Disclaimer

This EMP report has been prepared by third party; E Guard Environmental Services Co., Ltd. for Myogyi Substation 20 MWac Ground Mounted Solar Power Plant Project, proposed by Myogyi Investment Holdings Limited. The project is located at Sae Ywar Village Tract, Ywar Ngan Township, Danu Self-administrative Zone, Shan State, Myanmar. The report preparation was done inside the framework of Myanmar EIA Procedure (2015).

The analysis works had been done based on the provided data of the proposed plan of project from the project proponent and onsite observation of environmental parameters guided by Myanmar Government Environmental Authority, Environmental Conservation Department, hereinafter ECD.

The impact assessment and mitigation measures are prepared based on the facts and figures of detail plan/ process of the project obtained from the project proponent.

Moreover, this report has been prepared in line with the prevailing active Laws, Rules, Procedure, Guidelines, and Standards etc. of Myanmar legal system.

The drawings, sketches, maps and other illustrative figures in this report are for the demonstrative/ descriptive purposes only and not to be considered as approved boundary nor accepted territory nor recognized properties extend of any kind.

In case of dual or multiple meanings of the wordings, those wordings should be interpreted as relevant meaning to the concerned areas of discussed in this report.

The individual/ personal, organizational and commercial data and information found in this report are included based on the concerned authority's requirement. The privacy and trade secrets concerned are to be addressed to the concerned authority ECD.

Report Review Form

Report Title: Environmental Management Plan (EMP) Report For Myogyi Substation 20 MWac Ground Mounted Solar Power Plant Project	
Report Version: Version 00	
Proponent: **Myogyi Investment Holdings Limited** No (4), 73rd Street, Between 102-A & 103 Street, Mingalar Mandalay, Myanmar. Mobile: +959 251556091 Email: ma.zl@sepco.net.cn	**Prepared by;** **E Guard Environmental Services Co., Ltd.** No. (145, A2-3), Thiri Mingalar Street, Ward No. (4), 8th Mile, Mayangone Township, 11062, Yangon Region, Myanmar. Tel: +951 9667757, Fax: +951 9667757 Mobile +959 782042233 Email: info@eguardservices.com

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Submitted Date: 07/03/2023	**Signature:**
Checked by: U Aung Myint Myat	**Position: Associate Consultant**
Checked Date: 17/03/2023	**Signature:**
Summary: EMP Report This document presents the EMP report as required for construction and operation of Myogyi Substation 20 MWac Ground Mounted Solar Power Plant Project.	**Approved by:**

Distribution:

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MYOGYI INVESTMENT HOLDINGS LIMITED
(Incorporated in the Republic of the Union of Myanmar)
Company Registration No. 132854335

Corner Of Bogyoke Aung San Road And 27th Street, Unit 01-05, Level 10, Junction City Office Tower, Pabedan Township, Yangon Region, Myanmar

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, Myogyi Investment Holdings Limited, strongly commit that this EMP report, prepared by E Guard Environmental Services Co., Ltd. is strong and complete. We also commit that our company and our sub-contractors will operate the proposed project according to our commitments and implement Environmental Management Plans (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.

Yours Sincerely,

E GUARD ENVIRONMENTAL SERVICES
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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 regard to the above matter, we, E Guard Environmental Services Co., Ltd. has prepared the Environmental Management Plan (EMP) Report for Myogyi Substation 20 MWac Ground Mounted Solar Power Plant Project, proposed by Myogyi Investment Holdings Limited. 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

Environmental Management Plan (EMP) Report for

Myogyi Substation 20MWac Ground Mounted Solar Power Plant Project

Proposed by;

Myogyi Investment Holdings Limited

Prepared by;

E Guard Environmental Services Co., Ltd.

March, 2023

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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
DICA	: Directorate of Investment and Company Administration
ECD	: Environmental Conservation Department
EMoP	: Environmental Monitoring Plan
EMP	: Environmental Management Plan
EPGE	: Electric Power Generation Enterprise
HSE	: Health, Safety and Environment
km	: Kilometer
kV	: Kilovolt
kWh	: Kilo Watt Hour
mg/l	: Milligram per Liter
MMK	: Myanmar Kyats
MOEE	: Ministry of Electricity and Energy
MONREC	: Ministry of Natural Resources and Environmental Conservation
MWh	: Mega Watt Hour
NO_2	: Nitrogen Dioxide
ºC	: Degrees Celsius
pH	: Pond us Hydrogenium
PM	: Particulate Matter
ppm	: Part Per Million
PV	: Photovoltaic
SO_2	: Sulfur Dioxide
TSP	: Total Suspended Particulates
USD	: US Dollars
WHO	: World Health Organization

အစီရင်ခံစာအကျဉ်းချုပ်

အခန်း (၂)။ ဤပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်သည် မြို့ကြီး ၂၀ မဂ္ဂါဝပ် နေရောင်ခြည်စွမ်းအင်သုံး လျှပ်စစ် ဓာတ်အား ထုတ်လုပ်ခြင်းစီမံကိန်းအတွက် ပြင်ဆင်ရေးဆွဲထားခြင်းဖြစ်သည်။ စီမံကိန်းအဆိုပြုသူမှာ Myogyi Investment Holdings Limited ဖြစ်ပြီး ၎င်းမှာ SPECO Electric Power Construction Corporation နှင့် HK New Energy Investment Holding Limited တို့ပူးပေါင်းထားခြင်းဖြစ်ကာ ၁၀၀ ရာခိုင်နှုန်း ပြည်ပရင်းနှီးမြှုပ်နှံမှုဖြစ်ပါသည်။ စီမံကိန်းအဆိုပြုသူသည် လျှပ်စစ်ဓာတ်အား ထုတ်လုပ်ရေးလုပ်ငန်း (EPGE) မှ နေရောင်ခြည်စွမ်းအင်သုံး လျှပ်စစ်ဓာတ်အား ထုတ်လုပ်ခြင်း စီမံကိန်းများ အကောင်အထည်ဖော်ခြင်းအတွက် ဈေးပြိုင်ခေါ်ယူသည့် တင်ဒါအမှတ် RFP EPGE PV 02/2021-2022 အား ဝင်ရောက်ယှဉ်ပြိုင်အောင်မြင်ခဲ့သည်။ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန၏ သဘောထားမှတ်ချက်များအရ အဆိုပြုစီမံကိန်းသည် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်တင်ပြရန် လိုအပ်ပြီး E Guard Environmental Services Co., Ltd. သည် အဆိုပြုစီမံကိန်းအတွက် အစီရင်ခံစာ ပြင်ဆင်ရေးဆွဲကာ ပတ်ဝန်းကျင်ဆိုင်ရာ လေ့လာမှုများပြုလုပ်ခဲ့သည်။ ဤအစီရင်ခံစာတွင် လေ့လာမှုများသည် နေရောင်ခြည်စွမ်းအင်သုံးလျှပ်စစ်ဓာတ်အား ထုတ်လုပ်ခြင်းစီမံကိန်း တည်ဆောက်ခြင်းနှင့် ဓာတ်အားဖြန့်ဖြူးရန် ကောင်းကင်ဓာတ်အားလိုင်းသွယ်တန်းခြင်း၊ စီမံကိန်းမှ နေရောင်ခြည်စွမ်းအင် အသုံးပြု၍ လျှပ်စစ်ဓာတ်အားထုတ်လုပ်ခြင်းနှင့် မြို့ကြီးဓာတ်အားခွဲရုံသို့ ၃၃ ကေဗွီ ကောင်းကင်ဓာတ်အားလိုင်းဖြင့် လျှပ်စစ်ဓာတ်အားဖြန့်ဖြူးခြင်း လုပ်ငန်းများအတွက် ပြုလုပ်ခဲ့ခြင်း ဖြစ်သည်။ ဤပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်၏ ရည်ရွယ်ချက်များမှာ အဆိုပြုစီမံကိန်း တည်ဆောက်ခြင်းနှင့် လုပ်ငန်းလည်ပတ်ခြင်းကြောင့် ပတ်ဝန်းကျင်နှင့် လူမှုစီးပွား အခြေအနေများအပေါ် မည်ကဲ့သို့ထိခိုက်နိုင်သည်ကို လေ့လာရန်၊ ထိခိုက်မှုများအား မည်သို့လျှော့ချနိုင်ရန်၊ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်၊ စောင့်ကြပ်ကြည့်ရှုမှုအစီအစဉ်နှင့် အခြားအစီအစဉ်များရေးဆွဲရန် ဖြစ်ပါသည်။ လေ့လာမှုနယ်ပယ်အား စီမံကိန်းဗဟိုမှ ၁ ကီလိုမီတာ အချင်းဝက်ရှိသော ဧရိယာအတွင်းနှင့် ဓာတ်အားဖြန့်ဖြူးရန် သွယ်တန်းထားသော ကောင်းကင်ဓာတ်အားလိုင်း၏ မီတာ ၂၀၀ အတွင်း သတ်မှတ်လေ့လာခဲ့ခြင်းဖြစ်ပြီး ထိုဧရိယာသည် စီမံကိန်းကြောင့်ဖြစ်ပေါ်လာနိုင်သည့် ပတ်ဝန်းကျင်နှင့် လူမှုစီးပွားဆိုင်ရာသက်ရောက်မှုများအတွက် လုံလောက်မှုရှိသည်။

အဆိုပြုစီမံကိန်းသည် ဆည်ရွာကျေးရွာအုပ်စု၊ ရွာငံမြို့နယ်၊ ဓနုကိုယ်ပိုင်အုပ်ချုပ်ခွင့်ရဒေသ၊ ရှမ်းပြည်နယ်၊ မြန်မာနိုင်ငံတွင်တည်ရှိသည်။ စီမံကိန်း၏ တည်နေရာမှာ မြောက်လတ္တီကျူ ၂၁ ဒီဂရီ ၃၀ မိနစ် ၃၉.၇၉ စက္ကန့်နှင့် အရှေ့လောင်ဂျီကျူ ၉၆ ဒီဂရီ ၂၂ မိနစ် ၁၉.၈၄ စက္ကန့်ဖြစ်ကာ ပင်လယ်ရေမျက်နှာပြင်အမြင့် ၂၁၈ မီတာတွင်တည်ရှိသည်။ အဆိုပြုစီမံကိန်း၏ တည်ဆောက်ခြင်းလုပ်ငန်းများတွင် box inverter all-in-one machine များ၊ supporting bracket များ၊ solar power station နှင့် အခြားလိုအပ်သော အဆောက်အဦများ တည်ဆောက်တပ်ဆင်ခြင်း၊ လျှပ်စစ်ဓာတ်အား ဖြန့်ဖြူးရန် ၃၃ ကေဗွီ ကောင်းကင်ဓာတ်အားလိုင်းတည်ဆောက်ခြင်းနှင့် လိုင်းသွယ်တန်းခြင်း လုပ်ငန်းများပါဝင်သည်။ အဆိုပြုစီမံကိန်း၏ ပြန်လှန်လျှပ်စီး စွမ်းရည်မှာ ၂၁.၈၇ မဂ္ဂါဝပ်ဖြစ်ပြီး တိုက်ရိုက်လျှပ်စီး စွမ်းရည်မှာ ၃၀.၄၈ မဂ္ဂါဝပ်ဖြစ်ကာ ဆိုလာပြားမှ လျှပ်စစ်ထုတ်ယူသည့် စက်လေးခု (box inverter all-in-one machine ၄ လုံး) ဖြင့် လျှပ်စစ်ဓာတ်အား ထုတ်လုပ်သွားမည်ဖြစ်သည်။ စီမံကိန်းအဆိုပြုသူသည် စီမံကိန်းအတွက် မြေနေရာအားမြေပိုင်ရှင်ထံမှငှားရမ်းထားပြီး စီမံကိန်းအတွက် စုစုပေါင်းမြေဧရိယာ ၁၄၉.၁၅ ဧက (၆၀.၃၆ ဟတ်တာ) လိုအပ်သည်။ စီမံကိန်းမြေနေရာကို Renewable Power Myanmar Co., Ltd. က ပိုင်ဆိုင်ပြီး ငှားရမ်းသည့် ကာလကို ၂၀၂၂ ခုနှစ် ဩဂုတ်လ ၂ ရက်နေ့မှ ၂၀၄၃ ခုနှစ် ဩဂုတ်လ ၂ ရက်နေ့အထိ နှစ် ၂၀ သတ်မှတ်ထားပါသည်။ စီမံကိန်းအဆိုပြုသူသည် စီမံကိန်းတွင် ဆိုလာပြား ၅၆၄၄၈ ခု၊ box inverter all-in-one machine (EP-3125-HA-UD/3391) တစ်လုံး၊ box inverter all-in-one machine (EP-6250-HA-UD/33) သုံးလုံး၊ horizontal single-axis tracking bracket ၂၄၁၇၃ ခု နှင့် fixed tracking bracket ၃၂၂၇၅ ခု အား နေရောင်ခြည်စွမ်းအင်မှ လျှပ်စစ်ဓာတ်အားထုတ်လုပ်ရန် တပ်ဆင်သွားမည်ဖြစ်သည်။ စီမံကိန်းတည်ဆောက်ရန်ခန့်မှန်းကြာချိန်မှာ ၁၅ လဖြစ်သည်။ တည်ဆောက်ခြင်းလုပ်ငန်းများအား ၂၀၂၂ ခုနှစ်၊ ဧပြီလတွင် စတင်ခဲ့ပြီး ၂၀၂၃ ခုနှစ် ဇူလိုင်လတွင်ပြီးဆုံးမည်ဖြစ်သည်။

အခန်း (၃)။ စီမံကိန်းအဆိုပြုသည့် အဖွဲ့အစည်းမှာ Myogyi Investment Holdings Limited ဖြစ်ပြီး ၎င်းသည် SPECO Electric Power Construction Corporation နှင့် HK New Energy Investment Holding Limited တို့ပူးပေါင်းထားခြင်းဖြစ်ကာ ၁၀၀ ရာခိုင်နှုန်း ပြည်ပရင်းနှီးမြှုပ်နှံမှုဖြစ်ပါသည်။ Myogyi Investment Holdings Limited သည် မြန်မာနိုင်ငံ ရင်းနှီးမြှုပ်နှံမှုနှင့် ကုမ္ပဏီများညွှန်ကြားမှုဦးစီးဌာနတွင် မှတ်ပုံတင်ထားသော ကုမ္ပဏီတစ်ခုဖြစ်ပြီး ကုမ္ပဏီမှတ်ပုံတင်အမှတ်မှာ ၁၃၂၈၅၄၃၃၅ ဖြစ်သည်။ ရုံးလိပ်စာမှာ အမှတ် ၄၊ ၇၃ လမ်း၊ ၁၀၂ အေ နှင့် ၁၀၃ ကြား၊ မင်္ဂလာမန္တလေး၊ မန္တလေးတိုင်းဒေသကြီး၊ မြန်မာနိုင်ငံဖြစ်သည်။ အဆိုပြုစီမံကိန်း၏ စုစုပေါင်းရင်းနှီးမြှုပ်နှံမှုပမာဏမှာ အမေရိကန်ဒေါ်လာသန်းပေါင်း ၂၁.၄၃ သန်းဖြစ်ပြီး စက်ပစ္စည်းနှင့် ကိရိယာများအတွက် ရင်းနှီးမြှုပ်နှံမှု၊ ပရိဘောဂနှင့်အခြားပစ္စည်းများအတွက် ရင်းနှီးမြှုပ်နှံမှုနှင့် အခြေခံအဆောက်အဦ

များအတွက် ရင်းနှီးမြှုပ်နှံမှုတို့ပါဝင်သည်။ တည်ဆောက်ခြင်း လုပ်ငန်းများပြီးစီးပါက အဆိုပြုစီမံကိန်းသည် နေရောင်ခြည်စွမ်းအင်ကိုအသုံးပြု၍ လျှပ်စစ်ဓာတ်အား ထုတ်လုပ်မည်ဖြစ်ပြီး မြို့ကြီးဓာတ်အားခွဲရုံသို့ ၃၃ ကေဗွီ ကောင်းကင်ဓာတ်အားလိုင်းဖြင့် လျှပ်စစ်ဓာတ်အား ဖြန့်ဖြူးသွားမည်ဖြစ်ကာ လုပ်ငန်းလည်ပတ်ရန် ကာလမှာ နှစ် ၂၀ ဖြစ်သည်။ အဆိုပြုစီမံကိန်းသည် Build, Own and Operate (BOO) စနစ်ကိုအခြေခံဆောင်ရွက်သောကြောင့် စီမံကိန်းအကောင်အထည်ဖော်သူအနေဖြင့် လုပ်ငန်းလည်ပတ်ရန်ကာလအား သက်ဆိုင်ရာအစိုးရဌာန၏ ခွင့်ပြုချက်ဖြင့် သက်တမ်းတိုးမြှင့်ပြီး နေရောင်ခြည်စွမ်းအင်မှလျှပ်စစ် ဓာတ်အားထုတ်လုပ်ခြင်း လုပ်ငန်းများအား နှစ် ၂၀ နောက်ပိုင်းတွင် ဆက်လက်ဆောင်ရွက်သွားမည်ဖြစ်သည်။

အခန်း (၄)။ ဤပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်ကို E Guard Environmental Services Co., Ltd မှ TCR ရရှိထားသောဘာသာရပ်ဆိုင်ရာကျွမ်းကျင်ပညာရှင်များ ဦးဆောင်၍ လုံလောက်သော အတွေ့အကြုံရှိပညာရှင်များဖြင့်ရေးဆွဲထားသည်။ ပါဝင်ဆောင်ရွက်ခဲ့သော ပညာရှင်များ၏ အချက်အလက်များကိုဖော်ပြထားသည်။

အခန်း (၅)။ အဆိုပြုစီမံကိန်း တည်ဆောက်ခြင်းနှင့် လုပ်ငန်းလည်ပတ်ခြင်းတို့တွင် ပတ်ဝန်းကျင်အား ထိခိုက်မှုကာကွယ်ရန် လိုက်နာရမည့် နိုင်ငံတော်၏တည်ဆဲဥပဒေနှင့် စည်းမျဉ်း စည်းကမ်းများအား ဖော်ပြထားသည်။

အခန်း (၆)။ လက်ရှိစီမံကိန်းအခြေအနေကို ကွင်းဆင်းလေ့လာခြင်းနှင့် ယခင်လေ့လာပြီးသော အချက်အလက်များအား မှီငြမ်းလေ့လာခြင်းသည် ပတ်ဝန်းကျင်ထိခိုက်မှုများ ဆန်းစစ်ခြင်းအတွက် အလွန်အရေးပါသည်။ လက်ရှိစီမံကိန်း၏ ပတ်ဝန်းကျင်ဆိုင်ရာ အခြေအနေများအား ကွင်းဆင်းလေ့လာခြင်းသည် ပတ်ဝန်းကျင်ဆိုင်ရာ လေ့လာမှုများပြုလုပ်ရာတွင် အရေးပါသော နေရာတွင်ပါဝင်သည်။ ထို့ကြောင့် E Guard Environmental Services Co., Ltd. သည် စီမံကိန်း၏ လေအရည်အသွေး၊ ရေအရည်အသွေးနှင့် ဆူညံသံပမာဏတို့အား စီမံကိန်းဧရိယာတွင် ၂၀၂၂ ခုနှစ်၊ အောက်တိုဘာလ ၂၃ ရက်နှင့် ၂၄ ရက်တို့တွင် ၂၄ နာရီဆက်တိုက် စောင့်ကြပ်ကြည့်ရှုသည့်နည်းဖြင့် တိုင်းတာခဲ့သည်။ တိုင်းတာရရှိသော ရလဒ်များအား အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များနှင့် အခြားနိုင်ငံတကာလမ်းညွှန်ချက်များဖြင့် နှိုင်းယှဉ် လေ့လာခဲ့သည်။ လေထုအတွင်း ဓာတ်ငွေ့ပါဝင်မှုရလဒ်များအား နှိုင်းယှဉ်လေ့လာခြင်းအရ ဆာလဖာဒိုင်အောက်ဆိုဒ် (၂.၅၀ μg/m^3)၊ နိုက်ထရိုဂျင်ဒိုင်အောက်ဆိုဒ် (၁၁.၉၅ μg/m^3)၊ ကာဗွန်မိုနောက်ဆိုဒ် (၀.၁၀ ppm)နှင့် ကာဗွန်ဒိုင်အောက်ဆိုဒ် (၂၉၅.၆၀ ppm) တို့သည် သက်ဆိုင်ရာ လမ်းညွှန်ချက်တန်ဖိုးများအတွင်း ရှိကြောင်းလေ့လာတွေ့ရှိရသည်။ လေထုအတွင်း အမှုန်ပါဝင်မှု

လေ့လာခြင်း ရလဒ်များအရ PM_{10} (၆.၅၁ μg/m^3) နှင့် $PM_{2.5}$ (၃.၁၉ μg/m^3) တို့သည် အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်တန်ဖိုးများ အတွင်းရှိကြောင်း လေ့လာတွေ့ရှိရသည်။ စီမံကိန်း တည်ဆောက်စဉ်ကာလအတွင်းအသုံးပြုသော မြေအောက်ရေအရည်အသွေးနှင့် စီမံကိန်းအနီးရှိချောင်းမှ မြေပေါ်ရေအရည်အသွေးတို့ကို တိုင်းတာရန် ကိရိယာဖြင့်တိုင်းတာခြင်းနှင့် ရေနမူနာကောက်ယူခြင်း တို့ဖြင့်ဆောင်ရွက်ခဲ့သည်။ ရေအရည်အသွေး တိုင်းတာမှုရလဒ်များအရ တိုင်းတာ သောမြေအောက်ရေနှင့် မြေပေါ်ရေတို့၏ Parameters အားလုံးသည် အမျိုးသားပတ်ဝန်းကျင် ဆိုင်ရာအရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်တန်ဖိုးများ အတွင်းရှိပါသည်။ ဆူညံသံပမာဏ တိုင်းတာမှုအား ၂ နေရာခွဲ၍ တိုင်းတာခဲ့ပါသည်။ နေရာ (၁)အဖြစ် ယာယီစီမံကိန်းရုံးခန်း နှင့် နေရာ (၂) အဖြစ် ဆောက်လုပ်ရေးအလုပ်သမားများနေထိုင်ရာ အဆောက်အဦများအနီးတို့တွင် တိုင်းတာ ခဲ့ပြီး နေရာ (၁)တွင် နေ့အချိန်တိုင်းတာရရှိမှု ရလဒ်များ (၄၈.၁၂ dBA) နှင့် ညအချိန်တိုင်းတာရရှိမှု ရလဒ်များ (၃၈.၁၀ dBA) သည် လမ်းညွှန်ချက်တန်ဖိုးများအတွင်း ရှိကြောင်း လေ့လာတွေ့ရှိရသည်။ နေရာ (၂) တွင် နေ့အချိန်တိုင်းတာရရှိမှု ရလဒ်များ (၄၄.၂၆ dBA) နှင့် ညအချိန်တိုင်းတာရရှိမှု ရလဒ်များ (၃၀.၈၉ dBA) သည်လည်း လမ်းညွှန်ချက် တန်ဖိုးများအတွင်း ရှိကြောင်း လေ့လာတွေ့ရှိ ရသည်။ ထို့ကြောင့် စီမံကိန်းဝန်းကျင် ပတ်ဝန်းကျင်အရည်အသွေး (လေအရည်အသွေး၊ ရေအရည် အသွေးနှင့် ဆူညံသံပမာဏ) များသည် စီမံကိန်းတည်ဆောက်ခြင်း ကာလတွင် သက်ဆိုင်ရာ လမ်းညွှန်ချက်တန်ဖိုးများ အတွင်းရှိကြောင်း လေ့လာတွေ့ရှိရသည်။ စီမံကိန်းအကောင် အထည်ဖော်သူသည် စီမံကိန်းဝန်းကျင် လက်ရှိပတ်ဝန်းကျင် အရည်အသွေး များအား ရေရှည် ကောင်းမွန်စေရန် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်များနှင့် လျော့ချရန်နည်းလမ်းများကို မဖြစ်မနေလိုက်နာဆောင်ရွက်ရမည်။ ထို့ပြင် ယခင်လေ့လာပြီးသော အချက်အလက်များ ဖြစ်သည့် လူမှုစီးပွားဆိုင်ရာအချက်အလက်များ၊ သဘာဝတရားနှင့် ဇီဝဗေဒဆိုင်ရာ ပတ်ဝန်းကျင်၊ ငလျင်ပြင်းအား၊ မြေဆီလွှာအနေအထား၊ ရာသီဥတုဆိုင်ရာ အချက်အလက်များနှင့် အခြားလေ့လာပြီးသော အချက်အလက်များအား ဤအစီရင်ခံစာတွင် ဖော်ပြထားသည်။

အခန်း (၇)။ စီမံကိန်းတည်ဆောက်ခြင်းနှင့် လုပ်ငန်းလည်ပတ်ခြင်းတို့ကြောင့် ပတ်ဝန်းကျင်ဆိုင်ရာ အရင်းအမြစ်များ၊ ဂေဟဗေဒ အရင်းအမြစ်များ၊ လူသားများနှင့် စွန့်ပစ်ပစ္စည်းစွန့်ပစ်မှုတို့အပေါ် ထိခိုက်နိုင်သော ဖြစ်နိုင်ခြေရှိသည့် သက်ရောက်မှုများအား ခွဲခြားလေ့လာခဲ့ပြီး ထိုသက်ရောက်မှုများ အား ကျယ်ကျယ်ပြန့်ပြန့်လက်ခံကြသည့် သက်ရောက်မှုများနှင့် သက်ရောက်ခံများ၏ သဘောသဘာဝတို့အပေါ်အခြေခံသော ဆန်းစစ်ခြင်းနည်းလမ်း (IEMA, 2011) ကို

အသုံးပြု၍ဆန်းစစ်ခဲ့သည်။ သက်ရောက်မှုများ ဆန်းစစ်လေ့လာရာတွင် အဆိုပြု စီမံကိန်းအတွက် တည်ဆောက်ခြင်းကာလနှင့် လုပ်ငန်းလည်ပတ်သည့်ကာလဟူ၍ ကာလနှစ်ခု ခွဲခြားလေ့လာခဲ့သည်။

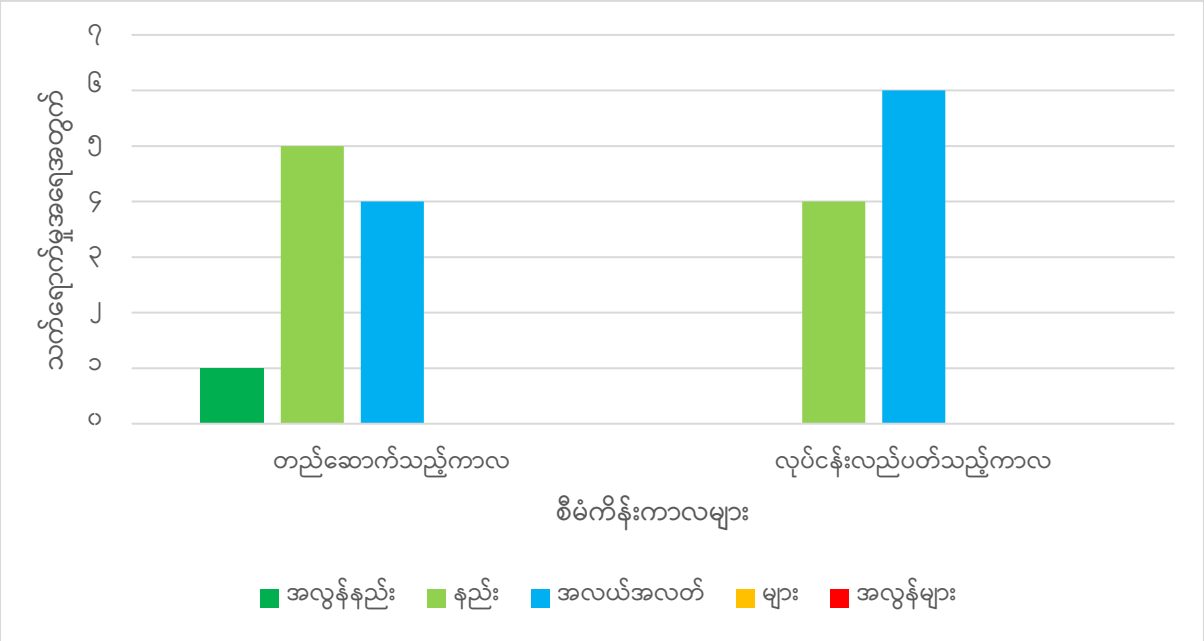
တည်ဆောက်ခြင်းကာလတွင် လျှပ်စစ်ဓာတ်အား စတင်ဖြန့်ဖြူးရန်နေရာ၊ ထိန်းချုပ်ခန်းနှင့် အခြားအဆောက်အဦများ၊ ဆိုလာပြားများတပ်ဆင်ခြင်း၊ box inverter all-in-one machine များ၊ ဆိုလာပြားများတပ်ဆင်ရန် ထောက်တိုင်များ ၊ မြို့ကြီးဓာတ်အားခွဲရုံသို့လျှပ်စစ်ဓာတ်အား ဖြန့်ဖြူးရန် ကောင်းကင်ဓာတ်အားလိုင်း၏ ဓာတ်တိုင်များစိုက်ထူခြင်းနှင့် ဓာတ်အားလိုင်းသွယ်တန်းခြင်းတို့ ပါဝင်သည်။ စီမံကိန်းတည်ဆောက်ရန်ခန့်မှန်းကြာချိန်မှာ ၁၅ လဖြစ်သည်။ တည်ဆောက်ခြင်းလုပ်ငန်းများအား ၂၀၂၂ ခုနှစ်၊ ဧပြီလတွင် စတင်ခဲ့ပြီး ၂၀၂၃ ခုနှစ် ဇူလိုင်လတွင်ပြီးဆုံးမည်ဖြစ်သည်။

လုပ်ငန်းလည်ပတ်သည့်ကာလတွင် နေရောင်ခြည်စွမ်းအင်မှ လျှပ်စစ်ဓာတ်အားထုတ်လုပ်ပြီး မြို့ကြီးဓာတ်အားခွဲရုံသို့ ၅.၀၅ ကီလိုမီတာ (၃.၁၄ မိုင်) အရှည်ရှိသော ၃၃ ကေဗွီ ကောင်းကင်ဓာတ်အားလိုင်းဖြင့် လျှပ်စစ်ဓာတ်အား ဖြန့်ဖြူးခြင်းတို့ ပါဝင်သည်။ လုပ်ငန်းလည်ပတ်သည့်ကာလမှာ နှစ် ၂၀ ဖြစ်သည်။

လုပ်ငန်းဖျက်သိမ်းသည့်ကာလတွင် လုပ်ငန်းလည်ပတ်သည့်ကာလပြီးဆုံးပါက အဆိုပြုစီမံကိန်းသည် Build, Own and Operate (BOO) စနစ်ကိုအခြေခံဆောင်ရွက်သောကြောင့် စီမံကိန်း အကောင်အထည်ဖော်သူအနေဖြင့် လုပ်ငန်းလည်ပတ်ရန်ကာလအား သက်ဆိုင်ရာ အစိုးရဌာန၏ ခွင့်ပြုချက်ဖြင့် သက်တမ်းတိုးမြှင့်ပြီး နေရောင်ခြည်စွမ်းအင်မှ လျှပ်စစ်ဓာတ်အား ထုတ်လုပ်ခြင်း လုပ်ငန်းများ ဆက်လက်ဆောင်ရွက်သွားမည်ဖြစ်သည်။ စီမံကိန်းအား အပြီးသတ်ဖျက်သိမ်း မည်ဆိုမှသာ စီမံကိန်းအကောင်အထည်ဖော်သူသည် လုပ်ငန်းဖျက်သိမ်းမည့်ကာလအတွက် အစီအစဉ်များကို တင်ပြသွားရမည်ဖြစ်သည်။ ထို့ကြောင့် အဆိုပြုစီမံကိန်း၏ လုပ်ငန်းဖျက်သိမ်းသည့် ကာလနှင့် သက်ဆိုင်သောသက်ရောက်မှုများအား လေ့လာဖော်ထုတ်ခြင်း၊ ဆန်းစစ်လေ့လာခြင်းနှင့် ဆိုးကျိုးသက်ရောက်မှုများအား လျှော့ချရန်နည်းလမ်းများ ရေးဆွဲခြင်းတို့အား ဤအစီရင်ခံစာတွင် ထည့်သွင်းထားခြင်းမရှိပါ။

တည်ဆောက်ခြင်းကာလတွင် လေအရည်အသွေးအပေါ်သက်ရောက်မှု၊ မြေအရည်အသွေး အပေါ် သက်ရောက်မှု၊ ဆူညံသံနှင့် တုန်ခါမှုသက်ရောက်မှု နှင့် အစိုင်အခဲစွန့်ပစ်ပစ္စည်းကြောင့် သက်ရောက်မှုများသည် **အလယ်အလတ်အဆင့် သက်ရောက်မှုများ**အဖြစ် ဆန်းစစ်လေ့လာ တွေ့ရှိရသည်။ အခြားသက်ရောက်မှုများဖြစ်သည့် ရေအရည်အသွေးအပေါ် သက်ရောက်မှု၊ လုပ်ငန်းခွင်ကျန်းမာရေးနှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေးဆိုင်ရာ သက်ရောက်မှု၊ လူထုကျန်းမာရေးနှင့်

ဘေးအန္တရာယ် ကင်းရှင်းရေးဆိုင်ရာ သက်ရောက်မှု၊ မီးဘေးအန္တရာယ်သက်ရောက်မှုနှင့် အန္တရာယ်ရှိ စွန့်ပစ်ပစ္စည်းကြောင့် သက်ရောက်မှုများ သည် **နည်းသည့်အဆင့်သက်ရောက်မှုများ** အဖြစ်တွေ့ရှိရပြီး စွန့်ပစ်ရေကြောင့် သက်ရောက်မှုသည် **အလွန်နည်းသည့်အဆင့် သက်ရောက်မှု**အဖြစ် ဆန်းစစ်တွေ့ရှိရသည်။ **လုပ်ငန်းလည်ပတ်သည့်ကာလ**တွင် ရေအရည်အသွေးအပေါ် သက်ရောက်မှု၊ လုပ်ငန်းခွင်ကျန်းမာရေးနှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေးဆိုင်ရာ သက်ရောက်မှု၊ လူထုကျန်းမာရေးနှင့် ဘေးအန္တရာယ် ကင်းရှင်းရေးဆိုင်ရာ သက်ရောက်မှု၊ မီးဘေးအန္တရာယ်သက်ရောက်မှု၊ စွန့်ပစ်ရေနှင့် အန္တရာယ်ရှိ စွန့်ပစ်ပစ္စည်းကြောင့် သက်ရောက်မှုများသည် **အလယ်အလတ်အဆင့် သက်ရောက်မှုများ**အဖြစ် ဆန်းစစ်တွေ့ရှိရသည်။ အခြားသက်ရောက်မှုများ ဖြစ်သည့် လေအရည်အသွေးအပေါ်သက်ရောက်မှု၊ မြေအရည်အသွေးအပေါ် သက်ရောက်မှု၊ ဆူညံသံသက်ရောက်မှုနှင့် အစိုင်အခဲစွန့်ပစ်ပစ္စည်းကြောင့် သက်ရောက်မှုများသည် **နည်းသည့်အဆင့် သက်ရောက်မှုများ**အဖြစ် ဆန်းစစ်လေ့လာခြင်းရလဒ်များအရ ဆန်းစစ်တွေ့ရှိရသည်။ အောက်ဖော်ပြပါပုံတွင် စီမံကိန်းကြောင့် ဖြစ်ပေါ်လာနိုင်သော ဆိုးကျိုးသက်ရောက်မှုများ၏ အသေးစိတ်အဆင့်များအား ဖော်ပြထားသည်။



လျော့ချရန်နည်းလမ်းများသည် ဆိုးကျိုးသက်ရောက်မှုများအား သက်ရောက်မှုနည်းနိုင်သမျှ နည်းစေရေးနှင့် လျော့ချရန်အတွက် အရေးကြီးသည်။ ထိုလျော့ချရန်နည်းလမ်းများအား ဆောင်ရွက်ရန်လိုအပ်သော ဆောင်ရွက်ချက်များနှင့် နည်းပညာများအား သက်ရောက်မှု အမျိုးအစားပေါ် မူတည်ပြီးဖော်ပြထားသည်။ အဆိုပြု စီမံကိန်းသည် ဆိုးကျိုးသက်ရောက်မှုများကို ဖြစ်စေနိုင်သော်လည်း အလုပ်အကိုင်အခွင့်အလမ်းများ ဖန်တီးပေးနိုင်ခြင်း၊ စီးပွားရေး အခွင့်အလမ်းများ ဖန်တီးပေးနိုင်ခြင်း၊ ကာဗွန်ထုတ်လုပ်မှု လျော့ချခြင်း၊ သယံဇာတများ

ထိန်းသိမ်းခြင်းနှင့် ပတ်ဝန်းကျင်နှင့်လိုက်လျောညီထွေသော လျှပ်စစ်စွမ်းအင်များ ထုတ်လုပ်နိုင်ခြင်း၊ အစိုးရအတွက် အခွန်ငွေရရှိနိုင်ခြင်း၊ လူမှုစီးပွားတာဝန်ယူမှု အစီအစဉ်များကြောင့် ဒေသတွင်းဖွံ့ဖြိုးတိုးတက်ခြင်းစသည့် ကောင်းသောသက်ရောက်မှုများကိုလည်း ဖြစ်ပေါ်စေနိုင်သည်။

အခန်း (၈)။ လျှော့ချရန်နည်းလမ်းများနှင့် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်များအား အကောင်အထည်ဖော် ဆောင်ရွက်ရာတွင်လိုအပ်သော အဖွဲ့အစည်းလိုအပ်ချက်များနှင့် တာဝန်ရှိသူများအား ဤအစီရင်ခံစာတွင် ဖော်ပြထားသည်။ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်အား သက်ရောက်မှုများ လေ့လာဆန်းစစ်ချက် များနှင့် သက်ရောက်မှုအဆင့်များကို အခြေခံ၍ စီမံကိန်း၏ တည်ဆောက်ခြင်းကာလနှင့် လုပ်ငန်းလည်ပတ်သည့်ကာလတို့အတွက် ကျန်းမာရေးနှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေး မူဘောင်များနှင့်အညီ ရေးဆွဲထားခြင်းဖြစ်သည်။ စီမံကိန်း အကောင်အထည် ဖော်သူသည် အဆိုပြုစီမံကိန်းအား အောက်ဖော်ပြပါအစီအစဉ်များ ၅ ခု ပါဝင်သော ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်နှင့်အညီ အကောင်အထည်ဖော်ဆောင်ရွက်သွားမည်။

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

ထို့အပြင် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်နှင့် ပတ်ဝန်းကျင်စောင့်ကြပ်ကြည့်ရှုမှု အစီအစဉ်များ ဆောင်ရွက်ရန် ခန့်မှန်းကုန်ကျစရိတ်ကိုလည်း ထည့်သွင်းဖော်ပြထားသည်။ ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှုအစီအစဉ်သည် စီမံကိန်း၏ဆိုးကျိုးသက်ရောက်မှုများ၊ သက်ရောက်မှုရင်းမြစ်များ၊ လျှော့ချရန်နည်းလမ်းများ၊ ကျန်ရှိသောသက်ရောက်မှုများနှင့် တာဝန်ယူဆောင်ရွက်မည့်ပုဂ္ဂိုလ်တို့ အား တည်ဆောက်ခြင်းကာလနှင့် လုပ်ငန်းလည်ပတ်သည့်ကာလတို့အတွက် ဖော်ပြထားခြင်း ဖြစ်သည်။ ပတ်ဝန်းကျင်စောင့်ကြပ်ကြည့်ရှုမှု အစီအစဉ်တွင် လေနှင့်ရေအရည်အသွေး၊ ဆူညံသံပမာဏ၊ စွန့်ပစ်ပစ္စည်းထွက်ရှိမှုနှင့် ပတ်ဝန်းကျင်ဆိုင်ရာစစ်ဆေးခြင်းများအား စောင့်ကြပ် ကြည့်ရှုရန်အမျိုးအစား၊ အကြိမ်အရေအတွက်နှင့် တာဝန်ယူဆောင်ရွက်မည့် ပုဂ္ဂိုလ်တို့အား ဖော်ပြထားသည်။ လူမှုစီးပွားတာဝန်ယူမှုအစီအစဉ်သည် ဒေသခံပြည်သူ များတွက် လူမှုဘဝဖူလုံရေးလုပ်ငန်းများ ဆောင်ရွက်ပေးရန်နှင့် အဆိုပြုစီမံကိန်းသည် စီမံကိန်း အကောင်အထည်ဖော်သူကိုသာမက ဒေသခံပြည်သူများအတွက်လည်း အကျိုးရှိကြောင်း ဖော်ပြရန်ရည်ရွယ်သည်။ မီးဘေးအန္တရာယ် ကင်းရှင်းရေးအစီအစဉ်သည် အဆိုပြုစီမံကိန်း၏ မီးဘေးအန္တရာယ်များ လျှော့ချရန်အတွက် ရည်ရွယ်သည်။ အရေးပေါ်ကိစ္စများအတွက် တုံ့ပြန်ရေးနှင့်

ကြိုတင်ပြင်ဆင်ရေးအစီအစဉ်သည် အရေးပေါ်ကိစ္စရပ်များဖြစ်ပေါ်ပါက ကျော်လွှားနိုင်ရန် မည်သို့ထိရောက်စွာဆောင်ရွက်ရမည်ကို ဖော်ပြထားခြင်းဖြစ်သည်။ မကျေလည်မှုများကို ဖြေရှင်းပေးမည့် အစီအစဉ်သည် အဆိုပြုစီမံကိန်းနှင့် ပတ်သက်သော မကျေလည်မှုများကို အဆင့်လိုက်မည်သို့ဖြေရှင်း ပေးမည်ဖြစ်ကြောင်း ဖော်ပြထားခြင်းဖြစ်သည်။

အခန်း (၉)။ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် ပြင်ဆင်ရေးဆွဲရာတွင် စီမံကိန်းအကြောင်းအရာများကို ရှင်းလင်းတင်ပြခြင်းသည် အရေးကြီးပြီး သက်ဆိုင်သူများ၏ အကြံဉာဏ်နှင့်အမြင်များကို အစီရင်ခံစာတွင် ထည့်သွင်းစဉ်းစားရေးဆွဲရမည်ဖြစ်သည်။ ထို့ကြောင့် အဆိုပြုစီမံကိန်းအတွက် အများပြည်သူသဘောထားရယူခြင်း အခမ်းအနားကို ၂၀၂၂ ခုနှစ်၊ အောက်တိုဘာလ (၂၄) ရက်နေ့တွင် အဆိုပြုစီမံကိန်း၏ ယာယီစီမံကိန်းရုံးခန်းတွင် ကျင်းပခဲ့သည်။ အခမ်းအနားကို မွန်းလွဲ ၁ နာရီတွင် စတင်ခဲ့ပြီး မွန်းလွဲ ၂ နာရီ ၃၀ မိနစ်တွင် ပြီးဆုံးခဲ့သည်။ အများပြည်သူသဘောထား ရယူခြင်းအခမ်းအနား၏ ရည်ရွယ်ချက်မှာ စီမံကိန်းအကြောင်းအရာများ၊ စီမံကိန်းကြောင့် ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများ၊ လျှော့ချရန် နည်းလမ်းများဖော်ပြရန်နှင့် ဒေသခံ ပြည်သူများ၏ အကြံဉာဏ်နှင့်သုံးသပ်ချက်များ ရယူရန်ဖြစ်သည်။ စီမံကိန်းအကောင်အထည် ဖော်သူသည် အခမ်းအနားသို့တက်ရောက်ရန် ဒေသခံပြည်သူများအား ကျေးရွာအုပ်ချုပ်ရေးမှူးများမှ တစ်ဆင့်ဖိတ်ကြားခဲ့သည်။ ကျွန်းကြီးကျေးရွာ၊ မြို့ကြီးကျေးရွာနှင့် ဆည်ရွာကျေးရွာများမှ ဒေသခံပြည်သူများ၊ စီမံကိန်းအကောင်အထည်ဖော်သူ၏ ကိုယ်စားလှယ်များနှင့် E Guard Environmental Services Co., Ltd. မှ ကိုယ်စားလှယ်များ ပါဝင်သည့် တက်ရောက်သူ စုစုပေါင်း ၁၉ ယောက်ရှိခဲ့ပြီး အချို့တက်ရောက်သူများသည် သိရှိလိုသည်များကို မေးမြန်းဆွေးနွေး အကြံပြုခဲ့ကြသည်။ စီမံကိန်းအကောင်အထည်ဖော်သူ၏ ကိုယ်စားလှယ်များသည် တက်ရောက်သူများ၏ ဆွေးနွေးအကြံပြုချက်များကို စီမံကိန်းအကောင်အထည်ဖော်သူ တာဝန်ရှိသူများထံ တင်ပြသွားမည်ဖြစ်သည်။ စီမံကိန်းဆိုင်ရာ အချက်အလက်များနှင့် ဤပတ်ဝန်းကျင် စီမံခန့်ခွဲမှုအစီရင်ခံစာကို အဆိုပြုစီမံကိန်း၊ စီမံကိန်းအကောင်အထည်ဖော်သူ၏ရုံး၊ E Guard Environmental Services Co., Ltd. ၏ရုံး နှင့် အောက်ပါ website link https://www.mediafire.com/folder/of1mc8x0hr58n/Myogyi_20_MW_Solar_Power_Plant_Project တွင် အများပြည်သူများနှင့် စီမံကိန်းနှင့်သက်ဆိုင်သူများ ဖတ်ရှုလေ့လာနိုင်ရန် ဖော်ပြထားပါသည်။

အခန်း (၁၀)။ နိဂုံးချုပ်အားဖြင့် အဆိုပြုစီမံကိန်းသည် အလုပ်အကိုင်အခွင့်အလမ်းများ ဖန်တီးပေးနိုင်ခြင်း၊ စီးပွားရေးအခွင့်အလမ်းများ ဖန်တီးပေးနိုင်ခြင်း၊ ကာဗွန်ထုတ်လုပ်မှု လျှော့ချခြင်း၊ သယံဇာတများထိန်းသိမ်းခြင်းနှင့် ပတ်ဝန်းကျင်နှင့်လိုက်လျောညီထွေသော လျှပ်စစ်စွမ်းအင် ထုတ်လုပ်ခြင်း၊ နိုင်ငံတော်အစိုးရအတွက် အခွန်ငွေရရှိနိုင်ခြင်း၊ လူမှုစီးပွားတာဝန်ယူမှု အစီအစဉ်များ

ကြောင့် ဒေသတွင်း ဖွံ့ဖြိုးတိုးတက်ခြင်းစသည့် ကောင်းသောသက်ရောက်မှုများကို ဖြစ်ပေါ်စေသည်။ တည်ဆောက်ခြင်းကာလနှင့် လုပ်ငန်းလည်ပတ်သည့်ကာလ တို့တွင် ဖြစ်ပေါ်နိုင်သော မကောင်းသောသက်ရောက်မှုများအားလုံးကိုလည်း လျှော့ချရန်နည်းလမ်းများနှင့် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်များကို အသုံးပြု၍လျှော့ချနိုင်သည်။ ပတ်ဝန်းကျင်စောင့်ကြပ်ကြည့်ရှုမှု အစီအစဉ်အား စီမံကိန်းပတ်ဝန်းကျင် အရည်အသွေးများအား စောင့်ကြပ်ကြည့်ရှုရန် အကောင်အထည်ဖော် ဆောင်ရွက်ရမည်။ စီမံကိန်းအကောင်အထည်ဖော်သူသည် ဤအစီရင်ခံစာ အား ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနမှ စိစစ်သုံးသပ်ပြီးပါက ပေးပို့လာမည့် သဘောထား မှတ်ချက်များ နှင့် အကြံပြုချက်များကို လိုက်နာရမည်။ ဤအစီရင်ခံစာကို သက်ဆိုင်ရာမှ အတည်ပြုပြီးပါက စီမံကိန်းအကောင်အထည်ဖော်သူမှ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်များအား အကောင်အထည်ဖော် ဆောင်ရွက်ခြင်းသည် စီမံကိန်းအား ပတ်ဝန်းကျင်အပေါ်ထိခိုက်မှု အနည်းဆုံးဖြစ်အောင် ဆောင်ရွက်ခြင်းအတွက် အလွန်အရေးပါသည်။ စီမံကိန်းအကောင်အထည် ဖော်သူသည် ပြည်ထောင်စုသမ္မတ မြန်မာနိုင်ငံတော်၏ ပတ်ဝန်းကျင်ဆိုင်ရာတည်ဆဲဥပဒေ၊ နည်းဥပဒေ၊ မူဝါဒများနှင့် လမ်းညွှန်ချက်များကို စီမံကိန်းလည်ပတ်စဉ်ကာလတစ်လျှောက်လုံး လိုက်နာ ဆောင်ရွက်ရမည်ဖြစ်သည်။

1. Executive Summary

Chapter (2): This Environmental Management Plan (EMP) report is prepared for Myogyi Substation 20 MWac ground mounted solar power plant project. The project proponent is Myogyi Investment Holdings Limited, which is jointly formed by the SPECO Electric Power Construction Corporation and HK New Energy Investment Holding Limited and it is 100% foreign investment. The project proponent won the Tender No. RFP EPGE PV 02/2021-2022, invited by the Electric Power Generation Enterprise (EPGE) to bid for the solar power plant projects implementation. According to the instructions from Environmental Conservation Department (ECD), this proposed project requires to submit Environmental Management Plan (EMP) report, therefore, E Guard Environmental Services Co., Ltd. prepared 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 Myogyi Substation via 33 kV overhead transmission line. The objectives of this EMP report is to study how construction and operation of the proposed project can impact on physical environment and socio-economic condition of the surrounding environment, to mitigate these impacts, to develop EMPs, EMoPs and other sub-plans. The scope of the study area for the solar power plant area is roughly defined to be the area within 1 km radius from the center of the power plant and within 200 m from the overhead transmission line route, this area would be large enough to cover for most environmental and socio-economic impacts of the project.

The proposed project is located at Sae Ywar Village Tract, Ywar Ngan Township, Danu Self-administered Zone, Shan State, Myanmar. Its coordinate points are 21° 30' 39.79" N, 96° 22' 19.84" E and the average altitude of the site is 218 m. The construction of the proposed project includes box inverter all-in-one machines, supporting brackets, construction of solar power station and other buildings as well as construction and stringing of 33 kV overhead transmission line. The total capacity of AC side of the proposed project is 21.87 MWac and DC side is 30.48 MWp, including four photovoltaic power generation units (box inverter all-in-one machines). The project proponent leased the land slot from the owner to construct the solar power plant and total land requirement for the project is 149.15 acres (60.36 hectares). The land is owned by Renewable Power Myanmar Co., Ltd. and land lease period is 20 years (2nd August, 2022 – 2nd August, 2043). The proposed project will install 56,448 PV modules, 1 box inverter all-in-one machine (EP-3125-HA-UD/3391), 3 box inverter all-in-one machine (EP-6250-HA-UD/33), 24,173 horizontal single-axis tracking bracket and 32,275 fixed tracking brackets to generate electricity from solar energy. The estimated construction period of the proposed project is 15 months. The construction activities of the project started in April, 2022 and will be finished in July, 2023.

Chapter (3): The proposed project is proposed by Myogyi Investment Holdings Limited, which is jointly formed by the SPECO Electric Power Construction Corporation and HK New Energy Investment Holding Limited and it is 100% foreign investment. Myogyi Investment Holdings Limited is a registered company at DICA, Myanmar and its company registration number is 132854335. The office address is No (4), 73rd Street, Between 102-A & 103 Street, Mingalar Mandalay, Mandalay, Myanmar. The total investment amount for

the proposed project is 21.43 million USD and it includes investment for machineries and materials, investment for furniture and equipment and investment for infrastructure. After construction period, the proposed project will generate electricity from solar energy and distribute to the Myogyi Substation via 33 kV overhead transmission line and proposed operation period is 20 years. As the proposed project is of a Build, Own and Operate (BOO) basis, project proponent will submit the application to the relevant authorities to extend the operation period and continue operation activities after 20 years.

Chapter (4): This EMP report is prepared by E Guard Environmental Services Co., Ltd., with experts who obtained Transitional Consultant Registration (TCR) Certificates and other experts who has experiences in relevant professional fields. The responsible persons of study team for this EMP report preparation are described**.**

Chapter (5): National laws and regulations for environmental protection applicable for construction and operation of proposed project are compiled and presented.

Chapter (6): Primary data and secondary data collections are very important to assess environmental impacts. Primary data collection for baseline environmental quality measurement 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 23rd and 24th October, 2022 (24 hours continuous monitoring system). The observed values are compared with National Emissions Quality (Emission) Guidelines and other international guideline values. According to the comparison results of gaseous emissions, the observed values of SO_2 (2.50 µg/m^3), NO_2 (11.95 µg/m^3), CO (0.10 ppm) and CO_2 (295.60 ppm) are lower than the respective guideline values. For dust emissions, the observed values of PM_{10} (6.51 µg/m^3) and $PM_{2.5}$ (3.19 µg/m^3) are also within the guideline values of NEQEG. The existing groundwater quality used for construction period and surface water quality of adjacent small creek were measured by two methods: on-site measurement and sampling water. All of the parameters are within the reference values of NEQEG for not only groundwater but also surface water. For noise level, monitoring was done at two points: Point 1 (nearby temporary project office) and Point 2 (construction worker camps), results of Point 1 are lower than standard value not only at day time (48.12 dBA) but also at night time (38.10 dBA). For Point 2, the results are also lower than standard value not only at day time (44.26 dBA) but also at night time (30.89 dBA). Therefore, it can be considered that the baseline environmental qualities (air quality, water quality and noise level) at the proposed project are within the respective guideline values during construction phase of the project. The project proponent must follow EMPs and mitigation measures in order to sustain baseline environmental quality of the project. In addition, secondary data like socio-economic condition, physical/biological environment, earthquake intensity, soil profile, weather data and other secondary data are described in this report.

Chapter (7): 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 widely accepted impact assessment methodology based on the magnitude of the impacts and nature of the receptors (IMEA, 2011).

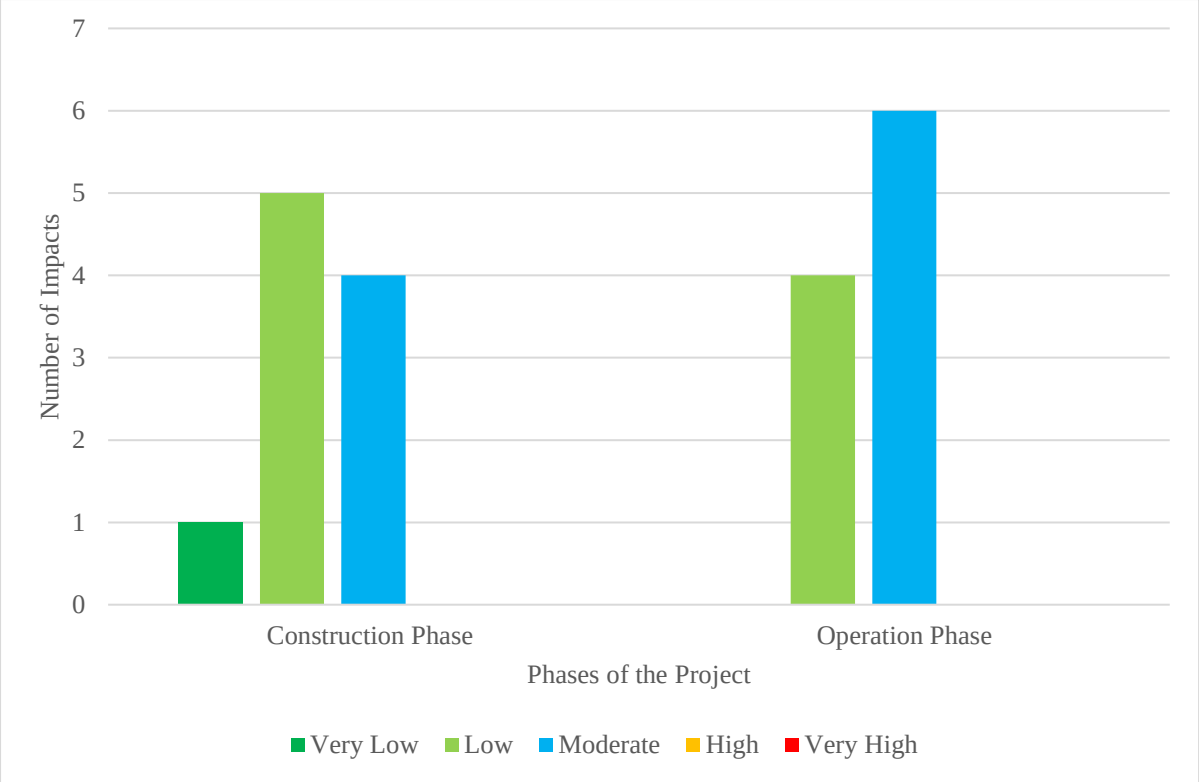
Potential impacts for the proposed projects are differentiated into two main phases namely; Construction phase and Operation phase.

Construction Phase: includes construction of switchyard, control building and other buildings, installation of PV modules, box inverter all-in-one machines, supporting brackets, poles of overhead transmission line and stringing cables of overhead transmission line, which will connect to the existing Myogyi Substation. The estimated construction period of the proposed project is 15 months. The construction activities of the project started in April, 2022 and will be finished in July, 2023.

Operation Phase: includes electric power generation from solar energy and distributing to the Myogyi Substation with 33 kV overhead transmission line, which length is almost 5.05 km (3.14 miles). The proposed operation period of the proposed project is 20 years.

Decommissioning Phase: after operation period, 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. The project proponent will submit the decommissioning plan prior to the termination of the project operation only when they have a plan to close their project permanently. Therefore, impacts identification, impacts assessment and mitigation measures formulating for decommissioning phase of the project is excluded in this Environmental Management Plan Report.

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



Mitigation measures are important to minimize and reduce these potential negative impacts. Requirements of impact mitigation tasks and technologies are also described according to the types of impacts scales. Although, negative impacts can be generated by the proposed project, it can also ensure some positive impacts such as providing job opportunities, business opportunities, carbon emission reduction and resources conservation, provision of clean electricity power, revenue to government and CSR development.

Chapter (8): Institutional requirements and responsible persons for implementing mitigation measures and Environmental Management Plan (EMP) are also described in this report. The 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 **EMP** identifies potential negative environmental impacts, source of impacts, the way 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, waste

quantity 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.

Chapter (9): 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 24th October, 2022 at temporary project office of the proposed project. The staring time was 1:00 pm and finished at 2:30 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. A total of 19 persons including local people from Kyun Gyi Village, Myo Gyi Village, Sae Ywar Village, representatives of project proponent and E Guard Environmental Services attended public consultation meeting and some attendees discussed their opinions with regards to the project. The representatives of project proponent will report the concerns of the attendees to management of proponent. The project information and this EMP report can be accessible via the following link and at the project office, project proponent's office and E Guard Environmental Service Co., Ltd.'s office for disclosure to public and stakeholders.

https://www.mediafire.com/folder/of1mc8x0hr58n/Myogyi_20_MW_Solar_Power_Plant_Project

Chapter (10): In conclusion, the proposed project can ensure some positive impacts such as providing job opportunities, business opportunities, carbon emission reduction and resources conservation, provision of clean electricity power, revenue to government and CSR development. All of 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) needs to be implemented for monitoring the environmental quality of surrounding area of the proposed project. Finally, the project proponent must follow the comments and suggestions that will be given by ECD after reviewing this EMP report. Once EMP report is approved by concerned authorities, effective implementation of EMPs and EMoPs by the project proponent is essential to implement sound management of the project's physical, natural and social environments. The project proponent shall abide environmental policy, laws, rules and instructions of the Republic of the Union of Myanmar throughout the lifespan of the project.

2. Project Description

This Environmental Management Plan (EMP) report is prepared by E Guard Environmental Services Co., Ltd. for Myogyi Substation 20 MWac ground mounted solar power plant project. The project proponent is Myogyi Investment Holdings Limited, which is jointly formed by the SPECO Electric Power Construction Corporation and HK New Energy Investment Holding Limited and it is 100% foreign investment. The project proponent won the Tender No. RFP EPGE PV 02/2021-2022, invited by the Electric Power Generation Enterprise (EPGE) to bid for the solar power plant projects implementation. The proposed project will contribute to fulfill a goal for achieving nationwide electricity access by 2030 as per Myanmar National Electrification Plan (NEP). It can also contribute to fulfill targets for Sustainable Development Goals (SDGs) of Myanmar, especially Goal No. 7: Affordable and Clean Energy. Myanmar is one of the lowest rates of electrification country in Southeast Asia, in which almost 61.60% of households in Myanmar have access to electricity as of December, 2021 and electricity consumption per capita is among the lowest in the world, therefore, development of electricity generation projects, especially from renewable energy are urgently required in Myanmar. The objective of the project is to generate electricity from solar energy and distribute to Myogyi Substation.

Every development project in Myanmar require 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) based on the criteria for specific kind of economic activity, which was enacted in the Environmental Impact Assessment Procedure (2015). The proposed project requires to submit Environmental Management Plan (EMP) report to meet the environmental assessment requirements in line with Environmental Policy, Environmental Conservation Law and other environmental related rules and procedures, as per the instructions from Environmental Conservation Department (ECD). Therefore, E Guard Environmental Services Co., Ltd. and Myogyi Investment Holdings Limited agreed for conducting the environmental studies for the proposed project.

The specific objectives of this study are to:

(1) Identify the major impacts that may arise from the project activities on natural environment and socio-economic environment of the project,
(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 and EMoP are developed sufficiently and soundly for the proposed project and
(5) Implement the Corporate Social Responsibility Plan (CSR Plan), which plays an essential role for the improvement of the social welfare of community and development of the region.

2.1 Scope of the Study

The scope of the study for EMP will vary on the scale and type of the development project. In this EMP, construction of solar power plant, overhead transmission line and operation of solar power plant to generate electricity from solar energy and distribute to the Myogyi Substation with 33 kV overhead transmission line are included for the study. 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 and nearby community. 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 and social concerns for various types of development projects in Myanmar.

A study team from E Guard Environmental Services conducted site survey on 23rd and 24th October, 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 measures and monitoring plans were also included to mitigate adverse environmental impacts due to the activities of the proposed project during construction and operation phase. It is estimated that there will be not much significant impacts on the environmental and socio-economic environment due to implementation of the proposed project because the project will utilize renewable energy to generate electricity and distributing to Myogyi Substation. Therefore, the scope of the study area for the solar power plant area is roughly defined to be the area within 1 km radius from the center of the power plant and within 200 m from the overhead transmission line route. Based on the nature of the project activities during the construction and operation phases, these areas are considered sufficient to cover for most environmental and socio-economic impacts of the project. Within this defined area, available secondary information and primary information collected from site survey were used for the consideration of impacts and if any other anticipated impacts occur, this study area is not limited and beyond the scope of study area will be considered. The following figure illustrates the scope of the study area for solar power plant of the proposed project.

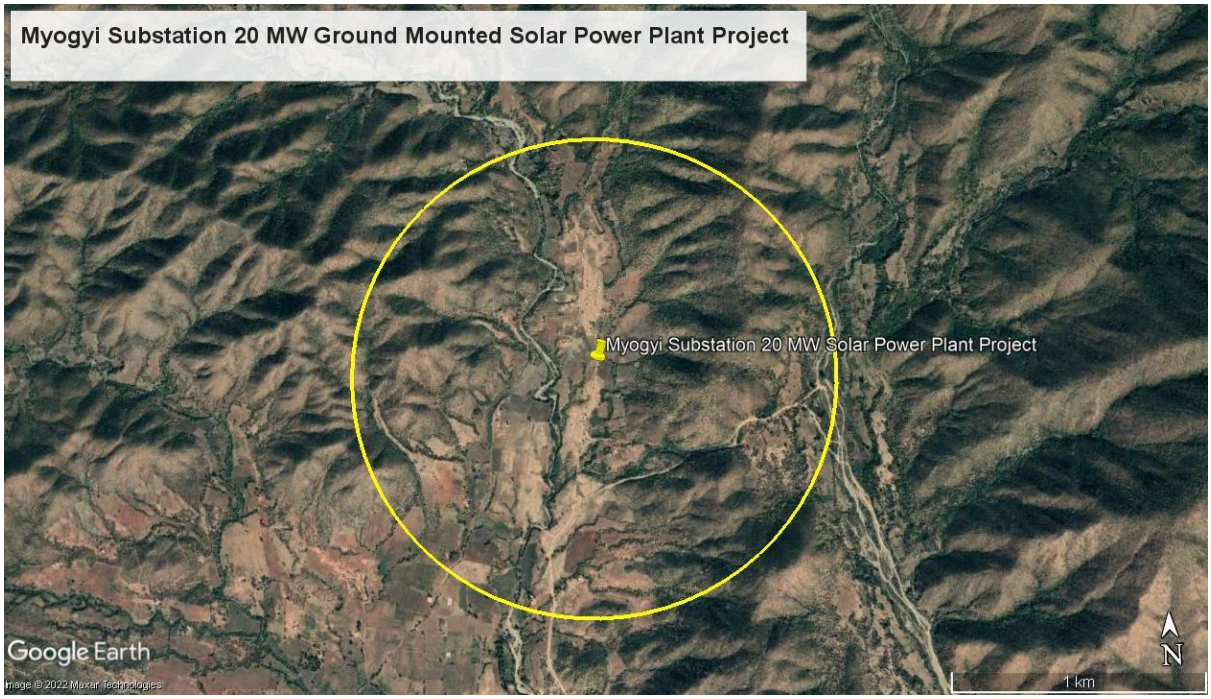


Figure 2. 1 Scope of the Study Area

2.2 Project Size and Location of the Project

The proposed project is located at Sae Ywar Village Tract, Ywar Ngan Township, Danu Self-administered Zone, Shan State, Myanmar. Its coordinate points are 21° 30' 39.79" N, 96° 22' 19.84" E and the average altitude of the site is 218 m. The construction of the proposed project includes box inverter all-in-one machines, supporting brackets, construction of solar power station and other buildings as well as construction and stringing of 33 kV overhead transmission line. The total capacity of capacity of AC side of the proposed project is 21.87 MWac and DC side is 30.48 MWp, including four photovoltaic power generation units (box inverter all-in-one machines). The photovoltaic power station is connected to the 33 kV bus side of the Myogyi Substation. Total land area of solar power plant is 149.15 acres (60.36 hectares) and annual total solar radiation level of the project site is huge. The following figures illustrate the loaction of the proposed project, layout of PV field and overhead transmission line which will connect to Myogyi Substation.

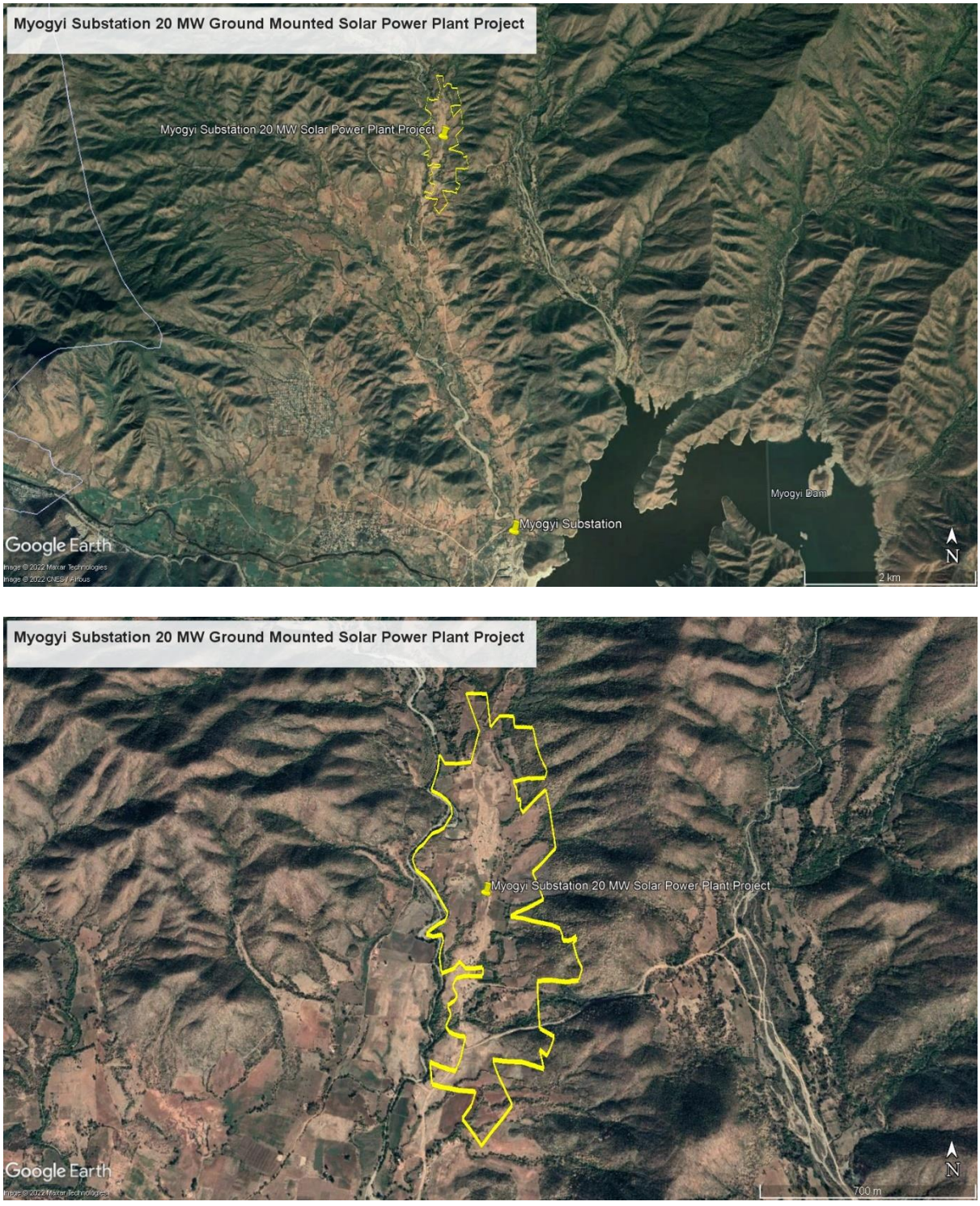


Figure 2. 2 Location of the Project

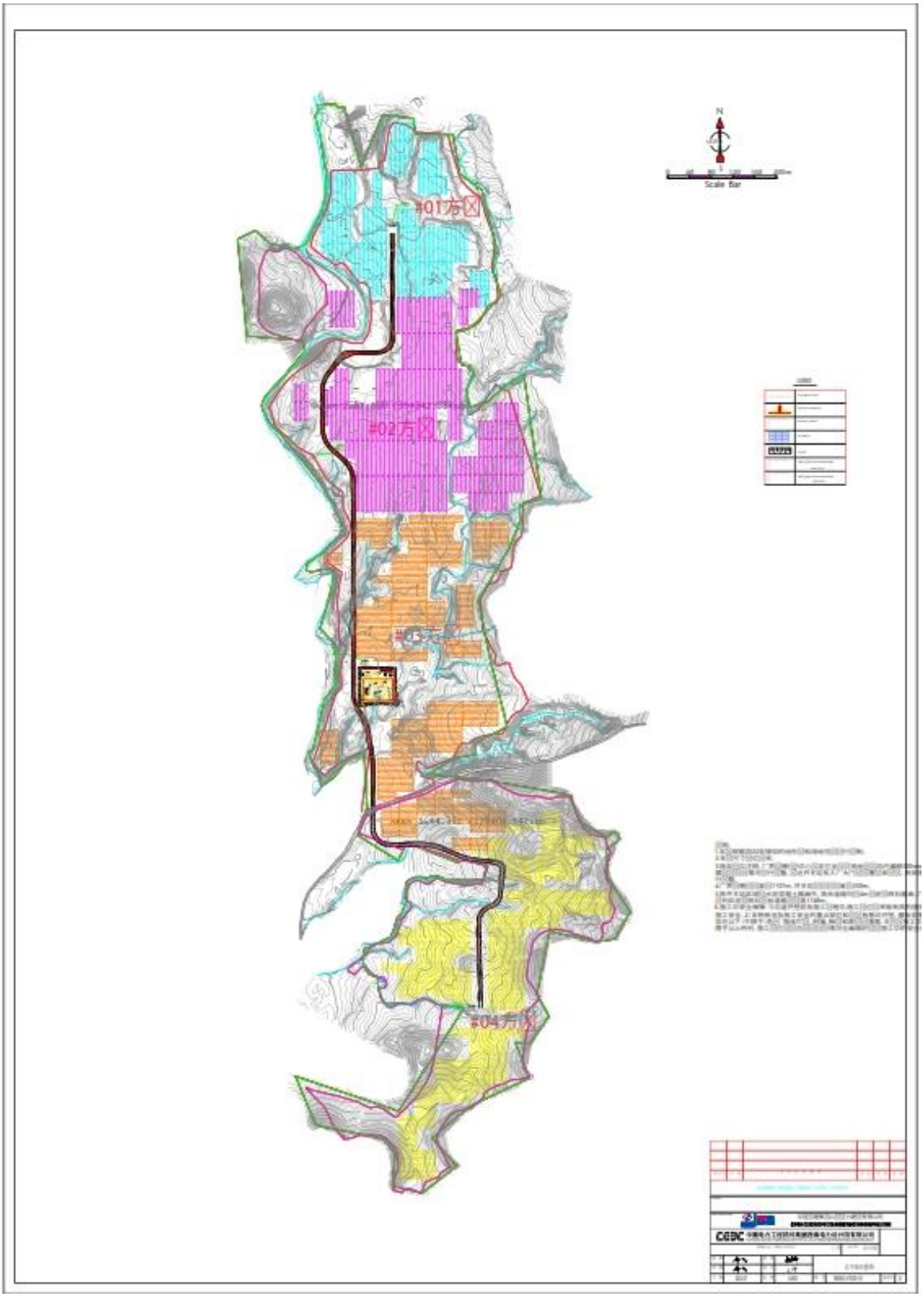


Figure 2. 3 Layout of PV Field

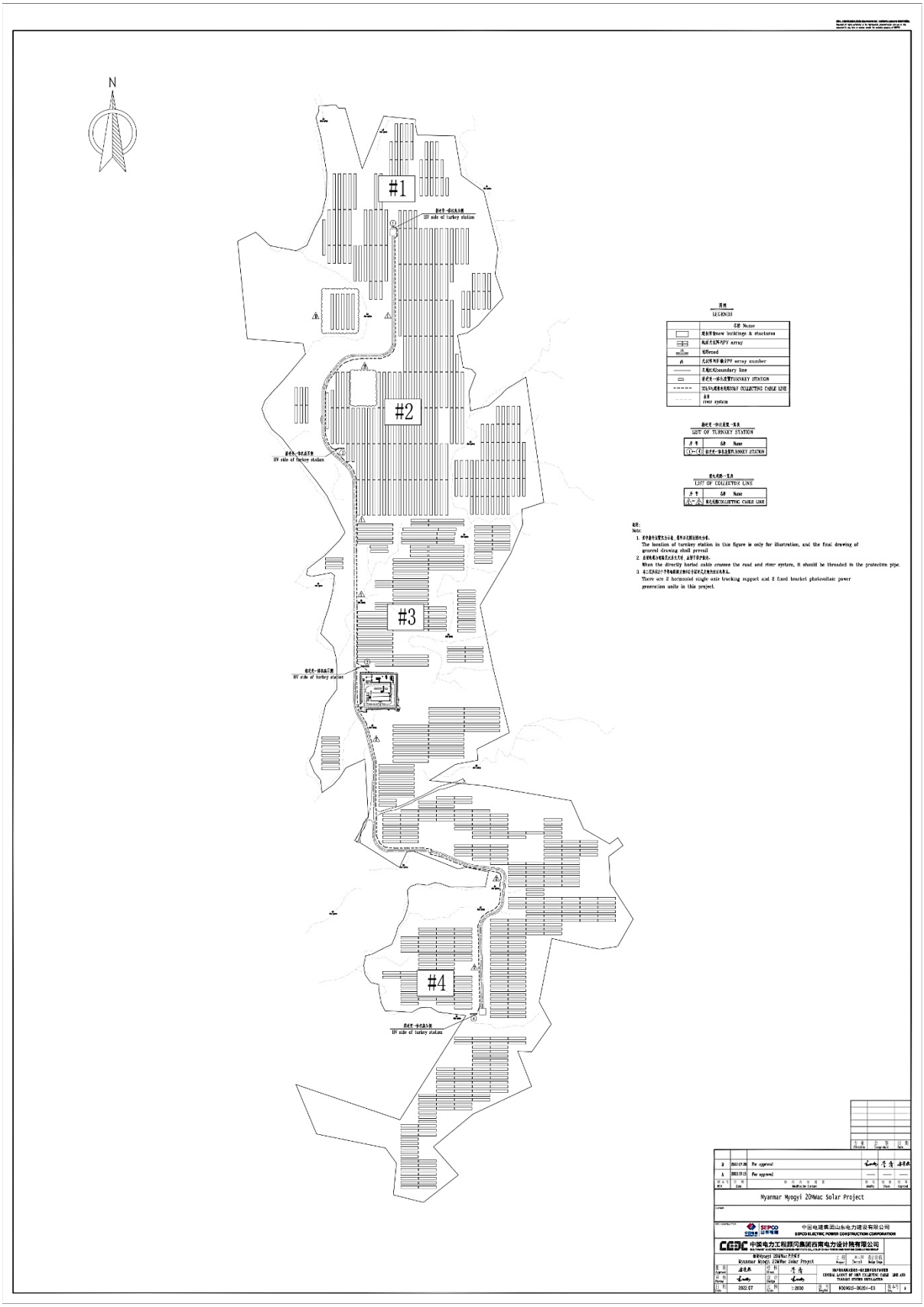


Figure 2. 4 Layout of PV Field

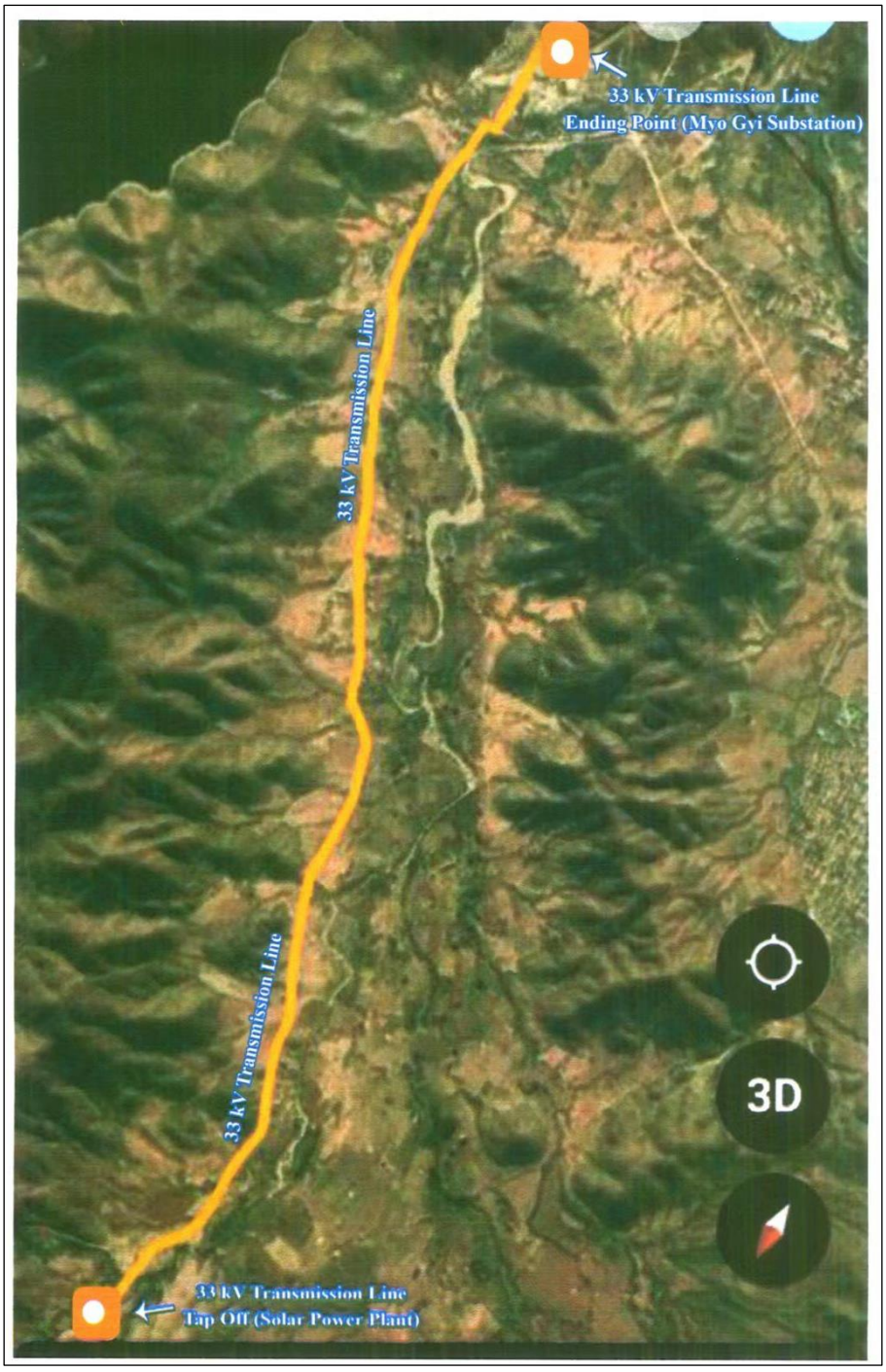


Figure 2. 5 Route of Overhead Transmission Line

2.3 History of Land

The project proponent leased the land slot from the owner to construct the Solar Power Plant and total land requirement for the project is 149.15 acres (60.36 hectares). The land is owned by Renewable Power Myanmar Co., Ltd. and land lease period is 20 years (2nd August, 2022 – 2nd August, 2043). Land acquisition for overhead transmission line shall be carried out legally in line with existing laws and regulations. The land of the project is covered with small trees and bushes, which is plainland and unrich biodiversity. However, some hills can also be found

not only in the project site but also around the project. There are no cultivation areas nearby the project.

2.4 Project Description

The planned photovoltaic installed capacity of the project is 30.48 MWp and the rated capacity is 21.875 MW. The components are single crystal double-sided double glass high-efficiency half chip components with a peak power of 540 Wp (the specification of a single component is 2278 × 1134 × 30mm). In the proposed project, every 28 components are connected in series and the rated power capacity of each component in series is 540 Wp × 28 = 15.12 kWp, one DC combiner box is connected every 24 strings. Every 24 DC lightning protection combiner boxes are connected to one EP-6250-HA-UD/33 box inverter integrated equipment (3 devices in total) and every 12 DC lightning combiner boxes are connected to a EP-3125-HA-UD/33 box inverter integrated equipment (a total of 1 device), boosting the low-voltage AC output by the inverter to 33 kV. The proposed project consists of three 8.70912 MWp square arrays and one 4.35456 MWp square array, which are transmitted to 33 kV switchyard by two circuit collecting lines.

2.4.1 PV System Overall Design

The following table describes the overall design of PV system of the proposed project.

Table 2. 1 Overall Design of PV System

No.	Name	Specification	Unit	Number
1.	PV module	Single crystal double-sided double glass high-efficiency half chip components with a peak power of 540 Wp	Set	56,448
2.	Box inverter all-in-one machine; EP-3125-HA-UD/33	Max. PV input voltage: 1,500 V Max. input current: 4,075 A Rated AC output power: 3,125 kVA @ 50°C AC voltage: 33 kV	Set	1
3.	Box inverter all-in-one machine; EP-6250-HA-UD/33	Max. PV input voltage: 1,500 V Max. input current: 4,075 A*2 Rated AC output power: 2*3,125 kVA @ 50°C AC voltage: 33 kV	Set	3
4.	Horizontal single-axis tracking bracket	Horizontal projection Tracking rotation angle of the support: ±60°	Set	24,173
5.	Fixed tracking bracket	Fixed type	Set	32,275

2.4.2 PV Module

The components of the project are single crystal double-sided double glass high-efficiency half chip components with a peak power of 540 Wp, manufactured by Jinkle Energy Co., Ltd. The following table shows the details specification of PV modules.

Table 2. 2 Details Specification of PV Module

Item	Unit	Specification
Peak power	Wp	540
Open circuit voltage (Voc)	V	49.73
Short-circuit current (Isc)	A	13.89
MPP voltage (Vmp)	V	41.13
Peak power current (Imp)	A	13.13
Module efficiency	/	20.90%
Maximum system voltage	Vdc	1500 V
Operating temperature	°C	-40 ~ +85
Temperature		
Temp. Coeff. of Pmax	% / °C	-0.35
Temp. Coeff. of Voc	% / °C	-0.28
Temp. Coeff. of Isc	% / °C	+0.048
Quality Assurance		First year ≤2.0%, 2-25year ≤0.45%
Mechanical parameter		
Size	mm	2,278 × 1,134 × 30
Weight	kg	32
Frame		Anodized Aluminium Alloy
Solar cells		Monocrystalline
Upper surface glass material		2.0 mm, High permeability coated glass
Glass material of lower surface		2.0 mm, Heat-strengthened glass
J-box		Protection level IP68

2.4.3 Box Inverter All-in-one Machine

The proposed project will adopt two types of box inverter all-in-one machine; EP-3125-HA-UD/33 and EP-6250-HA-UD/33 box inverter all-in-one machines manufactured by Sineng Electric Co., Ltd. and the following tables show the detail specification of box inverter all-in-one machine.

Table 2. 3 Details Specification of Box Inverter All-in-one Machine EP-3125-HA-UD/33

No.	Item	Specification
1.	**Input (DC)**	
	Max. PV input voltage	1,500 V
	Max. input current	4,075 A
	MPP voltage range for nominal power	900 ~ 1,300 V
	Number of MPPT trackers	2
	Number of DC inputs	20
2.	**Output (AC)**	
	Rated AC output power	3,125 kVA @ 50°C

No.	Item	Specification
	Max. AC output power	3,625 kVA @ 25°C
	AC voltage	33 kV
	Rated grid frequency/ range	50 Hz/ 45~55 Hz, 60 Hz/ 55~65 Hz
	Output current harmonic (at nominal power)	< 3%
	DC current injection	< 0.5% In
	Power factor at nominal power/ range	>0.99/ 0.8 lagging to 0.8 leading
3.	**Protection**	
	DC input protection	Load break switch + fuse
	AC output protection	Circuit breaker
	AC MV output protection	Circuit breaker
	Overvoltage protection	DC type I+II/ AC type II
	Leakage current monitoring	Yes
	Grid monitoring/ Ground fault monitoring	Yes/ Yes
	Insultation monitoring	Yes
	Overheat protection	Yes
	Night SVG function	Optional
	Anti-PID function	Optional
4.	**Efficiency**	
	Inverter max. efficiency	99.00%
	Inverter EU efficiency	98.70%
5.	**Transformer**	
	Transformer rated power	3,125 kVA
	Transformer max. power	3,625 kVA
	LV/ MV voltage	0.63/ 33 kV
	Transformer Vector	Dy11
	Transformer cooling type	ONAN (Oil Natural Air Natural)
6.	**General Data**	
	Weight	18t
	Protection level	Inverter: IP65, Others: IP54
	Auxiliary power supply	Standard: 5 kVA, Optional: max. 40 kVA
	Temperature	-30~+60°C (>50°C derating)
	Allowed humidity (non condensing)	0-95%
	Cooling method	Temperature controlled forced air cooling
	Max. operating altitude	2,000 m (standard)/ > 2,000 m (optional)
	Display	Touch Screen
	Communication port	RS 485/ Ethernet, Optional: optical fiber

Table 2. 4 Details Specification of Box Inverter All-in-one Machine EP-6250-HA-UD/33

No.	Item	Specification
1.	**Input (DC)**	
	Max. PV input voltage	1,500 V
	Max. input current	4,075 A*2
	MPP voltage range for nominal power	900 ~ 1,300 V
	Number of MPPT trackers	4

No.	Item	Specification
	Number of DC inputs	20*2
2.	**Output (AC)**	
	Rated AC output power	2*3,125 kVA @ 50°C
	Max. AC output power	2*3,625 kVA @ 25°C
	AC voltage	33 kV
	Rated grid frequency/ range	50 Hz/ 45~55 Hz, 60 Hz/ 55~65 Hz
	Output current harmonic (at nominal power)	< 3%
	DC current injection	< 0.5% In
	Power factor at nominal power/ range	>0.99/ 0.8 lagging to 0.8 leading
3.	**Protection**	
	DC input protection	Load break switch + fuse
	AC output protection	Circuit breaker
	AC MV output protection	Circuit breaker
	Overvoltage protection	DC type I+II/ AC type II
	Leakage current monitoring	Yes
	Grid monitoring/ Ground fault monitoring	Yes/ Yes
	Insultation monitoring	Yes
	Overheat protection	Yes
	Night SVG function	Optional
	Anti-PID function	Optional
4.	**Efficiency**	
	Inverter max. efficiency	99.00%
	Inverter EU efficiency	98.70%
5.	**Transformer**	
	Transformer rated power	6,250 kVA
	Transformer max. power	7,250 kVA
	LV/ MV voltage	0.63-0.63/ 33 kV
	Transformer Vector	Dy11y11
	Transformer cooling type	ONAN (Oil Natural Air Natural)
6.	**General Data**	
	Weight	28t
	Protection level	Inverter: IP65, Others: IP54
	Auxiliary power supply	Standard: 5 kVA, Optional: max. 40 kVA
	Temperature	-30~+60°C (>50°C derating)
	Allowed humidity (non condensing)	0-95%
	Cooling method	Temperature controlled forced air cooling
	Max. operating altitude	2,000 m (standard)/ > 2,000 m (optional)
	Display	Touch Screen
	Communication port	RS 485/ Ethernet, Optional: optical fiber

2.4.4 DC Combiner Box

The DC combiner box manufactured by Suzhou Changfeng Automation Technology Co., Ltd. is used in the project and the following table shows detail specification of DC combiner box.

Table 2. 5 Detail Specification of DC Combiner Box

No.	Item	Specification
1.	Dimension	900*670*185 mm
2.	Voltage	DC 1,500 V
3.	SPD level	In=20KA, Imax=40KA
4.	In or out mode	Down into the buttom
5.	Nema Degree	IP65
6.	Mounting Method	Wall Mounting
7.	Working Environment	-40~60°C
8.	Device color	RAL7035
9.	Weight	~61 kg

2.4.5 Bracket Type Selection of PV Array

Commonly used solar cell module brackets in ground PV power stations are fixed bracket, horizontal single-axis tracking bracket, tilt single-axis tracking bracket and dual axis tracking bracket. Among them, horizontal single-axis tracking bracket and fixed bracket will be adopted for the proposed project based on its location and contour. The horizontal single-axis tracking bracket rotates in the east-west direction for ensuring the minimum angle between the sun and the solar cell panel at each moment to obtain large amount of power generation. The project adopts the mixed scheme of 2P56 and 2P28 flat uniaxial support and fixed support, with flat uniaxial support. The tracking rotation angle of the support is ±60°, and the lowest point of the horizontal uniaxial tracking support must be no less than 0.5 m from the ground and greater than 0.5 m from the 30-year flood level. The lowest point of the fixed support group value is not less than 1.5 m from the ground and is greater than 0.5 m from the flood level with a return period of 30 years. The installation inclination of the fixed support is 16°. The fixed bracket is a setup with solar panels connected in one location. The solar panels aren't designed to move but remain stationary and collect whatever sunlight reaches the cells. When the sun sets or moves from the east to the west, the efficiency of these panels drops dramatically. These take very little effort and time to set up but have proven to be quite efficient and long-lasting, even in harsh climatic conditions.

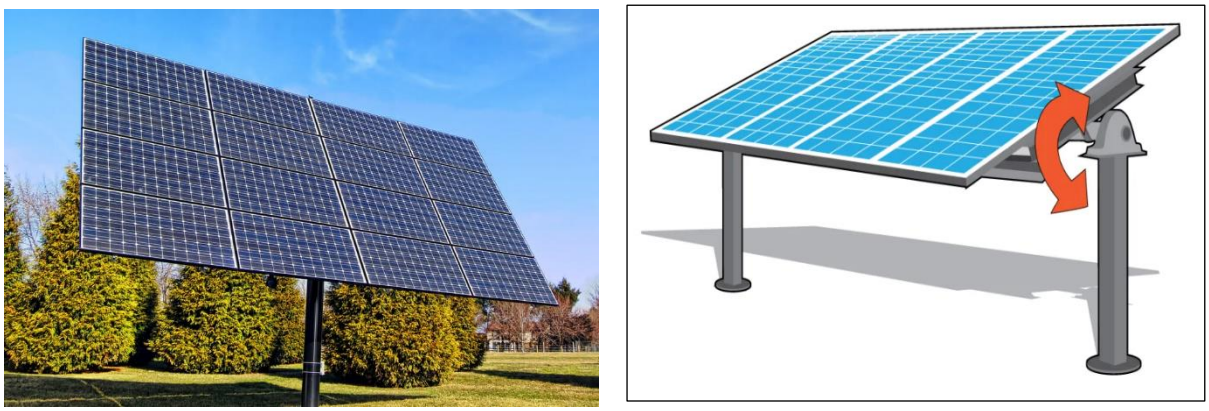


Figure 2. 6 Fixed Bracket and Horizontal Single-axis Bracket Type

2.4.6 Switchyard

A new switchyard will be constructed in the proposed project to distribute generated electricity to Myogyi Substation. The steel bars used in the design are of Chinese standard, HPB 300 and HRB 400. Earthquake resistant level for the first, second and tertiary structure, the framework of the vertical reinforced using ordinary steel, reinforced the tensile strength of the measured values and the ratio of yield strength measured values will not be less than 1.25, reinforced the yield strength of the measured values and the ratio of yield strength standard values will not be greater than 1.3 and the total elongation of reinforced under the maximum tension values will not be less than 9%. Steel joints can be lap joints or welded joints. Welding rod, wire and flux shall conform to the base metal in strength principally. The welding rod type E43XX and type E50XX will be used. Quality of welding rod shall meet the requirements of carbon steel coated electrodes or low alloy steel coated electrodes. The type of welding rod shall match the base metal in strength. The wire and flux used for automatic or semi-automatic welding shall match the base metal in strength. Wires shall meet the requirements of the current standard "wire used for fusion welding".

Concrete mixing, transportation and pouring should comply with the relevant regulations and specifications, shall not appear cold joints, honeycomb, pockmarked surface and other quality defects or accidents. Concrete batching will be in the condition of test mix ratio, according to the incoming material and environmental temperature, mix ratio adjustment and according to the provisions of the test block sampling, to ensure that the strength of concrete and impermeable grade meet the design requirements. Cement consumption shall not be less than 300 kg/m^3, when mixing with active admixture, cement dosage shall not be less than 280 kg/m^3. Water cement ratio shall not be greater than 0.55, sand ration should be 35%-45% and the cement-sand ratio should be 1:2 or 1:2.5, it should be continuous casting and less construction joints, waterproof concrete should be immediately after the final setting of maintenance. The brick adopted sintered hollow clay brick, the brick bulk density is less than or equal 13kN/m^3. The steel grating is made of ordinary carbon steel and needs to be hot-dip galvanized. The average thickness of galvanized layer should be greater than 505g/m^2. The secondary grouting material shall be the grouting material with good fluidity, slight expansibility and guaranteed strength. The control building will be constructed with reinforced concrete frame structure, independent foundation under the column, natural foundation as the bearing layer. Other equipment foundation will be constructed with independent foundation or large block reinforced concrete foundation, with natural foundation as the bearing layer. There is a battery room designed in control room. 2 groups of battery (300AH, 24pcs/group) will be installed in the battery room. It will be used for backup power supply once the diesel generator malfunctions.

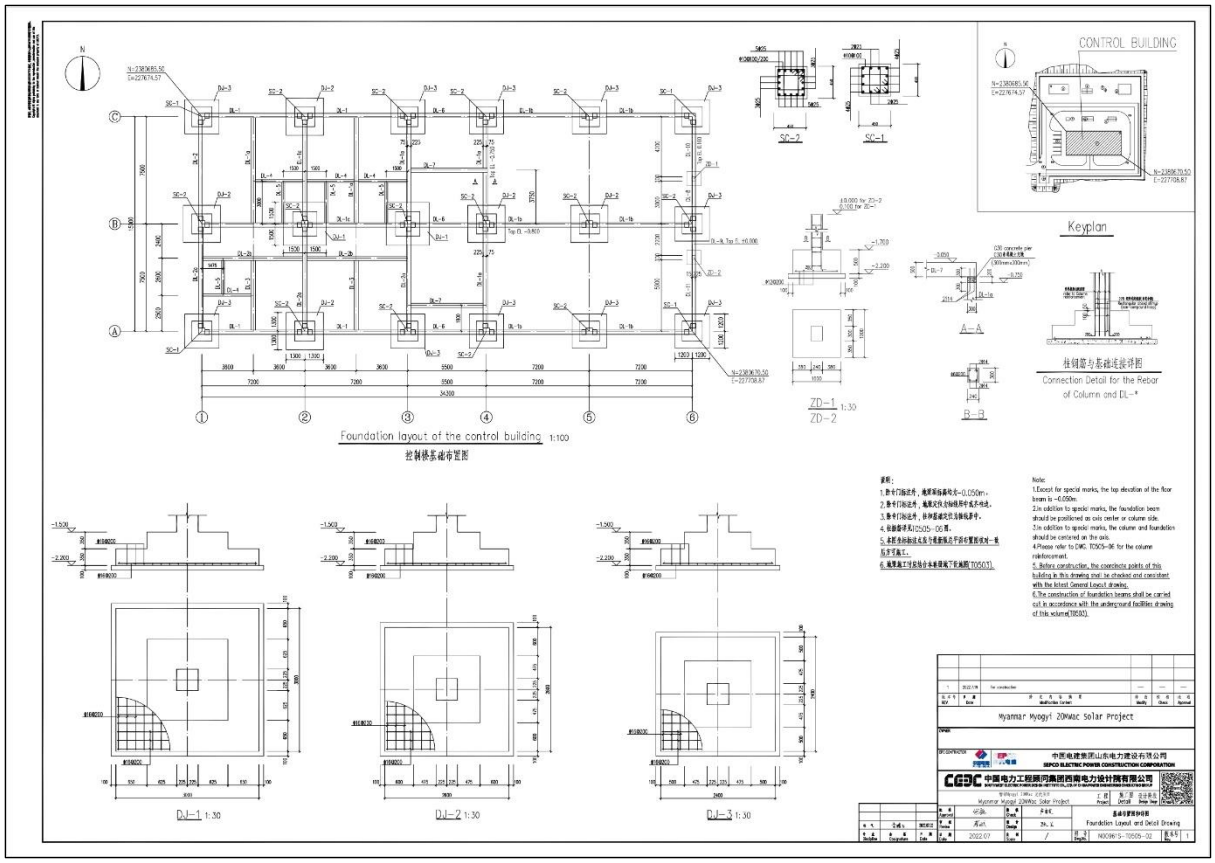


Figure 2. 7 Layout of Control Building

2.4.7 Overhead Transmission Line Design

The proposed project will use the 33 KV single-circuit overhead transmission line to connect the PV solar power station of the project and the Myogyi Substation. Total length of transmission line is about 5.05 km (3.14 miles). The proposed project will install three types of poles for 33 kV overhead transmission line including; Tension 4-pole, Tension H-pole and Single pole. The following table describes the details numbers of poles used for 33 kV overhead transmission line of the proposed project.

Table 2. 6 Details Numbers of Poles Used for Overhead Transmission Line

No.	Name	Unit	Number
1.	Tension 4-pole	Nos	6
2.	Tension H-pole	Nos	12
3.	Single pole	Nos	108
Total			**126**

The following figures illustrate the detail plan of poles for overhead transmission line and detail design of poles.

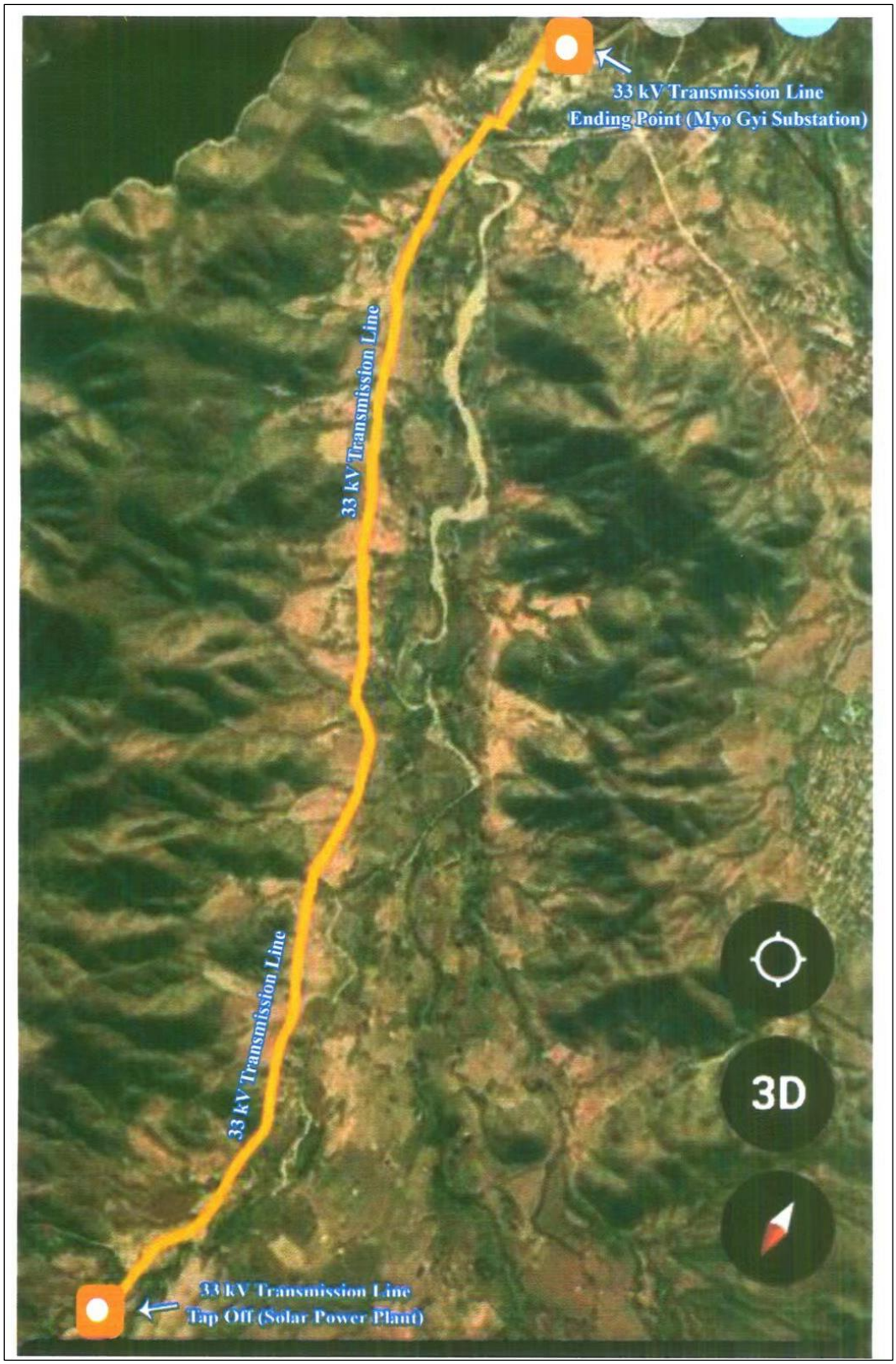


Figure 2. 8 Route of Overhead Transmission Line

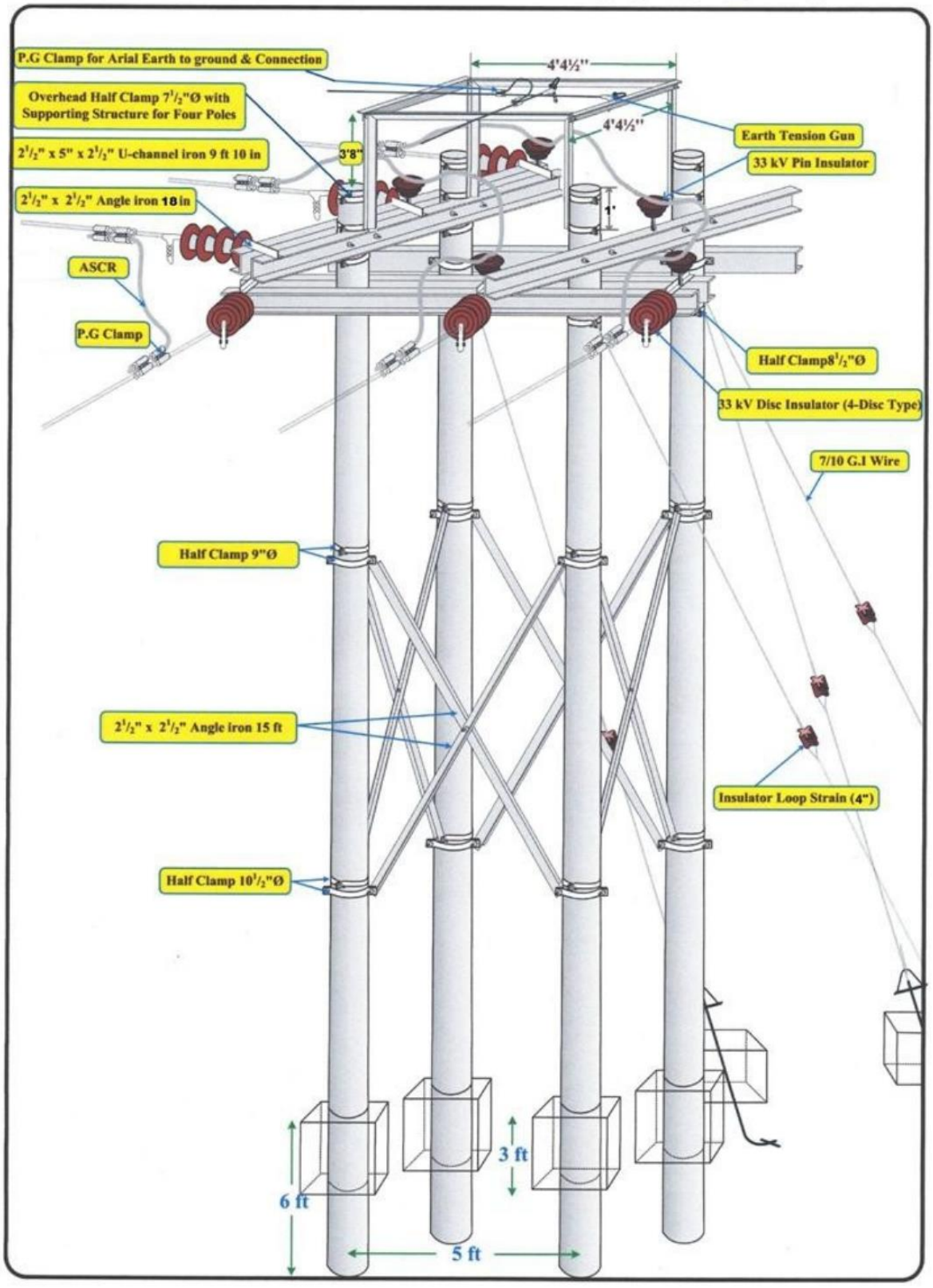


Figure 2. 9 Pole Design of Tension 4-Pole

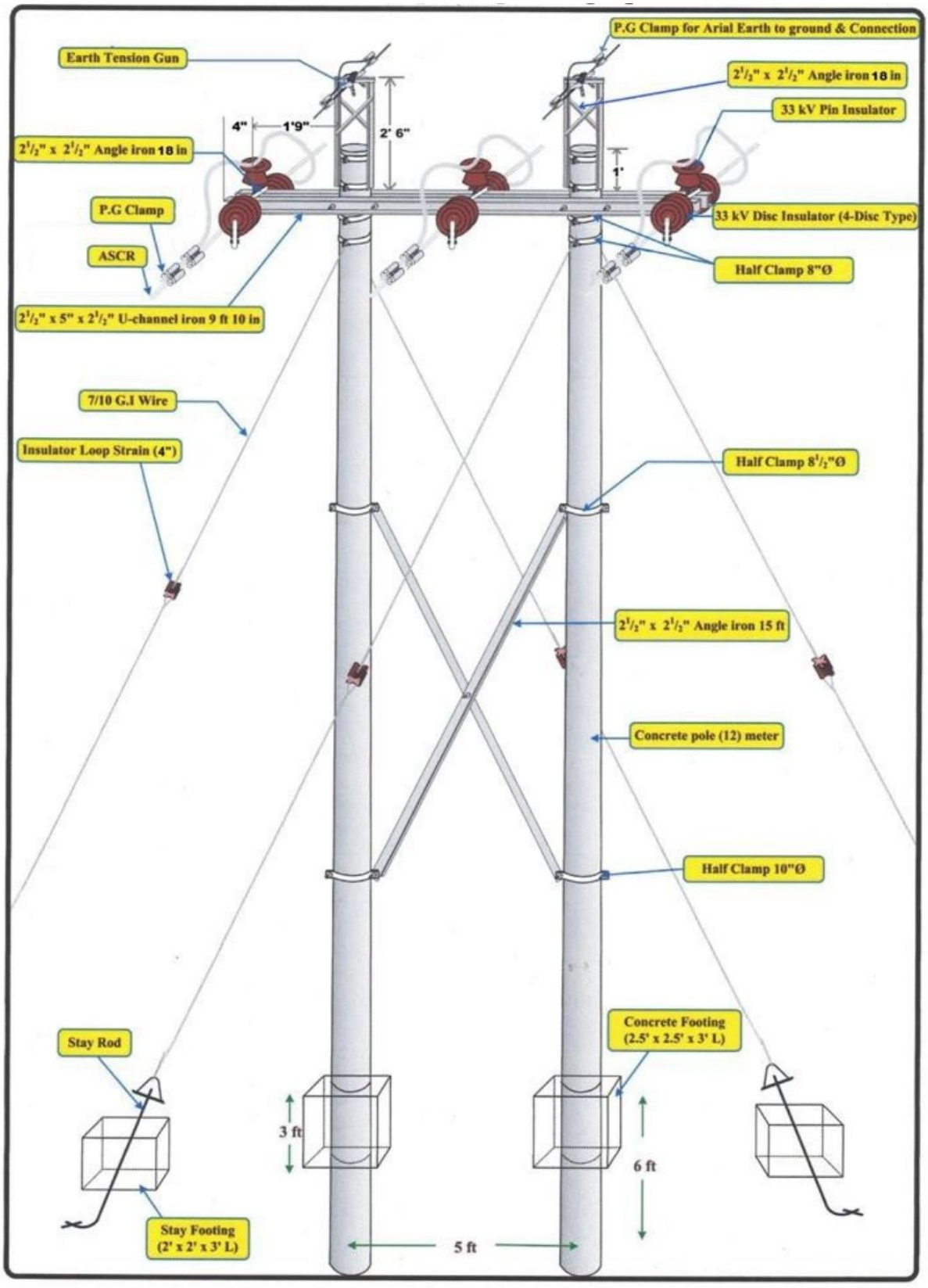


Figure 2. 10 Pole Design of Tension H-Pole

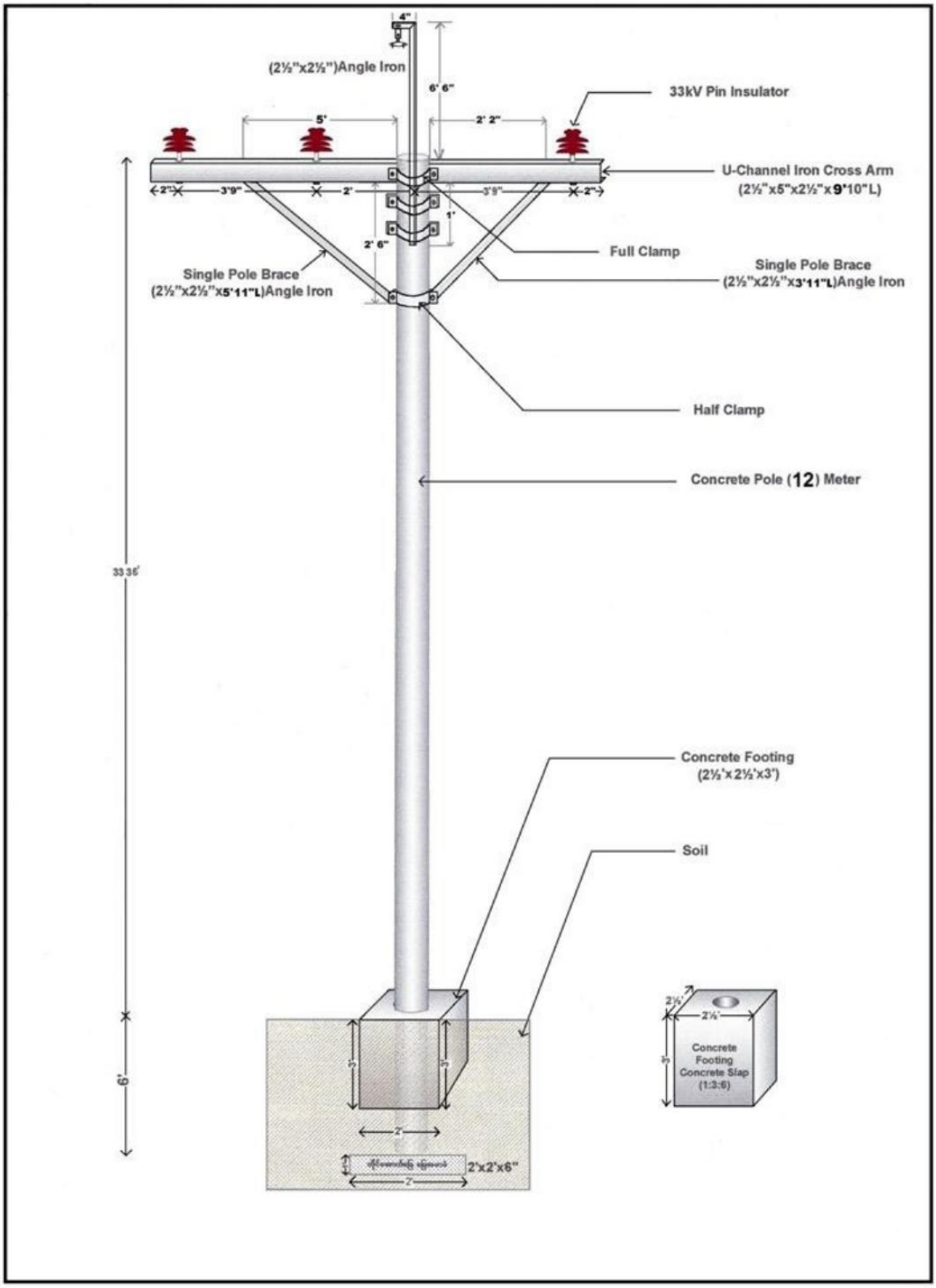


Figure 2. 11 Pole Design of Single Pole

2.4.8 Electricity Power Generation Estimation

The following table shows the details estimated contracted capacity and estimated contracted energy of the proposed project.

Table 2. 7 Estimated Electricity Generation of the Project

Year	Estimated Contracted Capacity	Estimated Contracted Energy		
	Indicative MW$_{AC}$	Net Yearly Output (MWh)	Permissible Lower Limit of Annual Generation 80% (MWh)	Maximum Electricity Power Generation 110% (MWh)
1	20	5,727.84	4,582.27	6,300.62
2	20	5,702.06	4,561.64	6,272.26
3	20	5,676.29	4,541.03	6,243.91
4	20	5,650.51	4,520.40	6,215.56
5	20	5,624.74	4,499.79	6,187.21
6	20	5,598.96	4,479.16	6,158.85
7	20	5,573.19	4,458.55	6,130.50
8	20	5,547.41	4,437.92	6,102.15
9	20	5,521.64	4,417.31	6,073.80
10	20	5,495.86	4,396.68	6,045.44
11	20	5,470.09	4,376.07	6,017.09
12	20	5,444.31	4,355.44	5,988.74
13	20	5,418.54	4,334.83	5,960.39
14	20	5,392.76	4,314.20	5,932.03
15	20	5,366.98	4,293.58	5,903.67
16	20	5,341.21	4,272.96	5,875.33
17	20	5,315.43	4,252.34	5,846.97
18	20	5,289.66	4,231.72	5,818.62
19	20	5,238.11	4,190.48	5,761.92
20	20	5,470.09	4,376.07	6,017.09

2.4.9 Electrical Primary

The short-circuit breaking current of 33 kV electrical equipment is 25 kA and that of 1 kV electrical equipment is 40 kA. The pollution level of the project site is temporarily level IV, and the outdoor electrical equipment is selected according to the creepage distance of not less than 3.1 cm/kV.

2.4.10 Electric Secondary

Design principle of secondary line: The measurement and control unit in the box transformer collects the data of the box transformer, inverter and DC combiner box to form a self-healing optical fiber ring network and uploads the collected data to the computer monitoring system or video safety monitoring system of the booster station in the switchyard. The inverter has the function of automatic tracking and grid connection and is equipped with overload, short circuit, overvoltage, undervoltage and other protections. The monitoring of the circuit breaker at the low-voltage side of the box transformer and the protection of the box transformer itself are realized by the box transformer measurement, control and communication integrated device. The box transformer measurement, control and communication integrated device are

configured by the box transformer manufacturer and arranged in the box transformer low-voltage switchgear room.

Monitoring and protection of photovoltaic power generation unit: There are four independent photovoltaic arrays in the proposed project, which are composed of photovoltaic cell array and box inverter. The inverter has the communication function, and the measurement and control unit are set in the box transformer to communicate with the station control layer equipment of the photovoltaic plant monitoring system through the optical fiber switch. The inverter can measure the DC voltage, DC current, DC power, AC voltage, AC current, frequency, power factor and internal temperature of the inverter at the input and output sides, and can calculate the current power generation, daily power generation and cumulative power generation, and can generate a daily power generation curve. The inverter can realize AC voltage protection, frequency protection, DC voltage protection, overload, short circuit protection, radiator overheating, etc.

Closed circuit industrial television and security system: According to the overall planning and construction requirements of the remote centralized control system, this photovoltaic power station is equipped with a set of centralized monitoring system substation and photovoltaic area SCADA. The system should comply with the requirements of IEC and Myanmar power grid standards and specifications. The main equipment of the photovoltaic power station must have independent transmission ports in terms of hardware, open data in terms of software, and open equipment in terms of public protocols.

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.

(1) 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 which include switch state change records, accident sequency records etc.
- Power system anomaly records which include various limit measurements of telemetry, time records of telemetry that is occurring or has been restored under various abnormal conditions etc.
- Power system normal records (retain historical records for one month and can be summoned for printing) which include various daily reports, monthly report records and hourly record tables.
- Automation system requirement operation status records which include monitoring equipment and channel abnormal records, monitoring device input and exit records etc.
- Remote operation record which records the name, time and operation content of the remote operator.

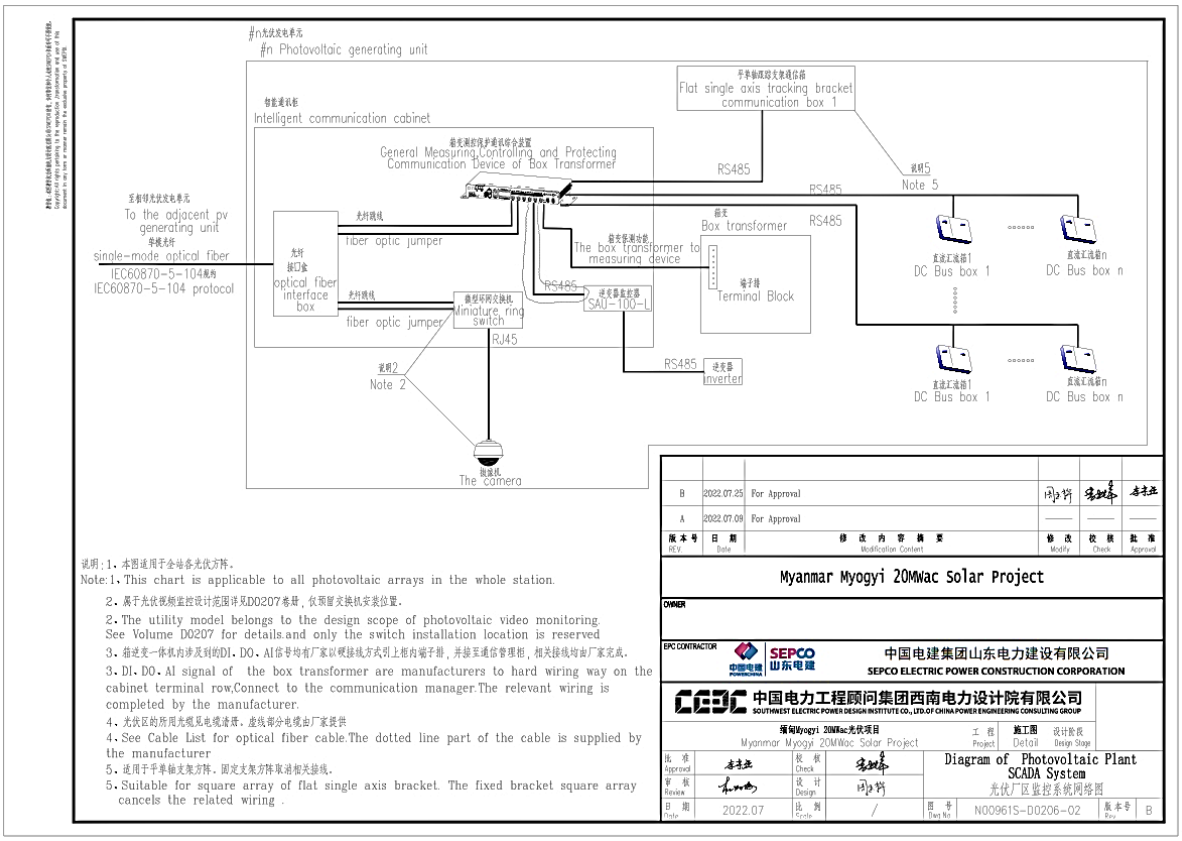


Figure 2. 12 Diagram of SCADA System

Overvoltage protection: The insulation of all electrical equipment in the proposed project is selected and determined according to national standards. The grounding of photovoltaic array shall be designed for lightning protection and grounding of photovoltaic power stations in accordance with the relevant specifications of the technical requirements for lightning protection of photovoltaic power stations and the technical code for lightning protection of photovoltaic power stations. AC and DC low-voltage systems such as inverters are equipped with surge protectors in step by step through insulation cooperation. Direct lightning protection: the photovoltaic array area uses the metal frame and metal clips of photovoltaic modules as the photovoltaic array anti direct lightning arrester, but the photovoltaic field area covers a large area, the frame of photovoltaic modules is made of aluminum alloy, and the battery panels are fixed with steel materials such as angle steel and channel steel, which are all metal materials with good conductivity and easy to form induced overvoltage, according to the technical requirements for lightning protection of photovoltaic power stations.

Grounding device: All parts requiring grounding shall be grounded. A general grounding device is set in the station. After making full use of the reinforcement in the foundation of each photovoltaic cell array as the natural grounding body, the horizontal grounding body is the main body and the vertical grounding body is the auxiliary body, forming a composite grounding grid. The metal frame outside the support and module board is reliably connected with the underground grounding grid in the station, and the grounding resistance should not be greater than 1 ohm. The horizontal grounding body adopts 50 × 5 hot-dip galvanized flat steel, and the support grounding adopts 40 × 4 hot-dip galvanized flat steel or 1 × 50mm^2 steel strand, the laying depth is 0.6m and the vertical grounding electrode adopts ϕ50, L=2.5m hot-dip galvanized round steel and the components are grounded with BVR 4mm^2~6mm^2 insulated copper stranded wire.

Cable selection and routing: DC cable selection and laying: the DC cable from photovoltaic module to inverter adopts photovoltaic special cable, which is mainly laid in the trough purlin of photovoltaic panel support, bound and fixed, and protected by PE pipe when crossing the support. ZC-YJLV22-DC1.8 kV cross-linked polyethylene insulated steel tape armored PVC sheathed aluminum core power cable from combiner box to box transformer adopts direct burial laying method. When the cable enters and exits the box and the cable crosses the road, it passes through protective tube. ZC-YJLV22-26/35 cross linked polyethylene insulated steel tape armored PVC sheathed aluminum core power cables are used for 33 kV collecting line cables, which are directly buried along the road and protected by pipes at the places where they enter and exit the box and pass through the road. The voltage drop of DC cable of photovoltaic system should not be greater than 3%. The voltage drop of medium voltage cable should not be greater than 0.5%. The site layout must be considered to optimize the cable section. The following table shows specific specification of cable selection.

Table 2. 8 Detail Specification of Cable Selection

Cable Category	Number	Cable Specification
DC cable for PV	1	PV1-F-DC1.8kV-1 × 4mm^2

Cable Category	Number	Cable Specification
	2	PV1-F-DC1.8kV-1 × 6mm^2
DC combiner box to box inverter integrated machine low voltage power cable	1	ZC-YJLV22-1.8/3kV-2 × 300
	2	ZC-YJLV22-1.8/3kV-2 × 400
33kV collector line cable	1	ZC-YJLV22-26/35-3 × 70
	2	ZC-YJLV22-26/35-3 × 120
	3	ZC-YJLV22-26/35-3 × 185
Communication optical cable	1	GYFTA53-24B1
RS485 communication line	1	ZR-DJVPVP2/22-0.45/0.75-2 × 2 ×1

Cable fire protection: The fire prevention and flame retardation measures of cables shall be designed according to the fire prevention and flame retardation measures of cables in standard for design of cables in electric power engineering. Both ends of the cable protection tube are filled with fireproof blocking materials.

The following figure illustrates the electricity generation processes from solar energy and distribute to Myogyi Substation.

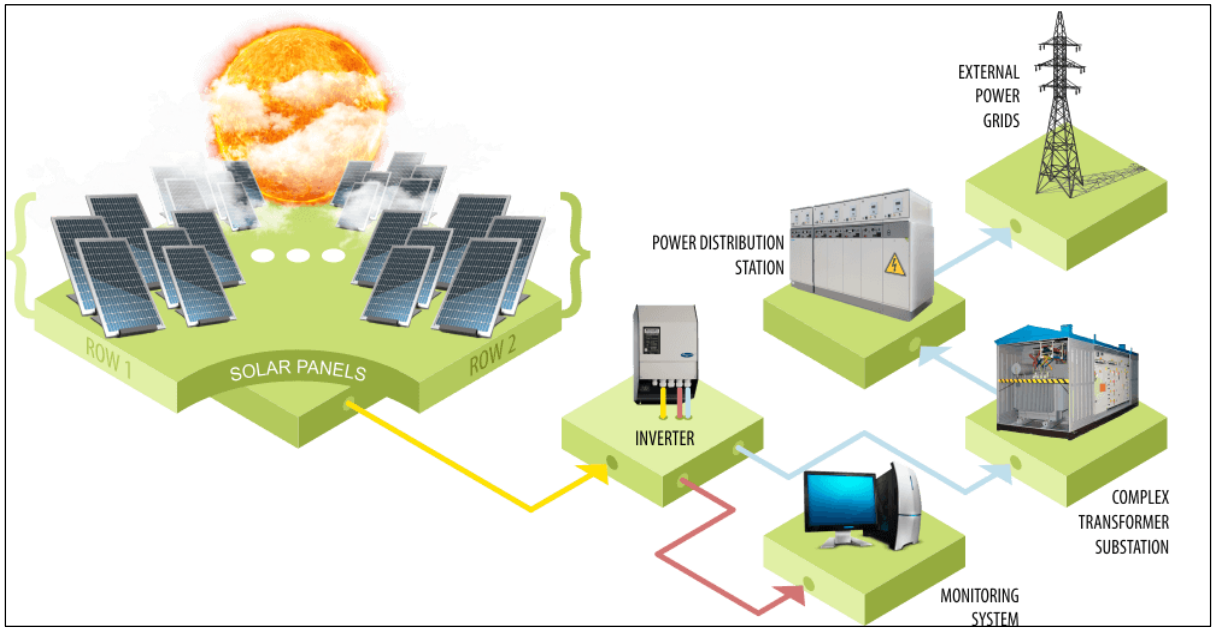


Figure 2. 13 Electricity Generation Processes

2.5 Construction Schedule and Current Conditions of the Project

The estimated construction period of the proposed project is 15 months. The construction activities of the project started in April, 2022 and will be finished in July, 2023. The construction processes will be carried out by the sub-contractors for the proposed project. Detail construction schedule of the project is attached in **Appendix- 10**.

The following figures show the current site condition of the proposed project.

Control Building Construction at Switchyard

Guard House Construction

Temporary Project Office

Worker Camps

Welding Area

Construction Activities Working Area

Access Road

Access Road

Construction Area

Construction Area

Construction Area

Construction Area

Figure 2. 14 Current Site Condition

2.6 Utilities

2.6.1 Construction Materials and Machines Requirement

Cement, gravel, steel and wood will be purchased from local providers at Mandalay for the construction of the proposed project. Estimated construction materials requirement are 600 tons (cement), 2,000 tons (gravel), 200 tons (steel) and 80 tons (wood) for construction phase.

Different types of construction machines and vehicles will be utilized for construction processes of the project. These include road roller, loader, excavator, steel bar bender, tamping machine, cutting machine, pickup truck, truck, tractor, semitrailer, mixer truck and pump truck. The following table describes detail construction machines and vehicles used for proposed project.

Table 2. 9 List of Construction Machines and Vehicles

No.	Type of Machines and Vehicles	Number of Machines and Vehicles
1.	Road roller	1
2.	Loader	1
3.	Excavator	1
4.	Steel bar bender	1
5.	Tamping machine	1
6.	Cutting machine	1
7.	Pickup truck	1
8.	Truck	1
9.	Tractor	1
10.	Semitrailer	1
11.	Concrete mixer truck	1
12.	Pump truck	1
Total		**12**

The following figure shows construction machines and vehicles used for proposed project.

Road Roller

Loader

Excavator

Steel Bar Bender

Tamping Machine

Cutting Machine

Pickup Truck

Truck

Tractor

Semitrailer

Concrete Mixer truck

Pump truck

Figure 2. 15 Construction Machines and Vehicles

2.6.2 Water Requirement

Estimated water requirement for construction processes are 2,400 gallons per month and domestic water requirement is 1,000 gallons per month. Groundwater will be pumped out from a tube-well nearby the project site and stored with water tanks for construction phase of the project. Purified drinking water will be provided by the proponent for the workers.

Estimated water requirement for operation processes, especially for PV modules cleaning are 1,500 gallons per month and domestic water requirement is 500 gallons per month. Groundwater will be pumped out from tube-wells in the project site and stored with water tanks for PV modules cleaning and domestic water. Purified drinking water will be provided by the proponent for the workers.

2.6.3 Electricity and Fuel Requirement

Electricity for construction phase will be generated by diesel generators (capacity of 30 kW) and estimated electricity requirement is 2 MWh per month.

Electricity for operation phase will be obtained from national grid line and estimated electricity requirement is 5 MWh per month. One generator, capacity of 30 kW, will also install for emergency cases.

Diesel will be mainly used for construction machines, vehicles and diesel generators and estimated requirement is 150 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 mainly used for vehicles and diesel generators in operation processes and estimated requirement is 50 gallons per month. Diesel will be purchased from nearby fuel station and stored with portable fuel tanks in the project site.

2.6.4 Human Resources Requirement

A total of 60 workers are employed for construction phase of the project, including 10 foreign workers and 50 locals. Working hours is 8 hours per day and working days is 30 days per month. Working hours is from 8:00 am to 5:00 pm and there is only one working shift in the construction phase. There are worker camps for migrant workers in the project site as well as some local workers from nearby villages are employed.

Totally, 10 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 and there are two working shifts in a day. The project proponent will provide accommodation for the workers in project site.

2.7 Waste Generation

2.7.1 Solid Wastes Generation

Solar Power Plant: During the construction phase, rejected components and packaging materials of electrical equipment and building materials, surplus materials, papers, containers, broken bricks, solvent containers are common solid wastes. These solid wastes can be injurious to the environment through blockage of natural drains and drainage systems because these wastes may contain hazardous substances such as residue of cement, adhesive and cleaning solvents bottles. Site preparation, access road construction and leveling activities can generate construction soil wastes due to excavation as well as site clearance activities for PV modules, switchyard, control building and other building construction will also generate vegetation debris. Domestic solid wastes like garbage and organic waste from construction workers camp and construction area are other sources of solid waste generation.

During the operation phase, no operation solid waste will be disposed of from the proposed project's operation processes for electricity generation. However, domestic solid waste such as garbage, rejected stationary materials and organic waste from control building and other buildings are anticipated as common solid wastes generation.

Overhead Transmission Line: During the construction phase, site clearance activities along right of way for overhead transmission line will generate vegetation debris.

2.7.2 Liquid Waste Generation

Solar Power Plant: During the construction phase, common liquid waste includes cleaning construction vehicles and machines within the project site, however, it has insignificant impact. Domestic liquid waste such as black water from toilets used by construction workers and grey water from basins and bath places in construction workers camp will be also discharged from the proposed project.

During the operation phase, the surface dust cleaning of PV modules to promote their efficiency for electricity generation and this liquid waste can contain dust, which is main source of operation liquid waste. Domestic liquid waste like black water from toilets and grey water from basins and bathrooms of control building and other buildings within the project site are other sources.

Overhead Transmission Line: No liquid waste will be generated from not only construction activities but also operation activities of overhead transmission line.

2.7.3 Hazardous Waste Generation

Solar Power Plant: During the construction phase, cracked or damaged PV modules due to improper installation are common hazardous waste generation of the proposed project because PV modules release toxic chemicals. Used oil disposed of from repair and maintenance of construction machines and vehicles, oil spills and leakage from refueling, fuel storage area, machineries maintenance area and parking area within the project site are other sources of hazardous waste generation.

During the operation phase, common hazardous wastes include cracked or damaged PV modules due to improper cleaning activities and maintenance activities. Uninstalled lifespan-expired PV modules when exchanging new PV modules are also common hazardous wastes. Used oil from box inverter all-in-one machines, oil spills and leakage from maintenance activities, vehicles, refueling and fuel storage area are other sources of hazardous waste generation.

Overhead Transmission Line: No hazardous waste will be generated from not only construction activities but also operation activities of overhead transmission line.

3. Identification of Project Proponent

The proposed project is proposed by Myogyi Investment Holdings Limited, which is jointly formed by the SPECO Electric Power Construction Corporation and HK New Energy Investment Holding Limited and it is 100% foreign investment. Myogyi Investment Holdings Limited is a registered company at DICA and its company registration number is 132854335. The office address is No (4), 73rd Street, Between 102-A & 103 Street, Mingalar Mandalay, Mandalay, Myanmar. The estimated construction period of the proposed project is 15 months. The construction activities of the project started in April, 2022 and will be finished in July, 2023 and the proposed project will generate electricity from solar energy and distribute to the Myogyi Substation, which will take 20 years. After operation period, the project proponent will submit the application to the relevant authorities to extend the operation period because the project will operate as the Build, Own, Operate (BOO) basis.

3.1 Information of the Project Proponent

Myogyi Investment Holdings Limited is jointly formed by the SPECO Electric Power Construction Corporation and HK New Energy Investment Holding Limited. The following are brief description of the investors.

SEPCO Electric Power Construction Corporation

SEPCO Electric Power Construction Corporation was established in 1952 and is a wholly-owned subsidiary of Power Construction Corporation of China (Power China). SEPCO has the integrated service capabilities of the entire industrial chain of power, oil and gas and petrochemical, renewable energy, energy conservation and environmental protection and infrastructure sector, including project planning, investment and financing, survey and design, complete equipment supply, construction and installation, commissioning, operation and maintenance. In recent years, SEPCO has deeply implemented the overall development strategy of "global development, concentric diversification, innovative and upgraded, international first-class" and focused on building a world-class energy investment and construction company with "quality and benefit type, innovative and ecological, global layout, professional operation, and integrated development".

SEPCO is currently working in 35 countries and until these days, they have already conducted 46 waste incineration power units, 12 biomass power units, 3,357 wind power units and 87 solar power plant projects in energy production sector. Myanmar branch of SEPCO was founded in 2018 and conducts electricity and telecommunication works such as construction of transmission lines, distribution lines and recessed lines and construction of solar power plants. They also support electrical work such as substation and campus facilities. In addition, they also undertake maintenance and management of equipment such as cranes and conveyors. In December 2018, SEPCO and China Energy Engineering Group Hunan Electric Power Design Institute Co., Ltd. implemented 500 KV Kankaung (Meikthila) – Sapakywe (Taungoo) National Grid System Project.

HK New Energy Investment Holding Limited

HK New Energy Investment Holding Limited adheres to the core value of "Powering the world with Green Energy" and is an energy developer focused on government permitted long term energy power plant development and operations. Their proposition is Source Chinese outbound investment opportunities, provide system solutions through their investment platform and generating long term sustainable growth. Their role is to determine the choice of technology, negotiate and finalize project terms, provide equity financing solution, manage and coordinate local subcontractors and construct the electricity generation station, operate and maintenance the power plant. Their strategy is to enter into projects as a co-sponsor and an active joint development partner, providing the resources and capital to advance the project towards financial closing and construction.

HK New Energy Investment Holding Limited operates 1,250 MWs of diesel power plant in the Middle East, 774 MWs renewable energy in South America, 520 MWs in Southeast Asia. HKNE in Myanmar has main office in Yangon and formed a consortium and experienced many projects in Myanmar. HKNE together with China National Petroleum Cooperation's subsidiary HQC and CPP are currently developing refining, chemical industry plants in Magway and Tanintharyi Regions. In addition, together with Sungrow power, are currently developing 420 MWs solar power plant projects in Naypyidaw, Magway, Mandalay, Sagaing and Bago regions. HKNE is now currently developing wind power projects in Yangon, Chin, Rakhine, Ayeyarwady regions. HKNE joint venture with its partner Sungrow power awarded through international public bidding process organized by Ministry of Energy in case of Myanmar Solar Pipeline Project.

The following data provides information of management responsible person of the project proponent.

Name:	Mr. Bing Shuai
Position	Director
Nationality:	Chinese
Address:	No (4), 73rd Street, Between 102-A & 103 Street, Mingalar Mandalay, Mandalay, Myanmar
Type of investment	100% Foreign Investment

3.2 Organizational Structure of the Project

The organizational structure of the proposed project can be generally categorized into four departments; Design Control Department, Procurement and Transportation Department, Construction Department and Finance and Legal Affairs Department. Southwest Electric Power Design Institute manages design control of the project. Procurement and Transportation Department controls manufacturers and transportation affairs. Shandong Tiejun Electric Power

Engineering (Myanmar) is responsible as Construction Department for road, building, power plant structure and overhead transmission line construction, while Finance and Legal Control Department manages finance and VDB LOI. Construction Manager is also assigned to control construction processes and SPECO EPC Project Manager is responsible for controlling operation processes and quality of the project. Board of directors manage as management responsible persons of the proposed project. The following figure shows the organization chart of the proposed 20 MWac ground mounted solar power plant project.

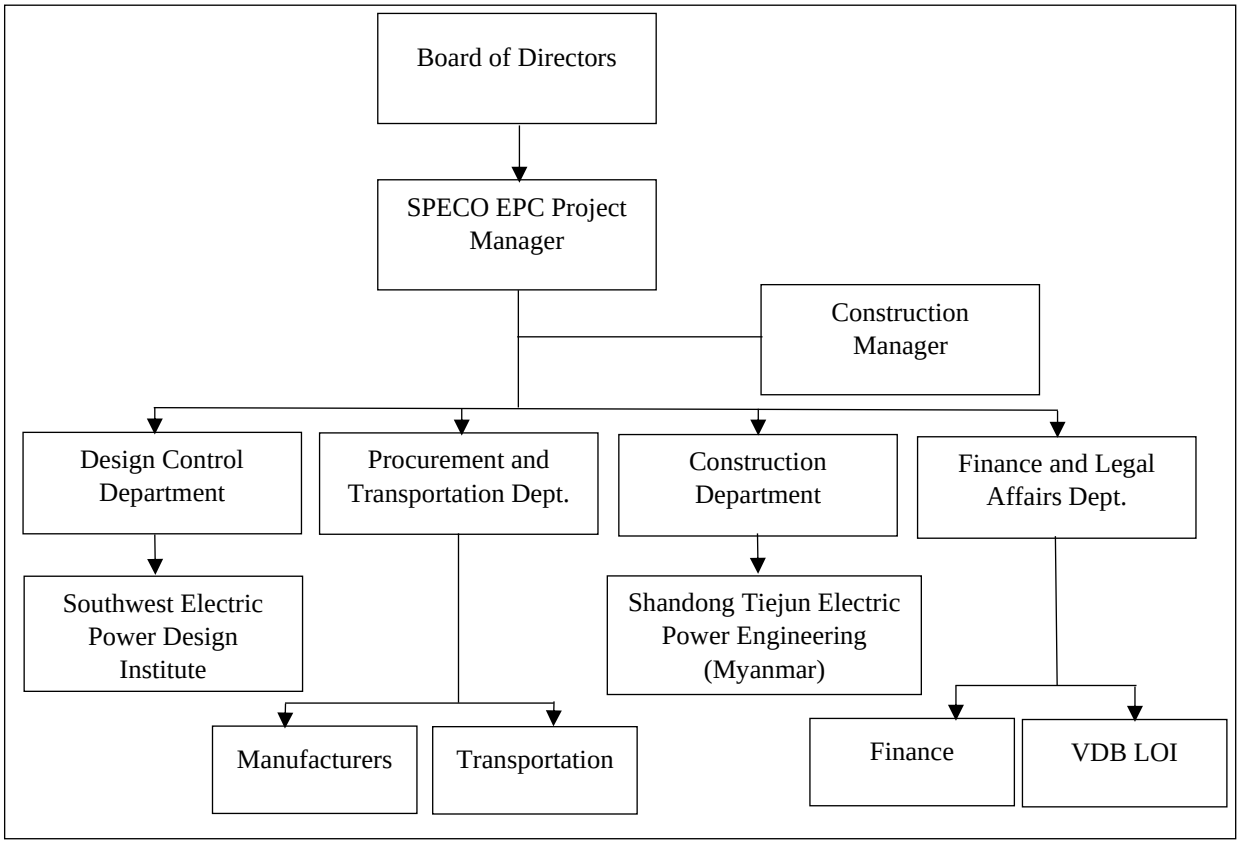


Figure 3. 1 Organization Structure of the Proposed Project

The total investment amount for the proposed project is 21.43 million USD and it includes investment for machineries and materials, investment for furniture and equipment and investment for infrastructure. The following table describes detail investment plan for the proposed project.

Table 3. 1 Investment Plan of the Project

No.	Category	Investment Amount (USD)
1.	Investment for machineries and materials	3,857,142.86
2.	Investment for furniture and equipment	15,285,714.30
3.	Investment for infrastructure	2,285,714.29
Total		**21,428,571.40**

4. Identification of the EMP Experts

The Environmental Management Plan (EMP) Report for the proposed Myogyi Substation 20 MWac Ground Mounted Solar Power Plant Project is prepared by E Guard Environmental Services Co., Ltd., which hold Transitional Consultant Registration Certificate No. 00028, issued by the Environmental Conservation Department (ECD). The environmental study was carried out by the study team and the following is a summary of team member's responsibilities.

U Aye Thiha (Managing Director)

Since E Guard was formed, U Aye Thiha has been working for the organization as Managing Director. He obtained his Bachelor Degree from University of Yezin in 1995. Furthermore, he got his Natural Resources Management Master Degree from Asian Institute of Technology in 2001. He was also awarded Master of Business of Administration from Yangon University of Economic in 2018. He also got a Diploma in Computer Science from the University of Yangon. He has a broad range of experiences in managing and implementing numerous projects (including local and foreign funded infrastructure development as well as investment projects). At E Guard, he is responsible for cost estimation, contracting, staff recruitment, etc.

U Aung Si Thu Thein (Associate Consultant, Team Leader)

U Aung Si Thu Thein is an Associate Consultant, who holds Transitional Consultant Certificate No. 00281, described expertise in Ecology and Biodiversity, GIS and Land Use. He received his Bachelor Degree in Forestry from the University of Forestry in September, 2015. He 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 five 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 Aung Myint Myat (Associate Consultant)

U Aung Myint Myat is an Associate Consultant, who holds Transitional Consultant Certificate No. 00099, described expertise is Forestry. He has Bachelor Degree in Forestry from the University of Forestry in 2014. He also obtained his Post Graduate Diploma in Geographic Information Systems from the Dagon University in February, 2019 and Post Graduate Diploma in Environmental Impact Assessment and Environmental Management System from the Yangon Technological University in July, 2019. He has nine years-experiences on environmental impact assessments and social impact assessments for development projects in

Myanmar. Moreover, he led many environmental site surveys and also socio-economic surveys. Another experience is to cooperate with clients, government authorities and local people to conduct stakeholder engagement and public consultation meeting.

U Thaw Tar Htun (Associate Consultant)

U Thaw Tar Htun is an Associate Consultant, who holds Transitional Consultant Certificate No. 00267, has been working on EIA project reporting in E Guard Environmental Services Co., Ltd. since 2018. He received Bachelor of Civil Engineering from Taunggyi Technological University in 2011 and Master of Engineering in (International Graduate Program in Environmental and Water Resources Engineering) from Mahidol University, Thailand in 2016. He had experiences in environmental fields for eight years including his master degree research, "Mathematical Modelling Wastewater Collection System in Cha-Am Municipality using PCSWMM". His master thesis paper was presented in 3rd International Conference on Civil, Biological and Environmental Engineering Conference, Phukhet, Bangkok. He had worked as a Sub Assistant Engineer at Engineering Department (Water and Sanitation) at Naypyitaw Development Committee, Naypyitaw, Naypyitaw Union Terrority from August 2012 to October 2017.

Daw Shwe Ya Min Bo (Environmental Specialist)

Daw Shwe Ya Min Bo is an Environmental Specialist, who holds Transitional Consultant Certificate No. 00279, 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 more than six years-experiences in preparation of Environmental Management Plan and Initial Environmental Examination projects' reports and in participation many Environmental Impact Assessment and Resettlement Action Plan projects. She also participates in the activities of socio- economic survey, biodiversity survey, and reviewing the reports.

Daw Htet Shwe Sin Aung (Environmental Specialist)

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 four 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.

U Nyein Chan Aung (Project Associate)

U Nyein Chan Aung who holds Transitional Consultant Certificate No. 00376 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.

U Aung Zayar Wint (Project Assistant)

U Aung Zayar Wint is a Project Assistant in Environmental Quality Team at E Guard Environmental Services Co., Ltd. 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.

Daw May Thu Win (Project Assistant)

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.

U Kee Thang (Project Assistant)

U Kee Thang is a Project Assistant, who had his Bachelor of Science Degree in Forestry from University of Forestry and Environmental Science (UFES) in 2019. He also got Certificate in Environmental Management Online Basic Course from Environmental Science Alumni Organization and Certificate in "Sustainable coexistence between forest and people for SDGs – Culture born from rural life (Satoyama life) and forest" from Kyoto University, Japan. He has many experiences in socio-economic surveys, environmental conservation programs, biodiversity conservation activities, agroforestry practices, cooperation in public consultations and data analyzing process.

U Ye Chit Zaw (Project Assistant)

Ye Chit Zaw is a Project Assistant at the Environmental Quality (EQ) team of E Guard Environmental Services. He graduated on February 2019 with the Bachelor of Science (Geology) at the Dagon University in Yangon. He has experience in land surveying and has done land surveying for road and bridge paving for Thilawa (Hansae) Project.

U Khin Zaw Min (Surveyor)

U Khin Zaw Min is a Surveyor, who finished matriculation examination and has more than seven years of surveyor experience. He specializes in instrumentation and field data collection of environmental condition of the site and measuring of environment base line data.

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

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5. Policy, Legal and Institutional Framework

We, Myogyi Investment Holdings Limited 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 Myogyi Substation 20 MWac Ground Mounted Solar Power Plant Project. We also committed to construct and operate the proposed project by following the plans and mitigation measures stated in this EMP report.

Third Party, 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 Myogyi Substation 20 MWac Ground Mounted Solar Power Plant Project, operated by Myogyi Investment Holdings Limited.

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 Rules (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. The Law Amending the Prevention and Control of Communicable Disease Law (2011)
9. Prevention of Hazards from Chemical and Related Substances Law (2013)
10. The Control of Smoking and Consumption of Tobacco Product Law (2006)
11. Myanmar Fire Brigade Law (2015)
12. Motor Vehicles Safety and Management Law (2020)
13. The Myanmar Insurance Law (1993)
14. The Public Health Law (1972)
15. Labor Organization Law (2011)
16. Settlement of Labor Dispute Law (2012)
17. The Development of Employment and Skill Law (2013)
18. The Minimum Wages Law (2013)
19. The Payment of Wages Law (2016)
20. Workmen's Compensation Act (1923)
21. The Leaves and Holiday Act (1951)
22. Social Security Law (2012)
23. Occupational Safety and Health Law (2019)
24. The Rights of National Races Law (2015)
25. The Petrol and Petroleum Product Law (2017)
26. Forest Law (2018)

27. Protection of Biodiversity and Protected Area Law (2018)
28. Import and Export Law (2012)
29. Freshwater Fisheries Law (1991)
30. The Underground Water Act (1930)
31. The Electricity Law (2014)
32. The Farm Land Law (2012)
33. Land Acquisition, Resettlement and Rehabilitation Law (2019)
34. Natural Disaster Management Law (2013)

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 cause 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 Rules (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.

The environmental quality shall be within the limit of the following reference values of NEQEG.

Table 5. 1 Reference Values of NEQEG for the Project

Parameter	Unit	Guideline Value
Air Quality		
Nitrogen dioxide (1 hour)	µg/m^3	200
Sulfur dioxide (24 hours)	µg/m^3	20
Particulate Matters (PM_{10}) (24 hours)	µg/m^3	50
Particulate Matters ($PM_{2.5}$) (24 hours)	µg/m^3	25
Effluent Water Quality		
Biochemical oxygen demand	mg/l	30
Chemical oxygen demand	mg/l	125
Oil and grease	mg/l	10
pH	S.U	6-9
Total coliform bacteria	100ml	400
Total nitrogen	mg/l	10
Total phosphorus	mg/l	2
Total Suspended Solid	mg/l	50
Noise Level	**Day Time (07:00-22:00)**	**Night Time (22:00-07:00)**
Standard value for industrial, commercial	70	70
Standard value for residential	55	45

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 section 51of 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 section 65of 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 section 65of 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 section 65of 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 ensure the prescribed insurance by rules, under section 73 of said law.

8. 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)
  (a) Mass death of animals included in birds or chicken;
  (b) Mass death of mouse;
  (c) Suspense of occurring of communicable disease or occurring of communicable disease;
  (d) 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.

9. 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.

10. 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 project 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 project area, under sub-section (d) of section 9 of said law.

11. 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.

12. 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.

13. 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 ensure the insurance for injured person under section 15 of said law.
- The project proponent has to ensure 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.

14. 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.

15. Labor 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 labor organizations systematically and independently.

- The project owner promises to allow the labor 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 labor 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 labor 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 labor 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 labor laws under section 20 of said law.
- The project proponent promises the labor organization to participate in solving the collective bargains of the employees in accord with the labor laws under section 21 of said law.
- The project proponent promises the labor 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 Labor Organization under section 22 of said law.

16. Settlement of Labor 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 labor by reducing of product without efficient cause, under section 51 of said Law.

17. 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.

18. The Minimum Wages Law (2013)

Purpose: To ensure the project owner pay the wages not less than prescribed wages and notify obviously this wage 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.

19. 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.

20. 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.

21. 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.

22. Social Security Law (2012)

Purpose: The project proponent has to create the social security for the employees. 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.

23. 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.

24. 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.

25. 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.

26. 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

27. Protection of Biodiversity and Protected Area Law (2018)

Purpose: to ensure abiding by the prohibitions and stipulations to protect biodiversity and protected area

- The project proponent has to avoid entering the prohibited area located in protected area without permission under sub-section (a) of section35.
- The project proponent has to avoid digging on the land or carrying out any activity in protected area under sub-section (c) of section35.
- The project proponent has to avoid extracting, collecting or destroying in any manner, any kind of wild or cultivated plant in protected area under sub-section (d) of section35
- The project proponent has to avoid polluting soil, water and air, damaging a water-course or poisoning water, electrification, using chemical or explosive materials in protected area under sub-section (a) of section39.
- The project proponent has to avoid possessing or disposing of toxic objectives or mineral wastes in protected area under sub-section (b) of section39.

28. Import and Export Law (2012)

Purpose: To ensure to abide by the permission for import

The project proponent has to abide by the conditions contained in permission for import, under section 7 of said law.

29. 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.

30. The Underground Water Act (1930)

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

- The project owner will obtain the license 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.

31. The Electricity Law (2014)

The 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.

32. 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.

33. Land Acquisition, Resettlement and Rehabilitation Law (2019)

The project proponent shall provide concern with the compensation to landowner for the land acquisition and other related persons as the following processes-

- In the confiscated land, if there are no permanent buildings and other business buildings, the compensation for this land shall be issued to the landowner and the person concerned in the confiscated land under sub-section (a) of section 39 of said law.
- In the confiscated land, if there are permanent buildings and other business buildings, the compensation for land and building shall be issued to the landowner with local current market price under sub-section (b) of section 39 of said law.

- In the confiscated land, if there are no perennial plants, seasonal crops and livelihood business, the compensation for this land shall be issued to the landowner with local current market price under sub-section (c) of section 39 of said law.
- In the confiscated land, if there are perennial plants, seasonal crops and livelihood business as the following,
    - Three times of local current market price for perennial crop currently grown
    - Three times of local current market price based on the yield per acre for paddy and other crops grown
    - Estimated loss of income due to loss of livelihood and employment
    - Animals, other livestock and materials loss under sub-section (d) of section 39 of said law.
- The representative or effective person shall be identified and compensated for compensation under sub-section (e) of section 39 of said law.

The project proponent shall implement resettlement or rehabilitation as the following plan

- The process of land acquisition and transfer of land is initiated and the landowner is given the right to re-enforce the resettlement process under sub-section (a) of section 46 of said law.
- Housing development process, the necessary infrastructure and support for the livelihood of the households are needed. The resettlement process is including infrastructure and other needs for development of ward and village development under sub-section (b) of section 46 of said law.
- Rehabilitation processes that include livelihood activities and job placement arrangements under sub-section (c) of section 46

34. 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 programs 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.

The project proponent also commits the descriptions in EMP report are accurate and correct. The following table describes the list of commitments.

Table 5. 2 List of Commitments

Particular	Item	Commitment Description	Reference Chapter
Introduction	1.1	Myogyi Investment Holdings Limited strongly commits that the information about the proponent was correctly described.	3
	1.2	Myogyi Investment Holdings Limited strongly commits that the information about the environmental and social study team for the EMP report preparation was correctly described.	4
Project Description	2	Myogyi Investment Holdings Limited strongly commits that the information and data about the project and the operation process were accurate and correct.	2
Policy, Legal and Institutional Framework	3	Myogyi Investment Holdings Limited strongly commits to follow the related laws, rules, regulations, standards and guideline which was described in the EMP report.	5
Description of Surrounding Environment	4.1	Myogyi Investment Holdings Limited strongly commits not to disturb the Existing Environment Conditions expressed in Chapter 6.	6

Particular	Item	Commitment Description	Reference Chapter
and Social Condition	4.2	Myogyi Investment Holdings Limited strongly commits to consider the baseline condition of environmental and socioeconomic of the surrounding area during the construction and operation phase.	6
	4.3	Myogyi Investment Holdings Limited strongly commits that Air Quality, Water Quality and Noise Level were measured with the proper devices and compared the results with the National Environmental (Emission) Guideline.	6
Identification and Assessment of Potential Environmental Impacts and Mitigation Measures	5.1	Myogyi Investment Holdings Limited strongly commits to certainly follow the mitigation measures for avoiding and reducing the potential environmental and socio-economic impacts during the construction and operation phase.	7
	5.2	Myogyi Investment Holdings Limited specifically commits to follow the mitigation measures for air pollution during the construction and operation phase.	7
	5.3	Myogyi Investment Holdings Limited specifically commits to follow the mitigation measures for water pollution during the construction and operation phase.	7
	5.4	Myogyi Investment Holdings Limited specifically commits to follow the mitigation measures for waste disposal during the construction and operation phase.	7
	5.5	Myogyi Investment Holdings Limited specifically commits to follow the mitigation measures for noise and vibration during the construction and operation phase.	7
Environmental Management Plan	6.1	Myogyi Investment Holdings Limited commits to certainly follow the Environmental Management Plan.	8
	6.2	The compliance monitoring report will be reported annually along with the environmental monitoring plan for the construction and operation phase.	8
	6.3	Myogyi Investment Holdings Limited has established a Grievance Redress Mechanism with local people to solve the problems and complaints concerns with the project.	8
	6.4	Myogyi Investment Holdings Limited implemented the Corporate Social Responsibility Plan to support 2% of annual net profits for developing community	8

Particular	Item	Commitment Description	Reference Chapter
		development and improving socio-economic condition of local people.	
Focus Group Discussion and Information Disclosure	7.1	Myogyi Investment Holdings Limited commits that the time, date, list of attendants, the place and subject of discussion were correct.	9
	7.2	Myogyi Investment Holdings Limited commits to resolve any social and environmental related grievances locally in consultation with the aggrieved party to facilitate smooth implementation of the project.	9

MYOGYI INVESTMENT HOLDINGS LIMITED
(Incorporated in the Republic of the Union of Myanmar)
Company Registration No. 132854335

Corner Of Bogyoke Aung San Road And 27th Street, Unit 01-05, Level 10, Junction City Office Tower, Pabedan Township, Yangon Region, Myanmar

Commitment to Follow Legal Frameworks Including Environmental Conservation Law, Rules and Standards Stated in the Environmental Management Plan (EMP) Report

With regards to the above matter, we, Myogyi Investment Holdings Limited strongly commit that our company and our sub-contractors will perform all our construction and operation activities for the proposed project in an environmental friendly manner by following existing laws and regulations, especially Environmental Conservation Law (2012), Environmental Conservation Rules (2014), Environmental Impact Assessment Procedure (2015), National Environmental Quality (Emission) Guidelines (2015) and other relevant environmental standards through successful implementation of mitigation measures stated in the Environmental Management Plans (EMP) of EMP report.

Yours Sincerely,

MYOGYI INVESTMENT HOLDINGS LIMITED
No.
Date

6. Description of the Surrounding Environment

The followings are the methodologies used for analyzing surrounding condition including physical environment, socio-economic environment and biological environment of the proposed project.

i) **Onsite Measurements 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, earthquake intensity, soil profile and weather data were collected from official township data from the General Administration 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	Purpose	Measuring Instrument
1.	Haz-Scanner EPAS	PM_{10}, $PM_{2.5}$, CO, CO_2, SO_2, NO_2	
2.	Davis Vantage Pro2 Wireless Weather Station	Wind speed and wind direction	
3.	Digital Sound Level Meter	Noise level	
4.	Onsite Water Quality Monitor	Water quality	

6.1 Physical Environment

6.1.1 Climate

The climate of Myanmar can be described as tropical monsoon climate. It is characterized by strong monsoon influences, has a considerable amount of sun, a high rate of rainfall, and high humidity. The annual average temperature ranges from 22°C to 27°C year-round.

Temperature and Rainfall- The proposed project site is located at Ywar Ngan Township, Danu Self-administered Zone, Shan State, Myanmar. The highest temperature of Ywar Ngan Township is 39 °C and the lowest temperature is 4 °C. The total rainfall in 2020 is 43.32 inches with a total of 88 rainy days throughout the whole year. Annual rainfall and temperature of Ywar Ngan Township from 2019 to 2020 is described as followed.

Table 6. 2 Rainfall and Temperature of Myitthar Township

No.	Year	Rainfall		Temperature	
		Rainy Days	Total Rainfall (inches)	Summer (°C)	Winter (°C)
				Highest	Lowest
1.	2019	-		39	7
2.	2020	88	43.32	35	4

Source; Ywar Ngan Township Data (GAD, 2020)

6.1.2 Wind Speed and Wind Direction

The following figures describe the wind speed, wind direction and wind class frequency distribution of the proposed project site on 23rd to 24th October, 2022. According to the observed data, the wind blow to North, North East and East directions with the highest speed of 3.6 – 5.7 m/s from the project site.

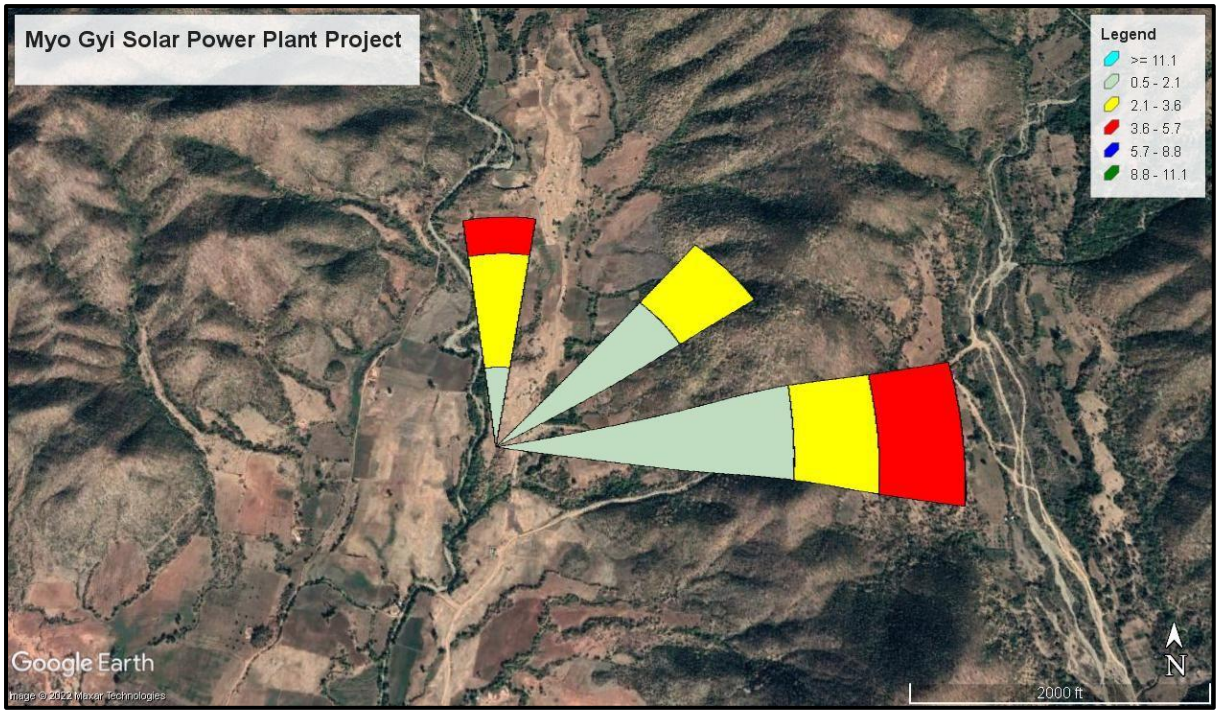


Figure 6. 1 Wind Speed and Wind Direction at the Proposed Project

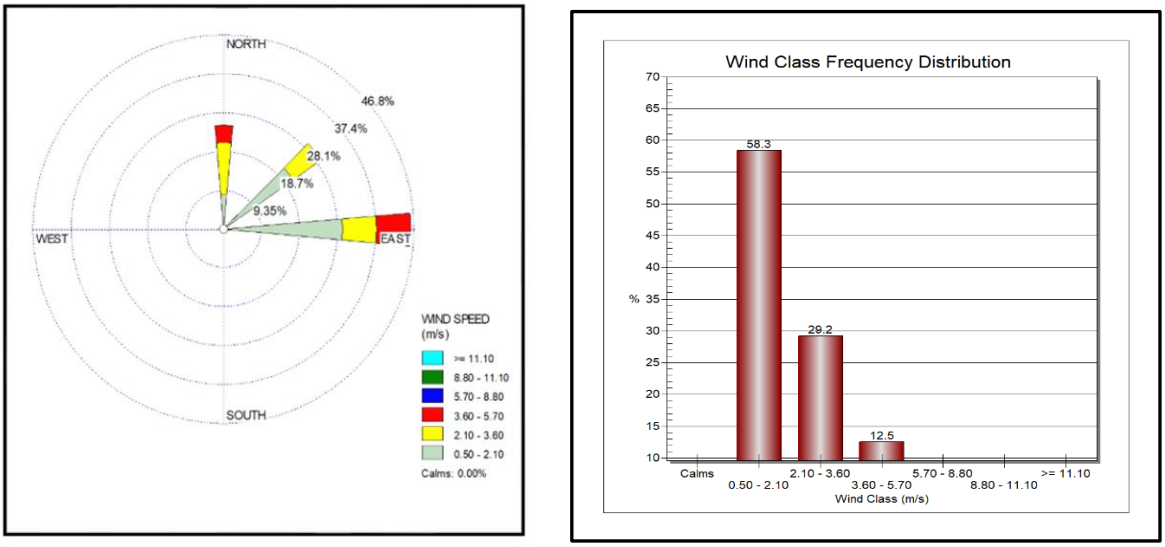


Figure 6. 2 Wind Class Frequency Distribution

6.1.3 Earthquake Intensity

Myanmar is exposed to multiple natural hazards including cyclones, earthquakes, floods and fire and it has been periodically exposed by natural disasters. The Ywar Ngan Township is located close to the Sagaing Fault, which 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.

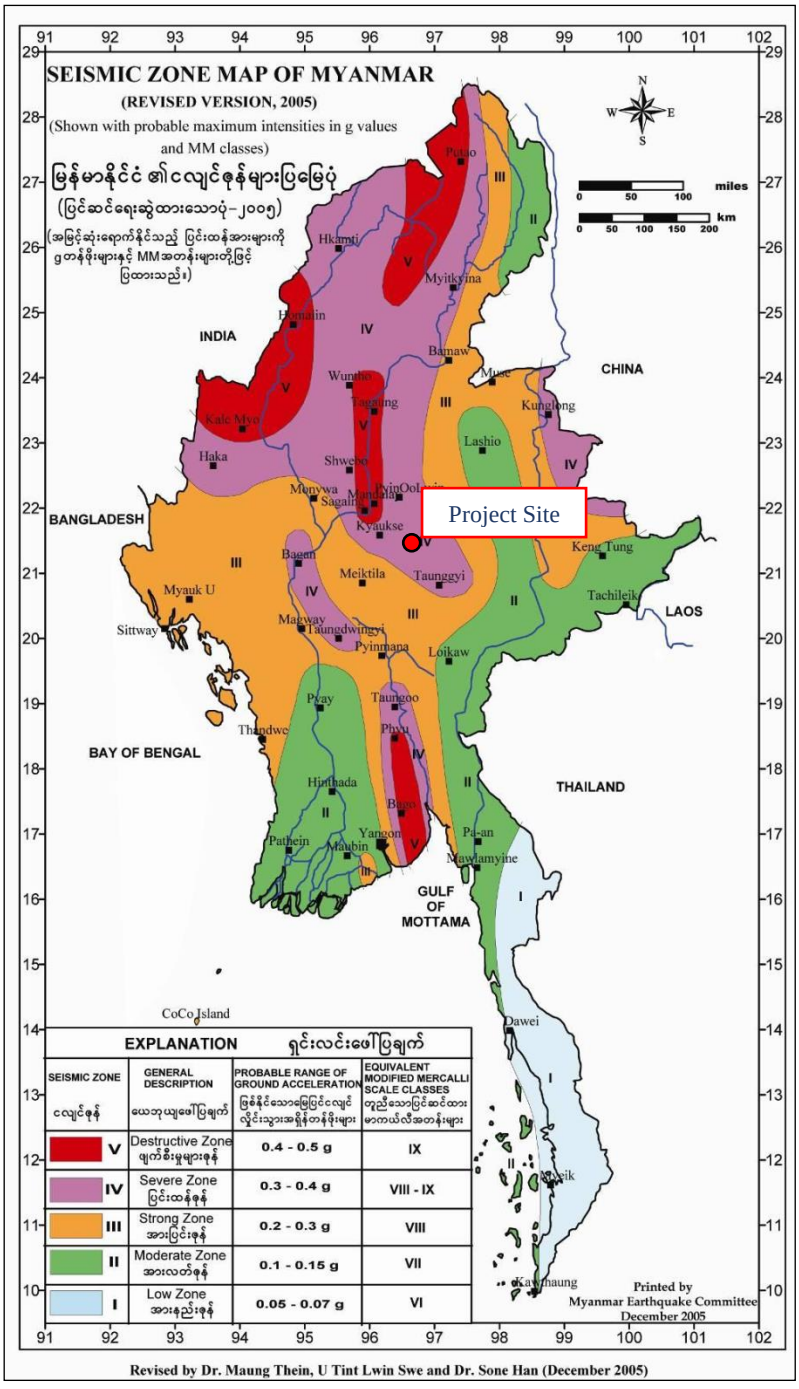


Figure 6. 3 Seismic Zone Map of Myanmar

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 taken into account 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.

As per map, the proposed project is located within the **Zone IV (Severe Zone).** Therefore, the project proponent shall consider all structural designs of the building and electrical equipment installation such as PV modules, box inverter all-in-one machines, supporting brackets and overhead transmission line in order to prevent earthquake risks.

6.1.4 Topography

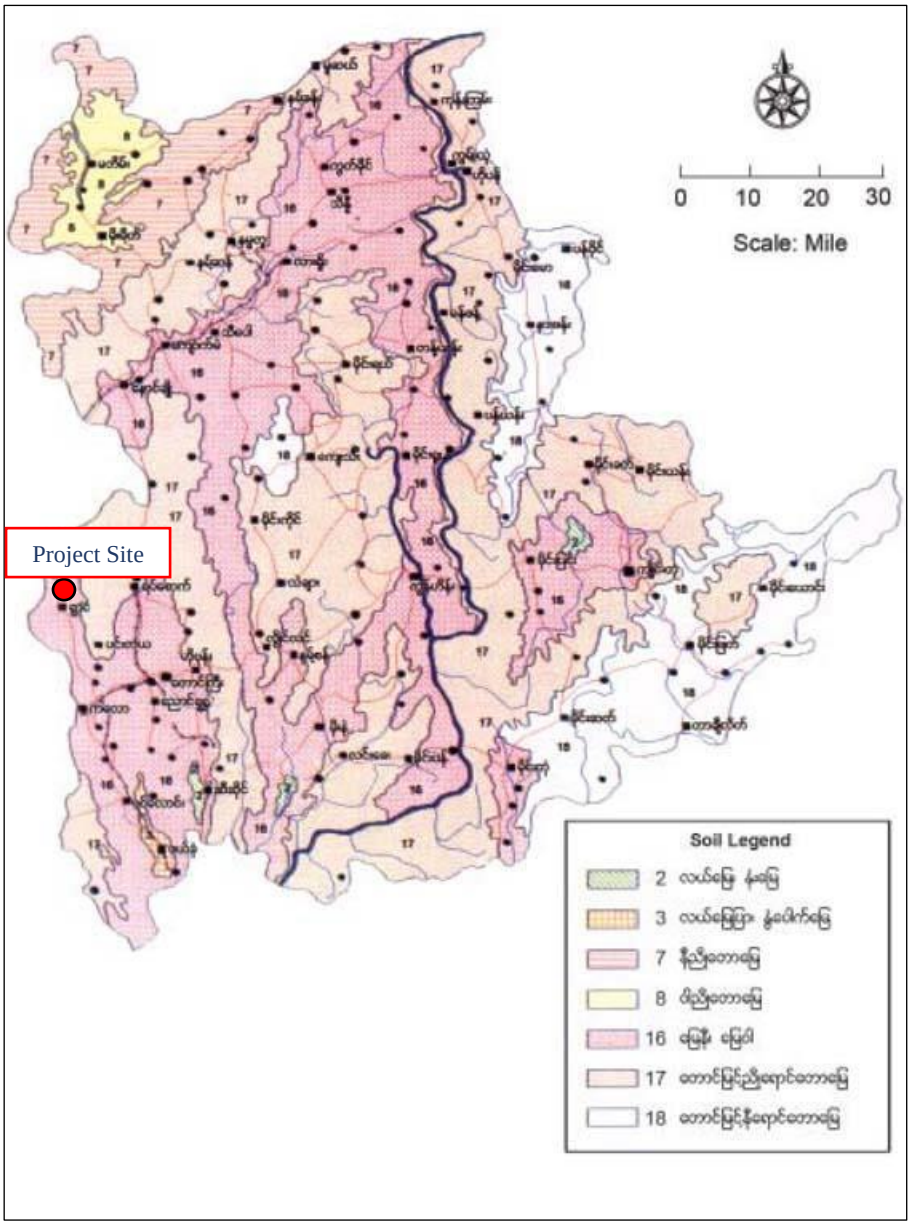
The topography of Ywar Ngan Township is mountainous and high forest-covered region. It can be categorized into three main regions: mountainous, highlands and lowlands. The well-known mountains are Ya or Me-Ne Mountain, Moe-Lone-Hein and A-Yan Mountains in the eastern part, Nghat-Kyee-Le-Swal Mountain, Ga-Nan Mountain, Pal-Htway Mountain and Taung-Swae Mountain in the western part of the township. There is a 50-mile-wide highland plain widen from the southernmost part of Kalaw Township to Yae-U area in Ywar Ngan Township. The Pan-Laung river's watershed area is located in the western part, Zaw Gyi River in the northern part and Myogyi area are the lowland areas in Ywar Ngan Township.

6.1.5 Hydrology

Only few creeks are found in Ywar Ngan Township and most creeks flow from South to North. The Zaw Gyi and Pan-Laung Rivers are the well-known rivers and Zaw Gyi River flows from Yat Sauk Township and pass through Myogyi area in Ywangan Township. The Zaw-Gyi River is freshwater and usable for agriculture and drinking purposes. The depth of the water reaches to around a meter (3 feet) during summer and no navigation cannot be used. The Panlaung River flows from Ashay-Myin-Anaut-Myin area of Ywar Ngan Township and flows through to the Ya-Ne area and finally flows into the Kinda Dam. The Panlaung River is also a freshwater river and usable for both agriculture and drinking purposes and no navigation cannot be used.

6.1.6 Soil Profile

The soil type of the proposed project is Red Earths and Yellow Earths, which is fair class and its soil texture is sandy loam and clay loam. It is suitable for upland rice, soybean, corn, groundnut and niger, tea and coffee cultivation, however, no cultivation area are found in and around the project site. Soil depth is thick, pH level is 5.0 – 5.5, Nitrogen level is medium, Phosphorus level is low and Potassium level is medium. The following figure illustrates soil map of Shan State.



Source; Land Use Division, Ministry of Agriculture and Irrigation, Myanmar.

Figure 6. 4 Soil Map of Shan State

6.2 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 (nearby temporary project office). 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 and Parameters of Air Quality Monitoring

Date	Item	GPS Coordinates	Locations	Parameters
23.10.2022 – 24.10.2022	Air Quality Monitoring Point	Lat: 21° 30' 34.36" N Long: 96° 22' 17.56" E	Nearby Temporary Project Office	**Gaseous Emission:** CO, CO_2, SO_2, NO_2 **Dust Emission:** PM_{10}, $PM_{2.5}$

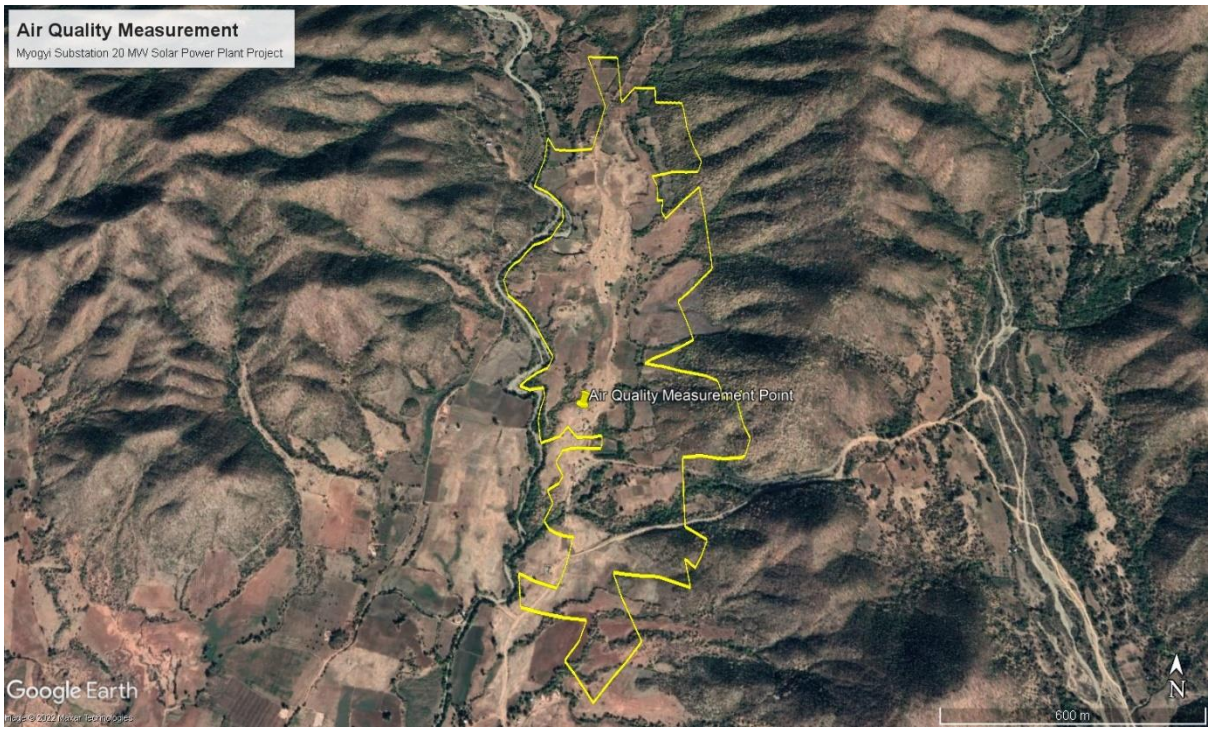


Figure 6. 5 Location of Air Quality Measurement

The following figures illustrate air quality measurement for the proposed project.


Figure 6. 6 Air Quality Monitoring at the Proposed Project

Air quality measurement was carried out in the project site on 23rd to 24th October, 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 measurement which are compared with respective guideline values for the proposed project.

Table 6. 4 Air Quality Monitoring Results

Parameter	Observed Value	Guideline Value	Guideline	Unit	Averaging Period
Gaseous Emission					
SO_2	2.50	20	NEQG	µg/m^3	24 hours
NO_2	11.95	200	NEQG	µg/m^3	1 hour
CO	0.10	9	NAAQS	ppm	8 hours
CO_2	295.60	5000	ACGIH	ppm	8 hours
Dust Emission					
PM_{10}	6.51	50	NEQG	µg/m^3	24 hours
$PM_{2.5}$	3.19	25	NEQG	µg/m^3	24 hours

According to the comparison results of gaseous emissions, the observed values of SO_2 (2.50 µg/m^3), NO_2 (11.95 µg/m^3), CO (0.10 ppm) and CO_2 (295.60 ppm) are lower than the respective guideline values. For dust emissions, the observed values of PM_{10} (6.51 µg/m^3) and $PM_{2.5}$ (3.19 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 during the construction phase. The project proponent must follow EMPs and mitigation measures in order to sustain baseline air quality of the project. The following figures describe detail air quality measurement results for 24 hours continuously at the proposed project.

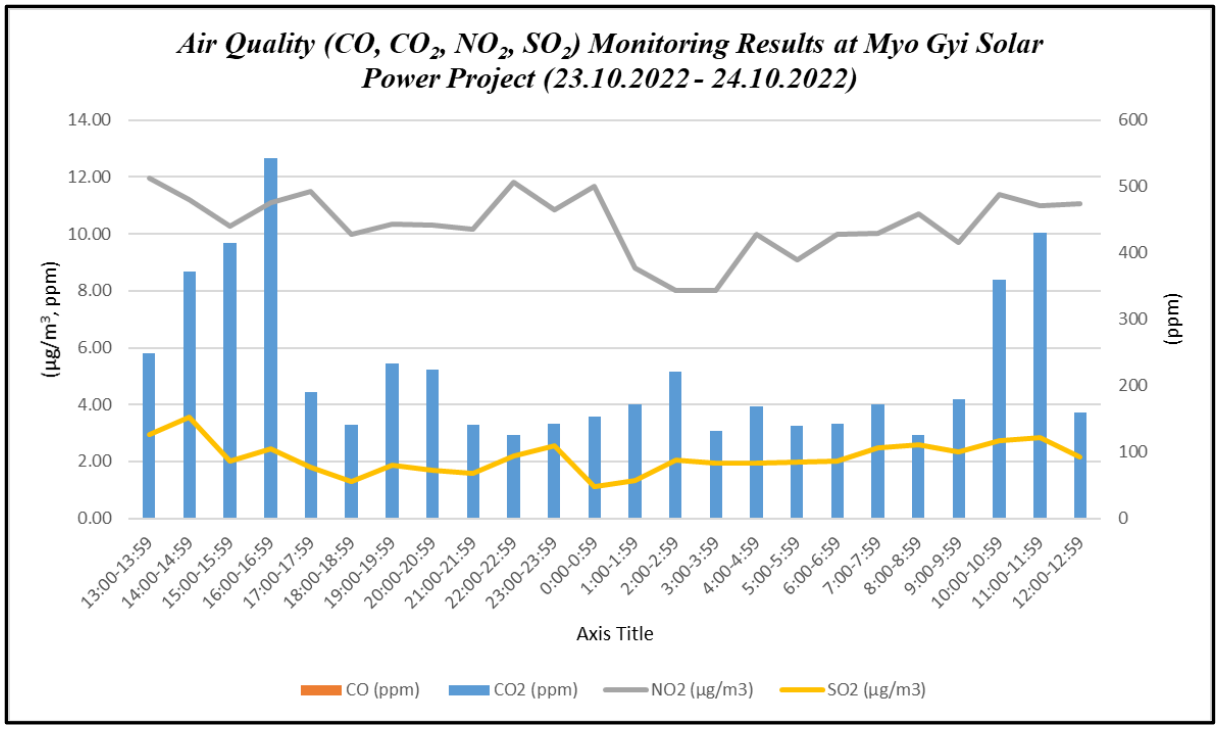


Figure 6. 7 Detail Gaseous Emissions Measurement Results

According to the results of gaseous emissions, the emission level of NO_2 increased significantly at 13:00 and 22:00. The highest CO_2 emission level is found at between 16:00 and 17:00. However, steady emission level of CO and SO_2 are investigated during 24 hours continuous measurement. It is considered that most significant level of gaseous level are found during construction working hours.

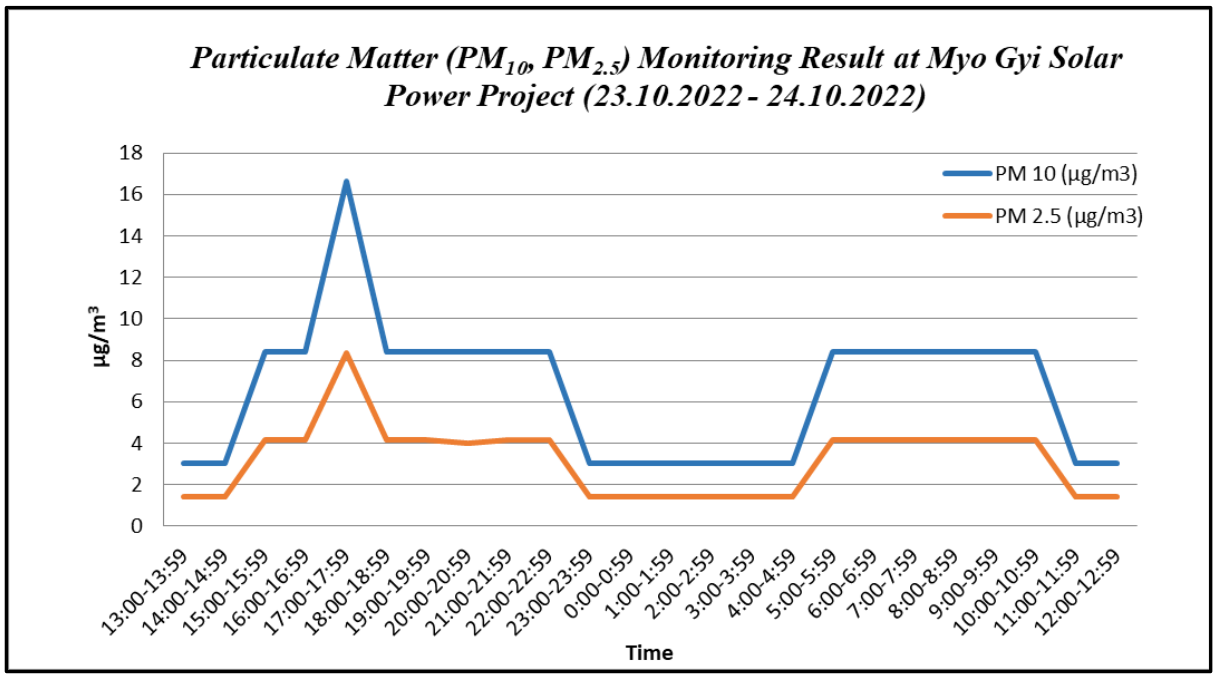


Figure 6. 8 Detail Dust Emissions Measurement Results

According to the results of dust emissions, dust generation of both PM_{10} and $PM_{2.5}$ is relatively high between 5:00-12:00, and again 15:00-22:00 with a peak level between 17:00-18:00 pm.

6.3 Water Quality

The water supply for the construction of proposed project will be obtained from a tube well adjacent to the project site. Therefore, groundwater quality is measured from that tube well and the surface quality is also measured from a small creek which flows adjacent to the project site. The existing groundwater and surface water quality were tested by two methods: on-site measurement and sampling water in order to compare the difference between quality of the groundwater and surface water before and after implementation of the project. On the other hand, there is no effluent water discharge from the project, therefore, water quality measurement for effluent water was not carried out. The survey team from E Guard sampled groundwater and surface water on 24th October, 2022 and sent to respective laboratories for measuring the required parameters. National Environmental Quality (Emission) Guideline's reference values are used to compare for data interpretation. The baseline data of groundwater and surface water quality comparing with National Environmental Quality (Emission) Guideline's reference values are described in the following table. Water quality results from laboratories test and on-site measurement are attached in **Appendix- 8 and 9**. The following figures describe location of water samplings and on-site water quality measurement and water sampling.

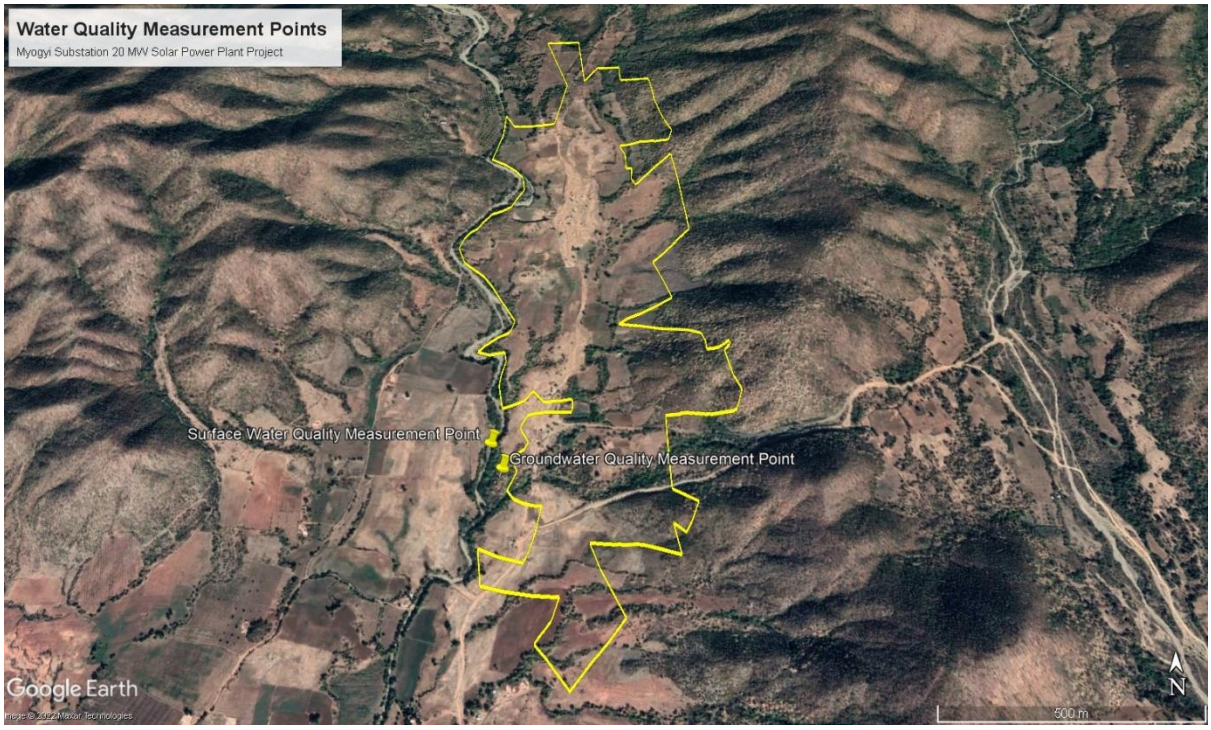


Figure 6. 9 Locations of Water Quality Monitoring

Figure 6. 10 On-site Water Quality Measurements and Water Samplings

Table 6. 5 Water Quality Results of On-site Measurement

Location	pH	Electrical Conductivity			DO (mg/l)	Turbidity (NTU)	Oxidation Reduction Potential (ORP)
		EC (ms/cm)	TDS (g/l)	Salinity (ppt)			
Groundwater	7.40	0.13	0.10	0.1	6.25	21.3	289
Surface Water	6.75	0.12	0.08	0.1	6.94	51.0	289

Table 6. 6 Water Quality Results of Water Samples

Item	Unit	Groundwater	Surface Water	National Environmental Quality (Emission) Guideline
Biological Oxygen Demand (BOD)	mg/l	2	6	30
Chemical Oxygen Demand (COD)	mg/l	32	64	125

Item	Unit	Groundwater	Surface Water	National Environmental Quality (Emission) Guideline
Total Nitrogen	mg/l	5	<2	10
Total Phosphorus	mg/l	<1.0	<1.0	2
Total suspended solid (TSS)	mg/l	7.6	8.7	50
Total coliform bacteria	CFU/100ml	40	-	400
Potassium	mg/l	1.59	1.40	-
Oil and Grease	mg/l	9	8	10
Chromium	mg/l	<0.1	<0.1	-

According to the observed values, all of the parameters are within the reference values of NEQEG for not only groundwater but also surface water. Therefore, it can be considered that both groundwater and surface water quality were quite good during the construction phase. The project proponent must follow EMPs and mitigation measures in order to sustain baseline water qualities of the project.

6.4 Noise Level

Noise level LAeq (dBA) was measured for 24 hours continuously at the selected locations by using the digital sound level meters 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 measurement at the proposed project.

Table 6. 7 Location and Parameter of Noise Level Measurement

Item	GPS Coordinates	Locations	Parameters
Point 1	Lat: 21° 30' 34.14" N Long: 96° 22' 17.57" E	Nearby Temporary Project Office	*Noise: (LAeq (dB (A))* 1hr interval for 24 hours)
Point 2	Lat: 21° 30' 32.32" N Long: 96° 22' 14.75" E	Construction Worker Camp	

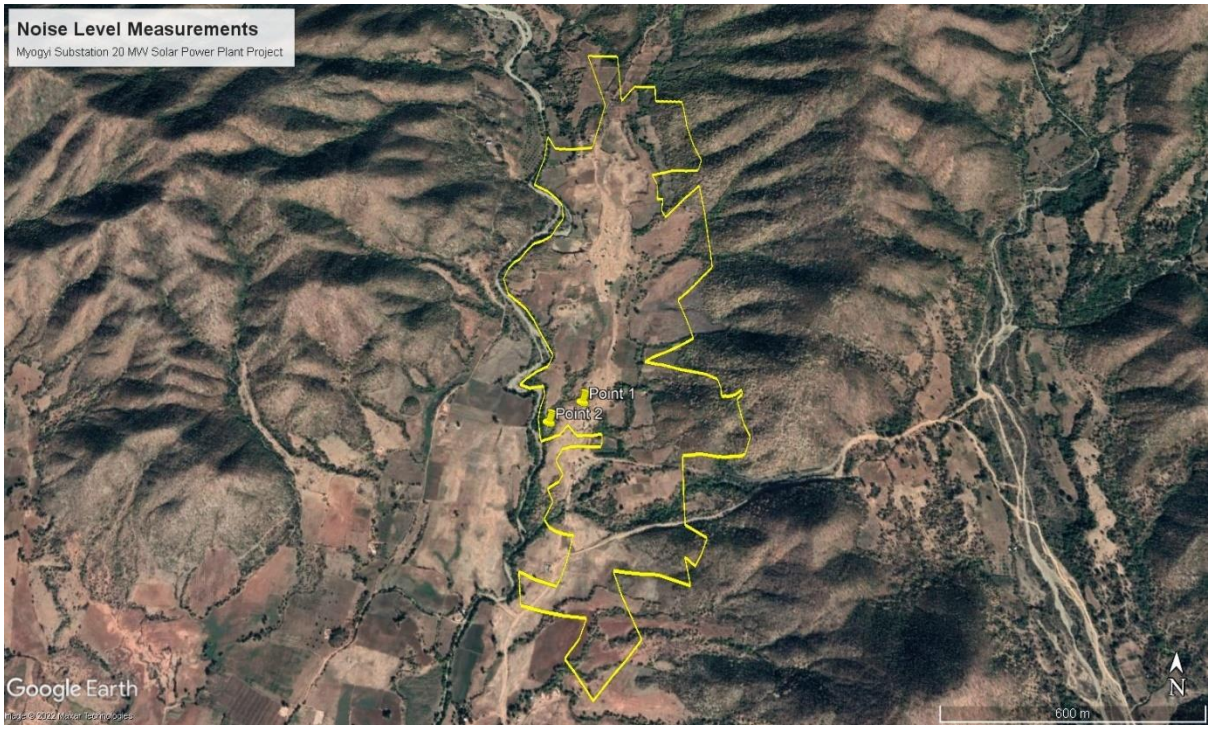


Figure 6. 11 Locations of Noise Level Monitoring

Figure 6. 12 Noise Level Monitoring at Point 1 and 2 of the Proposed Project

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. 8 Noise Level Monitoring Results

Location	Measured Values (dB (A))	
	Day Time (07:00-22:00)	**Night Time (22:00-7:00)**
Point 1	48.12	38.10
Point 2	44.26	30.89
Noise Level Standards from National Environmental Quality (Emission) Guidelines		
Standard value for industrial, commercial	70	70
Standard value for residential	55	45

As the proposed project is located at residential area, standard values for noise level at day time is considered as 55 dBA and at night time is 45 dBA. With regards to noise level at Point 1, the results are lower than standard value not only at day time (48.12 dBA) but also at night time (38.10 dBA). With regards to noise level at Point 2, the results are lower than standard value not only at day time (44.26 dBA) but also at night time (30.89 dBA). Therefore, it can be considered that the noise level at the proposed project is within the guideline value of NEQEG during construction phase of the project. The project proponent must follow EMPs and mitigation measures in order to sustain baseline noise levels of the project. The following figures illustrate detail noise level at Point 1 and 2 of the proposed project.

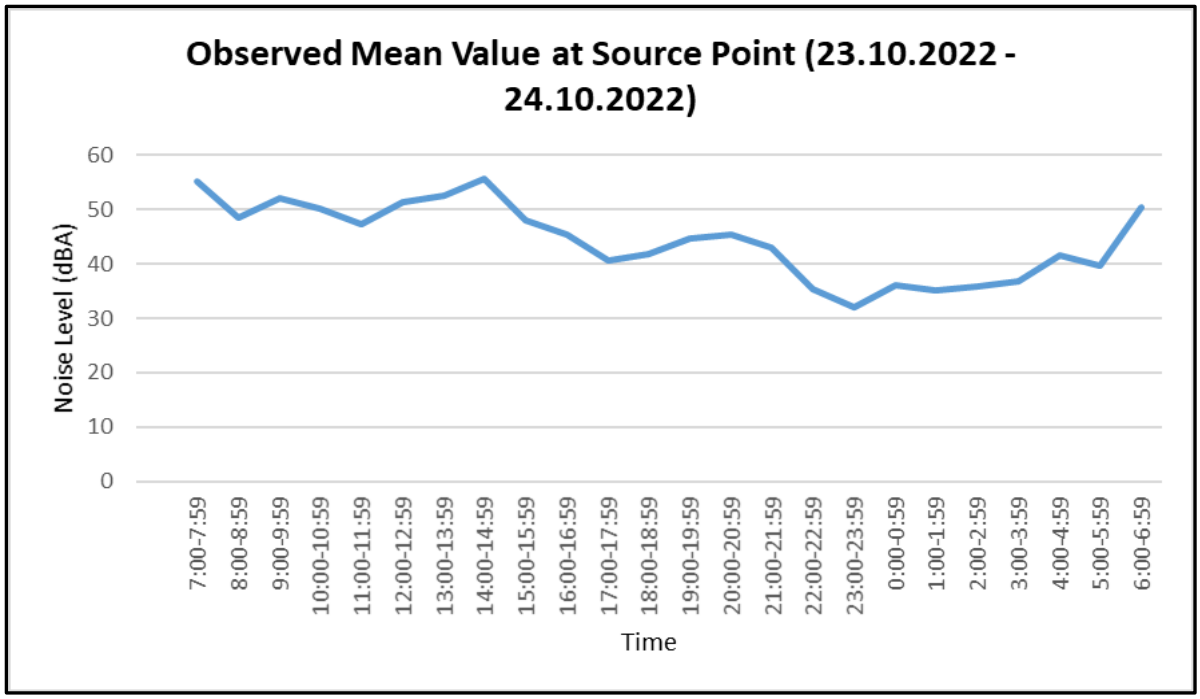


Figure 6. 13 Detail Noise Level Monitoring Results at Point 1

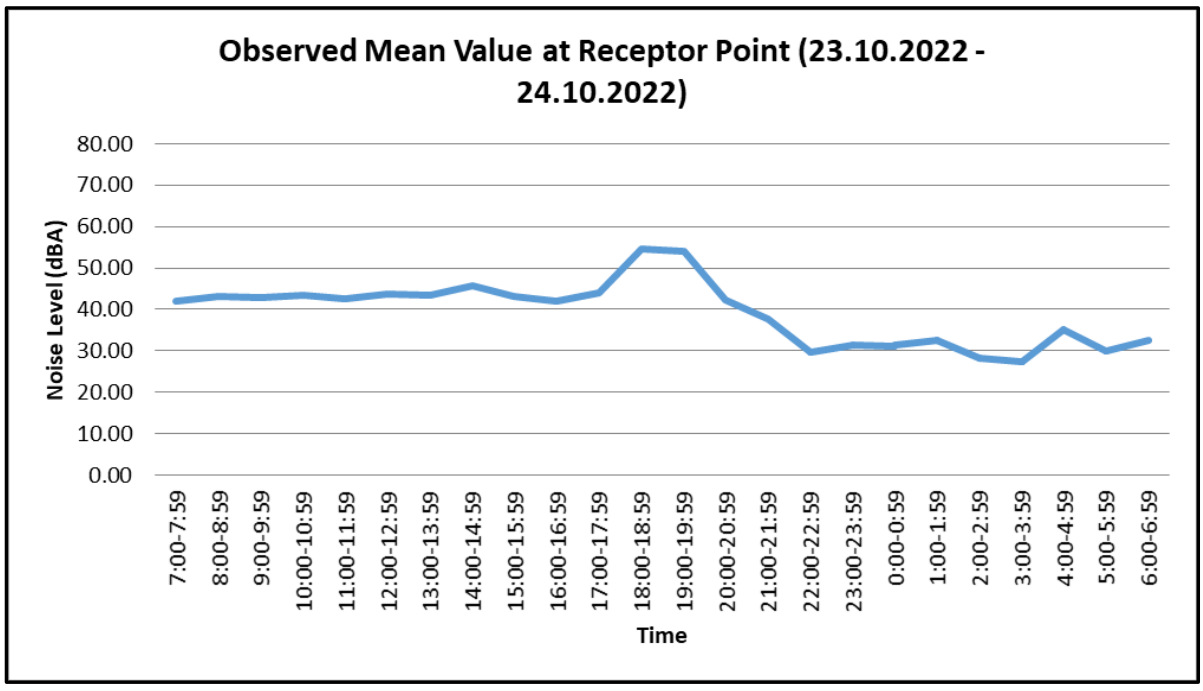


Figure 6. 14 Detail Noise Level Monitoring Results at Point 2

According to the results of noise level at Point 1, noise generation was significantly increased between 12:00 and 16:00, which is construction hour of the project. On the other hand, peak level of noise generation at Point 2 was found at between 18:00 and 20:00, when construction hour is finished and construction workers returned to their camps (Point 2 is at construction worker camps) .

6.5 Biological Environment

The existing of biologicals as not only terrestrial but also aquatic are rare conditions and only bushes and small trees are found. In addition, there are no forests, protected areas and coastal resources within the proposed project area as well as the route of overhead transmission line.

Table 6. 9 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 project, however, some tress can be found within the scope of 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
Coastal resources	No coastal resources existing within the scope of the study

Source; Ywar Ngan Township Data (GAD, 2020)

6.6 Socio-economic Environment

6.6.1 Demographic Profile

The following table describes the number of houses, households, quarter, village tracts and villages in Ywar Ngan Township.

Table 6. 10 Administrative Structure of Ywar Ngan Township

Houses	Households	Quarters	Village Tracts	Villages
20,026	20,630	3	28	125

Source; Ywar Ngan Township Data (GAD, 2020)

The detail population status of Ywar Ngan Township is described in the following table.

Table 6. 11 Population Status of Ywar Ngan Township

No.	Subject	Male	Female	Total
1.	Urban	2,202	2,431	4,533
2.	Rural	41,624	41,514	83,138
Total		**43,826**	**43,945**	**87,771**

Source; Ywar Ngan Township Data (GAD, 2020)

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

Table 6. 12 Ethnic Status of Ywar Ngan Township

No.	Ethnic	Total Population in Township	Number of Ethnic People	Percentage of Total Population
1.	Kachin	87,771	20	0.23
2.	Lisu	87,771	3	0.003
3.	Karen	87,771	24	0.27
4.	Chin	87,771	4	0.05
5.	Kayan	87,771	11	0.013
6.	Burma	87,771	3,590	4.09
7.	Rakhine	87,771	38	0.04
8.	Shan	87,771	632	0.70
9.	Pa-oh	87,771	7,020	7.99
10.	Danu	87,771	74,947	85.40
11.	Taungyo	87,771	-	-
12.	Palaung	87,771	1,404	1.60
13.	Intha	87,771	53	0.06
14.	Others	87,771	25	0.03
Total			**87,771**	**100.00**

Source; Ywar Ngan Township Data (GAD, 2020)

The detail religious status of Ywar Ngan Township is described in the following table.

Table 6. 13 Religious Status of Ywar Ngan Township

No.	Religion	Number of People
1.	Buddhist	87,764
2.	Christian	7
3.	Hindu	-
4.	Islam	-
Total		**87,771**

Source; Ywar Ngan Township Data (GAD, 2020)

6.6.2 Socio-economic Profile

Socio-economic profile of Ywar Ngan Township is summarized as the following table.

Table 6. 14 Socio-economic Conditions of Ywar Ngan Township

Socio-economic Profile	
Population of workers	Workable population- 53,578 Workers population- 50,990 Jobless population- 2,588 Jobless percentage- 4.83%
Per capita GDP	741,858 (2017-2018) 722,116 (2018-2019) 835,332 (2019-2020)

Socio-economic Profile	
Number of industries	Public factories- 0 factories Private factories- 4 factory Workshops- 0 workshop Small and medium enterprises- 187
Number of universities	N/A
Number of schools	36 Pre-primary schools 58 Primary schools 24 Post-primary schools 11 Middle schools 7 Middle schools (branch) 6 High schools 12 High schools (branch) 0 Monastery schools
Literacy percentage	100%
Public health facilities	Public general hospitals- 3 hospitals Private hospitals- 0 hospital Private clinics- 0 clinics Public clinics- 25 clinics
Transportation	The main transportation is occupied by roads only. There is no railways, navigation and aviation transport.

Source; Ywar Ngan Township Data (GAD, 2020)

6.6.3 Land Use Status

The following table describes the land use status of Myitthar Township.

Table 6. 15 Land Use Status of Myitthar Township

No.	Type of Land	Area (Acres)
1.	Agricultural Land	66,883
	Paddy land	2,956
	Dry land	48,971
	Alluvial	-
	Garden land	14,956
	Dani	-
2.	Fellow Land	5,926
	Paddy land	-
	Dry land	1374
	Alluvial	-
	Garden land	4552
	Dani	-
3.	Grazing Land	-
4.	Industrial Land	-
5.	Urban Land	1,085
6.	Rural Land	4,379
7.	Other type of Land	-

No.	Type of Land	Area (Acres)
8.	Reserved Forest/ Protected Public Forest	414,588
9.	Virgin Land	-
10.	Wild Land	81,997
11.	Non-agricultural Land	81,760
Total		**656,618**

Source; Ywar Ngan Township Data (GAD, 2020)

6.7 Historical and Well-known Places

An ancient heritage zone (Pya-Dar-Linn Cave), which is located at Le Kaing Village Tract and 55 kilometers away from the proposed project, is a historical place in Ywar Ngan Township.

7. Identification, Assessment and Mitigation Measures of Potential Impacts

7.1 Objectives of the Study

The objectives of the study are to identify 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, control building and other buildings, installation of PV modules, box inverter all-in-one machines, supporting brackets, poles of overhead transmission line and stringing cables of overhead transmission line, which will connect to the existing Myogyi Substation. The estimated construction period of the proposed project is 15 months. The construction activities of the project started in April, 2022 and will be finished in July, 2023.

Operation Phase: includes electric power generation from solar energy and distributing to the Myogyi Substation with 33 kV overhead transmission line, which length is almost 5.05 km (3.14 miles). The proposed operation period of the proposed project is 20 years.

Decommissioning Phase: after operation period, 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. The project proponent will submit the decommissioning plan prior to the termination of the project operation only when they have a plan to close their project permanently. 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 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.

A widely accepted impact assessment methodology based on the magnitude of the impacts and nature of the receptors (IEMA, 2011) was applied to assess the environmental impacts of the project mainly on air, water, soil, biodiversity, 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	6-15 years	Life of operation	Post closure
Extent (E)	Limited to the site	Limited to the local area	Limited to the region	National	International
Probability	Very improbable	Improbable	Probable	Highly probably	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 (SP)	Impact Significance
<15	Very Low
15-29	Low
30-44	Moderate
45-59	High
>59	Very High

7.4 Identification of Impacts

There may be some positive and negative impacts on surrounding environment of the project 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.

7.5 Positive Impacts

7.5.1 Construction Phase

Job Opportunities

The proposed project will create job opportunities for civil engineers, electrical engineers, surveyors, electricians, machine operators, drivers, bricklayers, carpenters and general labors. Income will be enhanced as other indirect opportunities for service providers such as security services, cleaning and waste collection. Especially, the proposed project will provide

employment opportunities for causal labors from nearby local villages. Their technology, skill, knowledge and experience will be improved to advance by cooperating with experienced engineers and workers of the project. The net effect of job opportunities creation is livelihood and living standard improvement of local community and poverty reduction.

Business Opportunities

Local construction material providers will obtain business opportunities and enhance income due to construction of the project because a huge quantity of building and road materials such as sand, gravel, stones, woods, cement and other construction materials will be required for construction. The implementation of the project will also provide several business opportunities for small-scale traders and vendors of local community such as food stalls and cold drink stalls near the project site.

7.5.2 Operation Phase

Job Opportunities

The proposed project will create job opportunities for several workers such as electrical engineers, electricians, managers, cleaners, securities and drivers as the positive impacts in operation phase. Among them, local workers and local graduates will have the chance to obtain job opportunities.

Carbon Emission Reduction and Resources Conservation

Electricity generation from solar energy emit insignificant amount of carbon into the atmosphere. This heads to less carbon emission, which compared to other types of electricity generations such as coal, oil and gas power plant. Solar power plant has a much lower effect on climate change than fossil fuel alternatives do because of fewer carbon emissions. 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.

Provision of Clean Electricity Power

The proposed project will deliver electricity to the Myogyi Substation by generating the electricity from solar energy, which is the renewable energy. The proposed project will also solve local energy demand, alleviate electricity shortage in Myanmar and help to fulfill the national electrification target of Myanmar by 2030.

Revenue to 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 as the positive impact.

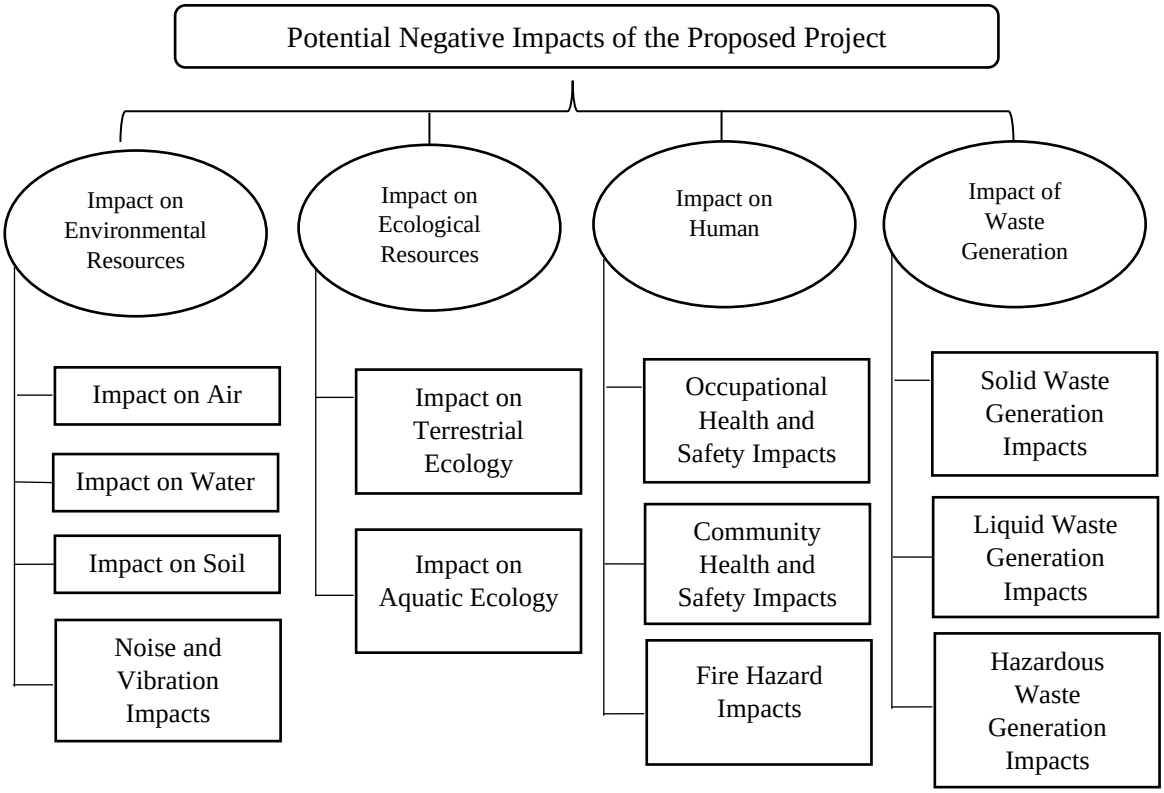
CSR Developments

The project proponent shall contribute CSR activities to surrounding local community by providing support to schools, clinics, roads and bridges throughout operation lifespan of the

project. This will lead to local community improvement due to implementation of the proposed project.

7.6 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

7.6.1 Impacts on Environmental Resources

Impact on Air

Solar Power Plant: During the construction phase, dust emission will be generated due to site clearing, leveling and earth working activities, which will get worse during dry season. Operating and movement of construction machines and vehicles such as road roller, loader, excavator, pickup truck, truck, tractor, semitrailer, concrete mixer truck and pump truck as well as operating generators and tamping machine will cause gaseous emission and dust emission into the air. Vehicles used for delivering electrical equipment and construction materials to the project site will also emit dust and gases. Odor from painting of control building and other buildings will also affect indoor air quality.

During the operation phase, gaseous emission from office vehicles, maintenance vehicles, generators, refrigerators and air conditioning system of the project is anticipated, although, dust emission due to operation activities of the project is insignificant. Odor and smoke can also be emitted from kitchen used by workers and staff.

Overhead Transmission Line: During the construction phase, operating and movement of construction vehicles and transportation vehicles can generate dust and gaseous emission. Other sources of dust generation include site clearing, leveling and earth working activities along the route of overhead transmission line.

During the operation phase, dust and gases can be only generated by operating and movement of maintenance vehicles.

Impact on Water

Solar Power Plant: During the construction phase, groundwater and surface water of nearby small creek may be contaminated by oil spillage and leakage from construction machines, construction vehicles, transportation vehicles and generators. Water discharged from construction activities may also contaminate groundwater and surface water. Especially, concrete foundation of tracking brackets, switchyard, control building and other buildings 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. Groundwater pollution can be occurred due to improper temporary PV modules storage, cracked or damaged PV modules due to improper installation, improper waste storage, fuel storage, refueling, machineries maintenance and parking area by penetrating into groundwater layer. Water usage demand will also increase for site clearing, site preparation, water spraying activities and other water required construction activities and used by construction workers.

During the operation phase, groundwater and surface water contamination can be occurred due to oil and waste spillage and leakage from box inverter all-in-one machines accident, improper waste storage, fuel storage and refueling. Poor waste management may also lead to blocking of drains, which will cause to flooding and unsanitary conditions within the project site. Improper handling of cracked or damaged PV modules due to improper cleaning and maintenance activities, uninstalled lifespan-expired PV modules and batteries when exchanging new PV modules and batteries are other sources of groundwater pollution because these PV modules release toxic chemicals when cracking. Water consumption will increase due to the surface dust cleaning of PV modules to promote their efficiency for electricity generation.

Overhead Transmission Line: During the construction phase, water discharged from construction activities will also contaminate groundwater and nearby surface water. Especially, there is negative impact on groundwater quality because of concrete foundation construction for poles of overhead transmission line.

Impacts on Soil

Solar Power Plant: During the construction phase, site preparation and leveling activities for construction will disturb soil structure and formation. Especially, soil excavation for the foundation of tracking brackets, switchyard, control building and other buildings can result soil structure disturbance. Consequently, it may cause an increasing soil erosion within the project site and release of sediments into the natural drainage system and surface water. During

construction activities, top soil nutrient layers will be removed, lower soil will be covered and in somewhere soil layer will be mixed. Oil spills and leakage from construction machines, construction vehicles, generators and transportation vehicles can cause soil pollution. Soil pollution can be occurred due to improper temporary PV modules storage, cracked or damaged PV modules released from improper installing, improper waste storage, fuel storage, refueling, machineries maintenance and parking area.

During the operation phase, improper handling of cracked or damaged PV modules due to improper cleaning and maintenance activities, uninstalled lifespan-expired PV modules and batteries when exchanging new PV modules and batteries are main drivers of soil contamination because these PV modules release toxic chemicals when cracking. Leakage from improper waste storage, oil spillage and leakage from box inverter all-in-one machines accident, fuel storage and refueling will cause soil pollution.

Overhead Transmission Line: During the construction phase, soil excavation for the foundation construction for poles of overhead transmission line will cause soil structure and formation disturbance. Stringing cables for overhead transmission line will also disturb soil structure and upper soil layer.

Noise and Vibration Impacts

Solar Power Plant: During the construction phase, operating and movement of construction machines and vehicles such as road roller, loader, excavator, pickup truck, truck, tractor, semitrailer, concrete mixer truck and pump truck as well as operating generators and tamping machine are main sources of noise and vibration generation. Improper mobilization of construction machines and vehicles, unloading electrical equipment, construction materials and other equipment will also cause noise pollution.

During the operation phase, noise will be generated by movement of management vehicles and maintenance vehicles and operating generators. Other sources include operating box inverter all-in-one machines; however, this impact is insignificant.

Overhead Transmission Line: During the construction phase, improper unloading electrical equipment and cables for overhead transmission line will generate noise and vibration. Other noise generation sources include operating and movement of construction machines and vehicles for erecting poles and stringing cables.

During the operation phase, main source of noise generation is only from operating maintenance and management vehicles, however, this impact is insignificant.

7.6.2 Impacts on Ecological Resources

Impacts on Terrestrial Ecology

Solar Power Plant: The impact on terrestrial ecology is insignificance during construction and operation phases because the project site composed of only bushes and small trees and there is no huge natural vegetation or forests within the project site. There is no national park, reserved

forest, protected public forest, protected area and wildlife within the scope of study area of the proposed project.

Overhead Transmission Line: Overhead transmission line will pass through mainly agricultural and farm land, and only bushes and small trees are found along the route of overhead transmission line. Therefore, the impacts on terrestrial ecology is also insignificance during construction and operation phases**.**

Impacts on Aquatic Ecology

Solar Power Plant: The impact on aquatic ecology is insignificance during construction and operation phases because there is no marine park, coastal resources and mangrove area within the scope of study area for the proposed project. However, a small creek, namely the Nga Mwal Creek passes adjacent to the project site.

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.

7.6.3 Impacts on Human Resources

Impacts on Occupational Health and Safety

Solar Power Plant: During the construction phase, falling from height related to ladder which can cause fatal or permanent disabling injury is the common potential accidental injury. Small injuries due to slips and falls, accidents and electric shock can also occur as the effects of mismanagement. Improper management of construction activities in erection and installation of electrical equipment, metal grinding, welding and cutting, concrete work, piling, access roads construction, high-speed vehicles driving, absence of proper traffic sign and warning sign board can impact negatively 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 construction materials in the construction site can pose temporary hazard such as physical contact, spill, dust emission, noise and vibration. Construction workers' safety could be also affected by lack of adequate Personal Protective Equipment (PPEs). Domestic wastewater such as grey water and black water discharged by construction workers can impact on worker's health if not managed properly because of its adverse smell. A certain number of migrant construction workers will enter 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. The construction workers can also be infected COVID-19 virus during Pandemic period, if they do not follow strictly the instructions.

During the operation phase, falling from height related to ladder for maintenance activities which can cause fatal or permanent disabling injury is the common occupational health and safety impact. 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 lockout-tagout system while repair and maintenance for electrical equipment of solar power plant. 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 control building and other buildings 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 operation workers and staff can also be infected COVID-19 virus during Pandemic period, if they do not follow strictly the instructions.

Overhead Transmission Line: During the construction phase, falling from height related to poles of overhead transmission line for poles erection and cable stringing which can cause fatal or permanent disabling injury is the common potential accidental 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 construction materials for 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 the safety of construction workers.

During the operation phase, falling from height related to poles 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.

Impacts on Community Health and Safety

Solar Power Plant: During the construction phase, the common community health and safety impacts of the project include accidents due to operating and movement of construction machines, vehicles and transportation vehicles at public roads. Earth working and site leveling activities, switchyard, control building, other buildings 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 insignificance because of short construction period and certain distance from adjacent 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 adjacent 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 impact on nearby local communities under particular conditions. Nearby villagers have high risk for electric shock due to entering into the project site without permission. Operating

management vehicles and maintenance vehicles at public roads can also impact on community health and safety.

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

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

Fire Hazards Impacts

Solar Power Plant: During the construction phase, poor installation of electrical equipment and overloads, heating from bunched cables and damaged cables at construction workers camp and working area are common high risks of fire hazards. Improper storage of raw materials for electrical equipment and construction materials at temporary storage yard can cause fire hazards. Main sources for fire hazards also include fuel storage area, improper fuel handling and improper maintenance of construction machines and vehicles.

During the operation phase, improper and irregular maintenance of electrical equipment of solar power plant are common high risks of fire hazards. Other factors are fuel storage area, improper fuel handling, overloads, heating from bunched cables and damaged cables at switchyard, control building and other buildings.

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

7.6.4 Wastes Generation Impacts

Solid Wastes Generation Impacts

Solar Power Plant: During the construction phase, rejected components and packaging materials of electrical equipment and building materials, surplus materials, papers, containers, broken bricks, solvent containers are common solid wastes. These solid wastes can be injurious to the environment through blockage of natural drains and drainage systems because these wastes may contain hazardous substances such as residue of cement, adhesive and cleaning solvents bottles. Site preparation, access road construction and leveling activities can generate construction soil wastes due to excavation as well as site clearance activities for PV modules, switchyard, control building and other building construction will also generate vegetation debris. Domestic solid wastes like garbage and organic waste from construction workers camp and construction area are other sources of solid waste generation.

During the operation phase, no operation solid waste will be disposed of from the proposed project's operation processes for electricity generation. However, domestic solid waste such as garbage, rejected stationary materials and organic waste from control building and other buildings are anticipated as common solid wastes generation.

Overhead Transmission Line: During the construction phase, site clearance activities along right of way for overhead transmission line will generate vegetation debris.

Liquid Waste Generation Impacts

Solar Power Plant: During the construction phase, common liquid waste includes cleaning construction vehicles and machines within the project site, however, it has an insignificant impact. Domestic liquid waste such as black water from toilets used by construction workers and grey water from basins and bath places in construction workers camp will be also discharged from the proposed project.

During the operation phase, the surface dust cleaning of PV modules to promote their efficiency for electricity generation and this liquid waste can contain dust, which is main source of operation liquid waste. Domestic liquid waste like black water from toilets and grey water from basins and bathrooms of control building and other buildings within the project site are other sources.

Overhead Transmission Line: No liquid waste will be generated from not only construction activities but also operation activities of overhead transmission line.

Hazardous Waste Generation Impacts

Solar Power Plant: During the construction phase, cracked or damaged PV modules due to improper installation are common hazardous waste generation of the proposed project because PV modules release toxic chemicals when cracking. Used oil disposed of from repair and maintenance of construction machines and vehicles, oil spills and leakage from refueling, fuel storage area, machineries maintenance area and parking area within the project site are other sources of hazardous waste generation.

During the operation phase, common hazardous wastes include cracked or damaged PV modules due to improper cleaning activities and maintenance activities. Uninstalled lifespan-expired PV modules and batteries when exchanging new ones are also common hazardous wastes. Used oil from box inverter all-in-one machines, oil spills and leakage from maintenance activities, vehicles, refueling and fuel storage area are other sources of hazardous waste generation.

Overhead Transmission Line: No hazardous waste will be generated from not only construction activities but also operation activities of overhead transmission line.

7.7 Impact Significance

The above-mentioned potential adverse impacts of the proposed project should be assessed in order to formulate for reducing these impacts. Therefore, the following table shows the details impact significance of potential adverse impacts of the project.

Table 7. 3 Details Impact Significance of Potential Adverse Impacts of the Project

No.	Potential Adverse Impacts	Project Activities	Significance of Potential Adverse Impacts					Impact Significance
			M	D	E	P	SP	
A.	**Construction Phase**							
1.	Impacts on Air	**Solar Power Plant:** • Dust emission will be generated due to site clearing, leveling and earth working activities, which will get worse during dry season • Operating and movement of construction machines and vehicles such as road roller, loader, excavator, pickup truck, truck, tractor, semitrailer, concrete mixer truck and pump truck as well as operating generators and tamping machine will cause gaseous emission and dust emission • Vehicles used for delivering electrical equipment and construction materials to the project site will also emit dust and gases	4	1	2	5	35	Moderate

No.	Potential Adverse Impacts	Project Activities	Significance of Potential Adverse Impacts					Impact Significance
			M	D	E	P	SP	
		• Odor from painting of control building and other buildings will also affect indoor air quality **Overhead Transmission Line:** • Operating and movement of construction vehicles and transportation vehicles can generate dust and gaseous emission • Other sources of dust generation include site clearing, leveling and earth working activities						
2.	Impacts on Water	**Solar Power Plant:** • Groundwater and surface water of nearby small creek may be contaminated by oil spillage and leakage from construction machines, construction vehicles, transportation vehicles and generators • Water discharged from construction activities may also contaminate groundwater and surface water	3	1	2	3	18	Low

No.	Potential Adverse Impacts	Project Activities	Significance of Potential Adverse Impacts					Impact Significance
			M	D	E	P	SP	
		• Concrete foundation of tracking brackets, switchyard, control building and other buildings 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 • Groundwater pollution can be occurred due to improper temporary PV modules storage, cracked or damaged PV modules due to improper installation, improper waste storage, fuel storage, refueling, machineries maintenance and parking area • Water usage demand will also increase for site clearing, site preparation, water spraying activities and other water required						

No.	Potential Adverse Impacts	Project Activities	Significance of Potential Adverse Impacts					Impact Significance
			M	D	E	P	SP	
		construction activities and used by construction workers **Overhead Transmission Line:** • Water discharged from construction activities will also contaminate groundwater and nearby surface water • There is negative impact on groundwater quality because of concrete foundation construction for poles of overhead transmission line						
3.	Impacts on Soil	**Solar Power Plant:** • Site preparation and leveling activities for construction will disturb soil structure and formation • Soil excavation for the foundation of tracking brackets, switchyard, control building and other buildings can result soil structure disturbance • Consequently, it may cause an increasing soil erosion within the	5	1	1	5	35	Moderate

No.	Potential Adverse Impacts	Project Activities	Significance of Potential Adverse Impacts					Impact Significance
			M	D	E	P	SP	
		project site and release of sediments into the natural drainage system and surface water • Top soil nutrient layers will be removed, lower soil will be covered and in somewhere soil layer will be mixed • Oil spills and leakage from construction machines, construction vehicles, generators and transportation vehicles can cause soil pollution • Soil pollution can be occurred due to improper temporary PV modules storage, cracked or damaged PV modules released from improper installing, improper waste storage, fuel storage, refueling, machineries maintenance and parking area **Overhead Transmission Line:** • Soil excavation for the foundation construction for poles of overhead						

No.	Potential Adverse Impacts	Project Activities	Significance of Potential Adverse Impacts					Impact Significance
			M	D	E	P	SP	
		transmission line will cause soil structure and formation disturbance • Stringing cables for overhead transmission line will also disturb soil structure and upper soil layer						
4.	Noise and Vibration Impacts	**Solar Power Plant:** • Operating and movement of construction machines and vehicles such as road roller, loader, excavator, pickup truck, truck, tractor, semitrailer, concrete mixer truck and pump truck as well as operating generators and tamping machine are main sources of noise and vibration generation • Improper mobilization of construction machines and vehicles, unloading electrical equipment, construction materials and other equipment will also cause noise pollution **Overhead Transmission Line:**	4	1	1	5	30	Moderate

No.	Potential Adverse Impacts	Project Activities	Significance of Potential Adverse Impacts					Impact Significance
			M	D	E	P	SP	
		• Improper unloading electrical equipment and cables for overhead transmission line will generate noise and vibration • Other noise generation sources include operating and movement of construction machines and vehicles for erecting poles and stringing cables						
5.	Impacts on Occupational Health and Safety	**Solar Power Plant:** • Falling from height related to ladder which can cause fatal or permanent disabling injury is the common potential accidental injury • Small injuries due to slips and falls, accidents and electric shock can also occur as the effects of mismanagement • Improper management of construction activities in erection and installation of electrical equipment, metal grinding, welding and cutting, concrete work, piling,	5	1	1	4	28	Low

No.	Potential Adverse Impacts	Project Activities	Significance of Potential Adverse Impacts					Impact Significance
			M	D	E	P	SP	
		access roads construction, high-speed vehicles driving, absence of proper traffic sign and warning sign board can impact negatively 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 construction materials in the construction site can pose temporary hazard such as physical contact, spill, dust emission, noise and vibration • Construction workers' safety could be also affected by lack of adequate Personal Protective Equipment (PPEs) • Domestic wastewater such as grey water and black water discharged by construction workers can impact on worker's health if not managed properly						

No.	Potential Adverse Impacts	Project Activities	Significance of Potential Adverse Impacts					Impact Significance
			M	D	E	P	SP	
		• A certain number of migrant construction workers will enter 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) • The construction workers can also be infected COVID-19 virus during Pandemic period, if they do not follow strictly the instructions **Overhead Transmission Line:** • Falling from height related to poles of overhead transmission line for poles erection and cable stringing which can cause fatal or permanent disabling injury is the common potential accidental injury • Use of lifting equipment for overhead transmission line stringing can also impact on occupational health and safety						

No.	Potential Adverse Impacts	Project Activities	Significance of Potential Adverse Impacts					Impact Significance
			M	D	E	P	SP	
		• Poor working conditions will damage health and put workers at risk as well as operating machinery and using construction materials for 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 the safety of construction workers						
6.	Impacts on Community Health and Safety	**Solar Power Plant:** • Common community health and safety impacts of the project include accidents due to operating and movement of construction machines, vehicles and transportation vehicles at public roads • Earth working and site leveling activities, switchyard, control	4	1	2	4	28	Low

No.	Potential Adverse Impacts	Project Activities	Significance of Potential Adverse Impacts					Impact Significance
			M	D	E	P	SP	
		building, other buildings 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 **Overhead Transmission Line:** • Main impact of community health and safety include overhead transmission line's cable stringing and poles erection activities along the route • Other impacts are operating and movement of construction vehicles and machines						
7.	Fire Hazard Impacts	• Poor installation of electrical equipment and overloads, heating from bunched cables and damaged cables at construction workers camp and working area are common high risks of fire hazards	5	1	1	4	28	Low

No.	Potential Adverse Impacts	Project Activities	Significance of Potential Adverse Impacts					Impact Significance
			M	D	E	P	SP	
		• Improper storage of raw materials for electrical equipment and construction materials at temporary storage yard can cause fire hazards • Main sources for fire hazards also include fuel storage area, improper fuel handling and improper maintenance of construction machines and vehicles						
8.	Solid Waste Generation Impacts	**Solar Power Plant:** • Rejected components and packaging materials of electrical equipment and building materials, surplus materials, papers, containers, broken bricks, solvent containers are common solid wastes • These solid wastes can be injurious to the environment through blockage of natural drains and drainage systems because these wastes may contain hazardous substances such as residue of	4	1	1	5	30	Moderate

No.	Potential Adverse Impacts	Project Activities	Significance of Potential Adverse Impacts					Impact Significance
			M	D	E	P	SP	
		cement, adhesive and cleaning solvents bottles • Site preparation, access road construction and leveling activities can generate construction soil wastes due to excavation • Site clearance activities for PV modules, switchyard, control building and other building construction will also generate vegetation debris • Domestic solid wastes like garbage and organic waste from construction workers camp and construction area are other sources of solid waste generation **Overhead Transmission Line:** • Site clearance activities along right of way for overhead transmission line will generate vegetation debris						

No.	Potential Adverse Impacts	Project Activities	Significance of Potential Adverse Impacts					Impact Significance
			M	D	E	P	SP	
9.	Liquid Waste Generation Impacts	• Common liquid waste includes cleaning construction vehicles and machines within the project site • Domestic liquid waste such as black water from toilets used by construction workers and grey water from basins and bath places in construction workers camp will be also discharged	2	1	1	3	12	Very Low
10.	Hazardous Waste Generation Impacts	• Cracked or damaged PV modules due to improper installation are common hazardous waste generation of the proposed project because PV modules release toxic chemicals when cracking • Used oil disposed of from repair and maintenance of construction machines and vehicles, oil spills and leakage from refueling, fuel storage area, machineries maintenance area and parking area within the project site are other	4	1	1	4	24	Low

No.	Potential Adverse Impacts	Project Activities	Significance of Potential Adverse Impacts					Impact Significance
			M	D	E	P	SP	
		sources of hazardous waste generation						
B.	**Operation Phase**							
1.	Impacts on Air	**Solar Power Plant:** • Gaseous emission from office vehicles, maintenance vehicles, generators, refrigerators and air conditioning system of the project is anticipated, although, dust emission due to operation activities of the project is insignificant • Odor and smoke can also be emitted from kitchen used by workers and staff **Overhead Transmission Line:** • Dust and gases can be only generated by operating and movement of maintenance vehicles	3	4	2	3	27	Low
2.	Impacts on Water	• Groundwater and surface water contamination can be occurred due to oil and waste spillage and	4	4	2	4	40	Moderate

No.	Potential Adverse Impacts	Project Activities	Significance of Potential Adverse Impacts					Impact Significance
			M	D	E	P	SP	
		leakage from box inverter all-in-one machines accident, improper waste storage, fuel storage and refueling • Poor waste management may also lead to blocking of drains, which will cause to flooding and unsanitary conditions within the project site • Improper handling of cracked or damaged PV modules due to improper cleaning and maintenance activities and uninstalled lifespan-expired PV modules and batteries when exchanging new PV modules and batteries are other sources of groundwater pollution because these PV modules release toxic chemicals when cracking • Water consumption will increase due to the surface dust cleaning of PV modules to promote their efficiency for electricity generation						

No.	Potential Adverse Impacts	Project Activities	Significance of Potential Adverse Impacts					Impact Significance
			M	D	E	P	SP	
3.	Impacts on Soil	• Improper handling of cracked or damaged PV modules due to improper cleaning and maintenance activities and uninstalled lifespan-expired PV modules and batteries when exchanging new PV modules and batteries are main drivers of soil contamination because these PV modules release toxic chemicals when cracking • Leakage from improper waste storage, oil spillage and leakage from box inverter all-in-one machines accident, fuel storage and refueling will cause soil pollution	3	4	1	3	24	Low
4.	Noise Impacts	**Solar Power Plant:** • Noise will be generated by movement of management vehicles and maintenance vehicles and operating generators • Other sources include operating box inverter all-in-one machines **Overhead Transmission Line:**	3	4	1	3	24	Low

No.	Potential Adverse Impacts	Project Activities	Significance of Potential Adverse Impacts					Impact Significance
			M	D	E	P	SP	
		• Main source of noise generation is only from operating maintenance and management vehicles						
5.	Impacts on Occupational Health and Safety	**Solar Power Plant:** • Falling from height related to ladder for maintenance activities which can cause fatal or permanent disabling injury is the common occupational health and safety impact • 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 • Workers' safety could be affected by lack of adequate Personal Protective Equipment (PPEs) and lockout-tagout system while repair	5	4	1	4	40	Moderate

No.	Potential Adverse Impacts	Project Activities	Significance of Potential Adverse Impacts					Impact Significance
			M	D	E	P	SP	
		and maintenance for electrical equipment • 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 control building and other buildings 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 operation workers and staff can also be infected COVID-19 virus during Pandemic period, if they do not follow strictly the instructions						

No.	Potential Adverse Impacts	Project Activities	Significance of Potential Adverse Impacts					Impact Significance
			M	D	E	P	SP	
		Overhead Transmission Line: • Falling from height related to poles 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						
6.	Impacts on Community Health and Safety	**Solar Power Plant:** • Electromagnetic field can be occurred due to the operations of PV modules and switchyard, which can impact on community health of adjacent villagers • Although, there is a certain distance from project site to local communities, glint and glare from PV modules can impact on nearby	4	4	2	4	40	Moderate

No.	Potential Adverse Impacts	Project Activities	Significance of Potential Adverse Impacts					Impact Significance
			M	D	E	P	SP	
		local communities under particular conditions • Nearby villagers have high risk for electric shock due to entering into the project site without permission • Operating management vehicles and maintenance vehicles at public roads can also impact on community health and safety **Overhead Transmission Line:** • Maintenance activities for overhead transmission line and climbing poles of overhead transmission line by nearby villagers are main community health and safety impacts						
7.	Fire Hazard Impacts	**Solar Power Plant:** • Improper and irregular maintenance of electrical equipment of solar power plant are common high risks of fire hazards	5	4	1	4	40	Moderate

No.	Potential Adverse Impacts	Project Activities	Significance of Potential Adverse Impacts					Impact Significance
			M	D	E	P	SP	
		• Other factors are fuel storage area, improper fuel handling, overloads, heating from bunched cables and damaged cables at switchyard, control building and other buildings **Overhead Transmission Line:** • Improper and irregular maintenance of overhead transmission line is main fire hazard impact due to electric shock						
8.	Solid Waste Generation Impacts	• Domestic solid waste such as garbage, rejected stationary materials and organic waste from control building and other buildings are anticipated as common solid wastes generation	2	4	1	3	21	Low
9.	Liquid Waste Generation Impacts	• Surface dust cleaning of PV modules to promote their efficiency for electricity generation and this liquid waste can contain dust, which is main source of operation liquid waste	3	4	1	5	40	Moderate

No.	Potential Adverse Impacts	Project Activities	Significance of Potential Adverse Impacts					Impact Significance
			M	D	E	P	SP	
		• Domestic liquid waste like black water from toilets and grey water from basins and bathrooms of control building and other buildings within the project site are other sources						
10.	Hazardous Waste Generation Impacts	• Common hazardous wastes include cracked or damaged PV modules due to improper cleaning activities and maintenance activities • Uninstalled lifespan-expired PV modules and batteries when exchanging new ones are also common hazardous wastes • Used oil from box inverter all-in-one machines, oil spills and leakage from maintenance activities, vehicles, refueling and fuel storage area are other sources of hazardous waste generation	4	4	1	4	36	Moderate

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

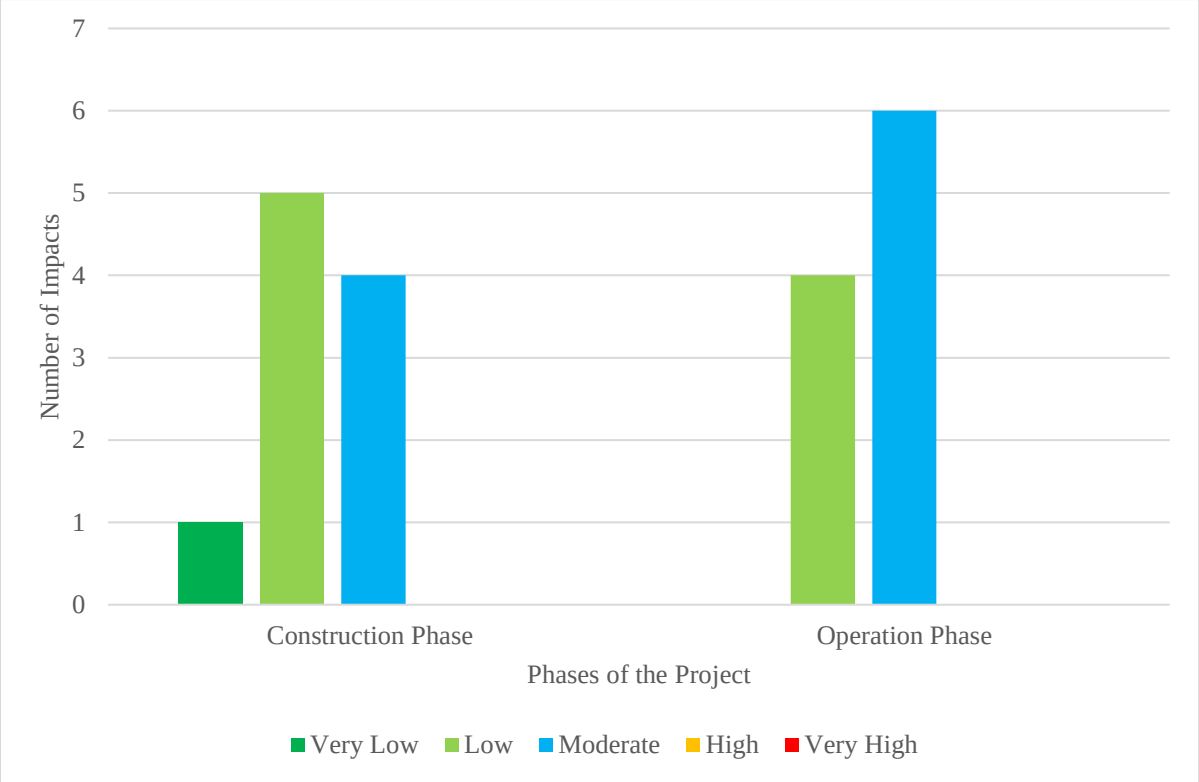


Figure 7. 2 Impact Significance of Potential Adverse Impacts of the Proposde Project

7.8 Mitigation Measures

7.8.1 Mitigation Measures for Impacts on Environmental Resources

Mitigation Measures for Impacts on Air

Solar Power Plant: During the construction phase, regular water spraying on road ways and working ground such as earth working, leveling and excavation area must be carried out to increase humidity of the working place. If possible, access roads of the project should be paved in order to control dust emission. The project proponent must instruct vehicle drivers to control speed of construction vehicles and transportation vehicles within the project site for controlling dust emission. Transportation vehicles must need to install proper covers when carrying soil, sand and cement to avoid falling down along route of transportation and dust emission control.

On extremely windy days, construction activities and earth working, leveling and excavation activities which generate excessive dust must be avoided to reduce dust generation. Personal Protective Equipment (PPEs) such as masks and dust respirators must be provided for construction workers who work at intensive dust generation area. Temporary building enclosures (green shade net fencing) must be installed at intensive dust generated working area in order to control dust emission from the project to nearby local community. With regards to the gaseous emission, regular inspection and proper management for the construction machines, vehicles and transportation vehicles must be implemented. The project proponent must instruct to the construction workers to turn off the construction machines when not in use and stop the engine of transportation vehicles while unloading the electrical equipment and construction materials.

During the operation phase, access roads without concrete pavement shall be covered with gravel in order to prevent dust emissions. Gaseous emission from the operation of management vehicles, maintenance vehicles, generators, refrigerators and air conditioning systems can be minimized by implementing regular maintenance and inspection. The project proponent must install good ventilation system at the control building and other buildings 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 of extremely windy days, overhead transmission line construction activities, earth working and excavation activities which generate excessive dust must be avoided to control dust generation. Temporary building enclosures (green shade net fencing) must be installed at intensive dust generated working area in order to control dust emission to nearby local community.

Mitigation Measures for Impacts on Water

Solar Power Plant: During the construction phase, earth working, leveling and excavation activities must be avoided during the rainy days to control surface runoff following the heavy rain for reducing surface water and groundwater contamination. Site leveling should be done with minimum alteration in contour level to prevent natural drainage system of the project. Regular inspection and proper management for the generators, construction machines, vehicles and transportation vehicles must be implemented to prevent oil leak and spillage. The exit of runoff from the project site to the adjacent surrounding area must be restricted to prevent surface runoff scattering. A total of 4 toilets and 2 septic tanks are provided for the construction workers to reduce impacts on water. Awareness and trainings for fuel handling and waste management must be provided for the construction workers. Waste from construction activities, domestic solid and liquid waste shall not be disposed into the adjacent small creek. The project proponent must carry out systematic groundwater usage in construction activities to prevent depletion of groundwater.

During the operation phase, PV modules cleaning and maintenance activities must be carried out properly in order to prevent damaging modules. Cracked or damaged PV modules and uninstalled lifespan-expired PV modules and batteries when exchanging must be disposed with

adequate packaging at waste management authorities or service providers, in line with the instructions of the government authorities. Direct burry and open burning of these PV modules and batteries must be strictly prohibited. HSE Manager must monitor handling, stockpiling and disposal of PV modules and batteries as per monitoring plan. Box inverter all-in-one machines, management vehicles, maintenance vehicles and generators must be inspected and maintained regularly to reduce oil spillage. Refueling must be done properly and the project proponent must install proper drainage system within the project site to reduce impacts on water. The drainage system must be managed properly by regular checking and cleaning drains. Adequate toilets, septic tanks and basins must be provided for the operation workers and staff. Direct disposing domestic solid and liquid waste from control building and other buildings shall not be disposed into the drainage system and adjacent small creek to prevent blocking.

Overhead Transmission Line: During the construction phase, domestic solid, liquid wastes and water discharged from construction activities shall not be discharged into the natural drains and adjacent small creek to prevent blocking and surface water contamination.

Mitigation Measures for Impacts on Soil

Solar Power Plant: During the construction phase, systematic concrete mixing processes for brackets foundation of solar PV modules, switchyard, control building and other buildings must be applied and earth working, leveling and excavation activities must be carried out properly. Modernized construction machines and 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. Leak-proof fuel containers with secondary containments must be used in fuel storage area. Refueling must be done carefully for preventing oil spills and leakage. Awareness and trainings for fuel handling and waste management must be provided for the construction workers. PV modules installation must be carried out properly in order to prevent damaging modules. Cracked or damaged PV modules must be disposed with adequate packaging at waste management authorities or service providers, in line with the instructions of the government authorities. Direct burry and open burning of these PV modules must be strictly prohibited. HSE Manager must monitor handling, stockpiling and disposal of PV modules as per monitoring plan. Electrical equipment and construction materials storage yard must be defined with impervious surface to prevent seepage into the soil layer. A total of 4 toilets and 2 septic tanks are provided for the construction workers to reduce impacts on soil. Some shady trees must be planted to reduce soil erosion and restore top soil layer.

During the operation phase, PV modules cleaning and maintenance activities must be carried out carefully in order to prevent damaging PV modules. Cracked or damaged PV modules and uninstalled lifespan-expired PV modules and batteries when exchanging must be disposed with adequate packaging at waste management authorities or service providers, in line with the instructions of the government authorities. Direct burry and open burning of these PV modules and batteries must be strictly prohibited. HSE Manager must monitor handling, stockpiling and disposal of PV modules and batteries as per monitoring plan. 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 box type inverter all-in-one machines 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. The drainage system must be designed and managed properly by regular checking and cleaning drains. Adequate toilets, septic tanks and basins must be provided for the operation workers and staff.

Overhead Transmission Line: During the construction phase, systematic concrete mixing processes in foundation construction for overhead transmission line and earth working and excavation activities must be carried out properly. Proper management must be needed for cable stringing and vegetation clearance along right of way of overhead transmission line to reduce impacts on soil.

Mitigation Measures for Noise and Vibration Impacts

Solar Power Plant: During the construction phase, construction machines, vehicles and generators used in construction activities must be inspected and maintained regularly to control noise and vibration generation. Prior notification for local community is needed for excessive noise and vibration generated construction activities. Personal Protective Equipment (PPEs) such as earplugs and earmuffs must be provided for construction workers who work in intensive noise generated area. The project proponent must instruct transportation vehicles' drivers to switch off engines while unloading materials and to avoid gunning of vehicle engines or hooting when passing through sensitive areas such as schools and hospitals along transportation routes. Unloading electrical equipment and construction materials must be done properly. All generators and heavy-duty construction equipment must be insulated or placed in enclosures to minimize ambient noise levels. Noise and vibration generated construction activities must not be carried out at night, if possible.

During the operation phase, generators, box inverter all-in-one machines, management vehicles and maintenance vehicles must be inspected and maintained regularly to reduce noise pollution. Silence-type generator is recommended to use and some shady trees must be planted to reduce noise impacts. On the other hand, no specific mitigation measures are required to reduce vibration impacts because all of the electricity generation processes from ground mounted solar power plant and electricity distributing processes to the Myogyi Substation via overhead transmission line do not generate vibration significantly.

Overhead Transmission Line: During the construction phase, prior notification for local community is needed for excessive noise and vibration generated construction activities. The project proponent must instruct transportation vehicles' drivers 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.

Figure 7. 3 Silence Type Generator

7.8.2 Mitigation Measures for Impacts on Ecological Resources

Mitigation Measures for Impacts on Terrestrial Ecology

Solar Power Plant: Vegetation clearance beyond project site boundary of ground mounted solar power plant must be prohibited strongly. Introduction of exotic species by migrant construction and operation workers shall not be allowed during the construction and operation phase of the project.

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

Mitigation Measures for Impacts on Aquatic Ecology

There is no marine park, coastal resource, mangrove area as well as significant water body such as river, lake and reservoir within the scope of study area for the proposed project. However, a small creek, namely the Nga Mwal Creek passes adjacent to the project and waste from construction activities and domestic waste shall not be disposed into the surface water body during construction and operation phase.

7.8.3 Mitigation Measures for Impacts on Human

Mitigation Measures for Occupational Health and Safety Impacts

Solar Power Plant: 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 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. 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. For the safety of construction workers, project proponent must provide adequate safety measures, including availability of first-aid facilities in case of emergency and develop a plan to send the injured workers to the nearest clinics or hospitals. 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. Safety induction meetings must provide for every fresh worker. Construction machines and construction vehicles must be operated by trained and licensed industrial machine operators. Proper management such as checking all electrical cords, cables and do not use overload voltage must be carried out. 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 provides purified drinking water to prevent health risk of workers. Especially, all construction workers must follow the instructions 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. For the safety of maintenance workers, project proponent must provide adequate safety measures, including availability of first-aid facilities in case of emergency and develop a plan to send the injured workers to the nearest clinics or hospitals. 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. 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 insignificant impacts on occupational health and safety. Moreover, housekeeping staffs must be trained and assigned for regular cleaning and housekeeping to prevent 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 operation workers and staff must follow the instructions 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 and regular maintenance and inspection is needed.

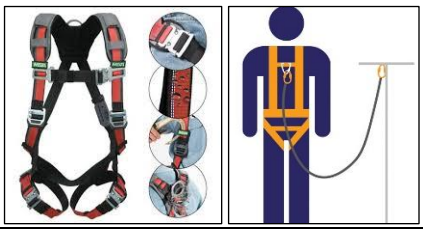
During the operation phase, personal fall restraint system must be provided for overhead transmission line maintenance workers who are working at height. The project proponent must provide Personal Protective Equipment (PPEs) such as safety helmets, safety gloves, reflected safety suits and safety boots 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. 4 Tagged Safety Signages in the Project

Table 7. 4 Types of PPEs and Their Functions

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	

Function of PPEs	Feature and Characteristics
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 Impacts

Solar Power Plant: 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 to reduce community health and safety impacts. Public road which is adjacent to the project site used for transportation must be cleaned and repaired, if damaged after the construction period.

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 insignificant impacts on community health and safety. The project proponent must follow international standards to generate electricity and distribute to Myogyi Substation. Before PV modules installation, project proponent must assess glint and glare on nearby local community 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 in order to prohibit local people entering the project area without permission.

Overhead Transmission Line: During the construction phase, prior notification for local community is needed for cable stringing and poles construction activities for overhead transmission line. These activities must be 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 poles.

Mitigation Measures for Fire Hazard Impacts

Solar Power Plant: During the construction phase, regular inspection and maintenance for construction machines, vehicles, generators and electrical system of construction worker camps must be carried out. Fire extinguishers must be installed at storage yard, fuel storage area, generators, construction worker camps and temporary office building. A total of 21 fire extinguishers, 2 sets of fire hose reels, 2 fire hydrants and a fire alarm system will be installed in the project for firefighting. Firefighting equipment 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, regular maintenance activities must be implemented regularly and properly for electrical equipment of ground mounted solar power plant to protect fire hazards. Fire extinguishers must be installed at fuel storage area, generators, switchyard, control building and other buildings. A total of 2 sets of fire hose reels, 2 fire hydrants and a fire alarm system will be installed in the project. Firefighting equipment must be inspected regularly. Especially, dry powder type fire extinguishers must be installed to extinguish electrical fire and water shall not be used. Firefighting training and fire drills must be provided for all workers in order to extinguish fire cases. Fire protection lane must be defined around the project site to prevent fire in dry season. Water must be stored adequately and properly with fire tanks for other type of fire cases. An assembly point must be assigned at switchyard for emergency cases to gather workers and smoking must be strongly prohibited in the project site. Emergency routes and exists must be designated at control building and other buildings, these must not be blocked. 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.

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

Figure 7. 5 Firefighting Equipment and Assembly Point Singage

7.8.4 Mitigation Measures for Waste Generation Impacts

Mitigation Measures for Solid Waste Generation Impacts

Solar Power Plant: During the construction phase, the project proponent must calculate detail requirement of electrical equipment and construction raw materials for purchasing to reduce

solid waste generation. Recycling, reuse and refurbishment of solid waste will reduce the amount of construction waste other than disposal. Vegetation 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 designate temporary waste disposal area within the project, before final disposal and these wastes must be segregated by using different appropriate waste bins. Domestic solid waste like garbage and kitchen waste must not be disposed directly into the drains and adjacent small creek to prevent drainage block. Burning and landfilling solid waste at the project site must be strictly prohibited and final disposal must be transferred to the Township Municipal.

During the operation phase, there is no operation solid waste generation from electricity generation and distributing processes of the proposed project. However, the project proponent must designate temporary waste disposal area within the project for domestic waste, before final disposal. Domestic solid wastes from control building and other buildings must be segregated by using different appropriate waste bins. Burning and landfilling domestic solid waste at the project site and disposed of into the adjacent small creek must be strongly prohibited and final disposal must be transferred to the Township Municipal.

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.

Mitigation Measures for Liquid Waste Generation Impacts

During the construction phase, sanitation facilities such as toilets, washing basins and septic tanks must be provided adequately. Therefore, a total of 4 toilets and 2 septic tanks are provided for construction workers in order to control domestic wastewater.

During the operation phase, the project proponent must install proper drainage system within the project site to reduce liquid waste generation impacts. Sanitation facilities such as toilets, washing basins and septic tanks must be provided adequately for operation workers and staff in order to control domestic wastewater.

Mitigation Measures for Hazardous Waste Generation Impacts

During the construction phase, systematic storage and handling are needed for fuel and lubricants used in construction machines and vehicles. Awareness and trainings for fuel handling and waste management must be provided for the construction workers. Used oil must be disposed of by collecting with leak proof containers and isolated machineries maintenance area must be identified with paved ground in the project. PV modules installation must be carried out properly in order to prevent damaging modules. Cracked or damaged PV modules must be disposed with adequate packaging at waste management authorities or service providers, in line with the instructions of the government authorities. Direct burry and open burning of these PV modules must be strictly prohibited. HSE Manager must monitor handling, stockpiling and disposal of PV modules as per monitoring plan. 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 hazardous waste service providers, recognized by Township Municipal and Shan State ECD.

During the operation phase, systematic storage and handling is needed for fuel and lubricants. Awareness and trainings for fuel handling and waste management must be provided for the workers and staff. Cracked or damaged PV modules, uninstalled lifespan-expired PV modules and batteries due to exchanging new PV modules and batteries at the time of extending operation period of the project must be disposed with adequate packaging at waste management authorities or service providers, in line with the instructions of the government authorities. Direct burry and open burning of these PV modules and batteries must be strictly prohibited. HSE Manager must monitor handling, stockpiling and disposal of PV modules and batteries as per monitoring plan. Used oil must be disposed of by collecting with leak proof containers and final disposal of hazardous waste must be transferred to the hazardous waste service providers, recognized by Township Municipal and Shan State ECD.

8. Institutional Requirement and Environmental Management Plan (EMP)

8.1 Institutional Requirement

This Environmental Management Plan (EMP) report is prepared as an environmental management framework for Myogyi Substation 20 MWac Ground Mounted Solar Power Plant Project. 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 proponent shall appoint one Health, Safety and Environment (HSE) Officer throughout the life span of the project. The HSE Manager will review and update this plan at least one time annually to cover all potential impacts, mitigations and modifications as necessary. He will manage the sub-contractors for all HSE matters of the project at construction phase and revisions will be made as needed throughout the year. Myogyi Investment Holdings Limited is responsible party for this Environmental Management Plan of Myogyi Substation 20 MWac Ground Mounted Solar Power Plant Project. Moreover, if the cost estimation for the implementation of Environmental Management Plan and Environmental Monitoring Plan does not fully cover the practical solutions stated in this report at the time of implementation, Myogyi Investment Holdings Limited will add additional funds to get the target of these plans through the project lifespan. Any suggestions, comments and questions must be directed to Myogyi Substation 20 MWac Ground Mounted Solar Power Plant Project. Myogyi Investment Holdings Limited had made commitment that it will construct and operate the project in line with the commitments made 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 the project. The project proponent and the sub-contractors also commit to work out their 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.

8.2 Environmental Management Plan

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 and
- 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.

Myogyi Investment Holdings Limited 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 and
- Grievance Redress Mechanism

Responsible Persons for EMP and Mitigation Measures

Implementation of the EMP, management practices and mitigation measures are the responsibility of all site personnel: however, key personnel (Project Director, Project Manager, HSE Director, 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 tables in terms of their name, position, department and responsibilities.

Table 8. 1 Responsible Persons for EMP and Mitigation Measures

No.	Name	Position	Department	Responsibilities and Duties
1.	Mr. Bing Shuai	Project Director	Myogyi Investment Holdings Limited	• Implementation of the EMP • Supervision and management of the implementation of EMP
2.	Mr. Zhu Peng	Construction Manager		• Implementation of the EMP • Supervision and monitoring of the implementation of EMP
3.	Mr. Bao Lei	HSE Manager		• 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.	U Kyaw Kyaw Linn	Translator		• Translation to Myanmar Language for communication between Project Director, Construction Manager, HSE Manager and workers, nearby community and other local stakeholders
5.	Members of MONREC	Department	MONREC	• Monitoring and inspection of projects to determine compliance with all environmental and social requirements

No.	Name	Position	Department	Responsibilities and Duties
				• 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 o Promptly inform the project proponent o Indicate specific non-compliances of the project environmental and social requirements; and o Specify a time period for the project proponent to bring the project into compliance • In the event of noncompliance o Inform the project proponent indicating the specific non-compliances 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: o Suspension of project operation; and o Employing third parties to correct non-compliance **Source: Environmental Impact Assessment Procedure (2015).**

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.	Impacts on air	Solar Power Plant	Dust and gaseous emission	• Regular water spraying on road ways and working ground must be carried out • If possible, access roads of the project should be paved in order to control dust emission • The project proponent must instruct vehicle drivers to control speed of construction vehicles and transportation vehicles within the project site for controlling dust emission • Transportation vehicles must need to install proper covers when carrying soil, sand and	Already included in cost estimation for EMP	Low	Myogyi Investment Holdings Limited and all sub-contractors

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				cement to avoid falling down along route of transportation and dust emission control • On extremely windy days, construction activities and earth working, leveling and excavation activities which generate excessive dust must be avoided to reduce dust generation • Personal Protective Equipment (PPEs) such as masks and dust respirators must be provided for construction workers who work at intensive dust generation area • Temporary building enclosures (green shade			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				net fencing) must be installed at intensive dust generated working area in order to control dust emission from the project to nearby local community • With regards to the gaseous emission, regular inspection and proper management for the construction machines, vehicles and transportation vehicles must be implemented • The project proponent must instruct to the construction workers to turn off the construction machines when not in use and stop the engine of transportation vehicles			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				while unloading the electrical equipment and construction materials			
		Overhead Transmission Line		• On extremely windy days, overhead transmission line construction activities, earth working and excavation activities which generate excessive dust must be avoided to control dust generation • Temporary building enclosures (green shade net fencing) must be installed at intensive dust generated working area in order to control dust emission to nearby local community			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
2.	Impacts on water	Solar Power Plant	Surface water, groundwater pollution and groundwater depletion	• Earth working, leveling and excavation activities must be avoided during the rainy days to control surface runoff following the heavy rain for reducing surface water and groundwater contamination • Site leveling should be done with minimum alteration in contour level to prevent natural drainage system of the project • Regular inspection and proper management for the generators, construction machines, vehicles and transportation vehicles	Already included in cost estimation for EMP	Very Low	Myogyi Investment Holdings Limited and all sub-contractors

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				must be implemented to prevent oil leak and spillage • The exit of runoff from the project site to the adjacent surrounding area must be restricted to prevent surface runoff scattering • A total of 4 toilets and 2 septic tanks are provided for the construction workers to reduce impacts on water • Awareness and trainings for fuel handling and waste management must be provided for the construction workers • Waste from construction activities,			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				domestic solid and liquid waste shall not be disposed into the adjacent small creek • The project proponent must carry out systematic groundwater usage in construction activities to prevent depletion of groundwater			
		Overhead Transmission Line		• Domestic solid, liquid wastes and water discharged from construction activities shall not be discharged into the natural drains and adjacent small creek to prevent blocking and surface water contamination			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
3.	Impact on soil	Solar Power Plant	Soil contamination	• Systematic concrete mixing processes for brackets foundation of solar PV modules, switchyard, control building and other buildings must be applied and earth working, leveling and excavation activities must be carried out properly • Modernized construction machines and vehicles shall be used for the construction activities of the project • These machines and vehicles must be maintained regularly and isolated machineries	Already included in cost estimation for EMP	Low	Myogyi Investment Holdings Limited and all sub-contractors

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				maintenance area must be identified with paved ground in the project • Leak-proof fuel containers with secondary containments must be used in fuel storage area • Refueling must be done carefully for preventing oil spills and leakage • Awareness and trainings for fuel handling and waste management must be provided for the construction workers • PV modules installation must be carried out properly in order to prevent			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				damaging modules • Cracked or damaged PV modules must be disposed with adequate packaging at waste management authorities or service providers, in line with the instructions of the government authorities • Direct burry and open burning of these PV modules must be strictly prohibited • HSE Manager must monitor handling, stockpiling and disposal of PV modules as per monitoring plan • Electrical equipment and construction materials storage yard must be defined with			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				impervious surface to prevent seepage into the soil layer • A total of 4 toilets and 2 septic tanks are provided for the construction workers to reduce impacts on soil • Some shady trees must be planted to reduce soil erosion and restore top soil layer			
		Overhead Transmission Line		• Systematic concrete mixing processes in foundation construction for overhead transmission line and earth working and excavation activities must be carried out properly • Proper management			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				must be needed for cable stringing and vegetation clearance along right of way of overhead transmission line to reduce impacts on soil			
4.	Noise and vibration impacts	Solar Power Plant	Nuisance due to noise and vibration generation	• Construction machines, vehicles and generators used in construction activities must be inspected and maintained regularly to control noise and vibration generation • Prior notification for local community is needed for excessive noise and vibration generated construction activities • Personal Protective	Already included in cost estimation for EMP	Low	Myogyi Investment Holdings Limited and all sub-contractors

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				Equipment (PPEs) such as earplugs and earmuffs must be provided for construction workers who work in intensive noise generated area • The project proponent must instruct transportation vehicles' drivers to switch off engines while unloading materials and to avoid gunning of vehicle engines or hooting when passing through sensitive areas such as schools and hospitals along transportation routes • Unloading electrical equipment and construction materials			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				must be done properly • All generators and heavy-duty construction equipment must be insulated or placed in enclosures to minimize ambient noise levels • Noise and vibration generated construction activities must not be carried out at night, if possible			
		Overhead Transmission Line		• Prior notification for local community is needed for excessive noise and vibration generated construction activities • The project proponent must instruct transportation vehicles'			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				drivers 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			
5.	Impacts on terrestrial ecology	Solar Power Plant	Disturbance terrestrial ecology and habitats	• Vegetation clearance beyond project site boundary of ground mounted solar power plant must be prohibited strongly • Introduction of exotic species by migrant construction workers	Already included in cost estimation for EMP	Very Low	Myogyi Investment Holdings Limited and all sub-contractors

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				shall not be allowed			
		Overhead Transmission Line		• Vegetation clearance within right of way of overhead transmission line must be minimized as much as possible and clearance beyond right of way must be prohibited			
6.	Impacts on aquatic ecology	Solar Power Plant	Disturbance aquatic ecology and habitats	• Waste from construction activities and domestic waste shall not be disposed into the surface water body	Already included in cost estimation for EMP	Very Low	Myogyi Investment Holdings Limited and all sub-contractors
7.	Occupational health and safety impacts	Solar Power Plant	Health and safety problems for construction workers	• Personal fall restraint system must be provided for installation workers who are working at height	Already included in cost estimation for EMP	Very Low	Myogyi Investment Holdings Limited and all sub-

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				• Lockout-tagout system must be used for installation of electrical equipment • 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 • The project proponent must monitor regularly whether construction workers use PPEs adequately or not for ensuring safe working site • Safety notices and			contractors

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				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 • For the safety of construction workers, project proponent must provide adequate safety measures, including availability of first-aid facilities in case of emergency and develop a plan to send the injured workers to the nearest clinics or hospitals • First aid training, safety training, firefighting			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				training, electrical equipment installation training and other essential trainings for construction activities must be arranged for all construction workers • Safety induction meetings must provide for every fresh worker • Construction machines and construction vehicles must be operated by trained and licensed industrial machine operators • Proper management such as checking all electrical cords, cables and do not use overload voltage must be carried out • The project proponent			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				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 provides purified drinking water to prevent health risk of workers • Especially, all construction workers must follow the instructions to prevent COVID-19 virus infection during			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				pandemic period			
		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) 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			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				• 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 and regular maintenance and inspection is needed			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
8.	Community health and safety impacts	Solar Power Plant	Health and safety problems for nearby local communities	• Construction vehicle drivers and transportation vehicle drivers must drive carefully with low speed at public road while mobilizing, transporting electrical equipment and construction materials • Public road which is adjacent to the project site used for transportation must be cleaned and repaired, if damaged after the construction period	Already included in cost estimation for EMP	Very Low	Myogyi Investment Holdings Limited and all sub-contractors
		Overhead Transmission Line		• Prior notification for local community is needed for cable stringing and poles construction activities			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				• These activities must be done properly to reduce community health and safety impacts			
9.	Fire hazard impacts	All construction area	Loss of properties and life	• Regular inspection and maintenance for construction machines, vehicles, generators and electrical system of construction worker camps must be carried out • Fire extinguishers must be installed at storage yard, fuel storage area, generators, construction worker camps and temporary office building • A total of 21 fire extinguishers, 2 sets of fire hose reels, 2 fire	Already included in cost estimation for EMP	Very Low	Myogyi Investment Holdings Limited and all sub-contractors

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				hydrants and a fire alarm system will be installed in the project for firefighting • Firefighting equipment 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 • Safety notices and emergency contact numbers of the Fire Services Department, Hospitals and Police			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				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			
10.	Wastes generation impacts	Solar Power Plant	Water and soil pollution and impacts on health	• The project proponent must calculate detail requirement of electrical equipment and construction raw materials for purchasing to reduce solid waste generation • Recycling, reuse and	Already included in cost estimation for EMP	Low	Myogyi Investment Holdings Limited and all sub-contractors

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				refurbishment of solid waste will reduce the amount of construction waste other than disposal • Vegetation 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 designate temporary waste disposal area within the project, before final disposal and these wastes must be segregated by using			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				different appropriate waste bins • Domestic solid waste like garbage and kitchen waste must not be disposed directly into the drains and adjacent small creek to prevent drainage block • Burning and landfilling solid waste at the project site must be strictly prohibited and final disposal must be transferred to the Township Municipal • Sanitation facilities such as toilets, washing basins and septic tanks must be provided adequately • A total of 4 toilets and 2 septic tanks are			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				provided for construction workers • Systematic storage and handling are needed for fuel and lubricants used in construction machines and vehicles • Awareness and trainings for fuel handling and waste management must be provided for the construction workers • Used oil must be disposed of by collecting with leak proof containers and isolated machineries maintenance area must be identified with paved ground in the project • PV modules			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				installation must be carried out properly in order to prevent damaging modules • Cracked or damaged PV modules must be disposed with adequate packaging at waste management authorities or service providers, in line with the instructions of the government authorities • Direct burry and open burning of these PV modules must be strictly prohibited • HSE Manager must monitor handling, stockpiling and disposal of PV modules as per monitoring plan • Residual cement,			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				solvent-based paints and other lubricants must be collected separately at designated area • Final waste disposal must be transferred to the hazardous waste service providers, recognized by Township Municipal and Shan State ECD			
		Overhead Transmission Line		• 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			

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 area	Dust and gaseous emission	• Access roads without concrete pavement shall be covered with gravel in order to prevent dust emissions • Gaseous emission from the operation of management vehicles, maintenance vehicles, generators, refrigerators and air conditioning systems can be minimized by implementing regular maintenance and inspection • The project proponent must install good ventilation system at the control building and other buildings to reduce adverse impacts	Already included in cost estimation for EMP	Very Low	Myogyi Investment Holdings Limited

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				of indoor air quality • Some shady trees must be planted			
2.	Impacts on water	All operation area	Surface water, groundwater pollution and groundwater depletion	• PV modules cleaning and maintenance activities must be carried out properly in order to prevent damaging modules • Cracked or damaged PV modules and uninstalled lifespan-expired PV modules and batteries when exchanging must be disposed with adequate packaging at waste management authorities or service providers, in line with the instructions of the government authorities	Already included in cost estimation for EMP	Low	Myogyi Investment Holdings Limited

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				• Direct burry and open burning of these PV modules and batteries must be strictly prohibited • HSE Manager must monitor handling, stockpiling and disposal of PV modules and batteries as per monitoring plan • Box inverter all-in-one machines, management vehicles, maintenance vehicles and generators must be inspected and maintained regularly to reduce oil spillage • Refueling must be done properly and the project proponent must install proper drainage system within the project site			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				• The drainage system must be managed properly by regular checking and cleaning drains • Adequate toilets, septic tanks and basins must be provided for the operation workers and staff • Direct disposing domestic solid and liquid waste from control building and other buildings shall not be disposed into the drainage system and adjacent small creek to prevent blocking			
3.	Impact on soil	All operation area	Soil contamination	• PV modules cleaning and maintenance activities must be	Already included in cost estimation for	Very Low	Myogyi Investment Holdings

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				carried out carefully in order to prevent damaging PV modules • Cracked or damaged PV modules and uninstalled lifespan-expired PV modules and batteries when exchanging must be disposed with adequate packaging at waste management authorities or service providers, in line with the instructions of the government authorities • Direct burry and open burning of these PV modules and batteries must be strictly prohibited • HSE Manager must monitor handling,	EMP		Limited

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				stockpiling and disposal of PV modules and batteries as per monitoring plan • 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 box type inverter all-in-one machines must be carried out systematically by technicians and experts • Temporary domestic waste storage area, fuel storage area and switchyard must be inspected regularly to			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				reduce impacts on soil • The drainage system must be designed and managed properly by regular checking and cleaning drains • Adequate toilets, septic tanks and basins must be provided for the operation workers and staff			
4.	Noise and vibration impacts	All operation area	Nuisance due to noise and vibration generation	• Generators, box inverter all-in-one machines, management vehicles and maintenance vehicles must be inspected and maintained regularly to reduce noise pollution • Silence-type generator is recommended to use and some shady trees	Already included in cost estimation for EMP	Very Low	Myogyi Investment Holdings Limited

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				must be planted to reduce noise impacts			
5.	Impacts on terrestrial ecology	All operation area	Disturbance terrestrial ecology and habitats	• Introduction of exotic species by migrant operation workers shall not be allowed	Already included in cost estimation for EMP	Very Low	Myogyi Investment Holdings Limited
6.	Impacts on aquatic ecology	All operation area	Disturbance aquatic ecology and habitats	• Domestic waste shall not be disposed into the surface water body	Already included in cost estimation for EMP	Very Low	Myogyi Investment Holdings Limited
7.	Occupational health and safety impacts	Solar Power Plant	Health and safety problems for construction workers	• 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	Already included in cost estimation for EMP	Low	Myogyi Investment Holdings Limited

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				must provide Personal Protective Equipment (PPEs) such as safety helmets, safety gloves, reflected safety suits and safety boots for all maintenance workers • The project proponent must monitor regularly whether maintenance workers use PPEs adequately or not for ensuring safe working site • 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			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				project site • For the safety of maintenance workers, project proponent must provide adequate safety measures, including availability of first-aid facilities in case of emergency and develop a plan to send the injured workers to the nearest clinics or hospitals • 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			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				arranged for all workers • 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 • housekeeping staffs must be trained and assigned for regular cleaning and housekeeping to prevent accidents due to poor housekeeping in the project • The project proponent must manage the drainage systems of the			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				project properly and provide purified drinking water to prevent health risk of workers • Especially, all operation workers and staff must follow the instructions to prevent COVID-19 virus infection during pandemic period			
		Overhead Transmission Line		• 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			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				(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			
8.	Community health and safety impacts	Solar Power Plant	Health and safety problems for nearby local communities	• The project proponent must follow international standards to generate electricity and distribute to Myogyi Substation • Before PV modules	Already included in cost estimation for EMP	Low	Myogyi Investment Holdings Limited

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				installation, project proponent must assess glint and glare on nearby local community 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 in order to prohibit local people entering the project area without permission			
		Overhead Transmission Line		• Safety notices and warning signs must be tagged at poles of overhead transmission line to prohibit local people climbing poles			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
9.	Fire hazard impacts	Solar Power Plant	Loss of properties and life	• Regular maintenance activities must be implemented regularly and properly for electrical equipment of ground mounted solar power plant to protect fire hazards • Fire extinguishers must be installed at fuel storage area, generators, switchyard, control building and other buildings • A total of 2 sets of fire hose reels, 2 fire hydrants and a fire alarm system will be installed in the project • Firefighting equipment must be inspected regularly • Especially, dry powder	Already included in cost estimation for EMP	Low	Myogyi Investment Holdings Limited

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				type fire extinguishers must be installed to extinguish electrical fire and water shall not be used • Firefighting training and fire drills must be provided for all workers in order to extinguish fire cases • Fire protection lane must be defined around the project site to prevent fire in dry season • Water must be stored adequately and properly with fire tanks for other type of fire cases • An assembly point must be assigned at switchyard for			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				emergency cases to gather workers and smoking must be strongly prohibited in the project site • Emergency routes and exists must be designated at control building and other buildings, these must not be blocked • 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			
		Overhead		• Maintenance activities			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
		Transmission Line		must be implemented regularly and properly for overhead transmission line to protect electric shock and fire hazards			
10.	Wastes generation impacts	All operation area	Water and soil pollution and impacts on health	• The project proponent must designate temporary waste disposal area within the project for domestic waste, before final disposal • Domestic solid wastes from control building and other buildings must be segregated by using different appropriate waste bins • Burning and landfilling domestic solid waste at the project site and	Already included in cost estimation for EMP	Low	Myogyi Investment Holdings Limited

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				disposed of into the adjacent small creek must be strongly prohibited • Final disposal of domestic solid waste must be transferred to the Township Municipal • The project proponent must install proper drainage system within the project site to reduce liquid waste generation impacts • Sanitation facilities such as toilets, washing basins and septic tanks must be provided adequately for operation workers and staff in order to control domestic wastewater			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				• Systematic storage and handling is needed for fuel and lubricants • Awareness and trainings for fuel handling and waste management must be provided for the workers and staff • Cracked or damaged PV modules, uninstalled lifespan-expired PV modules and batteries due to exchanging new PV modules and batteries at the time of extending operation period of the project must be disposed with adequate packaging at waste management authorities or service			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				providers, in line with the instructions of the government authorities • Direct burry and open burning of these PV modules and batteries must be strictly prohibited • HSE Manager must monitor handling, stockpiling and disposal of PV modules and batteries as per monitoring plan • Used oil must be disposed of by collecting with leak proof containers • Final disposal of hazardous waste must be transferred to the hazardous waste service providers,			

No.	Potential Impacts	Location	Impacts	Mitigation Measures	Estimated Cost of Proposed Measures	Residual Impacts	Responsible Party
				recognized by Township Municipal and Shan State ECD			

8.3 Environmental Monitoring Plan

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	Nearby temporary project office	Already included in cost estimation for EMP	Myogyi Investment Holdings Limited
2.	Groundwater quality	pH, EC, TDS, Salinity, DO, Turbidity, Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Total Nitrogen, Total Phosphorus, Potassium, Oil and Grease, Total Suspended Solid (TSS), Total Coliform Bacteria	Once	Nearby tube well, used for construction	Already included in cost estimation for EMP	Myogyi Investment Holdings Limited

No.	Environmental Concerns	Parameters	Frequency	Location	Estimated Cost	Responsible Party
3.	Surface water quality	pH, EC, TDS, Salinity, DO, Turbidity, Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Total Nitrogen, Total Phosphorus, Potassium, Oil and Grease, Total Suspended Solid (TSS)	Once	Nearby small creek	Already included in cost estimation for EMP	Myogyi Investment Holdings Limited
4.	Noise level	Equivalent Noise Level dB (A)	Once	Point 1 (nearby temporary project office) Point 2 (construction worker camp)	Already included in cost estimation for EMP	Myogyi Investment Holdings Limited
5.	Waste Quantity	Amount of construction solid waste, domestic solid waste and hazardous waste disposal	Monthly	All construction area	Already included in cost estimation for EMP	Myogyi Investment Holdings Limited
B.	**Construction Phase (Overhead Transmission Line)**					
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	Myogyi Investment Holdings Limited
2.	Noise level	Equivalent Noise Level dB (A)	Once	In the middle of transmission line's route	Already included in cost estimation for EMP	Myogyi Investment Holdings Limited
C.	**Operation Phase**					

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	Twice a year	In front of control building	Already included in cost estimation for EMP	Myogyi Investment Holdings Limited
2.	Groundwater quality	pH, EC, TDS, Salinity, DO, Turbidity, Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Total Nitrogen, Total Phosphorus, Potassium, Oil and Grease, Total Suspended Solid (TSS), Total Coliform Bacteria	Twice a year	An outlet from tube well within the project site	Already included in cost estimation for EMP	Myogyi Investment Holdings Limited
3.	Surface water quality	pH, EC, TDS, Salinity, DO, Turbidity, Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Total Nitrogen, Total Phosphorus, Potassium, Oil and Grease, Total Suspended Solid (TSS)	Twice a year	Nearby small creek	Already included in cost estimation for EMP	Myogyi Investment Holdings Limited
4.	Discharged water quality	pH, Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Oil and Grease, Total Coliform Bacteria, Total Nitrogen, Total Phosphorus, Total Suspended Solids	Twice a year	At final outlet of drainage system	Already included in cost estimation for EMP	Myogyi Investment Holdings Limited

No.	Environmental Concerns	Parameters	Frequency	Location	Estimated Cost	Responsible Party
5.	Noise level	Equivalent Noise Level dB (A)	Twice a year	Point 1 (in front of control building) Point 2 (near security gate)	Already included in cost estimation for EMP	Myogyi Investment Holdings Limited
6.	Waste Quantity	Amount of domestic solid waste and hazardous waste disposal	Quarterly	All operation area	Already included in cost estimation for EMP	Myogyi Investment Holdings Limited
7.	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	Myogyi Investment Holdings Limited

8.4 Cost Estimation for EMP and EMoP

The following table shows the expenditures for the implementation of Environmental Management Plan and mitigation measures. Estimated prices may be varied according to the implementation time and service providers. Myogyi Investment Holdings Limited strongly commit that it 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			Lump Sum	3,000,000
2.	Provide Personal Protective Equipment (PPEs) to workers			Lump Sum	800,000
3.	Provide adequate toiles and septic tanks facilities			Lump Sum	1,000,000
4.	Use leak-proof fuel containers with secondary containments			Lump Sum	500,000
5.	Provide first aid kits and training for workers			Lump Sum	1,000,000
6.	Provide purified drinking water for workers			Lump Sum	700,000
7.	Install fire extinguishers			Lump Sum	1,000,000
8.	Wastes disposal			Lump Sum	1,000,000
Subtotal					**9,000,000**
B.	**Mitigation Measures for Operation Phase**				
1.	Install good ventilation system			Lump Sum	1,500,000
2.	Plant some shady trees			Lump Sum	1,000,000
3.	Install proper drainage system			Lump Sum	1,500,000
4.	Provide Personal Protective			Lump Sum	800,000

No.	Item	Unit	Frequency	Unit Cost (MMK)	Cost (MMK)
	Equipment (PPEs) for workers				
5.	Provide first aid kits for workers			Lump Sum	500,000
6.	Provide purified drinking water for workers			Lump Sum	800,000
7.	Install dry powder type fire extinguishers, fire hose reels and fire hydrants			Lump Sum	1,000,000
8.	Install visible and audible fire alarm system			Lump Sum	500,000
9.	Waste disposal	Month	12	100,000	1,200,000
	Subtotal				**8,800,000**
Contingency					**2,000,000**
Total					**19,800,000**

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	Twice a year	2	700,000	1,400,000
2.	Water quality	Twice a year	2	900,000	1,800,000
3.	Noise level	Twice a year	2	500,000	1,000,000
4.	Waste quantity	Quarterly	4	200,000	800,000
5.	Environmental auditing	Once a year	1	300,000	300,000
Subtotal					**5,300,000**
B.	**Supervision**				
1.	HSE Manager	Months	12	700,000	8,400,000
2.	HSE Assistant	Months	12	400,000	4,800,000
Subtotal					**13,200,000**

No.	Item	Unit	Quantity	Unit Cost (MMK)	Annual Cost (MMK)
C.	**Capacity Building Programs (Training for workers)**				**1,000,000**
Total					**19,500,000**

8.5 Corporate Social Responsibility (CSR) Plan

Myogyi Investment Holdings Limited 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.

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%

8.6 Grievance Redress Mechanism

People who settle near the project site or stakeholders concerned with the problems and impacts that they suffer from the proposed project, they can complain though Grievance Committee, which includes the responsible persons of the project proponent, representatives from Sae Ywar Village and representative from General Administration Department (Ywar Ngan 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.

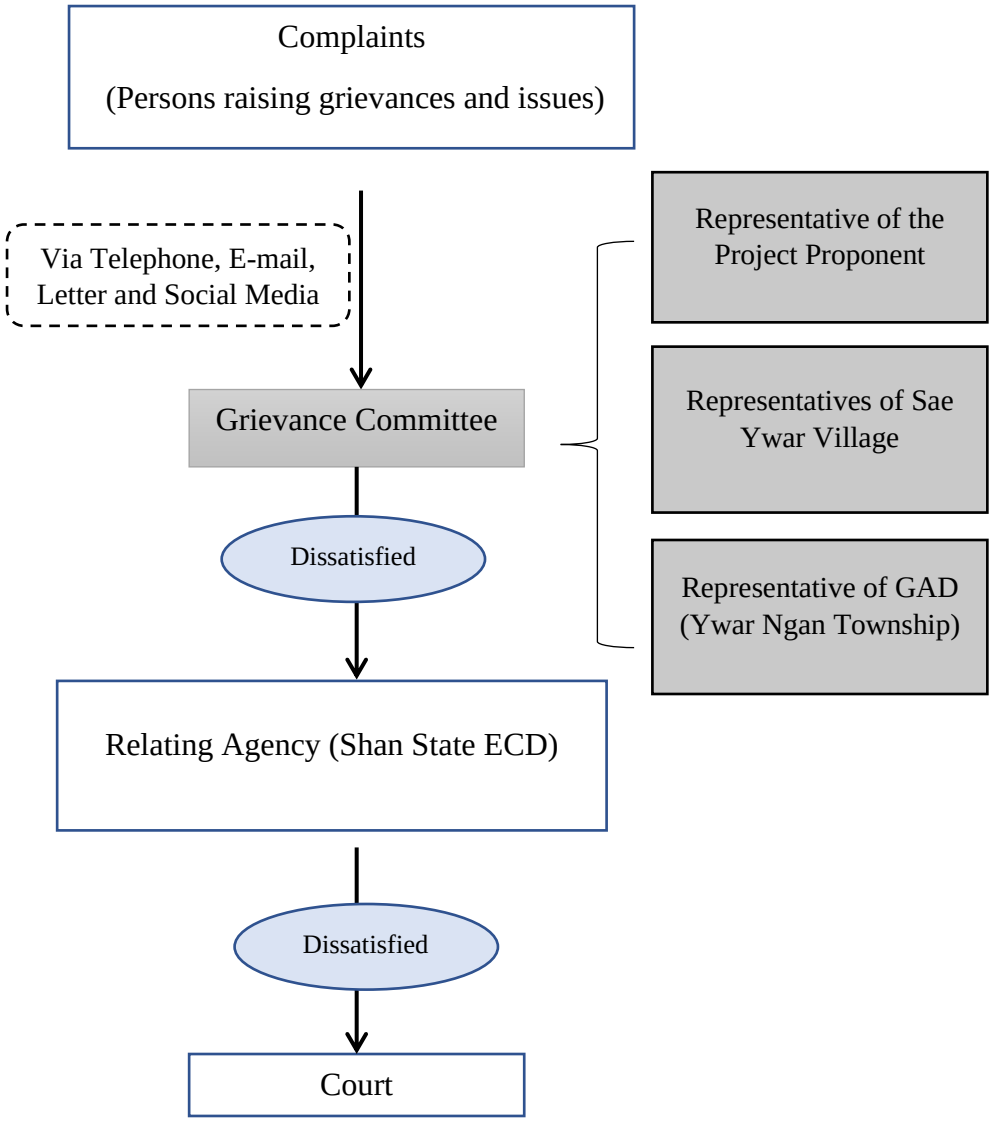


Figure 8. 1 Grievance Redress Mechanism for the Proposed Project

8.7 Firefighting Plan

Fire extinguishers must be installed at storage yard, fuel storage area, generators, switchyard, control building and regular inspection must be implemented for these fire extinguishers. 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. Therefore, the project proponent will install 21 fire extinguishers, 2 sets of fire hose reels, 2 fire hydrants and a fire alarm system for firefighting. Firefighting training and fire drills must be provided for all workers and staff 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 workers and smoking must be strongly prohibited in the project site. Emergency routes and exists must be assigned at control building and other buildings, these must not be blocked. Moreover, the

project proponent must assign teams for firefighting such as preparedness team, extinguishing team, evacuation team and first aid team.

8.8 Emergency Response and Preparedness Plan

In case of fire, all workers including guests should be evacuated systematically as soon as possible. Firefighting group must be assigned which will cooperate with Ywar Ngan Township and other adjacent townships' Fire Services Department. The proponent has committed to abide guidelines provided by Myanmar Fire Services Department. Emergency escape plan must be prepared and tagged at control building and other buildings.

As the project is located within the **Zone IV (Severe Zone)** earthquake zone, the emergency preparedness for earthquake must also be taken. The control building, other buildings and electrical equipment including switchyard and overhead transmission line must be built with the international standards to withstand the risk of earthquake. The workers and staff should have awareness and knowledge concerning with the earthquake.

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


[FIRE]
A fire is both frightening and destructive. Fires are a danger to buildings and residents in equal measure. Keep your cool in the event of a fire by following these SAFE STEPS:
BE PREPARED...
PREPARE YOUR GO-BAGS
KNOW AND PRACTICE YOUR ESCAPE ROUTE
FIRE ALARM
GET IT
INSTALL IT
CHECK IT
CARRY OUT ANNUAL CHECKS, ENSURE FIRE ALARMS WORK
DO NOT LEAVE BURNING CIGARETTES OR CANDLES UNATTENDED
SAND
PREPARE FIRE FIGHTING EQUIPMENT...
AND KNOW HOW TO EXTINGUISH A FIRE
PULL
AIM
SQUEEZE
SWEEP
IF USING EXTINGUISHER, PULL PIN, AIM AND SQUEEZE HANDLE, SWEEP BASE OF FIRE
NEVER USE WATER OR FOAM EXTINGUISHER ON AN OIL OR ELETRICAL FIRE
IN CASE OF FIRE...
IF YOUR CLOTHES CATCH FIRE...
STOP
STOP WHERE YOU ARE
DROP
DROP TO THE GROUND
ROLL
ROLL ON THE FLOOR TO PUT OUT THE FLAMES
IF THERE IS SMOKE...
GET DOWN LOW - COVER YOUR MOUTH WITH A DAMP CLOTH AND GET OUT!
EXIT
GET OUT THROUGH A SAFE EXIT
FIRE ALARM
SOUND ALARM AND CALL FOR HELP
BEWARE OF GAS LEAKS AND EXPOSED WIRE
DO NOT GO HOME UNLESS LOCAL AUTHORITIES DEEM IT SAFE
NATIONAL GEOGRAPHIC CHANNEL
SAFESTEPS.COM
SAFE STEPS TIPS APPROVED BY:
International Federation of Red Cross and Red Crescent Societies
PRUDENCE FOUNDATION

Figure 8. 2 Safety Cards for Awareness of Emergency Cases

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

- Activate fire alarm system
- Alert other workers and staff to gather at assembly point
- Report to project managers and supervisors

- For electrical fire, turn off electricity distributing devices before fighting
- For electrical fire, oil and lubricant fire DO NOT USE WATER, rather use dry powder type fire extinguishers
- If small, control using an extinguisher or fire hose reel (for other types of fire)
- Contact Fire Services Department if not under immediate control
- Once out of the building, stay out. Do not allow people to go back into the burning building to collect valuables. While existing the building, close doors (but do not lock) to slow down the spread of fire
- Obey all instructions issued by the project proponent
- Proceed to emergency evacuation area
- First aid measures should be followed to all injured persons and transfer to clinic or hospital if necessary.

9. Results of the Public Consultation

9.1 Purpose of the Consultation Meeting

It is important to disclose the information of the project during the EMP report preparation and the opinions of attendees must be considered in implementation of the project. Public 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, environmental management plans 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 and its workers to attend the public consultation meeting. The EMP report will be finalized and submitted to ECD for environmental approval. After submission, the submitted EMP report will be ensured for available to interested parties and public at the proposed project's office, office of Myogyi Investment Holdings Limited and office of E Guard Environmental Services and the following link, where any interested persons can review for further comments and suggestions.

https://www.mediafire.com/folder/of1mc8x0hr58n/Myogyi_20_MW_Solar_Power_Plant_Project

Public consultation and information disclosure concerning with the Environmental Management Plan (EMP) for the construction and operation of Myogyi Substation 20 MWac ground mounted solar power plant project, proposed by Myogyi Investment Holdings Limited was held on 24th October, 2022 at temporary project office of the proposed project. The staring time was 1:00 pm and finished at 2:30 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. The attendance list, meeting minutes, recorded photos and presentation file of public consultation meeting are described in **Appendix- 4, 5, 6 and 7.** 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 Kyun Gyi Village	8
2.	Local People from Myo Gyi Village	2
3.	Local People from Sae Ywar Village	3
4.	Representatives of Project Proponent	2

No.	Category	Number of Participants
5.	Representatives of E Guard Environmental Services	4
Total		**19**

9.3 Agenda of Public Consultation Meeting

The meeting was held in accordance with the following agenda;

Agenda:

1) Opening the ceremony
2) Presentation of Project Information and Environmental Management Plan (EMP) for construction and operation of Myogyi Substation 20 MWac Ground Mounted Solar Power Project by U Aung Si Thu Thein (Associate Consultant, E Guard Environmental Services Co., Ltd.)
3) Questions, Comments and Suggestions from the attendees.
4) Closing the ceremony

1. Opening Ceremony

2. Presentation of Project Information and Environmental Management Plan (EMP) including impacts and mitigation measures for Myogyi Substation 20 MWac Ground Mounted Solar Power Project by U Aung Si Thu Thein (Associate Consultant, E Guard Environmental Services Co., Ltd.)

U Aung Si Thu Thein explained the project information, project proponent information, electricity generation processes, resources requirement for the project and processes of environmental management plan preparation, potential positive impacts of the project, potential negative impacts of the project, proposed mitigation measures to reduce anticipated negative impacts, proposed environmental monitoring plan, grievance redress mechanism and environmental quality measurements processes during the site visit.

3. Questions, Comments and Suggestions from the Attendees

Question: U Nay Win (Sae Ywar Village) discussed that he would like to thank for economic development of the country due to the project implementation, especially for the job opportunities for local people and the accessible road. He wants to know the pros and cons of implementing the project. He also requests to slow down vehicular movement in the area because they are afraid of dust affecting on the pollination and if possible, they request to spray water on the road.

Answer: U Wan Se Naint (Translator, Myogyi Investment Holdings Limited) answered that the project proponent puts first priority to employ the locals. In case of spraying water, they will inform to the head office and will be preparing.

Answer: U Aung Si Thu Thein (Assistant Consultant, E Guard Environmental Services Co., Ltd.) answered that there are both positive and negative impacts due to project implementation.

However, negative impacts can be reduced by implementing mitigation measures, EMPs and EMoPs. Mitigation measures for vehicle accidents and dust have already proposed for project just like limitation for vehicle speed not more than 10 miles per hour in the vicinity of project and near villages and this will reduce the impacts of dust.

Question: U Maung Zaw (Sae Ywar Village) discussed that he afraid of forming ponds on the higher side of the road and he requests to install box culvert to avoid this potential flooding situation.
Answer: U Wan Se Naint (Translator, Myogyi Investment Holdings Limited) answered that they will inform to the head office and will be preparing to handle this potential problem.

Question: U Maung Zaw (Sae Ywar Village) asked the compensation for the land when the electricity poles of overhead transmission line have to set in their farm land along the route.
Answer: U Wan Se Naint (Translator, Myogyi Investment Holdings Limited) answered that they will inform to the head office and will carry out compensation processes legally.

4. Closing the Ceremony

10. Conclusion

This Environmental Management Plan (EMP) Report was prepared by E Guard Environmental Services Co., Ltd. for construction and operation of Myogyi Substation 20 MWac ground mounted solar power plant project, proposed by Myogyi Investment Holdings Limited. The project proponent is jointly formed by the SPECO Electric Power Construction Corporation and HK New Energy Investment Holding Limited. The proposed project is located at Sae Ywar Village Tract, Ywar Ngan Township, Danu Self-administered Zone, Shan State, Myanmar. Its coordinate points are 21° 30' 39.79" N, 96° 22' 19.84" E and the average altitude of the site is 218 m. The construction of the proposed project includes box inverter all-in-one machines, supporting brackets, construction of solar power station and other buildings as well as construction and stringing of 33 kV overhead transmission line. 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, however, study for decommissioning phase is excluded because after operation period, 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. The project proponent will have prior to submission of the decommissioning plan if they have a plan to close their project permanently. Environmental Management Plan (EMP) has been prepared for the proposed project in accordance with Environmental Impact Assessment Procedure as per instructions of Environmental Conservation Department (ECD). The project proponent has to implement the proposed project in compliance with the National laws and regulations for environmental protection.

E Guard Environmental Services conducted baseline environmental quality measurement at project site on 23rd and 24th October, 2022. According to the observed data, the observed values of gases such as SO_2, NO_2, CO and CO_2 are lower than the respective guideline values. For dust emissions, the observed values of both PM_{10} and $PM_{2.5}$ are also within the guideline values of NEQEG. All of the parameter measured to analyze groundwater and surface water quality are within the reference values of NEQEG. With regards to noise level at Point 1, the results are lower than standard value not only at day time but also at night time. Similarly, with regards to noise level at Point 2, the results are lower than standard value not only at day time but also at night time. Therefore, it can be considered that the baseline environmental qualities (air quality, water quality and noise level) at the proposed project are within the respective guideline values during construction phase of the project. The project proponent must follow EMPs and mitigation measures in order to sustain baseline environmental quality of the project.

This project can ensure some positive impacts such as providing job opportunities, business opportunities, carbon emission reduction and resources conservation, provision of clean electricity power, revenue to government and CSR development. The assessment of each impact is based on consideration of the magnitude, duration, extent and probability of activities which are going to be carried out during construction and operation phases. During the ***construction phase***, impacts on air, soil, noise and vibration impacts and solid waste generation impacts are assessed as **Moderate Impacts** and other impacts such as impacts on water, occupational health and safety, community health and safety, fire hazards impacts 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 impact 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.

However, Environmental Management Plan (EMP) must be implemented to control these negative impacts in construction and operation phases. Environmental Monitoring Plan (EMoP) must need to implement for monitoring the environmental quality of the proposed project. Then, the estimated budget needed for implementing Environmental Management Plan, Environmental Monitoring Plan, supervision and capacity building programs are mentioned in this report. Moreover, CSR plan, firefighting plan, emergency preparedness and response plan and grievance redress mechanism to solve the complaints related with the proposed project are also described. Finally, the project proponent shall follow comments and suggestions made by ECD after reviewing this EMP report. Once EMP report is approved by concerned authorities, effective implementation of EMPs and EMoPs by the project proponent is essential. The proponents shall abide environmental policy, laws, rules and instructions of the Republic of the Union of Myanmar throughout the lifespan of the project.

References

- E Guard Environmental Services Co., Ltd., 2021, *"Environmental Management Plan for 20 MW Ground Mounted Solar Power Plant Project, Connected to Taungdawgwin Substation"*.
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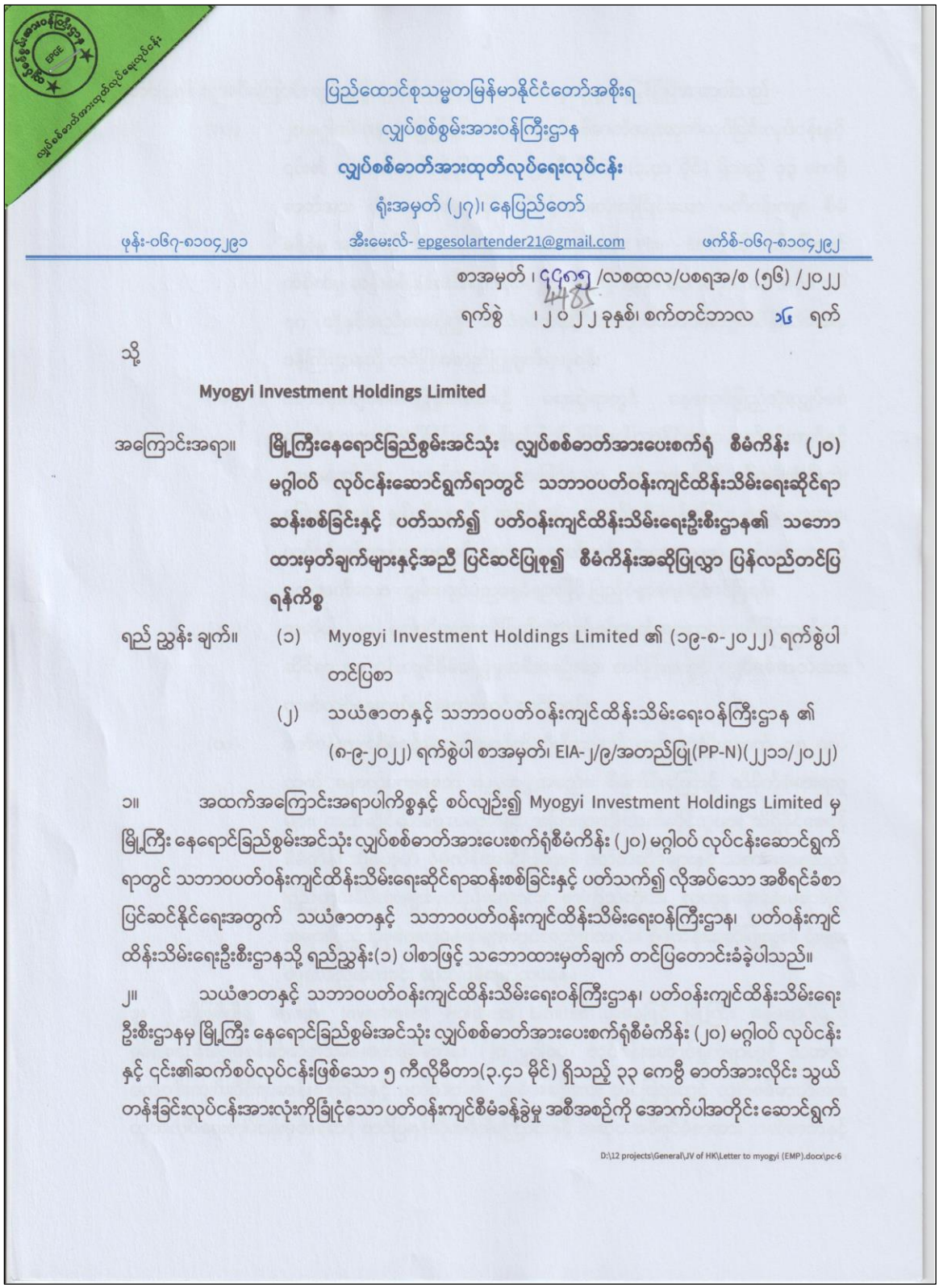
- Myanmar Survey Research (MSR), 2017, "*Environmental and Socio-economic Impact Assessment (ESIA) Report for Implementing Solar Power Plant Project in Minbu District, Magwe Region*".

Appendix

(1) Instructions to prepare EMP report



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သို့

Myogyi Investment Holdings Limited

အကြောင်းအရာ။ **မြို့ကြီးနေရောင်ခြည်စွမ်းအင်သုံး လျှပ်စစ်ဓာတ်အားပေးစက်ရုံ စီမံကိန်း (၂၀) မဂ္ဂါဝပ် လုပ်ငန်းဆောင်ရွက်ရာတွင် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဆိုင်ရာ ဆန်းစစ်ခြင်းနှင့် ပတ်သက်၍ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန၏ သဘောထားမှတ်ချက်များနှင့်အညီ ပြင်ဆင်ပြုစု၍ စီမံကိန်းအဆိုပြုလွှာ ပြန်လည်တင်ပြရန်ကိစ္စ**

ရည် ညွှန်း ချက်။ (၁) Myogyi Investment Holdings Limited ၏ (၁၉-၈-၂၀၂၂) ရက်စွဲပါ တင်ပြစာ

(၂) သယံဇာတနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာန ၏ (၈-၉-၂၀၂၂) ရက်စွဲပါ စာအမှတ်၊ EIA-၂/၉/အတည်ပြု(PP-N)(၂၂၁၁/၂၀၂၂)

၁။ အထက်အကြောင်းအရာပါကိစ္စနှင့် စပ်လျဉ်း၍ Myogyi Investment Holdings Limited မှ မြို့ကြီး နေရောင်ခြည်စွမ်းအင်သုံး လျှပ်စစ်ဓာတ်အားပေးစက်ရုံစီမံကိန်း (၂၀) မဂ္ဂါဝပ် လုပ်ငန်းဆောင်ရွက်ရာတွင် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဆိုင်ရာဆန်းစစ်ခြင်းနှင့် ပတ်သက်၍ လိုအပ်သော အစီရင်ခံစာ ပြင်ဆင်နိုင်ရေးအတွက် သယံဇာတနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာန၊ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနသို့ ရည်ညွှန်း(၁) ပါစာဖြင့် သဘောထားမှတ်ချက် တင်ပြတောင်းခံခဲ့ပါသည်။

၂။ သယံဇာတနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာန၊ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနမှ မြို့ကြီး နေရောင်ခြည်စွမ်းအင်သုံး လျှပ်စစ်ဓာတ်အားပေးစက်ရုံစီမံကိန်း (၂၀) မဂ္ဂါဝပ် လုပ်ငန်းနှင့် ၎င်း၏ဆက်စပ်လုပ်ငန်းဖြစ်သော ၅ ကီလိုမီတာ(၃.၄၁ မိုင်) ရှိသည့် ၃၃ ကေဗွီ ဓာတ်အားလိုင်း သွယ်တန်းခြင်းလုပ်ငန်းအားလုံးကိုခြုံငုံသော ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်ကို အောက်ပါအတိုင်း ဆောင်ရွက်

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ာင်ပြရန် လိုအပ်ကြောင်း ရည်ညွှန်း(၂) ပါစာဖြင့် သဘောထားမှတ်ချက် ပြန်ကြားလာပါသည် -

(က) ၂၀ မဂ္ဂါဝပ် နေရောင်ခြည်စွမ်းအင်သုံး လျှပ်စစ်ဓာတ်အားထုတ်လုပ်ခြင်းလုပ်ငန်းနှင့် ၎င်း၏ ဆက်စပ်လုပ်ငန်းဖြစ်သော ၅ ကီလိုမီတာ(၃.၄၁ မိုင်) ရှိသည့် ၃၃ ကေဗွီ ဓာတ်အား လိုင်းသွယ်တန်းခြင်းလုပ်ငန်းအားလုံးကိုခြုံငုံသော ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှု အစီအစဉ်(Environmental Management Plan - EMP) ကို ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း အပိုဒ် ၆၃၊ အပိုဒ် (ဇ)၊ အပိုဒ် ၇၆၊ ၇၇ တို့နှင့်အညီရေးဆွဲ၍ သယံဇာတနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ဝန်ကြီးဌာနသို့ တင်ပြအတည်ပြုချက်ရယူရန်၊

(ခ) ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် ရေးဆွဲရာတွင် နေရောင်ခြည်သုံးလျှပ်စစ်ဓာတ်အားထုတ်လုပ်ခြင်းလုပ်ငန်းကြောင့် ဖြစ်ပေါ်လာနိုင်သော ပတ်ဝန်းကျင်နှင့် လူမှုရေးဆိုင်ရာ သက်ရောက်မှုများဖြစ်သော ဂေဟစနစ်နှင့် ဇီဝမျိုးစုံမျိုးကွဲ၊ မြေအသုံးချမှု၊ စွန့်ပစ်ပစ္စည်း(အစိုင်အခဲ/ အရည်) စီမံခန့်ခွဲခြင်း၊ လူမှုစီးပွားရေး၊ လုပ်ငန်းခွင်ကျန်းမာရေးနှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေးစသည့် နယ်ပယ်များနှင့် ပတ်သက်သော ကျွမ်းကျင်ပညာရှင်များဖြင့် ပြည့်စုံစွာရေးဆွဲတင်ပြရန်၊

(ဂ) အဆိုပါ ၂၀ မဂ္ဂါဝပ်နေရောင်ခြည်သုံးလျှပ်စစ်ဓာတ်အားထုတ်လုပ်ခြင်းလုပ်ငန်းဆိုင်ရာ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်အား တင်ပြရာတွင် လျှပ်စစ်ဓာတ်အားထုတ်လုပ်ရေးလုပ်ငန်းမှတစ်ဆင့် တင်ပြရန်၊

(ဃ) ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်ကို ဦးစီးဌာနသို့ တင်သွင်းပြီးနောက် ၁၅ ရက်ထက် နောက်မကျစေဘဲ လူမှုအဖွဲ့အစည်း၊ စီမံကိန်းကြောင့် ထိခိုက်ခံစားရသူများ၊ ဒေသဆိုင်ရာအဖွဲ့အစည်းနှင့် အခြားအကျိုးသက်ဆိုင်သူများ သိရှိနိုင်စေရန် စီမံကိန်း သို့မဟုတ် စီမံကိန်းအဆိုပြုသူ၏ ဝက်ဘ်ဆိုဒ်များနှင့် သတင်းစာစသည့် ပြည်တွင်းမီဒီယာများမှလည်းကောင်း၊ စာကြည့်တိုက်၊ လူထုစုဝေးခန်းမစသည့် အများပြည်သူစုဝေးရာနေရာများတွင်လည်းကောင်း၊ စီမံကိန်းအဆိုပြုသူ၏ ရုံးများတွင်လည်းကောင်း ထုတ်ပြန်ကြေညာရန်။

၃။ သို့ဖြစ်ပါ၍ Myogyi Investment Holdings Limited အနေဖြင့် မြို့ကြီး နေရောင်ခြည်စွမ်းအင်သုံးလျှပ်စစ်ဓာတ်အားပေးစက်ရုံစီမံကိန်း (၂၀ မဂ္ဂါဝပ်) လုပ်ငန်းဆောင်ရွက်ရာတွင် သဘာဝပတ်ဝန်းကျင်ဆိုင်ရာဆန်းစစ်ခြင်းနှင့် ပတ်သက်၍ အစီအစဉ်အား တင်ပြရာတွင် လျှပ်စစ်ဓာတ်အားထုတ်လုပ်ရေးလုပ်ငန်းမှတစ်ဆင့် တင်ပြရန်လိုအပ်ပါကြောင်းနှင့် အဆိုပါအစီရင်ခံစာအား သယံဇာတနှင့်

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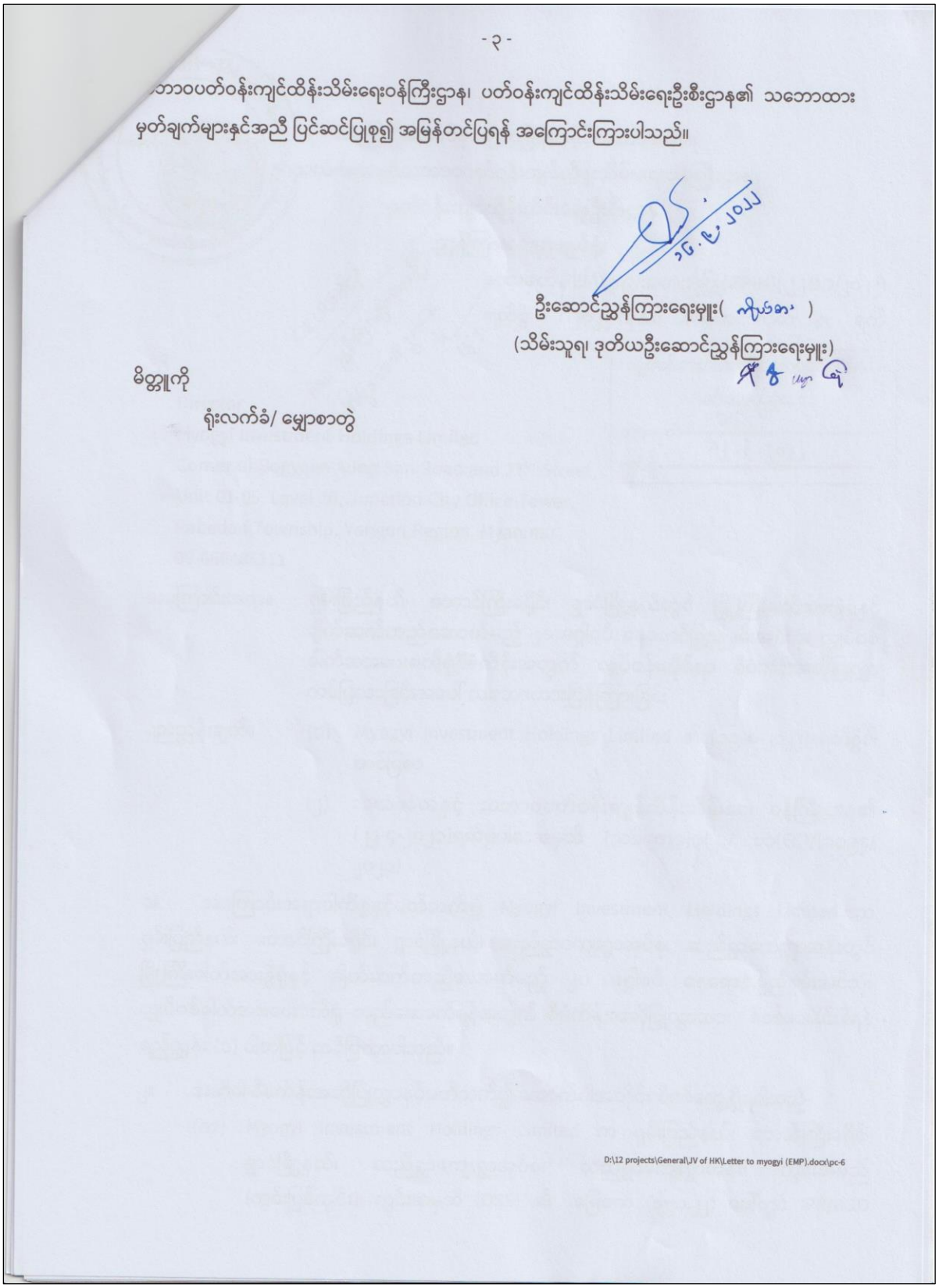

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ဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာန၊ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန၏ သဘောထား
မှတ်ချက်များနှင့်အညီ ပြင်ဆင်ပြုစု၍ အမြန်တင်ပြရန် အကြောင်းကြားပါသည်။

၁၆.၆.၂၀၂၂

ဦးဆောင်ညွှန်ကြားရေးမှူး(ကိုယ်စား)
(သိမ်းသူရ၊ ဒုတိယဦးဆောင်ညွှန်ကြားရေးမှူး)

မိတ္တူကို
ရုံးလက်ခံ/ မျှောစာတွဲ

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(2) Project proponent's company registration card

ကုမ္ပဏီမှတ်ပုံတင်လက်မှတ်

Certificate of Incorporation

MYOGYI INVESTMENT HOLDINGS LIMITED
Company Registration No. 132854335

မြန်မာနိုင်ငံကုမ္ပဏီများဥပဒေ၂၀၁၇ အရ
MYOGYI INVESTMENT HOLDINGS LIMITED
အား ၂၀၂၂ ခုနှစ် မတ်လ ၂၅ ရက်နေ့တွင်
အစုရှယ်ယာအားဖြင့် တာဝန်ကန့်သတ်ထား သည့် အများနှင့်မသက်ဆိုင်သောကုမ္ပဏီ
အဖြစ် ဖွဲ့စည်းမှတ်ပုံတင်ခွင့်ပြုလိုက်သည်။

This is to certify that
MYOGYI INVESTMENT HOLDINGS LIMITED
was incorporated under the Myanmar Companies Law 2017 on 25 March 2022 as a Private Company Limited by Shares.

ကုမ္ပဏီမှတ်ပုံတင်အရာရှိ
Registrar of Companies
ရင်းနှီးမြှုပ်နှံမှုနှင့်ကုမ္ပဏီများညွှန်ကြားမှုဦးစီးဌာန
Directorate of Investment and Company Administration

(3) 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. 00028 Date 8 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 သယ်ဇာတနှင့် 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

The VALIDITY of this certificate is extended for one year from (1.4.2018) to (31.3.2019)

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

EXTENSION (သက်တမ်းတိုးမြှင့်ခြင်း)
The VALIDITY of this certificate is extended for one year from (1.1.2022) to (31.12.2022)
For Director General
(Soe Naing, Director)
Environmental Conservation Department

EXTENSION
The VALIDITY of this certificate is extended for six months from (1.7.2021) to (31.12.2021)
For Director General
(Soe Naing, Director)
Environmental Conservation Department

EXTENSION
The VALIDITY of this certificate is extended for nine months from (1.4.2019) to (31.12.2019)
For Director General
(Soe Naing, Director)
Environmental Conservation Department

EXTENSION
The VALIDITY of this certificate is extended for one year from (1.1.2020) to (31.12.2020)
For Director General
(Soe Naing, Director)
Environmental Conservation Department

EXTENSION
SoeNaing

REPUBLIC OF THE UNION OF MYANMAR

Ministry of Natural Resources and Environmental Conservation

CERTIFICATE FOR TRANSITIONAL CONSULTANT REGISTRATION

(ကြားကာလအကြံပေးလုပ်ကိုင်သူမှတ်ပုံတင်ခြင်းအထောက်အထားလက်မှတ်)

No. 10106 Date [illegible]

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)	U Aye Thiha
(b)	Citizenship (နိုင်ငံသား)	Myanmar
(c)	Identity Card / Passport Number (မှတ်ပုံတင်/ နိုင်ငံကူးလက်မှတ် အမှတ်)	12/ Ma Ya Ka (Naing) 069784
(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. ayethiha@eguardservices.com , 09 2042233
(e)	Organization (အဖွဲ့အစည်း)	E Guard Environmental Services Co., Ltd.
(f)	Type of Consultancy (အကြံပေးလုပ်ကိုင်မှုအမျိုးအစား)	Person
(g)	Duration of validity (သက်တမ်းကုန်ဆုံးရက်)	31 March 2018

EXTENSION
The VALIDITY of this certificate is extended for one year from (1.4.2018) to (31.3.2019)
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. Ecology and Biodiversity
2. Facilitation of Meting
3. Legal Analysis
4. Socio-Economy

EXTENSION
သက်တမ်းတိုးခြင်း
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 တိုးပြင်းသည်။
For Director General
(Soe Naing, Director)
Environmental Conservation Department

EXTENSION
သက်တမ်းတိုးခြင်း
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 တစ်နှစ်သက်တမ်းတိုးပြင်းသည်။
For Director General
(Soe Naing, Director)
Environmental Conservation Department

EXTENSION
သက်တမ်းတိုးခြင်း
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)လသက်တမ်းတိုးပြင်းသည်။
For Director General
(Soe Naing, Director)
Environmental Conservation Department

EXTENSION
သက်တမ်းတိုးခြင်း
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)လသက်တမ်းတိုးပြင်းသည်။
For Director General
(Soe Naing, Director)
Environmental Conservation Department

EXTENSION (သက်တမ်းတိုးခြင်း)
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 တစ်နှစ်သက်တမ်းတိုးပြင်းသည်။
For Director General
(Soe Naing, Director)
Environmental Conservation Department

EXTENSION (သက်တမ်းတိုးခြင်း)
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)လသက်တမ်းတိုးပြင်းသည်။
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 ဓာတုဗေးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်းနှင့် 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 ရုပ်ဆိုင်းခြင်း 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 ရုပ်ဆိုင်းခြင်း 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 ရုပ်ဆိုင်းခြင်း သို့မဟုတ် ပယ်ဖျက်ခြင်း ခံရမည်၊

၄။ အထောက်အထားလက်မှတ်ရရှိသော အဖွဲ့အစည်းသည် သက်ဆိုင်ရာစီမံကိန်းအတွက် လေ့လာဆန်းစစ်ရေးဆွဲ ဆောင်ရွက်ရန် တတိယအဖွဲ့အစည်းအဖြစ် အတည်ပြုချက်ရယူရာ၌ 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။

REPUBLIC OF THE UNION OF MYANMAR

Ministry of Natural Resources and Environmental Conservation

CERTIFICATE FOR TRANSITIONAL CONSULTANT REGISTRATION

(ကြားကာလအကြံပေးလုပ်ကိုင်သူမှတ်ပုံတင်ခြင်းအထောက်အထားလက်မှတ်)

No. 00099 Date 15 Jan 2018

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)	U Aung Myint Myat
(b)	Citizenship (နိုင်ငံသား)	Myanmar
(c)	Identity Card / Passport Number (မှတ်ပုံတင်/ နိုင်ငံကူးလက်မှတ် အမှတ်)	9/ Ka Pa Ta (Naing) 214545
(d)	Address (ဆက်သွယ်ရန်လိပ်စာ)	Mudita lane, Loklatyae Quarter, Kyaukpadaung Township, Mandalay Region. aungmyintmyat@eguardservices.com , 09 797005168 , 09 794555989
(e)	Organization (အဖွဲ့အစည်း)	E Guard Environmental Services Co., Ltd.
(f)	Type of Consultancy (အကြံပေးလုပ်ကိုင်မှုအမျိုးအစား)	Person
(g)	Duration of validity (သက်တမ်းကုန်ဆုံးရက်)	31 March 2018

EXTENSION

သက်တမ်းတိုးချဲ့ခြင်း

The VALIDITY of this certificate is extended for one year from (1.4.2018) to (31.3.2019)

ဤလက်မှတ်အား (၀၁-၀၄-၂၀၁၈) ရက်နေ့မှ (၃၁.၃.၂၀၁၉) ရက်နေ့အထိ တစ်နှစ်တိုးချဲ့ထားပါကြောင်းသဘောပေါက်ပါသည်။

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

EXTENSION
သက်တမ်းတိုးခြင်း
The VALIDITY of this certificate is extended for nine months from (1.4.2019) to (31.12.
For Director General
(Soe Naing, Director)
Environmental Conservation Department

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

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

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

EXTENSION (သက်တမ်းတိုးခြင်း)
The VALIDITY of this certificate is extended for six months from (1.1.2023) to (30.6.2023)
ကျွန်ုပ်မှတ်သား(၁-၁-၂၀၂၃) ရက်နေ့မှ (၃၀-၆-၂၀၂၃) ရက်နေ့အထိ (၆)လသက်တမ်းတိုးပြုပြင်သည်။
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. 00267 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. Thaw Tar Htun
(b)	Citizenship (နိုင်ငံသား)	Myanmar
(c)	Identity Card / Passport Number (မှတ်ပုံတင်/ နိုင်ငံကူးလက်မှတ် အမှတ်)	7/PhaMaNa (N) 135716
(d)	Address (ဆက်သွယ်ရန်လိပ်စာ)	Building 275, Room 14, Gantgaw Housing, MingalarTheiddi Ward, Zabbuthiri Tsp, Naypyitaw. Mobile phone: 09978232387 E mail: thawtar.htun.38@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. Water Pollution Control.
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 ရုပ်ဆိုင်းခြင်း သို့မဟုတ် ပယ်ဖျက်ခြင်း ခံရမည်၊

(ဂ) ဤအထောက်အထားလက်မှတ်တွင် ခွင့်ပြုထားသည့် ကျွမ်းကျင်မှုနယ်ပယ်များအတွက်သာ တာဝန်ယူလေ့လာဆန်းစစ်ရေးဆွဲခွင့်ရှိသည်၊

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

(c) 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 ရုပ်ဆိုင်းခြင်း 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 ရုပ်ဆိုင်းခြင်း 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 ရုပ်ဆိုင်းခြင်း 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 ရုပ်ဆိုင်းခြင်း 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 ရုပ်ဆိုင်းခြင်း 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 ရုပ်ဆိုင်းခြင်း သို့မဟုတ် ပယ်ဖျက်ခြင်း ခံရမည်၊

(ဂ) ဤအထောက်အထားလက်မှတ်တွင် ခွင့်ပြုထားသည့် ကျွမ်းကျင်မှုနယ်ပယ်များအတွက်သာ တာဝန်ယူ လေ့လာဆန်းစစ်ရေးဆွဲခွင့်ရှိသည်၊

(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 ရုပ်ဆိုင်းခြင်း 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 ရုပ်ဆိုင်းခြင်း သို့မဟုတ် ပယ်ဖျက်ခြင်း ခံရမည်၊

၄။ အထောက်အထားလက်မှတ်ရရှိသော အဖွဲ့အစည်းသည် သက်ဆိုင်ရာစီမံကိန်းအတွက် လေ့လာဆန်းစစ်ရေးဆွဲ ဆောင်ရွက်ရန် တတိယအဖွဲ့အစည်းအဖြာဖြာချက်ရယူရာ၌ 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. 00376 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 သယံဇာတနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာနသည် ဤအထောက်အထားလက်မှတ်ကို ထုတ်ပေးလိုက်သည်။)

(a)	Name of Consultant (အကြံပေးပုဂ္ဂိုလ်အမည်)	Mr. Nyein Chan Aung
(b)	Citizenship (နိုင်ငံသား)	Myanmar
(c)	Identity Card / Passport Number (မှတ်ပုံတင်/ နိုင်ငံကူးလက်မှတ် အမှတ်)	5/KaLaNa (C) 059799
(d)	Address (ဆက်သွယ်ရန်လိပ်စာ)	No. 39, Bayint Naung 1st, 1 Ward, Mayangone Township, Yangon, Myanmar. Mobile phone: 959798627909, 09893244228, E mail: nyeinchamaung1993@gmail.com, nyeinnca1993@gmail.com
(e)	Organization (အဖွဲ့အစည်း)	E Guard Environmental Services Company Limited.
(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. Ecology and Biodiversity.
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 ရုပ်သိမ်းခြင်း သို့မဟုတ် ပယ်ဖျက်ခြင်း ခံရမည်၊

(ဂ) ဤအထောက်အထားလက်မှတ်တွင် ခွင့်ပြုထားသည့် ကျွမ်းကျင်မှုနယ်ပယ်များအတွက်သာ တာဝန်ယူ လေ့လာဆန်းစစ်ရေးဆွဲခွင့်ရှိသည်၊

(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 ရုပ်သိမ်းခြင်း 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 ရုပ်သိမ်းခြင်း 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. 00377 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 သယံဇာတနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာနသည် ဤအထောက်အထားလက်မှတ်ကို ထုတ်ပေးလိုက်သည်။)

(a)	Name of Consultant (အကြံပေးပုဂ္ဂိုလ်အမည်)	Mr. Aung Zayar Wint
(b)	Citizenship (နိုင်ငံသား)	Myanmar
(c)	Identity Card / Passport Number (မှတ်ပုံတင်/ နိုင်ငံကူးလက်မှတ် အမှတ်)	12/MaYaKa (N) 154380
(d)	Address (ဆက်သွယ်ရန်လိပ်စာ)	No.(145-A2-3),Thiri Mingalar Street, Ward No.(4), 8th Mile, Mayangone Township, Yangon Mobile phone: 09450539306, 0919667757 Email: aungzayarwint@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. Risk Assessment and Hazard Management.	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၊ စာဒဏာတက်မှုများနှင့်စပ်လျဉ်း၍ တာဝန်ယူဖြေရှင်းရမည်။ ယင်းသို့ ဖြေရှင်းနိုင်ခြင်း မရှိပါက အထောက်အထားလက်မှတ် ရပ်ဆိုင်းခြင်း သို့မဟုတ် ပယ်ဖျက်ခြင်း ခံရမည်၊

(ဂ) ဤအထောက်အထားလက်မှတ်တွင် ခွင့်ပြုထားသည့် ကျွမ်းကျင်မှုနယ်ပယ်များအတွက်သာ တာဝန်ယူလေ့လာဆန်းစစ်ရေးဆွဲခွင့်ရှိသည်၊

(ဃ) မိမိအဖွဲ့အစည်းတွင် ပါဝင်သည့် အကြံပေးပုဂ္ဂိုလ်များ ပြောင်းလဲမှု တစ်စုံတစ်ရာရှိပါက ကြားကာလအကြံပေးလုပ်ကိုင်သူမှတ်ပုံတင်ခြင်း အထောက်အထားလက်မှတ် ရရှိထားသူဖြင့်သာ အစားထိုးပြောင်းလဲရမည်၊

(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 တတိယအဖွဲ့အစည်းအဖြစ် အစည်းအဝေးတည်ပြုချက်ရယူရာ၌ မိမိအဖွဲ့အစည်းတွင် မှတ်ပုံတင်ထားသည့် အကြံပေးပုဂ္ဂိုလ်များ၏ အမည်စာရင်းကိုသာ တင်ပြရမည်၊

၅။ အထောက်အထားလက်မှတ်ရရှိသော အဖွဲ့အစည်းသည် မိမိအဖွဲ့အစည်းက လက်လှမ်းမမီသော ကျွမ်းကျင်မှုနယ်ပယ်များအတွက် လေ့လာဆန်းစစ်ရေးဆွဲ ဆောင်ရွက်နိုင်ရန် ကြားကာလအကြံပေးလုပ်ကိုင်သူ မှတ်ပုံတင်ခြင်း အထောက်အထားလက်မှတ် ရရှိပြီးဖြစ်သည့် တစ်သီးပုဂ္ဂလလုပ်ကိုင်သူ (Freelancer) ကို သက်ဆိုင်ရာစီမံကိန်းအတွက်သာ 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 သယံဇာတနှင့် 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 ပြည့်ခြောက်သည့်နေ့တွင် 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 တာဝန်ယူ လေ့လာဆန်းစစ်ရေးဆွဲခွင့်ရှိသည်၊

(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၊

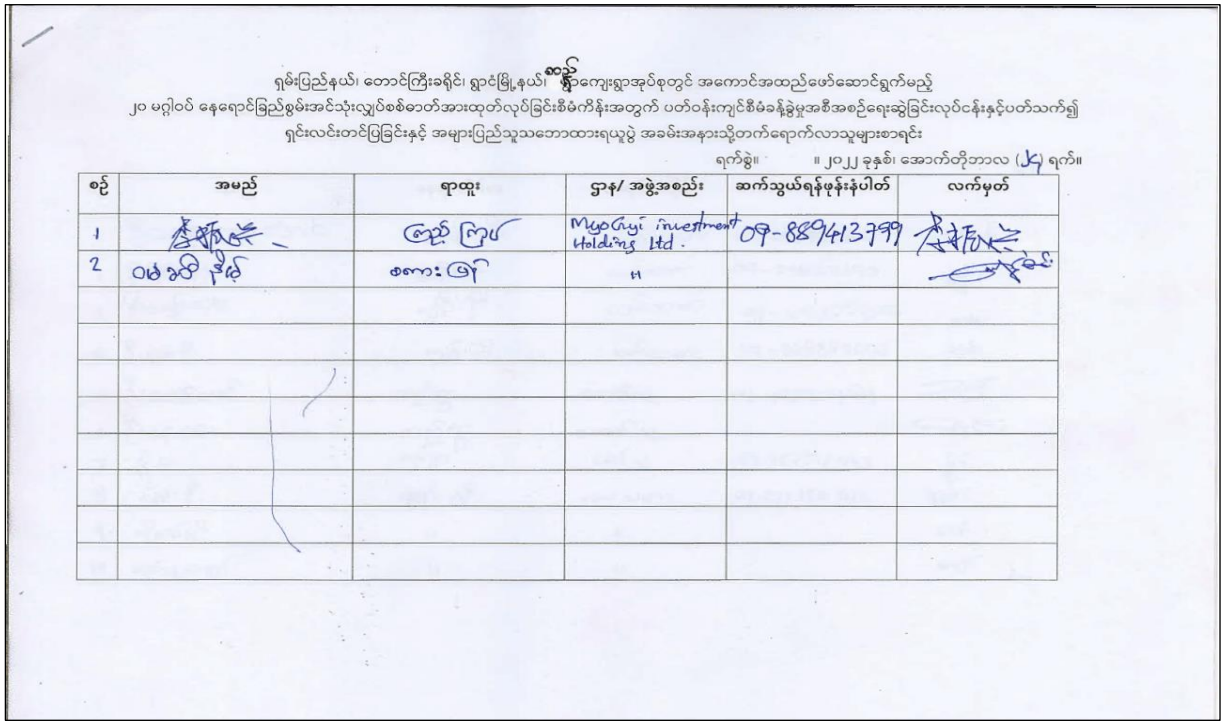
၂။ အထောက်အထားလက်မှတ်ရရှိသူသည် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနက ခွင့်ပြုထားသော ပတ်ဝန်းကျင် ဆန်းစစ်ခြင်းအမျိုးအစားကိုသာ ဆောင်ရွက်ရမည်၊

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 တတိယအဖွဲ့အစည်းအဖြစ် ပြုချက်ရယူရာ၌ 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။

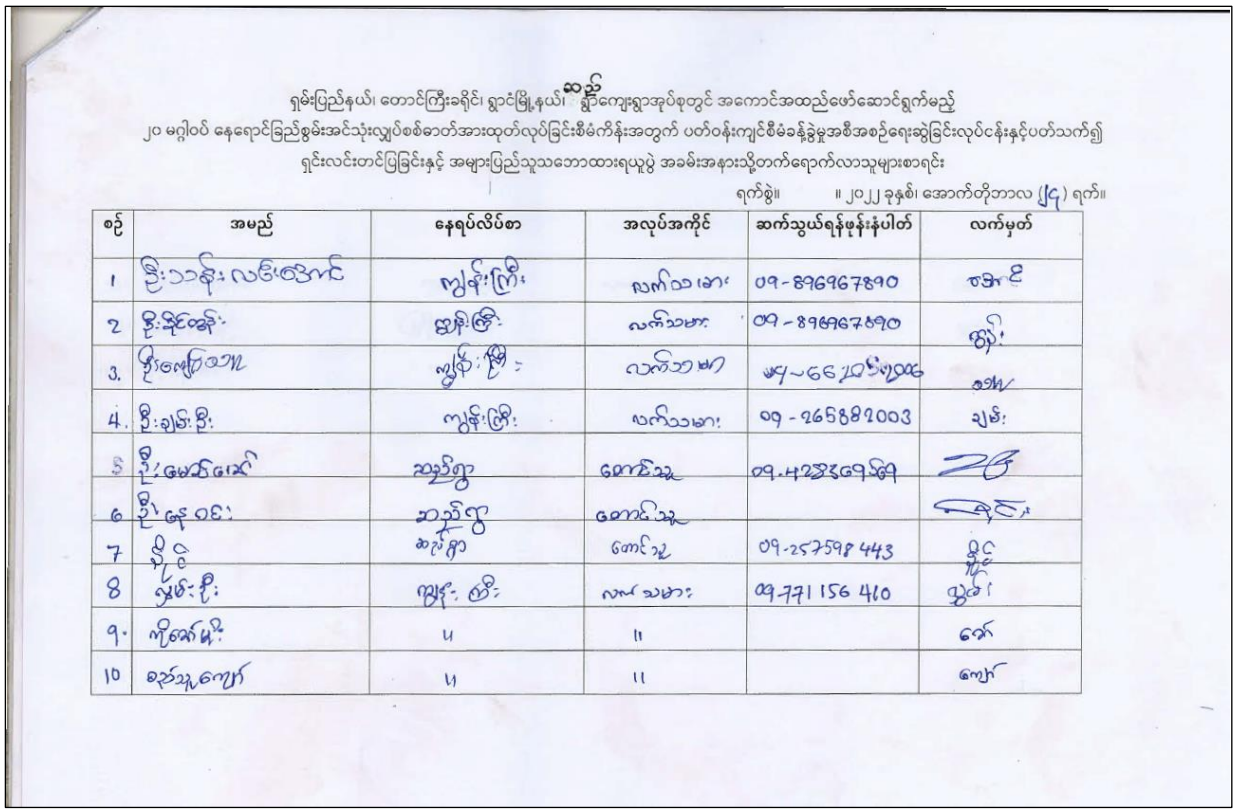
(4) Public consultation meeting's attendance lists



ရုပ်မြင်ပြည်နယ်၊ တောင်ကြီးခရိုင်၊ ရွာငံမြို့နယ်၊ ဆည်ကျေးရွာအုပ်စုတွင် အကောင်အထည်ဖော်ဆောင်ရွက်မည့်
၂၀ မဂ္ဂါဝပ် နေရောင်ခြည်စွမ်းအင်သုံးလျှပ်စစ်ဓာတ်အားထုတ်လုပ်ခြင်းစီမံကိန်းအတွက် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်ရေးဆွဲခြင်းလုပ်ငန်းနှင့်ပတ်သက်၍
ရှင်းလင်းတင်ပြခြင်းနှင့် အများပြည်သူသဘောထားရယူပွဲ အခမ်းအနားသို့တက်ရောက်လာသူများစာရင်း

ရက်စွဲ။ ။ ၂၀၂၂ ခုနှစ်၊ အောက်တိုဘာလ (၂၄) ရက်။

စဉ်	အမည်	ရာထူး	ဌာန/ အဖွဲ့အစည်း	ဆက်သွယ်ရန်ဖုန်းနံပါတ်	လက်မှတ်
1	[illegible]	[illegible]	Myogyi Investment Holdings Ltd.	09-889413799	[illegible]
2	[illegible]	[illegible]	〃		[illegible]



ရုပ်မြင်ပြည်နယ်၊ တောင်ကြီးခရိုင်၊ ရွာငံမြို့နယ်၊ ဆည်ကျေးရွာအုပ်စုတွင် အကောင်အထည်ဖော်ဆောင်ရွက်မည့်
၂၀ မဂ္ဂါဝပ် နေရောင်ခြည်စွမ်းအင်သုံးလျှပ်စစ်ဓာတ်အားထုတ်လုပ်ခြင်းစီမံကိန်းအတွက် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်ရေးဆွဲခြင်းလုပ်ငန်းနှင့်ပတ်သက်၍
ရှင်းလင်းတင်ပြခြင်းနှင့် အများပြည်သူသဘောထားရယူပွဲ အခမ်းအနားသို့တက်ရောက်လာသူများစာရင်း

ရက်စွဲ။ ။ ၂၀၂၂ ခုနှစ်၊ အောက်တိုဘာလ (၂၄) ရက်။

စဉ်	အမည်	နေရပ်လိပ်စာ	အလုပ်အကိုင်	ဆက်သွယ်ရန်ဖုန်းနံပါတ်	လက်မှတ်
1	[illegible]	[illegible]	[illegible]	09-896967890	[illegible]
2	[illegible]	[illegible]	[illegible]	09-896967890	[illegible]
3.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4.	[illegible]	[illegible]	[illegible]	09-265882003	[illegible]
5	[illegible]	[illegible]	[illegible]	09.423826[illegible]	[illegible]
6	[illegible]	[illegible]	[illegible]		[illegible]
7	[illegible]	[illegible]	[illegible]	09-257598443	[illegible]
8	[illegible]	[illegible]	[illegible]	09-771156410	[illegible]
9.	[illegible]	〃	〃		[illegible]
10	[illegible]	〃	〃		[illegible]

ရှမ်းပြည်နယ်၊ တောင်ကြီးခရိုင်၊ ရွာငံမြို့နယ်၊ ဆည်ရွာကျေးရွာအုပ်စုတွင် အကောင်အထည်ဖော်ဆောင်ရွက်မည့်
၂၀ မဂ္ဂါဝပ် နေရောင်ခြည်စွမ်းအင်သုံးလျှပ်စစ်ဓာတ်အားထုတ်လုပ်ခြင်းစီမံကိန်းအတွက် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်ရေးဆွဲခြင်းလုပ်ငန်းနှင့်ပတ်သက်၍
ရှင်းလင်းတင်ပြခြင်းနှင့် အများပြည်သူသဘောထားရယူပွဲ အခမ်းအနားသို့တက်ရောက်လာသူများစာရင်း

ရက်စွဲ။ ။ ၂၀၂၂ ခုနှစ်၊ အောက်တိုဘာလ (၂၄) ရက်။

စဉ်	အမည်	နေရပ်လိပ်စာ	အလုပ်အကိုင်	ဆက်သွယ်ရန်ဖုန်းနံပါတ်	လက်မှတ်
၁၁။	ဝေသော်ဇင်အောင်	ကျွန်းကြီး	လယ်သမား		[illegible]
၁၂။	မင်းမင်းသူ	မြို့ကြီး	”		[illegible]
၁၃။	ဦးကျလား	”	”		[illegible]

(5) Public consultation meeting's meeting minutes

E Guard Environmental Services Co., Ltd. **Meeting Minutes**	
Subject: Public Consultation Meeting for Myogyi Substation 20 MW Ground Mounted Solar Power Project	**Date:** 24th October, 2022.
Venue: Sae Ywar Village, Sae Ywar Village Tract, Ywar Ngan Township, Taunggyi District, Shan State	**Time:** 01:00 PM to 3:00 PM
Attendees: Total: 19 Local People from Kyun Gyi Village: 8 Local People from Myo Gyi Village: 2 Local People from Sae Ywar Village: 3 Representatives of Project Proponent: 2 Representatives of E Guard Environmental Services: 4	
Note Taker: U Kee Thang	

Agenda:

1) Opening the ceremony
2) Presentation of Project Information and Environmental Management Plan (EMP) for construction and operation of Myogyi Substation 20MW Ground Mounted Solar Power Project by U Aung Si Thu Thein (Assistant Consultant, E Guard Environmental Services Co., Ltd.)
3) Questions, Comments and Suggestions from the attendees.
4) Closing the ceremony

1. Opening Ceremony

2. Presentation of Project Information and Environmental Management Plan (EMP) including impacts and mitigations for Myogyi Substation 20MW Ground Mounted Solar Power Project by U Aung Si Thu Thein (Assistant Consultant, E Guard Environmental Services Co., Ltd.)

U Aung Si Thu Thein explained the project information, project proponent information, electricity generation processes and processes of environmental management plan preparation, potential positive impacts of the project, potential negative impacts of the project, proposed mitigation measures to reduce anticipated negative impacts, proposed environmental monitoring

plan, grievance redress mechanism and environmental quality measurements processes during the site visit.

3. Questions, Comments and Suggestions from the Attendees

Question: U Nay Win (Sae Ywar Village) discussed that he would like to thank for economic development of the country due to the project implementation, especially for the job opportunities for local people and the accessible road. He wants to know the pros and cons of implementing the project. He also requests to slow down vehicular movement in the area because they are afraid of dust affecting on the pollination and if possible, they request to spray water on the road.

Answer: U Wan Se Naint (Translator) answered that the project proponent puts first priority to employ the locals. In case of spraying water, they will inform to the head office and will be preparing.

Answer: U Aung Si Thu Thein (Assistant Consultant, E Guard Environmental Services Co., Ltd.) answered that there are both positive and negative impacts due to project implementation. However, negative impacts can be reduced by implementing mitigation measures, EMPs and EMoPs. Mitigation measures for vehicle accidents and dust have already applied for project just like limitation for vehicle speed not more than 10 miles per hour in the vicinity of project and near villages and this will reduce the impacts of dust.

Question: U Maung Zaw (Sae Ywar Village) discussed that he afraid of forming ponds on the higher side of the road and he requests to install box culvert to avoid this potential flooding situation.

Answer: U Wan Se Naint (Translator) answered that they will inform to the head office and will be preparing to handle this potential problem.

Question: U Maung Zaw (Sae Ywar Village) asked the compensation for the land when the electricity poles of overhead transmission line have to set in their farm land along the route.

Answer: U Wan Se Naint (Translator) answered that they will inform to the head office and will carry out compensation processes legally.

4. Closing the Ceremony

(6) Public consultation meeting's photos

Presented by UAung Si Thu Thein (E Guard Environmental Services)

Presented by U Aung Si Thu Thein (E Guard Environmental Services)

Presented by U Aung Si Thu Thein (E Guard Environmental Services)

Questions, Comments and Suggestions from the Attendees

Questions, Comments and Suggestions from the Attendees

Questions, Comments and Suggestions from the Attendees

Answered by U Aung Si Thu Thein (E Guard Environmental Services)

Answered by U Wan Se Naint (Myogyi Investment Holdings Limited)

(7) Presentation file of public consultation meeting


စီမံကိန်းအတွက်ရင်းနှီးမြှုပ်နှံမှုပုံစံ
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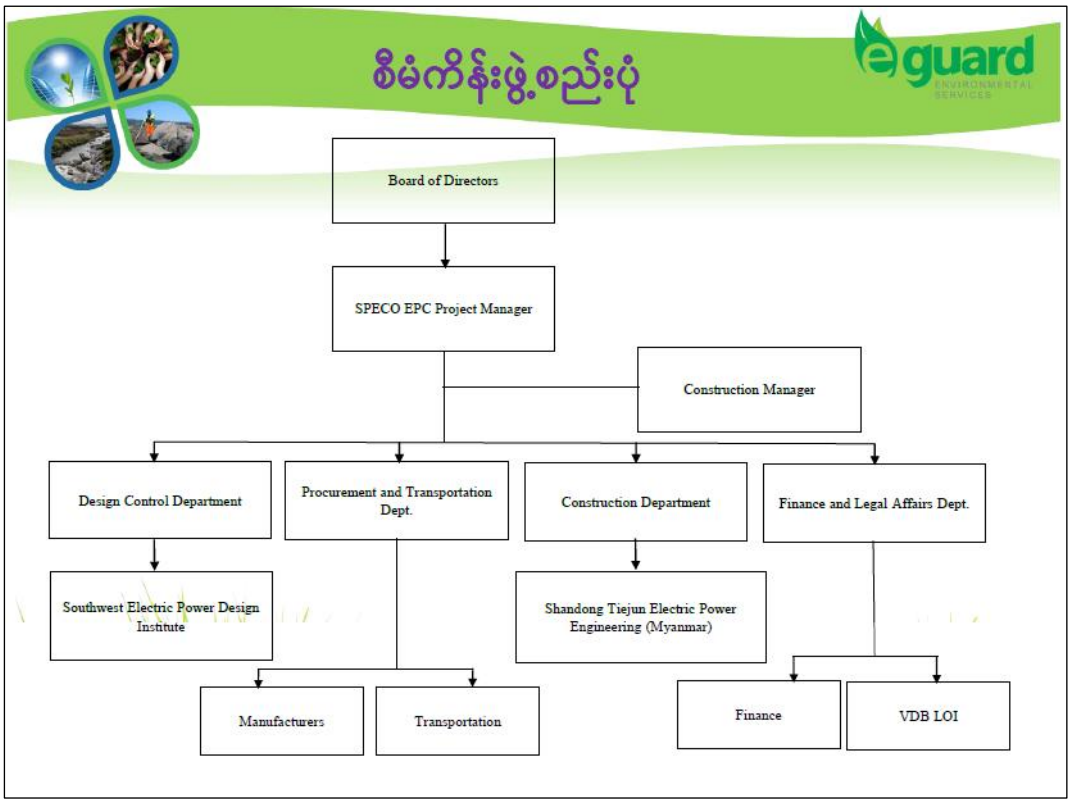
ENVIRONMENTAL SERVICES
Myogyi Investment Holdings Limited
• ကွင်းဆင်းဆောင်ရွက်ခြင်းနှင့် ဒီဇိုင်းရေးဆွဲခြင်း
• တည်ဆောက်ရေးလုပ်ငန်းများ ဆောင်ရွက်ခြင်း
• ဓာတ်အားလိုင်းသွယ်တန်းခြင်း
• ကွန်ပျူတာစနစ်ဖြင့်ဓာတ်အားထုတ်လုပ်မှု၊ ပို့လွှတ်မှုများအား ထိန်းချုပ်ခြင်း


စီမံကိန်းဖွဲ့စည်းပုံ
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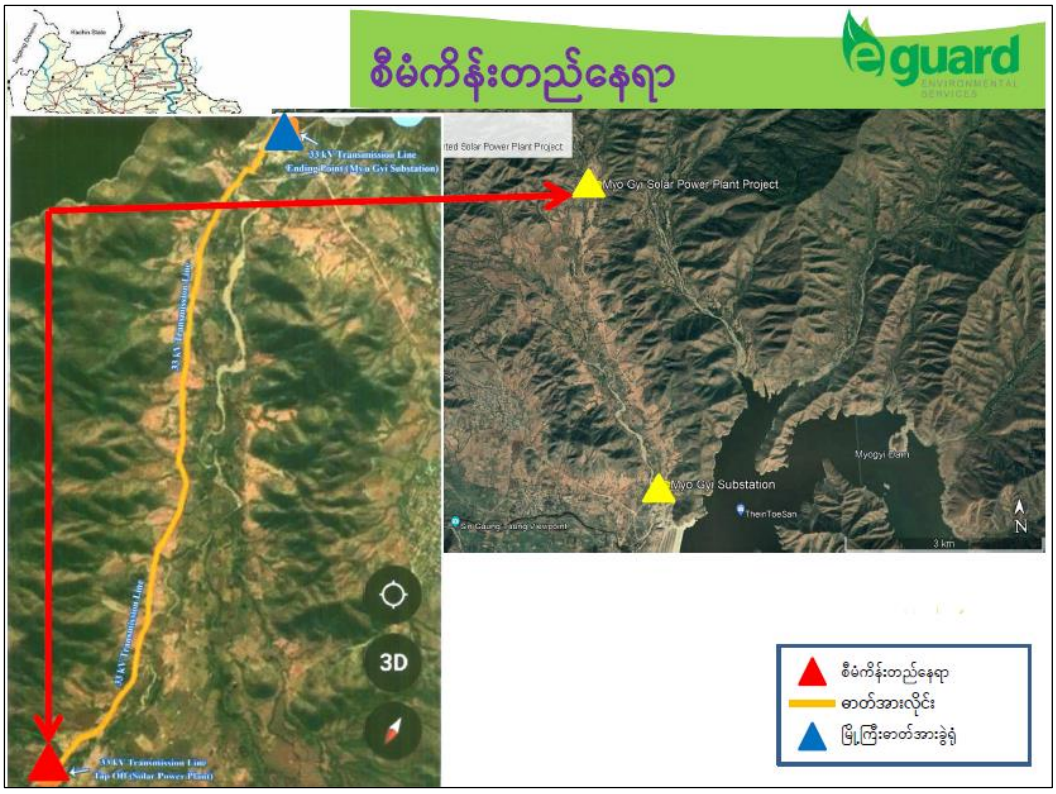
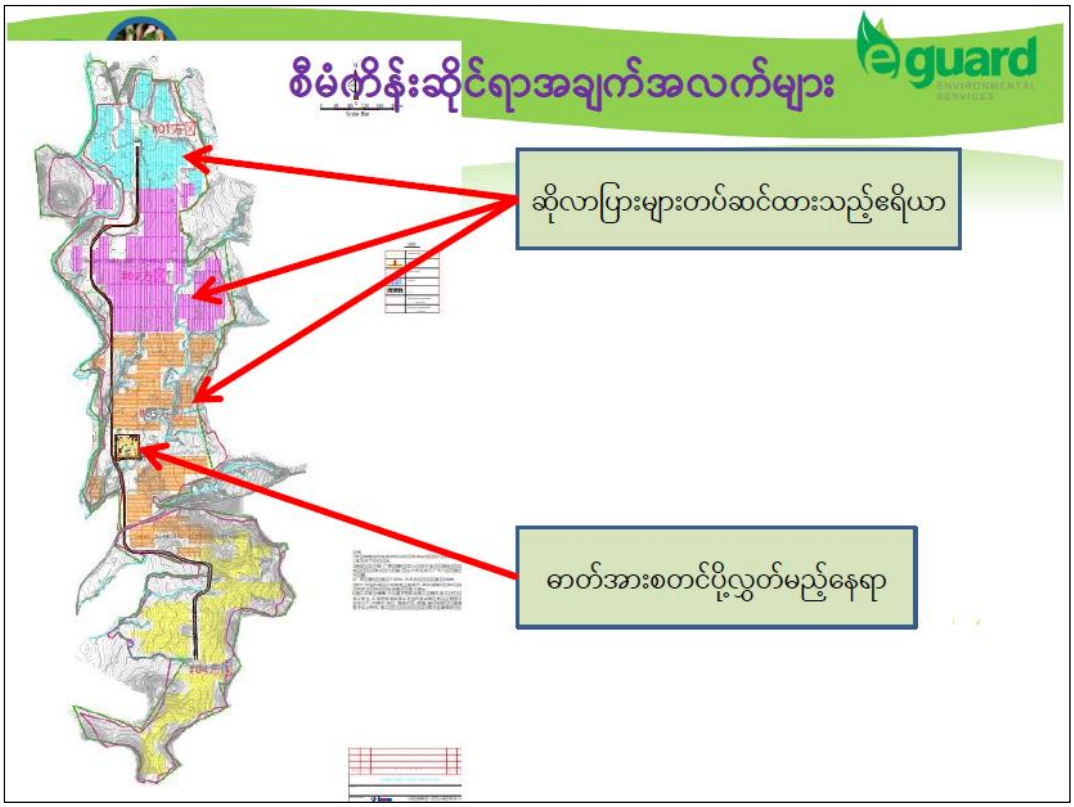
ENVIRONMENTAL SERVICES
Board of Directors
SPECO EPC Project Manager
Construction Manager
Design Control Department
Procurement and Transportation Dept.
Construction Department
Finance and Legal Affairs Dept.
Southwest Electric Power Design Institute
Shandong Tiejun Electric Power Engineering (Myanmar)
Manufacturers
Transportation
Finance
VDB LOI


စီမံကိန်းတည်နေရာ
eguard
Myo Gyi Solar Power Plant Project
Myo Gyi Substation
Myogyi Dam
ThenToeSan
3 km
N
3D
စီမံကိန်းတည်နေရာ
ဓာတ်အားလိုင်း
မြို့ကြီးဓာတ်အားခွဲရုံ


စီမံကိန်းဆိုင်ရာအချက်အလက်များ
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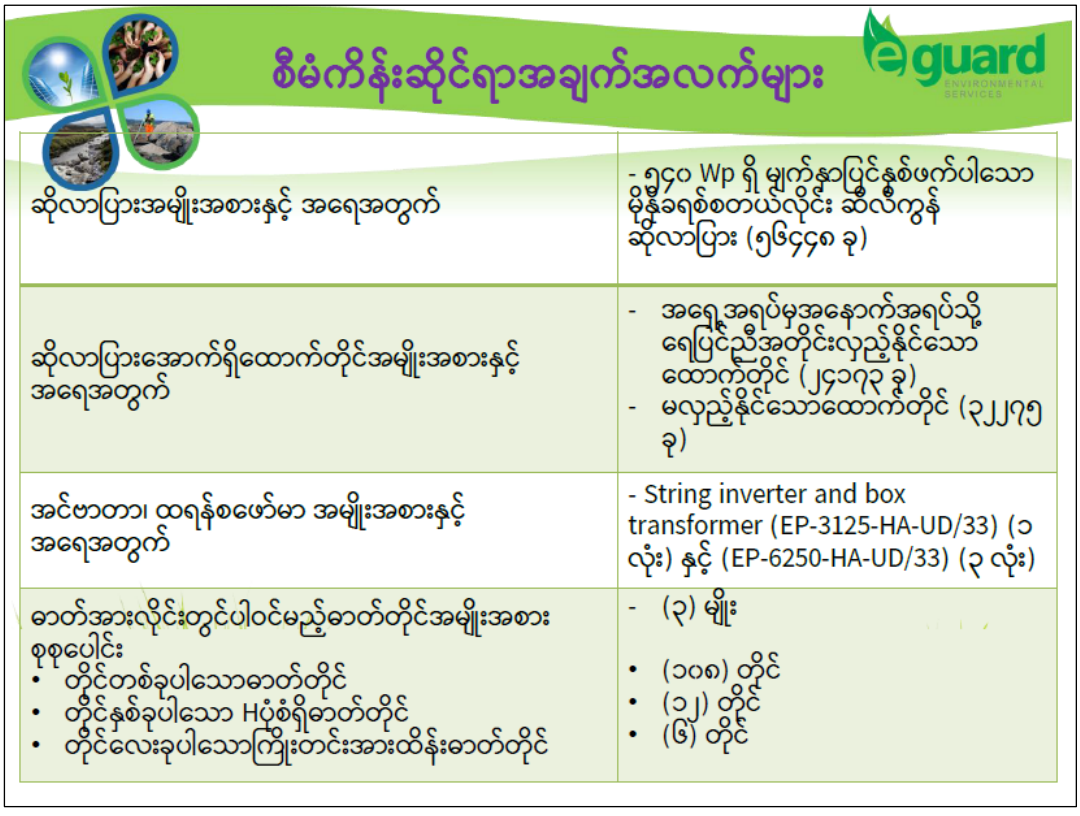
ဆိုလာပြားများတပ်ဆင်ထားသည့်ရေယာ
ဓာတ်အားစတင်ပို့လွှတ်မည့်နေရာ

စိမ်ကိန်းဆိုင်ရာအချက်အလက်များ

စိမ်ကိန်းတည်ဆောက်မည့်ကာလ	- (၆) လ
စိမ်ကိန်းလည်ပတ်မည့်ကာလ	- နှစ် (၂၀)
စိမ်ကိန်းအကျယ်အဝန်း	- (၁၄၉) ဧကာ၊ (၆၀.၃၆ ဟတ်တာ)
ဓာတ်အားလိုင်းမှပို့လွှတ်နိုင်သည့်ပမာဏ	- (၃၃) ကေဗီအေ
ဓာတ်အားလိုင်းအရှည်	- (၃.၁၄) မိုင်၊ (၅) ကီလိုမီတာခန့်



စိမ်ကိန်းဆိုင်ရာအချက်အလက်များ

ဆိုလာပြားအမျိုးအစားနှင့် အရေအတွက်	- ၅၄၀ Wp ရှိ မျက်နှာပြင်နှစ်ဖက်ပါသော မိုနိုခရစ်စတယ်လိုင်း ဆီလီကွန် ဆိုလာပြား (၅၆၄၄၈ ခု)
ဆိုလာပြားအောက်ရှိထောက်တိုင်အမျိုးအစားနှင့် အရေအတွက်	- အရှေ့အရပ်မှအနောက်အရပ်သို့ ရေပြင်ညီအတိုင်းလှည့်နိုင်သော ထောက်တိုင် (၂၄၁၇၃ ခု) - မလှည့်နိုင်သောထောက်တိုင် (၃၂၂၇၅ ခု)
အင်ဗာတာ၊ ထရန်စဖော်မာ အမျိုးအစားနှင့် အရေအတွက်	- String inverter and box transformer (EP-3125-HA-UD/33) (၁ လုံး) နှင့် (EP-6250-HA-UD/33) (၃ လုံး)
ဓာတ်အားလိုင်းတွင်ပါဝင်မည့်ဓာတ်တိုင်အမျိုးအစား စုစုပေါင်း • တိုင်တစ်ခုပါသောဓာတ်တိုင် • တိုင်နှစ်ခုပါသော H ပုံစံရှိဓာတ်တိုင် • တိုင်လေးခုပါသောကြိုးတင်းအားထိန်းဓာတ်တိုင်	- (၃) မျိုး • (၁၀၈) တိုင် • (၁၂) တိုင် • (၆) တိုင်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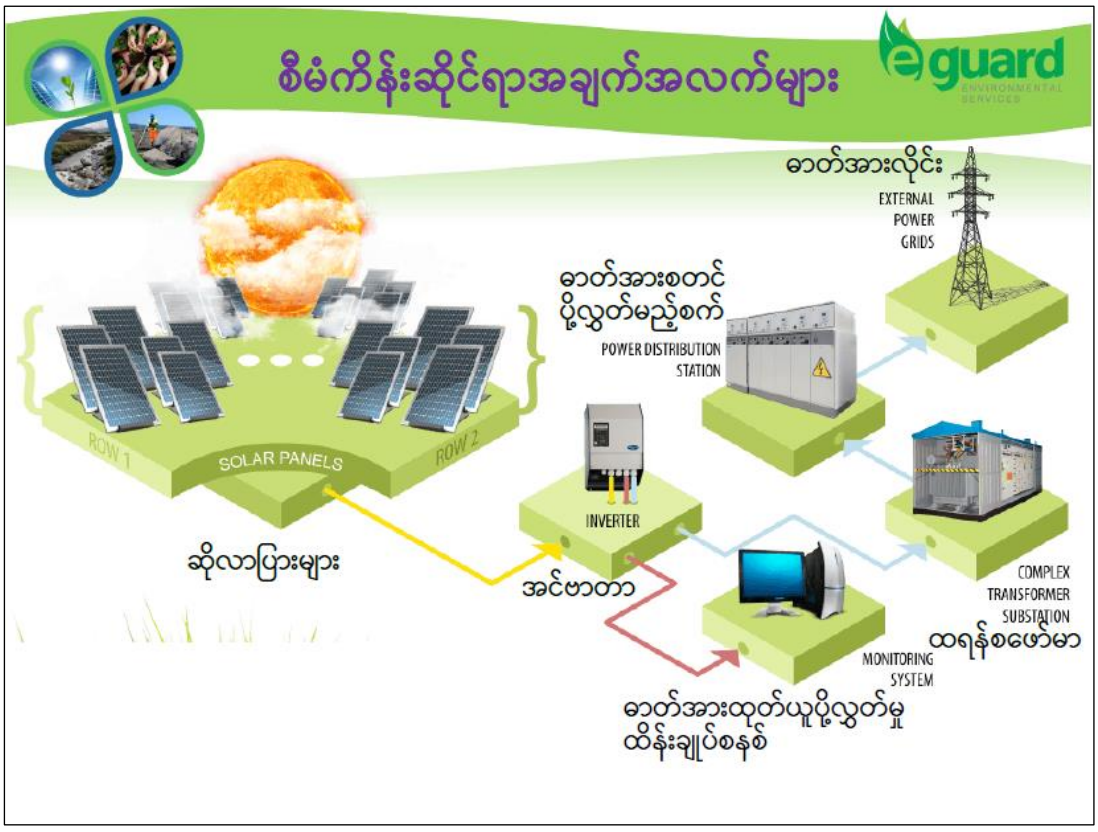
အင်ဗာတာနှင့်
ထရန်စဖော်မာ


စီမံကိန်းဆိုင်ရာအချက်အလက်များ
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ENVIRONMENTAL SERVICES
မော်အားလိုင်း
EXTERNAL POWER GRIDS
မော်အားစတင်
ပို့လွှတ်မည့်စက်
POWER DISTRIBUTION STATION
ROW 1
SOLAR PANELS
ROW 2
INVERTER
COMPLEX TRANSFORMER SUBSTATION
ထရန်စဖော်မာ
MONITORING SYSTEM
ဆိုလာပြားများ
အင်ဗာတာ
မော်အားထုတ်ယူပို့လွှတ်မှု
ထိန်းချုပ်စနစ်


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ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်ရေးဆွဲခြင်း
(Environmental Management Plan)
E Guard Environmental Services
11


ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်ရေးဆွဲခြင်း
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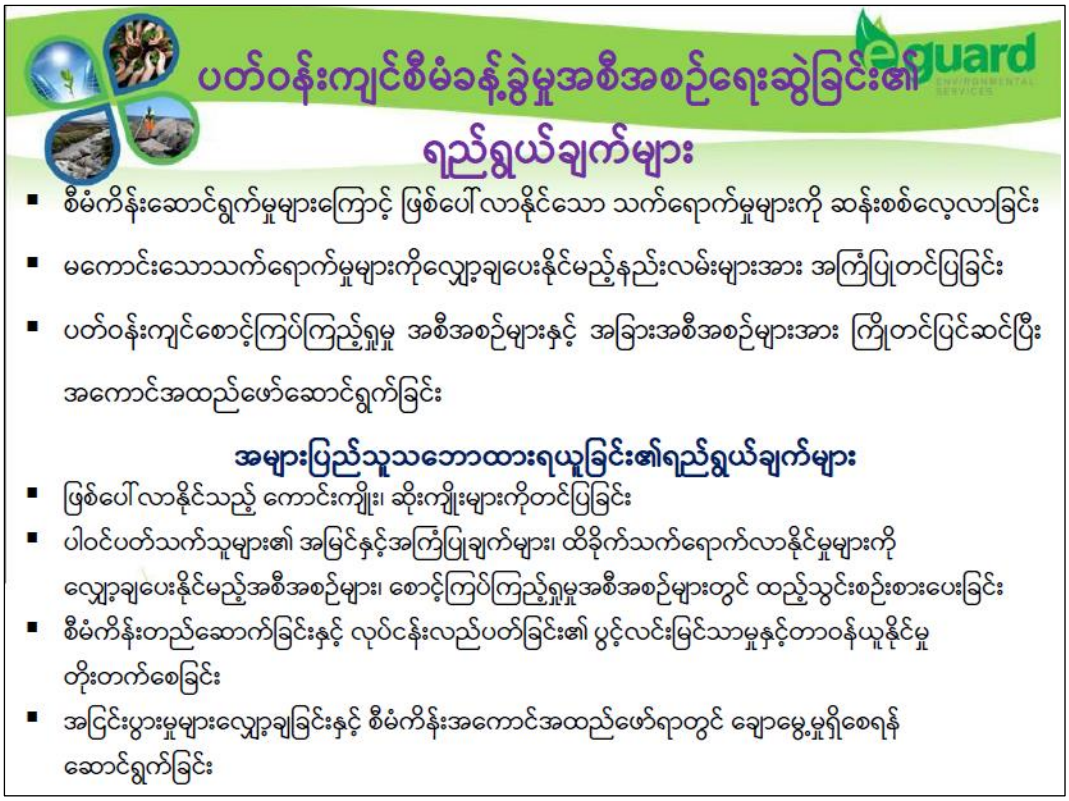
ENVIRONMENTAL SERVICES
စီမံကိန်း၏ဖြစ်နိုင်ခြေရှိသော သက်ရောက်မှုများ
စစ်ဆေးခြင်း
✓ သိသာထင်ရှားမှုရှိ/မရှိ
✓ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း ဆောင်ရွက်ရန် လိုအပ်ခြင်းရှိ/မရှိ
✓ သတ်မှတ်ထားသော အထောက်အထားများ ပြုစုတင်ပြရန်လိုအပ်ခြင်းရှိ/မရှိ
ဆောင်ရွက်သည့်အဖွဲ့အစည်း - E Guard Environmental Services Co., Ltd.
စိစစ်ခွင့်ပြုမည့်အဖွဲ့အစည်း - သယံဇာတနှင့်သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာန၊ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန
လိုက်နာရမည့်ဥပဒေ၊ နည်းဥပဒေနှင့် စည်းမျဉ်းစည်းကမ်းများ
ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော် ဖွဲ့စည်းပုံအခြေခံဥပဒေ (၂၀၀၈)
ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဥပဒေ၊ နည်းဥပဒေနှင့် စည်းမျဉ်းစည်းကမ်းများ၊
ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း၊ အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များ
3


ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်ရေးဆွဲခြင်း၏
ရည်ရွယ်ချက်များ
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စီမံကိန်းဆောင်ရွက်မှုများကြောင့် ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများကို ဆန်းစစ်လေ့လာခြင်း
မကောင်းသောသက်ရောက်မှုများကိုလျှော့ချပေးနိုင်မည့်နည်းလမ်းများအား 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


ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်
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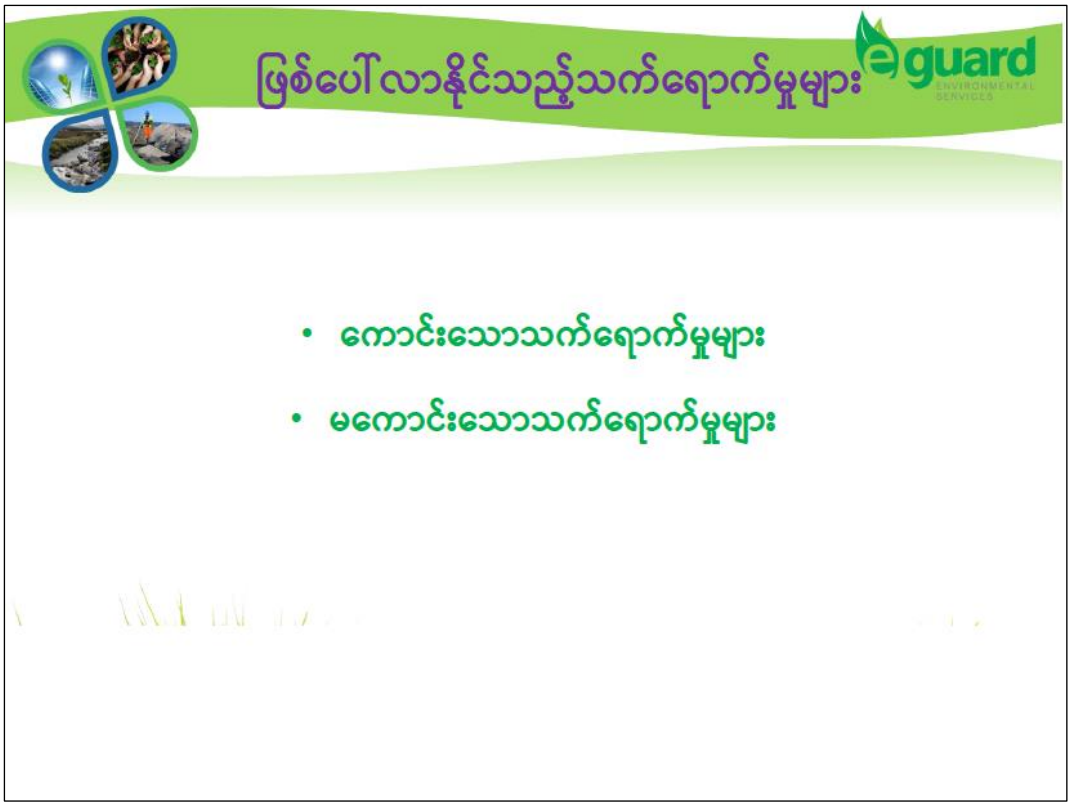
အဆောက်အဦနှင့် လမ်းတည်ဆောက်ခြင်း၊ ဆိုလာပြားများ၊ အင်ဗာတာများ၊ ထရန်စဖော်မာများတပ်ဆင်ခြင်း၊ ဓာတ်အားလိုင်းသွယ်တန်းခြင်း
(တည်ဆောက်သည့်ကာလ)
နေရောင်ခြည်စွမ်းအင်မှ လျှပ်စစ်ဓာတ်အားထုတ်လုပ်ပြီး မြို့ကြီးဓာတ်အားခွဲရုံသို့ ဓာတ်အားပို့လွှတ်ခြင်း
(လုပ်ငန်းလည်ပတ်သည့်ကာလ)
စီမံကိန်းပိတ်သိမ်းခြင်း
(စီမံကိန်းဖျက်သိမ်းသည့်ကာလ)
ဆိုးကျိုးသက်ရောက်ခြင်းမှ
ကာကွယ်ရန်
ရှောင်လွှဲရန်
လျော့နည်းစေရန်
နည်းလမ်းနှင့်အစီအစဉ်များ ဖော်ပြသည့်စီမံချက်
လုပ်ငန်းလည်ပတ်သည့်ကာလ ပြီးဆုံးပါက စီမံကိန်းအား သက်တမ်းတိုးပြီး ဆက်လက်ဆောင်ရွက်မည်ဖြစ်သောကြောင့် စီမံကိန်းဖျက်သိမ်းသည့်ကာလအား ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်တွင် ထည့်သွင်းစဉ်းစားခြင်းမရှိပါ။


ဖြစ်ပေါ်လာနိုင်သည့်သက်ရောက်မှုများ
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ENVIRONMENTAL SERVICES
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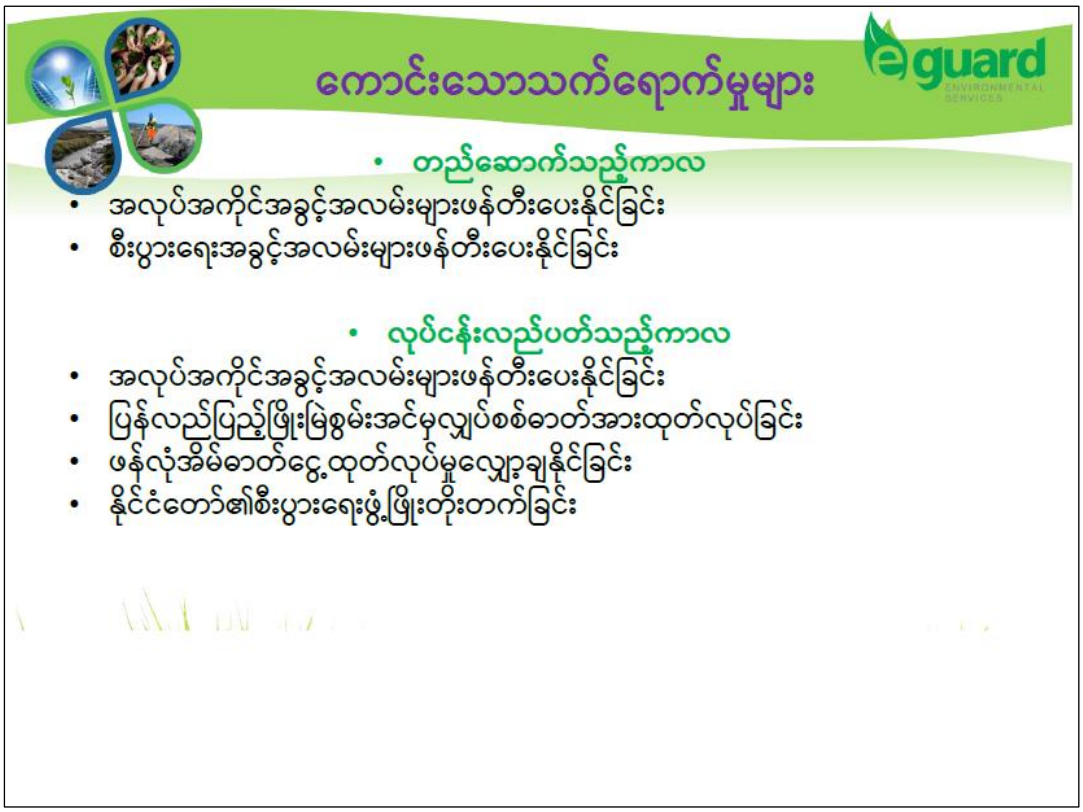
• မကောင်းသောသက်ရောက်မှုများ


ကောင်းသောသက်ရောက်မှုများ
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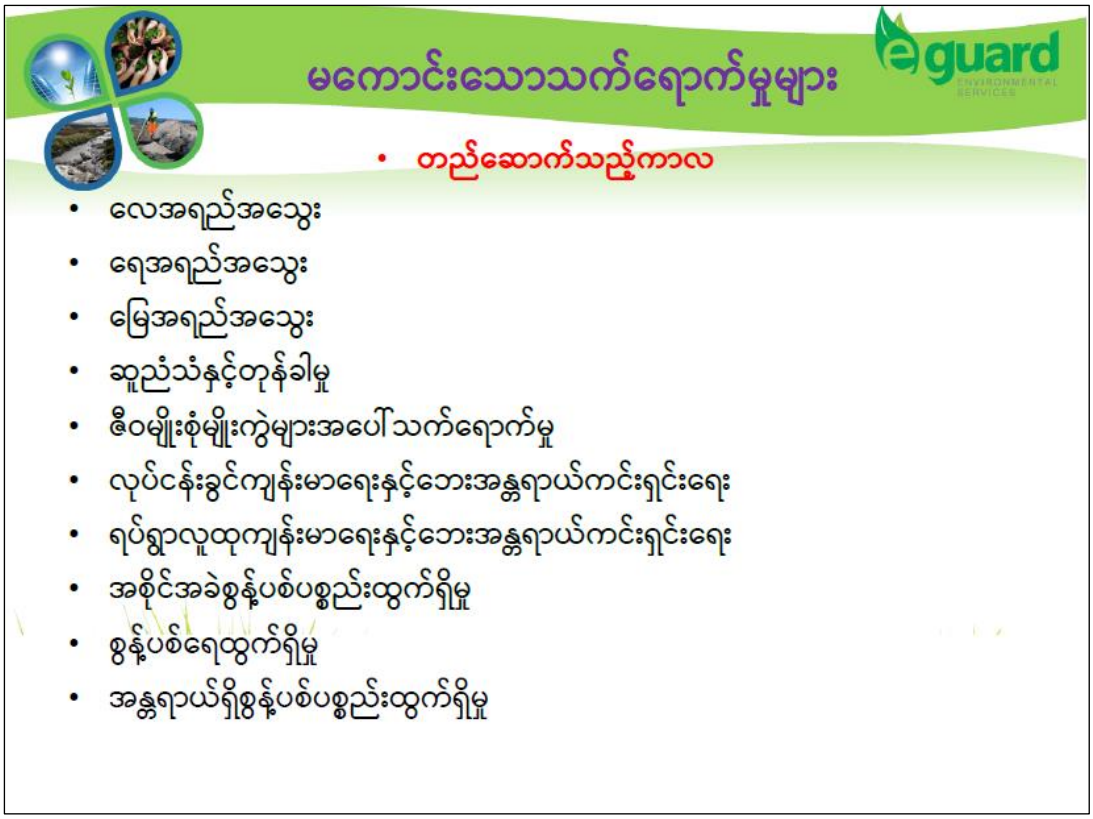
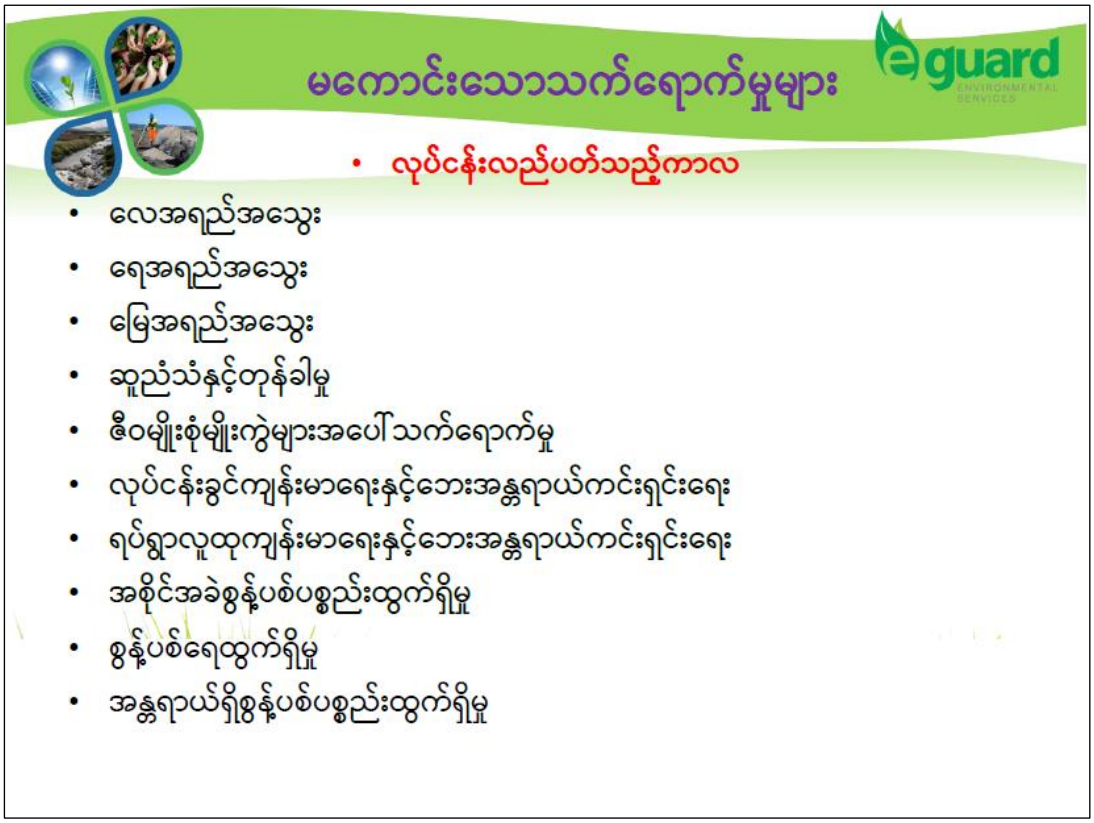
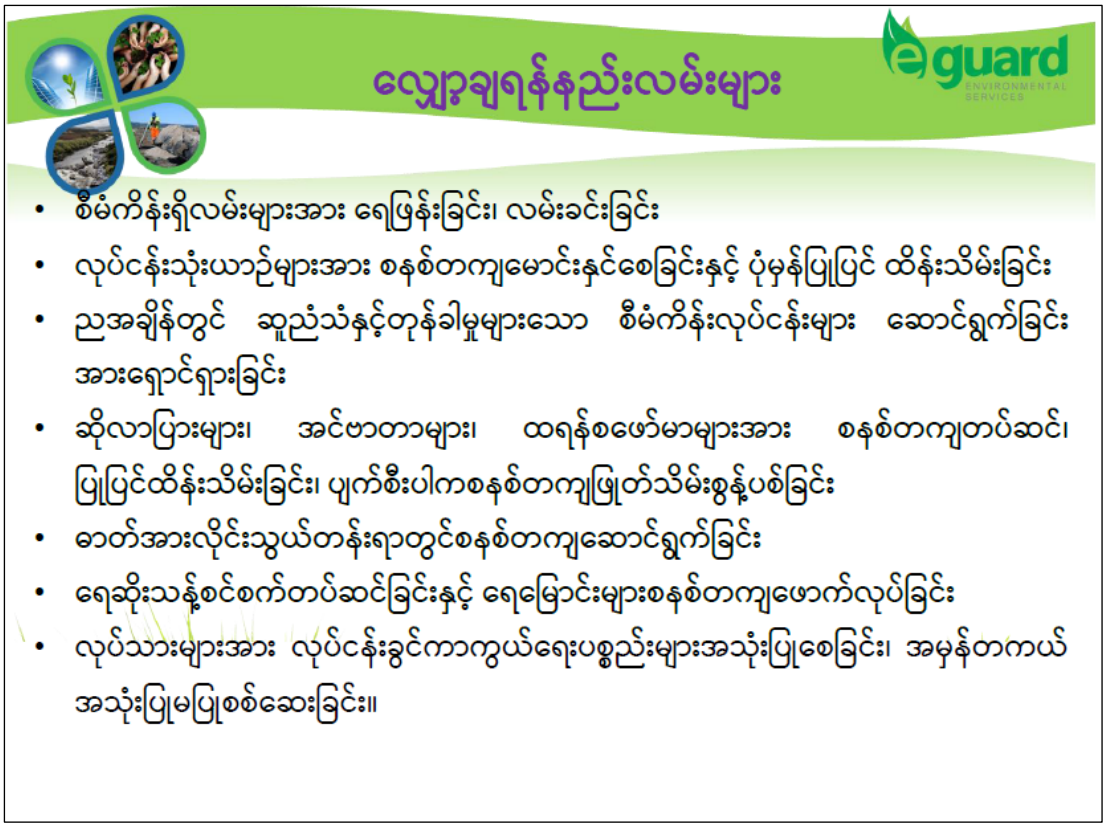
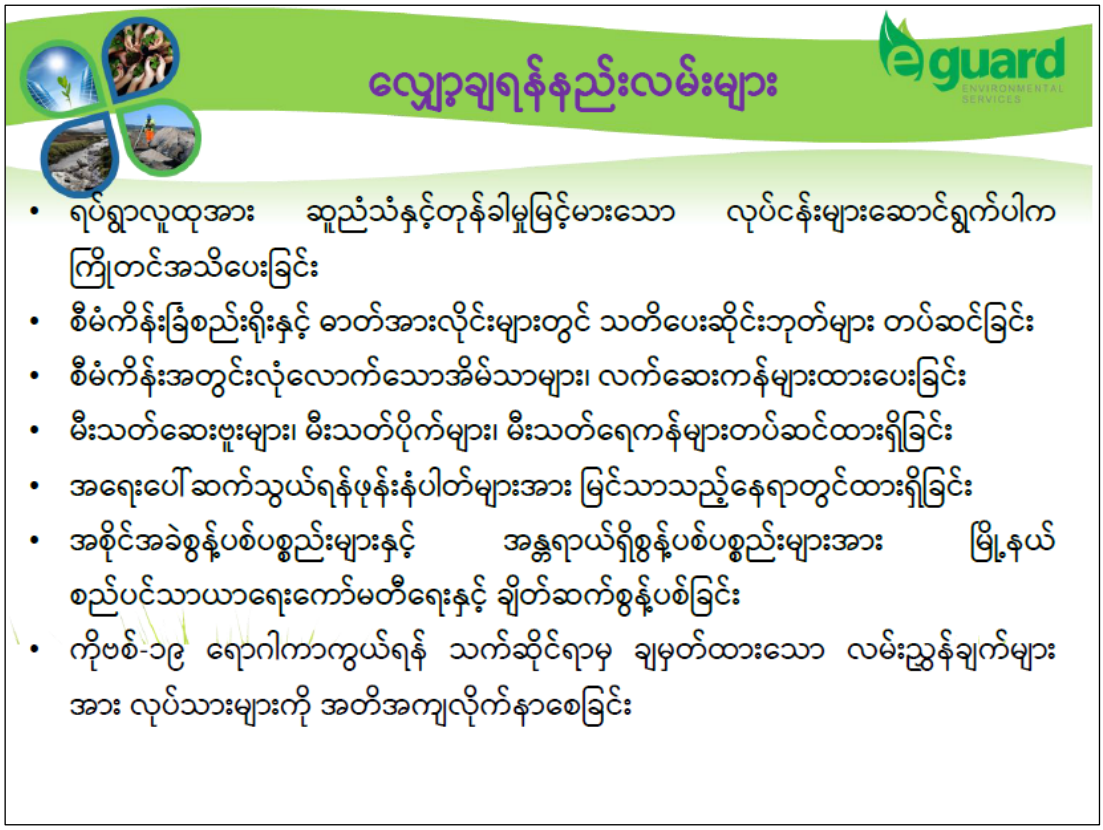
ENVIRONMENTAL SERVICES
• တည်ဆောက်သည့်ကာလ
• အလုပ်အကိုင်အခွင့်အလမ်းများဖန်တီးပေးနိုင်ခြင်း
• စီးပွားရေးအခွင့်အလမ်းများဖန်တီးပေးနိုင်ခြင်း
• လုပ်ငန်းလည်ပတ်သည့်ကာလ
• အလုပ်အကိုင်အခွင့်အလမ်းများဖန်တီးပေးနိုင်ခြင်း
• ပြန်လည်ပြည့်ဖြိုးမြဲစွမ်းအင်မှလျှပ်စစ်ဓာတ်အားထုတ်လုပ်ခြင်း
• ဖန်လုံအိမ်ဓာတ်ငွေ့ထုတ်လုပ်မှုလျော့ချနိုင်ခြင်း
• နိုင်ငံတော်၏စီးပွားရေးဖွံ့ဖြိုးတိုးတက်ခြင်း


မကောင်းသောသက်ရောက်မှုများ
eguard
ENVIRONMENTAL SERVICES
• တည်ဆောက်သည့်ကာလ
• လေအရည်အသွေး
• ရေအရည်အသွေး
• မြေအရည်အသွေး
• ဆူညံသံနှင့်တုန်ခါမှု
• ဇီဝမျိုးစုံမျိုးကွဲများအပေါ်သက်ရောက်မှု
• လုပ်ငန်းခွင်ကျန်းမာရေးနှင့်ဘေးအန္တရာယ်ကင်းရှင်းရေး
• ရပ်ရွာလူထုကျန်းမာရေးနှင့်ဘေးအန္တရာယ်ကင်းရှင်းရေး
• အစိုင်အခဲစွန့်ပစ်ပစ္စည်းထွက်ရှိမှု
• စွန့်ပစ်ရေထွက်ရှိမှု
• အန္တရာယ်ရှိစွန့်ပစ်ပစ္စည်းထွက်ရှိမှု


မကောင်းသောသက်ရောက်မှုများ
eguard
ENVIRONMENTAL SERVICES
• လုပ်ငန်းလည်ပတ်သည့်ကာလ
• လေအရည်အသွေး
• ရေအရည်အသွေး
• မြေအရည်အသွေး
• ဆူညံသံနှင့်တုန်ခါမှု
• ဇီဝမျိုးစုံမျိုးကွဲများအပေါ်သက်ရောက်မှု
• လုပ်ငန်းခွင်ကျန်းမာရေးနှင့်ဘေးအန္တရာယ်ကင်းရှင်းရေး
• ရပ်ရွာလူထုကျန်းမာရေးနှင့်ဘေးအန္တရာယ်ကင်းရှင်းရေး
• အစိုင်အခဲစွန့်ပစ်ပစ္စည်းထွက်ရှိမှု
• စွန့်ပစ်ရေထွက်ရှိမှု
• အန္တရာယ်ရှိစွန့်ပစ်ပစ္စည်းထွက်ရှိမှု

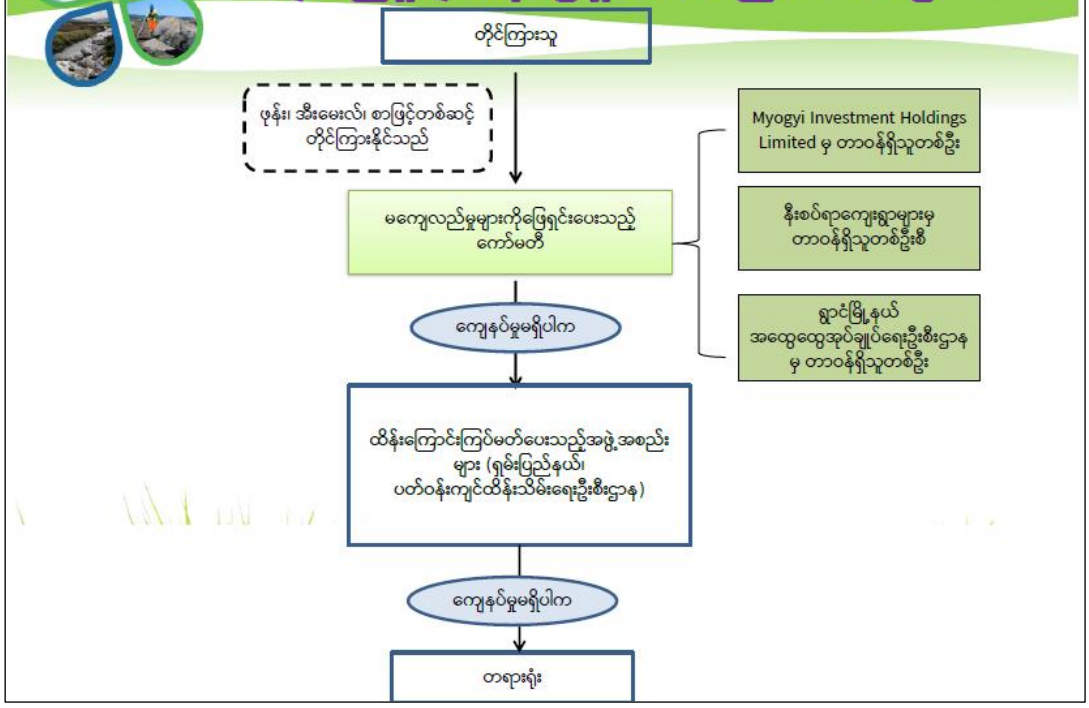

လျှော့ချရန်နည်းလမ်းများ
eguard
ENVIRONMENTAL SERVICES
• စီမံကိန်းရှိလမ်းများအား ရေဖြန်းခြင်း၊ လမ်းခင်းခြင်း
• လုပ်ငန်းသုံးယာဉ်များအား စနစ်တကျမောင်းနှင်စေခြင်းနှင့် ပုံမှန်ပြုပြင် ထိန်းသိမ်းခြင်း
• ညအချိန်တွင် ဆူညံသံနှင့်တုန်ခါမှုများသော စီမံကိန်းလုပ်ငန်းများ ဆောင်ရွက်ခြင်း အားရှောင်ရှားခြင်း
• ဆိုလာပြားများ၊ အင်ဗာတာများ၊ ထရန်စဖော်မာများအား စနစ်တကျတပ်ဆင်၊ ပြုပြင်ထိန်းသိမ်းခြင်း၊ ပျက်စီးပါကစနစ်တကျဖြုတ်သိမ်းစွန့်ပစ်ခြင်း
• ဓာတ်အားလိုင်းသွယ်တန်းရာတွင်စနစ်တကျဆောင်ရွက်ခြင်း
• ရေဆိုးသန့်စင်စက်တပ်ဆင်ခြင်းနှင့် ရေမြောင်းများစနစ်တကျဖောက်လုပ်ခြင်း
• လုပ်သားများအား လုပ်ငန်းခွင်ကာကွယ်ရေးပစ္စည်းများအသုံးပြုစေခြင်း၊ အမှန်တကယ် အသုံးပြုမပြုစစ်ဆေးခြင်း။


လျှော့ချရန်နည်းလမ်းများ
eguard
ENVIRONMENTAL SERVICES
• ရပ်ရွာလူထုအား ဆူညံသံနှင့်တုန်ခါမှုမြင့်မားသော လုပ်ငန်းများဆောင်ရွက်ပါက ကြိုတင်အသိပေးခြင်း
• စီမံကိန်းခြံစည်းရိုးနှင့် ဓာတ်အားလိုင်းများတွင် သတိပေးဆိုင်းဘုတ်များ တပ်ဆင်ခြင်း
• စီမံကိန်းအတွင်းလုံလောက်သောအိမ်သာများ၊ လက်ဆေးကန်များထားပေးခြင်း
• မီးသတ်ဆေးဗူးများ၊ မီးသတ်ပိုက်များ၊ မီးသတ်ရေကန်များတပ်ဆင်ထားရှိခြင်း
• အရေးပေါ်ဆက်သွယ်ရန်ဖုန်းနံပါတ်များအား မြင်သာသည့်နေရာတွင်ထားရှိခြင်း
• အစိုင်အခဲစွန့်ပစ်ပစ္စည်းများနှင့် အန္တရာယ်ရှိစွန့်ပစ်ပစ္စည်းများအား မြို့နယ် စည်ပင်သာယာရေးကော်မတီရေးနှင့် ချိတ်ဆက်စွန့်ပစ်ခြင်း
• ကိုဗစ်-၁၉ ရောဂါကာကွယ်ရန် သက်ဆိုင်ရာမှ ချမှတ်ထားသော လမ်းညွှန်ချက်များ အား လုပ်သားများကို အတိအကျလိုက်နာစေခြင်း

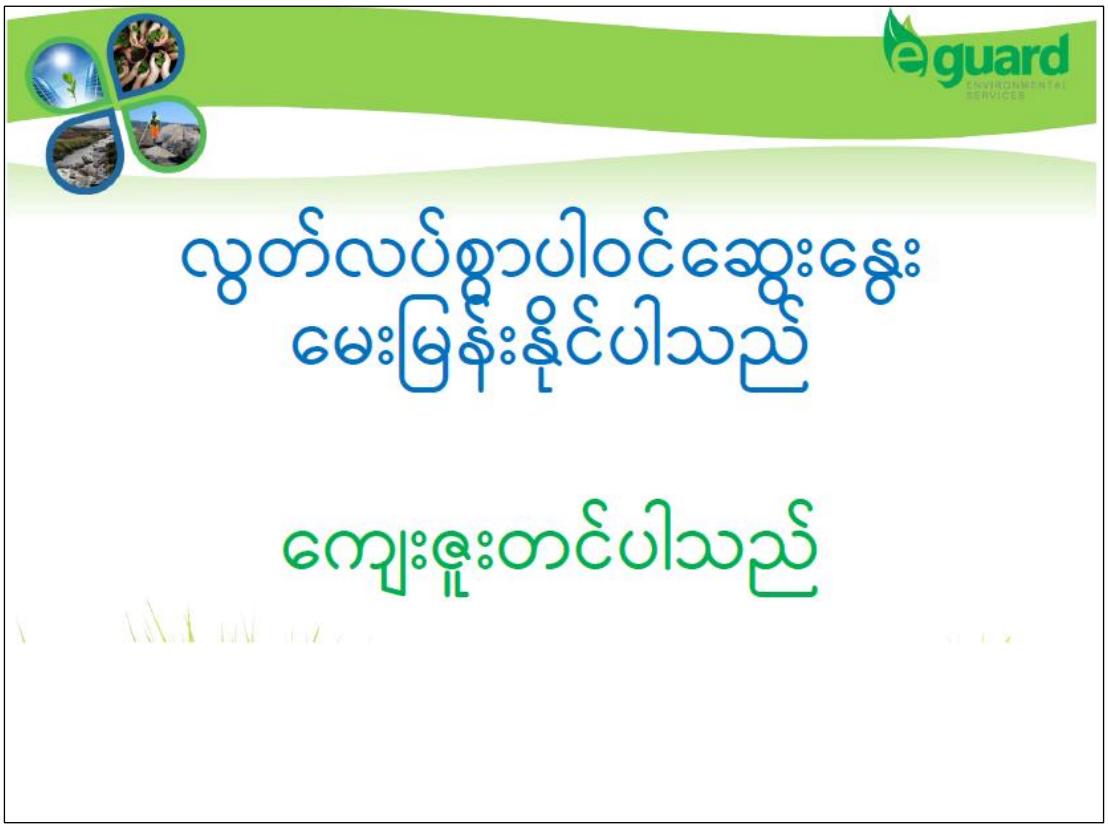
အခြားအစီအစဉ်များ

- ပတ်ဝန်းကျင်စောင့်ကြပ်ကြည့်ရှုမှုအစီအစဉ် (ဒေလတစ်ကြိမ်)
  - လေအရည်အသွေး
  - ရေအရည်အသွေး
  - ဆူညံသံပမာဏ
- မီးဘေးအန္တရာယ်ကင်းရှင်းရေးအစီအစဉ်
- အရေးပေါ်ကိစ္စရပ်များအတွက်ကြိုတင်ပြင်ဆင်မှုနှင့်တုန့်ပြန်မှုအစီအစဉ်
- လုပ်ငန်းခွင်ကျန်းမာရေးနှင့်ဘေးအန္တရာယ်ကင်းရှင်းရေးအစီအစဉ်
- လူမှုစီးပွားတာဝန်ယူမှုအစီအစဉ်
- မကျေလည်မှုများကိုဖြေရှင်းပေးမည့်အစီအစဉ်

မကျေလည်မှုများကိုဖြေရှင်းပေးမည့်အစီအစဉ်




ပတ်ဝန်းကျင်အရည်အသွေးတိုင်းတာမှုများ
eguard
ENVIRONMENTAL SERVICES
လေအရည်အသွေးတိုင်းတာခြင်း
ဆူညံသံပမာဏတိုင်းတာခြင်း


eguard
ENVIRONMENTAL SERVICES
လွတ်လပ်စွာပါဝင်ဆွေးနွေး
မေးမြန်းနိုင်ပါသည်
ကျေးဇူးတင်ပါသည်

(8) Water quality's laboratory results and on-site measurement result of groundwater

ORIGINAL

SGS

Report No. : 22520-00128
Job Ref. : 5000189
Date : 28-Oct-22
Page 1 of 1

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 : Myo Gyi Hydropower Substation Project (Ywarngan Township, Shan State)

Sample Condition : Plastic bottle at chilled

Lab Code : W-130

Date Sample(s) Received : 26-Oct-22

Testing Period : 27-Oct-22 TO 27-Oct-22

No.	Test Items	Methods	Results	Units
1	Potassium	APHA 3500-K B (Flame Photometric Method) (23rd Edition)	1.59	mg/L
2	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

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)

PRO LAB
ANALYTICAL LABORATORY

Myanmar Innovation Group of Co., Ltd
Address : No. (9), Sabae Housing, Pyi Htaung Su Road, (26) Ward, South Dagon Tsp, Yangon, Myanmar.
Tel : 09-893 767 424
E-mail : info@prolabmyanmar.com

LABORATORY ANALYSIS REPORT

1	Client Name	: Myo Gyi Hydropower Substation
2	Location	: Ywar Ngan Township, Taunggyi District, Shan State
3	Type of Sample	: Ground Water
4	Sample No.	: 00865/2022
5	Contact Person	: E guard Environmental Services
6	Phone No.	: 09-797005170
7	Date Received	: 26.10.2022
8	Date of Test Performed	: 29.10.2022
9	Date of Issued	: 03.11.2022
10	Result	:

No.	Parameter	Result	Unit	WHO STD 2018	Method
1	Oil and Grease	9	mg/L	NA	[a] 5520D, Soxhlet Extraction Method
2	Total Nitrogen	5	mg/L	NA	Hach DR 3900 Spectrophotometer, Persulfate Digestion Method
3	Total Phosphorus	< 1.0	mg/L	NA	Hach DR 3900 Spectrophotometer, Molybdovanadate with Acid Persulfate Digestion

Remark:
This certificate is issued only for the receipt of the test sample.
[a] American Public Health Association, Standard Methods for the Examination of Water and Wastewater.

Tested By
Name : MAY THU NAING
Position : Laboratory Technician
Signature :.....

Approved By
Name : KYAWT KYAWT YIN
Position : Technical Consultant Manager
Signature :.....

Myanmar Innovation Group of Co., Ltd. PRO LAB ANALYTICAL LABORATORY

LAB-FO-024-00

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)

WTL-RE-001
Issue Date - 01-1-2016
Effective Date - 01-1-2016
Issue No - 1.0/Page 1 of 1

M0122 029

WATER QUALITY TEST (MICROBIOLOGY) RESULTS FORM

Client: Myo Gyi Solar Power Project
Nature of Water: Ground Water
Location: Ywar Ngan Township, Taunggyi District, Shan State
Date and Time of collection: 23.10.2022
Date and Time of arrival at Laboratory: 26.10.2022
Date and Time of commencing examination: 26.10.2022
Date and Time of completing: 27.102022

Results of Water Analysis			WHO Drinking Water Guideline (Geneva - 1993)
Total Coliform Count	40	CFU/100ml	Not detected
Thermotolerant (fecal) Coliform Count	8	CFU/100ml	Not detected
pH	7.3		6.5 - 8.5
Turbidity	21	NTU	5 NTU
Colour (True)	10	TCU	15 TCU
Free Chlorine	Nil	mg/l	
Total Chlorine	Nil	mg/l	

Remark : Unsatisfactory for drinking purpose.
: This certificate is issued only for the receipt of the test sample.
: < - Less than

Tested by
Signature:
Name:

Approved by
Signature:
Name:

(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.
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 1

W1022 441

WATER QUALITY TEST RESULTS FORM

Client	20 MW Ground Mounted Solar Power Plant Project
Nature of Water	Ground Water
Location	Ywar Ngan Township, Shan State.
Date and Time of collection	25.10.2022
Date and Time of arrival at Laboratory	26.10.2022
Date and Time of commencing examination	27.10.2022
Date and Time of completing	1.11.2022

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
Total Suspended Solid (TSS)	7.6	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
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

eguard	Operation Department Environmental Quality Baseline Sampling/Survey Field Notes	E Guard-OD-EQ-F-10 Version :01	Approved by MD On Date: 03/25/2021 Page 5 of 11

Water Quality Baseline Sampling/Survey Field Notes

Surveyor: Ye Chit Zaw	**Date:** 24.12.2022
Location: Yuwa Ngan Township, Shan State	**Time:** 10:00 AM
Lat. & Long.: 21°30'26.096"N 96°22'14.410"E	**Instrument:** Hach
Weather:	**Sample/Location ID:** **GPS Waypoint no:** **Temperature:** **Time:**

~~Surface~~/Ground/~~Effluent~~ Water

Sr. No.	pH	Electrical Conductivity			DO (mg/l)	Turbidity (NTU)	ORP	Flow Rate (m/sec)	Depth (m)	Remarks
		EC (ms/cm)	TDS (g/l)	Salinity (ppt)						
2	7.3	0.125	0.095	0.1	6.25	21.3	289			

Aim of Sampling

- Quality, Consistency, Representative Sample, Prevent Deterioration, Prevent Contamination Suitable sampling techniques; Accurate field measurement; Transportation; Time; Preparation:
- Monitoring Schedule; Review previous field sheets; Equipment checklist; Correct bottles and
- Preservatives; Check bottle types required with lab; Add preservatives_ if required
- Sampling Bottles
- Preferable to use NEW bottles; If not new then rigorous cleaning before re-use, Store in clean, dry dust free environment before use; Adequate for volume required.

Notes

.....

.....

Checked by:

Aung Zayar Wai.

EFFECTIVE DATE: 04/01/2021

Copy Document

(9) Water quality's laboratory results and on-site measurement result of surface water

ORIGINAL

SGS

Report No. : 22520-00129
Job Ref. : 5000189
Date : 28-Oct-22
Page 1 of 1

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 : Myo Gyi Hydropower Substation Project (Ywarngan Township, Shan State)

Sample Condition : Plastic bottle at chilled

Lab Code : W-131

Date Sample(s) Received : 26-Oct-22

Testing Period : 27-Oct-22 TO 27-Oct-22

No.	Test Items	Methods	Results	Units
1	Potassium	APHA 3500-K B (Flame Photometric Method) (23rd Edition)	1.40	mg/L
2	Chromium	APHA 3030 &3111B (Direct Air Acetylene Flame Method) (23rd Edition)	<0.1	mg/L

********** End of Report **********

M.G.Z

SGS (Myanmar) Limited
(Thin Thin Maw)
Laboratory Manager

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
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Tel : 09-893 767 424
E-mail : info@prolabmyanmar.com

LABORATORY ANALYSIS REPORT

1 Client Name : Myo Gyi Hydropower Substation
2 Location : Ywar Ngan Township, Taunggyi District, Shan State
3 Type of Sample : Surface Water
4 Sample No. : 00864/2022
5 Contact Person : E guard Environmental Services
6 Phone No. : 09-797005170
7 Date Received : 26.10.2022
8 Date of Test Performed : 29.10.2022
9 Date of Issued : 03.11.2022
10 Result :

No.	Parameter	Result	Unit	WHO STD 2018	Method
1	Oil and Grease	8	mg/L	NA	[a] 5520D, Soxhlet Extraction Method
2	Total Nitrogen	< 2	mg/L	NA	Hach DR 3900 Spectrophotometer, Persulfate Digestion Method
3	Total Phosphorus	< 1.0	mg/L	NA	Hach DR 3900 Spectrophotometer, Molybdovanadate with Acid Persulfate Digestion

Remark:
This certificate is issued only for the receipt of the test sample.
[a] American Public Health Association, Standard Methods for the Examination of Water and Wastewater.

Tested By
Name : MAY THU NAING
Position : Laboratory Technician
Signature :.....

Approved By
Name : KYAWT KYAWT YIN
Position : Technical Consultant Manager
Signature :.....

Myanmar Innovation Group of Co., Ltd. PRO LAB ANALYTICAL LABORATORY

LAB-FO-024-00

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)

WTL-RE-001
Issue Date - 01-12-2012
Effective Date - 01-12-2012
Issue No - 1.0/Page 1 of 1

W1022 442

WATER QUALITY TEST RESULTS FORM

Client	20 MW Ground Mounted Solar Power Plant Project
Nature of Water	Surface Water
Location	Ywar Ngan Township, Shan State.
Date and Time of collection	25.10.2022
Date and Time of arrival at Laboratory	26.10.2022
Date and Time of commencing examination	27.10.2022
Date and Time of completing	1.11.2022

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
Total Suspended Solid (TSS)	8.7	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)	6	mg/l	
Cyanide (CN)		mg/l	0.07 mg/l
Zinc (Zn)		mg/l	3 mg/l
Copper (Cu)		mg/l	2 mg/l
Silica (SiO_2)		mg/l	

Remark: This certificate is issued only for the receipt of the test sample.

Tested by
Signature:
Name: Zaw Hein Oo
B.Sc (Chemistry)
Sr.Chemist
ISO Tech Laboratory

Approved by
Signature:
Name: Soe Thit
B.E (Civil) 1980
Technical Officer
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

eguard	Operation Department Environmental Quality Baseline Sampling/Survey Field Notes	E Guard-OD-EQ-F-10 Version :01	Approved by MD On Date: 03/25/2021 Page 5 of 11

Water Quality Baseline Sampling/Survey Field Notes

Surveyor: Ye' Chit Zaw	**Date:** 24.12.2022
Location: Ywar Ngan Township, Shan State	**Time:** 10:00 AM
Lat. & Long.: 21°30' 28.028" N 96°22' 13.431" E	**Instrument:**
Weather:	**Sample/Location ID:** **GPS Waypoint no:** **Temperature:** **Time:**

Surface/~~Ground/Effluent~~ Water

Sr. No.	pH	Electrical Conductivity			DO (mg/l)	Turbidity (NTU)	ORP	Flow Rate (m/sec)	Depth (m)	Remarks
		EC (ms/cm)	TDS (g/l)	Salinity (ppt)						
1	6.75	0.124	0.081	0.1	6.94	51.0	289			

Aim of Sampling

- Quality, Consistency, Representative Sample, Prevent Deterioration, Prevent Contamination Suitable sampling techniques; Accurate field measurement; Transportation; Time; Preparation:
- Monitoring Schedule; Review previous field sheets; Equipment checklist; Correct bottles and
- Preservatives; Check bottle types required with lab; Add preservatives_ if required
- Sampling Bottles
- Preferable to use NEW bottles; If not new then rigorous cleaning before re-use, Store in clean, dry dust free environment before use; Adequate for volume required.

Notes

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Checked by:

Aung Zayar Win

EFFECTIVE DATE: 04/01/2021

Copy Document

(10) Construction schedule of the project

ID	任务名称	Duration	Start	Finish	Predecessors	Total Slack
1	**Myogyi 20MW SOLAR PROJECT CONSTRUCTION PLAN**	**1183 d?**	**'20 Apr 19**	**'23 Jul 15**		**3 d?**
2	**Comprehensive management**	**49 d**	**'22 Apr 19**	**'22 Jun 6**		**156 d**
3	LOA	0 d	'22 Apr 19	'22 Apr 19		156 d
4	EPC Contract Signment	10 d	'22 Apr 19	'22 Apr 28	3	156 d
5	LAND HANDOVER	0 d	'22 Apr 28	'22 Apr 28	4	338 d
6	Confirm of Design Institute	5 d	'22 Apr 29	'22 May 3	4	156 d
7	Machine and Team Mobilization	8 d	'22 May 14	'22 May 21	5FS+15 d	338 d
8	Exploration task book preparation	2 d	'22 May 4	'22 May 5	6	327 d
9	Exploration team confirmation	5 d	'22 May 6	'22 May 10	8	327 d
10	On-site exploration	21 d	'22 May 11	'22 May 31	9	327 d
11	Submission of exploration reports	0 d	'22 May 31	'22 May 31	10	413 d
12	Test pile task book preparation	1 d	'22 May 23	'22 May 23	10SS+10 d,76	325 d
13	Preparation of piles and test pile reports	14 d	'22 May 24	'22 Jun 6	12	325 d
14	Submission of test pile report	0 d	'22 Jun 6	'22 Jun 6	13	407 d
15	**Design**	**393 d**	**'22 May 4**	**'23 May 31**		**48 d**
16	**PV Area**	**120 d**	**'22 May 4**	**'22 Aug 31**		**220 d**
17	**Support and PV modules**	**54 d**	**'22 May 4**	**'22 Jun 26**		**322 d**
18	Technical specification of PV modules	1 d	'22 May 4	'22 May 4	6	322 d
19	Technical specification of support	6 d	'22 May 10	'22 May 15	6	321 d
20	Foundation of Support	7 d	'22 Jun 7	'22 Jun 13	13	325 d
21	Layout plan	35 d	'22 May 23	'22 Jun 26	76	355 d
22	Structure of PV support	5 d	'22 Jun 5	'22 Jun 9	77	321 d
23	**BOX inverter**	**51 d**	**'22 May 9**	**'22 Jun 28**		**257 d**
24	Technical specification of Box inverter	6 d	'22 May 9	'22 May 14	6FS+5 d	257 d
25	Technical specification of combiner box	7 d	'22 May 9	'22 May 15	6FS+5 d	318 d
26	Artwork of box inverter	3 d	'22 Jun 11	'22 Jun 13	85	257 d
27	Foundation of box inverter	15 d	'22 Jun 14	'22 Jun 28	26	257 d
28	**PV Area Cable**	**60 d**	**'22 Jul 3**	**'22 Aug 31**		**160 d**
29	Cable List	55 d	'22 Jul 3	'22 Aug 26	6FS+60 d	160 d
30	Passion -based cable laying and fire flame retardant measures	60 d	'22 Jul 3	'22 Aug 31	6FS+60 d	274 d
31	**Switchyard area**	**135 d**	**'22 May 4**	**'22 Sep 15**		**231 d**
32	**SVG**	**50 d**	**'22 May 9**	**'22 Jun 27**		**246 d**
33	Technical Specification of SVG	4 d	'22 May 9	'22 May 12	6FS+5 d	246 d
34	Artwork of SVG	4 d	'22 Jun 9	'22 Jun 12	97	246 d
35	Foundation of SVG	15 d	'22 Jun 13	'22 Jun 27	34	246 d
36	**Station Transformer**	**56 d**	**'22 May 4**	**'22 Jun 28**		**283 d**
37	Technical Specification of Station Transformer	8 d	'22 May 4	'22 May 11	6	283 d
38	Artwork of Station Transformer	5 d	'22 Jun 3	'22 Jun 7	101	328 d
39	Foundation of Station Transformer	21 d	'22 Jun 8	'22 Jun 28	38	328 d
40	**35kV Switchgear**	**3 d**	**'22 May 18**	**'22 May 20**		**289 d**
41	Technical Specification of 35kV Switchgear	3 d	'22 May 18	'22 May 20	6FS+14 d	289 d
42	**Switchyard Area Cable**	**60 d**	**'22 Jul 18**	**'22 Sep 15**		**156 d**
43	Switching station cable layout and fire prevention	53 d	'22 Jul 18	'22 Sep 8	6FS+75 d	156 d

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ID	任务名称	Duration	Start	Finish	Predecessors	Total Slack
44	Underground facility design of the switch station area	60 d	'22 Jul 18	'22 Sep 15	6FS+75 d	229 d
45	**Electrical Control Building**	**22 d**	**'22 Jun 1**	**'22 Jun 22**		**329 d**
46	Foundation of Control building	15 d	'22 Jun 1	'22 Jun 15	6, 10	329 d
47	Structure of Control building	19 d	'22 Jun 1	'22 Jun 19	46SS	368 d
48	Architecture design of the Control Building	15 d	'22 Jun 8	'22 Jun 22	47SS+7 d	368 d
49	**Communication and Control system**	**19 d**	**'22 May 4**	**'22 May 22**		**262 d**
50	Technical Specification of communication equipment	1 d	'22 May 4	'22 May 4	6	262 d
51	Technical Specification of UPS System	4 d	'22 May 19	'22 May 22	6FS+15 d	296 d
52	**Fire protection and life water supply**	**64 d**	**'22 May 11**	**'22 Jul 13**		**316 d**
53	Fire facility technical file preparation	10 d	'22 May 11	'22 May 20	6FS+7 d	398 d
54	Integrated domestic sewage equipment technical specification preparation	5 d	'22 May 12	'22 May 16	6FS+8 d	315 d
55	Artwork of Living sewage	4 d	'22 Jun 16	'22 Jun 19	123	315 d
56	Foundation drawing of water pump house	16 d	'22 Jun 20	'22 Jul 5	55	315 d
57	Structure Drawing of water pump house	19 d	'22 Jun 25	'22 Jul 13	56SS+5 d	330 d
58	**Road, Fence and Lighting**	**51 d**	**'22 May 14**	**'22 Jul 3**		**332 d**
59	Road Drawing	24 d	'22 Jun 3	'22 Jun 26	6FS+30 d	312 d
60	Construction drawing of fence	26 d	'22 May 14	'22 Jun 8	6FS+10 d	362 d
61	Drawing of lighting	31 d	'22 Jun 3	'22 Jul 3	6FS+30 d	380 d
62	Technical document of AC and ventilation	2 d	'22 Jun 23	'22 Jun 24	48	368 d
63	**33kV Transmission line**	**264 d**	**'22 Sep 10**	**'23 May 31**		**0 d**
64	**Transmission line**	**165 d**	**'22 Sep 10**	**'23 Feb 21**		**147 d**
65	Land Acquisation and line route confirmation	50 d	'22 Sep 10	'22 Oct 29	3	237 d
66	Transmission line exploration	5 d	'22 Oct 30	'22 Nov 3	65	237 d
67	Civil drawing of foundation for electrical poles	15 d	'22 Nov 4	'22 Nov 18	66	242 d
68	Electrical drawing of transmission line	20 d	'22 Nov 4	'22 Nov 23	66	237 d
69	**Opposite substation**	**110 d**	**'22 Sep 10**	**'22 Dec 28**		**101 d**
70	Technical Specification of equipment	5 d	'22 Sep 10	'22 Sep 14	6FS+30 d	101 d
71	Foundation drawing of opposite equipment	35 d	'22 Nov 24	'22 Dec 28	140	101 d
72	**Procurement**	**375 d**	**'22 May 5**	**'23 May 14**		**65 d**
73	**PV area**	**375 d**	**'22 May 5**	**'23 May 14**		**65 d**
74	**Support and PV moudules**	**368 d**	**'22 May 5**	**'23 May 7**		**47 d**
75	Contract signment of Pile foundation	15 d	'22 May 24	'22 Jun 7	12	331 d
76	Contract signment of PV modules	18 d	'22 May 5	'22 May 22	18	322 d
77	Contract signment of PV support	20 d	'22 May 16	'22 Jun 4	76FF+4 d, 19	321 d
78	Production of Steel pile	15 d	'22 Jun 14	'22 Jun 28	75, 20	325 d
79	Transportation of Steel pile	35 d	'23 Mar 27	'23 Apr 30	78	54 d

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ID	任务名称	Duration	Start	Finish	Predecessors	Total Slack
80	Production of PV support	21 d	'22 Jun 10	'22 Jun 30	77,22	321 d
81	Transportation of PV support	35 d	'23 Mar 27	'23 Apr 30	80	52 d
82	Production of PV Modules	40 d	'22 Oct 27	'22 Dec 5	76	165 d
83	Transportation of PV Modules	35 d	'23 Apr 3	'23 May 7	82	47 d
84	**Inverter**	**358 d**	**'22 May 15**	**'23 May 7**		**72 d**
85	Contract signment of inverter	27 d	'22 May 15	'22 Jun 10	24	257 d
86	Contract signment of Box combiner	31 d	'22 May 16	'22 Jun 15	25	318 d
87	Prodection of inverter	40 d	'22 Jun 11	'22 Jul 20	85	281 d
88	Prodection of box combiner	45 d	'22 Jun 16	'22 Jul 30	86	318 d
89	Transportation of inverter	35 d	'23 Apr 3	'23 May 7	87	25 d
90	Transportation of box combiner	35 d	'23 Apr 3	'23 May 7	88	72 d
91	**PV Area Cable**	**261 d**	**'22 Aug 27**	**'23 May 14**		**50 d**
92	Procurement of Cable	12 d	'22 Aug 27	'22 Sep 7	29	160 d
93	Production of Cable	24 d	'22 Nov 27	'22 Dec 20	92FS+80 d	160 d
94	Transportation of Cable	35 d	'23 Apr 10	'23 May 14	93	50 d
95	**Switchyard Area**	**375 d**	**'22 May 5**	**'23 May 14**		**65 d**
96	**SVG**	**360 d**	**'22 May 13**	**'23 May 7**		**34 d**
97	Bidding of SVG	27 d	'22 May 13	'22 Jun 8	33	246 d
98	Production of SVG	45 d	'22 Jun 9	'22 Jul 23	97	287 d
99	Transportation of SVG	35 d	'23 Apr 3	'23 May 7	98	34 d
100	**Station Transformer**	**361 d**	**'22 May 12**	**'23 May 7**		**39 d**
101	Bidding of Station Transformer	22 d	'22 May 12	'22 Jun 2	37	283 d
102	Production of Station Transformer	60 d	'22 Jun 3	'22 Aug 1	101	283 d
103	Transportation of Station Transformer	35 d	'23 Apr 3	'23 May 7	102	39 d
104	**35kV Switchgear**	**352 d**	**'22 May 21**	**'23 May 7**		**44 d**
105	Bidding of 35kV Switchgear	27 d	'22 May 21	'22 Jun 16	41	289 d
106	Production of 35kV Switchgear	45 d	'22 Jun 17	'22 Jul 31	105	289 d
107	Transportation of 35kV Switchgear	35 d	'23 Apr 3	'23 May 7	106	44 d
108	**Switchyard Cable**	**248 d**	**'22 Sep 9**	**'23 May 14**		**18 d**
109	Procurement of Cable	14 d	'22 Sep 9	'22 Sep 22	43	156 d
110	Production of Cable	31 d	'22 Oct 23	'22 Nov 22	109FS+30 d	156 d
111	Transportation of Cable	35 d	'23 Apr 10	'23 May 14	110	18 d
112	**Communication and control equipment**	**375 d**	**'22 May 5**	**'23 May 14**		**36 d**
113	**Communication system**	**375 d**	**'22 May 5**	**'23 May 14**		**35 d**
114	Bidding of communication equipment	14 d	'22 May 5	'22 May 18	50	262 d
115	Procurement of Communication equipment	99 d	'22 May 19	'22 Aug 25	114	262 d
116	Transprotation of communication equipment	35 d	'23 Apr 10	'23 May 14	115	35 d
117	**UPS System**	**357 d**	**'22 May 23**	**'23 May 14**		**36 d**
118	Bidding of UPS equipment	31 d	'22 May 23	'22 Jun 22	51	296 d
119	Production of UPS equipment	31 d	'22 Jun 23	'22 Jul 23	118	296 d

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ID	任务名称	Duration	Start	Finish	Predecessors	Total Slack
120	Transportation of UPS equipment	35 d	'23 Apr 10	'23 May 14	119	36 d
121	**Fire protection facilities and life water supply**	**356 d**	**'22 May 17**	**'23 May 7**		**72 d**
122	Bidding of firefighting equipment	26 d	'22 May 21	'22 Jun 15	53	398 d
123	Bidding of Integrated domestic sewage equipment	30 d	'22 May 17	'22 Jun 15	54	315 d
124	Production of firefighting equipment	45 d	'22 Jun 16	'22 Jul 30	123	333 d
125	Production of Integrated domestic sewage equipment	45 d	'22 Jun 16	'22 Jul 30	123	318 d
126	Transportation of firefighting equipment	20 d	'23 Apr 3	'23 Apr 22	124	87 d
127	Transportation of Integrated domestic sewage equipment	35 d	'23 Apr 3	'23 May 7	125	72 d
128	**Road, Fence and Lighting**	**315 d**	**'22 Jul 4**	**'23 May 14**		**34 d**
129	Procurement of lighting equipment	14 d	'22 Jul 4	'22 Jul 17		276 d
130	Production of lighting equipment	24 d	'22 Jul 18	'22 Aug 10	129	276 d
131	Transportation of lighting equipment	35 d	'23 Apr 10	'23 May 14	130	34 d
132	**Air conditioning ventilation system**	**316 d**	**'22 Jun 25**	**'23 May 6**		**73 d**
133	Bidding of AC ventilation equipment	21 d	'22 Jun 25	'22 Jul 15	62	368 d
134	Production of AC ventilation equipment	40 d	'22 Nov 30	'23 Jan 8		141 d
135	Transportation of AC ventilation equipment	34 d	'23 Apr 3	'23 May 6	134	57 d
136	**Transmission line**	**237 d**	**'22 Sep 15**	**'23 May 9**		**24 d**
137	**33kV Transmission line**	**35 d**	**'22 Dec 25**	**'23 Jan 28**		**125 d**
138	Procurement and Transportation of 33kV transmission line equipment	35 d	'22 Dec 25	'23 Jan 28		125 d
139	**Opposite Substation**	**237 d**	**'22 Sep 15**	**'23 May 9**		**18 d**
140	Bidding of equipment	70 d	'22 Sep 15	'22 Nov 23	70	101 d
141	Production of equipment	35 d	'22 Nov 25	'22 Dec 29	140FS+1 d	119 d
142	Transportation of equipment	30 d	'23 Apr 10	'23 May 9	141	18 d
143	**Construction**	**423 d**	**'22 May 22**	**'23 Jul 18**		**0 d**
144	**PV Area**	**423 d**	**'22 May 22**	**'23 Jul 18**		**0 d**
145	**PV support and modules**	**400 d**	**'22 May 22**	**'23 Jun 25**		**23 d**
146	Site clearing	15 d	'22 May 22	'22 Jun 5	7	408 d
147	Pile foundation positioning	25 d	'23 Mar 16	'23 Apr 9	21FS+7 d	100 d
148	Construction of pile foundation	25 d	'23 May 1	'23 May 25	79	54 d
149	Construction of PV support	25 d	'23 May 19	'23 Jun 12	148SS+2 d, 81	34 d
150	Construction of PV modules	25 d	'23 Jun 1	'23 Jun 25	149SS+2 d, 83	23 d
151	**Inverter**	**211 d**	**'22 Dec 20**	**'23 Jul 18**		**0 d**

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ID	任务名称	Duration	Start	Finish	Predecessors	Total Slack
152	Construction of Inverter foundation	81 d	'22 Dec 20	'23 Mar 10	27	83 d
153	Installation of Inverter	25 d	'23 May 15	'23 Jun 8	89, 152	18 d
154	**PV area cable**	**116 d**	**'23 Feb 13**	**'23 Jun 8**		**40 d**
155	Cable laying	15 d	'23 May 15	'23 May 29	94	50 d
156	Cable wiring	15 d	'23 May 22	'23 Jun 5		43 d
157	Fire blocking	3 d	'23 Jun 6	'23 Jun 8	156SS+1 d	40 d
158	**Switch yard area**	**405 d**	**'22 May 22**	**'23 Jun 30**		**18 d**
159	Site clearing	15 d	'22 May 22	'22 Jun 5	7	338 d
160	Fence construction	70 d	'23 Jan 5	'23 Mar 15	159	125 d
161	**SVG**	**197 d**	**'22 Nov 6**	**'23 May 21**		**34 d**
162	Construction of SVG foundation	102 d	'22 Dec 20	'23 Mar 31	35	71 d
163	Installation of SVG	14 d	'23 May 8	'23 May 21	99, 162	34 d
164	**Station Transformer**	**199 d**	**'22 Nov 7**	**'23 May 24**		**39 d**
165	Construction of Station Transformer foundation	21 d	'23 Feb 4	'23 Feb 24	39FS+3 d	111 d
166	Installation of Station transformer	17 d	'23 May 8	'23 May 24	103, 165	39 d
167	**35kV Switchgear**	**15 d**	**'23 May 8**	**'23 May 22**		**44 d**
168	Installation of 35kV switchgear	15 d	'23 May 8	'23 May 22	107	44 d
169	**Switchyard Cable**	**203 d**	**'22 Dec 10**	**'23 Jun 30**		**18 d**
170	Construction of Cable Trench	20 d	'23 Mar 12	'23 Mar 31	44FS+10 d	62 d
171	Cable laying	47 d	'23 May 15	'23 Jun 30	170, 30, 111	18 d
172	**Cable wiring**	**111 d**	**'23 Feb 12**	**'23 Jun 2**		**39 d**
173	Fire Blocking	12 d	'23 May 22	'23 Jun 2	171SS+7 d	39 d
174	**Control building**	**289 d**	**'22 Jun 16**	**'23 Mar 31**		**109 d**
175	Construction of foundation	24 d	'22 Jun 16	'22 Jul 9	46	329 d
176	Construction of Structure	45 d	'22 Oct 14	'22 Nov 27	175	233 d
177	Construction of Masonry	55 d	'22 Dec 8	'23 Jan 31		139 d
178	Construction of Architecture	50 d	'23 Feb 10	'23 Mar 31		109 d
179	**Communication and control system**	**20 d**	**'23 May 15**	**'23 Jun 3**		**35 d**
180	**Communication system**	**20 d**	**'23 May 15**	**'23 Jun 3**		**35 d**
181	Installation of Communication equipment	20 d	'23 May 15	'23 Jun 3	116	35 d
182	**UPS system**	**20 d**	**'23 May 15**	**'23 Jun 3**		**36 d**
183	Installation of UPS system	20 d	'23 May 15	'23 Jun 3	177, 120	36 d
184	**Fire protection facilities and life water supply**	**225 d**	**'22 Oct 15**	**'23 May 27**		**52 d**
185	Construction of foundation for water pump house	20 d	'22 Oct 15	'22 Nov 3	56FS+3 d	217 d
186	Construction of structure for water pump house	40 d	'22 Nov 21	'22 Dec 30	185, 57	200 d
187	Installation of firefighting euqipment	28 d	'23 Apr 24	'23 May 21		54 d
188	Installation of Integrated domestic sewage equipment	20 d	'23 May 8	'23 May 27		52 d
189	**Road, Fence and Lighting**	**222 d**	**'22 Nov 5**	**'23 Jun 14**		**34 d**
190	Construction of Road	75 d	'22 Dec 24	'23 Mar 8	59	132 d
191	Construction of fence	43 d	'22 Aug 15	'22 Sep 26	60	295 d
192	Construction of lighting equipment	30 d	'23 May 16	'23 Jun 14	131FS+1 d	34 d
193	**AC and Ventilation system**	**89 d**	**'23 Feb 20**	**'23 May 19**		**57 d**
194	Installation of AC and ventilation equipment	12 d	'23 May 8	'23 May 19	135FS+1 d	57 d

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ID	任务名称	Duration	Start	Finish	Predecessors	Total Slack
195	**33kV Transmission line**	**213 d**	**'22 Nov 15**	**'23 Jun 15**		**0 d**
196	**Transmission line**	**212 d**	**'22 Nov 15**	**'23 Jun 14**		**18 d**
197	Civil construction of transmission line	60 d	'22 Dec 26	'23 Feb 23		123 d
198	Electrical construction of transmission line	30 d	'23 May 16	'23 Jun 14	197FF+6 , 138, 142FS+6	18 d
199	**Opposite substation**	**165 d**	**'23 Jan 2**	**'23 Jun 15**		**0 d**
200	Construction of Foundation for opposite substation equipment	50 d	'23 Jan 2	'23 Feb 20	71	97 d
201	Installation of opposite substation equipment	37 d	'23 May 10	'23 Jun 15	200, 142	19 d
202	**Commissioning**	**45 d**	**'23 Jun 1**	**'23 Jul 15**		**0 d**
203	**PV area**	**12 d**	**'23 Jun 7**	**'23 Jun 18**		**7 d**
204	Commissioning of Box combiner	3 d	'23 Jun 14	'23 Jun 16	153FS+5 d	20 d
205	Commissioning of inverter	3 d	'23 Jun 16	'23 Jun 18	153FS+7 d	18 d
206	Commissioning of system	2 d	'23 Jun 14	'23 Jun 15	d, 204FS+2 d	25 d
207	**Switch yard**	**44 d**	**'23 Jun 1**	**'23 Jul 14**		**0 d**
208	**SVG**	**7 d**	**'23 Jun 1**	**'23 Jun 7**		**34 d**
209	Commissioning of SVG	7 d	'23 Jun 1	'23 Jun 7	163FS+10 d	34 d
210	**Station Transformer**	**7 d**	**'23 Jun 1**	**'23 Jun 7**		**34 d**
211	Commissioning of station transformer	7 d	'23 Jun 1	'23 Jun 7	166FS+2 d	34 d
212	**35kV Switchgear**	**19 d**	**'23 Jun 26**	**'23 Jul 14**		**4 d**
213	Commissioning of 35kV switchgear	4 d	'23 Jun 26	'23 Jun 29	168FS+2 d	12 d
214	Reverse power transmission	7 d	'23 Jul 8	'23 Jul 14	226, 216, 217	4 d
215	**Communication system**	**4 d**	**'23 Jul 4**	**'23 Jul 7**		**4 d**
216	Commissioning of communication system	2 d	'23 Jul 4	'23 Jul 5	181	5 d
217	Commissioning of UPS system	2 d	'23 Jul 6	'23 Jul 7	183	4 d
218	**Fire protection facilities and life water supply**	**7 d**	**'23 Jun 27**	**'23 Jul 3**		**15 d**
219	Commissioning of firefighting system	4 d	'23 Jun 27	'23 Jun 30	187	18 d
220	Commissioning of Integrated domestic sewage equipment	7 d	'23 Jun 27	'23 Jul 3		15 d
221	**Station subsidiary system**	**7 d**	**'23 Jun 26**	**'23 Jul 2**		**16 d**
222	Commissioning of Lighting system	7 d	'23 Jun 26	'23 Jul 2		16 d
223	Commissioning of AC and Ventilation system	3 d	'23 Jun 26	'23 Jun 28	194	20 d
224	**Transmission line**	**9 d**	**'23 Jun 15**	**'23 Jun 23**		**18 d**
225	Commissioning of 33kV transmission line	9 d	'23 Jun 15	'23 Jun 23	198	18 d
226	Commissioning of opposite substation equipment	7 d	'23 Jun 16	'23 Jun 22	201	19 d
227	**Commissioning of Unit**	**20 d**	**'23 Jun 26**	**'23 Jul 15**		**3 d**
228	First grid connection	5 d	'23 Jun 26	'23 Jun 30	206SS+4 d	10 d
229	Completed all grid connection	8 d	'23 Jul 6	'23 Jul 13	206, 216, 228	5 d
230	Performance test	5 d	'23 Jul 11	'23 Jul 15		3 d
231	COD	0 d	'23 Jul 15	'23 Jul 15	230	3 d