stakeholder engagement and public consultation meeting and Technical Report Writing of this EMP report. Daw Shwe Yamin Bo has assisted in secondary data collection and public consultation for this EMP Report.

U Aung Zayar Wint (Environmental Quality, Assistant Consultant)

U Aung Zayar Wint is a Project Assistant in Environmental Quality Team at E Guard Environmental Services. He got Bachelor Degree of Forestry from University of Forestry and Environmental Science (UFES) in 2017. He also got Post Graduate Diploma in

Environmental Impact Assessment and Environmental Management System from Yangon Technological University (YTU) in 2019. He has experiences of monitoring environmental quality, writing the environmental quality reports and project monitoring reports including Japan's ODA Loan Project. He also takes part in ISO document controlling of Environmental Quality Team. U Aung Zayar Wint has contributed in preparation of Environmental Quality Analysis Report for this Report.

U Nyein Chan Aung (Environmental Specialist)

U Nyein Chan Aung is currently working as a Project Associate at E Guard Environmental Services Co., Ltd. He has received Bachelor Degree in Forestry from University of Forestry and Environmental Sciences (Yezin, Naypyitaw) in November, 2016. Now, he is trying to achieve a Diploma in Environmental Studies at University of Yangon (YU). He has about four years experiences in reporting, conduction stakeholder engagement, biodiversity survey, social survey, RAP survey and site visiting. He has completed various trainings regard with environmental management and GIS. He has main responsibilities that are report preparation, planning and identifying, coordinating, data analysis and impact assessment, stakeholder engagement and public consultation meeting and information gathering process.

Daw Nang Aye Thida (Project Associate)

Daw Nang Aye Thida is working as a project assistant in E-Guard Environmental Services Co., Ltd. She obtained her Bachelor degree in Civil Engineering from Technological University (Taunggyi). She has over three years experiences working in Environmental and Social Fields. She has her experience in preparing Environmental Management Plan (EMP) report for New Donthami Bridge Construction Project and experience in working as one of the core team member of social team who did the preparation of RAP for Yangon Outer Ring Road (Eastern Section) Construction Project, Hanthawaddy New International Airport Development Project. Additionally, she has experience in collecting information, conducting socioeconomic surveys, data entry and analyzing, involved in engagement with stakeholders as well as the project owners, governmental organizations and public consultation meeting, site visit, impact assessment and reporting for the other relevant projects.

Daw Thet Shwe Yi Aung (Project Associate)

Daw Thet Shwe Yee Aung is working as Project Associate in E Guard Environmental Services. She completed her Bachelor Degree in Geology from University of Yangon in 2018. She has more than three years' experience in conduction stakeholder engagement and public consultation, social survey, and site visit. She is currently assisting in preparing environmental reports, drawing maps, public consultation and information gathering processes. Daw Thet Shwe Yi Aung has contributed in soil characteristics analysis for this EMP Report.

Contant: 09-797005173; thetshweyeeaugn@eguardservices.com

Daw May Thu Win (Legal Analyst)

Daw May Thu Win is working as a Project Assistant in E Guard Environmental Services Co., Ltd. She obtained her Bachelor Degree in Law from East Yangon University (Tarwa) in 2018. In this project, her responsibilities are legal aspect conformity analysis laws, rules, regulations, policies, agreements, international conventions, protocols, derivatives, announcements, and notifications used for environmental reports, cooperating in public consultations and information gathering process. Daw May Thu Win has contributed in preparation of laws, rules, regulation, and announcements for this EMP Report.

Shar Thae Hoy (Project Assistant, Biodiversity Team)

Daw Shar Thae Hoy, graduated with a qualified bachelor's degree in Plant Biology from the University of Yangon. She put a strong emphasis on environmental science in her final year research studies term paper, analyzing the quality of the water from the MyitNge River and how it affects local public health issues. Academically, she also has a keen enthusiasm for plants, ecosystems, and community ecology and possesses 4 years of lab and fieldwork experience. Right now, she is applying all her knowledge by working as a project assistant internship role at E-Guard Environmental Service, in which responsibilities include assisting senior project associates in researching and gathering Myanmar's biodiversity primary and secondary data information, especially for the physical and biological environmental impacts and mitigation for EIA reports.

U Khin Zaw Min (Environmental Surveyor)

U Khin Zaw Min specializes in instrumentation and field data collection of environmental condition of the site and measuring of environmental baseline data. He is responsible for onsite data collection and measuring baseline data for this EMP Report.

The full address of the company conducting this EMP report is as followed.

E Guard Environmental Services Co., Ltd.
No. (145, A2-3), Thiri Mingalar Street, Ward No. (4),
Mayangone Township, 11062, Yangon.
Tel: +95 1 9667757,
Fax: (+95)1 9667757
E-mail: info@eguardservices.com
URL: www.eguardservices.com

CHAPTER 5 - POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

Myanmar Kyeeon Kyeewa Solar Power Co., Ltd. had made commitment that this report is strongly prepared by following the related existing Laws and Rules including EIA Procedure and mitigation measures already stated in this Environmental Management Plan (EMP) report for the proposed 30 MW Ground Mounted Solar Power Plant Project Connected to Kyeeon Kyeewa Substation. Moreover, there is a commitment to operate the proposed project by following the plans and mitigation measures stated in this EMP report.

E Guard Environmental Services Co., Ltd. had also made commitment to follow and compliance with the related existing Laws, Environmental Conservation Law, Rules, Environmental Impact Assessment Procedure, National Environmental (Quality) Emission Guidelines, Standards and Mitigation Measures stated in this Environmental Management Plan (EMP) report for the proposed 30 MW Ground Mounted Solar Power Plant Project Connected to Kyeeon Kyeewa Substation operated by Myanmar Kyeeon Kyeewa Solar Power Co., Ltd.

The National Laws and Regulations for the Environmental Protection applicable to the proposed project are described as followings.

1. The Environmental Conservation Law (2012)
2. The Environmental Conservation Rule (2014)
3. Environmental Impact Assessment Procedure (2015)
4. National Environmental Quality (Emission) Guidelines (2015)
5. Myanmar National Environmental Policy (2019)
6. National Land Use Policy (2016)
7. Myanmar Investment Law (2016)
8. Foreign Investment Rules (2013)
9. The Law Amending The Prevention and Control of Communicable Disease Law (2011)
10. Prevention of Hazards from Chemical and Related Substances Law (2013)
11. The Control of Smoking and Consumption of Tobacco Product Law (2006)
12. Myanmar Fire Brigade Law (2015)
13. Motor Vehicles Safety and Management Law (2020)
14. The Myanmar Insurance Law (1993)
15. The Public Health Law (1972)
16. Labour Organization Law (2011)
17. Settlement of Labour Dispute Law (2012)
18. The Development of Employment and Skill Law (2013)
19. The Minimum Wages Law (2013)
20. The Payment of Wages Law (2016)

21. Workmen's Compensation Act (1923)
22. The Leaves and Holiday Act (1951)
23. Social Security Law (2012)
24. Occupational Safety and Health Law (2019)
25. The Rights of National Races Law (2015)
26. The Petrol and Petroleum Product Law (2017)
27. Forest Law (2018)
28. Freshwater Fisheries Law (1991)
29. The Underground Water Act (1930)
30. The Electricity Law (2014)
31. The Farm Land Law (2012)
32. Natural Disaster Management Law (2013)
33. Myanmar Climate Change Policy (2019)

1) The Environmental Conservation Law (2012)

Purpose: To construct a healthy and clean environment 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 conservation.

- The project proponent has to pay the compensation for damages if the project will causes injuries to environment, under the sub-section (o) of section 7 of said law.

- The project proponent has to purify, emit, dispose and keep the polluted materials in line with the stipulated standards, under section 14 of said law

- The project proponent has to install or use the apparatus, which can control or help to reduce, manage, control or monitor the impacts on the environment, under section 15 of said law.

- The project proponent has to allow relevant governmental organization or department to inspect whether performing is conformity with the terms and condition included in prior permission, issued by the ministry, or not, under section 24 of said law.

- The project proponent has to comply with the terms and conditions included in prior permission, under section25 of said law.

- The project proponent has to abide by the stipulations included in the rules, regulation, by-law, order, notification and procedure issued by said law, under section 29.

2) The Environmental Conservation Rule (2014)

- The project proponent has to avoid emit, discharge, or dispose, direct to discharge or dispose the materials which can pollute to environment, or hazardous waste or hazardous material prescribed by notification in the place where directly or indirectly injure to public, under sub- rule (a) of rule 69.

- The project proponent has to avoid performing to damage to ecosystem and the environment generated by said ecosystem, under sub-rule (b) of rule 69.

3) Environmental Impact Assessment Procedure (2015)

- The project proponent has to be liable for all adverse impacts caused by doing or omitting of project owner or contractor, sub-contractor, officer, employee, representative or consultant who is appointed or hired to perform on behalf of project owner, under sub-paragraph (a) of paragraph 102.

- The project proponent has to support, after consultation with effected persons by project, relevant governmental organization, governmental department and other related persons to resettlement and rehabilitation for livelihood until the effected persons by the project receiving the stable socio-economy, which is not lower than the status in pre-project, under sub-paragraph (b) of paragraph 102.

- The project proponent has to implement fully all commitments of project and conditions included in EMP. Moreover the project proponent has to be liable for contractor and sub-contractor who perform on behalf of him/her have to fully abide by the relevant laws, rules, this procedure, EMP and all conditions, under paragraph 103.

- The project proponent has to be liable and fully & effectively implement all requirements included in ECC, relevant laws and rules, this procedure and standards under rule 104.

- The project proponent has to inform the completed information, after specifying the adverse impacts caused by the project, from time to time, under paragraph 105.

- The project proponent has to continuously monitor all adverse impacts in the pre-construction phrase, construction phrase, operation phrase, suspension phrase,

closure phrase and post-closure phrase, moreover has to implement the EMP with abiding the all conditions included in ECC, relevant laws & rules and this procedure, under paragraph 106.

- The project proponent has to submit, as soon as possible, the failures of his or her responsibility, other implementation, ECC or EMP. If dangerous impact caused by this failure or failure should be known by the Ministry the project proponent has to submit within 24 hours and other than this situation has to submit within 7 days from knowing it, under paragraph 107.

- The project proponent has to submit the monitoring report semiannually prescribed time by Ministry in line with the schedule of EMP, under paragraph 108.

- The project proponent has to prepare the monitoring report in accord with the rule 109.

- The project proponent has to show this monitoring report in public place such as library, hall and website and office of project for the purpose to know this report by public within 10 days from the date, which the report is submitted to the Ministry. Moreover has to give the copy of this report, by email or other way which way agreed with the asked person, to any asked person or organization, under paragraph 110.

- The project proponent has to allow inspector to enter and inspect in working time and if it is needed by Ministry has to allow inspector to enter and inspect in the office and work place of project and other work place related to this project in any time, under paragraph 113.

- The project proponent has to allow inspector to immediately enter and inspect in any time if it is emergency or failure to implement the requirements related to social or environment or caused to it, under paragraph 115.

- The project proponent has to allow inspector to inspect the contractor and sub-contractor who implements on behalf of project, under paragraph 117.

4) Nation Environmental Quality (Emission) Guidelines (2015)

- The project proponent has to emit, discharge (or) dispose anything in line with the standards stipulated in said guideline.

5) Myanmar National Environmental Policy (2019)

Mission: To achieve a clean environment, with healthy and functioning ecosystems, that ensures inclusive development and wellbeing for all people in Myanmar.

Vision: To establish national environmental policy principles for guiding environmental protection and sustainable development and for mainstreaming environmental considerations into all policies, laws, regulations, plans, strategies, programs and projects in Myanmar.

6) National Land Use Policy (2016)

Objectives:

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

7) Myanmar Investment Law (2016)

Purpose: To ensure the appointing of employees, fulfilling the rights of employees, avoiding any injury to environment, social and cultural heritage, insure the prescribed insurance in line with the above law. This law focuses as follows,

- The project proponent has to register the land lease contract at the specific registration office, under sub-section (d) of section 51 of said law. (if the land lease contract is needed)

- The project proponent has to appoint the nationalities in the various levels of administrative, technical and expert work by the arrangement to develop their expertise, in line with the sub-section (b) of section51of said law.

- The project proponent has to appoint the nationalities only in normal work without expertise, in line with the sub-section (c) of section51of said law.

- The project proponent has to appoint either foreigner or nationality with the appointment agreement in accord with the law, in line with the sub-section (d) of section51of said law.

- The project proponent has to comply with the international best practices, existing laws, rules and procedures to not damage, pollute, and injure to environment, cultural heritage and social, in line with the sub-section (g) of section65of said law.

- The project proponent has to close the project after paying the compensation to the employees in accord with the existing laws if violates the appointment agreement or terminate, transfer or suspend the investment or reduce the number of employees , in line with the sub-section (i) of section65of said law.

- The project proponent has to pay the wages or salary to the employees in accord with the laws, rules, order and procedures in the suspension period, in line with the sub-section (j) of section65of said law.

- The project proponent has to pay the compensation or injured fees to the respected employees or their inheritors if injury in or loss of part of body or death caused by work, in line with the sub-section (k) of section 65of said law.

- The project proponent has to stipulate the foreign employees to respect the culture and custom and abide by the existing laws, rules, orders, directives, in line with the sub-section (l) of section65of said law.

- The project proponent has to abide by labor laws, in line with the sub-section (m) of section65of said law.

- The project proponent has to pay the compensation to the injured person for damages if damages of environment or socio-economy are occurred by misuse of project, in line with the sub-section (o) of section 65of said law.

- The project proponent has to allow to inspect in anywhere of project if Myanmar Investment Commission inform to inspect the project, in line with the sub-section (p) of section 65 of said law.

- The project proponent has to obtain the permission of MIC before EIA process and report this process to MIC, in line with the sub-section (q) of section 65 of said law.

- The project proponent has to insure the prescribed insurance by rules, under section 73 of said law.

8) Foreign Investment Rules (2013)

The promoter or investor shall:

- comply with Environmental Protection Law in dealing with environmental protection matters related to the business;
- shall carry out socially responsible investment in the interest of the Union and its people;
- shall co-operate with authorities for occasional or mandatory inspection;
- shall exercise due diligence to be in conformity and harmony with norms and standards prescribed by relevant Union Ministry in conducting construction of factories, workshops, buildings, and other activities;
- shall enforce Safety and Health under rule 54 of said rule.

9) The Law Amending the Prevention and Control of Communicable Diseases Law (2011)

Purpose: To ensure the healthy work environment and prevention the communicable diseases by the cooperation with the relevant health department.

- The project proponent has to build the housing in line with the health standards, distribute the healthful drinking water & using water and arrange to systematically discharge the garbage and sewage, under clause (9) of sub-section (a) of section 3 of said law.

- The project proponent has to abide by any instruction or stipulation by Department of health and Ministry of Health, under section 4 of said law.

- The project proponent has to inform promptly to the nearest health department or hospital if the following are occurred; (under section 9)

- Mass death of animals included in birds or chicken;

- Mass death of mouse;

- Suspense of occurring of communicable disease or occurring of communicable disease;

- Occurring of communicable disease, this must be informed.

- The project proponent has to allow any inspection, anytime, anywhere if it is need to inspect by health officer, under section 11 of said law.

10) Prevention of Hazards from Chemical and Related Substances Law (2013)

Purpose: To ensure to use the hazardous chemical and related substances safely and safety for the employees. Moreover, safety in carrying the hazardous chemical and related substances and storage place of it. If it is needed to train how to use the safety dresses, which provided to the employees with free of charges. Insure to compensate for injury to person or damage to environment. The project has to be inspected for safety use of hazardous chemical and related substances before starting the project.

- The project owner will be inspected for the safety and resistance of the machinery and equipment by the respective Supervisory Board and Board of Inspection before starting the business under sub-section (a) of section 15 of said law.

- The project owner will assign the employees, who will serve with the hazardous chemical and substances, to attend the trainings on prevention of hazardous chemical and substances in local or abroad under sub-section (b) of section 15 of said law.

- The project owner will abide by the conditions included in the license under sub-section (a) of section 16 of said law.

- The project owner will abide by and assign to the employees who serve in this work to abide by the instructions for safety in using the hazardous chemical and related substances under sub-section (b) of section 16 of said law.

- The project owner will arrange the enough safety equipment in the work place and provide the safety dresses to the employees who serve in this work with free of charge under sub-section (c) of section 16 of said law.

- The project owner will train, in work place my arrangement, the know how to use the occupational safety equipment, personal protection equipment and safety dresses systemically in the work place under sub-section (d) of section 16 of said law.

- The project owner will allow the receptive Supervisory Board and Board of Inspection to inspect whether the hazard may be injured to health of human, animal, or damaged to environment under sub-section (e) of section 16 of said law.

- The project owner will assign the healthy employees who have obtained the recommendation that is fit for this work after taken medical check- up and keep systematically the medical records of employees under sub-section (f) of section 16 of said law.

- The project owner will inform the copy of storage permission for hazardous chemical and related substances to the relevant township administrative office under sub-section (g) of section 16 of said law.

- The project owner will obtain the approval with instructions of relevant fire force before starting the work if the project will use the fire hazard substances or explosive substances under sub-section (h) of section 16 of said law.

- The project owner will transport only the limited amount of the chemical and related substance in accord with the prescribed stipulations in local transportation under sub-section (i) of section 16 of said law.

- The project owner will insure, in accord with the stipulations, to pay the compensation if the project cause injury to person or animals or damage to environment under section 17 of said law.

- The project owner will abide by the conditions included in the registration certificate. Moreover will abide by the orders and directives issued by the Central Supervisory Board from time to time under section 22 of said law.

- The project owner will classify the level of hazard to protect it in advance according to the properties of chemical and related substances under sub-section (a) of section 27 of said law.

- The project owner will provide the safety equipment, personal protection equipment to protect and reduce the accident and assign to attend the training to use the equipment systematically under sub-section (c) of section 27 of said law.

- The project proponent has to abide any regulation contained in license and any regulation contained in license and any regulation contained in certificate under section 30 of said law.

11) The Control of Smoking and Consumption of Tobacco Product Law (2006)

Purpose: To ensure the creation of smoking area and non-smoking area in the power plant area for health and control of smoking.

- The project proponent has to keep the caption and mark referring that is non-smoking area in the project area under sub-section (a) of section 9 of said law.
- The project proponent has to arrange the specific place for smoking in the project area, keep the caption and mark in accordance with the stipulations under sub-section (b) of section 9 of said law.
- The project proponent has to supervise and carry out the measures so that no one shall smoke at the non-smoking area under sub-section (c) of section 9 of said law.
- The project proponent has to allow the inspection of supervisory body in the power plant area, under sub-section (d) of section 9 of said law.

12) Myanmar Fire Brigade 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. Therefore, the project owner has to institute the specific fire service in line with the above law. This law focuses the following

- The project proponent has to institute the specific fire services if it is needed, under sub-section (a) of section 25.
- The project owner has to provide materials and apparatuses for fire precaution and prevention, Sub-section (b) of section 25.

13) Motor Vehicles Safety and Management Law (2020)

Purpose: When the construction period and if it is needed in operation and production period for the all vehicles.

- The project proponent has to comply with the restrictions and restrictions on the use of domestic vehicles by the Ministry of Transport and Communications with the approval of the Union Government under sub-section (a) of section 9 of said law.

- The project proponent has to comply with safety, environmental regulation, standards and regulations regarding the initial registration of vehicles issued by the Ministry under sub-section (c) of section 12 of said law.

- The project proponent has to drive at the speed limit set by the Road Transport Directorate to ensure the safe movement of vehicles on public roads under sub-section under sub-section (r) of section 14 of said law.

- The project proponent has to maintain the vehicles in accordance with the standards set by the Department so that it can be driven safely under sub-section (a) of section 18 of said law.

- The project proponent has not to carry or transport hazardous materials in public places in accordance with the regulations under sub-section (g) of section 81 of said law.

14) The Myanmar Insurance Law (1993)

Purpose: The project can cause the damages to the environment and injuries to public so to ensure the needed insurances are insured at Myanma Insurance. This law focuses the following matters;

- If the project proponent uses the owned vehicles, the project owner has to insure the insurance for injured person under section 15 of said law.

- The project proponent has to insure the insurance to compensate for general damages because the project may cause the damages to the environment and injury to public under section 16 of said law.

15) The Public Health Law (1972)

Purpose: To ensure the public health include not only employees but also resident people and cooperation with the authorized person or organization of health department. The project owner will cooperate with the authorized person or organization in line with the section 3 and 5 of said law.

Section 3 - The project proponent has to abide by any instruction or stipulation for public health.

Section 5 - The project proponent has to allow any inspection, anytime, anywhere if it is needed.

16) Labour Organization Law (2011)

Purpose: To ensure protection the rights of the employees, having the good relationships between the employees and employer and enabling to form and carry out the labour organizations systematically and independently.

- The project owner promises to allow the labour organization, to negotiate and to 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 summit demands to the employer and claim in accord with the relevant law if the agreement cannot be reached under section 17 of said law.

- The project proponent promises to demand the re-appointment of worker who is dismissed by the employer, without the conformity with the labour laws under section 18 of said law.

- The project proponent promises to send the representatives to the Conciliation Body in settling a dispute between the employer and the worker under section 19 of said law.

- The project proponent promises the labour organization to participate and discuss in discussing with the government, the employer and the complaining employees in respect of employee's rights or interest contained in the labour laws under section 20 of said law.

- The project proponent promises the labour organization to participate in solving the collective bargains of the employees in accord with the labour laws under section 21 of said law.

- The project proponent promises the labour organization to carry out the holding the meetings, going on strike and other collective activities in line with the procedure, regulation ,by-law and directive of relevant Chief Labour Organization under section 22 of said law.

17) Settlement of Labour Dispute Law (2012)

Purpose: To ensure negotiation and discussion between employees and project proponent, abiding the decision of Tribunal. This law focuses as follows;

- The project proponent has to not absent to negotiation within the stipulated time for complaint, under section 38 of said law.

- The project proponent has not to change the existing stipulations for employees within conducting period before Tribunal, under section 39 of said law.

- The project proponent has not to close the work without negotiation, discussion on dispute in accord with this law, decision by Tribunal, under section 40 of said law.

- The project proponent has to pay the compensation decided by Tribunal if violates any act or any omission to damage the interest of labour by reducing of product without efficient cause, under section 51 of said Law.

18) The Development of Employment and Skill Law (2013)

Purpose: To ensure the job security and to develop the employee's skill with the fund of project owner:

- The project proponent has to appoint employees with the contract in line with the provision of section 5 of said law.

- The project proponent has to carry out the training programs with the policy of Skill Development Body to develop the employment skill of employees who is appointed or will be appointed, under section 14 of said law.

- The project proponent has to monthly pay to the fund, which is fund for development of skill of employees, not less below 0.5 percentage of the total payment to the level of worker supervisor and the workers below such level, under sub-section (a) of section 30 of said law.

- The project proponent has to promise not to deduct from the payment of employees for above-mentioned fund, under sub-section (b) of section 30 of said law.

19) The Minimum Wages Law (2013)

Purpose: To ensure the project owner pay the wages not less than prescribed wages and notify obviously this wages in work place, moreover to be inspected.

- The project proponent has to pay the wages in line with section 12 of said law.

- The project proponent has to notify the prescribed wages obviously in work

place under sub-section (a) of section 13 of said law.

- The project proponent has to record correctly the lists, schedules, documents, and wages, report these to the relevant department, and give if these are asked while inspecting, in accord with the stipulations under sub-section (b) (c) (d) of section13 of said law.

- The project proponent has to allow to be inspected by the inspector, under sub-section (d) and (e) of section 13 and section 18 of said law.

- The project proponent has to allow holiday for medical treatment if the employee' health is not fit to work, under sub-section (f) of section 13 of said law.

- The project proponent has to allow holidays without deducting from the wages if one of parents or one of family dies, under sub-section (g) of section 13 of said law.

20) The Payment of Wages Law (2016)

Purpose: To ensure the way of payment and avoiding delay payment to the employees. This law focuses as follows;

- The project proponent has to pay the wages in accord with the section 3 and 4 of said law under section 3 and 4 of said law.

- The project proponent has to submit with the agreements of employees & reasonable ground to department if it is difficult to pay because of force majeure included in natural disaster, under section 5 of said law.

- The project proponent has to abide by the provisions of section 7 to 13 in chapter (3) in respect of deduction from wages.

- The project proponent has to pay the overtime fees, prescribed by law, to the employees who work over working hours, under section 14 of said law.

21) Workmen's Compensation Act (1923)

Purpose: To ensure the compensations to injured employee while implementing in line with the above law and pay the prescribed compensations in various kinds of injury. This law focuses as follow;

Section 13 -The project proponent has to pay the compensation in line with the provisions of said law base on kind of injury and case-by-case.

22) The Leaves and Holiday Act (1951)

Purpose: The employees can take the leaves and get the holidays legally and to ensure the right to get the holidays and leaves. This law focuses the following matters;

- The project proponent has to allow the leaves and holidays in line with the law.

23) Social Security Law (2012)

Purpose: The project proponent has to create the social security for the employees because the project is the business under the Myanmar Citizen Investment Law. To ensure the social security for employees of the project, the project owner has to register to the social security offices and to pay the prescribed fund.

- The project proponent has to register to the respected social security office, under sub-section (a) of section 11 of said law
- The project proponent has to pay the social security fund for at least four types of social security included in sub-section (a) of section 15, under section 15 of said law.
- The project proponent has to pay the fund, which has to be paid myself, and together with the fund which has to be paid from their salary by the employees. Moreover, the project owner will pay the cost for paying the above-mentioned fund only myself under sub-section (b) of section 18 of said law.
- The project proponent has to pay the fund for accidence, under sub-section (b) of section 48 of said law. (but this fund is not related to workmen compensation so if it is needed compensation must be separately paid by the Workmen compensation Act)
- The project proponent has to make correctly and submit the list and record provided in section 75 to respected social security office, under section 75 of said law.

24) 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.

- 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 under sub-section (e) of section 26 of said law.

- The project proponent has to arrange and display occupational safety and health instructions, warning signs, notices, posters, and signboards under sub-section (l) of section 26 of said law.

- 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 under sub-section (a) of section 30 of said law.

- 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 under sub-section (d) of section 30 of said law.

- 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 under sub-section (e) of section 30 of said law.

25) The Rights of National Races Law (2015)

Purpose: To ensure that project proponent has to disclose to residents ethnic nationalities about the project fully, moreover to ensure to cooperate with them. This law focuses the following matters;

Section 5 - The project proponent has to disclose all about the project fully to the residents who are national races.

- The project proponent has to cooperate with the residents who are national races.

26) The Petroleum and Product of Petroleum Law (2017)

Purpose: The project will transport and store the fuel in any phrase. To ensure to take the license for importation and storage and abide by the stipulations in the license

- The project proponent has to transport the fuel by the vehicle or vessel, which is licensed by the Ministry of Transportation and Communication under sub-section (a) of section 9 of said law.

- The project proponent has to abide by the procedures and conditions specified by the Ministry of Transportation and Communication under sub-section (e) of section 9 of said law.

- The project proponent has to transport after obtaining the transportation license issued by the Ministry of Natural Resource and Environmental Conservation under sub-section (b) of section 10 of said law.

- The project proponent has to allow inspection by the Ministry of Natural Resource and Environmental Conservation under sub-section (d) of section 10 of said law.

- The project proponent has to store the fuel in the tank, which is licensed by the Ministry of Natural Resource and Environmental Conservation under sub-section (a) of section 10 of said law.

- The project proponent has to show the notice of danger on the tank or container of fuel under section 11 of said law.

27) Forest Law (2018)

Purpose: To ensure in carrying out the project with the permission of Ministry of Natural Resources and Environmental Conservation if the project land is forestland or forest covered land. This law focuses as follow;

- The project proponent has to obtain the permission of Ministry of Natural Resources and Environmental Conservation before starting the work if the project land is forest land or forest covered under sub- section (a) of section 12.

28) Freshwater Fisheries Law (1991)

Purpose: According to the sub-section (e) of section 2 of said law, the freshwater area includes any river, creek, pond and water area so the project will be near by the river or creek which is freshwater area the safety of freshwater and aquatics. This law focuses as follow;

- The project proponent has to avoid any water pollution and disturbing to fish and

other aquatic lives in any fresh-water such as river, creek under section 40 of said law.

29) The Underground Water Act (1930)

Purpose: To ensure to obtain the licence before sinking the underground water and to abide by the conditions in license. This law focuses as follow;

- The project owner will obtain the licence granted by the water officer for sinking the underground water before sinking water, under section 3 of said law.
- The project proponent has to abide by the conditions prescribed by rules, under sub-section (a) of section 6 of said law.

30) The Electricity Law (2014)

Purpose: of this law is to ensure the compliance with the conditions of permission for productions of electricity, abiding by any stipulation, implementing with the best practices and paying compensation in line with above law. It stipulated the following obligations of the project proponent:

- To 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, under sub-section (b) of section 10;
- To take the certificate of electric safety, issued by the chief-inspector, before the commencement of power generation, under section 18;
- 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 directive issued under said law according to sub-section (a) of section 21;
- To be liable for damages to any person or enterprise by negligence of project owner according to sub-section (a) of section 22;
- To comply with the permission for electric searching and generation, under sub-section (a) and (b) of section 26;
- To inform promptly to chief-inspector and head officer of related office while occurring of accident in electricity generation, under section 27;
- To comply with the standards, rules and procedure. Moreover will allow the inspection by respected governmental department and organization if it is necessary, under section 40; and
- To 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 project owner, under section 68..

31) The Farm Land Law (2012)

Purpose: To ensure the right to use the farm land and sufficient compensation for acquisition of the farm land. This law focuses the following matters;

- The project owner has to abide by the decision of relevant Ministry with the coordination with the Central Administrative Body of the Farmland for paying the compensation if it is needed acquisition farm land under section 26 of said law.
- The project proponent has to obtain the permission of the Central Administrative Body of Farmland for the land use change from paddy field land to other land use under sub section (a) of section 30 of said law.
- The project proponent has to obtain the permission of the Yangon Region Government with the recommendation of Yangon Region Administrative Body of Farmland for the land use change from farm land other than paddy field land to other land use under sub section (b) of section 30 of said law.

32) Natural Disaster Management Law (2013)

Purpose: to implement natural disaster management programs and to coordinate with national and international organizations in carrying out natural disaster management activities; to conserve and restore the environment affected by natural disaster and to provide health, education, social and livelihood programmes in order to bring about better living conditions for victims.

- The project proponent has to perform preparatory and preventive measures for natural disaster risks reduction before the natural disaster strikes under sub section (a)(i) of section 13 of said law.
- The project proponent has to undertake rehabilitation and reconstruction activities for improving better living standard after the natural disaster strikes and conservation of the environment that has been affected by natural disaster under sub section (a)(iii) of section 13 of said law.
- The project proponent has to carry out better improvement on early warning system of natural disaster under sub section (b) of section 14 of said law.
- The project proponent has to carry out together with the measures of natural disaster risk reduction in development plans of the State under sub section (d) of section 14 of said law.
- 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 under section 25 of said law.

- Whoever interferes, prevents, prohibits, assaults or coerces the department, organization or person assigned by this law to perform any natural disaster management shall, on conviction, be punished with imprisonment for a term not exceeding two years or with fine or with both under section 26 of said law.
- 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 under section 29 of said law.
- Whoever willful failure to comply with any of the directives of the department, organization or person assigned by this law to perform any natural disaster management shall, on conviction, be punished with imprisonment for a term not exceeding one year or with fine or with both under sub section (a) of section 30 of said law.

33) Myanmar Climate Change Policy (2019)

Purpose - The Government of the Republic of the Union of Myanmar will take sector-relevant measures to implement this Policy.

(13) Low-carbon and resilient growth

- Ensure that actions undertaken under Myanmar's Green Economy Framework and energy policies integrate climate change adoption and mitigation considerations, are complementary to and/or support actions under this Policy, and encourage public-private partnership to support a green economy;
- Ensure that the energy, transport and industry sectors, including infrastructure, are well-integrated among each other, reliable, sustainable and resilient to current and future climate change impacts, recognizing that they are vital to Myanmar's economic growth;
- Decouple Myanmar's continued growth from increasing greenhouse gas emissions and contribute to the global climate change mitigation effort through sustainable, low-carbon energy, transport, industrial and waste management systems, while ensuring that Myanmar's social and economic development needs are met;
- Promote and prioritise sustainable and renewable energy sources and energy efficiency, in order to meet Myanmar's growing energy needs and ensure energy security in a low-carbon manner;
- Ensure equitable access to affordable, reliable, sustainable and modern energy for all as a pathway to inclusive and sustainable development and eradicating poverty;
- Increase the productivity and resource-efficiency of the industrial sector, an important sector for Myanamr's economy, through low-carbon growth and by developing competitive and innovative green industrials, recognizing the relative importance of this sector for Myanmar's economy, including its potential for job creation;
-

34) The Protection and Preservation of Ancient Monuments Law (2015)

Purpose; To ensure the protection of 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.

- Section 15 - The project proponent has to obtain the prior permission of Department of Ancient Research Museum if the project area is in the prescribed area of Ancient monument.

- Sub-section (f) of section 20 - The project proponent has to obtain the prior permission, by written, of Department of Ancient Research and Museum if the project proponent disposes the chemical and solid waste in the Ancient Monument area.

CHAPTER 6 - DESCRIPTION OF THE SURROUNDING ENVIRONMENT

The objective of baseline data collection is to establish the meaningful and relevant information of the environmental as primary data collection. The methodology had been designed to know the nature and degree of pollution from various sources in the environment. Baseline environmental parameters were defined according to the guideline which applies to projects. All necessary criteria such as site selections for sampling and analysis of ambient air quality, water quality and noise and vibration level of the project site were identified by environmental specialists of E Guard.

i) **Onsite Measurement and Analysis** – Baseline environmental parameters such as wind speed, wind direction, air quality, water quality and noise level of the project were measured by using the appropriate environmental quality measuring equipment.

ii) **Secondary Data Collection and Analysis** – Some data such as socio-economic condition, physical/biological environment and weather data were collected from official township data from the General Administrative Department and analyzed by the study team.

Onsite measurements are conducted by using the following environmental quality measuring equipment.

Table 6.1 - Environmental Quality Measuring Equipment

No.	Name and Model of Instrument	Parameters	Measuring Instrument
1.	**Haz-Scanner EPAS**	- PM_{10}, PM $_{2.5}$, NO_2, Temperature, and Relative Humidity	
2.	**Digital Sound Level Meter**	- Noise	
3.	**Soil Sampler (One Piece Auger)**	- Soil	

6.1 Physical Environment

6.1.1 Climate

Myanmar has a tropical to sub-tropical monsoon climate with three seasons:

(i) hot, dry-inter-monsoonal (mid-February to mid-May)
(ii) rainy southwest monsoon (mid-May to late-October)
(iii) cool relatively dry northeast monsoon (late-October to mid-February)

Climates varies across Myanmar's different ecological zones, controlled mainly by distance from the coast and altitude. Generally, temperatures from various regions are high and relatively the same all the year round. Myanmar's central zone is drier (typically 500 – 1,000 mm of rain per day) and experience greater temperature variation, but temperature can exceed 40°C.

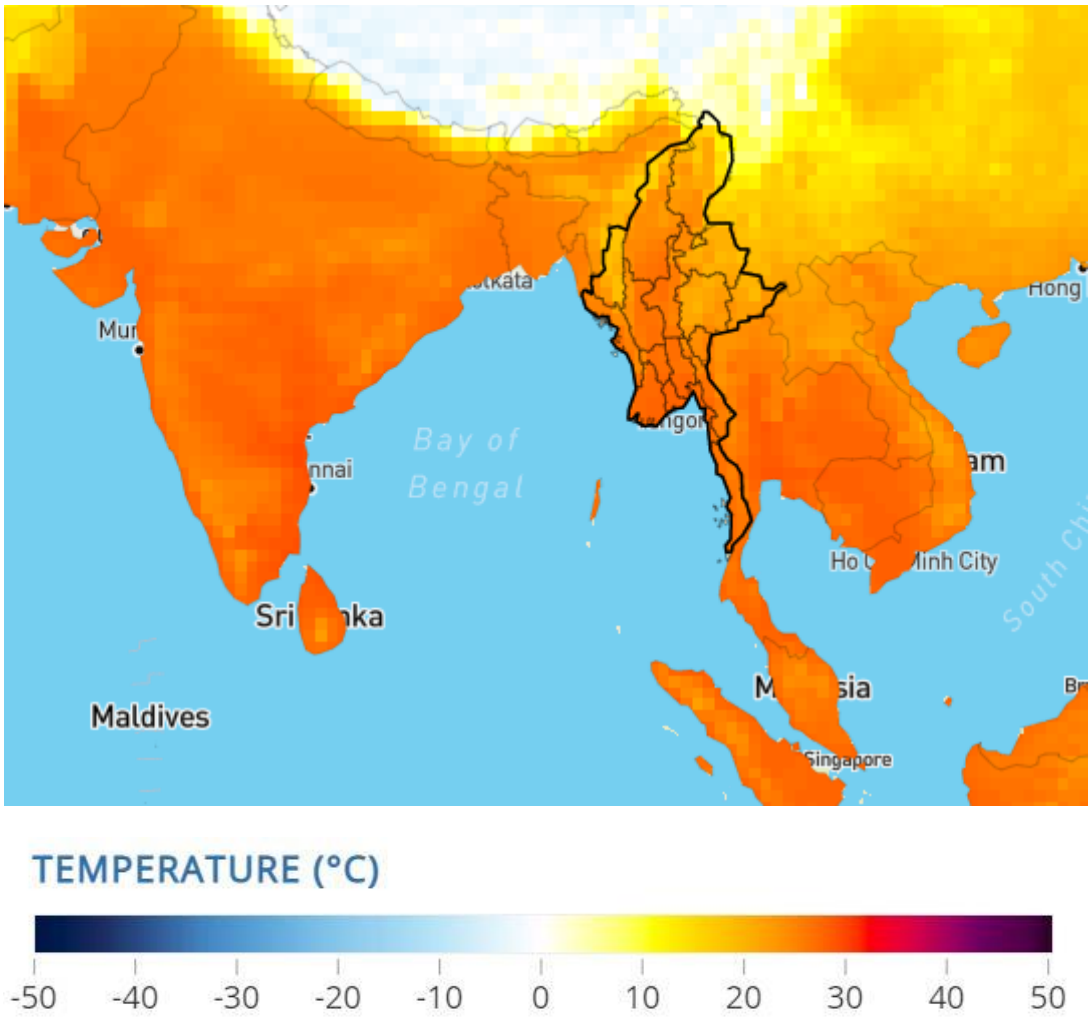


Figure 6.1 Observed Annual Mean Temperature of Myanmar for 2020

Source: Climate Change Knowledge Portal of World Bank

Temperature and Rainfall of Project Located Area: the proposed project is located at Pwint Phyu Township, Minbu District, Magway Region, Myanmar. Pwint Phyu Township has dry and tropical climate. The highest temperature of that region is 42°C and the lowest is 13°C. Rainfall and temperature of Pwint Phyu Township from 2016 to 2019 is described as followed.

Table 6.2 Rainfall and Temperature of Pwint Phyu Township

Number	Year	Rainfall		Temperature	
		Rainy Days	Total Rainfall (Inches)	Summer (°C)	Winter (°C)
				Highest	Lowest
1.	2016	53	31.67	41	13
2.	2017	50	37.94	42	14
3.	2018	47	37.42	42	13
4.	2019	45	22.64	42	13

Source: Pwint Phyu Township Data (GAD 2019)

6.1.2 Wind Speed and Wind Direction

The following figure describes the wind speed, wind direction and wind class frequency of the proposed project site on 26th to 27th May 2022. According to the observed data, wind below mainly from southwest with the highest speed of 5 m/s in the project site.

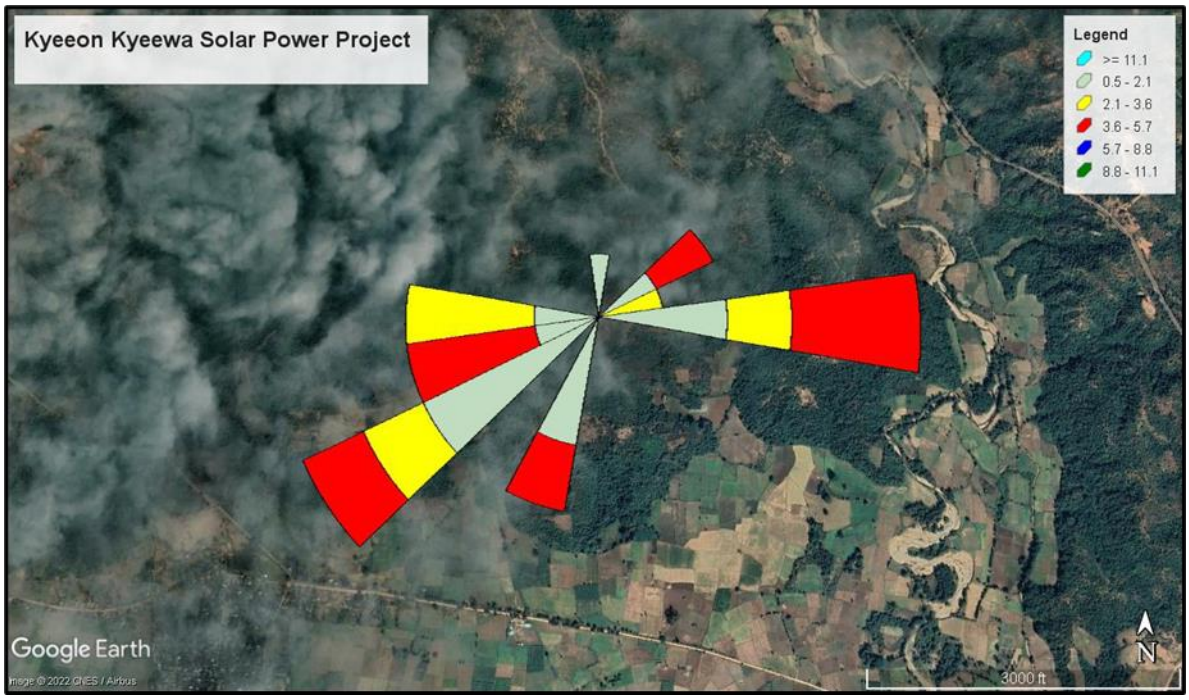


Figure 6.2 Wind Speed and Wind Direction at Air Monitoring Point in the Project Site

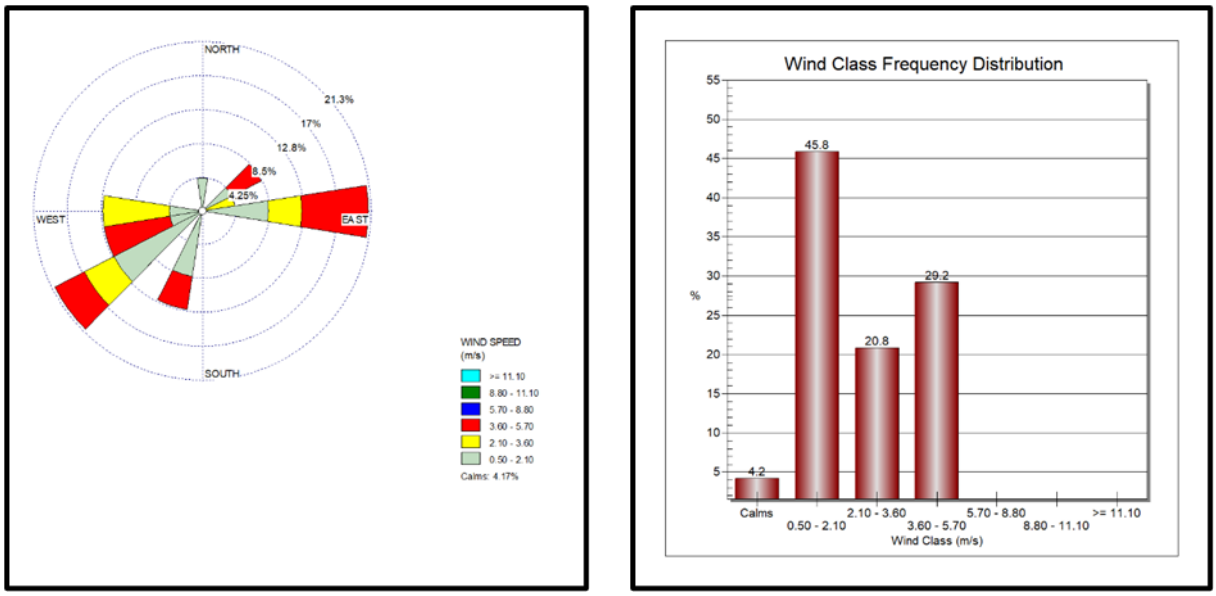


Figure 6.3 Wind Speed Data and Wind Class Frequency Distribution at Monitoring Point in the Project Site

6.1.3 Natural Disasters

Myanmar is exposed to multiple natural hazards including cyclones, earthquakes, flood, and fire, and it has been periodically exposed by natural disasters. The most frequent natural disasters encountered in Magway Region are earthquakes and flood.

Earthquake Intensity

The Sagaing fault is a major tectonic structure that cuts through the center of Myanmar. The Sagaing Fault broadly divides the country into a western half moving north with the Indian Plate and an eastern half attached to the Eurasian Plate.

The Sagaing fault is a major tectonic structure that cuts through the center of Myanmar. The Sagaing Fault broadly divides the country into a western half moving north with the Indian Plate and an eastern half attached to the Eurasian Plate. Earthquake intensity of the area in Myanmar can be seen in the following figure.

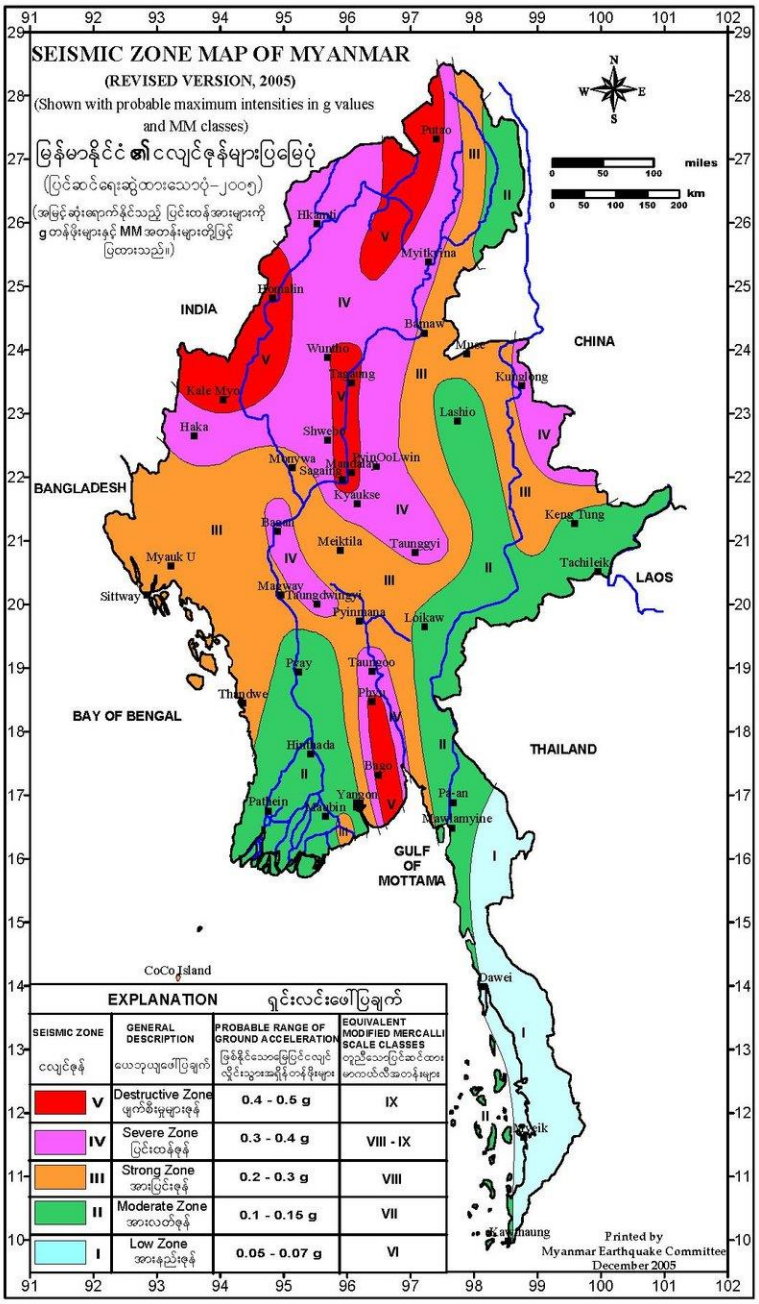


Figure 6.4 Seismic Zone Map of Myanmar

The approach is mainly empirical and historical in the sense that it makes use of past seismic events and history to make educated predictions about region wide intensities in the future. It is hoped that a probabilistic seismic risk (or earthquake hazard map) on horizontal ground acceleration should be considered in the design. As shown in the map, five seismic zones are demarcated and named (from low to high) **Zone I (Low Zone), Zone II (Moderate Zone), Zone III (Strong**

Zone), Zone IV (Severe Zone), and Zone V (Destructive Zone), mainly following the nomenclature of the European Macro Seismic Scale 1992.

Although Pwint Phyu Township is not situated on severe zone of the Sagaing Fault, it is in strong earthquake zone where likely to encounter destructive magnitude. As per map, the proposed project is located within the Zone III (Strong Zone).

Therefore, the project proponent shall consider all structural designs of the building and electrical equipment installation such as solar panels, inverters, transformers, and overhead transmission line in order to prevent earthquake risks. Emergency evacuation plan should be prepared in order to earthquake emergency response. **(Earthquake emergency response plan is described in chapter 8 Emergency Response Plan Sector.)**

6.1.4 Topography

Pwint Phyu township compromised plain regions and hilly regions. Two third of township area is plain region and the western part of region, one third of the area, is covered by hills and mountains. Famous mountains of this region are Lwan Mountain, Mya Kyaing Mountain and, Than Sel Mountain. With regards to topography of the proposed project, site condition is nearly flat and plain condition because altitude of surrounding area of the project ranges between 165 m and 175 m. The following figures shows contour map and 3D map of surrounding area of the project.

6.1.5 Hydrology

Pwint Phyu Township is a mountainous and hilly region, streams, and rivers flow from North to South. Mone Creek flows through the middle of Pwint Phyu Township from West to East. Ayeyarwaddy River flows from North to South. Mone Creek is a vital fresh water source for agriculture, and household usages. During summer, the water level of Mone creek reaches to 3 ft and there are only small canoes and boats can be used for transportation.

6.1.6 Soil Condition

The location where the soil sample was collected had been cleared for project site. The site used to be paddy fields before. Collected soils sample are visually verified with soil classification map of Magway Division which is shown in the figure below. The color of top soil sample is dark red brown and sub soil is light brown color. The texture of the soils is medium to heavy loamy and the top soil contain moderate amount of plant available nutrients.

Soil types mostly found in Point Phyu Township are light forest soil and yellow brown forest soils. They mainly occur in the region of gentle slopes of low hills and foot hills at the elevation of 300 to 1500 feet above sea level. The project site has yellow brown soil closely connected with the red brown forest soils in their distribution and usually replacing them down the slope.

The soil types at the project are typical for the monsoon or tropical mixed deciduous forests and contain more percentage of clay and humus than the Red Brown Forest soils. The soil is slightly acid with the pH value ranging from 5.0 to 6.0 and have moderate porosity and the water

holding capacity is 20 to 30 %. The majority of these soils are classified as good garden lands and suitable crops for this type of soil are rubber, mango, pineapple, oil palm and orchards.

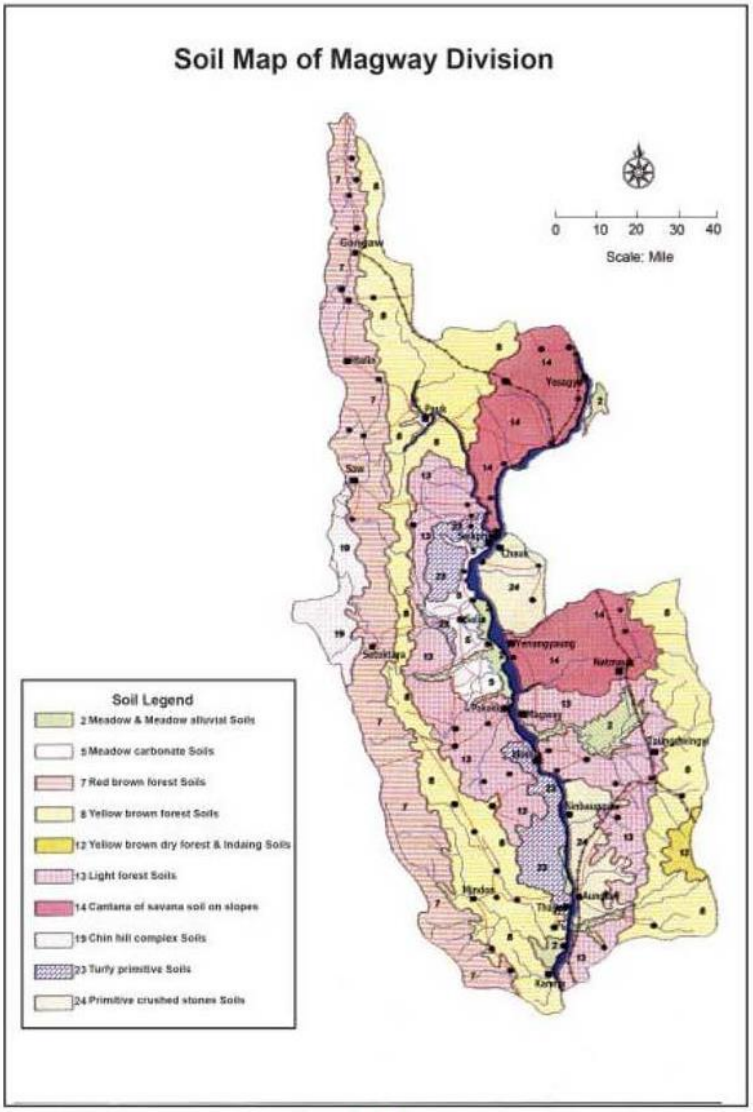


Figure 6.5 Soil Map of Magway Division

6.1.7 Air Quality

The emissions of dust particles and gases were monitored for 24 hours continuously at the selected site using the Portable Haz Scanner Environmental Parameter Air Station (EPAS) within the project. The EPAS provides direct readings in real time with data logging capabilities. The following table and figure describe detail location of air quality monitoring point for the proposed project.

Table 6.3 Location of Air Quality Point

Date	Item	GPS Coordinates	Locations	Parameters
26.05.2022 – 27.05.2022	Air Monitoring Point	Lat: 20° 20' 14.87" N Long: 94° 28' 08.47" E	In the project site	Gas Emission: CO, CO_2, SO2, NO_2 Dust Emission: PM_{10}, $PM_{2.5}$

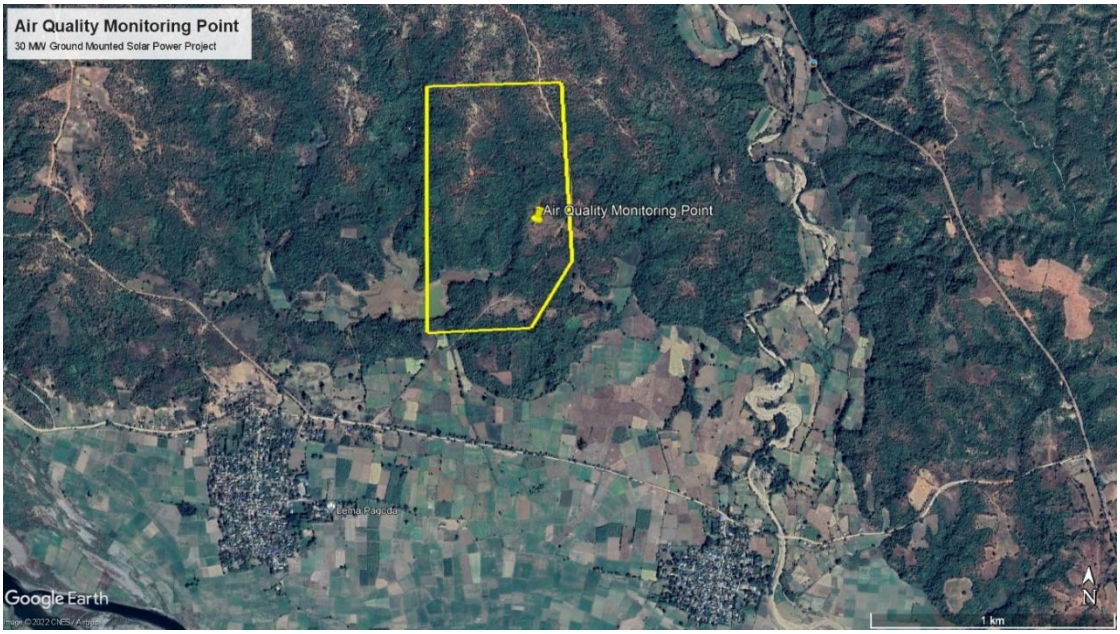


Figure 6.6 Location of Air Quality Monitoring Point

The following figures illustrate air quality monitoring for the proposed project site.

Figure 6.7 Air Quality Monitoring at the Proposed Project Site

Air quality monitoring was carried out in the project site on 26th to 27th May, 2022. The observed values of parameters are compared with National Environmental Quality (Emission) Guideline, National Ambient Air Quality Standards and American Conference of Governmental Industrial Hygienists. The following table describes the detail results of air quality monitoring which are compared with respective guideline values for the proposed project.

Table 6.4 Observed Values of Air Monitoring in the project site

Parameter	Observed Value	Guideline Value	Guideline	Unit	Averaging Period
SO_2	0.044	20	NEQG	µg/m^3	24 hours
NO_2	25.55	200	NEQG	µg/m^3	1 hour
CO	0.008	9	NAAQS	ppm	8 hours
CO_2	400.99	5000	ACGIH	ppm	8 hours
PM_{10}	20.62	50	NEQG	µg/m^3	24 hours
$PM_{2.5}$	9.01	25	NEQG	µg/m^3	24 hours

According to the comparison results of gaseous emissions, the observed values of SO2 (0.044 µg/m3), NO2 (25.55 µg/m3), CO (0.008 ppm) and CO2 (400.99 ppm) are lower than the respective guideline values. For dust emissions, the observed values of PM10 (27.11 µg/m3) and PM2.5 (9.00 µg/m3) are also within the guideline values of NEQEG. Therefore, it can be considered that the ambient air quality of the proposed project is quite good before the implementation of the project. It is anticipated that ambient air quality will be decreased during the construction phase of the proposed project because of construction activities implementation. The following figures describe detail air quality monitoring results for 24 hours continuously at the proposed project.

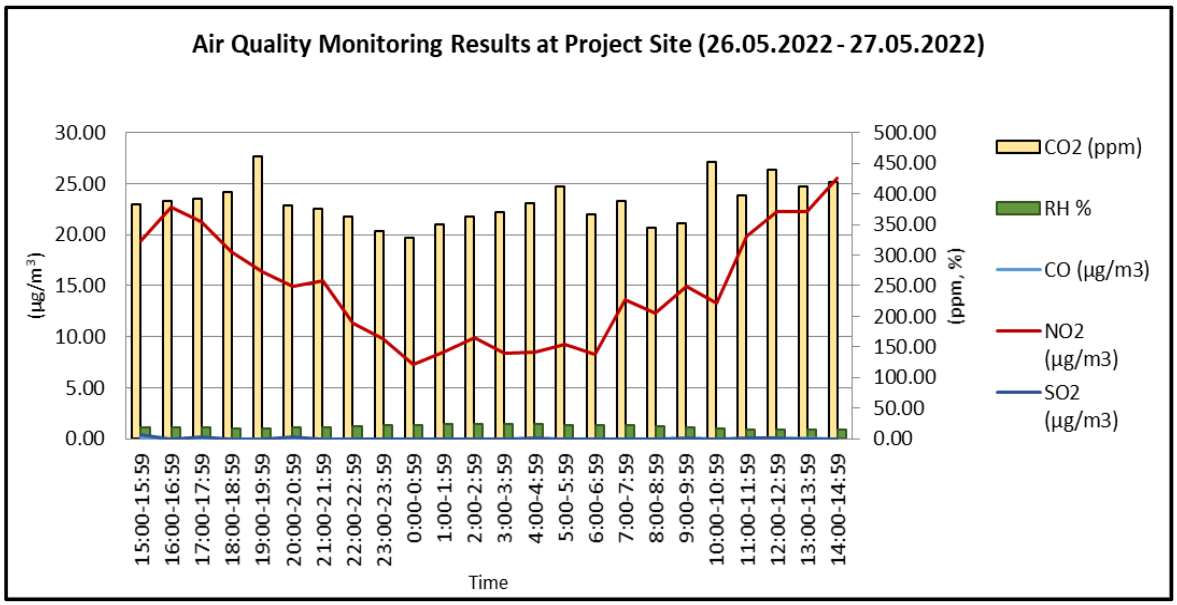


Figure 6.8 Detail of Gaseous Emission Monitoring Result in the project site

According to the results of gaseous emissions, the emission level of NO_2 increased significantly during working hours (between 8:00 and 20:00) and CO_2 emission level is found more than 20 µg/m^3 for almost the whole period. However, low emission of Relative Humidity (RH) is found very low during 24 hours continuously. Other perimeters of CO and SO_2 is nearly zero and almost negligible.

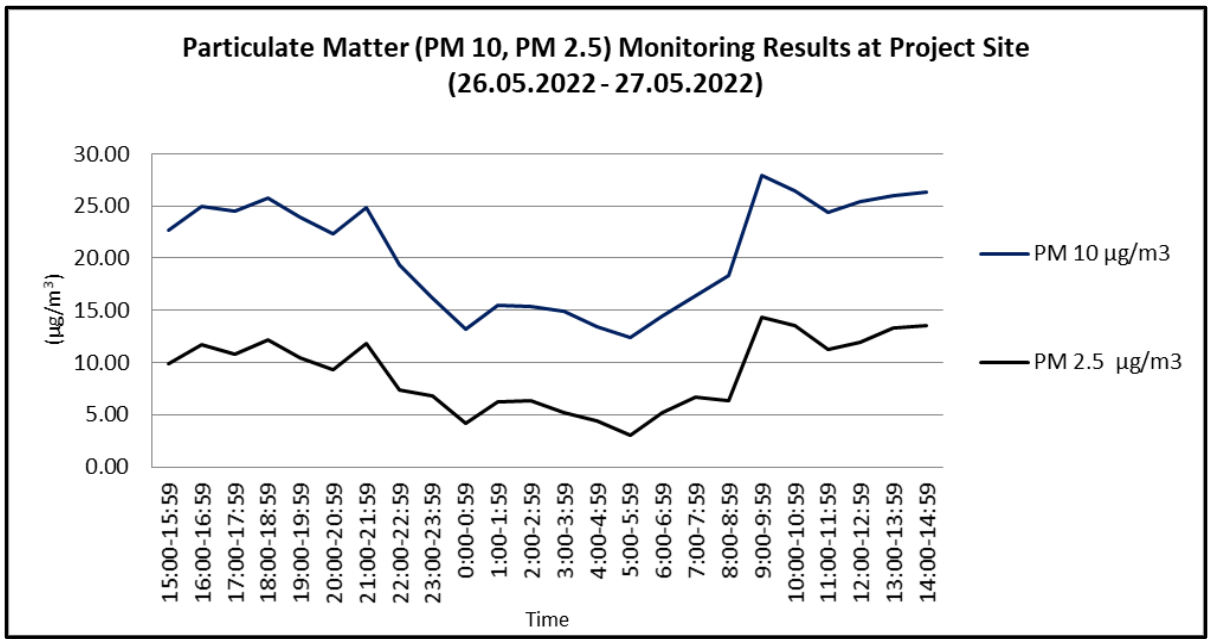


Figure 6.9 Detail of Dust Emission Monitoring Result in the project site

According to the result of dust emission, dust generation of PM_{10} and $PM_{2.5}$ increases significantly during working hours of 9:00 to 19:00 and a sudden drop has been occurred during 21:00. After that, emission decreases steadily and increases again at 6:00.
According to the results, the increase of dust emission occurs during operation hours and mitigation measures should be established to control dust emission.

6.1.8 Water Quality

The existing groundwater and surface water quality was tested by two methods: onsite measurement and sampling water in order to compare the difference between quality before and after implementation of the project.

For ground water measurement, water supply for the proposed project will be taken from tube wells within the project site. However, tube wells are not dug yet at the time of water quality measurement and water for construction has been bought from a well of nearest village, Kyal Chan Village. Therefore, the water sample was taken from the tube well of Kyal Chan Village for groundwater quality measurement.

For surface water: Surface water sampling was conducted at Mezali Weir which was 2.8 kilometer away from proposed project location. Although surface water sampling point is out of 1 km scope area, water ways from temporary creeks and streams near the project site flow into Mezali Weir through Mone Stream. As Pwint Phyu Township was an irrigation area for agriculture, Mezali Wier is an important fresh water source for local people and it is necessary to protect water pollution.

The survey team from E Guard sampled ground and surface water on 26th May, 2022 and sent to respective laboratories for measuring the required parameters. World Health Organization (WHO) standards are used to compare for data interpretation. The baseline data of water quality comparing with WHO drinking water quality standards are described in the following table. Water quality results from laboratories test and on-site measurement are attached in Appendix-8.
On-site water quality measurements were conducted using HORIBA U-50, Multipara meter Water Quality Meter. Water samples were collected using appropriate sampling equipment and procedures. The sampling team has pre-arranged with the labs in Yangon for analysis and logistic arrangement made to reach the preserved samples with unique IDs to the designated labs within 48hrs.
The following laboratories were used for analysis of sampled water.

1. ISO Lab, No-18, Lanthit Road, Insein Township, Yangon. Tel; 01 540 955, 732251575
2. SGS (Myanmar) Limited, Mineral Services, 79/D, Bo Chein Street, 6 ½ Mile, Hlaing Township, Yangon, Myanmar. Tel; +95(1) 654 795

The location of water quality measurement for groundwater and surface water with measuring perimeters are described as below.

Table 6.5 Locations of Surface Water and Ground Water Quality Sampling Points

Item	GPS Coordinates	Location	Parameters
Surface Water Quality Sampling Point	Lat: 20° 18' 59.03"N Long: 94° 29' 29.05"E	From Mel Za Li Dam	Biochemical Oxygen Demand, Chemical Oxygen Demand, pH, EC, Total Dissolved Solid, Salinity, Dissolved Oxygen, Turbidity, Total Suspended Solid, Total Phosphorus, Total Nitrogen, Total Coliform Count, Oil & Grease, Potassium
Ground Water Quality Sampling Point	Lat: 20° 19' 31.19"N Long: 94° 28' 36.26"E	From Kywal Chan Village	

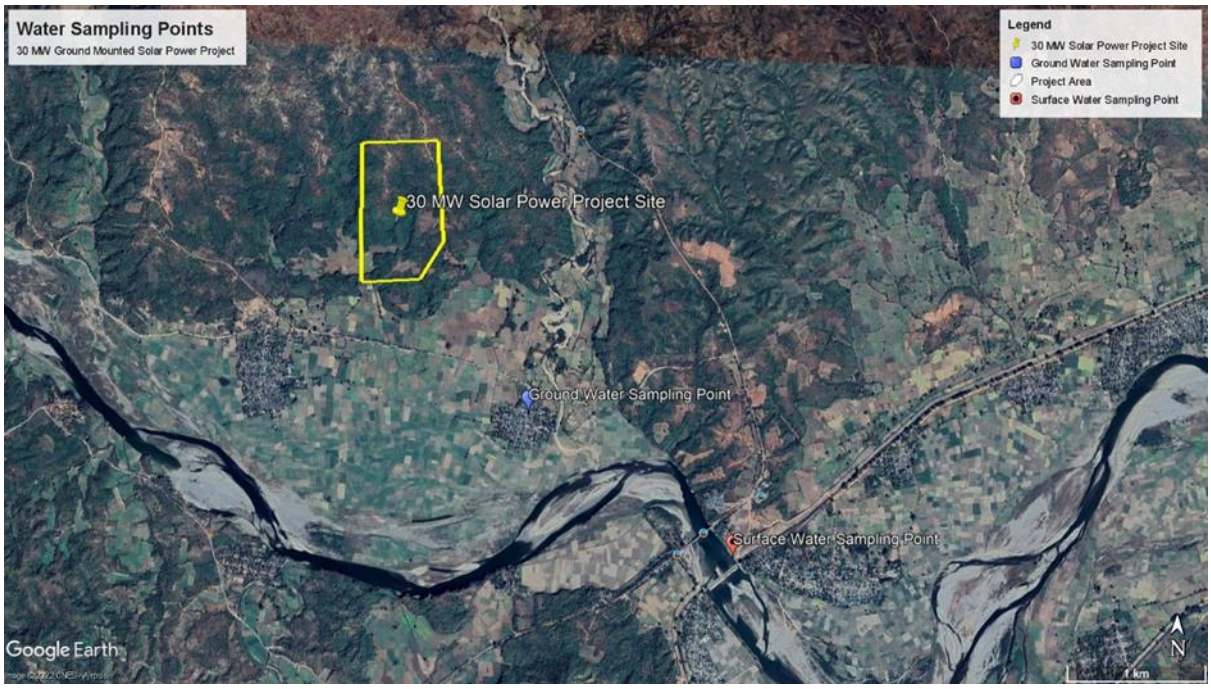


Figure 6.10 Location of Ground and Surface Water Sampling

On Site Surface Water Quality Measurement

Surface Water Sample Taking

On Site Ground Water Quality Measurement

Ground Water Sample Taking

Figure 6.11 Onsite Water Quality Measurements

The results of the observed parameters are compared with National Environmental Quality (Emission) Guideline. The results of both ground water and surface water are under the guideline limit.

Table 6.6 Results of Onsite Water Quality Measurement

Location	pH	Electrical Conductivity			DO (mg/l)	Turbidity (NTU)	Oxidation Reduction Potential (ORP)	Depth (ft)
		EC (ms/cm)	TDS (g/l)	Salinity (ppt)				
Surface Water	7.0	0.03	0.217	0.2	6.58	36.5	387	-
Ground Water	7.5	0.07	0.465	0.4	3.33	2.7	438	-

Table 6.7 Comparison of Lab Results and National Emission Quality Emission Guideline

Item	Unit	Ground Water	Surface Water	National Environmental Quality (Emission) Guideline
Biological Oxygen Demand (BOD)	mg/l	2	12	30
Chemical Oxygen Demand (COD)	mg/l	32	64	125
Chromium	mg/l	<0.1	<0.1	-
Total Nitrogen	mg/l	<1	<1	10
Total Phosphorus	mg/l	0.04	<0.01	2
Potassium	mg/l	1.38	1.48	-
Oil and Grease	mg/l	<5	<5	10
Total suspended solid (TSS)	mg/l	5	43	50
Total coliform bacteria	CFU/100ml	4	18	400

According to the observed values, most of the parameters are within the limit of WHO standard, and there is no any pollution for water resource before and during construction phase.

6.1.9 Noise Level

Noise level LAeq (dBA) was measured at the selected locations on 26th to 27th May 2022 regarding as source and receptor. Duration and frequency were monitored for 24 hours continuously at the selected locations by using the digital sound level meters. Noise level was measured at the same time with air quality measurement. Measurement range of noise level measuring meter is 20-130 dBA. The environmental noise quality was recorded at every 1 minute for 24 hours. The following table and figure describe detail locations of noise level monitoring at the proposed project.

Table 6.8 Location of Noise and Vibration Points

Item	GPS Coordinates	Locations	Parameters
Noise Point 1	Lat: 20° 20' 14.89" N Long: 94° 28' 08.37" E	In the project site (Source)	*Noise: (LAeq (dB (A))* 1hr interval for 24 hours) *Vibration: (Lveq (dB)* 1hr interval for 24 hours)
Noise Point 2	Lat: 20° 19' 30.91" N Long: 94° 27' 31.51" E	At Lema Village (Receptor)	

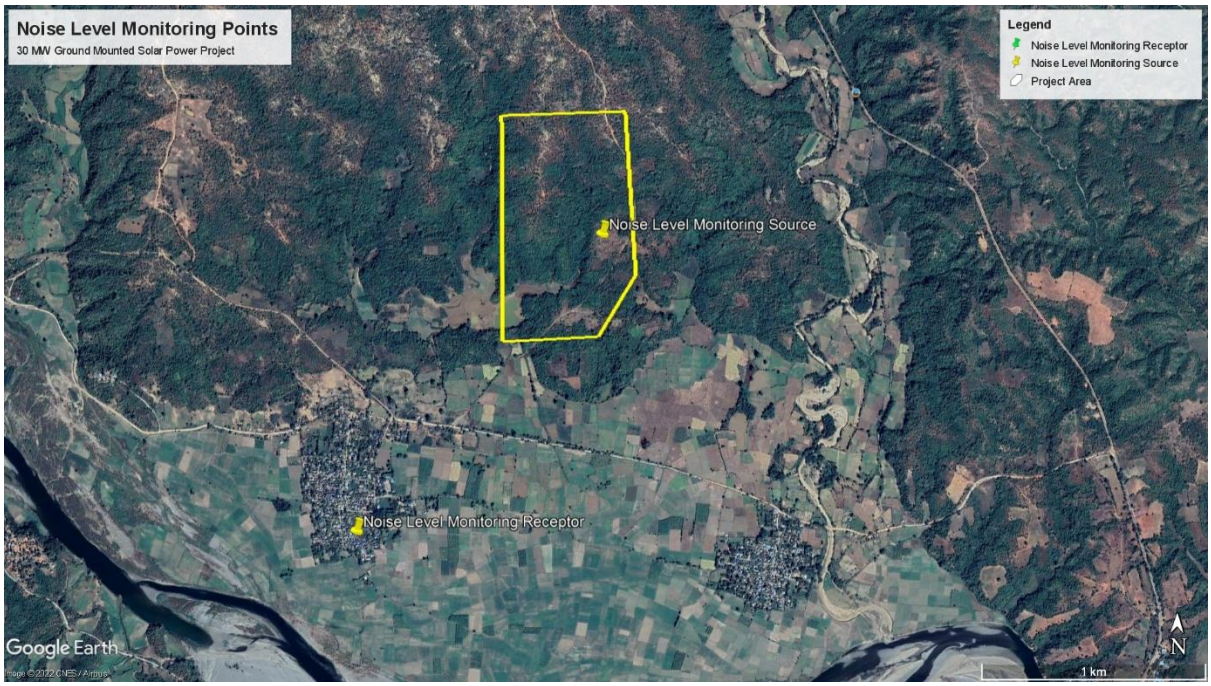


Figure 6.12 Location of Noise Level Monitoring

Figure 6.13 Insite Air and Noise Level Monitoring

Hourly averaged noise levels in energy weighted values of day and night time averages are shown in the following table. The results are compared with National Environmental Quality (Emission) Guidelines.

Table 6.9 Noise Level Monitoring Results

Location	Measured Values (dB (A))	
	Day Time (07:00-22:00)	**Night Time (22:00-7:00)**
Point 1	56.12	50.32
Point 2	47.26	43.12
Noise Level Standards from National Environmental Quality (Emission) Guideline		
Standard Value (NEQG) for industrial, commercial	70	70
Standard Value (NEQG) for residential	55	45

Although the noise level of source is higher than standard value of residential area day with day time for 56.12 dB(A) and night time for 50.32 dB(A), nearest residential area of Lema Village is about 1.58 km far away from project site and this can be considered out of range for source noise level. With regards to noise level at receptor, the results are lower than standard value not only at day time, 47.26 dB(A) but also at night time, 43.12 dB(A). Therefore, it can be considered that the noise level at the proposed project is within the guideline value of NEQEG before the implementation of the project and noise level from construction phase will not be affected to near residential areas. The following figures illustrate detail noise level at source and receptor of the proposed project.

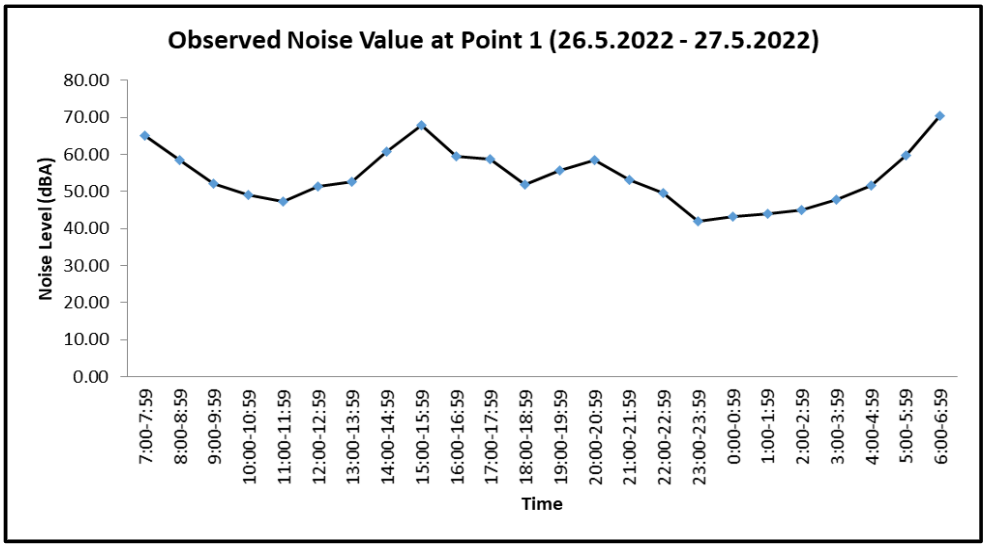


Figure 6.14 Detail Noise Level Monitoring at Source (Project Site)

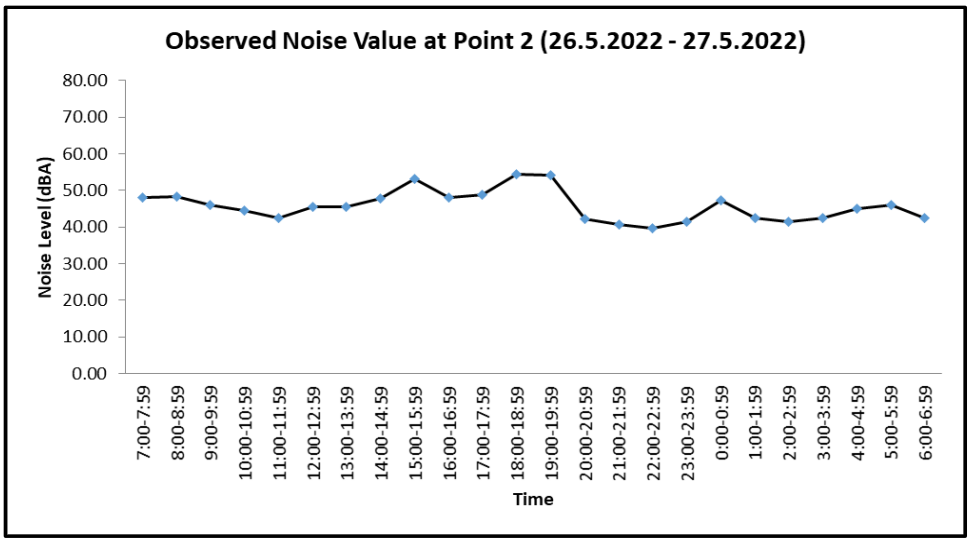


Figure 6.15 Detail Noise Level Monitoring at Receptor (Lema Village)

According to the results, peak level of noise generation at source can be occurred between 6:00 to 7:00, 7:00 to 8:00 and 15:00 to 16:00. Also, for receptor, peak noise can be occurred between 14:00 to 20:00.

6.2 Biological Environment

The vegetation in the project area is dense, and the main vegetation types are small trees, shrubs, etc. This vegetation is widely distributed in the surrounding areas and have strong secondary nature. According to the preliminary field survey, the plants affected by the construction of PV power station are mostly local common species, which are widely distributed in the surrounding areas. The construction of the project including transmission line will not affect the existing flora in this area although it will only lead to the loss of population of individual species.

Table 6.10 Biological Environment of the Proposed Project

Biological Resources	Existing Conditions
Fisheries and aquatic biology	No fisheries and aquatic biology existing within the scope of the study
Wildlife	No wildlife existing within the scope of the study
Natural Vegetation	Only bushes and small trees are found within the scope of the study
Rare or endangered species	No rare or endangered species existing within the scope of the study
Protected areas	No protected areas existing within the scope of the study

Biological Resources	Existing Conditions
Coastal resources	No coastal resources existing within the scope of the study

6.3 Socio-economic Environment

6.3.1 Demographic Profile

The following table describes the number of houses, households, quarters, village tracts and villages in Pwint Phyu Township.

Table 6.11 Administrative Structure of Pwint Phyu Township

No.	Subject	Houses	Households	Quarters	Village Tracts	Villages
1.	Urban	1,327	1,517	4	-	-
2.	Rural	39,377	42,031	-	52	204
Total		**40,704**	**43,548**	**4**	**52**	**204**

Source; Pwint Phyu Township Data (GAD, 2019)

The detail population status of Pwint Phyu Township is described in the following table.

Table 6.12 Population Status of Pwint Phyu Township

No.	Subject	Over 18 years old			Under 18 years old			Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
1.	Urban	2,066	2,541	4,607	904	965	1,869	2,970	3,506	6,476
2.	Rural	52,859	60,901	113,760	29,674	31,480	61,154	82,533	92,831	174,914
Total		**54,925**	**63,442**	**11,836**	**30,587**	**32,445**	**630,23**	**85,503**	**95,887**	**181,390**

Source; Pwint Phyu Township Data (GAD, 2019)

The detail number of ethnic people who live in Pwint Phyu Township is described in the following table.

Table 6.13 Ethnic Status of Pwint Phyu Township

No.	Ethnic	Township Total Population	Number of Ethnic People	Percentage of Total Population
1.	Kachin	181,390	1	0.00055
2.	Kayah	181,390	-	-
3.	Kayin	181,390	-	-
4.	Chin	181,390	1,620	0.89
5.	Mon	181,390	-	-
6.	Bamar	181,390	179,377	98.89
7.	Rakhine	181,390	3	0.0016
8.	Shan	181,390	-	-

9.	Others	181,390	389	0.22
		181,390	**181,390**	**100**

Source; Pwint Phyu Township Data (GAD, 2019)

The detail religious status of Pwint Phyu Township is described in the following table.

Table 6.14 Religious Status of Pwint Phyu Township

No.	Township	Buddhism	Christian	Hinduism	Islam	Others	Total
1.	Pwint Phyu	180,957	2	64	367	-	181,390
Total		**180,957**	**2**	**64**	**367**	**-**	**181,390**

Source; Pwint Phyu Township Data (GAD, 2019)

6.3.2 Socio-economic Profile

Socio-economic profile of Pwint Phyu Township is summarized as the following table.

Table 6.15 Socio-economic Condition of Pwint Phyu Township

Socio-economic Profile	
Employment Condition	Workable Population: 96,707 Workers population: 92,800 Jobless Population: 3,907 Jobless Percentage: 4.04 %
Per Capita GDP	1343,532 MMK (2016-2017) 1255,768 MMK (2017-2018) 1473,227 MMK (2018-2019)
Number of Industries	Public Factory - 1 Private Factories - 213 Cottage Industries - 169
Higher Education	School of Agriculture Science
Basic Education	Pre-primary Schools – 145 Primary Schools – 122 Post-primary Schools – 17 Sub-middle Schools – 5 Middle Schools – 7 Sub-high Schools – 16 High Schools – 9 Monastery Education - 3
Public Learning Facilities	Public Libraries – 32 Government Libraries - 1 Private Libraries – 165
Literacy Percentage	100 %

Public Health Facilities	Public General Hospitals – 4 Private General Clinic – 5 Public General Clinic - 35
transportation	Main transportation for public and private sectors is road. Railway transportation can be accessed between Pwint Phyu and Minbu Township with 3 railway stations. There was no access for water and air transports.
NGOs/INGOs and Organizations	NGOs – 1 INGOs – 4 Local Organizations - 16

Source; Pwint Phyu Township Data (GAD, 2019)

6.4 Land use Status

The following table describes the land use status of Pwint Phyu Township.

Table 6.16 Land Use Status of Pwint Phyu Township

No.	Type of Land	Area (Acres)
1.	**Agriculture Land**	113,268
	Paddy land	63,115
	Dry land	40,946
	Alluvial	28,844
	Garden Land	-
	Dani	-
2.	Fellow Land	168
	Paddy land	-
	Dry land	168
	Alluvial	-
	Garden Land	-
	Dani	-
3.	Grazing Land	1,367
4.	Industrial Land	609
5.	Urban Land	109
6.	Rural Land	5,733
7.	Other Type of Land	16,435
6.	Reserved Forests/Protected Public Forests	71,862
7.	Virgin Land	30,637

8.	Wild Land	15,335
9.	Non-Agricultural Land	25,943
Total		**301,466**

Source; Pwint Phyu Township Data (GAD, 2019)

6.5 Dams, Wiers and Canals for Agriculture

As Pwint Phyu Township is situated in dry tropical region and the main business of local people is agriculture, irrigation system and fresh water access for cultivation is important for the whole region. Dams and weirs are main water storage facilities and water access has been accomplished by long canals. The following tables show main water storage facilities for Pwint Phyu Township.

Table 6.17 Dams of Pwint Phyu Township

No.	Name of Dam	Character of Facility	Water Storage Capacity (Cubic Feet)	Water Supply Area (acres)
1.	Chaung Ma Gyi	Earth Dam	1,000	175
2.	Ko Yin Gyi	Earth Dam	408	82
3.	Kyauk Wet Pout	Earth Dam	1,505	250
Total			**2,923**	**507**

Source; Pwint Phyu Township Data (GAD, 2019)

6.6 Historical and Well-known Places

An ancient historical monastery with ancient wooden sculptures has been situated in Lel Kaing Village, about 100 years old, which was the only one ancient well-known place in Pwint Phyu Township.

CHAPTER 7 - IDENTIFICATION, ASSESSMENT AND MITIGATION MEASURES OF POTENTIAL IMPACTS

7.1 Objectives of the Study

The objectives of the study are to identified the potential impacts on the natural environment and human beings due to the project activities, to highlight the significance of impacts with assessment parameters and its scales and to formulate mitigation measures to eliminate or reduce adverse potential impacts on the surrounding environment.

7.2 Phases of the Project

Potential impacts for the proposed projects are normally differentiated into three main categories, namely; Construction phase, Operation phase and Decommissioning phase:

Construction Phase: includes construction of switchyard and multiple-use building, installation of PV modules, tracking brackets, inverters, transformers, poles of overhead transmission line and stringing cables of overhead transmission line, which will connect to the Kyeeon Kyeewa Substation. The construction period of the proposed project is 6 months.

Operation Phase: includes generating electricity from solar energy and distributing to the Kyeeon Kyeewa Substation through 132 kV overhead transmission line by 132 kVA step-up transformer. The operation period of the proposed project is 20 years.

Decommissioning Phase: after operation period, the project proponent will extend operation period of the project many times to generate electricity from solar energy. Therefore, impacts identification, impacts assessment and mitigation measures formulating for decommissioning phase of the project is excluded in this Environmental Management Plan Report.

7.3 Identification of Impacts

There may be some positive and negative impacts on surrounding environment of the proposed site due to the implementation of proposed project. The possible environmental impacts are identified based on the analysis of environmental baseline information and project activities. Most of the identified impacts were quantified to the extent based on the professional judgment. Each of the environmental issues was examined in terms of their current conditions, likely impacts during construction and operation phases, however, consideration for decommissioning phase of the project is excluded in this study.

7.4 Positive Impacts

7.4.1 Construction Phase

Job Opportunities

Several job opportunities such as civil engineers, electrical engineers, surveyors, electricians, machine operators, drivers, bricklayers, carpenters, and general labors will be created. Security services, cleaning and waste collection are some of the services that will benefit indirectly. Especially, the proposed project will create job opportunities for causal labors from local community. The advanced technology, skill, knowledge, and experience of local community will be improved by cooperating with experienced engineers and workers from the project. The net effect of job opportunities creation is livelihood and living standard improvement of local community and poverty reduction.

Infrastructure Development

New development of roads and bridges for the purpose of construction material transportation and machines mobilization will lead to better transportation system for local villages. Construction of storm water canals, gutters and curvet structures will protect floodings and destruction of roads on local area.

Business Opportunities

The construction processes of the project require a huge quantity of building and road materials such as sand, gravel, stones, woods, cement, and other construction materials. This will provide business opportunities for local markets and will increase their income. The construction of the project will also provide several business opportunities for small-scale traders and vendors such as food stalls and cold drink stalls near the project site.

7.4.2 Operation Phase

Job Opportunities

The operation processes of the project will create job opportunities for several workers such as electrical engineers, electricians, managers, cleaners, securities, and drivers. Especially, local workers and local graduates will have the chance to obtain job opportunities.

Revenue for National and Local Government

National and local government will earn payment of relevant taxes such as properties tax, income tax and other fees from the proposed project throughout operation lifespan of the project.

CSR Developments

CSR activities will be considered for surrounding local community by providing to schools, clinics, roads, and bridges throughout operation lifespan of the project. This will lead to improvement of local community due to implementation of the proposed project.

Carbon Emission Reduction and Resource Conservation

Electricity generation from solar energy emit insignificant carbon into the atmosphere. This leads carbon emission reduction that compared to other electricity generations such as coal, oil, and gas power plant. With fewer carbon emissions, solar power plant has a much lower effect on climate change than fossil fuel alternatives do. Besides, the proposed project does not require any solid fuel such as coal, oil, or gas mining activities for generating electricity, which has huge benefits for resources conservation.

Green Ecology

Although solar power continues to account for a small share of overall energy supply, the residential and commercial sectors are slowly embracing renewable energy, especially solar energy. As solar power plant implementation prices continue to decline, it is expected that solar energy systems become more prevalent and lead to green economy.

7.5 Negative Impacts

The following figure briefly describes the potential negative impacts of the proposed project. There are four main types of impacts; impact on environmental resources, impact on ecological resources, impact on human and impact of waste generation.

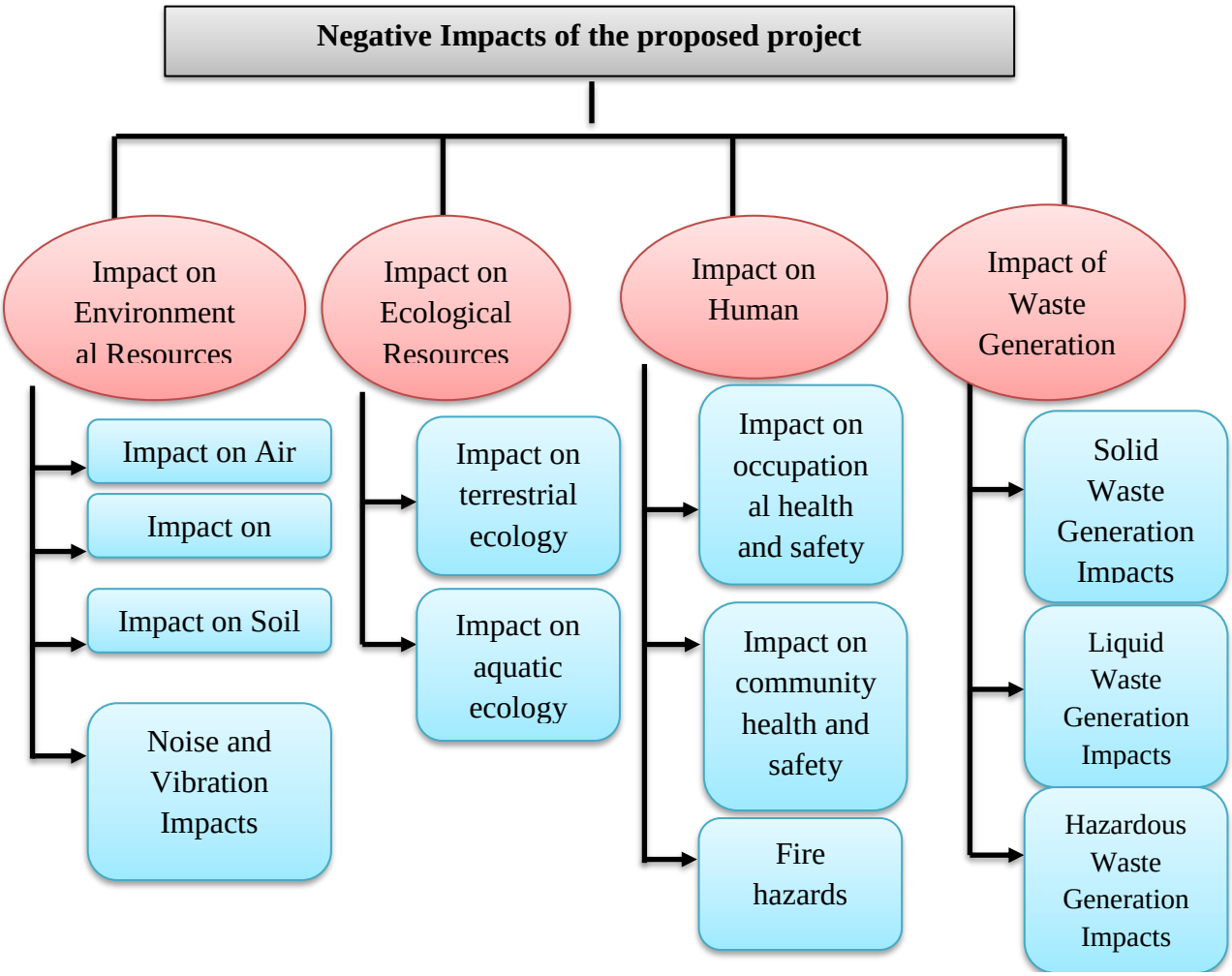


Figure 7.1 Potential Negative Impacts of the Proposed Project

Impact on Airs

During the construction phase, site clearing and earth works activities, which will get worse during dry season, will be the main reason of dust emission. Operating construction machines and vehicles such as loaders, excavators, dumpers, bulldozers, backhoes, road rollers, water bowsers, cranes, trucks, and concrete mixers as well as operating generators will cause gaseous emission and dust emission into the air. It is also anticipated that vehicles which used for delivering electrical equipment such as PV modules, tracking brackets, inverters, transformers and cables and construction materials to the project site will also emit dust and gases.

During the operation phase, dust emission from the operation activities of the project is insignificant. However, gaseous emission is anticipated from office vehicles, maintenance vehicles, generators, refrigerators, and air conditioning system of the project. Odor and smoke can also be emitted multiple-use building's kitchen

Overhead Transmission Line: *During the construction phase*, dust and gaseous emissions can cause due to operating and movement of construction vehicles and transportation vehicles. Site clearing, leveling and earth moving activities can also generate dust.

During the operation phase, operating and movement of maintenance vehicles can cause dust and gaseous emission.

Impact on Water

During the construction phase, groundwater may be contaminated by earth working activities during rainy days. Construction waste from earthworks and concrete mixing, clearing of construction materials can flow into nearest creeks and streams with storm waters during raining seasons. Oil spillage and leakage from construction machines, construction vehicles, transportation vehicles and generators will contaminate groundwater. Water discharged from construction activities of ground mounted solar power plant and overhead transmission line will contaminate groundwater. Especially, concrete foundation of tracking brackets, poles of overhead transmission line, switchyard, multiple-use building will excavate surface layer of earth and deeply excavated foundation processes need to use cement and hardener chemicals, which will impact negatively on groundwater quality. Sewage disposed of from toilets used by construction workers can also lead to groundwater pollution. Improper temporary PV modules storage, damaged PV modules released from improper installing, improper waste storage, fuel storage, refueling and machineries maintenance area can also cause groundwater pollution by penetrating groundwater layer. Water usage demand will also increase for site clearing, site preparation, water spraying activities and other water required construction activities and construction workers.
During the operation phase, groundwater can be contaminated by oil and waste spillage and leakage from transformers, improper waste storage, fuel storage and refueling. Poor waste management may also lead to blocking of drains, which will lead to flooding and unsanitary conditions within the project site. Improper handling of damaged PV modules due to improper cleaning and maintenance activities and uninstalled lifespan-expired PV modules can cause groundwater pollution because these PV modules contain toxic chemicals. Water consumption will also increase for cleaning PV modules in order to enhance their efficiency for generating electricity.

Overhead Transmission Line: *During the construction phase*, water discharged from construction activities may also contaminate groundwater and nearby surface water (Mezali Weir).

Impact on Soil

During the construction phase, site preparation and leveling activities will be carried out for the construction of ground mounted solar power plant and overhead transmission line. Especially, soil excavation for the foundation of tracking brackets, switchyard, multiple-use building and poles of

overhead transmission line can result in disturbance of soil structure, which may cause an increasing soil erosion at the project site and release of sediments into the natural drainage system. Top soil nutrient layers will be removed, lower soil will be covered and in somewhere soil layer will be mixed. Soil contamination can also be occurred due to oil spills and leakage from construction machines, construction vehicles, generators, and transportation vehicles. Improper temporary PV modules storage, damaged PV modules due to improper installing, improper waste storage, fuel storage, refueling and machineries maintenance area will also cause soil pollution. Drilling activities for PV supports can cause soil erosions.

During the operation phase, the possible reasons of soil pollution are improper handling of damaged PV modules due to improper cleaning and maintenance activities and uninstalled lifespan-expired PV modules because these PV modules contain toxic chemicals. Soil can also be contaminated by leakage from improper waste storage, oil spillage and leakage from transformers, fuel storage and refueling.

Overhead Transmission Line: *During the construction phase,* soil structure and formation may be disturbed due to soil excavation for the foundation of overhead transmission line.

Noise and Vibration Impacts

During the construction phase, operating construction vehicles such as loaders, excavators, dumpers, bulldozers, backhoes, road rollers, water bowsers, cranes, trucks, and concrete mixers as well as transportation vehicles and generators will generate noise and vibration. Improper unloading electrical equipment for ground mounted solar power plant and overhead transmission line, construction materials and other equipment will also cause noise pollution. Stringing cables for overhead transmission line can also cause noise pollution. Drilling machines can cause noise pollutions during the drilling operation.

During the operation phase, the main reason for noise impacts is operating generators, management vehicles and maintenance vehicles. Other sources include transformers and inverters however, this impact is insignificant.

Overhead Transmission Line: *During the operation phase*, the main reason for noise impacts is operating generators, management vehicles and maintenance vehicles. Other sources include transformers and inverters; however, this impact is insignificant. Stringing cables for overhead transmission line can also cause noise pollution.

7.5.2 Impacts on Ecological Resources

Impacts on Terrestrial Ecology

The impact on terrestrial ecology is insignificant in construction and operation phases because the project is located at agricultural land and farm land. Only bushes and small trees are found not

only within the project site area, there is no huge natural vegetation. There is no national park, reserved forest, protected public forest, protected area, and wildlife within the scope of study area for the proposed project.

Overhead Transmission Line: Overhead transmission line will pass through mainly agricultural and farm land. Therefore, only bushes and small trees are found along the route of overhead transmission line.

Impact on Aquatic Ecology

The impact on aquatic ecology is insignificant in construction and operation phases because there is no marine park, coastal resource, mangrove area as well as water body such as river, creek, stream, lake, and reservoir within the scope of study area for the proposed project.

Overhead Transmission Line: There is no aquatic ecology along the route of overhead transmission line as well as marine Park, coastal resource and mangrove area are not situated within the scope of study area for the project.

7.5.3 Impact on Human Resources

Impact on Occupational Health and Safety

During the construction phase, the common possible accidental injuries include falling from height related to ladder and poles of overhead transmission line for cable stringing which can cause fatal or permanent disabling injury. Small injuries due to slips and falls, accidents and electric shock can also happen. Improper management of construction activities in erection and installation of electrical equipment, metal grinding and cutting, concrete work, piling, use of lifting equipment for overhead transmission line stringing, access roads construction, highspeed vehicles driving, absence of proper traffic sign and warning sign board can impact on the workers' occupational health and safety. Poor working conditions will damage health and put workers at risk as well as operating machinery and using materials in the construction site can pose temporary hazard such as physical contact, spill, dust emission, noise, and vibration. Construction workers' safety could be affected by lack of adequate Personal Protective Equipment (PPEs). Domestic wastewater such as waste water and black water discharged by construction workers can impact on worker's health if not managed properly. A certain number of migrant construction workers will come into the project site for construction, which can lead the issues related to infectious diseases including insect borne disease, water borne disease, and sexually transmitted infections (STIs), including HIV/AIDS. As an area of Malaria Region, certain dosage of Malaria Vaccines should be supported to workers. The construction workers can also be infected COVID-19 virus during Pandemic period, if they do not follow strictly the instructions of Ministry of Health and Sports.

During Operation phase, the common occupational health and safety impacts are falling from height related to ladder and poles of overhead transmission line for maintenance which can cause fatal or permanent disabling injury. Small injuries due to slips and falls, accidents and electric shock can also happen. The electromagnetic field can be occurred due to the operations of PV modules and switchyard, which can impact on occupational health of workers. However, this impact is insignificant because voltage level of the project is low and the project will use qualified products and modern technology for electricity generation. Workers' safety could be affected by lack of adequate Personal Protective Equipment (PPEs) and lack of using lockout-tagout system while repair and maintenance for electrical equipment of solar power plant and overhead transmission line. Domestic wastewater such as grey water and black water from the project can impact on occupational health if not managed properly because of its adverse smell. Poor waste management at multiple-use building can also lead to the blocking of drains, which in turn can lead to flooding and unsanitary conditions within the project site. Improper housekeeping is also an important factor in causing injuries, illness, and property damage that may results from hazards such as trips, slips, and falls, fires, and pest infestation. The construction workers can also be infected COVID-19 virus during Pandemic period, if they do not follow strictly the instructions of Ministry of Health and Sports.

Overhead Transmission Line: *During the construction phase,* the possible accidental injury sources are falling from height related to overhead transmission line for iron tower erection and cable stringing which can cause fatal or permanent disabling injury. Use of lifting equipment for overhead transmission line stringing can also impact on occupational health and safety. Poor working conditions will damage health and put workers at risk as well as operating machinery and using materials in the overhead transmission line construction can pose temporary hazard such as physical contact, spill, dust emission, noise, and vibration. Lack of adequate Personal Protective Equipment (PPEs) and warning signs can also impact on construction workers' safety.

During the operation phase, falling from height related to tower of overhead transmission line for maintenance activities is main occupational health and safety impact. Other impact includes lack of adequate Personal Protective Equipment (PPEs) and lockout-tagout system while repair and maintenance for overhead transmission line.

Impact on Community Health and Safety

During the construction phase, the accidents due to operating construction vehicles and transportation vehicles at public roads are common community health and safety impacts. Activities such as earth working, overhead transmission line's cable stringing, switchyard, multiple-use building and access road construction can generate dust, gases, noise and vibration, which can impact directly and indirectly on community health and safety in terms of nuisance and

health effects. However, these impacts are insignificant because of short construction period and certain distance from nearby villages to project site.

During the operation phase, electromagnetic field can be occurred due to the operations of PV modules and switchyard, which can impact on community health of nearby villagers. However, this impact is insignificant because voltage level of the project is low and the project will use qualified products and modern technology for electricity generation. Although, there is a certain distance from project site to local communities, glint and glare from PV modules can effect on nearby local communities under conditions. Electric shock can also be anticipated due to entering the project site without permission and climbing overhead transmission line by nearby villagers. Operating management vehicles and maintenance vehicles at public roads can also impact on community health and safety.

Overhead Transmission Line: *During the construction phase*, overhead transmission line's cable stringing and iron tower erection along the route is main impact of community health and safety. Other impacts are operating and movement of construction machines and vehicles.

During the operation phase, maintenance activities for overhead transmission line and climbing tower of overhead transmission line by nearby villagers are main community health and safety impacts.

Fire Hazard Impacts

During the construction phase, poor installation of electrical equipment and overloads, heating from bunched cables and damaged cables at construction workers camp are common high risks of fire hazards. Improper storage of raw materials for electrical equipment and construction materials can cause fire hazards. Fuel storage area, improper fuel handling and improper maintenance of construction machines and construction vehicles are also main reasons for fire hazards.

During the operation phase, improper and irregular maintenance of electrical equipment of ground mounted solar power plant and overhead transmission line are common high risks of fire hazards. Fuel storage area, improper fuel handling, overloads, heating from bunched cables and damaged cables at multiple-use building are other factors of fire hazards.

Overhead Transmission Line: *During the operation phase, improper and irregular maintenance of overhead transmission line is main fire hazard impact.*

7.5.4 Waste Generation Impacts

Solid Waste Generation

During the construction phase, rejected components and packaging materials of electrical equipment and building materials, surplus materials, papers, containers, broken bricks, solvent containers are main sources of solid wastes generation from the proposed project. These solid

wastes can be injurious to the environment through blockage of drainage systems because these wastes may contain hazardous substances such as residue of cement, adhesive, and cleaning solvents bottles. Construction soil wastes will be also excavated mainly from site preparation, access road construction and leveling activities as well as vegetable debris will be generated at the time of land clearance for PV modules, switchyard, multiple-use building and right of way for overhead transmission line. Domestic solid wastes such as garbage and organic waste from construction workers camp are other sources of solid waste generation.

During the construction phase, there is no operation solid waste which are disposed of from the proposed project's operation processes. However, domestic solid waste such as garbage, rejected office materials and organic waste from multiple-use building are common solid wastes generation.

Overhead Transmission Line: *During the construction phase,* vegetation debris will be generated during site clearance along right of way for overhead transmission line.

Liquid Waste Generation

During the construction phase, cleaning construction machines and construction vehicles within the project site will generate liquid waste. Domestic liquid waste such as waste water from toilets used by construction workers and water from basins and bathrooms in construction workers camp will be also discharged from the proposed project.

During the operation phase, main source of operation liquid waste is cleaning activities for PV modules to promote their efficiency for electricity generation. Domestic liquid waste such as black water from toilets and grey water from basins and bathrooms within the project site will be discharged.

Overhead Transmission Line: There is no liquid waste generated from not only construction but also operation activities of overhead transmission line.

Hazardous Waste Generation

During the construction phase, damaged PV modules due to improper installation are common hazardous waste generation of the proposed project because PV modules contain toxic chemicals. Heavy metals from PV modules damage can occur several acute. Used oils disposed of from repair and maintenance of construction machines and construction vehicles, oil spills and leakage from refueling, fuel storage area and machineries maintenance area within the project site are also common hazardous waste.

During the operation phase, damaged PV modules due to improper handling during cleaning activities and maintenance activities are common hazardous wastes generation. Also, uninstalled expired PV modules due to exchanging new PV modules at the time of extending operation period of the project are also common hazardous wastes. Hazardous waste from PV module defects can leak out heavy metal wastes such as cadmium and lead which can lead to severe effects on soil,

water resources and human health. Other hazardous wastes are used oil from transformers, oil spills and leakage from maintenance activities, vehicles, refueling and fuel storage area.

***Overhead Transmission Line*:** There is no hazardous waste generated from not only construction but also operation activities of overhead transmission line.

7.6 Impact Significant

7.6.1 Methodology for the Assessment

The assessment of each impact is based on consideration of the magnitude, duration, extent, and frequency of activities, which are going to be carried out during three phases and characteristics of the project site. The significance of potential environmental impacts identified during the basic assessment by using a ranking scale. The significance of each impact is classified into five categories.

The following methodology was applied to assess the environmental impacts of the project mainly on air, water, soil, biodiversity including human beings and wastes generation. Each source of impact was assessed by four parameters, magnitude, duration, extent, and probability and each assess have five scales as mentioned below:

Table 7.1 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 years	6-5 years	Life of Operation	Post closure
Extend (E)	Limited to the site	Limited to the local area	Limited to the region	National	International
Probability	Very Improbable	Improbable	Probable	Highly Probable	Definite

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

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

Impact Significance: Based on calculated significant point, impact significance can be categorized as follows:

Table 7.2 Impact Significance

Significant Point	Impact Significance
<15	Very Low
15-29	Low
30-44	Moderate
45-59	High
>59	Very High

7.6.2 Impact Significance for Potential adverse Effects

The mentioned potential adverse impacts of the proposed project should be assessed in order to formulate for reducing these impacts. Impact Significance assessment has been categorized with 30 MW ground mounted solar plant and overhead transmission line according to project nature. The following table shows the details impact significance of potential adverse impacts of the 30 MW ground mounted solar power plant.

Table 7.3 Detail Significance of Potential Adverse Impacts of the 30 MW Ground Mounted Solar Plant

No.	Potential Adverse Impacts	Project Activities	Significance of Potential Adverse Impacts					Impact Significance
			M	D	E	P	SP	
A.	**Construction Phase**							
1.	Impact on Air	▪ Site clearing and earth moving activities, which will get worse during dry season ▪ Dust and gaseous emission due to operating construction machines and vehicles ▪ Gaseous emission due to operating generators ▪ Dust and gaseous emission due to movement of transportation vehicles for electrical equipment and construction materials ▪ Odor from painting of multiple-use building **Overhead Transmission Line:** • Dust and gaseous emission can occur due to operating and movement of construction vehicles and transportation vehicles	3	1	2	5	30	Moderate

		• Site clearing, leveling and earth moving activities						
2.	Impact on Water	▪ Earth working activities during rainy days ▪ Oil spillage and leakage from construction machines, construction vehicles, transportation vehicles and generators ▪ Water discharged from construction activities ▪ Deeply excavated concrete foundation processes of tracking brackets, poles of overhead transmission line, switchyard, and multiple-use building ▪ Sewage disposed of from toilets used by construction workers ▪ Improper temporary PV modules storage, damaged PV modules due to improper installing, improper waste storage, fuel storage, refueling and machineries maintenance area	3	1	2	3	18	Low

		▪ Water usage demand increasing due to site clearing, site preparation, water spraying activities and other water required construction activities and construction workers **Overhead Transmission Line:** • Groundwater and surface water quality will be negatively impacted by water discharged from construction activities • Especially, concrete foundation of poles of overhead transmission line						
3.	Impact on Soil	▪ Site preparation and leveling activities ▪ Foundation activities for tracking brackets, switchyard, multiple-use building and poles of overhead transmission line ▪ Stringing cables for overhead transmission line ▪ Oil spills and leakage from construction machines,	4	1	1	5	30	Moderate

		construction vehicles, generators, and transportation vehicles ▪ Improper temporary PV modules storage, damaged PV modules due to improper installing, improper waste storage, fuel storage, refueling and machineries maintenance area **Overhead Transmission Line:** • Soil structure and formation may be disturbed due to soil excavation for the foundation of iron tower of overhead transmission line • Stringing cables for overhead transmission line will also disturb soil structure and upper soil layer						
4.	Noise and Vibration Impacts	▪ Operating construction vehicles, transportation vehicles and generators ▪ Improper unloading electrical equipment, construction materials and other equipment	3	1	1	5	25	Low

		Overhead Transmission Line: • Improper unloading electrical equipment and cables for overhead transmission line will generate noise and vibration • Operating and movement of construction machines and vehicles for erecting poles and stringing cables						
5.	Impact on Occupational health and safety	▪ Falling from height related to ladder and poles of overhead transmission line for cable stringing ▪ Small injuries due to slips and falls, accidents, and electric shock ▪ Improper management of construction activities in erection and installation of electrical equipment, metal grinding and cutting, concrete work, piling, use of lifting equipment for overhead transmission line stringing ▪ Access roads construction, highspeed vehicles driving,	5	1	1	4	28	Low

		absence of proper traffic sign and warning sign board ▪ Poor working conditions and operating machinery and using materials in the construction site ▪ Lack of adequate Personal Protective Equipment (PPEs) ▪ Improper management of domestic wastewater such as grey water and black water ▪ Increasing issues related to infectious diseases due to migrant construction workers ▪ Malaria Infection ▪ COVID-19 virus infection during Pandemic period **Overhead Transmission Line:** • Falling from height related to ladder and poles of overhead transmission line for cable stringing • Use of lifting equipment • Poor working conditions will damage health and put workers at risk as well as operating machinery and using materials in the						

		overhead transmission line construction • Lack of adequate Personal Protective Equipment (PPEs) and warning signs						
6.	Community health and safety	▪ Accidents due to operating construction vehicles and transportation vehicles at public roads ▪ Dust, gases emission, noise, and vibration generation due to earth working, overhead transmission line's cable stringing, switchyard, multiple-use building and access road construction **Overhead Transmission Line:** • Overhead transmission line's cable stringing and tower erection along the route • Movement of construction machines and vehicles	4	1	2	4	28	Low
7.	Fire Hazard Impacts	▪ Poor installation of electrical equipment and overloads	5	1	2	4	32	Moderate

		▪ Heating from bunched cables and damaged cables at construction workers' camp ▪ Improper storage of raw materials for electrical equipment and construction materials ▪ Fuel storage area, improper fuel handling and improper maintenance of construction machines and construction vehicles						
8.	Solid Waste Generation Impact	▪ Rejected components and packaging materials of electrical equipment and building materials ▪ Surplus materials, papers, containers, broken bricks, solvent containers ▪ Construction soil wastes from site preparation, access road construction and leveling activities ▪ Vegetable debris from land clearance for PV modules, switchyard, multiple-use building and right of way for overhead transmission line	3	1	1	4	20	Low

		▪ Domestic solid wastes such as garbage and organic waste from construction workers' camp **Overhead Transmission Line:** ▪ During the construction phase, vegetation debris will be generated during site clearance along right of way for overhead transmission line						
9.	Liquid Waste Generation	▪ Cleaning construction machines and construction vehicles within the project site ▪ Domestic liquid waste such as black water from toilets used by construction workers and grey water from basins and bathrooms in construction workers camp	2	1	1	3	12	Very Low
10.	Hazardous Waste Generation	▪ Damaged PV modules due to improper installation ▪ Heavy metals from PV module defects ▪ Used oil disposed of from repair and maintenance of construction machines and construction vehicles	4	1	2	4	28	Low

		▪ Oil spills and leakage from refueling, fuel storage area and machineries maintenance area ▪ Heavy metals such as lead and cadmium can be came out from solar panel defects.						
B.	**Operation Phase**							
1.	Impact on Air	• Dust and gaseous emission due to operating office vehicles, maintenance vehicles, generators, refrigerators, and air conditioning system • Odor and smoke from kitchen of multiple-use building **Overhead Transmission Line:** ▪ Operating and movement of maintenance vehicles	2	4	2	3	24	Low
2.	Impact on Water	• Oil and waste spillage and leakage from transformers, improper waste storage, fuel storage and refueling • Poor waste water management • Improper handling of damaged PV modules due to improper cleaning and maintenance activities and uninstalled lifespan-expired PV modules	4	4	2	4	40	Moderate

		• Water consumption increasing due to cleaning PV modules						
3.	Impact on Soil	• Improper handling of damaged PV modules due to improper cleaning and maintenance activities and uninstalled lifespan-expired PV modules • Leakage from improper waste storage • Oil spillage and leakage from transformers, fuel storage and refueling	3	4	1	2	16	Low
4.	Noise Impact	• Operating generators, management vehicles and maintenance vehicles • Operating transformers **Overhead Transmission Line:** ▪ Operating and movement of maintenance vehicles	2	4	1	3	21	Low
5.	Impact on Occupational Health and Safety	• Falling from height related to ladder and poles of overhead transmission line for maintenance • Small injuries due to slips and falls, accidents, and electric shock • Electromagnetic field occurrence	5	4	1	4	40	Moderate

		• Lack of adequate Personal Protective Equipment (PPEs) • Lack of using lockout-tagout system while repair and maintenance • Improper management of domestic wastewater • Poor waste management at multiple-use building • Improper housekeeping • COVID-19 virus infection during Pandemic period • Malaria infection via mosquitoes **Overhead Transmission Line:** • Falling from height related to iron towers of overhead transmission line for maintenance activities • Lack of adequate Personal Protective Equipment (PPEs) and lockout-tagout system while repair and maintenance for overhead transmission line						
6.	Impact on Community Health and Safety	• Electromagnetic field occurrence	5	4	2	4	44	Moderate

		• Glint and glare from PV modules • Electric shock due to entering the project site without permission and any protection • Operating management and maintenance vehicles at public areas. **Overhead Transmission Line:** • Maintenance activities for overhead transmission line • Climbing towers of overhead transmission line by nearby villagers						
7.	Solid Waste Generation	• Domestic solid waste such as garbage, rejected office materials and organic waste from multiple use building	2	4	1	3	21	Low
8.	Fire Hazard Impacts	• Improper and irregular maintenance of electrical equipment of ground mounted solar power plant and overhead transmission line • Fuel storage area and improper fuel handling	4	4	1	4	36	Moderate

		• Overloads and heating from bunched cables and damaged cables at multiple-use building						
9.	Liquid Waste Generation Impact	• Operation liquid waste from cleaning activities of PV modules • Domestic liquid waste form toilet, basins, and bathrooms	3	4	1	4	32	Moderate
10.	Hazardous Waste Generation Impacts	• Damaged PV modules due to improper handling during cleaning activities and maintenance activities • Heavy metals from damaged PV modules such as cadmium and lead. • Uninstalled expired PV modules due to exchanging new PV modules at the time of extending operation period of the project • Used oil from transformers • Oil spills and leakage from maintenance activities, vehicles, refueling and fuel storage area	5	4	1	4	40	Moderate

During the construction phase, impacts on air, soil and fire hazards are assessed as **Moderate Impacts** and other impacts such as impacts on water, noise and vibration, occupational health and safety, community health and safety and hazardous waste generation impacts are categorized as **Low Impacts** as well as liquid waste generation impact is considered as **Very Low Impact** as per the results of

assessments. During the operation phase, impacts on water, occupational health and safety, community health and safety, fire hazard impacts, liquid waste generation and hazardous waste generation impacts are assessed as **Moderate Impacts** and other impacts like impacts on air, soil, noise impacts and solid waste generation impacts are categorized as **Low Impacts** according to the results of assessments. The following figure illustrates detail impact significances of potential adverse impacts of 30 MW ground mounted solar power plant.

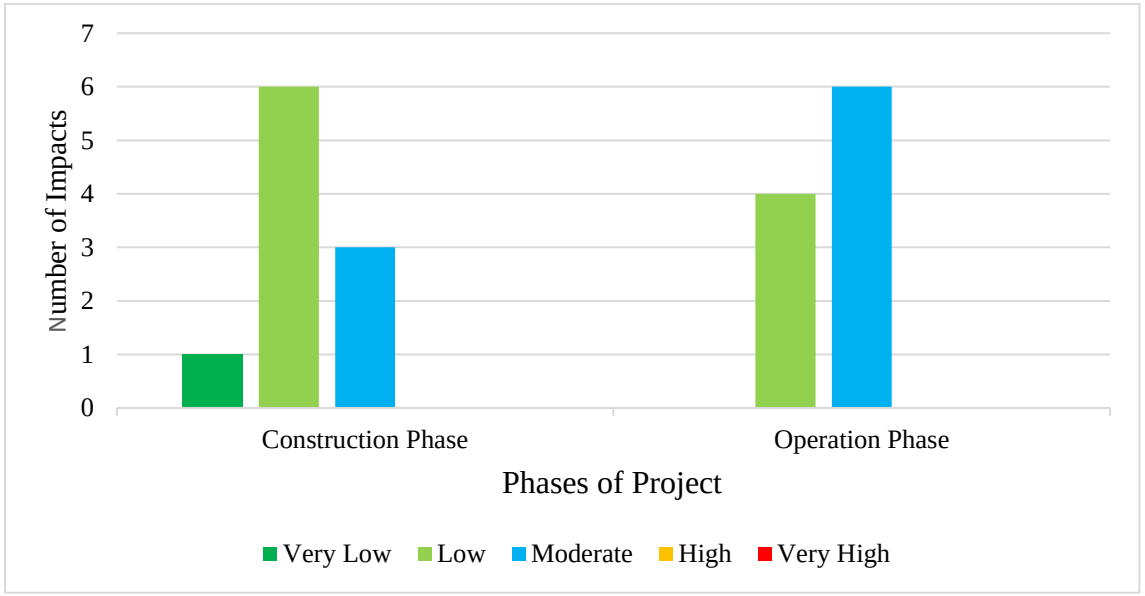


Figure 7.2 Impact Significance of Potential Adverse Impacts of 30 MW Ground Mounted Solar Plant

7.7 Mitigation Measures

7.7.1 Mitigation Measures for Impact on Environmental Resource

Mitigation Measure of Impact on Air

During the construction phase, speed of construction vehicles and transportation vehicles must be controlled within the project site to control the dust emission. Regular water spraying on access roads and working places must be carried out in order to control dust emission by increasing humidity of working area. If possible, access roads of the project should pave to control dust emission. Transportation vehicles must need to install proper covers when carrying soil, sand, and cement to avoid falling along route of transportation and dust emission. Construction activities and earth working activities which generate excessive dust must be avoided on extremely windy days. Temporary building enclosures (green shade net fencing) must be installed at excessive dust generated working area in order to control dust emission from the project to nearby local community. Personal Protective Equipment (PPEs) such as masks and dust respirators must be provided for construction workers who work in intensive dust generation area. Regular inspection and proper maintenance for the construction machines, generators, construction vehicles and transportation vehicles must be implemented to control gaseous emission from the proposed project.
During Operation Phase, all roads within the project shall be paved in order to prevent dust emissions. Regular maintenance and inspection for management vehicles, maintenance vehicles, generators, refrigerators, and air conditioning system must be implemented to control gaseous emission. Good ventilation system must be ensured and project proponent will install ventilators and air conditioners at multiple-use building to reduce adverse impacts of indoor air quality. Some shady trees must be planted to reduce impacts on air of the project.

Overhead Transmission Line: During the construction phase, overhead transmission line construction activities and earth working and excavation activities which generate excessive dust must be avoided on extremely windy days. Temporary building enclosures (green shade net fencing) must be installed at excessive dust generated working area in order to control dust emission to nearby local community.

Mitigation Measures of Impacts on Water

During the construction phase, site levelling should be done with minimum alteration in contour level to prevent natural drainage system of the project. Regular inspection for construction machines, generators, construction vehicles and transportation vehicles must be done to prevent oil leak and spillage. Toilets, washing basins and septic tanks must be provided adequately for the construction workers to reduce impacts on water. Moreover, the project

proponent must manage groundwater usage systematically in construction activities to prevent depletion of groundwater.

During the operation, project proponent must install proper drainage system within the project site to reduce impacts on water. PV modules cleaning and maintenance must be carried out properly in order to prevent damaging PV modules. Damaged PV modules and uninstalled lifespan-expired PV modules must be disposed with adequate packaging at authorized waste management services providers and direct buried must be strongly prohibited. Transformers, management vehicles, maintenance vehicles and generators must be inspected and maintained regularly to reduce oil spillage. Refueling must be done properly and drainage system must be checked and cleaned properly. Direct disposing domestic waste from multiple-use building into the drains must be prohibited to prevent drainage block.

Overhead Transmission Line: During the construction phase, domestic solid, liquid wastes and water discharged from construction activities shall not be discharged into the Mezali Weir.

Mitigation Measures of Impact on Soil

During the construction phase, earth working activities and concrete mixing processes for foundation of PV modules' brackets, poles of overhead transmission line, switchyard and multiple-use building must be carried out systematically and properly. Soil contamination can be reduced through using leak-proof fuel containers with secondary containments in fuel storage area. Refueling must be done carefully for preventing oil spills and leakage. Modernized construction machines, construction vehicles and transportation vehicles shall be used for the construction activities of the project. These machines and vehicles must be maintained regularly and isolated machineries maintenance area must be identified with paved ground in the project. PV modules installing must be carried out properly in order to prevent damaging PV modules. If PV modules are damaged, direct buried must be strongly prohibited and disposing with adequate packaging at authorized waste dealer must be implemented. Some shady trees must be planted to reduce soil erosion and restore top soil. Raw materials storage area for electrical equipment and construction materials must be defined with impervious surface to prevent seepage into the soil layer. Proper management must be needed for cable stringing and vegetation clearance for right of way of overhead transmission line. Toilets, washing basins and septic tanks must be provided adequately for the construction workers to reduce impacts on soil.

During the operation phase, project proponent must install proper drainage system within the project site to reduce impacts on soil. PV modules cleaning and maintenance must be carried out carefully in order to prevent damaging PV modules. Damaged PV modules and uninstalled lifespan-expired PV modules must be disposed with adequate packaging at authorized waste management services providers and direct buried must be strongly prohibited. Fuel storage area and generators area must be designed with impervious surface in order to prevent seepage into

soil layer. Electrical equipment maintenance especially for transformers must be carried out systematically by technicians and experts. Temporary domestic waste storage area, fuel storage area and switchyard must be inspected regularly to reduce impacts on soil.

Overhead Transmission Line: *During the construction phase,* earth working activities and concrete mixing processes for foundation of iron tower for overhead transmission line must be carried out properly. Proper management must be needed for cable stringing and vegetation clearance for right of way of overhead transmission line.

Mitigation Measures for Noise and Vibration Impacts

During the construction phase, excessive noise and vibration generated construction activities must be notified to nearby local communities, firstly. Construction machines, construction vehicles and transportation vehicles used in construction activities must be inspected and maintained regularly for reducing noise and vibration. Personal Protective Equipment (PPEs) such as earplugs and earmuffs must be provided for construction workers who work in excessive noise generated area. Transportation vehicles' drivers should be instructed to avoid gunning of vehicle engines or hooting when passing through sensitive areas such as schools and hospitals across transportation routes. Highly noise and vibration generated construction machines and generators must be placed in enclosures to minimize noise generation. Noise and vibration generated construction activities must not be carried out at night, if possible.

During the operation phase, generators, inverters, transformers, management vehicles and maintenance vehicles must be inspected and maintained regularly to reduce noise pollution. Drivers must drive carefully with low speed at public road while passing through the villages. Silence-type generators are recommended to use and some shady trees must be planted around the project boundary to reduce noise impacts. On the other hand, no specific mitigation measures are required to reduce vibration impacts because all the electricity generation processes from ground mounted solar power plant and electricity distributing processes to the Kyeeonkyeewa Substation via overhead transmission line do not generate vibration significantly.

Overhead Transmission Line: *During the construction phase*, excessive noise and vibration generated construction activities must be notified to nearby local communities, firstly. Transportation vehicles' drivers should be instructed to avoid gunning of vehicle engines or hooting when passing through sensitive areas such as schools and hospitals across transportation routes. Noise and vibration generated construction activities must not be carried out at night, if possible.

7.7.2 Mitigation Measures for Impact on Flora and Fauna

Solar Power Plant: Vegetation clearance beyond designated area of ground mounted solar power plant must be prohibited strongly. Introduction of exotic species by workers shall not be

allowed during the construction and operation phase of the project. Pouching and hunting will be also prohibited.

Overhead Transmission Line: Vegetation clearance within right of way of overhead transmission line must be minimized as much as possible.

7.7.3 Mitigation Measures for Impact on Human Resources

Mitigation Measures for Occupational Health and Safety

During the construction phase, personal fall restraint system must be provided for installation workers who are working at height. Lockout-tagout system must be used for installation of electrical equipment. The project proponent must provide Personal Protective Equipment (PPEs) such as safety helmets, splash goggles, dust respirators, ear muffs, safety gloves, reflected safety suits and safety boots for all construction workers to reduce occupational health and safety impacts. The project proponent must monitor regularly whether construction workers use PPEs adequately or not for ensuring safe working site. Besides, safety notices and emergency contact numbers of the Fire Services Department, Hospitals and Police Stations and contact persons for emergency cases must be tagged at noticeable places of the project site. First aid training, safety training, firefighting training, electrical equipment installation training and other essential trainings for construction activities must be arranged for all construction workers and first aid kits must be provided in the project site. Construction machines and construction vehicles must be operated by trained and licensed industrial machine operators. The project proponent must prepare health and safety management plan for construction workers based on the EMP in Myanmar language and any other language that construction workers can read and display prominently at the project site. The project proponent must provide purified drinking water to prevent health risk of workers. Especially, all construction workers must follow the instructions issued by the Ministry of Health and Sports to prevent COVID-19 virus infection during pandemic period.

During the operation phase, personal fall restraint system must be provided for maintenance workers who are working at height. Lockout-tagout system must be used for maintenance of electrical equipment. The project proponent must provide Personal Protective Equipment (PPEs) such as safety helmets, safety gloves, reflected safety suits and safety boots for all maintenance workers to reduce occupational health and safety impacts. The project proponent must monitor regularly whether maintenance workers use PPEs adequately or not for ensuring safe working site. Besides, safety notices and emergency contact numbers of the Fire Services Department, Hospitals and Police Stations and contact persons for emergency cases must be tagged at noticeable places of the project site. First aid training, safety training, firefighting training, electrical equipment repairs and maintenance training and other essential trainings for operation processes of electricity generation and distributing must be arranged for all workers and first aid kits must be provided in the project site. All energized electrical equipment of the project must be marked with warning signs. Proper management for electricity generation and

distributing such as checking all electrical cords, cables and do not use overload voltage must be carried out. The voltage level of the project is low and the project will use qualified products and modern technology for electricity generation, therefore, the power frequency electromagnetic field generated has little impacts on occupational health and safety. Moreover, housekeeping staffs must be trained and assigned to do regular cleaning and housekeeping for prevention of accidents due to poor housekeeping in the project. The project proponent must manage the drainage systems of the project properly and provide purified drinking water to prevent health risk of workers. Especially, all construction workers must follow the instructions issued by the Ministry of Health and Sports to prevent COVID-19 virus infection during pandemic period.

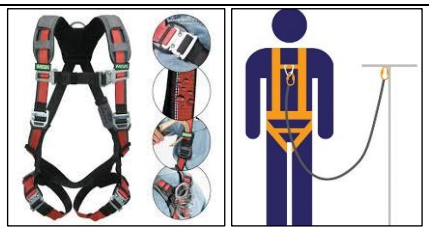
Overhead Transmission Line: *During the construction phase*, personal fall restraint system must be provided for overhead transmission line installation workers who are working at height. The project proponent provides Personal Protective Equipment (PPEs) such as safety helmets, splash goggles, dust respirators, ear muffs, safety gloves, reflected safety suits and safety boots for all construction workers to reduce occupational health and safety impacts. The project proponent must monitor regularly whether construction workers use PPEs adequately or not for ensuring safe working site. Cable stringing processes must be carried out properly to reduce occupational health and safety impacts. Construction machines and construction vehicles must be operated by trained and licensed industrial machine operators.

During the operation phase, personal fall restraint system must be provided for overhead transmission line maintenance workers who are working at height. The project proponent must provide Personal Protective Equipment (PPEs) such as safety helmets, safety gloves, reflected safety suits and safety boots for all maintenance workers to reduce occupational health and safety impacts. The project proponent must monitor regularly whether maintenance workers use PPEs adequately or not for ensuring safe working site.

Figure 7.3 Safety Signs

Table 7.4 Type of PPE and Their Function

Function of PPEs	Feature and Characteristics
Protective Goggles (Suitable for protection from dust, particle, chips, chemical splattering)	
Goggles with direct vents are suitable for protection from chemical splattering or smoke.	
Hearing Protection	
Cotton earplugs: disposable earplugs for short- term use – not suitable for high noise levels	
Earmuffs: They offer a high level of sound reduction and are suitable for high noise levels. They can be used in combination with a safety helmet.	 
Respiratory Protection	
Dust mask: lightweight mask that is fitted over the nose and mouth and secured behind the head with elastic.	
Head Protection	
Use head gear which conforms to recognized safety standards	
Hand and Arm Protection	
Gloves for common tasks (cotton/ leather)	
Foot Protection	
Select footwear that fits the purpose and conforms to recognized safety standards.	
Body Protection	
Reflective clothing: For working in busy traffic: brightly-colored reflective clothing can increase the visibility of employees and reduce their chances of being struck by vehicles or machinery	

High fall protective equipment (personal fall restraint system): to prevent construction workers from falling off of overhead platforms, elevated work stations or into holes in the floor and walls.	

Mitigation Measures for Community Health and Safety

During the construction phase, construction vehicle drivers and transportation vehicle drivers must drive carefully with low speed at public road while mobilizing, transporting electrical equipment and construction materials. Cable stringing and poles construction for overhead transmission line must be informed to nearby local community to reduce community health and safety impacts.

During the operation phase, voltage level of the project is low and the project will use qualified products and modern technology for electricity generation, therefore, the power frequency electromagnetic field generated has little impacts on community health and safety. The project proponent must follow international standards to generate electricity and distribute to Kyeeonkyeewa Substation. Before PV modules installation, project proponent must assess glint and glare on nearby local communities and consult with experts to reduce glint and glare impacts. Safety notices and warning signs must be tagged at the fence of the project site and iron towers of overhead transmission line in order to prohibit local people entering the project area without permission and climbing poles of overhead transmission line. Vehicle drivers must drive carefully with low speed at public road while passing through the villages.

Overhead Transmission Line: *During the construction phase*, cable stringing and iron towers construction for overhead transmission line must be informed to nearby local community and done properly to reduce community health and safety impacts.

During the operation phase, safety notices and warning signs must be tagged at poles of overhead transmission line to prohibit local people climbing towers.

Mitigation Measures for Fire Hazards

During the construction phase, construction machines, construction vehicles, transportation vehicles and electrical system of construction worker camp must be inspected and maintained regularly. Fire extinguishers must be installed near temporary raw materials storage area, fuel storage area, generators and construction worker camp and these fire extinguishers must be inspected regularly. Water for firefighting must be stored adequately and properly with storage tanks. Firefighting training and fire drills must be provided for all construction workers in order to extinguish fire cases. Besides, safety notices and emergency contact numbers of the Fire Services Department, Hospitals and Police Stations and contact persons for emergency cases

must be tagged at noticeable places of the project site. An assembly point must be assigned for emergency cases to gather construction workers and smoking must be strongly prohibited in the project site.

During the operation phase, maintenance activities must be implemented regularly and properly for ground mounted solar power plant and overhead transmission line. Fire extinguishers must be installed near fuel storage area, generators, switchyard, multiple-use building and these fire extinguishers must be inspected regularly. Especially, dry powder type fire extinguishers must be used to extinguish electrical fire and water shall not be used. Water must be stored adequately and properly with storage tanks for other type of fire cases. Fire hose reels and fire hydrants must be installed to extinguish fire by using water. Firefighting training and fire drills must be provided for all workers in order to extinguish fire cases. Fire protection lane must be implemented around the project site to prevent fire in dry season. Besides, safety notices and emergency contact numbers of the Fire Services Department, Hospitals and Police Stations and contact persons for emergency cases must be tagged at noticeable places of the project site. An assembly point must be assigned for emergency cases to gather workers and smoking must be strongly prohibited in the project site. Visible and audible fire alarm system must be installed and emergency routes and exists must be assigned at multiple-use building, these emergency routes and exists must not be blocked.

Overhead Transmission Line: *During the construction and operation phases*, construction and maintenance activities must be implemented regularly and properly for overhead transmission line to protect fire hazards.

Figure 7.4 Firefighting Equipment and Signage

7.7.4 Mitigation Measures for Waste Generation Impacts.

Mitigation Measures for Solid Waste Generation Impacts

During the construction phase, vegetable debris generated from land clearance activities must be collected at separate place and excavated soil must be reused at other places of the project as soil filing and leveling activities. The project proponent must calculate detail requirement of raw materials for purchasing electrical equipment and construction materials to reduce solid waste generation. Recycling, reuse, and refurbishment of solid waste will reduce the amount of construction waste other than disposal. The project proponent must define temporary disposal site within the project, before final disposal and these wastes must be segregated by using different appropriate waste bins. Burning and landfilling solid waste at the project site must be strongly prohibited and final disposal must be transferred to the Township Development Committee.

Overhead Transmission Line: *During the construction phase*, vegetation debris generated from land clearance activities along right of way of overhead transmission line must be collected at separate place and excavated soil must be reused as soil filing and leveling activities.

Figure 7.5 Samples of Waste Bins for Solid Waste Disposal

Mitigation Measures for Liquid Waste Generation

During the construction phase, adequate sanitation facilities such as toilets, washing basins and septic tanks will be provided. Therefore, 10 toilets and 10 washing basins will be provided for construction workers in order to control domestic wastewater. Establish waste water treatment system for domestic waste water dispose.

During the operation phase, proper drainage system will be installed at the project site to reduce liquid waste generation impacts. Adequate sanitation facilities such as toilets, washing basins and septic tanks must be provided. Therefore, 6 toilets, 6 washing basins and 4 septic tanks will be provided for workers in order to control domestic wastewater. The project proponent makes sure that the untreated site runoff water does not flow into the nearby water body and manage it systematically.

Mitigation Measures for Hazardous Waste Generation Impact

During the construction phase, fuel and lubricants for construction machines and vehicles must be kept and handled systematically. Used oil must be disposed of by collecting with leak

proof containers and machineries maintenance area must be identified with paved ground in the project. If PV modules are damaged during installing, direct buried must be strongly prohibited and disposing with adequate packaging at authorized waste dealer must be implemented. Residual cement, solvent-based paints and other lubricants must be collected separately at designated area and final disposal of hazardous waste must be transferred to the Township Development Committee.

During the operation phase, fuel and lubricants for maintenance vehicles must be kept and handled systematically. Damaged PV modules and uninstalled lifespan-expired PV modules due to exchanging new PV modules at the time of extending operation period of the project must be disposed with adequate packaging at authorized waste management services providers and direct buried must be strongly prohibited. Used oil must be disposed of by collecting with leak proof containers and final disposal of hazardous waste must be transferred to the Township Development Committee.

CHAPTER 8 – INSTITUTIONAL REQUIREMENT AND ENVIRONMENTAL MANAGEMENT PLAN (EMP)

8.1 Institutional Requirement

Environmental Management Plan (EMP) report is prepared as an environmental management framework for 30 MW Ground Mounted Solar Power Plant Project Connected to Kyeeon Kyeewa Substation. The environmental management practices, procedures and responsibilities are defined herein to get full compliance with the existing environmental policy, laws, rules, and instructions of the Republic of the Union of Myanmar. The project will assign an environmental engineer or environmental staff throughout the life span of the project. The environmental engineer/ staff will review and update this plan at least one time annually to cover all potential impacts, mitigations, and modifications as necessary. Revisions will be made as need throughout the year.

The estimated cost for the implementation of Environmental Management Plan and Environmental Monitoring Plan may not fully cover the practical solutions stated in this report at the time of implementation. Myanmar Kyeeon Kyeewa Solar Power Co., Ltd. will add additional funds to get the target of these plans through the project lifespan. Any suggestions, comments and questions must be directed to 30 MW Ground Mounted Solar Power Plant Project. We, Myanmar Kyeeon Kyeewa Solar Power Co., Ltd had made commitment that we will construct and operate our project according to our commitments and, implement Environmental Management Plans (EMP) and mitigation measures that are mentioned in this EMP report, prepared by E Guard Environmental Services Co., Ltd. for our project. We also commit to work out our best not to cause any impacts on social and environment during the construction, operation, and decommissioning phases of the project by implementing the appropriate mitigation measures described in this EMP report. If any impacts that are not anticipated in this report occur, appropriate mitigation measures must be implemented accordingly

8.2 Environmental Management Plan (EMP)

The Environmental Management Plan (EMP) prepared for the proposed project covers the anticipated impacts of the project, mitigation measures, management, and monitoring plans during each of the phases:

- Construction Phase
- Operation Phase

The objectives of EMP areas are as follows:

- Identify the possible environmental impacts due to implementation the activities of the project;
- Develop measures to minimize, mitigate and manage these impacts and estimate the budget of EMP for each phase.

Myanmar Kyeeon Kyeewa Solar Power Co., Ltd. must manage the development of the proposed project by implementing this EMP, which is comprised the following parts:

- Environmental Management Plan
- Environmental Monitoring Plan
- Corporate Social Responsibility Plan
- Firefighting Plan
- Emergency Preparedness and Response Plan
- Grievance Redress Mechanism

Responsible Person for EMP and Mitigation Measures

Implementation of the EMP, management practices and mitigation measures are the responsibility of all project implementers: however, key personnel (Project Director, Site Manager, HSE Coordinator, HSE Assistant, Ministry of Natural Resources and Environmental Conservation (MONREC)) are main responsible persons for communicating environmental matters and ensuring management practices and procedures are being implemented. The list of responsible persons for implementing EMP and mitigation measures are described in the following table in terms of their name, position, department, phone number and responsibilities.

Table 8.1 Responsible Persons for EMP and Mitigation Measures

No.	Name	Position	Department	Responsibilities and Duties
1.	Responsible person	Project Manger	Myanmar Kyeeonkyeewa Solar Power Company Limited	• Implementation of the EMP • Supervision and management of the implementation of EMP
2.	Responsible person	Project Engineer		• Implementation of the EMP • Supervision and monitoring of the implementation of EMP
3.	The project proponent shall appoint one HSE Coordinator	HSE Coordinator		• Implementation of the EMP • Oversight of overall implementation of the project environmental activities • Supervision and monitoring of the implementation of EMP • Supervision, monitoring and performing of Health and safety for workers
4.	Members of MONREC	Department	MONREC	• Monitoring and inspection of projects to determine compliance with all

				environmental and social requirements • The Ministry may impose penalties and/ or require the project proponent to undertake corrective action • Where, the Ministry views that the project is not in compliance, it shall ➢ Promptly inform the project proponent ➢ Indicate specific noncompliance of the project environmental and social requirements; and ➢ Specify a time period for the project proponent to bring the project into compliance • In the event of noncompliance ➢ Inform the project proponent indicating the specific noncompliance with environmental and social requirements; • Where a project is not in compliance or not likely to comply with its environmental and social requirements, take enforcement action including: ➢ Suspension of project operation; and ➢ Employing third parties to correct non-compliance **Source: Environmental Impact Assessment Procedure (2015).**

8.3 Environmental Management Plan

The detail Environmental Management Plans for the proposed project is described in the following tables.

Table 8.2 Environmental Management Plan for Construction Phase

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
1.	Impact on air	All construction area	Dust and gaseous emission	▪ To improve road design by using gravels rather than normal earth road ▪ Reduce traffic and use vehicles only for necessary cases. ▪ Control speed of construction vehicles and transportation vehicles within the project site ▪ Spray water regularly on access roads and working places, if possible, pave all access roads of the project ▪ Install proper covers for transportation vehicles when carrying soil, sand, and cement ▪ Avoid construction activities and earth working activities which generate excessive dust on extremely windy days	Already included in cost estimation for EMP	Low	Myanmar Kyeeon kyeewa Solar Power Co., Ltd.

				▪ Install Temporary Building Enclosures at excessive dust generated working area ▪ Provide Personal Protective Equipment (PPEs) such as masks and dust respirators for construction workers who work in intensive dust generation area ▪ Implement regular inspection and proper maintenance for the construction machines, generators, construction vehicles and transportation vehicles			
		Overhead Transmission Line Area		▪ Overhead transmission line construction activities and earth working and excavation activities which generate excessive dust must be avoided on extremely windy days ▪ Temporary building enclosures (green shade net fencing) must be installed at excessive dust generated working area			
2.	Impact on water	All construction area	Ground and surface water pollution and depletion	▪ Establish green space just like garden in order to fill ground water from raining	Already included in cost estimation for	Very Low	Myanmar Kyeeon Kyeewa

				▪ Avoid to build concrete flooring for a wide space ▪ Carry out site levelling with minimum alteration in contour level ▪ Provide toilets, washing basins and septic tanks adequately ▪ Manage groundwater usage systematically in construction activities ▪ Built systematic waterways, gutters, and canals direct to waste sedimentation ponds to prevent sediments flowing into irrigation weir through creeks ▪ Establish waste sedimentation pond for construction waste water ▪ Establish waste water treatment system for domestic waste water from staff housing and offices	EMP		Solar Power Co., Ltd.
		Overhead transmission Line		▪ Domestic solid, liquid wastes and water discharged from construction activities shall not be discharged into the Mezali Weir nearby project site			

3.	Impact on Soil	All Construction area	Soil contamination	▪ Carry out earth working activities and concrete mixing processes for foundation systematically and properly ▪ Reuse top soil from construction earthworks for various purpose such as gardening, planting in vegetation areas rather than dumping in one area ▪ Use leak-proof fuel containers with secondary containments in fuel storage area ▪ Carry out refueling carefully ▪ Use modernized construction machines, construction vehicles and transportation vehicles ▪ Maintain these machines and vehicles regularly ▪ Identify isolated Machineries maintenance area with paved ground ▪ Carry out PV modules installing properly ▪ If PV modules are damaged, direct buried must be strongly prohibited and disposing with adequate packaging at	Already included in cost estimation for EMP	Low	Myanmar Kyeeon Kyeewa Solar Power Co., Ltd.

				authorized waste dealer must be implemented ▪ Plant some shady trees ▪ Define raw materials storage area with impervious surface ▪ Manage cable stringing and vegetation clearance activities for right of way of overhead transmission line properly ▪ Provide toilets, washing basins and septic tanks adequately			
		Overhead transmission line		▪ Earth working activities and concrete mixing processes for foundation of towers must be carried out properly ▪ Proper management must be needed for cable stringing and vegetation clearance along right of way of overhead transmission line			
4.	Noise and vibration impacts	All construction area	Nuisance due to noise and vibration generation	▪ Notify excessive noise and vibration generated construction activities to nearby local communities ▪ Inspect and maintain construction machines, construction vehicles and	Already included in cost estimation for EMP	Low	Myanmar Kyeeon Kyeewa Solar Power Co., Ltd.

				transportation vehicles regularly ▪ Provide Personal Protective Equipment (PPEs) such as earplugs and earmuffs for construction workers who work in excessive noise generated area ▪ Instruct transportation vehicles' drivers to avoid gunning of vehicle engines or hooting when passing through sensitive areas across transportation routes ▪ Place highly noise and vibration generated construction machines and generators in enclosures ▪ Avoid working noise and vibration generated construction activities at night, if possible			
		Overhead Transmission line		▪ Excessive noise and vibration generated construction activities must be notified to nearby local communities, firstly ▪ Transportation vehicles'			

				drivers should be instructed to avoid gunning of vehicle engines or hooting when passing through sensitive areas ▪ Noise and vibration generated construction activities must not be carried out at night, if possible			
5.	Impact on flora and fauna	All construction area Overhead Transmission line	Disturbance Flora and fauna	▪ Minimize vegetation clearance within right of way of overhead transmission line as much as possible ▪ Prohibit vegetation clearance beyond designated area of ground mounted solar power plant ▪ Prohibit illegal logging ▪ Prohibit trading of exotic species by staffs and workers ▪ Prohibit pouching and fishing at surrounding area by staffs and workers ▪ Minimize vegetation clearance within right of the way of overhead transmission line as much as possible.	Already included in cost estimation for EMP	Very Low	Myanmar Kyeeon Kyeewa Solar Power Co., Ltd.

6.	Occupational health and safety impacts	All construction area	Health and safety problems for construction workers	▪ Provide personal fall restraint system for installation workers who are working at height ▪ Use lockout-tagout system for installation and testing of electrical equipment ▪ Provide Personal Protective Equipment (PPEs) such as safety helmets, splash goggles, dust respirators, ear muffs, safety gloves, reflected safety suits and safety boots for all construction workers ▪ Monitor regularly whether construction workers use PPEs adequately or not ▪ Tag safety notices and emergency contact numbers of the Fire Services Department, Hospitals and Police Stations and contact persons for emergency cases at noticeable places ▪ Provide First aid training, safety training, firefighting training, electrical equipment installation training and other essential trainings for construction activities	Already included in cost estimation for EMP	Low	Myanmar Kyeeon Kyeewa Solar Power Co., Ltd.

				▪ Provide first aid kits at visible and convenient places ▪ Operate construction machines and construction vehicles by trained and licensed industrial machine operators ▪ Prepare health and safety management plan for construction workers based on the EMP in Myanmar language and any other language that construction workers can read and display prominently ▪ Provide purified drinking water for construction workers ▪ Follow the instructions issued by the Ministry of Health and Sports to prevent COVID-19 virus infection during pandemic period ▪ Occupational health and safety will be			
		Overhead transmission line		▪ Personal fall restraint system must be provided for overhead transmission line installation workers who are working at height			

				▪ The project proponent provides Personal Protective Equipment (PPEs) for all construction workers ▪ The project proponent must monitor regularly whether construction workers use PPEs adequately or not ▪ Cable stringing processes must be carried out properly ▪ Construction machines and construction vehicles must be operated by trained and licensed industrial machine operators			
7.	Community health and safety impacts	All construction area	Health and safety problems for nearby local communities	▪ Drive vehicles properly with low speed at public road while mobilizing, transporting electrical equipment and construction materials ▪ Inform cable stringing and poles construction activities for overhead transmission line to nearby local communities ▪ Establish proper warning signs around the project site to avoid community accidents at construction area during construction and operation	Already included in cost estimation for EMP	Low	Myanmar Kyeeon Kyeewa Solar Power Co., Ltd.

		Overhead transmission Line		▪ Cable stringing and iron towers construction for overhead transmission line must be informed to nearby local community and done properly			
8.	Fire hazards	All construction area	Loss of properties and life	▪ Inspect and maintain construction machines, generators, construction vehicles, transportation vehicles and electrical system of construction worker camp regularly ▪ Install fire extinguishers near temporary raw materials storage area, fuel storage area, generators, and construction worker camp ▪ Inspect fire extinguishers regularly ▪ Store water for firefighting purposes adequately ▪ Provide firefighting training and fire drills for all construction workers ▪ Tag safety notices and emergency contact numbers of the Fire Services Department, Hospitals and Police Stations and contact persons for	Already included in cost estimation for EMP	Very Low	Myanmar Kyeeon Kyeewa Solar Power Co., Ltd.

				emergency cases at noticeable places ▪ Assign an assembly point ▪ Provide smoking area and prohibit smoking strictly in the project site			
9.	Waste generation impacts	All construction area	Water, and soil pollution and impacts on health and aesthetics	▪ Collect vegetable debris generated from land clearance activities at separate places ▪ Reuse excavated soil at other places of the project as soil filling and leveling ▪ Calculate detail requirement of raw materials for purchasing electrical equipment and construction materials ▪ Implement recycling, reuse, and refurbishment of solid waste ▪ Define temporary disposal site within the project, before final disposal ▪ Segregate solid wastes by using different appropriate waste bins ▪ Prohibit burning and landfilling solid waste at the project site strictly ▪ Establish a certain pit or landfill area with adequate landfill system such as by using	Already included in cost estimation for EMP	Low	Myanmar Kyeeon Kyeewa Solar Power Co., Ltd.

				impermeable base to avoid soil and ground water contaminations ▪ Cover landfills and waste pits to protect from animals and avoid bad odors ▪ Provide adequate sanitation facilities such as toilets, washing basins and septic tanks for construction workers ▪ Keep and handle fuel and lubricants for construction machines and vehicles systematically ▪ Dispose of used oil by collecting with leak proof containers with secondary containments ▪ Identify isolated Machineries maintenance area with paved ground ▪ If PV modules are damaged during installing, direct buried is prohibited. Damaged PV modules are properly stored, transport with proper package and disposal at authorized waste disposal sites.			

				▪ Collect residual cement, solvent-based paints, and other lubricants separately at designated area ▪ Transfer final disposal of solid wastes and hazardous wastes to the Township Development Committee			
		Overhead transmission line		▪ Vegetation debris generated from land clearance activities along right of way of overhead transmission line must be collected at separate place ▪ Excavated soil must be reused as soil filing and leveling activities			

Table 8.3 Environmental Management Plan for Operation Phase

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
1.	Impacts on air	All operation	Dust and	• Pave all roads within	Already	Very	Myanmar

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
		area	gaseous emission	the project • Implement regular maintenance and inspection for management vehicles, maintenance vehicles, generators, refrigerators, and air conditioning system • Drive vehicles properly with low speed at public road • Plant some shady trees	included in cost estimation for EMP	Low	Kyeeonkyeewa Solar Power Co., Ltd.
2.	Impacts on water	All operation area	Groundwater pollution and depletion, and Surface water	• Install proper drainage system within the project site • Carry out PV modules cleaning and maintenance properly • Damaged PV modules and uninstalled lifespan-	Already included in cost estimation for EMP	Low	Myanmar Kyeeonkyeewa Solar Power Co., Ltd.

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				expired PV modules must be disposed with adequate packaging at authorized waste management services providers and direct buried must be strongly prohibited • Inspect and maintain transformers, management vehicles, maintenance vehicles and generators regularly • Carry out refueling properly • Check and clean drainage system properly • Prohibit direct disposing domestic			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				waste from multiple-use building into the drains • Make sure that untreated site runoff water does not flow into the nearby water body, and manage systematically			
3.	Impact on soil	All operation area	Soil contamination	• Install proper drainage system within the project site • Carry out PV modules cleaning and maintenance properly • Damaged PV modules and uninstalled lifespan-expired PV modules must be disposed with adequate packaging at	Already included in cost estimation for EMP	Very Low	Myanmar Kyeeonkyeewa Solar Power Co., Ltd.

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				authorized waste management services providers and direct buried must be strongly prohibited. • Design fuel storage area and generators area with impervious surface • Carry out electrical equipment maintenance, especially for transformers, by technicians and experts properly • Inspect temporary domestic waste storage area, fuel storage area and switchyard regularly			
4.	Noise and vibration	All operation	Nuisance due to noise and	• Inspect and maintain generators, inverters,	Already included in	Very	Myanmar Myanmar

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
	impacts	area	vibration generation	transformers, management vehicles and maintenance vehicles regularly • Install silence-type generators • Plant some shady trees	cost estimation for EMP	Low	Kyeeonkyeewa Solar Power Co., Ltd.
5.	Impacts on terrestrial ecology	All operation area	Disturbance terrestrial ecology and habitats	• Prohibit introduction of exotic species by workers	Already included in cost estimation for EMP	Very Low	Myanmar Kyeeonkyeewa Solar Power Co., Ltd.
6.	Occupational health and safety impacts	Solar Power Plant Area	Health and safety problems for construction workers	• Provide personal fall restraint system for maintenance workers who are working at height • Use lockout-tagout system for maintenance of electrical equipment	Already included in cost estimation for EMP	Low	Myanmar Kyeeonkyeewa Solar Power Co., Ltd.

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				• Provide Personal Protective Equipment (PPEs) such as safety helmets, safety gloves, reflected safety suits and safety boots for all maintenance workers • Monitor regularly whether maintenance workers use PPEs adequately or not • Tag safety notices and emergency contact numbers of the Fire Services Department, Hospitals and Police Stations and contact persons for emergency cases at			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				noticeable places • Provide first aid training, safety training, firefighting training, electrical equipment repairs and maintenance training and other essential trainings for operation processes of electricity generation and distributing • Provide first aid kits • Mark all energized electrical equipment with warning sign • Carry out proper management for electricity generation and distributing such as checking all			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
		Overhead		electrical cords, cables and do not use overload voltage • Train and assign housekeeping staffs to do regular cleaning and housekeeping • Manage the drainage systems of the project properly • Provide purified drinking water for workers • Follow the instructions issued by the Ministry of Health and Sports to prevent COVID-19 virus infection during pandemic period • Personal fall			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
		transmission Line		restraint system must be provided for overhead transmission line maintenance workers who are working at height • The project proponent must provide Personal Protective Equipment (PPEs) The project proponent must provide Personal Protective Equipment (PPEs) for all maintenance workers • The project proponent must monitor regularly whether maintenance			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				workers use PPEs adequately or not			
7.	Community health and safety impacts	Solar Power Plant Area Overhead Transmission Line	Health and safety problems for nearby local communities	• Follow international standards to generate electricity and distribute to Kyeeonkyeewa Substation • Assess glint and glare on nearby local communities and consult with experts, before PV modules installation • Tag safety notices and warning signs at the fence of the project site and poles of overhead transmission line • Safety notices and warning signs must be tagged at poles of	Already included in cost estimation for EMP	Low	Myanmar Kyeeonkyeewa Solar Power Co., Ltd.

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				overhead transmission line			
8.	Fire hazard impacts	Solar Power Plant Area	Loss of properties and life	• Implement maintenance activities regularly and properly • Install fire extinguishers must be installed near fuel storage area, generators, switchyard, multiple-use building • Inspect fire extinguishers regularly • Use dry powder type fire extinguishers to extinguish electrical fire and water shall not be used • Store water adequately and	Already included in cost estimation for EMP	Low	Myanmar Kyeeonkyeewa Solar Power Co., Ltd.

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				properly with storage tanks for other type of fire cases • Install fire hose reels and fire hydrants to extinguish fire by using water • Provide firefighting training and fire drills for all workers • Implement fire protection lane in dry season around the project site • Tag safety notices and emergency contact numbers of the Fire Services Department, Hospitals and Police Stations and contact persons for emergency cases at			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
		Overhead Transmission Line		noticeable places • Assign an assembly point for emergency cases • Prohibit smoking strongly within the project site • Install visible and audible fire alarm system • Assign emergency routes and exists at multiple-use building, these emergency routes and exists must not be blocked • Maintenance activities must be implemented regularly and properly			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
9.	Wastes generation impacts	All operation area	Water and soil pollution and impacts on health	• Define temporary disposal site within the project for domestic waste, before final disposal • Segregate domestic waste by using different appropriate waste bins • Prohibit burning and landfilling solid waste at the project site strongly • Install proper drainage system within the project site • Provide adequate sanitation facilities such as toilets, washing basins and septic tanks • Keep and handle fuel and lubricants for	Already included in cost estimation for EMP	Low	Myanmar Kyeeonkyeewa Solar Power Co., Ltd.

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				maintenance vehicles • Damaged PV modules and uninstalled lifespan-expired PV modules must be disposed with adequate packaging at authorized waste management services providers and direct buried must be strongly prohibited. • Dispose of used oil by collecting with leak proof containers • Transfer final disposal of solid wastes and hazardous wastes to the Township Development			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				Committee			

8.4 Environmental Monitoring Plan (EMoP)

Monitoring of the anticipated environmental and social impacts in the receiving environments is important in evaluating the effectiveness of mitigation plan and compliance with the regulatory measures in place. During the operation phase and decommissioning phase monitoring will be undertaken to ensure that proposed mitigation measures for negative impacts and enhancement measures for positive impacts are implemented.

Main objectives of environment monitoring plan include;

- To identify and resolve environmental issues and other functions that may arise during the operation phase
- To implement water quality, air quality and noise impact monitoring plan during the operation phase
- To check and quantify the overall environmental performance, implement action plans and recommend and implement remedial actions
- To conduct regular reviews of monitored data as the basis for assessing mitigation measures are identified, designed and implemented;
- To assess and interpret all environmental monitoring, data to ascertain whether environmental control measures and practices are functioning in accordance to specifications
- To predict the unforeseen impacts.

The following table describes the detail Environmental Monitoring Plan for construction phase and operation phase of the proposed project.

Table 8.4 Environmental Monitoring Plan

No.	Environmental Concerns	Parameters	Frequency	Location	Estimated Cost	Responsible Party
A.	**Construction Phase (Solar Power Plant)**					
1.	Air quality	PM_{10}, $PM_{2.5}$, CO, CO_2, SO_2, NO_2	Once	A suitable point within the project site	Already included in cost estimation for EMP	Myanmar Kyeeonkyeewa Solar Power Co., Ltd.
2.	Surface water quality	pH, Color (true), Turbidity, Conductivity, Total Alkalinity, Iron, Chloride, Manganese**,** Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Oil and Grease, Total Coliform Bacteria, Total Nitrogen, Total Phosphorus, Total Suspended Solids	Once	Same as baseline water quality sampling location (Mezali Weir)	Already included in cost estimation for EMP	Myanmar Kyeeonkyeewa Solar Power Co., Ltd.
3.	Noise level	Equivalent Noise Level dB (A)	Once	A suitable point within the project site and a suitable point at the boundary of project site	Already included in cost estimation for EMP	Myanmar Kyeeonkyeewa Solar Power Co., Ltd.
4.	Waste Quantity	Amount of construction solid waste, domestic solid waste, and hazardous waste disposal	Quarter per year	Within the project site	Already included in cost estimation for EMP	Myanmar Kyeeonkyeewa Solar Power Co., Ltd.
B.	**Construction Phase (Overhead Transmission Line)**					

No.	Environmental Concerns	Parameters	Frequency	Location	Estimated Cost	Responsible Party
1.	Air quality	PM_{10}, $PM_{2.5}$, CO, CO_2, SO_2, NO_2	Once	In the middle of transmission line's route	Already included in cost estimation for EMP	Myanmar Kyeeonkyeewa Solar Power Co., Ltd.
2.	Noise level	Equivalent Noise Level dB (A)	Once	In the middle of transmission line's route	Already included in cost estimation for EMP	Myanmar Kyeeonkyeewa Solar Power Co., Ltd.
B.	**Operation Phase**					
1.	Air quality	PM_{10}, $PM_{2.5}$, CO, CO_2, SO_2, NO_2	Once a year	A suitable point within the project site	Already included in cost estimation for EMP	Myanmar Kyeeonkyeewa Solar Power Co., Ltd.
2.	Surfacewater quality	pH, Color (true), Turbidity, Conductivity, Total Alkalinity, Iron, Chloride, Manganese, Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Oil and Grease, Total Coliform Bacteria, Total Nitrogen, Total Phosphorus, Total Suspended Solids	Once a year	Same as baseline water quality sampling location (Mezali Weir)	Already included in cost estimation for EMP	Myanmar Kyeeonkyeewa Solar Power Co., Ltd.
3.	Ground water quality	pH, Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Oil and Grease, Total Coliform	Once a year	At final outlet of drainage system	Already included in cost estimation for EMP	Myanmar Kyeeonkyeewa Solar Power Co., Ltd.

No.	Environmental Concerns	Parameters	Frequency	Location	Estimated Cost	Responsible Party
		Bacteria, Total Nitrogen, Total Phosphorus, Total Suspended Solids				
4.	Noise level	Equivalent Noise Level dB (A)	Once a year	A suitable point within the project site and a suitable point at the boundary of project site	Already included in cost estimation for EMP	Myanmar Kyeeonkyeewa Solar Power Co., Ltd.
5.	Waste Quantity	Amount of construction solid waste, domestic solid waste, and hazardous waste disposal	Quarter per year	Within the project site	Already included in cost estimation for EMP	Myanmar Kyeeonkyeewa Solar Power Co., Ltd.
6.	Environmental auditing	Assess the compliances with this EMP as well as laws, rules, policies, and regulations	Once a year	At the project office	Already included in cost estimation for EMP	Myanmar Kyeeonkyeewa Solar Power Co., Ltd.

8.5 Cost Estimation for EMP and EMoP

The following table shows the expenditures for the implementation of Environmental Management Plan and mitigation measures. Estimated cost amounts may be varied according to the implementation time and service providers. We, Myanmar Kyeeon Kyeewa Solar Power Co., Ltd. Strongly commit that we will add required funds for the implementation of Environmental Management Plan and mitigation measures including monitoring plan if the following cost estimation for EMP is not enough at the time of real practices throughout the project lifespan.

Table 8.5 Cost Estimation for EMP and Mitigation Measures

No	Item	Unit	Frequency	Unit Cost (MMK)	Cost (MMK)
A	**Mitigation Measures for Construction Phase**				
1.	Dust Control			Lumpsum	3,000,000
2.	Provide Personal Protective Equipment (PPEs) to workers			Lumpsum	1,000,000
3.	Provide adequate toiles and septic tanks facilities			Lumpsum	800,000
4.	Use leak-proof fuel containers with secondary containments			Lumpsum	500,000
5.	Provide first aid kits and training for workers			Lumpsum	800,000
6.	Provide purified drinking water for workers			Lumpsum	600,000
7.	Install fire extinguishers			Lumpsum	500,000
8.	Waste Disposal			Lumpsum	900,000
Subtotal					**8,100,000**
B	**Mitigation Measures for Operation Phase**				
1.	Install good ventilation system			Lumpsum	2,500,000
2.	Plant some shady trees			Lumpsum	1,000,000
3.	Install proper drainage system			Lumpsum	1,500,000

4.	Provide personal protectives equipment (PPE) for workers			Lumpsum	500,000
5.	Provide first aid kits for workers			Lumpsum	500,000
6.	Install dry powder type fire extinguisher, fire hose reels and fire hydrants			Lumpsum	800,000
7.	Provide purified drinking water for workers			Lumpsum	1,000,000
8.	Install visible and audible fire alarm system			Lumpsum	500,000
9.	Waste Disposal	Month	12	1,000,000	1,200,000
				Subtotal	**9,500,000**
				Contingency	**2,000,000**
				Total	**19,600,000**

The following table describes the cost estimation for Environmental Monitoring Plan, Supervision and Capacity Building Programs and these will cost annually. Prices may be varied according to the implementation time and services providers.

Table 8.6 Cost Estimation for Monitoring, Supervision and Capacity Building

No	Item	Unit	Quantity	Unit Cost (MMK)	Annual Cost (MMK)
A	**Environmental Monitoring Plan**				
1.	Air Quality	Frequency per year	1	800,000	800,000
2.	Water Quality	Frequency per year	1	900,000	900,000
3.	Noise Level	Frequency per year	1	400,000	400,000
4	Waste Quantity	Frequency per year	4	150,000	600,000
4.	Monitoring and Reporting	Frequency per year	1	800,000	800,000
				Subtotal	**3,500,000**
B	**Supervision**				

1.	Environmental Officer	Month	12	500,000	6,000,000
				Subtotal	9,500,000
C	**Capacity Building (Training Programs for Workers)**				**1,500,000**
Total					**11,000,000**

8.6 Air Quality Sub-Management Plan

(i) Objectives

The purposes of the plan are

- To minimize dust and gaseous emission from the project
- To sustain ambient air quality of the project

(ii) Legal Requirement

The project proponent shall adopt the requirements of National Laws and Regulations as described in Chapter 5: Policy, Legal and Institutional Framework

(iii) Action Plan

- To improve road design by using gravels rather than normal earth road
- Reduce traffic and use vehicles only for necessary cases.
- Control speed of construction vehicles and transportation vehicles within the project site
- Spray water regularly on access roads and working places, if possible, pave all access roads of the project
- Install proper covers for transportation vehicles when carrying soil, sand, and cement
- Avoid construction activities and earth working activities which generate excessive dust on extremely windy days
- Install Temporary Building Enclosures at excessive dust generated working area
- Provide Personal Protective Equipment (PPEs) such as masks and dust respirators for construction workers who work in intensive dust generation area
- Implement regular inspection and proper maintenance for the construction machines, generators, construction vehicles and transportation vehicles
- Overhead transmission line construction activities and earth working and excavation activities which generate excessive dust must be avoided on extremely windy days
- Temporary building enclosures (green shade net fencing) must be installed at excessive dust generated working area
- Pave all roads within the project
- Implement regular maintenance and inspection for management vehicles, maintenance

vehicles, generators, refrigerators, and air conditioning system
- Drive vehicles properly with low speed at public road
- Plant some shady trees

(iv) Implementation Schedule

The Action Plan will be implemented during the construction phase and operation phase.

(v) Monitoring Plans

The Environmental Monitoring Report will include the items listed in the following table.

No.	Environmental Concerns	Parameters	Frequency	Location	Responsible Party
1.	Air quality (Construction Phase)	PM_{10}, $PM_{2.5}$, CO, CO_2, SO_2, NO_2	Once	A suitable point within the project site	Myanmar Kyeeonkyeewa Solar Power Co., Ltd.
2.	Air quality (Construction Phase)	PM_{10}, $PM_{2.5}$, CO, CO_2, SO_2, NO_2	Once	In the middle of transmission line's route	Myanmar Kyeeonkyeewa Solar Power Co., Ltd.
3.	Air quality (Operation Phase)	PM_{10}, $PM_{2.5}$, CO, CO_2, SO_2, NO_2	Once a year	A suitable point within the project site	Myanmar Kyeeonkyeewa Solar Power Co., Ltd.

(vi) Budget Allocation

Estimated budget allocation for Air Quality Management Plan is already included in cost estimation for EMPs.

8.7 Water Quality Sub-Management Plan

(i) Objectives

The purposes of the plan are

- To minimize discharge from the project

- To sustain surface and groundwater quality of the project

(ii) Legal Requirement

The project proponent shall adopt the requirements of National Laws and Regulations as described in Chapter 5: Policy, Legal and Institutional Framework

(iii) Action Plan

- Establish green space just like garden in order to fill ground water from raining
- Avoid to build concrete flooring for a wide space
- Carry out site levelling with minimum alteration in contour level
- Provide toilets, washing basins and septic tanks adequately
- Manage groundwater usage systematically in construction activities
- Built systematic waterways, gutters, and canals direct to waste sedimentation ponds to prevent sediments flowing into irrigation weir through creeks
- Establish waste sedimentation pond for construction waste water
- Establish waste water treatment system for domestic waste water from staff housing and offices
- Domestic solid, liquid wastes and water discharged from construction activities shall not be discharged into the Mezali Weir nearby project site
- Install proper drainage system within the project site
- Carry out PV modules cleaning and maintenance properly
- Damaged PV modules and uninstalled lifespan-expired PV modules must be disposed with adequate packaging at authorized waste management services providers and direct buried must be strongly prohibited
- Inspect and maintain transformers, management vehicles, maintenance vehicles and generators regularly
- Carry out refuelling properly
- Check and clean drainage system properly
- Prohibit direct disposing domestic waste from multiple-use building into the drains
- Make sure that untreated site runoff water does not flow into the nearby water body, and manage systematically

(iv) Implementation Schedule

The Action Plan will be implemented during the construction phase and operation phase.

(v) Monitoring Plans

The Environmental Monitoring Report will include the items listed in the following table.

No.	Environmental Concerns	Parameters	Frequency	Location	Responsible Party
1.	Surface water quality (Construction Phase)	pH, Color (true), Turbidity, Conductivity, Total Alkalinity, Iron, Chloride, Manganese**,** Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Oil and Grease, Total Coliform Bacteria, Total Nitrogen, Total Phosphorus, Total Suspended Solids	Once	Same as baseline water quality sampling location (Mezali Weir)	Myanmar Kyeeonkyeewa Solar Power Co., Ltd.
2.	Surface water quality (Operation Phase)	pH, Color (true), Turbidity, Conductivity, Total Alkalinity, Iron, Chloride, Manganese, Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Oil and Grease, Total Coliform Bacteria, Total Nitrogen, Total Phosphorus, Total Suspended Solids	Once a year	Same as baseline water quality sampling location (Mezali Weir)	Myanmar Kyeeonkyeewa Solar Power Co., Ltd.
3.	Ground water quality (Operation Phase)	pH, Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Oil and Grease, Total Coliform Bacteria, Total Nitrogen, Total Phosphorus, Total Suspended Solids	Once a year	Same as baseline water quality sampling location	Myanmar Kyeeonkyeewa Solar Power Co., Ltd.

(vi) Budget Allocation

Estimated budget allocation for Water Quality Management Plan is already included in cost estimation for EMPs.

8.8 Noise Sub-Management Plan

(i) Objectives

The purposes of the plan are

- To minimize noise level due to the project activities
- To minimize noise impacts of the project

(ii) Legal Requirement

The project proponent shall adopt the requirements of National Laws and Regulations as described in Chapter 5: Policy, Legal and Institutional Framework

(iii) Action Plan

- Notify excessive noise and vibration generated construction activities to nearby local communities
- Inspect and maintain construction machines, construction vehicles and transportation vehicles regularly
- Provide Personal Protective Equipment (PPEs) such as earplugs and earmuffs for construction workers who work in excessive noise generated area
- Instruct transportation vehicles' drivers to avoid gunning of vehicle engines or hooting when passing through sensitive areas across transportation routes
- Place highly noise and vibration generated construction machines and generators in enclosures
- Avoid working noise and vibration generated construction activities at night, if possible
- Excessive noise and vibration generated construction activities must be notified to nearby local communities, firstly
- Transportation vehicles' drivers should be instructed to avoid gunning of vehicle engines or hooting when passing through sensitive areas
- Noise and vibration generated construction activities must not be carried out at night, if possible
- Inspect and maintain generators, inverters, transformers, management vehicles and maintenance vehicles regularly
- Install silence-type generators
- Plant some shady trees

(iv) Implementation Schedule

The Action Plan will be implemented during the construction phase and operation phase.

(v) Monitoring Plans

The Environmental Monitoring Report will include the items listed in the following table.

No.	Environmental Concerns	Parameters	Frequency	Location	Responsible Party
1.	Noise level (Construction Phase)	Equivalent Noise Level dB (A)	Once	A suitable point within the project site and a suitable point at the boundary of project site	Myanmar Kyeeonkyeewa Solar Power Co., Ltd.
2.	Noise level (Construction Phase)	Equivalent Noise Level dB (A)	Once	In the middle of transmission line's route	Myanmar Kyeeonkyeewa Solar Power Co., Ltd.
3.	Noise level (Operation Phase)	Equivalent Noise Level dB (A)	Once a year	A suitable point within the project site and a suitable point at the boundary of project site	Myanmar Kyeeonkyeewa Solar Power Co., Ltd.

(vi) Budget Allocation

Estimated budget allocation for Noise Management Plan is already included in cost estimation for EMPs.

8.9 Occupational Health and Safety Sub-Management Plan

(i) Objectives

The purposes of the plan are

- To reduce occupational health and safety impacts of the project
- To minimize near-miss, incidents and accidents due to the project activities

(ii) Legal Requirement

The project proponent shall adopt the requirements of National Laws and Regulations as described in Chapter 5: Policy, Legal and Institutional Framework

(iii) Action Plan

- Provide personal fall restraint system for installation workers who are working at height
- Use lockout-tagout system for installation and testing of electrical equipment
- Provide Personal Protective Equipment (PPEs) such as safety helmets, splash goggles, dust respirators, ear muffs, safety gloves, reflected safety suits and safety boots for all construction workers
- Monitor regularly whether construction workers use PPEs adequately or not
- Tag safety notices and emergency contact numbers of the Fire Services Department, Hospitals and Police Stations and contact persons for emergency cases at noticeable places
- Provide First aid training, safety training, firefighting training, electrical equipment installation training and other essential trainings for construction activities
- Provide first aid kits at visible and convenient places
- Operate construction machines and construction vehicles by trained and licensed industrial machine operators
- Prepare health and safety management plan for construction workers based on the EMP in Myanmar language and any other language that construction workers can read and display prominently
- Provide purified drinking water for construction workers
- Follow the instructions issued by the Ministry of Health and Sports to prevent COVID-19 virus infection during pandemic period
- Personal fall restraint system must be provided for overhead transmission line installation workers who are working at height
- The project proponent provides Personal Protective Equipment (PPEs) for all construction workers

- The project proponent must monitor regularly whether construction workers use PPEs adequately or not
- Cable stringing processes must be carried out properly
- Construction machines and construction vehicles must be operated by trained and licensed industrial machine operators
- Provide Personal Protective Equipment (PPEs) such as safety helmets, safety gloves, reflected safety suits and safety boots for all maintenance workers
- Monitor regularly whether maintenance workers use PPEs adequately or not
- Mark all energized electrical equipment with warning sign
- Carry out proper management for electricity generation and distributing such as checking all electrical cords, cables and do not use overload voltage
- Train and assign housekeeping staffs to do regular cleaning and housekeeping
- Manage the drainage systems of the project properly

(iv) Implementation Schedule

The Action Plan will be implemented during the construction phase and operation phase.

(v) Monitoring Plans

The Environmental Monitoring Report will include the items listed in the following table.

No.	Environmental Concerns	Parameters	Frequency	Location	Responsible Party
1.	Incident reporting	Description, causes, corrective and preventative measures for incidents	If occurs	Project Office	Myanmar Kyeeonkyeewa Solar Power Co., Ltd.

(vi) Budget Allocation

Estimated budget allocation for Occupational Health and Safety Management Plan is already included in cost estimation for EMPs.

8.10 Waste Sub-Management Plan

(i) Objectives

The purposes of the plan are

- To ensure that classification of wastes and waste disposal are done properly

- To provide clear directions on waste management
- To ensure all personal involved with waste perform their roles and responsibilities as outlined
- To ensure proper implementation and compliance, including segregation

(ii) Legal Requirement

The project proponent shall adopt the requirements of National Laws and Regulations as described in Chapter 5: Policy, Legal and Institutional Framework

(iii) Action Plan

- Collect vegetable debris generated from land clearance activities at separate places
- Reuse excavated soil at other places of the project as soil filling and leveling
- Calculate detail requirement of raw materials for purchasing electrical equipment and construction materials
- Implement recycling, reuse, and refurbishment of solid waste
- Define temporary disposal site within the project, before final disposal
- Segregate solid wastes by using different appropriate waste bins
- Prohibit burning and landfilling solid waste at the project site strictly
- Establish a certain pit or landfill area with adequate landfill system such as by using impermeable base to avoid soil and ground water contaminations
- Cover landfills and waste pits to protect from animals and avoid bad odors
- Provide adequate sanitation facilities such as toilets, washing basins and septic tanks for construction workers
- Keep and handle fuel and lubricants for construction machines and vehicles systematically
- Dispose of used oil by collecting with leak proof containers with secondary containments
- Identify isolated Machineries maintenance area with paved ground
- If PV modules are damaged during installing, direct buried is prohibited. Damaged PV modules are properly stored, transport with proper package and disposal at authorized waste disposal sites.
- Collect residual cement, solvent-based paints, and other lubricants separately at designated area
- Transfer final disposal of solid wastes and hazardous wastes to the Township Development Committee
- Vegetation debris generated from land clearance activities along right of way of overhead transmission line must be collected at separate place
- Excavated soil must be reused as soil filing and levelling activities
- Define temporary disposal site within the project for domestic waste, before final

disposal

- Segregate domestic waste by using different appropriate waste bins
- Prohibit burning and landfilling solid waste at the project site strongly
- Install proper drainage system within the project site
- Provide adequate sanitation facilities such as toilets, washing basins and septic tanks
- Keep and handle fuel and lubricants for maintenance vehicles
- Damaged PV modules and uninstalled lifespan-expired PV modules must be disposed with adequate packaging at authorized waste management services providers and direct buried must be strongly prohibited.
- Dispose of used oil by collecting with leak proof containers
- Transfer final disposal of solid wastes and hazardous wastes to the Township Development Committee

(iv) Implementation Schedule

The Action Plan will be implemented during the construction phase and operation phase.

(v) Monitoring Plans

The Environmental Monitoring Report will include the items listed in the following table.

No.	Environmental Concerns	Parameters	Frequency	Location	Responsible Party
1.	Waste Quantity (Construction Phase)	Amount of construction solid waste, domestic solid waste, and hazardous waste disposal	Quarter per year	Within the project site	Myanmar Kyeeonkyeewa Solar Power Co., Ltd.
2.	Waste Quantity (Operation Phase)	Amount of construction solid waste, domestic solid waste, and hazardous waste disposal	Quarter per year	Within the project site	Myanmar Kyeeonkyeewa Solar Power Co., Ltd.

(vi) Budget Allocation

Estimated budget allocation for Waste Management Plan is already included in cost estimation for EMPs.

8.11 Firefighting Sub-Management Plan

(i) Objectives

The purposes of the plan are

- To reduce risks of fire in the project

(ii) Legal Requirement

The project proponent shall adopt the requirements of National Laws and Regulations as described in Chapter 5: Policy, Legal and Institutional Framework

(iii) Action Plan

- Fire extinguishers must be installed near fuel storage area, generators, switchyard, multiple-use building and these fire extinguishers must be inspected regularly. Especially, dry powder type fire extinguishers must be used to extinguish electrical fire and water shall not be used
- Water must be stored adequately and properly with storage tanks for other type of fire.
- Fire hose reels and fire hydrants must be installed around the facility.
- Firefighting training and fire drills must be provided for all workers.
- Besides, safety notices and emergency contact numbers of Myanmar Fire Service Department, Hospitals and Police Stations of persons must be tagged at noticeable places in the project sites.
- An assembly point must be assigned for emergency cases to gather workers.
- Smoking must be strongly prohibited in the project site and must be assigned for smoking area.
- Visible and audible fire alarm system must be installed and emergency routes and exits must be assigned at multiple-use building, these emergency routes and exits must not block. Moreover, must assigned team as firefighting team, evacuation team and first-aid team.

(iv) Implementation Schedule

The Action Plan will be implemented during the construction phase and operation phase.

(v) Monitoring Plans

The Environmental Monitoring Report will include the items listed in the following table.

No.	Environmental Concerns	Parameters	Frequency	Location	Responsible Party
1.	Incident reporting	Description, causes, corrective and preventative measures for incidents	If occurs	Project Office	Myanmar Kyeeonkyeewa Solar Power Co., Ltd.

(vi) Budget Allocation

Estimated budget allocation for Firefighting Plan is already included in cost estimation for EMPs.

8.12 Emergency Preparedness and Response Sub-Management Plan

(i) Objectives

The purposes of the plan are

- To reduce risks of emergency cases like flood and earthquake in the project

(ii) Legal Requirement

The project proponent shall adopt the requirements of National Laws and Regulations as described in Chapter 5: Policy, Legal and Institutional Framework

(iii) Action Plan

In case of emergency, all the workers including guests must be evacuated systematically as soon as possible. Firefighting group must be assigned which will cooperate with Pwint Phyu Township Fire Service Department. We committed to abide guidelines provided by Myanmar Fire Services Department. Emergency escape plan must be tagged at multiple-use building.

For all emergency cases, emergency response plan must be developed by the project proponent and train to all workers in order to evacuate systematically during emergency cases. Recovery plan must be developed because recovery plan must be followed severe damages due to emergency cases.

In case of Fire, the following emergency response plan must be done immediately.

- Alert other workers to gather at assembly point
- For electrical fire, turn off electricity distributing devices before extinguishing
- For electrical fire, oil and lubricant fire DO NOT USE WATER, rather use dry powder fire extinguishers
- If small, control using an extinguisher or fire hose reel
- Immediately contact Fire Services Department
- Once out of the building, stay outside. Do not allow people to go back into the burning building to collect valuables. While exiting the building, close doors to slow down the spread of fire but do not lock the door.
- Obey all instruction
- Proceed to assembly point
- First aiding to all injured persons and transfer to clinic or hospital

Figure 8.1 - Safety card for Awareness of Emergency Cases

As the project is located within the **Zone III (Strong Zone)** earthquake zone, the emergency preparedness for earthquake must also be taken. The workers must have the knowledge concerning with the earthquake.

In case of earthquake-

If you are at indoors: "DROP, COVER AND HOLD ON"

- Stay inside.
- **Drop** under heavy furniture such as a table, desk, bed, or any solid furniture.
- **Cover** your head and torso to prevent being hit by falling objects.

- **Hold on** to the object that you are under so that you remain covered. Be prepared to move with the object until the shaking has finished.
- If you can't get under something strong, or if you are in a hallway, flatten yourself or crouch against an interior wall and protect your head and neck with your arms.
- If you are in a shopping mall, go into the nearest store. Stay away from windows, and shelves with heavy objects.
- If you are at school, get under a desk or table and hold on. Face away from windows.
- If you are in a wheelchair, lock the wheels and protect the back of your head and neck.

If you are at outdoors

- Stay outside.
- Go to an open area away from buildings. The most dangerous place is near exterior walls.
- If you are in a crowded public place, take cover where you won't be trampled.

If you are in a vehicle

- Pull over to a safe place where you are not blocking the road. Keep roads clear for rescue and emergency vehicles.
- Avoid bridges, overpasses, underpasses, buildings, or anything that could collapse.
- Stop the car and stay inside.
- Listen to your car radio for instructions from emergency officials.
- Do not attempt to get out of your car if downed power lines are across it. Wait to be rescued.
- Place a HELP sign in your window if you need assistance.
- If you are on a bus, stay in your seat until the bus stops. Take cover in a protected place. If you can't take cover, sit in a crouched position, and protect your head from falling debris.

AVOID the following in an earthquake

- Doorways. Doors may slam shut and cause injuries.
- Windows, bookcases, tall furniture, and light fixtures. You could be hurt by shattered glass or heavy objects.
- Elevators. If you are in an elevator during an earthquake, hit the button for every floor and get out as soon as you can.
- Downed power lines – stay at least 10 meters away to avoid injury

(iv) Implementation Schedule

The Action Plan will be implemented during the construction phase and operation phase.

(v) Monitoring Plans

The Environmental Monitoring Report will include the items listed in the following table.

No.	Environmental Concerns	Parameters	Frequency	Location	Responsible Party
1.	Incident reporting	Description, causes, corrective and preventative measures for incidents	If occurs	Project Office	Myanmar Kyeeonkyeewa Solar Power Co., Ltd.

(vi) Budget Allocation

Estimated budget allocation for Emergency Preparedness and Response Plan is already included in cost estimation for EMPs.

8.13 Corporate Social Responsibility (CSR) Plan

Myanmar Kyeeonkyeewa Solar Power Co., Ltd. will implement Corporate Social Responsibility (CSR) Plan together with Environmental Management Plan (EMP) through the project lifespan. The objective of this plan is to create social welfare for local community and to prove that implement of the proposed project is beneficial for not only the project proponent but also for local community. The project proponent has a plan to use **2% of Annual Net Profit** for the corporate social responsibility fund for the following subjects. Detail CSR Plan of the proposed project is as the following.

Table 8.7 Corporate Social Responsibility Plan of the Project

No.	Subjects	Percentage of the Fund
1.	Education	25%
2.	Health Care	25%
3.	Social Aid	25%
4.	Environmental Conservation	25%

8.14 Grievance Redress Mechanism

Grievance Redress Mechanism (GRM) is a complaint and proposal consideration mechanism that provides an additional and accessible channel for submission of complaints and feedback to individuals and communities. The aim of the Grievance Redress Mechanisms (GRM) is to ensure that grievances and concerns raised by PAPs or other people within the communities can be effectively dealt with in a timely and satisfactory manner.

People who live near the project site or stakeholders concerned with the problems and impacts that they suffer by the proposed project; they can complain though Grievance Committee, which includes the responsible persons of the project proponent, representatives from Kywal Chan and Lema Villages and representative from General Administration Department (Pwint Phyu 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 court will decide in legal terms. The following diagram shows detail steps of Grievance Redress Mechanism of the proposed project.

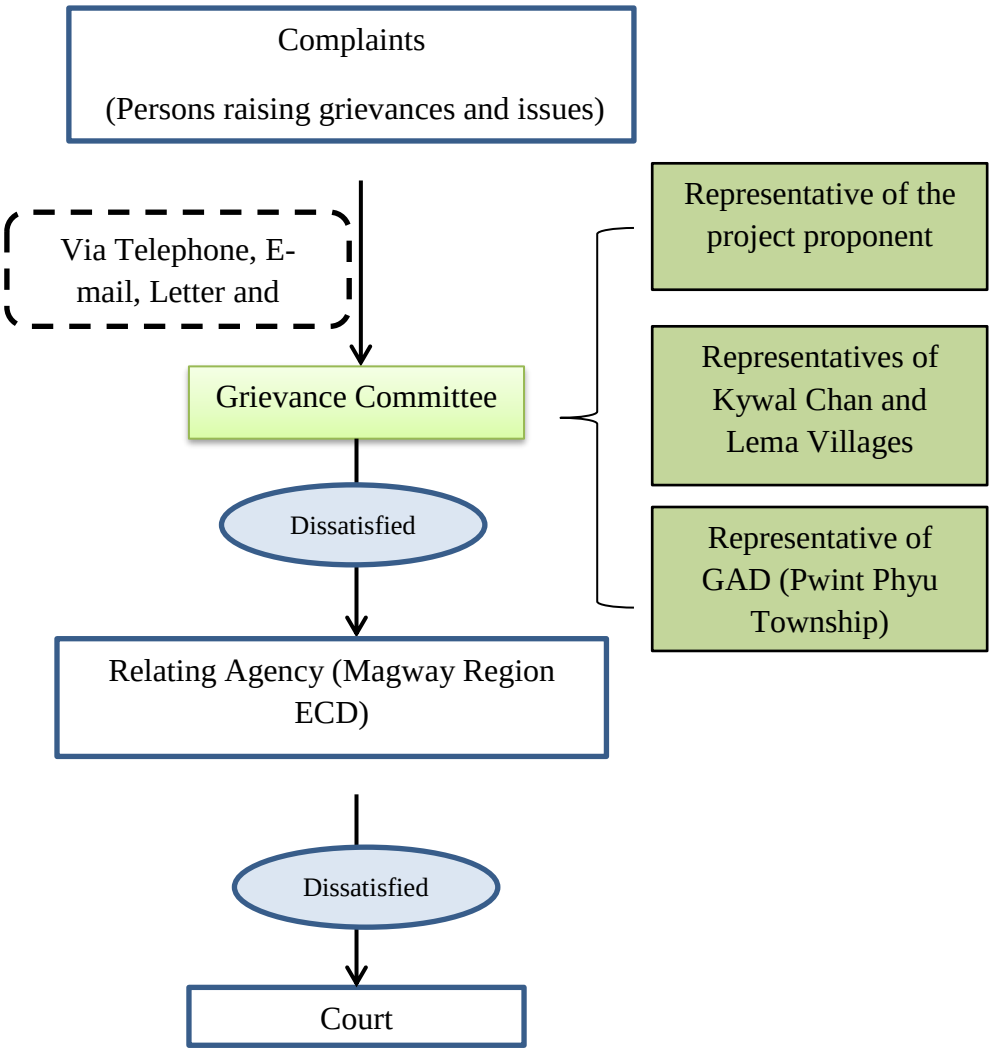


Figure 8.2 - Grievance Redress Mechanism (GRM)

CHAPTER 9 RESULT OF THE STAKEHOLDER MEETING

9.1 Purpose of the Consultation Meeting

The main purpose of public consultation meeting is to disclose the information of the project, environmental management plan and aware grievance redress mechanism. Suggestions and opinions of attendees must be considered in implementation of the project. Consultation meeting should be held with local people to be affected by the project, administrative bodies, and community-based organizations. Especially, results of consultation with Project Affected Persons (PAP) should be considered in identification of impacts, impact assessment, mitigation measures formulating and environmental monitoring plans.

9.2 Methodology and Approach

As methodology, information disclosure should be carried out by announcing the public consultation meeting for the proposed project to local people within an adequate time needed for invitation. All feedbacks from public consultation meeting should be well-addressed and considered in the formulation of EMP, environmental monitoring plan and CSR plan.
For the proposed project, the project proponent informed and invited local people to attend the public consultation meeting. The EMP report will be finalized and submitted to Environmental Conservation Department for approval. After submission, the submitted EMP report will be ensured for available to interested parties and public at Pwint Phyu Township General Administration Department, Magway Region Environmental Conservation Department, proposed ground mounted solar power plant's project office and office of E Guard Environmental Services, where any interested persons can review for further comments and suggestions.

9.3 Public Consultation Ceremony

Public consultation and information disclosure concerning with the Environmental Management Plan (EMP) for the construction and operation of 30 MW ground mounted solar power plant project connected to Kyeeon Kyeewa Substation, proposed by Myanmar Kyeeon Kyeewa Solar Power Co., Ltd. was held on 27th May, 2022 at Buddha Wihaya Monastery, Lelma Village, Mezali Village Tract, Pwint Phyu Township. The staring time was 1:30 PM and finished at 4:30 PM.
The objective of the meeting is to disclose information of the project, potential impacts of project activities, mitigation measures and, to receive public recommendations and feedbacks for the proposed project. The project proponent invited local people by negotiating with village administrators. As the public consultation meeting was held during COVID-19 Pandemic Period, there were some limitations related to number of attendees, venue, and social distancing. The attendance list, presentation file and photos are described in **Appendix-4** The number of attendees in the meeting is briefly shown in the following table**.**

Table 9.1 Attendance List of Public Consultation Meeting

No.	Category	Number of Participants
1.	Local People from Lel Ma Village	36
2.	Representatives of Project Proponent	2
3.	Representatives of E Guard Environmental Services	4
4.	Government Representatives	6
Total		48

9.4 Agenda of Public Consultation Meeting

The meeting was held in accordance with the following agenda.

(1) Opening Ceremony
(2) Presentation of Project Information by U Ar Hi (Translator, Myanmar Kyeeon Kyeewa Solar Power Co., Ltd.) on behalf of Mr. Kyint Height Kan (Project Manager, Myanmar Kyeeon Kyeewa Solar Power Co., Ltd)
(3) Presentation of Environmental Management Plan (EMP) for construction and operation of 30 MW ground mounted solar power plant project connected to Kyeeon Kyeewa Substation by U Zaw Ye Naung (Project Assistant, E Guard Environmental Services Co., Ltd.)
(4) Questions, comments, and suggestions form the attendees.
(5) Closing Ceremony

The detail of each agenda is described as following;

1. **Opening Ceremony**

2. **Presentation of Project Information by U Ar Hi (Translator, Myanmar Kyeeon Kyeewa Solar Power Co., Ltd.) on behalf of Mr. Kyint Height Kan (Project Manager, Myanmar Kyeeon Kyeewa Solar Power Co., Ltd)**
   U Ar Hi briefly explained the project information such as type of business, construction and operation process of the project, project proponent information a project description.

3. **Presentation of Environmental Management Plan (EMP) for construction and operation of 30 MW ground mounted solar power plant project connected to Kyeeon Kyeewa Substation by U Zaw Ye Naung (Project Assistant, E Guard Environmental Services Co., Ltd.)**
   U Zaw Ye Naung explained the processes of environmental management plan preparation, potential positive impacts of the project, potential negative impacts of the project, proposed mitigation measures to reduce these negative impacts, proposed

monitoring plan, grievance redress mechanism and environmental quality measurements processes of the proposed project.

4. Questions, comments, and suggestions form the attendees.

Question: **Daw Nilar Win (Lalma Village)** Is any hazard for plants and animals because of waste water from solar panel clearing during operation stage?
Answer: **Mr. Ar Hi (Translator, Myanmar Kyeeon Kyeewa Solar Power Co., Ltd.)** There will be no hazards or any dangerous for environment because solar panel clearing is only for dust on panle surface and clearing process will be conduct with natural water.
U Zaw Ye Naung (E Guard Environmental Services Co., Ltd) Company will implement waste water treatment and management system if any necessary for water disposal.

Suggestion: **U Tin Win (Lalma Village)** Would like to have job opportunities for local villagers more than any other people apart from project area because of povity.
Answer: **Mr. Ar Hi (Translator, Myanmar Kyeeon Kyeewa Solar Power Co., Ltd.)** Company will try to supply more job opportunity for local people in future.

Suggestion: **U Tin Win (Lalma Village)** Would like to get access road to Than Zel Taung Taw Ya Monastery for the village because project site is established on old road of Monastery and villagers can't pass through the site area.
Answer: **Mr. Ar Hi (Translator, Myanmar Kyeeon Kyeewa Solar Power Co., Ltd.)** Company will contact main contractor and try to get access road to Monastery.

Suggestion: **U Lay Myint (Lalma Village Administrator)** Got much complains to get more jobs on project site, paid wages for site clearing from company to villagers because company has established at the place already cleared by villagers for agriculture. And, need to provide access water for farms but access road of project site is situated between canal and farms.
Answer: **Mr. Ar Hi (Translator, Myanmar Kyeeon Kyeewa Solar Power Co., Ltd.)** Will Contact main contractor and discuss for wild clearing compensations. Also, will provide water way facility such as pipe line or curvets.

Suggestion: **Daw Mar Mar Aye (Lalma Village)** Would like to have employment opportunity for both men and women on site.
Answer: **Mr. Ar Hi (Translator, Myanmar Kyeeon Kyeewa Solar Power Co., Ltd.)** Company will try to create more job opportunity for women in future in appropriate sectors.

Suggestion: **U Lu Yin (Lalma Village)** Would like to have more job opportunities for local villagers because there are only 100 families out of 600 employed.
Answer: **Mr. Ar Hi (Translator, Myanmar Kyeeon Kyeewa Solar Power Co., Ltd.)** Company will try to create more job opportunities for local people in future.

Suggestion: **U Naing Min (Lalma Village)** Survey points and benchmarks with labelled of **MOEE** for transmission line inside the forest lead to difficulties for animal husbandry, cows, and goats for grazing.
Answer: **Mr. Ar Hi (Translator, Myanmar Kyeeon Kyeewa Solar Power Co., Ltd.)** Company will contact MOEE and try to solve this problem.

Suggestion: **U Naing Min (Lalma Village)** Roads have been destroyed by heavy machines and vehicles. Would like to have repaired roads
Answer: **Mr. Ar Hi (Translator, Myanmar Kyeeon Kyeewa Solar Power Co., Ltd.)** This is mainly because of wood and gravel commercial trucks and not for solar project site. But company will try to repair access roads for the village.

Suggestion: **U Wai Lu (Lalma Village)** How long will it take to build the solar project?
Answer: **Mr. Kyint Height Kan (Project Manager, Myanmar Kyeeon Kyeewa Solar Power Co., Ltd.)** Expected deadline for construction phase is coming November.

5. Closing the ceremony

CHAPTER 10 CONSLUSION AND RECOMMENDATIONS

10.1 Conclusion

This Environmental Management Plan (EMP) is formulated for the proposed project in accordance with Environmental Impact Assessment Procedure as per instructions of Environmental Conservation Department (ECD). The project proponent will implement the EMP during construction and operation in compliance with the National laws and regulations for environmental protection.

The effective implementation of the mitigation measures proposed will ensure towards good environmental management within the proposed project area. Implementation of appropriate mitigation measures are needed to be implemented by establishing an EMS (Environmental Management System) based on the description from this EMP. Employment of Environmental Staff, training to the engineers and workers, budget allocation, etc., is vital for the success of an EMS.

A GRM will be implemented from the earlier stage of the commencement of the project and engage the problem arise from the public or encounter due to the activities by the project proponent or contractors.

Though, the main objective of the study is to identify the major environmental impacts due to the implementation of the project activities in two phases; construction phase and operation phase but descriptions of decommissioning phase is excluded as the project proponent will extend the operation periods with the approval of relevant departments to generate electricity from solar energy as per Build, Own, Operate (BOO) basis at the end of contracted operation period. The project proponent is committed to submit decommissioning plan when the project is to be closed permanently due to any reasons; operational, technical, financial, social, or political.

This EMP report will be used as guidance for implementing the environmental management tasks practically and cost effectively with continuous improvement.

The findings of the EMP study indicated that the proposed project would generate positive impacts such as local employment and business opportunities, and enhancement of capabilities and working skills of the employees. Consequently, local socio-economic in the region is expected to be improved. Successful implementation of the proposed project will raise confidence for investors and aid agencies to develop further solar and other renewable projects in Myanmar. Major benefits of this project is that it will increase the supply of electrical energy in Myanmar from a renewable source, which is in line with the aim of the Myanmar Government to increase energy supply and reduce the overall CO_2 emission of Myanmar by substituting energy from the predominating coal-fired Power Plants.

References

- General Administration Department (Minbu Township), 2019, *"Minbu Township Data"*.
- Ministry of Environmental Conservation and Forestry (MOECAF), 2015, *"Environmental Impact Assessment Procedure".*
- Ministry of Environmental Conservation and Forestry (MOECAF), 2015, *"National Environmental Quality (Emission) Guidelines".*
- E Guard Environmental Services Co., Ltd, 2021, "*Environmental Management Plan (EMP) Report for 30MW Ground Mounted Solar Power Project Connected to Thapyaywa Substation*".

Appendix

(1) **Commitment to follow by Project Proponent**

MYANMAR KYEEONKYEEWA SOLAR POWER COMPANY LIMITED

To follow Commitments and Mitigation Measures stated in the Environmental Management Plans (EMP) of Environmental Management Plan (EMP) Report

With regards to the above matter, we, MYANMAR KYEEON KYEEWA SOLAR POWER COMPANY LIMITED, strongly commit that this EMP report, prepared by E Guard Environmental Services Co., Ltd. is strong and complete. We also commit that we will operate our proposed project according to our commitments and implement Environmental Management Plan (EMP) and mitigation measures that are mentioned in this EMP report. Moreover, we commit to work out our best not to cause any impacts on social and environment during the construction and operation phases of the project by implementing the appropriate mitigation measures described in this EMP report and if any impacts that are not anticipated in the report occur, appropriate mitigation measures must be implemented accordingly.

Your Sincerely,

Mr. JIANG Xingcheng

Director of

MYANMAR KYEENKYEEWA SOLAR POWER COMPANY LIMITED

(2) **Commitment to follow by Third Party**

E GUARD ENVIRONMENTAL SERVICES
No. 145 (A2-3), Thiri Mingalar Street (သီရိမင်္ဂလာလမ်းသွယ်),
Ward No. (4), 8 Mile-Pyay Road, Mayangone Township, 11062, Yangon,
the Republic of the Union of Myanmar
Ph: (+95) 1 9667757, (+95) 9 797005151
www.eguardservices.com; info@eguardservices.com

Commitment to follow and compliance with Environmental Conservation Law, Rules, Environmental Impact Assessment Procedure, National Environmental Quality (Emission) Guidelines, Relevant Environmental Standards and Mitigation Measures stated in the Environmental Management Plan (EMP) of EMP Report

With regards to the above matter, we, E Guard Environmental Services Co., Ltd. Has prepared the Environmental Management Plans (EMP) Report for 30 MW Ground Mounted Solar Power Plant Project connected to Kyeeonkyeewa Substation, proposed by Myanmar Kyeeonkyeewa Solar Power Co., Ltd., Our company strongly commits that this EMP report has been prepared by following Environmental Conservation Law (2012), Environmental Conservation Rules (2014), Environmental Impact Assessment Procedure (2015), National Environmental Quality (Emission) Guidelines (2015) and relevant environmental standards through successful implementation of mitigation measures and environmental monitoring plans stated in the Environmental Management Plan (EMP) of EMP Report.

Aye Thiha
Managing Director
E guard Environmental Services

www.facebook.com/EGuardmm/

(3) **Instruction to prepare EMP Report**

ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော်အစိုးရ
သယံဇာတနှင့်သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာန
ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန
ညွှန်ကြားရေးမှူးချုပ်ရုံး

စာအမှတ်၊ EIA - ၂/၉/ သဘောထား (PP-N)(ခရုပ/ ၂၀၂၂)
ရက်စွဲ ၊ ၂၀၂၂ခုနှစ် ဩဂုတ် လ ၃ ရက်

သို့

အုပ်ချုပ်မှုဒါရိုက်တာ
Myanmar Kyeeonkyeewa Solar Power Co.,Ltd
အမှတ် (၆၈၀) စိန်ပန်းလမ်းနှင့် သရဖီလမ်းထောင့်၊ သပြေကုန်းရပ်ကွက်၊ ဇမ္ဗူသီရိမြို့နယ်၊
နေပြည်တော်၊ ဖုန်း - ၀၉- ၂၂၂၀၉၈၂

အကြောင်းအရာ။ **Myanmar Kyeeonkyeewa Solar Power Co.,Ltd ၏ ၃၀ မဂ္ဂါဝပ် နေရောင်ခြည်သုံး လျှပ်စစ်ဓာတ်အားထုတ်လုပ်ခြင်းလုပ်ငန်းနှင့်ပတ်သက်၍ ပေးပို့လာသော စီမံကိန်းအဆိုပြုလွှာအပေါ် သဘောထားမှတ်ချက်ပြန်ကြားခြင်း**

ရည်ညွှန်းချက်။ (၁) Myanmar Kyeeonkyeewa Solar Power Co.,Ltd ၏ ၂၁-၇-၂၀၂၂ ရက်နေ့ ရက်စွဲပါ စာအမှတ်၊ kyeeonkyeewa/ECD/2022-01

(၂) ဤဝန်ကြီးဌာန၊ ပြည်ထောင်စုဝန်ကြီးရုံး၏ ၂၂-၄-၂၀၂၁ ရက်စွဲပါ စာအမှတ်၊ (သစ်တော) ၃(၂) /၀၃ (EC) / (၁၀၉၄ /၂၀၂၁)

၁။ အကြောင်းအရာပါကိစ္စနှင့်ပတ်သက်၍ Myanmar Kyeeonkyeewa Solar Power Co.,Ltd က မကွေးတိုင်းဒေသကြီး၊ မင်းဘူးခရိုင်၊ ပွင့်ဖြူမြို့နယ်၊ မဲဇလီကျေးရွာအုပ်စုတွင် အကောင်အထည်ဖော်ဆောင်ရွက်မည့် ၃၀ မဂ္ဂါဝပ် နေရောင်ခြည်သုံးလျှပ်စစ်ဓာတ်အား ထုတ်လုပ်မည့် စီမံကိန်းအတွက် စီမံကိန်းအဆိုပြုလွှာအားစိစစ်သုံးသပ်ပေးနိုင်ပါရန် ရည်ညွှန်း (၁) ပါစာဖြင့် ပေးပို့တင်ပြလာပါသည်။

၂။ Myanmar Kyeeonkyeewa Solar Power Co.,Ltd က အကောင်အထည်ဖော်ဆောင်ရွက်မည့် ၃၀ မဂ္ဂါဝပ် နေရောင်ခြည်သုံး လျှပ်စစ်ဓာတ်အားထုတ်လုပ်မည့် စီမံကိန်းအတွက် စီမံကိန်း အဆိုပြုလွှာအား စိစစ်သုံးသပ်ရာတွင် အောက်ဖော်ပြပါအတိုင်း တွေ့ရှိရပါသည်-

J

(က) နေရောင်ခြည်သုံး လျှပ်စစ်ဓာတ်အားထုတ်လုပ်မည့် စီမံကိန်းအကျယ်အဝန်းမှာ ၁၄၅ ဧက ကျယ်ဝန်းပြီး အဆိုပါ မြေနေရာအား Super One Holding Co.,Ltd မှ China ITS (Holdings) Col.,Ltd ထံသို့ ငှားရမ်းထားခြင်းဖြစ်ကြောင်း၊

(ခ) 540Wp monocrystalline silicon double-sided PV module အား တပ်ဆင် အသုံးပြုသွားမည်ဖြစ်ပြီး စုစုပေါင်း PV module 67,200 ခန့် တပ်ဆင်သွားမည် ဖြစ်ကြောင်း၊

(ဂ) Photovoltic Cells များမှ ထွက်ရှိလာသော 33kV လျှပ်စစ်ဓာတ်အားအား Power Collection Line တစ်ခုချင်းစီအနေဖြင့် PV Power 15MWac စုဆောင်းနိုင်သည့် Two Circuit Power Collection Lines အား အသုံးပြု၍ 132 kV booster station သို့ ပို့ဆောင်ထုတ်လွှတ်သွားမည်ဖြစ်ကြောင်း၊

(ဃ) ဇီဝမျိုးစုံမျိုးကွဲများနှင့် ပတ်ဝန်းကျင်ဆိုင်ရာအခြေအနေများအနေဖြင့် စီမံကိန်း ဧရိယာ အနီးတွင် Vegetation Cover မြင့်မားသော်လည်း အဖိုးတန်သစ်ပင်မျိုးများမရှိဘဲ ချုံနွယ်များ၊အပင်ငယ်မျိုးများသာပေါက်ရောက်ကြောင်း။ သတ္တဝါမျိုးစိတ်များအနေဖြင့်လည်း ကြီးမားသည့် နို့တိုက်သတ္တဝါမျိုးစိတ်များမရှိဘဲ ရှဉ့်နှင့်ကြွက်ကဲ့သို့သော အကောင်ငယ် များသာ ရှိကြောင်း။

၃။ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာလုပ်ထုံးလုပ်နည်းနောက်ဆက်တွဲ(က)ဆန်းစစ်ခြင်း ဆောင်ရွက်ရန်လိုအပ်သည့် စီမံကိန်းလုပ်ငန်းအမျိုးအစားများ သတ်မှတ်ချက်ဇယား အမှတ်စဉ် (၁၁) အရ နေရောင်ခြည်သုံးလျှပ်စစ်ဓာတ်အားထုတ်လုပ်ခြင်းလုပ်ငန်းအတွက်ထုတ်လုပ်မှုပမာဏ ၅၀ မဂ္ဂါဝပ် နှင့်အထက်လုပ်ငန်းများအနေဖြင့် ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း ပြုလုပ်ရမည်ဖြစ်ပြီး ဝန်ကြီးဌာနက ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းပြုလုပ်ရန် လိုအပ်သည်ဟု သတ်မှတ်သည့် စီမံကိန်းအားလုံးကို ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း ပြုလုပ်ရမည်ဟု ဖော်ပြပါရှိပါသည်။ ထို့အပြင် ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်းလုပ်ထုံးလုပ်နည်း အပိုဒ်(၂၄)တွင် "ဝန်ကြီးဌာနသည် အခြား မည်သည့်စီမံကိန်း သို့မဟုတ် လုပ်ငန်းကိုမဆို ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်ရေးဆွဲရန် လိုအပ်ခြင်း ရှိ မရှိ ရွေးချယ် သတ်မှတ်နိုင်သည်"ဟု ဖော်ပြထားပါသည်။

၄။ သို့ဖြစ်ပါ၍ Myanmar Kyeeonkyeewa Solar Power Co.,Ltd က မကွေးတိုင်းဒေသကြီး၊ မင်းဘူးခရိုင်၊ ပွင့်ဖြူမြို့နယ်၊ မဲဇလီကျေးရွာအုပ်စုတွင် အကောင်အထည်ဖော် ဆောင်ရွက်မည့် ၃၀ မဂ္ဂါဝပ် နေရောင်ခြည်သုံးလျှပ်စစ်ဓာတ်အား ထုတ်လုပ်မည့် စီမံကိန်းနှင့် ပတ်သက်၍ ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာလုပ်ထုံးလုပ်နည်း အပိုဒ် (၂၄) အရ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်

ရေးဆွဲရန်လိုအပ်ပါကြောင်း သုံးသပ်ရပါသဖြင့် အောက်ပါအတိုင်း ဆောင်ရွက်ရန် လိုအပ်ကြောင်း အကြောင်းပြန်ကြားပါသည်-

(က) ၃၀မဂ္ဂါဝပ် နေရောင်ခြည်သုံးလျှပ်စစ်ဓာတ်အားထုတ်လုပ်ခြင်း စီမံကိန်းနှင့် ၎င်း၏ ဆက်စပ်လုပ်ငန်းများဖြစ်သည့် Battery Square Area တည်ဆောက်ခြင်း၊ 132kV Booster Station တည်ဆောက်ခြင်း၊ ၁၃၂ကေဗွီ လျှပ်စစ်ဓာတ်အားလိုင်းသွယ်တန်းခြင်း၊ လမ်းဖောက်ခြင်း၊ ဝန်ထမ်းများနေထိုင်ရာနေရာများတည်ဆောက်ခြင်း စသည့် လုပ်ငန်းများအားလုံးကိုခြုံငုံသောပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်ကို ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာလုပ်ထုံးလုပ်နည်း အပိုဒ် ၆၃ (ဇ)နှင့် အပိုဒ် (၇၇)တို့နှင့် အညီရေးဆွဲ၍ သယံဇာတနှင့်သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာနသို့ တင်ပြ အတည်ပြုချက်ရယူရန်၊

(ခ) ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်ရေးဆွဲရာတွင် နေရောင်ခြည်သုံးလျှပ်စစ်ဓာတ်အားထုတ်လုပ်ခြင်းလုပ်ငန်းကြောင့် ဖြစ်ပေါ်လာနိုင်သော ပတ်ဝန်းကျင်နှင့် လူမှုရေးဆိုင်ရာ သက်ရောက်မှုများဖြစ်သော ဂေဟစနစ်နှင့် ဇီဝမျိုးစုံမျိုးကွဲ၊ မြေအသုံးချမှု၊ စွန့်ပစ်ပစ္စည်း(အစိုင်အခဲ/အရည်စီမံခန့်ခွဲခြင်း၊လူမှုစီးပွားရေး၊လုပ်ငန်းခွင်ကျန်းမာရေးနှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေးစသည့် နယ်ပယ်များဆိုင်ရာကျွမ်းကျင်ပညာရှင်များဖြင့် ပြည့်စုံစွာရေးဆွဲတင်ပြရန်၊

(ဂ) ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်ကို ဦးစီးဌာနသို့ တင်သွင်းပြီးနောက် ၁၅ ရက်ထက်နောက်မကျစေဘဲ လူမှုအဖွဲ့အစည်း၊ စီမံကိန်းကြောင့် ထိခိုက်ခံစားရသူများ၊ ဒေသဆိုင်ရာအဖွဲ့အစည်းနှင့် အခြားအကျိုးသက်ဆိုင်သူများ သိရှိနိုင်စေရန် စီမံကိန်းသို့မဟုတ် စီမံကိန်းအဆိုပြုသူ၏ ဝက်ဘ်ဆိုဒ်များနှင့် သတင်းစာစသည့် ပြည်တွင်းမီဒီယာများမှ လည်းကောင်း၊ စာကြည့်တိုက်၊ လူထုစုဝေးခန်းမစသည့် အများပြည်သူစုဝေးရာနေရာများတွင်လည်းကောင်း၊ စီမံကိန်းအဆိုပြုသူ၏ ရုံးများတွင်လည်းကောင်း ထုတ်ပြန်ကြေညာ၍ထုတ်ပြန်ကြေညာကြောင်းအထောက်အထားသို့မဟုတ် ဝက်ဘ်ဆိုဒ်လိပ်စာတို့အား အစီရင်ခံစာတင်သွင်းပြီး ၁၅ ရက်အတွင်း reporting.eia@gmail.com သို့ တင်ပြရန်။

ညွှန်ကြားရေးမှူးချုပ် (ကိုယ်စား)
(ဒေါက်တာဆန်ဦး၊ ဒုတိယညွှန်ကြားရေးမှူးချုပ်)

၄

မိတ္တူကို

ပြည်ထောင်စုဝန်ကြီးရုံး၊ သယံဇာတနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာန၊ ရုံးအမှတ် (၂၈)

ဦးဆောင်ညွှန်ကြားရေးမှူး၊ လျှပ်စစ်ဓာတ်အားထုတ်လုပ်ရေးလုပ်ငန်း ညွှန်ကြားရေးမှူးရုံး၊ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန၊ မကွေးတိုင်းဒေသကြီး ရုံးလက်ခံ၊ မျှောစာတွဲ

(4) **Project Proponent's Company Registration**

ကုမ္ပဏီမှတ်ပုံတင်လက်မှတ်

Certificate of Incorporation

MYANMAR KYEEONKYEEWA SOLAR POWER COMPANY LIMITED
Company Registration No. 132896348

မြန်မာနိုင်ငံကုမ္ပဏီများဥပဒေ၂၀၁၇ အရ
MYANMAR KYEEONKYEEWA SOLAR POWER COMPANY LIMITED
အား ၂၀၂၂ ခုနှစ် မတ်လ ၂၉ ရက်နေ့တွင်
အစုရှယ်ယာအားဖြင့် တာဝန်ကန့်သတ်ထား သည့် အများနှင့်မသက်ဆိုင်သောကုမ္ပဏီ
အဖြစ် ဖွဲ့စည်းမှတ်ပုံတင်ခွင့်ပြုလိုက်သည်။

This is to certify that
MYANMAR KYEEONKYEEWA SOLAR POWER COMPANY LIMITED
was incorporated under the Myanmar Companies Law 2017 on 29 March 2022 as a Private Company Limited by Shares.

ကုမ္ပဏီမှတ်ပုံတင်အရာရှိ
Registrar of Companies
ရင်းနှီးမြှုပ်နှံမှုနှင့်ကုမ္ပဏီများညွှန်ကြားမှုဦးစီးဌာန
Directorate of Investment and Company Administration

(5) **Third-party's and its experts' certificate for transitional consultant registration**

REPUBLIC OF THE UNION OF MYANMAR

Ministry of Natural Resources and Environmental Conservation

CERTIFICATE FOR TRANSITIONAL CONSULTANT REGISTRATION

(ကြားကာလအကြံပေးလုပ်ကိုင်သူမှတ်ပုံတင်ခြင်းအထောက်အထားလက်မှတ်)

No. 00228 Date 13 JUN 2017

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 အဖွဲ့အစည်းအား ထုတ်ပေးလိုက်သည်။)

(a)	Name of Organization (အဖွဲ့အစည်းအမည်)	E Guard Environmental Services Co., Ltd.
(b)	Name of the representative in the organization (အဖွဲ့အစည်းကိုယ်စားလှယ်၏အမည်)	U Aye Thiha
(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/ MRK (Naing) 069784
(e)	Address of organization (ဆက်သွယ်ရန်လိပ်စာ)	No. 99, Mya Kan Thar Lane, Nyein Chan Yay Street, 10 Miles, Pyay Road, Saw Bwar Gyi Gone, Insein Township, Yahgon. info@eguardservices.com, 09448001676
(f)	Type of Consultancy (အကြံပေးလုပ်ကိုင်မှုအမျိုးအစား)	Organization
(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)
ဤလက်မှတ်သက်တမ်းကို (၀၁-၀၄-၂၀၁၈) မှစ၍နေ့ (၃၁-၃-၂၀၁၉) ရက်နေ့အထိ တစ်နှစ်သက်တမ်း တိုးမြှင့်ပေးသည်။
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. Air Pollution Control
2. Ecology and Biodiversity
3. Facilitation of Meeting
4. Geology and Soil
5. Ground Water and Hydrology
6. Land Use
7. Legal Analysis
8. Modeling for Water Quality
9. Noise and Vibration
10. Risk Assessment and Hazard Management
11. Socio-Economy
12. Water Pollution Control
13. Waste Management
14. Agriculture, RAP
15. Food Technology
16. Health Impact Assessment
17. Marine and Microbiology, Water Quality
18. RS & GIS
19. Water Quality

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

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

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

EXTENSION
သက်တမ်းတိုးခြင်းခြင်း
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)လသက်တမ်းတိုးပေးသည်။
For Director General
(Soe Naing, Director)
Environmental Conservation Department

EXTENSION
သက်တမ်းတိုးခြင်းခြင်း
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)
ရက်နေ့အထိတစ်နှစ်သက်တမ်းတိုးပေးသည်။
For Director General
(Soe Naing, Director)
Environmental Conservation Department

EXTENSION
The VALIDITY of this certificate is extended
for six months from (1.1.2023) to (30.6.2023)
For Director General
(Soe Naing)
Environmental Conservation Department

REPUBLIC OF THE UNION OF MYANMAR

Ministry of Natural Resources and Environmental Conservation

CERTIFICATE FOR TRANSITIONAL CONSULTANT REGISTRATION

(ကြားကာလအကြံပေးလုပ်ကိုင်သူမှတ်ပုံတင်ခြင်းအထောက်အထားလက်မှတ်)

No. 10067 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၊ ၆၁၆/၂၀၁၅ အရ သယ်ဇာတနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာနသည် ဤအထောက်အထားလက်မှတ်ကို လူပုဂ္ဂိုလ်အားထုတ်ပေးလိုက်သည်။)

(a)	Name of Consultant (အကြံပေးပုဂ္ဂိုလ်အမည်)	U Soe Min
(b)	Citizenship (နိုင်ငံသား)	Myanmar
(c)	Identity Card / Passport Number (မှတ်ပုံတင်/နိုင်ငံကူးလက်မှတ် အမှတ်)	7/ Pa Ma Na (N) 006103
(d)	Address (ဆက်သွယ်ရန်လိပ်စာ)	No.42(A), Bawdiyeiktha, Shwetaunggyar (2), Bahan Township, Yangon. usoemin@gmail.com usoemin@eguardservices.com , 09 448001676
(e)	Organization (အဖွဲ့အစည်း)	E Guard Environmental Services Co.,Ltd.
(f)	Type of Consultancy (အကြံပေးလုပ်ကိုင်မှုအမျိုးအစား)	Person
(g)	Duration of validity (သက်တမ်းကုန်ဆုံးရက်)	31 March 2018

EXTENSION
သက်တမ်းတိုးခြင်း
The VALIDITY of this certificate is extended for one year from (1.4.2018) to (31.3.2019)
ဤလက်မှတ်အား (၁-၄-၂၀၁၈) ရက်နေ့မှ (၃၁.၃.၂၀၁၉) ရက်နေ့အထိ တစ်နှစ်သက်တမ်း တိုးပြုပြင်ထားသည်

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. Air Pollution Control

2. Modeling for Water Quality

3. Water Pollution Control

4. Water Resources Engineering

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

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

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

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

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

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

REPUBLIC OF THE UNION OF MYANMAR

Ministry of Natural Resources and Environmental Conservation

CERTIFICATE FOR TRANSITIONAL CONSULTANT REGISTRATION

(ကြားကာလအကြံပေးလုပ်ကိုင်သူမှတ်ပုံတင်ခြင်း အထောက်အထားလက်မှတ်)

No. 0104 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.

(ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာလုပ်ထုံးလုပ်နည်း၊ အမိန့်ကြော်ငြာစာအမှတ်၊ ၆၁၆/၂၀၁၅ အရ သယံဇာတနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာနသည် ဤအထောက်အထားလက်မှတ်ကို လူပုဂ္ဂိုလ်အားထုတ်ပေးလိုက်သည်။)

(a)	Name of Consultant (အကြံပေးပုဂ္ဂိုလ်အမည်)	Daw Thein Mwe Khin
(b)	Citizenship (နိုင်ငံသား)	Myanmar
(c)	Identity Card / Passport Number (မှတ်ပုံတင်/ နိုင်ငံကူးလက်မှတ် အမှတ်)	8/ Aa La Na (Naing) 140211
(d)	Address (ဆက်သွယ်ရန်လိပ်စာ)	99, Mya Kan Thar Lane, Nyein Chan Yay Street, 10 Mile, Pyay Road, Saw Bwar Gyi Kone Ward, Insein Township, Yangon Northern District, Yangon. theinmwe@eguardservices.com , 09 797005174
(e)	Organization (အဖွဲ့အစည်း)	E Guard Environmental Services Co., Ltd.
(f)	Type of Consultancy (အကြံပေးလုပ်ကိုင်မှုအမျိုးအစား)	Person
(g)	Duration of validity (သက်တမ်းကုန်ဆုံးရက်)	31 March 2018

သက်တမ်းတိုးမြှင့်ခြင်း
The VALIDITY of this certificate is extended for one year from (1.4.2018) to (31.3.2019)
ဤသက်မှတ်ထားသော (၀၁-၀၄-၂၀၁၈) ရက်နေ့မှ (၃၁.၃.၂၀၁၉) ထိ တစ်နှစ်တာကာလအတွက် တိုးမြှင့်ပေးသည်။

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. Forestry

EXTENSION
သက်တမ်းတိုးချဲ့ခြင်း
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 တစ်နှစ်သက်တမ်းတိုးချဲ့ပြီးသည်။
For Director General
(Soe Naing, Director)
Environmental Conservation Department

EXTENSION
သက်တမ်းတိုးချဲ့ခြင်း
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 တိုးချဲ့ပြီးသည်။
For Director General
(Soe Naing, Director)
Environmental Conservation Department

EXTENSION
သက်တမ်းတိုးချဲ့ခြင်း
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)လသက်တမ်းတိုးချဲ့ပြီးသည်။
For Director General
(Soe Naing, Director)
Environmental Conservation Department

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

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

THE REPUBLIC OF THE UNION OF MYANMAR

Ministry of Natural Resources and Environmental Conservation

CERTIFICATE FOR TRANSITIONAL CONSULTANT REGISTRATION

(ကြားကာလအကြံပေးလုပ်ကိုင်သူမှတ်ပုံတင်ခြင်းအထောက်အထားလက်မှတ်)

No. 00281 Date 13 FEB 2023

The Ministry of Natural Resources and Environmental Conservation, hereby, issues this certificate to the organization under Environmental Impact Assessment Procedure, Notification No. 616/2015.
(ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း၊ အမိန့်ကြော်ငြာစာအမှတ်၊ ၆၁၆/၂၀၁၅ အရ သယံဇာတနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာနသည် ဤအထောက်အထားလက်မှတ်ကို ထုတ်ပေးလိုက်သည်။)

(a)	Name of Consultant (အကြံပေးပုဂ္ဂိုလ်အမည်)	Mr. Aung Si Thu Thein
(b)	Citizenship (နိုင်ငံသား)	Myanmar
(c)	Identity Card / Passport Number (မှတ်ပုံတင်/ နိုင်ငံကူးလက်မှတ် အမှတ်)	12/AhSaNa (N) 199101
(d)	Address (ဆက်သွယ်ရန်လိပ်စာ)	Room No. (1), Building No. (30), Gyogone Avenue, Western Gyogone Ward, Insein Tsp, Yangon. Mobile phone: 095504419, 09797005164 Telephone: +95 1 3644743 E mail: agsithuforestry@gmail.com, aungsithu@eguardservices.com
(e)	Organization (အဖွဲ့အစည်း)	E guard Environmental Services Co., Ltd
(f)	Type of Consultancy (အကြံပေးလုပ်ကိုင်မှုအမျိုးအစား)	Person
(g)	Duration of validity (သက်တမ်းကုန်ဆုံးရက်)	30th June, 2023.

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

ဤအထောက်အထားလက်မှတ်သည် ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်းနှင့် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းပြုလုပ်သည့် တတိယပုဂ္ဂိုလ် သို့မဟုတ် အဖွဲ့အစည်းများလုပ်ငန်းလိုင်စင်ဆိုင်ရာ လုပ်ထုံးလုပ်နည်း ထုတ်ပြန်သည့်ရက်မှစ၍ (၆) လ ပြည့်မြောက်သည့်နေ့တွင် ပျက်ပြယ်မည် ဖြစ်သည်။

Areas of Expertise Permitted (ခွင့်ပြုသည့် ကျွမ်းကျင်မှုနယ်ပယ်များ)

1. Ecology and Biodiversity;	2. O (GIS);
3. Land use.	4.
5.	6.
7.	8.
9.	10.
11.	12.
13.	14.

စည်းကမ်းချက်များ

၁။ ကြားကာလအကြံပေးလုပ်ကိုင်သူမှတ်ပုံတင်ခြင်းအထောက်အထားလက်မှတ်ရရှိသူသည်-

(က) ဤအထောက်အထားလက်မှတ်ကို ဖျက်ဆီးခြင်း၊ ပြင်ဆင်ခြင်း၊ မသက်ဆိုင်သူတစ်ဦးဦးသို့ ငှားရမ်းခြင်း၊ အမည်ခံ အသုံးပြုစေခြင်းနှင့် တစ်ဆင့်လွှဲပြောင်းကိုင်ဆောင်စေခြင်းမပြုရ၊

(ခ) ဤအထောက်အထားလက်မှတ်ကို သတ်မှတ်သည့် စည်းကမ်းဘောင်အတွင်း လုပ်ငန်းလုပ်ကိုင်ခွင့် အငြင်းပွားမှုများ၊ စောဒကတက်မှုများနှင့်စပ်လျဉ်း၍ တာဝန်ယူဖြေရှင်းရမည်။ ယင်းသို့ ဖြေရှင်းနိုင်ခြင်း မရှိပါက အထောက်အထားလက်မှတ် ရပ်ဆိုင်းခြင်း သို့မဟုတ် ပယ်ဖျက်ခြင်း ခံရမည်၊

(ဂ) ဤအထောက်အထားလက်မှတ်တွင် ခွင့်ပြုထားသည့် ကျွမ်းကျင်မှုနယ်ပယ်များအတွက်သာ တာဝန်ယူလေ့လာဆန်းစစ်ရေးဆွဲခွင့်ရှိသည်၊

(ဃ) မိမိအဖွဲ့အစည်းတွင် ပါဝင်သည့် အကြံပေးပုဂ္ဂိုလ်များ ပြောင်းလဲမှု တစ်စုံတစ်ရာရှိပါက ကြားကာလ အကြံပေးလုပ်ကိုင်သူမှတ်ပုံတင်ခြင်း အထောက်အထားလက်မှတ် ရရှိထားသူဖြင့်သာ အစားထိုး ပြောင်းလဲရမည်၊

(င) အဖွဲ့အစည်းဖြစ်ပါက အဖွဲ့အစည်းတွင် ဒါရိုက်တာဘုတ်အဖွဲ့ (Board of Director)၊ အကြံပေးပုဂ္ဂိုလ် (Consultant) များ ပြောင်းလဲလိုလျှင် တည်ဆဲဥပဒေများနှင့်အညီ ဆောင်ရွက်ပြီး ရက်ပေါင်း ၃၀ အတွင်း ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနသို့ မဖျက်မကွက် အကြောင်းကြားရမည်၊

(စ) ဝန်ကြီးဌာနက အခါအားလျော်စွာ သတ်မှတ်သည့် စည်းကမ်းချက်များကိုလိုက်နာရမည်၊

(ဆ) ဖော်ပြပါ စည်းကမ်းချက်တစ်ရပ်ရပ်ကို ဖောက်ဖျက်ခြင်း၊ လိုက်နာရန်ပျက်ကွက်ခြင်း တစ်စုံတစ်ရာ ပေါ်ပေါက်ပါက အထောက်အထားလက်မှတ် ရပ်ဆိုင်းခြင်း သို့မဟုတ် ပယ်ဖျက်ခြင်း ခံရမည်၊

၂။ အထောက်အထားလက်မှတ်ရရှိသူသည် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနက ခွင့်ပြုထားသော ပတ်ဝန်းကျင် ဆန်းစစ်ခြင်းအမျိုးအစားကိုသာ ဆောင်ရွက်ရမည်၊

၃။ အထောက်အထားလက်မှတ်ရရှိသူသည် မြန်မာနိုင်ငံ၏ တည်ဆဲဥပဒေတစ်ရပ်ရပ်ကို ဖောက်ဖျက်ကြောင်း သို့မဟုတ် ဆန်းစစ်ခြင်းလုပ်ငန်းများ ဆောင်ရွက်ရာတွင် သိသာထင်ရှားသော မှားယွင်းမှုများ ပါရှိနေပြီး သတ်မှတ် စံချိန်စံညွှန်း သို့မဟုတ် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဥပဒေ၊ နည်းဥပဒေများ၊ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း ဆိုင်ရာ လုပ်ထုံးလုပ်နည်းတို့အရ စိစစ်သုံးသပ်ပြီး ကနဦးသဘောထားမှတ်ချက်နှင့်အညီ ပြန်လည်ပြင်ဆင်ခြင်း မရှိကြောင်း ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန၏ သတ်မှတ်ဆုံးဖြတ်ခြင်းခံရလျှင် အထောက်အထားလက်မှတ် ရပ်ဆိုင်းခြင်း သို့မဟုတ် ပယ်ဖျက်ခြင်း ခံရမည်၊

၄။ အထောက်အထားလက်မှတ်ရရှိသော အဖွဲ့အစည်းသည် သက်ဆိုင်ရာစီမံကိန်းအတွက် လေ့လာဆန်းစစ်ရေးဆွဲ ဆောင်ရွက်ရန် တတိယအဖွဲ့အစည်းအတည်ပြုချက်ရယူရာ၌ မိမိအဖွဲ့အစည်းတွင် မှတ်ပုံတင်ထားသည့် အကြံပေး ပုဂ္ဂိုလ်များ၏ အမည်စာရင်းကိုသာ တင်ပြရမည်၊

၅။ အထောက်အထားလက်မှတ်ရရှိသော အဖွဲ့အစည်းသည် မိမိအဖွဲ့အစည်းက လက်လှမ်းမမီသော ကျွမ်းကျင်မှု နယ်ပယ်များအတွက် လေ့လာဆန်းစစ်ရေးဆွဲ ဆောင်ရွက်နိုင်ရန် ကြားကာလအကြံပေးလုပ်ကိုင်သူ မှတ်ပုံတင်ခြင်း အထောက်အထားလက်မှတ် ရရှိပြီးဖြစ်သည့် တစ်သီးပုဂ္ဂလလုပ်ကိုင်သူ (Freelancer) ကို သက်ဆိုင်ရာစီမံကိန်း အတွက်သာ ငှားရမ်းဆောင်ရွက်ရမည်။

THE REPUBLIC OF THE UNION OF MYANMAR

Ministry of Natural Resources and Environmental Conservation

CERTIFICATE FOR TRANSITIONAL CONSULTANT REGISTRATION

(ကြားကာလအကြံပေးလုပ်ကိုင်သူမှတ်ပုံတင်ခြင်းအထောက်အထားလက်မှတ်)

No. 00379 Date 17 FEB 2023

The Ministry of Natural Resources and Environmental Conservation, hereby, issues this certificate to the organization under Environmental Impact Assessment Procedure, Notification No. 616/2015.
(ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း၊ အမိန့်ကြော်ငြာစာအမှတ်၊ ၆၁၆/၂၀၁၅ အရ သယ်ဇာတနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာနသည် ဤအထောက်အထားလက်မှတ်ကို ထုတ်ပေးလိုက်သည်။)

(a)	Name of Consultant (အကြံပေးပုဂ္ဂိုလ်အမည်)	Mr. Htet Aung
(b)	Citizenship (နိုင်ငံသား)	Myanmar
(c)	Identity Card / Passport Number (မှတ်ပုံတင်/ နိုင်ငံကူးလက်မှတ် အမှတ်)	12/MaYaKa(N)144621
(d)	Address (ဆက်သွယ်ရန်လိပ်စာ)	(141), Yeikthar (2) Lane, Waizayandar Garden Housing, Mi Gyaung Kan (1) Ward, Thingangyun township, Yangon. Mobile phone: 095074307 Email: htetaung@eguardservices.com hahtetaung22@gmail.com
(e)	Organization (အဖွဲ့အစည်း)	E Guard Environmental Services. Co., Ltd.
(f)	Type of Consultancy (အကြံပေးလုပ်ကိုင်မှုအမျိုးအစား)	Person
(g)	Duration of validity (သက်တမ်းကုန်ဆုံးရက်)	30th June, 2023.

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

ဤအထောက်အထားလက်မှတ်သည် ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်းနှင့် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းပြုလုပ်သည့် တတိယပုဂ္ဂိုလ် သို့မဟုတ် အဖွဲ့အစည်းများလုပ်ငန်းလိုင်စင်ဆိုင်ရာ လုပ်ထုံးလုပ်နည်း ထုတ်ပြန်သည့်ရက်မှစ၍ (၆) လ ပြည့်မြောက်သည့်နေ့တွင် ပျက်ပြယ်မည် ဖြစ်သည်။

Areas of Expertise Permitted (ခွင့်ပြုသည့် ကျွမ်းကျင်မှုနယ်ပယ်များ)

1. Geology and Soil.	2.
3.	4.
5.	6.
7.	8.
9.	10.
11.	12.
13.	14.

စည်းကမ်းချက်များ

၁။ ကြားကာလအကြံပေးလုပ်ကိုင်သူမှတ်ပုံတင်ခြင်းအထောက်အထားလက်မှတ်ရရှိသူသည်-

(က) ဤအထောက်အထားလက်မှတ်ကို ဖျက်ဆီးခြင်း၊ ပြင်ဆင်ခြင်း၊ မသက်ဆိုင်သူတစ်ဦးဦးသို့ ငှားရမ်းခြင်း၊ အမည်ခံ အသုံးပြုစေခြင်းနှင့် တစ်ဆင့်လွှဲပြောင်းကိုင်ဆောင်စေခြင်းမပြုရ၊

(ခ) ဤအထောက်အထားလက်မှတ်ကို သတ်မှတ်သည့် စည်းကမ်းဘောင်အတွင်း လုပ်ငန်းလုပ်ကိုင်ခွင့် အငြင်းပွားမှုများ၊ စောဒကတက်မှုများနှင့်စပ်လျဉ်း၍ တာဝန်ယူဖြေရှင်းရမည်။ ယင်းသို့ ဖြေရှင်းနိုင်ခြင်း မရှိပါက အထောက်အထားလက်မှတ် ရပ်ဆိုင်းခြင်း သို့မဟုတ် ပယ်ဖျက်ခြင်း ခံရမည်၊

(ဂ) ဤအထောက်အထားလက်မှတ်တွင် ခွင့်ပြုထားသည့် ကျွမ်းကျင်မှုနယ်ပယ်များအတွက်သာ တာဝန်ယူလေ့လာဆန်းစစ်ရေးဆွဲခွင့်ရှိသည်၊

(ဃ) မိမိအဖွဲ့အစည်းတွင် ပါဝင်သည့် အကြံပေးပုဂ္ဂိုလ်များ ပြောင်းလဲမှု တစ်စုံတစ်ရာရှိပါက ကြားကာလ အကြံပေးလုပ်ကိုင်သူမှတ်ပုံတင်ခြင်း အထောက်အထားလက်မှတ် ရရှိထားသူဖြင့်သာ အစားထိုး ပြောင်းလဲရမည်၊

(င) အဖွဲ့အစည်းဖြစ်ပါက အဖွဲ့အစည်းတွင် ဒါရိုက်တာဘုတ်အဖွဲ့ (Board of Director)၊ အကြံပေးပုဂ္ဂိုလ် (Consultant) များ ပြောင်းလဲလိုလျှင် တည်ဆဲဥပဒေများနှင့်အညီ ဆောင်ရွက်ပြီး ရက်ပေါင်း ၃၀ အတွင်း ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနသို့ မပျက်မကွက် အကြောင်းကြားရမည်၊

(စ) ဝန်ကြီးဌာနက အခါအားလျော်စွာ သတ်မှတ်သည့် စည်းကမ်းချက်များကိုလိုက်နာရမည်၊

(ဆ) ဖော်ပြပါ စည်းကမ်းချက်တစ်ရပ်ရပ်ကို ဖောက်ဖျက်ခြင်း၊ လိုက်နာရန်ပျက်ကွက်ခြင်း တစ်စုံတစ်ရာ ပေါ်ပေါက်ပါက အထောက်အထားလက်မှတ် ရပ်ဆိုင်းခြင်း သို့မဟုတ် ပယ်ဖျက်ခြင်း ခံရမည်၊

၂။ အထောက်အထားလက်မှတ်ရရှိသူသည် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနက ခွင့်ပြုထားသော ပတ်ဝန်းကျင်ဆန်းစစ်ခြင်းအမျိုးအစားကိုသာ ဆောင်ရွက်ရမည်၊

၃။ အထောက်အထားလက်မှတ်ရရှိသူသည် မြန်မာနိုင်ငံ၏ တည်ဆဲဥပဒေတစ်ရပ်ရပ်ကို ဖောက်ဖျက်ကြောင်း သို့မဟုတ် ဆန်းစစ်ခြင်းလုပ်ငန်းများ ဆောင်ရွက်ရာတွင် သိသာထင်ရှားသော မှားယွင်းမှုများ ပါရှိနေပြီး သတ်မှတ် စံချိန်စံညွှန်း သို့မဟုတ် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဥပဒေ၊ နည်းဥပဒေများ၊ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း ဆိုင်ရာ လုပ်ထုံးလုပ်နည်းတို့အရ စိစစ်သုံးသပ်ပြီး ကနဦးသဘောထားမှတ်ချက်နှင့်အညီ ပြန်လည်ပြင်ဆင်ခြင်း မရှိကြောင်း ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန၏ သတ်မှတ်ဆုံးဖြတ်ခြင်းခံရလျှင် အထောက်အထားလက်မှတ် ရပ်ဆိုင်းခြင်း သို့မဟုတ် ပယ်ဖျက်ခြင်း ခံရမည်၊

၄။ အထောက်အထားလက်မှတ်ရရှိသော အဖွဲ့အစည်းသည် သက်ဆိုင်ရာစီမံကိန်းအတွက် လေ့လာဆန်းစစ်ရေးဆွဲ ဆောင်ရွက်ရန် တတိယအဖွဲ့အစည်းအတည်ပြုချက်ရယူရာ၌ မိမိအဖွဲ့အစည်းတွင် မှတ်ပုံတင်ထားသည့် အကြံပေး ပုဂ္ဂိုလ်များ၏ အမည်စာရင်းကိုသာ တင်ပြရမည်၊

၅။ အထောက်အထားလက်မှတ်ရရှိသော အဖွဲ့အစည်းသည် မိမိအဖွဲ့အစည်းက လက်လှမ်းမမီသော ကျွမ်းကျင်မှု နယ်ပယ်များအတွက် လေ့လာဆန်းစစ်ရေးဆွဲ ဆောင်ရွက်နိုင်ရန် ကြားကာလအကြံပေးလုပ်ကိုင်သူ မှတ်ပုံတင်ခြင်း အထောက်အထားလက်မှတ် ရရှိပြီးဖြစ်သည့် တစ်သီးပုဂ္ဂလလုပ်ကိုင်သူ (Freelancer) ကို သက်ဆိုင်ရာစီမံကိန်း အတွက်သာ ငှားရမ်းဆောင်ရွက်ရမည်။

THE REPUBLIC OF THE UNION OF MYANMAR

Ministry of Natural Resources and Environmental Conservation

CERTIFICATE FOR TRANSITIONAL CONSULTANT REGISTRATION

(ကြားကာလအကြံပေးလုပ်ကိုင်သူမှတ်ပုံတင်ခြင်းအထောက်အထားလက်မှတ်)

No. 00266 Date 13 FEB 2023

The Ministry of Natural Resources and Environmental Conservation, hereby, issues this certificate to the organization under Environmental Impact Assessment Procedure, Notification No. 616/2015.
(ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း၊ အမိန့်ကြော်ငြာစာအမှတ်၊ ၆၁၆/၂၀၁၅ အရ သယံဇာတနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာနသည် ဤအထောက်အထားလက်မှတ်ကို ထုတ်ပေးလိုက်သည်။)

(a)	Name of Consultant (အကြံပေးပုဂ္ဂိုလ်အမည်)	Ms. Htet Shwe Sin Aung
(b)	Citizenship (နိုင်ငံသား)	Myanmar
(c)	Identity Card / Passport Number (မှတ်ပုံတင်/ နိုင်ငံကူးလက်မှတ် အမှတ်)	12/TaMaNa (N) 117189
(d)	Address (ဆက်သွယ်ရန်လိပ်စာ)	No-25, 3rd floor, Thida Street, Kyaukmyaung ward, Tamwe Tsp, Yangon. Mobile phone: 09797005151 Telephone: 951 9667757 E mail: shwesinhtet@eguardservices.com
(e)	Organization (အဖွဲ့အစည်း)	E guard Environmental Services Co., Ltd
(f)	Type of Consultancy (အကြံပေးလုပ်ကိုင်မှုအမျိုးအစား)	Person
(g)	Duration of validity (သက်တမ်းကုန်ဆုံးရက်)	30th June, 2023.

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

ဤအထောက်အထားလက်မှတ်သည် ထိခိုက်မှုဆန်းစစ်ခြင်းနှင့် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းပြုလုပ်သည့် တတိယပုဂ္ဂိုလ် သို့မဟုတ် အဖွဲ့အစည်းများလုပ်ငန်းလိုင်စင်ဆိုင်ရာ လုပ်ထုံးလုပ်နည်း ထုတ်ပြန်သည့်ရက်မှစ၍ (၆) လ ပြည့်မြောက်သည့်နေ့တွင် ပျက်ပြယ်မည် ဖြစ်သည်။

Areas of Expertise Permitted (ခွင့်ပြုသည့် ကျွမ်းကျင်မှုနယ်ပယ်များ)

1. Ecology and Biodiversity.
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.
13.
14.

စည်းကမ်းချက်များ

၁။ ကြားကာလအကြံပေးလုပ်ကိုင်သူမှတ်ပုံတင်ခြင်းအထောက်အထားလက်မှတ်ရရှိသူသည်-

(က) ဤအထောက်အထားလက်မှတ်ကို ဖျက်ဆီးခြင်း၊ ပြင်ဆင်ခြင်း၊ မသက်ဆိုင်သူတစ်ဦးဦးသို့ ငှားရမ်းခြင်း၊ အမည်ခံ အသုံးပြုစေခြင်းနှင့် တစ်ဆင့်လွှဲပြောင်းကိုင်ဆောင်စေခြင်းမပြုရ၊

(ခ) ဤအထောက်အထားလက်မှတ်ကို သတ်မှတ်သည့် စည်းကမ်းဘောင်အတွင်း လုပ်ငန်းလုပ်ကိုင်ခွင့် အငြင်းပွားမှုများ၊ စောဒကတက်မှုများနှင့်စပ်လျဉ်း၍ တာဝန်ယူဖြေရှင်းရမည်။ ယင်းသို့ ဖြေရှင်းနိုင်ခြင်း မရှိပါက အထောက်အထားလက်မှတ် ရပ်ဆိုင်းခြင်း သို့မဟုတ် ပယ်ဖျက်ခြင်း ခံရမည်၊

(ဂ) ဤအထောက်အထားလက်မှတ်တွင် ခွင့်ပြုထားသည့် ကျွမ်းကျင်မှုနယ်ပယ်များအတွက်သာ တာဝန်ယူလေ့လာဆန်းစစ်ရေးဆွဲခွင့်ရှိသည်၊

(ဃ) မိမိအဖွဲ့အစည်းတွင် ပါဝင်သည့် အကြံပေးပုဂ္ဂိုလ်များ ပြောင်းလဲမှု တစ်စုံတစ်ရာရှိပါက ကြားကာလ အကြံပေးလုပ်ကိုင်သူမှတ်ပုံတင်ခြင်း အထောက်အထားလက်မှတ် ရရှိထားသူဖြင့်သာ အစားထိုး ပြောင်းလဲရမည်၊

(င) အဖွဲ့အစည်းဖြစ်ပါက အဖွဲ့အစည်းတွင် ဒါရိုက်တာဘုတ်အဖွဲ့ (Board of Director)၊ အကြံပေးပုဂ္ဂိုလ် (Consultant) များ ပြောင်းလဲလိုလျှင် တည်ဆဲဥပဒေများနှင့်အညီ ဆောင်ရွက်ပြီး ရက်ပေါင်း ၃၀ အတွင်း ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနသို့ မဖျက်မကွက် အကြောင်းကြားရမည်၊

(စ) ဝန်ကြီးဌာနက အခါအားလျော်စွာ သတ်မှတ်သည့် စည်းကမ်းချက်များကိုလိုက်နာရမည်၊

(ဆ) ဖော်ပြပါ စည်းကမ်းချက်တစ်ရပ်ရပ်ကို ဖောက်ဖျက်ခြင်း၊ လိုက်နာရန်ပျက်ကွက်ခြင်း တစ်စုံတစ်ရာ ပေါ်ပေါက်ပါက အထောက်အထားလက်မှတ် ရပ်ဆိုင်းခြင်း သို့မဟုတ် ပယ်ဖျက်ခြင်း ခံရမည်၊

၂။ အထောက်အထားလက်မှတ်ရရှိသူသည် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနက ခွင့်ပြုထားသော ပတ်ဝန်းကျင် ဆန်းစစ်ခြင်းအမျိုးအစားကိုသာ ဆောင်ရွက်ရမည်၊

၃။ အထောက်အထားလက်မှတ်ရရှိသူသည် မြန်မာနိုင်ငံ၏ တည်ဆဲဥပဒေတစ်ရပ်ရပ်ကို ဖောက်ဖျက်ကြောင်း သို့မဟုတ် ဆန်းစစ်ခြင်းလုပ်ငန်းများ ဆောင်ရွက်ရာတွင် သိသာထင်ရှားသော မှားယွင်းမှုများ ပါရှိနေပြီး သတ်မှတ် စံချိန်စံညွှန်း သို့မဟုတ် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဥပဒေ၊ နည်းဥပဒေများ၊ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း ဆိုင်ရာ လုပ်ထုံးလုပ်နည်းတို့အရ စိစစ်သုံးသပ်ပြီး ကနဦးသဘောထားမှတ်ချက်နှင့်အညီ ပြန်လည်ပြင်ဆင်ခြင်း မရှိကြောင်း ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန၏ သတ်မှတ်ဆုံးဖြတ်ခြင်းခံရလျှင် အထောက်အထားလက်မှတ် ရပ်ဆိုင်းခြင်း သို့မဟုတ် ပယ်ဖျက်ခြင်း ခံရမည်၊

၄။ အထောက်အထားလက်မှတ်ရရှိသော အဖွဲ့အစည်းသည် သက်ဆိုင်ရာစီမံကိန်းအတွက် လေ့လာဆန်းစစ်ရေးဆွဲ ဆောင်ရွက်ရန် တတိယအဖွဲ့အစည်းအတည်ပြုချက်ရယူရာ၌ မိမိအဖွဲ့အစည်းတွင် မှတ်ပုံတင်ထားသည့် အကြံပေး ပုဂ္ဂိုလ်များ၏ အမည်စာရင်းကိုသာ တင်ပြရမည်၊

၅။ အထောက်အထားလက်မှတ်ရရှိသော အဖွဲ့အစည်းသည် မိမိအဖွဲ့အစည်းက လက်လှမ်းမမီသော ကျွမ်းကျင်မှု နယ်ပယ်များအတွက် လေ့လာဆန်းစစ်ရေးဆွဲ ဆောင်ရွက်နိုင်ရန် ကြားကာလအကြံပေးလုပ်ကိုင်သူ မှတ်ပုံတင်ခြင်း အထောက်အထားလက်မှတ် ရရှိပြီးဖြစ်သည့် တစ်သီးပုဂ္ဂလလုပ်ကိုင်သူ (Freelancer) ကို သက်ဆိုင်ရာစီမံကိန်း အတွက်သာ ငှားရမ်းဆောင်ရွက်ရမည်။

THE REPUBLIC OF THE UNION OF MYANMAR

Ministry of Natural Resources and Environmental Conservation

CERTIFICATE FOR TRANSITIONAL CONSULTANT REGISTRATION

(ကြားကာလအကြံပေးလုပ်ကိုင်သူမှတ်ပုံတင်ခြင်းအထောက်အထားလက်မှတ်)

No. 00279 Date 13 FEB 2023

The Ministry of Natural Resources and Environmental Conservation, hereby, issues this certificate to the organization under Environmental Impact Assessment Procedure, Notification No. 616/2015.
(ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း၊ အမိန့်ကြော်ငြာစာအမှတ်၊ ၆၁၆/၂၀၁၅ အရ သယံဇာတနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာနသည် ဤအထောက်အထားလက်မှတ်ကို ထုတ်ပေးလိုက်သည်။)

(a)	Name of Consultant (အကြံပေးပုဂ္ဂိုလ်အမည်)	Ms. Shwe Ya Min Bo
(b)	Citizenship (နိုင်ငံသား)	Myanmar
(c)	Identity Card / Passport Number (မှတ်ပုံတင်/ နိုင်ငံကူးလက်မှတ် အမှတ်)	8/MaKaNa (N) 218158
(d)	Address (ဆက်သွယ်ရန်လိပ်စာ)	No. A 870, 6th road, AungMyitter Quarter, Magway Region, Magway. Mobile phone: 09441545461 E mail: shweyaminbo712016@gmail.com shweyaminbo@eguardservices.com
(e)	Organization (အဖွဲ့အစည်း)	E guard Environmental Services Co., Ltd
(f)	Type of Consultancy (အကြံပေးလုပ်ကိုင်မှုအမျိုးအစား)	Person
(g)	Duration of validity (သက်တမ်းကုန်ဆုံးရက်)	30th June, 2023.

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

ဤအထောက်အထားလက်မှတ်သည် ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်းနှင့် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းပြုလုပ်သည့် တတိယပုဂ္ဂိုလ် သို့မဟုတ် အဖွဲ့အစည်းများလုပ်ငန်းလိုင်စင်ဆိုင်ရာ လုပ်ထုံးလုပ်နည်း ထုတ်ပြန်သည့်ရက်မှစ၍ (၆) လ ပြည့်မြောက်သည့်နေ့တွင် ပျက်ပြယ်မည် ဖြစ်သည်။

Areas of Expertise Permitted (ခွင့်ပြုသည့် ကျွမ်းကျင်မှုနယ်ပယ်များ)

1. O (Forestry);	2. O (GIS);
3. Ecology and Biodiversity.	4.
5.	6.
7.	8.
9.	10.
11.	12.
13.	14.

စည်းကမ်းချက်များ

၁။ ကြားကာလအကြံပေးလုပ်ကိုင်သူမှတ်ပုံတင်ခြင်းအထောက်အထားလက်မှတ်ရရှိသူသည်-

(က) ဤအထောက်အထားလက်မှတ်ကို ဖျက်ဆီးခြင်း၊ ပြင်ဆင်ခြင်း၊ မသက်ဆိုင်သူတစ်ဦးဦးသို့ ငှားရမ်းခြင်း၊ အမည်ခံ အသုံးပြုစေခြင်းနှင့် တစ်ဆင့်လွှဲပြောင်းကိုင်ဆောင်စေခြင်းမပြုရ၊

(ခ) ဤအထောက်အထားလက်မှတ်ကို သတ်မှတ်သည့် စည်းကမ်းဘောင်အတွင်း လုပ်ငန်းလုပ်ကိုင်ခွင့် အငြင်းပွားမှုများ၊ စောဒကတက်မှုများနှင့်စပ်လျဉ်း၍ တာဝန်ယူဖြေရှင်းရမည်။ ယင်းသို့ ဖြေရှင်းနိုင်ခြင်း မရှိပါက အထောက်အထားလက်မှတ် ရပ်ဆိုင်းခြင်း သို့မဟုတ် ပယ်ဖျက်ခြင်း ခံရမည်၊

(ဂ) ဤအထောက်အထားလက်မှတ်တွင် ခွင့်ပြုထားသည့် ကျွမ်းကျင်မှုနယ်ပယ်များအတွက်သာ တာဝန်ယူလေ့လာဆန်းစစ်ရေးဆွဲခွင့်ရှိသည်၊

(ဃ) မိမိအဖွဲ့အစည်းတွင် ပါဝင်သည့် အကြံပေးပုဂ္ဂိုလ်များ ပြောင်းလဲမှု တစ်စုံတစ်ရာရှိပါက ကြားကာလ အကြံပေးလုပ်ကိုင်သူမှတ်ပုံတင်ခြင်း အထောက်အထားလက်မှတ် ရရှိထားသူဖြင့်သာ အစားထိုး ပြောင်းလဲရမည်၊

(င) အဖွဲ့အစည်းဖြစ်ပါက အဖွဲ့အစည်းတွင် ဒါရိုက်တာဘုတ်အဖွဲ့ (Board of Director)၊ အကြံပေးပုဂ္ဂိုလ် (Consultant) များ ပြောင်းလဲလိုလျှင် တည်ဆဲဥပဒေများနှင့်အညီ ဆောင်ရွက်ပြီး ရက်ပေါင်း ၃၀ အတွင်း ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနသို့ မဖျက်မကွက် အကြောင်းကြားရမည်၊

(စ) ဝန်ကြီးဌာနက အခါအားလျော်စွာ သတ်မှတ်သည့် စည်းကမ်းချက်များကိုလိုက်နာရမည်၊

(ဆ) ဖော်ပြပါ စည်းကမ်းချက်တစ်ရပ်ရပ်ကို ဖောက်ဖျက်ခြင်း၊ လိုက်နာရန်ပျက်ကွက်ခြင်း တစ်စုံတစ်ရာ ပေါ်ပေါက်ပါက အထောက်အထားလက်မှတ် ရပ်ဆိုင်းခြင်း သို့မဟုတ် ပယ်ဖျက်ခြင်း ခံရမည်၊

၂။ အထောက်အထားလက်မှတ်ရရှိသူသည် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနက ခွင့်ပြုထားသော ပတ်ဝန်းကျင်ဆန်းစစ်ခြင်းအမျိုးအစားကိုသာ ဆောင်ရွက်ရမည်၊

၃။ အထောက်အထားလက်မှတ်ရရှိသူသည် မြန်မာနိုင်ငံ၏ တည်ဆဲဥပဒေတစ်ရပ်ရပ်ကို ဖောက်ဖျက်ကြောင်း သို့မဟုတ် ဆန်းစစ်ခြင်းလုပ်ငန်းများ ဆောင်ရွက်ရာတွင် သိသာထင်ရှားသော မှားယွင်းမှုများ ပါရှိနေပြီး သတ်မှတ် စံချိန်စံညွှန်း သို့မဟုတ် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဥပဒေ၊ နည်းဥပဒေများ၊ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း ဆိုင်ရာ လုပ်ထုံးလုပ်နည်းတို့အရ စိစစ်သုံးသပ်ပြီး ကနဦးသဘောထားမှတ်ချက်နှင့်အညီ ပြန်လည်ပြင်ဆင်ခြင်း မရှိကြောင်း ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန၏ သတ်မှတ်ဆုံးဖြတ်ခြင်းခံရလျှင် အထောက်အထားလက်မှတ် ရပ်ဆိုင်းခြင်း သို့မဟုတ် ပယ်ဖျက်ခြင်း ခံရမည်၊

၄။ အထောက်အထားလက်မှတ်ရရှိသော အဖွဲ့အစည်းသည် သက်ဆိုင်ရာစီမံကိန်းအတွက် လေ့လာဆန်းစစ်ရေးဆွဲ ဆောင်ရွက်ရန် တတိယအဖွဲ့အစည်းအတည်ပြုချက်ရယူရာ၌ မိမိအဖွဲ့အစည်းတွင် မှတ်ပုံတင်ထားသည့် အကြံပေး ပုဂ္ဂိုလ်များ၏ အမည်စာရင်းကိုသာ တင်ပြရမည်၊

၅။ အထောက်အထားလက်မှတ်ရရှိသော အဖွဲ့အစည်းသည် မိမိအဖွဲ့အစည်းက လက်လှမ်းမမီသော ကျွမ်းကျင်မှု နယ်ပယ်များအတွက် လေ့လာဆန်းစစ်ရေးဆွဲ ဆောင်ရွက်နိုင်ရန် ကြားကာလအကြံပေးလုပ်ကိုင်သူ မှတ်ပုံတင်ခြင်း အထောက်အထားလက်မှတ် ရရှိပြီးဖြစ်သည့် တစ်သီးပုဂ္ဂလလုပ်ကိုင်သူ (Freelancer) ကို သက်ဆိုင်ရာစီမံကိန်း အတွက်သာ ငှားရမ်းဆောင်ရွက်ရမည်။

THE REPUBLIC OF THE UNION OF MYANMAR

Ministry of Natural Resources and Environmental Conservation

CERTIFICATE FOR TRANSITIONAL CONSULTANT REGISTRATION

(ကြားကာလအကြံပေးလုပ်ကိုင်သူမှတ်ပုံတင်ခြင်းအထောက်အထားလက်မှတ်)

No. 00380 Date 17 FEB 2023

The Ministry of Natural Resources and Environmental Conservation, hereby, issues this certificate to the organization under Environmental Impact Assessment Procedure, Notification No. 616/2015.
(ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း၊ အမိန့်ကြော်ငြာစာအမှတ်၊ ၆၁၆/၂၀၁၅ အရ သယ်ဇာတနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာနသည် ဤအထောက်အထားလက်မှတ်ကို ထုတ်ပေးလိုက်သည်။)

(a)	Name of Consultant (အကြံပေးပုဂ္ဂိုလ်အမည်)	Ms May Thu Win
(b)	Citizenship (နိုင်ငံသား)	Myanmar
(c)	Identity Card / Passport Number (မှတ်ပုံတင်/ နိုင်ငံကူးလက်မှတ် အမှတ်)	12/Thakata(C)186124
(d)	Address (ဆက်သွယ်ရန်လိပ်စာ)	No.E/8, (9) Quarter, EPC (Staff Housing), Thaketa Township, Yangon Mobile phone: 09797005183, 09448033586 Email: maythuwin@eguardservices.com
(e)	Organization (အဖွဲ့အစည်း)	E Guard Environmental Services. Co., Ltd.
(f)	Type of Consultancy (အကြံပေးလုပ်ကိုင်မှုအမျိုးအစား)	Person
(g)	Duration of validity (သက်တမ်းကုန်ဆုံးရက်)	30th June, 2023.

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

ဤအထောက်အထားလက်မှတ်သည် ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်းနှင့် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းပြုလုပ်သည့် တတိယပုဂ္ဂိုလ် သို့မဟုတ် အဖွဲ့အစည်းများလုပ်ငန်းလိုင်စင်ဆိုင်ရာ လုပ်ထုံးလုပ်နည်း ထုတ်ပြန်သည့်ရက်မှစ၍ (၆) လ ပြည့်မြောက်သည့်နေ့တွင် ပျက်ပြယ်မည် ဖြစ်သည်။

Areas of Expertise Permitted (ခွင့်ပြုသည့် ကျွမ်းကျင်မှုနယ်ပယ်များ)

1. Legal Analysis	2.
3.	4.
5.	6.
7.	8.
9.	10.
11.	12.
13.	14.

စည်းကမ်းချက်များ

၁။ ကြားကာလအကြံပေးလုပ်ကိုင်သူမှတ်ပုံတင်ခြင်းအထောက်အထားလက်မှတ်ရရှိသူသည်-

(က) ဤအထောက်အထားလက်မှတ်ကို ဖျက်ဆီးခြင်း၊ ပြင်ဆင်ခြင်း၊ မသက်ဆိုင်သူတစ်ဦးဦးသို့ ငှားရမ်းခြင်း၊ အမည်ခံ အသုံးပြုစေခြင်းနှင့် တစ်ဆင့်လွှဲပြောင်းကိုင်ဆောင်စေခြင်းမပြုရ၊

(ခ) ဤအထောက်အထားလက်မှတ်ကို သတ်မှတ်သည့် စည်းကမ်းဘောင်အတွင်း လုပ်ငန်းလုပ်ကိုင်ခွင့် အငြင်းပွားမှုများ၊ စောဒကတက်မှုများနှင့်စပ်လျဉ်း၍ တာဝန်ယူဖြေရှင်းရမည်။ ယင်းသို့ ဖြေရှင်းနိုင်ခြင်း မရှိပါက အထောက်အထားလက်မှတ် ရပ်ဆိုင်းခြင်း သို့မဟုတ် ပယ်ဖျက်ခြင်း ခံရမည်၊

(ဂ) ဤအထောက်အထားလက်မှတ်တွင် ခွင့်ပြုထားသည့် ကျွမ်းကျင်မှုနယ်ပယ်များအတွက်သာ တာဝန်ယူလေ့လာဆန်းစစ်ရေးဆွဲခွင့်ရှိသည်၊

(ဃ) မိမိအဖွဲ့အစည်းတွင် ပါဝင်သည့် အကြံပေးပုဂ္ဂိုလ်များ ပြောင်းလဲမှု တစ်စုံတစ်ရာရှိပါက ကြားကာလ အကြံပေးလုပ်ကိုင်သူမှတ်ပုံတင်ခြင်း အထောက်အထားလက်မှတ် ရရှိထားသူဖြင့်သာ အစားထိုး ပြောင်းလဲရမည်၊

(င) အဖွဲ့အစည်းဖြစ်ပါက အဖွဲ့အစည်းတွင် ဒါရိုက်တာဘုတ်အဖွဲ့ (Board of Director)၊ အကြံပေးပုဂ္ဂိုလ် (Consultant) များ ပြောင်းလဲလိုလျှင် တည်ဆဲဥပဒေများနှင့်အညီ ဆောင်ရွက်ပြီး ရက်ပေါင်း ၃၀ အတွင်း ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနသို့ မဖျက်မကွက် အကြောင်းကြားရမည်၊

(စ) ဝန်ကြီးဌာနက အခါအားလျော်စွာ သတ်မှတ်သည့် စည်းကမ်းချက်များကိုလိုက်နာရမည်၊

(ဆ) ဖော်ပြပါ စည်းကမ်းချက်တစ်ရပ်ရပ်ကို ဖောက်ဖျက်ခြင်း၊ လိုက်နာရန်ပျက်ကွက်ခြင်း တစ်စုံတစ်ရာ ပေါ်ပေါက်ပါက အထောက်အထားလက်မှတ် ရပ်ဆိုင်းခြင်း သို့မဟုတ် ပယ်ဖျက်ခြင်း ခံရမည်၊

၂။ အထောက်အထားလက်မှတ်ရရှိသူသည် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနက ခွင့်ပြုထားသော ပတ်ဝန်းကျင်ဆန်းစစ်ခြင်းအမျိုးအစားကိုသာ ဆောင်ရွက်ရမည်၊

၃။ အထောက်အထားလက်မှတ်ရရှိသူသည် မြန်မာနိုင်ငံ၏ တည်ဆဲဥပဒေတစ်ရပ်ရပ်ကို ဖောက်ဖျက်ကြောင်း သို့မဟုတ် ဆန်းစစ်ခြင်းလုပ်ငန်းများ ဆောင်ရွက်ရာတွင် သိသာထင်ရှားသော မှားယွင်းမှုများ ပါရှိနေပြီး သတ်မှတ် စံချိန်စံညွှန်း သို့မဟုတ် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဥပဒေ၊ နည်းဥပဒေများ၊ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း ဆိုင်ရာ လုပ်ထုံးလုပ်နည်းတို့အရ စိစစ်သုံးသပ်ပြီး ကနဦးသဘောထားမှတ်ချက်နှင့်အညီ ပြန်လည်ပြင်ဆင်ခြင်း မရှိကြောင်း ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန၏ သတ်မှတ်ဆုံးဖြတ်ခြင်းခံရလျှင် အထောက်အထားလက်မှတ် ရပ်ဆိုင်းခြင်း သို့မဟုတ် ပယ်ဖျက်ခြင်း ခံရမည်၊

၄။ အထောက်အထားလက်မှတ်ရရှိသော အဖွဲ့အစည်းသည် သက်ဆိုင်ရာစီမံကိန်းအတွက် လေ့လာဆန်းစစ်ရေးဆွဲ ဆောင်ရွက်ရန် တတိယအဖွဲ့အစည်းအတည်ပြုချက်ရယူရာ၌ မိမိအဖွဲ့အစည်းတွင် မှတ်ပုံတင်ထားသည့် အကြံပေး ပုဂ္ဂိုလ်များ၏ အမည်စာရင်းကိုသာ တင်ပြရမည်၊

၅။ အထောက်အထားလက်မှတ်ရရှိသော အဖွဲ့အစည်းသည် မိမိအဖွဲ့အစည်းက လက်လှမ်းမမီသော ကျွမ်းကျင်မှု နယ်ပယ်များအတွက် လေ့လာဆန်းစစ်ရေးဆွဲ ဆောင်ရွက်နိုင်ရန် ကြားကာလအကြံပေးလုပ်ကိုင်သူ မှတ်ပုံတင်ခြင်း အထောက်အထားလက်မှတ် ရရှိပြီးဖြစ်သည့် တစ်သီးပုဂ္ဂလလုပ်ကိုင်သူ (Freelancer) ကို သက်ဆိုင်ရာစီမံကိန်း အတွက်သာ ငှားရမ်းဆောင်ရွက်ရမည်။

(6) **Public consultation meeting's attendance lists and Feedbacks**

၃၀ မဂ္ဂါဝပ် နေရောင်ခြည်စွမ်းအင်သုံး လျှပ်စစ်ဓာတ်အားထုတ်လုပ်ခြင်းစီမံကိန်း နှင့်ပတ်သက်၍ အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးခြင်း အခမ်းအနား
(ပွင့်ဖြူ မြို့နယ်)

အစိုးရဌာနဆိုင်ရာအဖွဲ့အစည်းများ

ရက်စွဲ ။ ။ ၂၀၂၂ ခုနှစ်၊ မေလ (၂၇) ရက်

စဉ်	အမည်	ရာထူး	ဌာနအဖွဲ့အစည်း	ဆက်သွယ်ရန်ဖုန်း	လက်မှတ်
၁။	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
၂။					
၃။					
၄။					
၅။					
၆။					
၇။					
၈။					
၉။					
၁၀။					
၁၁။					
၁၂။					

၃၀ မဂ္ဂါဝပ် နေရောင်ခြည်စွမ်းအင်သုံး လျှပ်စစ်ဓာတ်အားထုတ်လုပ်ခြင်းစီမံကိန်း နှင့်ပတ်သက်၍ အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးခြင်း အခမ်းအနား
(ပွင့်ဖြူ မြို့နယ်)

[illegible] ရပ်ကွက်/ ကျေးရွာ

ရက်စွဲ ။ ။ ၂၀၂၂ ခုနှစ်၊ မေလ (၂၇) ရက်

စဉ်	အမည်	ရပ်ကွက်	အလုပ်အကိုင်	ဖုန်းနံပါတ်	လက်မှတ်
၁။	[illegible]	[illegible]	[illegible]		[illegible]
၂။	[illegible]	〃	〃		[illegible]
၃။	[illegible]	〃	〃		[illegible]
၄။	[illegible]	〃	〃		[illegible]
၅။	[illegible]	〃	〃		[illegible]
၆။	[illegible]	〃	〃		[illegible]
၇။	[illegible]	〃	〃		[illegible]
၈။	[illegible]	〃	〃		[illegible]
၉။	[illegible]	〃	〃		[illegible]
၁၀။	[illegible]	〃	〃		[illegible]
၁၁။	[illegible]	〃	〃		[illegible]
၁၂။	[illegible]	〃	〃		Moe

၃၀ မဂ္ဂါဝပ် နေရောင်ခြည်စွမ်းအင်သုံး လျှပ်စစ်ဓာတ်အားထုတ်လုပ်ခြင်းစီမံကိန်း နှင့်ပတ်သက်၍ အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးခြင်း အခမ်းအနား

([illegible] မြို့နယ်)

[illegible] ရပ်ကွက်/ ကျေးရွာ

ရက်စွဲ ။ ။ ၂၀၂၂ ခုနှစ်၊ မေလ (၂၇) ရက်

စဉ်	အမည်	ရပ်ကွက်	အလုပ်အကိုင်	ဖုန်းနံပါတ်	လက်မှတ်
၁။	[illegible]	[illegible]	တောင်သူ		[illegible]
၂။	[illegible]	〃 〃	〃		[illegible]
၃။	[illegible]	〃	〃		[illegible]
၄။	[illegible]	〃	〃		[illegible]
၅။	[illegible]	〃	〃		[illegible]
၆။	[illegible]	〃	〃		[illegible]
၇။	[illegible]	〃	〃		[illegible]
၈။	[illegible]	〃	〃		[illegible]
၉။	[illegible]	〃	〃		[illegible]
၁၀။	[illegible]	〃	〃		[illegible]
၁၁။	[illegible]	〃	〃		[illegible]
၁၂။	[illegible]	〃	〃		[illegible]

၃၀ မဂ္ဂါဝပ် နေရောင်ခြည်စွမ်းအင်သုံး လျှပ်စစ်ဓာတ်အားထုတ်လုပ်ခြင်းစီမံကိန်း နှင့်ပတ်သက်၍ အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးခြင်း အခမ်းအနား

([illegible] မြို့နယ်)

[illegible] ရပ်ကွက်/ ကျေးရွာ

ရက်စွဲ ။ ။ ၂၀၂၂ ခုနှစ်၊ မေလ (၂၇) ရက်

စဉ်	အမည်	ရပ်ကွက်	အလုပ်အကိုင်	ဖုန်းနံပါတ်	လက်မှတ်
၁။	[illegible]	[illegible]	[illegible]	09·442982883	[illegible]
၂။	[illegible]	〃	〃		[illegible]
၃။	[illegible]	〃	〃		[illegible]
၄။	[illegible]	〃	〃		[illegible]
၅။	[illegible]	〃	〃		[illegible]
၆။	[illegible]	〃	〃		[illegible]
၇။	[illegible]	〃	〃		[illegible]
၈။	[illegible]	〃	〃		[illegible]
၉။	[illegible]	〃	〃		[illegible]
၁၀။	[illegible]	〃	〃		[illegible]
၁၁။	[illegible]	〃	〃		[illegible]
၁၂။	[illegible]	〃	〃		[illegible]

၃၀ မဂ္ဂါဝပ် နေရောင်ခြည်စွမ်းအင်သုံး လျှပ်စစ်ဓာတ်အားထုတ်လုပ်ခြင်းစီမံကိန်း နှင့်ပတ်သက်၍ အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးခြင်း အခမ်းအနား
(ပွင့်ဖြူ မြို့နယ်)

ပုဂ္ဂလိက ကုမ္ပဏီများ (Private Company)

ရက်စွဲ ။ ။ ၂၀၂၂ ခုနှစ်၊ မေလ (၂၇) ရက်

စဉ်	အမည်	ရာထူး	ကုမ္ပဏီများ	ဆက်သွယ်ရန်ဖုန်း	လက်မှတ်
၁။	Zong cheng Liang	[illegible]	Yadanar Ye Naidi	09943762228	
၂။	Zaw Aung	"	" "	09788024654	
၃။					
၄။					
၅။					
၆။					
၇။					
၈။					
၉။					
၁၀။					
၁၁။					
၁၂။					

ဒေသခံပြည်သူလူထု၏ သဘောထားမှတ်ချက်နှင့် အကြံပြုလွှာ

နေရောင်ခြည်စွမ်းအင်သုံး လျှပ်စစ်ဓာတ်အားထုတ်လုပ်ခြင်းစီမံကိန်း

ဖြည့်သွင်းသူ၏ အချက်အလက်

ရက်စွဲ	27. 5. 2022
အမည်	[illegible]
လိပ်စာ	[illegible]
ဖုန်းနံပါတ်	
ဖြည့်သွင်းသူ၏ ကိုယ်စားပြုအဖွဲ့အစည်း	☐ ကျေးရွာအုပ်ချုပ်ရေးမှူး ☐ ရာအိမ်မှူး ☐ ဆယ်အိမ်မှူး ☐ ရပ်မိရပ်ဖ ☑ ရွာသူ/ ရွာသား ☐ အခြား ( )

အကြံပြုချက်/ သုံးသပ်ချက်

(ကျေးဇူးပြု၍ သင်၏ သုံးသပ်ချက်များအား အောက်တွင်ရေးသားဖော်ပြပေးရန်နှင့် ထပ်မံရေးသားလိုသည့် အသေးစိတ်အချက်များရှိပါက ဤပုံစံနှင့် အတူ ပူးတွဲပေးပို့နိုင်ပါသည်။)

[illegible]

လက်မှတ် ....[illegible]........

ဒေသခံပြည်သူလူထု၏ သဘောထားမှတ်ချက်နှင့် အကြံပြုလွှာ

နေရောင်ခြည်စွမ်းအင်သုံး လျှပ်စစ်ဓာတ်အားထုတ်လုပ်ခြင်းစီမံကိန်း

ဖြည့်သွင်းသူ၏ အချက်အလက်

ရက်စွဲ	27. 5. 2022
အမည်	ဒေါ်ကြာကြာအေး
လိပ်စာ	လက်ပံမ ရွာ
ဖုန်းနံပါတ်	
ဖြည့်သွင်းသူ၏ ကိုယ်စားပြုအဖွဲ့အစည်း	☐ ကျေးရွာအုပ်ချုပ်ရေးမှူး ☐ ရာအိမ်မှူး ☐ ဆယ်အိမ်မှူး ☐ ရပ်မိရပ်ဖ ☑ ရွာသူ/ ရွာသား ☐ အခြား ( )

အကြံပြုချက်/ သုံးသပ်ချက်

(ကျေးဇူးပြု၍ သင်၏ သုံးသပ်ချက်များအား အောက်တွင်ရေးသားဖော်ပြပေးရန်နှင့် ထပ်မံရေးသားလိုသည့် အသေးစိတ်အချက်များရှိပါက ဤပုံစံနှင့် အတူ ပူးတွဲပေးပို့နိုင်ပါသည်။)

လက်ပံမကျေး ရွာသူ ရွာသား များအား ဦးစားပေး
လုပ်ကိုင်ခွင့်ပေးရန်
ကျေးရွာ [illegible] အား [illegible] ပေးရန်

လက်မှတ် ....ကြာကြာအေး....

ဒေသခံပြည်သူလူထု၏ သဘောထားမှတ်ချက်နှင့် အကြံပြုလွှာ

နေရောင်ခြည်စွမ်းအင်သုံး လျှပ်စစ်ဓာတ်အားထုတ်လုပ်ခြင်းစီမံကိန်း

ဖြည့်သွင်းသူ၏ အချက်အလက်

ရက်စွဲ	27-5-2022
အမည်	[illegible]
လိပ်စာ	[illegible]
ဖုန်းနံပါတ်	
ဖြည့်သွင်းသူ၏ ကိုယ်စားပြုအဖွဲ့အစည်း [illegible]	☑ ကျေးရွာအုပ်ချုပ်ရေးမှူး ☐ ရာအိမ်မှူး ☐ ဆယ်အိမ်မှူး ☐ ရပ်မိရပ်ဖ ☐ ရွာသူ/ ရွာသား ☐ အခြား ( )

အကြံပြုချက်/ သုံးသပ်ချက်

(ကျေးဇူးပြု၍ သင်၏ သုံးသပ်ချက်များအား အောက်တွင်ရေးသားဖော်ပြပေးရန်နှင့် ထပ်မံရေးသားလိုသည့် အသေးစိတ်အချက်များရှိပါက ဤပုံစံနှင့် အတူ ပူးတွဲပေးပို့နိုင်ပါသည်။)

[illegible]

လက်မှတ် .....

(7) **Public Consultation Meeting's meeting minutes**

Public Consultation Meeting Minutes

Stakeholder Meeting was held at Buddha Wihaya Monastery at Lelma Village near project site. The meeting was held in accordance with the following agenda.

(1) Opening Ceremony
(2) Presentation of Project Information by U Ar Hi (Translator, Myanmar Kyeeon Kyeewa Solar Power Co., Ltd.) on behalf of Mr. Kyint Height Kan (Project Manager, Myanmar Kyeeon Kyeewa Solar Power Co., Ltd)
(3) Presentation of Environmental Management Plan (EMP) for construction and operation of 30 MW ground mounted solar power plant project connected to Kyeeon Kyeewa Substation by U Zaw Ye Naung (Project Assistant, E Guard Environmental Services Co., Ltd.)
(4) Questions, comments, and suggestions form the attendees.
(5) Closing Ceremony

Attendance List of Stake Holder Meeting

No.	Category	Number of Participants
1.	Local People from Lel Ma Village	36
2.	Representatives of Project Proponent	2
3.	Representatives of E Guard Environmental Services	4
4.	Government	6

Details of each agenda is described in the following,

1. **Opening Ceremony**

2. **Presentation of Project Information by U Ar Hi (Translator, Myanmar Kyeeon Kyeewa Solar Power Co., Ltd.) on behalf of Mr. Kyint Height Kan (Project Manager, Myanmar Kyeeon Kyeewa Solar Power Co., Ltd)**
   U Ar Hi briefly explained the project information such as type of business, construction and operation process of the project, project proponent information a project description.

3. **Presentation of Environmental Management Plan (EMP) for construction and operation of 30 MW ground mounted solar power plant project connected to Kyeeon Kyeewa Substation by U Zaw Ye Naung (Project Assistant, E Guard Environmental Services Co., Ltd.)**
   U Zaw Ye Naung explained the processes of environmental management plan preparation, potential positive impacts of the project, potential negative impacts of the project, proposed mitigation measures to reduce these negative impacts, proposed monitoring plan, grievance redress mechanism and environmental quality measurements processes of the proposed project.

4. Questions, comments, and suggestions form the attendees.

Question: **Daw Nilar Win (Lalma Village)** Is any hazard for plants and animals because of waste water from solar panel clearing during operation stage?
Answer: **Mr. Ar Hi (Translator, Myanmar Kyeeon Kyeewa Solar Power Co., Ltd.)** There will be no hazards or any dangerous for environment because solar panel clearing is only for dust on panle surface and clearing process will be conduct with natural water. **U Zaw Ye Naung (E Guard Environmental Services Co., Ltd) Company will implement waste water treatment and management system if any necessary for water disposal.**

Suggestion: **U Tin Win (Lalma Village)** Would like to have job opportunities for local villagers more than any other people apart from project area because of povity.
Answer: **Mr. Ar Hi (Translator, Myanmar Kyeeon Kyeewa Solar Power Co., Ltd.)** Company will try to supply more job opportunity for local people in future.

Suggestion: **U Tin Win (Lalma Village)** Would like to get access road to Than Zel Taung Taw Ya Monastery for the village because project site is established on old road of Monastery and villagers can't pass through the site area.
Answer: **Mr. Ar Hi (Translator, Myanmar Kyeeon Kyeewa Solar Power Co., Ltd.)** Company will contact main contractor and try to get access road to Monastery.

Suggestion: **U Lay Myint (Lalma Village Administrator)** Got much complains to get more jobs on project site, paid wages for site clearing from company to villagers because company has established at the place already cleared by villagers for agriculture. And, need to provide access water for farms but access road of project site is situated between canal and farms.
Answer: **Mr. Ar Hi (Translator, Myanmar Kyeeon Kyeewa Solar Power Co., Ltd.)** Will Contact main contractor and discuss for wild clearing compensations. Also, will provide water way facility such as pipe line or curvets.

Suggestion: **Daw Mar Mar Aye (Lalma Village)** Would like to have employment opportunity for both men and women on site.
Answer: **Mr. Ar Hi (Translator, Myanmar Kyeeon Kyeewa Solar Power Co., Ltd.)** Company will try to create more job opportunity for women in future in appropriate sectors.

Suggestion: **U Lu Yin (Lalma Village)** Would like to have more job opportunities for local villagers because there are only 100 families out of 600 employed.
Answer: **Mr. Ar Hi (Translator, Myanmar Kyeeon Kyeewa Solar Power Co., Ltd.)** Company will try to create more job opportunities for local people in future.

Suggestion: **U Naing Min (Lalma Village)** Survey points and benchmarks with labelled of **MOEE** for transmission line inside the forest lead to difficulties for animal husbandry, cows, and goats for grazing.
Answer: **Mr. Ar Hi (Translator, Myanmar Kyeeon Kyeewa Solar Power Co., Ltd.)** Company will contact MOEE and try to solve this problem.

Suggestion: **U Naing Min (Lalma Village)** Roads have been destroyed by heavy machines and vehicles. Would like to have repaired roads

Answer: **Mr. Ar Hi (Translator, Myanmar Kyeeon Kyeewa Solar Power Co., Ltd.)** This is mainly because of wood and gravel commercial trucks and not for solar project site. But company will try to repair access roads for the village.

Suggestion: **U Wai Lu (Lalma Village)** How long will it take to build the solar project?

Answer: **Mr. Kyint Height Kan (Project Manager, Myanmar Kyeeon Kyeewa Solar Power Co., Ltd.)** Expected deadline for construction phase is coming November.

(8) **Public Consultation Meeting Photos**

Meeting with Pwint Phyu Township Administrator

Meeting with Mezali Village Tract Administrator

Public Consultation Attendance Record

Taking Feedback from Attendees

Pubic Consultation Meeting

Presented by U Ar Hi (Myanmar Kyeeonkyeewa Solar Power Co., Ltd)

Presented by U Zaw Ye Naung (E Guard Environmental Services Co., Ltd)

Questions, Comments and Suggestions from the Attendees

Questions, Comments and Suggestions from the Attendees

Questions, Comments and Suggestions from the Attendees

(9) **Presentation File of Public Consultation**

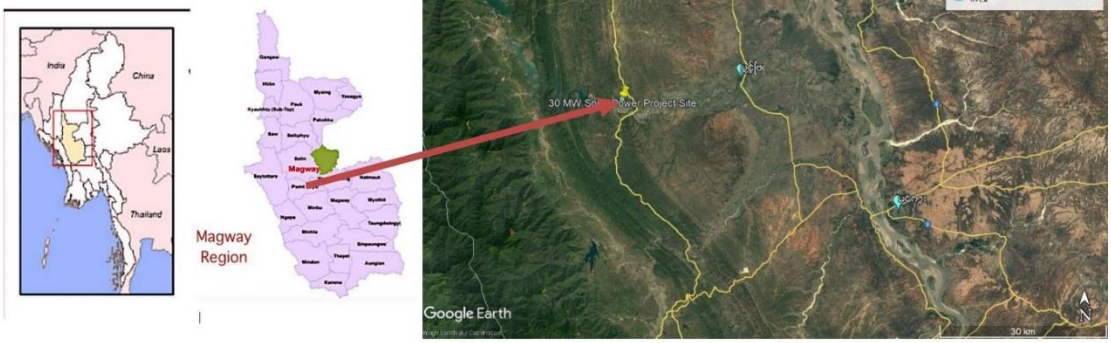
စီမံကိန်းအတွက်ရင်းနှီးမြှုပ်နှံမှုပုံစံ

ချိုင်းနားအိုင်တီအက်(စ်) ကုမ္ပဏီလီမိတက်

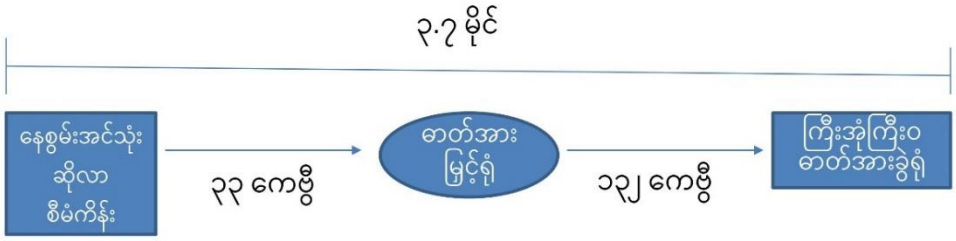
မြန်မာကြီးအုံကြီးဝဆိုလာပါဝါကုမ္ပဏီလီမိတက်

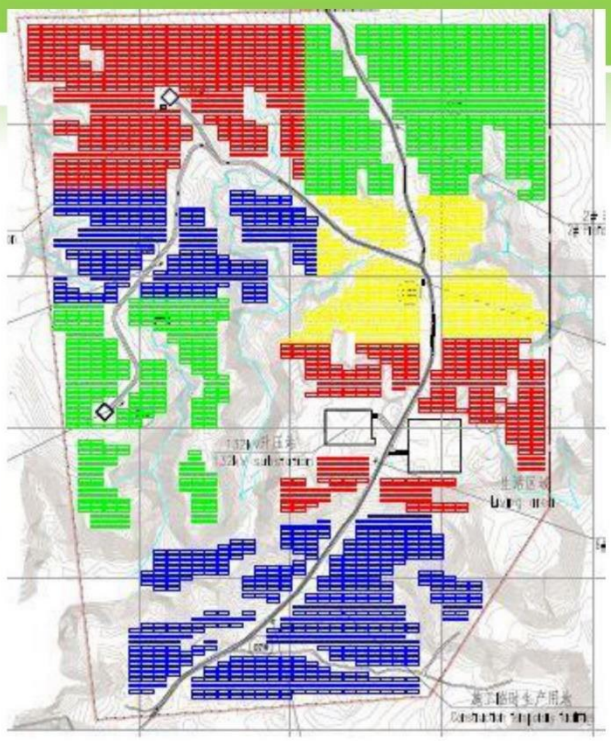
- ကွင်းဆင်းဆောင်ရွက်ခြင်းနှင့် ဒီဇိုင်းရေးဆွဲခြင်း
- တည်ဆောက်ရေးလုပ်ငန်းများ ဆောင်ရွက်ခြင်း
- ဓာတ်အားလိုင်းသွယ်တန်းခြင်း
- ကွန်ပျူတာစနစ်ဖြင့်ဓာတ်အားထုတ်လုပ်မှု၊ ပို့လွှတ်မှုများအား ထိန်းချုပ်ခြင်း

စီမံကိန်းတည်နေရာ



စိမ်ကိန်းဆိုင်ရာအချက်အလက်များ





စီမံကိန်းဆိုင်ရာအချက်အလက်များ

စီမံကိန်းတည်ဆောက်မည့်ကာလ	- (၆) လ
စီမံကိန်းလည်ပတ်မည့်ကာလ	- နှစ် (၂၀)
စီမံကိန်းအကျယ်အဝန်း	- (၁၄၅) ဧက
ဓာတ်အားလိုင်းမှပို့လွှတ်နိုင်သည့်ပမာဏ	- (၁၃၂) ကေဗီအေ
ဓာတ်အားလိုင်းအရှည်	- (၆) ကီလိုမီတာခန့်
ဓာတ်အားမြှင့်ရုံအဆောက်အဦအမျိုးအစား	- သံကူကွန်ကရစ်အဆောက်အဦ
အဆောက်အဦတွင်ပါဝင်မည့်အထပ်အရေအတွက်	- (၁) ထပ်

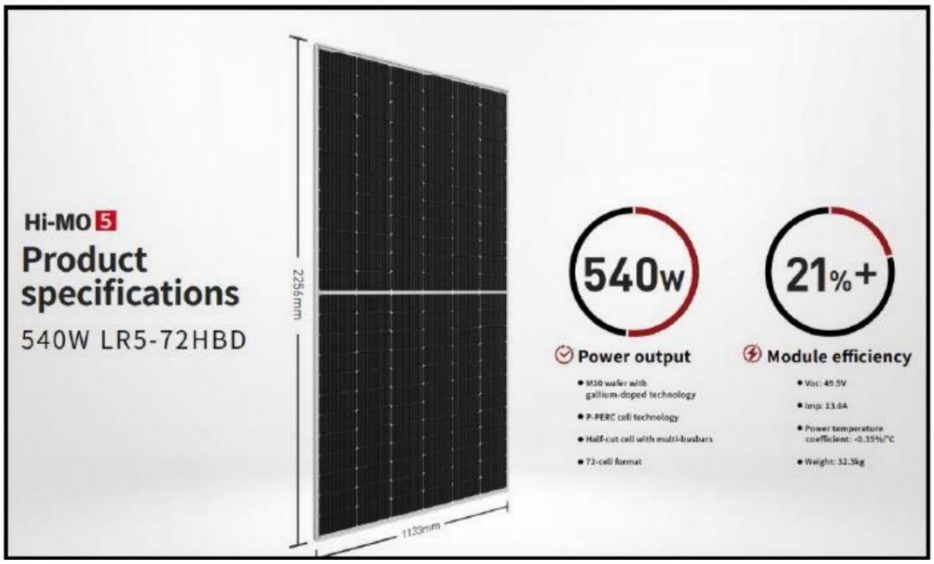
စီမံကိန်းဆိုင်ရာအချက်အလက်များ

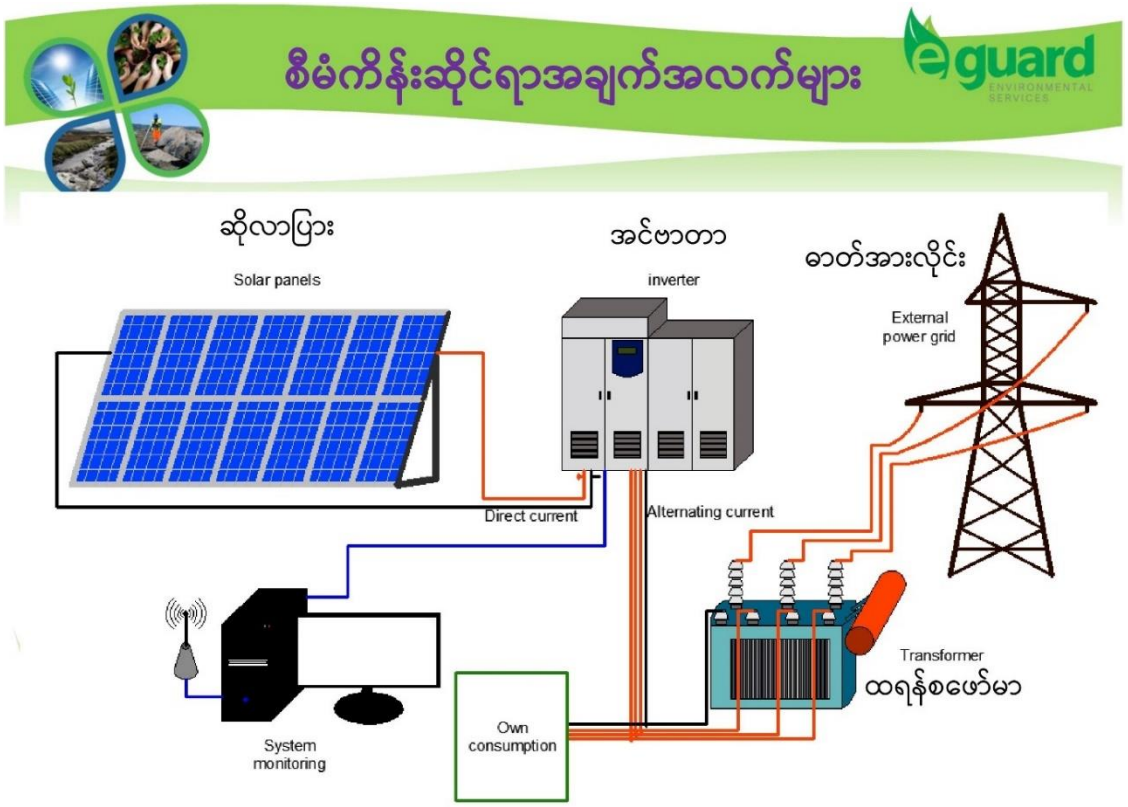
လုပ်ငန်းဆောင်ရွက်နေသူ လူဦးရေ	- ၁၀၀ ကျော်
ပြည်ပနိုင်ငံသားပညာရှင်	- ၃ ဦး
ဒေသခံ လုပ်ငန်းလုပ်ကိုင်နေသူများ	- ၄၀ ဦး

စိမံကိန်းဆိုင်ရာအချက်အလက်များ

ဆိုလာပြားအမျိုးအစားနှင့် အရေအတွက်	- ၅၄၀ Wp ရှိ မျက်နှာပြင်နှစ်ဖက်ပါသော မိုနိုခရစ်စတယ်လိုင်း ဆီလီကွန် ဆိုလာပြား (၆၇၂၀၀ ခု)
ပါဝင်သည့် အဆောက်အဦးအရေအတွက်	၂ ခု ထရန်စဖော်မာနှင့် ထိန်းချုပ်ခန်း လူနေထိုင်ဆောင်
ဆောက်လုပ်ရေး ပြီးဆုံးရန် မျှော်မှန်းကာလ	၂၀၂၂ နိုဝင်ဘာလ

စိမံကိန်းဆိုင်ရာအချက်အလက်များ

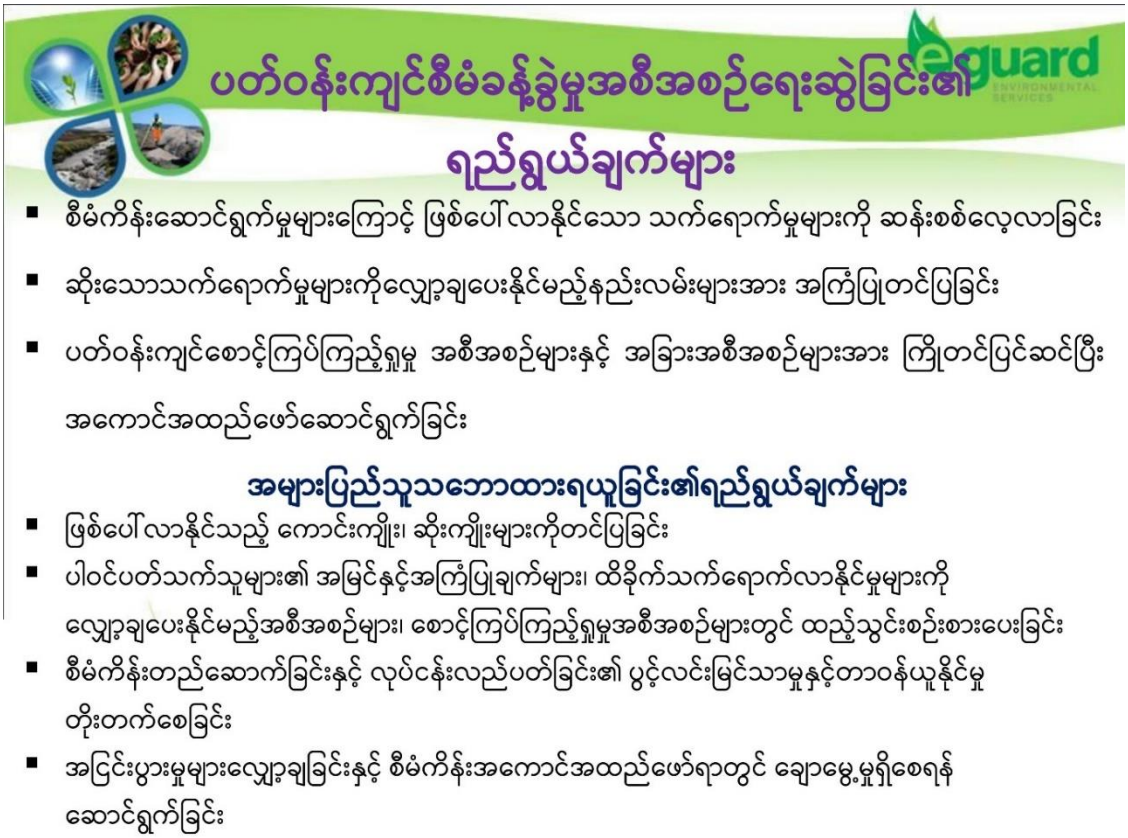



စိမ်ကိန်းဆိုင်ရာအချက်အလက်များ
eguard
ENVIRONMENTAL SERVICES
ဆိုလာပြား
Solar panels
အင်ဗာတာ
inverter
ဓာတ်အားလိုင်း
External power grid
Direct current
Alternating current
Transformer
ထရန်စဖော်မာ
System monitoring
Own consumption


eguard
ENVIRONMENTAL SERVICES
ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်ရေးဆွဲခြင်း
(Environmental Management Plan)
E Guard Environmental Services

12


ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်ရေးဆွဲခြင်း
eguard
ENVIRONMENTAL SERVICES
စီမံကိန်း၏ဖြစ်နိုင်ခြေရှိသော သက်ရောက်မှုများ
စစ်ဆေးခြင်း
✓ သိသာထင်ရှားမှုရှိ/မရှိ
✓ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း ဆောင်ရွက်ရန် လိုအပ်ခြင်းရှိ/မရှိ
✓ သတ်မှတ်ထားသော အထောက်အထားများ ပြုစုတင်ပြရန်လိုအပ်ခြင်းရှိ/မရှိ
ဆောင်ရွက်သည့်အဖွဲ့အစည်း - E Guard Environmental Services Co., Ltd.
စိစစ်ခွင့်ပြုမည့်အဖွဲ့အစည်း - သယံဇာတနှင့်သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာန၊ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန
လိုက်နာရမည့်ဥပဒေ၊ နည်းဥပဒေနှင့် စည်းမျဉ်းစည်းကမ်းများ
ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော် ဖွဲ့စည်းပုံအခြေခံဥပဒေ (၂၀၀၈)
ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဥပဒေ၊ နည်းဥပဒေနှင့် စည်းမျဉ်းစည်းကမ်းများ၊
ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း၊
အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များ
3


ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်ရေးဆွဲခြင်း၏
eguard
ENVIRONMENTAL SERVICES
ရည်ရွယ်ချက်များ
■ စီမံကိန်းဆောင်ရွက်မှုများကြောင့် ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများကို ဆန်းစစ်လေ့လာခြင်း
■ ဆိုးသောသက်ရောက်မှုများကိုလျှော့ချပေးနိုင်မည့်နည်းလမ်းများအား အကြံပြုတင်ပြခြင်း
■ ပတ်ဝန်းကျင်စောင့်ကြပ်ကြည့်ရှုမှု အစီအစဉ်များနှင့် အခြားအစီအစဉ်များအား ကြိုတင်ပြင်ဆင်ပြီး အကောင်အထည်ဖော်ဆောင်ရွက်ခြင်း
အများပြည်သူသဘောထားရယူခြင်း၏ရည်ရွယ်ချက်များ
■ ဖြစ်ပေါ်လာနိုင်သည့် ကောင်းကျိုး၊ ဆိုးကျိုးများကိုတင်ပြခြင်း
■ ပါဝင်ပတ်သက်သူများ၏ အမြင်နှင့်အကြံပြုချက်များ၊ ထိခိုက်သက်ရောက်လာနိုင်မှုများကို လျှော့ချပေးနိုင်မည့်အစီအစဉ်များ၊ စောင့်ကြပ်ကြည့်ရှုမှုအစီအစဉ်များတွင် ထည့်သွင်းစဉ်းစားပေးခြင်း
■ စီမံကိန်းတည်ဆောက်ခြင်းနှင့် လုပ်ငန်းလည်ပတ်ခြင်း၏ ပွင့်လင်းမြင်သာမှုနှင့်တာဝန်ယူနိုင်မှု တိုးတက်စေခြင်း
■ အငြင်းပွားမှုများလျှော့ချခြင်းနှင့် စီမံကိန်းအကောင်အထည်ဖော်ရာတွင် ချောမွေ့မှုရှိစေရန် ဆောင်ရွက်ခြင်း

ပတ်ဝန်းကျင်သို့သက်ရောက်မှုများအားတိုင်းတာခြင်း

- စီမံကိန်းဆောင်ရွက်မှုများကြောင့် ဖြစ်ပေါ်လာနိုင်သော ရေထု၊လေထု၊ ဆူညံသံများအားတိုင်းတာရေး ကိရိယာများဖြင့် ထိရောက်မှုရှိနိုင်သော နေရာများတွင် စနစ်တကျ လုံလောက်မှုရှိစွာ တိုင်းတာပါသည်။
- ဆူညံသံတိုင်းတာရေးအား စီမံကိန်းနှင့် အနီးဆုံး ကျေးရွာဖြစ်သော လည်မကျေးရွာတွင် တိုင်းတာပါသည်။
- စီမံကိန်းကြောင့် ရေထုထိခိုက်မှုရှိမရှိ စစ်ဆေးရာတွင် စီမံကိန်း အသုံးပြုရေသာမက အနီးရှိ မဲဇလီဆည်အတွင်းမှ ရေနမူနာယူပြီး စစ်ဆေးပါသည်။

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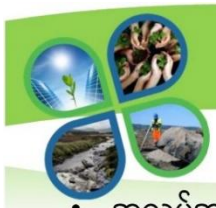
ဖြစ်ပေါ်လာနိုင်သည့်သက်ရောက်မှုများ

- ကောင်းသောသက်ရောက်မှုများ
- ဆိုးသောသက်ရောက်မှုများ



ကောင်းသောသက်ရောက်မှုများ

- တည်ဆောက်သည့်ကာလ
  - အလုပ်အကိုင်အခွင့်အလမ်းများဖန်တီးပေးနိုင်ခြင်း
  - စီးပွားရေးအခွင့်အလမ်းများဖန်တီးပေးနိုင်ခြင်း
- လုပ်ငန်းလည်ပတ်သည့်ကာလ
  - အလုပ်အကိုင်အခွင့်အလမ်းများဖန်တီးပေးနိုင်ခြင်း
  - ပြန်လည်ပြည့်ဖြိုးမြဲစွမ်းအင်မှလျှပ်စစ်ဓာတ်အားထုတ်လုပ်ခြင်း
  - ဖန်လုံအိမ်ဓာတ်ငွေ့ထုတ်လုပ်မှုလျှော့ချနိုင်ခြင်း
  - နိုင်ငံတော်၏စီးပွားရေးဖွံ့ဖြိုးတိုးတက်ခြင်း
- စီမံကိန်းဖျက်သိမ်းသည့်ကာလ
  - အလုပ်အကိုင်အခွင့်အလမ်းများဖန်တီးပေးနိုင်ခြင်း
  - စီးပွားရေးအခွင့်အလမ်းများဖန်တီးပေးနိုင်ခြင်း
  - ဖျက်သိမ်းပြီးလျှပ်စစ်ပစ္စည်းများအားပြန်လည်အသုံးပြုနိုင်ခြင်း

ဆိုးသောသက်ရောက်မှုများ

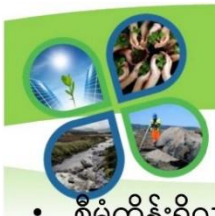
- တည်ဆောက်သည့်ကာလ
  - လေအရည်အသွေး
  - ရေအရည်အသွေး
  - မြေအရည်အသွေး
  - ဆူညံသံနှင့်တုန်ခါမှု
  - ဇီဝမျိုးစုံမျိုးကွဲများအပေါ်သက်ရောက်မှု
  - လုပ်ငန်းခွင်ကျန်းမာရေးနှင့်ဘေးအန္တရာယ်ကင်းရှင်းရေး
  - ရပ်ရွာလူထုကျန်းမာရေးနှင့်ဘေးအန္တရာယ်ကင်းရှင်းရေး
  - အစိုင်အခဲစွန့်ပစ်ပစ္စည်းထွက်ရှိမှု
  - စွန့်ပစ်ရေထွက်ရှိမှု
  - အန္တရာယ်ရှိစွန့်ပစ်ပစ္စည်းထွက်ရှိမှု

ဆိုးသောသက်ရောက်မှုများ

- လုပ်ငန်းလည်ပတ်သည့်ကာလ
  - လေအရည်အသွေး
  - ရေအရည်အသွေး
  - မြေအရည်အသွေး
  - ဆူညံသံနှင့်တုန်ခါမှု
  - ဇီဝမျိုးစုံမျိုးကွဲများအပေါ်သက်ရောက်မှု
  - လုပ်ငန်းခွင်ကျန်းမာရေးနှင့်ဘေးအန္တရာယ်ကင်းရှင်းရေး
  - ရပ်ရွာလူထုကျန်းမာရေးနှင့်ဘေးအန္တရာယ်ကင်းရှင်းရေး
  - အစိုင်အခဲစွန့်ပစ်ပစ္စည်းထွက်ရှိမှု
  - စွန့်ပစ်ရေထွက်ရှိမှု
  - အန္တရာယ်ရှိစွန့်ပစ်ပစ္စည်းထွက်ရှိမှု

ဆိုးသောသက်ရောက်မှုများ

- **စီမံကိန်းဖျက်သိမ်းသည့်ကာလ**
- လေအရည်အသွေး
- ရေအရည်အသွေး
- မြေအရည်အသွေး
- ဆူညံသံနှင့်တုန်ခါမှု
- ဧဝမျိုးစုံမျိုးကွဲများအပေါ်သက်ရောက်မှု
- လုပ်ငန်းခွင်ကျန်းမာရေးနှင့်ဘေးအန္တရာယ်ကင်းရှင်းရေး
- ရပ်ရွာလူထုကျန်းမာရေးနှင့်ဘေးအန္တရာယ်ကင်းရှင်းရေး
- အစိုင်အခဲစွန့်ပစ်ပစ္စည်းထွက်ရှိမှု
- စွန့်ပစ်ရေထွက်ရှိမှု
- အန္တရာယ်ရှိစွန့်ပစ်ပစ္စည်းထွက်ရှိမှု



လျော့ချရန်နည်းလမ်းများ

- စီမံကိန်းရှိလမ်းများအား ရေဖြန်းခြင်း၊ လမ်းခင်းခြင်း
- လုပ်ငန်းသုံးယာဉ်များအား စနစ်တကျမောင်းနှင်စေခြင်းနှင့် ပုံမှန်ပြုပြင် ထိန်းသိမ်း ခြင်း
- ညအချိန်တွင် ဆူညံသံနှင့်တုန်ခါမှုများသော စီမံကိန်းလုပ်ငန်းများ ဆောင်ရွက်ခြင်း အားရှောင်ရှားခြင်း
- ဆိုလာပြားများ၊ အင်ဗာတာများ၊ ထရန်စဖော်မာများအား စနစ်တကျတပ်ဆင်၊ ပြုပြင်ထိန်းသိမ်း၊ ဖြုတ်သိမ်းခြင်း
- ဓာတ်အားလိုင်းသွယ်တန်းရာတွင်စနစ်တကျဆောင်ရွက်ခြင်း
- ရေဆိုးသန့်စင်စက်တပ်ဆင်ခြင်းနှင့် ရေမြောင်းများစနစ်တကျဖောက်လုပ်ခြင်း
- လုပ်သားများအား လုပ်ငန်းခွင်ကာကွယ်ရေးပစ္စည်းများအသုံးပြုစေခြင်း၊ အမှန်တကယ် အသုံးပြုမပြုစစ်ဆေးခြင်း။

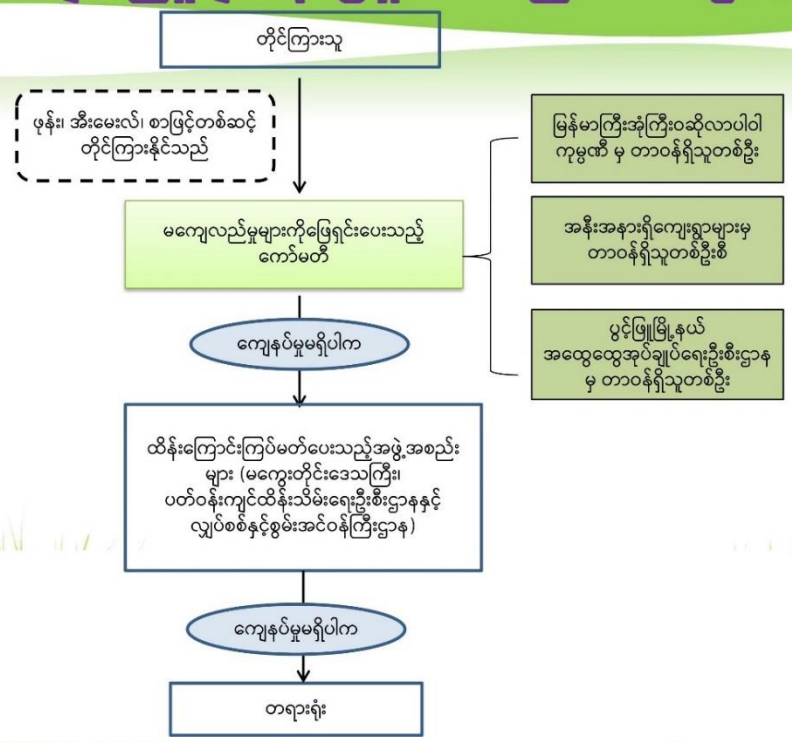
လျော့ချရန်နည်းလမ်းများ

- ရပ်ရွာလူထုအား ဆူညံသံနှင့်တုန်ခါမှုမြင့်မားသော လုပ်ငန်းများဆောင်ရွက်ပါက ကြိုတင်အသိပေးခြင်း
- စီမံကိန်းခြံစည်းရိုးနှင့် ဓာတ်အားလိုင်းများတွင် သတိပေးဆိုင်းဘုတ်များ တပ်ဆင်ခြင်း
- စီမံကိန်းအတွင်းလုံလောက်သောအိမ်သာများ၊ လက်ဆေးကန်များထားပေးခြင်း
- မီးသတ်ဆေးဗူးများ၊ မီးသတ်ပိုက်များ၊ မီးသတ်ရေကန်များတပ်ဆင်ထားရှိခြင်း
- အရေးပေါ်ဆက်သွယ်ရန်ဖုန်းနံပါတ်များအား မြင်သာသည့်နေရာတွင်ထားရှိခြင်း
- အစိုင်အခဲစွန့်ပစ်ပစ္စည်းများနှင့် အန္တရာယ်ရှိစွန့်ပစ်ပစ္စည်းများအား မြို့နယ်စည်ပင်သာယာရေးကော်မတီရေးနှင့် ချိတ်ဆက်စွန့်ပစ်ခြင်း
- ကိုဗစ်-၁၉ ရောဂါကာကွယ်ရန် သက်ဆိုင်ရာမှ ချမှတ်ထားသော လမ်းညွှန်ချက်များအား လုပ်သားများကို အတိအကျလိုက်နာစေခြင်း

အခြားအစီအစဉ်များ

- ပတ်ဝန်းကျင်စောင့်ကြပ်ကြည့်ရှုမှုအစီအစဉ် (ဖလတစ်ကြိမ်)
  - လေအရည်အသွေး
  - ရေအရည်အသွေး
  - ဆူညံသံပမာဏ
- မီးဘေးအန္တရာယ်ကင်းရှင်းရေးအစီအစဉ်
- အရေးပေါ်ကိစ္စရပ်များအတွက်ကြိုတင်ပြင်ဆင်မှုနှင့်တုန့်ပြန်မှုအစီအစဉ်
- လုပ်ငန်းခွင်ကျန်းမာရေးနှင့်ဘေးအန္တရာယ်ကင်းရှင်းရေးအစီအစဉ်
- လူမှုစီးပွားတာဝန်ယူမှုအစီအစဉ်
- မကျေလည်မှုများကိုဖြေရှင်းပေးမည့်အစီအစဉ်

မကျေလည်မှုများကိုဖြေရှင်းပေးမည့်အစီအစဉ်



ပတ်ဝန်းကျင်အရည်အသွေးတိုင်းတာမှုများ

လေအရည်အသွေးတိုင်းတာခြင်း

ဆူညံသံပမာဏတိုင်းတာခြင်း

လွတ်လပ်စွာပါဝင်ဆွေးနွေး မေးမြန်းနိုင်ပါသည်

ကျေးဇူးတင်ပါသည်

(10) Water Quality Laboratory Results for Onsite Measurements

ISO TECH LABORATORY

ISO 9001:2015 Cert. No.688283

Laboratory Technical Consultant: U Saw Christopher Maung
B.Sc Engg: (Civil), Dip S.E(Delft) Lecturer of YIT (Retd). Consultant (Y.C.D.C), LWSE 001.
Former Member (UNICEF, Water quality monitoring & Surveillance Myanmar)

WTL-RE-001
Issue Date - 01-1-2016
Effective Date - 01-1-2016
Issue No - 1.0/Page 1 of 1

M0522 035

WATER QUALITY TEST (MICROBIOLOGY) RESULTS FORM

Client: Kyeeon Kyeewa Solar Power Plant Project
Nature of Water: Ground Water
Location: Mezali Village Track, Pwintbyu Township, Minbu District Magway.
Date and Time of collection: 26.5.2022
Date and Time of arrival at Laboratory: 27.5.2022
Date and Time of commencing examination: 27.5.2022
Date and Time of completing: 28.5.2022

Results of Water Analysis			WHO Drinking Water Guideline (Geneva - 1993)
Total Coliform Count	4	CFU/100ml	Not detected
Thermotolerant (fecal) Coliform Count	Not detected (<1)	CFU/100ml	Not detected
pH	7.7		6.5 - 8.5
Turbidity	3	NTU	5 NTU
Colour (True)	Nil	TCU	15 TCU
Free Chlorine	Nil	mg/l	
Total Chlorine	Nil	mg/l	

*Date and Time Sample Collection Error.

Remark : Unsatisfactory for drinking purpose.
: This certificate is issued only for the receipt of the test sample.
: < - Less than

Tested by
Signature:
Name: Zaw Hein Oo
B.Sc (Chemistry),
Sr.Chemist
ISO Tech Laboratory

Approved by
Signature:
Name: Soe Thit
B.E (Civil) 1980,
Technical Officer
ISO TECH Laboratory

(a division of WEG Co.,Ltd.)
No.18. Lanthit Road, Nanthargone Quarter, Insein Township, Yangon, Myanmar.
Ph: 01-640955, 09-880100172, 09-880100173, 01-644506, E-mail: isotechlaboratory@gmail.com, Website: weg-myanmar.com

ISO TECH LABORATORY

Laboratory Technical Consultant: U Saw Christopher Maung
B.Sc Engg: (Civil), Dip S.E(Delft) Lecturer of YIT (Retd). Consultant (Y.C.D.C), LWSE 001.
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ISO 9001:2015 Cert. No.688283

WTL-RE-001
Issue Date - 01-12-2012
Effective Date - 01-12-2012
Issue No - 1.0/Page 2 of 2

W0522 701

WATER QUALITY TEST RESULTS FORM

Client: Kyeeon Kyeewa Solar Power Plant Project
Nature of Water: Ground Water
Location: Mezali Village Track, Pwintbyu Township, Minbu District Magway.
Date and Time of collection: 26.5.2022
Date and Time of arrival at Laboratory: 27.5.2022
Date and Time of commencing examination: 28.5.2022
Date and Time of completing: 2.6.2022

Results of Water Analysis

			WHO Drinking Water Guideline (Geneva - 1993)
Temperature (°C)		°C	
Fluoride (F)		mg/l	1.5 mg/l
Lead (as Pb)		mg/l	0.01 mg/l
Arsenic (As)		mg/l	0.01 mg/l
Nitrate ($N.NO_3$)		mg/l	50 mg/l
Chlorine (Residual)		mg/l	
Ammonia Nitrogen (NH_3)		mg/l	
Ammonium Nitrogen (NH_4)		mg/l	
Dissolved Oxygen (DO)		mg/l	
Chemical Oxygen Demand (COD)	32	mg/l	
Biochemical Oxygen Demand (BOD) (5 days at 20 °C)	2	mg/l	
Cyanide (CN)		mg/l	0.07 mg/l
Zinc (Zn)		mg/l	3 mg/l
Copper (Cu)		mg/l	2 mg/l
Silica (SiO_2)		mg/l	

Remark: This certificate is issued only for the receipt of the test sample.

Tested by
Signature:
Name: Zaw Hein Oo
B.Sc (Chemistry),
Sr.Chemist
ISO Tech Laboratory

Approved by
Signature:
Name: Soe Thit
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W0522 701

WATER QUALITY TEST RESULTS FORM

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Date and Time of commencing examination: 28.5.2022
Date and Time of completing: 2.6.2022

Results of Water Analysis

			WHO Drinking Water Guideline (Geneva - 1993)
pH	7.3		6.5 - 8.5
Colour (True)		TCU	15 TCU
Turbidity		NTU	5 NTU
Conductivity		micro S/cm	
Total Hardness		mg/l as $CaCO_3$	500 mg/l as $CaCO_3$
Calcium Hardness		mg/l as $CaCO_3$	
Magnesium Hardness		mg/l as $CaCO_3$	
Total Alkalinity		mg/l as $CaCO_3$	
Phenolphthalein Alkalinity		mg/l as $CaCO_3$	
Carbonate ($CaCO_3$)		mg/l as $CaCO_3$	
Bicarbonate (HCO_3)		mg/l as $CaCO_3$	
Iron		mg/l	0.3 mg/l
Chloride (as CL)		mg/l	250 mg/l
Sodium Chloride (as NaCL)		mg/l	
Sulphate (as SO_4)		mg/l	500 mg/l
Total Solids		mg/l	1500 mg/l
Total Suspended Solids	5	mg/l	
Total Dissolved Solids		mg/l	1000 mg/l
Manganese		mg/l	0.05 mg/l
Phosphate		mg/l	
Phenolphthalein Acidity		mg/l	
Methyl Orange Acidity		mg/l	
Salinity		ppt	

Remark: This certificate is issued only for the receipt of the test sample.

Tested by
Signature:
Name: Zaw Hein Oo
B.Sc (Chemistry),
Sr.Chemist
ISO Tech Laboratory

Approved by
Signature:
Name: Soe Thit
B.E (Civil) 1980,
Technical Officer
ISO TECH Laboratory

(a division of WEG Co.,Ltd.)
No.18. Lanthit Road, Nanthargone Quarter, Insein Township, Yangon, Myanmar.
Ph: 01-640955, 09-880100172, 09-880100173, 01-644506, E-mail: isotechlaboratory@gmail.com, Website: weg-myanmar.com

ORIGINAL

Report No. : **22520-00062**
Job Ref. : 5000130
Date : 02-Jun-22
Page 1 of 2

TEST REPORT

CLIENT NAME : **E GUARD ENVIRONMENTAL SERVICES COMPANY LIMITED**

ADDRESS : **NO.145,(A2-A3), THIRI MINGALAR STREET, 8 MILE, PYAY ROAD, MAYANGONE TOWNSHIP, YANGON**

The following sample was submitted and identified by client and analysed at our lab with the following results.

Sample Description : Kyeeon Kyeewa Solar Power Plant Project (Ground Water)
Sampling Date : 26-May-22
Sample Condition : Glass and Plastic Bottle at Ambient Temperature
Lab Code : W-064
Date Sample(s) Received : 27-May-22
Testing Period : 30-May-22 TO 31-May-22

No.	Test Items	Methods	Results	Units
1	Potassium	APHA 3500-K B (Flame Photometric Method) (23rd Edition)	1.38	mg/L
2	Nitrogen(Kjeldahl)	APHA 4500-NorgB (Macro Kjeldahl Method) (23rd Edition) (In-house Method)	<1	mg/L
3	Phosphorus	APHA 4500-P E (Ascorbic Acid Method) (23rd Edition)	0.040	mg/L

********** End of Report **********

M.C.Z

SGS (MYANMAR) LIMITED Oil, Gas & Chemicals

SGS (Myanmar) Limited | Natural Resources, 79/D, Bo Chein Street, 6 ½ Mile, Hlaing Township, Yangon, Myanmar
t +95(1) 654 795, 654 796, 654 864, 654 865 e sgs.myanmar@sgs.com
Member of SGS Group(SGS SA)

SGS

Report No. : **22520-00062**
Job Ref. : 5000130
Date : 02-Jun-22
Page 2 of 2

TEST REPORT

CLIENT NAME : **E GUARD ENVIRONMENTAL SERVICES COMPANY LIMITED**

ADDRESS : **NO.145,(A2-A3), THIRI MINGALAR STREET, 8 MILE, PYAY ROAD, MAYANGONE TOWNSHIP, YANGON**

The following sample was submitted and identified by client and analysed at our lab with the following results.

Sample Description : Kyeeon Kyeewa Solar Power Plant Project (Ground Water)
Sampling Date : 26-May-22

Sample Condition : Glass and Plastic Bottle at Ambient Temperature

Lab Code : W-064

Date Sample(s) Received : 27-May-22

Testing Period : 30-May-22 TO 31-May-22

No.	Test Items	Methods	Results	Units
4	Oil & Grease	APHA 5520 B (Partition-Gravimetric Method) (23rd Edition)	<5	mg/L
5	Chromium	APHA 3030 &3111B (Direct Air Acetylene Flame Method) (23rd Edition)	<0.1	mg/L

********** End of Report **********

M.C.Z

SGS (Myanmar) Limited
(Thin Thin Maw)
Laboratory Manager

ORIGINAL

Report No. : **22520-00061**
Job Ref. : 5000130
Date : 02-Jun-22
Page 1 of 2

TEST REPORT

CLIENT NAME : **E GUARD ENVIRONMENTAL SERVICES COMPANY LIMITED**

ADDRESS : **NO.145,(A2-A3), THIRI MINGALAR STREET, 8 MILE, PYAY ROAD, MAYANGONE TOWNSHIP, YANGON**

The following sample was submitted and identified by client and analysed at our lab with the following results.

Sample Description : Kyeeon Kyeewa Solar Power Plant Project (Surface Water)
Sampling Date : 26-May-22
Sample Condition : Glass and Plastic Bottle at Ambient Temperature
Lab Code : W-063
Date Sample(s) Received : 27-May-22
Testing Period : 30-May-22 TO 31-May-22

No.	Test Items	Methods	Results	Units
1	Potassium	APHA 3500-K B (Flame Photometric Method) (23rd Edition)	1.48	mg/L
2	Nitrogen(Kjeldahl)	APHA 4500-NorgB (Macro Kjeldahl Method) (23rd Edition) (In-house Method)	· <1	mg/L
3	Phosphorus	APHA 4500-P E (Ascorbic Acid Method) (23rd Edition)	<0.01	mg/L

********** End of Report **********

M.C.Z

SGS (MYANMAR) LIMITED Oil, Gas & Chemicals

SGS (Myanmar) Limited | Natural Resources, 79/D, Bo Chein Street, 6 ½ Mile, Hlaing Township, Yangon, Myanmar
t +95(1) 654 795, 654 796, 654 864, 654 865 e sgs.myanmar@sgs.com
Member of SGS Group(SGS SA)

SGS

Report No. : **22520-00061**
Job Ref. : 5000130
Date : 02-Jun-22
Page 2 of 2

TEST REPORT

CLIENT NAME : **E GUARD ENVIRONMENTAL SERVICES COMPANY LIMITED**

ADDRESS : **NO.145,(A2-A3), THIRI MINGALAR STREET, 8 MILE, PYAY ROAD, MAYANGONE TOWNSHIP, YANGON**

The following sample was submitted and identified by client and analysed at our lab with the following results.

Sample Description : Kyeeon Kyeewa Solar Power Plant Project (Surface Water)
Sampling Date : 26-May-22

Sample Condition : Glass and Plastic Bottle at Ambient Temperature

Lab Code : W-063

Date Sample(s) Received : 27-May-22

Testing Period : 30-May-22 TO 31-May-22

No.	Test Items	Methods	Results	Units
4	Oil & Grease	APHA 5520 B (Partition-Gravimetric Method) (23rd Edition)	<5	mg/L
5	Chromium	APHA 3030 &3111B (Direct Air Acetylene Flame Method) (23rd Edition)	<0.1	mg/L

********** End of Report **********

M.C.Z

SGS (Myanmar) Limited
(Thin Thin Maw)
Laboratory Manager

ISO TECH LABORATORY

Laboratory Technical Consultant: U Saw Christopher Maung
B.Sc Engg: (Civil), Dip S.E(Delft) Lecturer of YIT (Retd). Consultant (Y.C.D.C), LWSE 001.
Former Member (UNICEF, Water quality monitoring & Surveillance Myanmar)

ISO 9001:2015 Cert. No.658283

WTL-RE-001
Issue Date - 01-1-2016
Effective Date - 01-1-2016
Issue No - 1.0/Page 1 of 1

M0522 034

WATER QUALITY TEST (MICROBIOLOGY) RESULTS FORM

Client: Kyeeon Kyeewa Solar Power Plant Project
Nature of Water: Surface Water
Location: Mezali Village Track, Pwintbyu Township, Minbu District Magway.
Date and Time of collection: 26.5.2022
Date and Time of arrival at Laboratory: 27.5.2022
Date and Time of commencing examination: 27.5.2022
Date and Time of completing: 28.5.2022

Results of Water Analysis

			WHO Drinking Water Guideline (Geneva - 1993)
Total Coliform Count	18	CFU/100ml	Not detected
Thermotolerant (fecal) Coliform Count	4	CFU/100ml	Not detected
pH	7.5		6.5 - 8.5
Turbidity	35	NTU	5 NTU
Colour (True)	10	TCU	15 TCU
Free Chlorine	Nil	mg/l	
Total Chlorine	Nil	mg/l	

***Date and Time Sample Collection Error.**

Remark : Unsatisfactory for drinking purpose.

: This certificate is issued only for the receipt of the test sample.

: < - Less than

Tested by

Signature:

Name: Zaw Hein
B.Sc (Chemistry),
Sr.Chemist
ISO Tech Laboratory

Approved by

Signature:

Name: Soe Thit
B.E (Civil) 1980,
Technical Officer
ISO TECH Laboratory

(a division of WEG Co.,Ltd.)
No.18. Lanthit Road, Nanthargone Quarter, Insein Township, Yangon, Myanmar.
Ph: 01-640955, 09-880100172, 09-880100173, 01-644506, E-mail: isotechlaboratory@gmail.com, Website: weg-myanmar.com

ISO TECH LABORATORY

ISO 9001:2015 Cert. No.688283

Laboratory Technical Consultant: U Saw Christopher Maung
B.Sc Engg: (Civil), Dip S.E(Delft) Lecturer of YIT (Retd). Consultant (Y.C.D.C), LWSE 001.
Former Member (UNICEF, Water quality monitoring & Surveillance Myanmar)

WTL-RE-001
Issue Date - 01-12-2012
Effective Date - 01-12-2012
Issue No - 1.0/Page 1 of 2

W0522 700

WATER QUALITY TEST RESULTS FORM

Client: Kyeeon Kyeewa Solar Power Plant Project
Nature of Water: Surface Water
Location: Mezali Village Track, Pwintbyu Township, Minbu District Magway.
Date and Time of collection: 26.5.2022
Date and Time of arrival at Laboratory: 27.5.2022
Date and Time of commencing examination: 28.5.2022
Date and Time of completing: 2.6.2022

Results of Water Analysis

			WHO Drinking Water Guideline (Geneva - 1993)
pH	7.2		6.5 - 8.5
Colour (True)		TCU	15 TCU
Turbidity		NTU	5 NTU
Conductivity		micro S/cm	
Total Hardness		mg/l as $CaCO_3$	500 mg/l as $CaCO_3$
Calcium Hardness		mg/l as $CaCO_3$	
Magnesium Hardness		mg/l as $CaCO_3$	
Total Alkalinity		mg/l as $CaCO_3$	
Phenolphthalein Alkalinity		mg/l as $CaCO_3$	
Carbonate ($CaCO_3$)		mg/l as $CaCO_3$	
Bicarbonate (HCO_3)		mg/l as $CaCO_3$	
Iron		mg/l	0.3 mg/l
Chloride (as CL)		mg/l	250 mg/l
Sodium Chloride (as NaCL)		mg/l	
Sulphate (as SO_4)		mg/l	500 mg/l
Total Solids		mg/l	1500 mg/l
Total Suspended Solids	43	mg/l	
Total Dissolved Solids		mg/l	1000 mg/l
Manganese		mg/l	0.05 mg/l
Phosphate		mg/l	
Phenolphthalein Acidity		mg/l	
Methyl Orange Acidity		mg/l	
Salinity		ppt	

Remark: This certificate is issued only for the receipt of the test sample.

Tested by
Signature:
Name: Zaw Hein Oo
B.Sc (Chemistry)
Sr.Chemist
ISO Tech Laboratory

Approved by
Signature:
Name: Soe Thit
B.E (Civil) 1980,
Technical Officer
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ISO TECH LABORATORY

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Laboratory Technical Consultant: U Saw Christopher Maung
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Former Member (UNICEF, Water quality monitoring & Surveillance Myanmar)

WTL-RE-001
Issue Date - 01-12-2012
Effective Date - 01-12-2012
Issue No - 1.0/Page 2 of 2

W0522 700

WATER QUALITY TEST RESULTS FORM

Client	Kyeeon Kyeewa Solar Power Plant Project
Nature of Water	Surface Water
Location	Mezali Village Track, Pwintbyu Township, Minbu District Magway.
Date and Time of collection	26.5.2022
Date and Time of arrival at Laboratory	27.5.2022
Date and Time of commencing examination	28.5.2022
Date and Time of completing	2.6.2022

Results of Water Analysis			WHO Drinking Water Guideline (Geneva - 1993)
Temperature (°C)		°C	
Fluoride (F)		mg/l	1.5 mg/l
Lead (as Pb)		mg/l	0.01 mg/l
Arsenic (As)		mg/l	0.01 mg/l
Nitrate ($N.NO_3$)		mg/l	50 mg/l
Chlorine (Residual)		mg/l	
Ammonia Nitrogen (NH_3)		mg/l	
Ammonium Nitrogen (NH_4)		mg/l	
Dissolved Oxygen (DO)		mg/l	
Chemical Oxygen Demand (COD)	64	mg/l	
Biochemical Oxygen Demand (BOD) (5 days at 20 °C)	12	mg/l	
Cyanide (CN)		mg/l	0.07 mg/l
Zinc (Zn)		mg/l	3 mg/l
Copper (Cu)		mg/l	2 mg/l
Silica (SiO_2)		mg/l	

Remark: This certificate is issued only for the receipt of the test sample.

Tested by
Signature:
Name: Zaw Hein
B.Sc (Chemistry),
Sr.Chemist
ISO Tech Laboratory

Approved by
Signature:
Name: Soe Thit
B.E (Civil) 1980,
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(11) Equipment and Materials Supply (Offshore Portion) for the Project

MYANMAR KYEEONKYEEWA SOLAR POWER COMPANY LIMITED
EQUIPMENT AND MATERIAL SUPPLY (OFFSHORE) PORTION

ITEM M/L	HS CODE	NAME & SPECIFICATION	Unit	Qty	Estimated Price USD	Origin of Country	Preliminary Shipping Plan	Remark
1	8541.4022.00	PV module	U	96185	13376700	China		
2	7308.9099.00	PV support bracket	kg	1118000	2151392	China		
3	8504.4040.00	String inverters	U	190	811266	China		
4	8504.3429.00	Packaged transformer	U	10	894185	China		
5	8537.1092.00	Communications cabinets (Including switch, anti PID control device, data management device, etc)	kg	3600	54195	China		
6	8544.4929.00	PV cable (including accessories)	kg	30000	785088	China		
7	8544..6012.00	Power cable (including accessories)	kg	162600	375194	China		
8	8544..6012.00	Control cable (including accessories)	kg	4800	343574	China		
9	8504.2329.00	Main transformer(with accessory)	U	1	353007	China		
10	8535.9010.00	Neutral point equipment (including neutral isolating switch, current transformer, lightning arrester, etc.)	kg	2400	149908	China		
11	8535.9010.00	132kV line - transformer group interval	kg	72000	215037	China		
12	8535.9010.00	132kV outdoor equipment (132kV lightning arrester, attached discharge recorder, outdoor voltage transformer)	kg	12000	62989	China		
13	8537.1099.00	Distribution Equipment	kg	9600	309294	China		
14	8543.7090.00	Reactive power compensation device	U	3	322974	China		
15	8504.2192.00	Station service electricity equipment	U	10	143928	China		
16	9015.8090.00	environmental monitoring instrument	U	3	31863	China		
17	8507.2099.00	Valve-controlled sealed lead-acid battery	U	3	27978	China		
18	9030.3390.00	Fault recording cabinet	U	3	18317	China		
19	8543.7090.00	Supervisory system	U	6	358524	China		
20	8535.9090.00	Protection system	kg	4800	260564	China		
21	8517.6230.00	Communication system	U	6	302529	China		
22	8504.4011.00	DC and uninterruptible power supply system	U	6	82186	China		
23	9015.8090.00	Power prediction system equipment	U	3	33453	China		
24	8415.1010.00	Heating and ventilation system equipment	U	3	41131	China		
25	8424.1090.00	Fire fighting equipment	U	3	75532	China		
26	8531.1020.00	Fire alarm system	U	3	131743	China		
27	8421.2122.00	sewage treatment equipment	U	3	71000	China		
28	8517.6230.00	Meeting system	U	24	270965	China		
29	8517.6230.00	Internet equipment	U	24	270965	China		
30	8537. 2090 .00	step-up substation equipment	KG	50000	266094	China		
31	3917.3999.00	Carbon threaded pipe	kg	4800	5406	China		
32		Hot-dip galvanized steel pipe				China		
32.1	7306.3099.00	Hot-dip Galvanized steel pipe	kg	24000	19628	China		
32.2	7308.9099.00	Hot-dip Galvanized pipe pile	kg	96000	176653	China		
33	3816.0090.00	Cable Fire Retardant Coating	kg	2400	7950	China		
34	8544.4299.00	Panel ground wire	kg	900	5336	China		
35	3918.9019.00	Anti-static computer room floor	kg	7200	42799	China		
36	7228.7090.00	Galvanized Angle steel	kg	21600	38971	China		

37	3816.0090.00	Fire blocking material	kg	2400	9818	China		
38	3208.9090.00	Antirust paint	kg	36	317	China		
39	8535.4000.00	Framing lightning rod	kg	12000	101039	China		
40	8413.8119.00	Water supply and drainage equipment	U	3	26209	China		
41	8537.1099.00	Lighting distribution box	kg	960	7855	China		
42	8544.1900.00	Electric wire	kg	480	5237	China		
43	8502.2010.00	Diesel generator	U	3	53799	China		
44		132kV transmission line				China		
44.1	7318.1590.00	Anchor bolt	kg	24000	26114	China		
44.2	7308.2019.00	Transmission line tower	kg	600000	478766	China		
44.3	7614.1090.00	Steel core aluminum stranded wire	kg	42000	217621	China		
44.4	8538.9019.00	Connector clamp for transmission lines	kg	8400	60934	China		
44.5	8546.1000.00	Line insulator	kg	34800	87048	China		
Total					**23,963,075**			

(12) Equipment and Material Supply (Onshore Portion) for the Project

Kyeeonkyeewa Power Plant Equipment and Material Supply (Onshore Supply) Portion						
ITEM M/L	NAME & SPECIFICATION	Qty	Unit	Estamated Price USD	Origin of Country	Remark
1	borehole pump	1	Unit	11766		
2	Electric shrinkage gate	1	Unit	14975		
3	crawl	1	Unit	264565		
4	Sand & stone&brick&concrete , etc	1	Unit	1134583		
5	Pile foundation reinforcement	1	Unit	214575		
6	concrete iron	1	Unit	50809		
7	Hot galvanized steel pipe	1	Unit	89852		
8	Ground flat steel	1	Unit	166333		
9	light distribution box	1	Unit	45461	Myanmar	
10	diesel generator	1	Unit	144405		
11	wire	1	Unit	32090		
12	Supply and drainage equipment	1	Unit	123012		
13	PVC PIPE	1	Unit	21425		
14	portable dwellings	1	Unit	106967		
15	Temporary facilities	1	Unit	138165		
16	Epidemic prevention materials	1	Unit	98811		
17	Other sporadic materials	1	Unit	211856		
				2,869,650		