Environmental Impact Assessment Report for Kyaukse Gas Combined-Cycle Power Plant Construction Project in Myanmar [Draft]

March 2020

Electric Power Generation Enterprise, Ministry of Electricity and Energy

No	Document Type	Date of Submission	Date of Comment (or) Approve by ECD	Note
1	EIA Report	20th Mar 2020		

TABLE OF CONTENTS

EXECUTIVE SUMMAY

CHAPTER 1. Introduction 1-1
1.1. Presentation of the Project Proponent 1-1
1.1.1. Project Rationale 1-1
1.1.2. Project Context 1-1
1.1.3. Related Projects and Developments 1-1
1.2. Presentation of Environmental and Social Experts 1-1
1.3. Project Proponent's Commitments 1-2
1.4. Structure of the EIA Report 1-3
1.5. Survey Area 1-3
CHAPTER 2. Policy, Legal and Institutional Framework 2-1
2.1. Corporate Environmental and Social Policies 2-1
2.2. Overview of National Policy and Legal Framework 2-1
2.2.1. National Energy Policy (2014) 2-1
2.2.2. Legal Framework for Energy Sector 2-1
2.2.3. Legal Framework for Environmental and Social Considerations 2-2
2.2.4. International Conventions, Treaties and Agreement 2-7
2.2.5. JICA Guidelines for Environmental and Social Considerations 2-8
2.3. Institutional Framework 2-8
2.3.1. Government Institutional Framework 2-8
2.3.2. Institutional Framework (Energy Sector) 2-11
2.3.3. Institutional Framework (Environment and Social) 2-12
2.3.4. Organization of the Project 2-12
2.3.5. Institutional Framework for Environmental Management 2-15
2.4. National and International Environmental Guidelines and Standard 2-16
2.4.1. Myanmar National Environmental Quality (Emission) Guidelines 2-16
2.4.2. WBG EHS Guidelines for Thermal Power Plants 2-20
2.4.3. Japanese Guideline Value Related to Vibration 2-22
2.4.4. Applicable Target Value for the Project 2-22
CHAPTER 3. Project Description 3-1
3.1. Presentation of the Project and Description of Alternatives 3-1
3.1.1. Project Rationale and Background 3-1
3.1.2. Project Location, Overview Map and Site Layout Maps 3-1
3.1.3. Power Generation Process 3-12

3.1.4. Facility Layout ... 3-13
3.2. Comparison and Selection of Alternative ... 3-17
3.2.1. Methodology ... 3-17
3.2.2. Comparison and Selection of Alternative ... 3-17
3.3. Description of the Selected Alternative ... 3-25
3.3.1. Project Site ... 3-25
3.3.2. Water Source and Pipeline ... 3-28
3.3.3. Cooling System ... 3-34
CHAPTER 4. Description of the Surrounding Environment ... 4-1
4.1. Setting Study Limit ... 4-1
4.2. Physical Component ... 4-3
4.2.1. Climate and Meteorology ... 4-3
4.2.2. Topography ... 4-9
4.2.3. Geology ... 4-10
4.2.4. Soil Quality ... 4-12
4.2.5. Natural Disasters ... 4-12
4.2.6. Water Quality ... 4-12
4.2.7. Noise and Vibration ... 4-17
4.2.8. Traffic Volume ... 4-23
4.2.9. Air Quality ... 4-24
4.3. Biological Environment ... 4-29
4.3.1. Literature Survey ... 4-29
4.3.2. Field Survey ... 4-30
4.4. Socio-economic Component ... 4-65
4.4.1. Survey Items ... 4-65
4.5. Cultural Components ... 4-76
4.5.1. Literature Survey ... 4-76
4.5.2. Field Survey ... 4-78
4.6. Visual Component ... 4-86
4.6.1. Literature Survey ... 4-86
4.6.2. Field Survey ... 4-86
4.7. Valued Environmental Components ... 4-88
CHAPTER 5. Impact and Risk Assessment and Mitigation Measures ... 5-1
5.1. Impact Assessment Methodology ... 5-1
5.1.1. Scope of Assessment ... 5-1
5.1.2. Geographical Scope and Study Area Boundaries ... 5-5
5.1.3. Methodology ... 5-5

5.1.4. Mapping 5-5
5.1.5. Modeling Requirements 5-5
5.2. Identification of Impacts, Mitigation Measures and Residual Impacts 5-6
5.2.1. Biophysical Impact 5-6
5.2.2. Social Impact Assessment 5-47
5.2.3. Cultural Impact Assessment 5-94
5.2.4. Visual Impact Assessment 5-100
5.2.5. Summary of Impact Assessment 5-103
CHAPTER 6. Cumulative Impact Assessment 6-1
6.1. Methodology and Approach 6-1
6.1.1. Emission from Power Plant 6-1
6.1.2. Effluent Discharge to Myitnge River 6-1
6.2. Determination of a Spatial and Temporal Framework 6-2
6.2.1. Emission from Power Plant 6-2
6.2.2. Effluent Discharge to Myitnge River 6-2
CHAPTER 7. Environmental Management Plan 7-1
7.1. Environmental Mitigation Measures 7-1
7.1.1. Power Facility 7-2
7.1.2. Gas Pipeline 7-12
7.1.3. Water Pipeline 7-19
7.2. Environmental Monitoring Plan 7-27
7.2.1. Power Facility 7-28
7.2.2. Gas Pipeline 7-42
7.2.3. Water Pipeline 7-50
CHAPTER 8. Public Consultations and Disclosure 8-1
8.1. Introduction 8-1
8.2. Methodology and Approach 8-1
8.2.1. Pre-Meeting with Village Tract Leaders and Other Stakeholders 8-1
8.2.2. Identification of PAPs and Other Stakeholders 8-6
8.2.3. Method of the Public Consultation Meeting 8-7
8.2.4. Disclosure 8-7
8.3. Results of Consultations during Project Scoping 8-8
8.3.1. Summary of Consultations Undertaken 8-8
8.3.2. Results of Consultations during Scoping Stage 8-9
8.4. Results of Consultations during Preparation of EIA Report 8-11
8.4.1. Summary of Consultations Undertaken 8-11
8.4.2. Results of Consultations during EIA Preparation Stage 8-12

8.5. Conclusion 8-14

CHAPTER 9. Summary of Development Plans 9-1

9.1. Seismic Resistant Plan 9-1

9.2. Emergency Response Plan 9-1

9.3. Water Intake Management Plan 9-1

9.4. Waste Management Plan 9-1

9.5. Community Health and Safety Plan 9-2

9.6. Industrial Risk Management Plan 9-2

9.7. Community Development Plan 9-2

9.8. Occupational Health and Safety Management Plan 9-2

9.9. Grievance and Redress Mechanism 9-2

9.10. Safety Management Plan of Gas Pipeline 9-2

9.11. Planning Considerations for Pipeline Installation in Heritage Zone 9-3

9.12. Corporate Social Responsibility (CSR) Plan 9-3

APPENDIXES

Appendix A: Field Survey Data

Appendix B: Environment Monitoring Form

Appendix C: Public Consultation Materials for Scoping of EIA

Appendix D: Public Consultation Materials for EIA

Appendix E: Record of PCM for Scoping of EIA

Appendix F: Record of PCM for EIA

Appendix G: Development Plans

Appendix H: Abbreviated Resettlement Action Plan (A-RAP) [DRAFT]

LIST OF FIGURES

Figure 1.5-1 Study Area for Ambient Air and Socio-Economic Impact 1-4
Figure 1.5-2 Study Area for Biodiversity Impact 1-5
Figure 1.5-3 Study Area for Noise Impact 1-6
Figure 2.3-1 States and Regions of the Republic of the Union of Myanmar. 2-9
Figure 2.3-2 Organization Chart of the Republic of the Union of Myanmar. 2-10
Figure 2.3-3 Organization Chart of MOEE 2-12
Figure 2.3-4 Project Management Unit for Kyaukse CCPP 2-13
Figure 2.3-5 Organization of PMU 2-13
Figure 2.3-6 Organization of Power Plant for Operation Stage 2-14
Figure 2.3-7 Institutional Structure for Environmental Management in Construction Phase 2-15
Figure 2.3-8 Institutional Structure for Environmental Management in Operation Phase 2-16
Figure 3.1-1 Location of the Project Site 3-1
Figure 3.1-2 Location of the Project Facilities 3-3
Figure 3.1-3 Detail of the Location of Power Facilities 3-4
Figure 3.1-4 Detail of the Location of Transmission Line 3-5
Figure 3.1-5 Detail of the Location of Gas Pipeline 3-6
Figure 3.1-6(1) Detail of the Location of Water Pipeline 3-8
Figure 3.1-7 Intake and Discharge Structure (Plan) 3-11
Figure 3.1-8 Intake and Discharge Structure (Section) 3-11
Figure 3.1-9 Detail of the Location of Electricity Line 3-12
Figure 3.1-10 Conceptual Diagram of Combined Cycle System 3-13
Figure 3.1-11 Facility Layout Plan 3-14
Figure 3.2-1 Alternatives of the Project Site 3-18
Figure 3.2-2 Alternatives of Water Source and Water Pipeline 3-20
Figure 3.2-3 Detour Route of Ancient City 3-23
Figure 3.2-4 Alternatives of Cooling System 3-24
Figure 3.3-1 Topographic Map 3-26
Figure 3.3-2 Locations of Boreholes 3-27
Figure 3.3-3 Locations of Shwe Sa Yan Station and Myitnge Station 3-29
Figure 3.3-4 Monthly Reservoir Water Level of Yeywa Dam 3-30
Figure 3.3-5 Water Level and Discharge at Shwe Sa Yan Station in 2017 3-30
Figure 3.3-6 H-Q Curve at Shwe Sa Yan Station 3-31
Figure 3.3-7 Typical Areas of Pipeline Route 3-32
Figure 3.3-8 Typical Section of Water Pipeline for Area A 3-33
Figure 3.3-9 Typical Section of Water Pipeline for Area B 3-33

Figure 3.3-10 Typical Section of Water Pipeline for Area C 3-33
Figure 3.3-11 Typical Section of Water Pipeline for Area D 3-34
Figure 3.3-12 Conceptual Diagram of Air-Cooled Condenser System 3-34
Figure 4.1-1 Location Map of Field Survey Sampling Locations 4-2
Figure 4.2-1 Monthly Average Maximum and Minimum Temperature of Mandalay City (2005-2015) 4-4
Figure 4.2-2 Monthly Average Rainfall of Mandalay City (2005-2015) 4-4
Figure 4.2-3 Scene of Meteorology Survey at AQ1 4-5
Figure 4.2-4 Wind Rose Diagram for Rainy Season Survey 4-7
Figure 4.2-5 Wind Rose Diagram for Dry Season Survey 4-8
Figure 4.2-6 DEM of the Project Site 4-9
Figure 4.2-7 Regional Geology Map of the Project Site 4-11
Figure 4.2-8 Scene of Surface Water Survey 4-14
Figure 4.2-9 Scene of Ground Water Level Measurement 4-15
Figure 4.2-10 Location Map of Noise and Vibration Survey 4-18
Figure 4.2-11 Scene of Noise and Vibration Measurement at NV1 4-19
Figure 4.2-12 Scene of Noise and Vibration Measurement at NV2 4-19
Figure 4.2-13 Scene of Noise and Vibration Measurement at NV3 4-20
Figure 4.2-14 Scene of Noise and Vibration Measurement at NV4 4-20
Figure 4.2-15 Scene of Noise and Vibration Measurement at NV5, NV6, and NV7 4-21
Figure 4.2-16 Scene of Traffic Volume Survey at TV 4-24
Figure 4.2-17 Location Map of Air Quality Survey 4-26
Figure 4.2-18 Scene of Air Quality Survey at AQ 4-27
Figure 4.3-1 Protected Areas 4-30
Figure 4.3-2 Location of Survey Area (Intake Station) 4-31
Figure 4.3-3 Location of Survey Area (Project Site) 4-32
Figure 4.3-4 Location of Survey Area (Gas/Water Pipeline) 4-33
Figure 4.3-5 Interview Survey with Local People 4-35
Figure 4.3-6 Sceneries of Project Site 4-35
Figure 4.3-7 Habitat Map of Project Site 4-36
Figure 4.3-8 Photo of Some Recorded Bird Species 4-47
Figure 4.3-9 Photo of Some Recorded Mammal Species 4-50
Figure 4.3-10 Photo of Some Recorded Herpect Species 4-52
Figure 4.3-11 Photo of Some Recorded Butterfly Species 4-54
Figure 4.3-12 Some Photos of Recorded Dragonfly Species 4-56
Figure 4.3-13 Photo of Recorded Beetle Species 4-58
Figure 4.3-14 Photo of Recorded Snail Species 4-59
Figure 4.3-15 Photo of Some Recorded Fish Species 4-64

Figure 4.4-1 Photos of Public Hearing Survey 4-66
Figure 4.4-2 Urban and Rural of Sintgaing Township 4-67
Figure 4.4-3 Educational Infrastructures in Sintgaing Township 4-74
Figure 4.4-4 Health Facilities in Sintgaing Township 4-75
Figure 4.5-1 Location Map of Pagodas within AOI 4-77
Figure 4.5-2 Location of Traditional Zones and Valuable Pagodas 4-79
Figure 4.5-3 Distinct Pagodas Located within Buffer Zone 4-83
Figure 4.5-4 Location of Pagodas within Buffer Zone 4-85
Figure 4.6-1 Survey Points of Landscape 4-87
Figure 4.6-2 Landscape Condition of Pagoda Compound and the Project Site (view from south) 4-87
Figure 4.6-3 Landscape Condition of the Project Site (view from south, at southern boundary of the project site) 4-88
Figure 4.6-4 Landscape Condition of the Project Site (view from northeast, at northeast corner of the project site) 4-88
Figure 5.2-1 Wind Rose in the Project Site 5-9
Figure 5.2-2 Appearance of Atmospheric Stability Condition 5-9
Figure 5.2-3 Contour Map of Annual NO_2 Concentration 5-11
Figure 5.2-4 Conceptual Wastewater Treatment Diagram 5-16
Figure 5.2-5 Draft Design of Intake Facility (Top View) 5-17
Figure 5.2-6 Result of Noise Forecasting 5-30
Figure 5.2-7 Noise Countermeasure for Gas Turbine Intake and Exhaust System 5-32
Figure 5.2-8 Noise Countermeasure for Steam Turbine Exhaust System and Cooler 5-32
Figure 5.2-9 Location of the Noise Source for Forecasting 5-33
Figure 5.2-10 Result of Noise Forecasting 5-34
Figure 5.2-11 Location of Project Site Related to the Protected Areas of Myanmar 5-41
Figure 5.2-12 Regulation Pond 5-46
Figure 5.2-13 Process flow for Pipeline installation in the heritage zone 5-95
Figure 6.1-1 Location of the IPP Project 6-1
Figure 7.2-1 Monitoring Point of Air Quality in CONSTRUCTION PHASE, DECOMMISSIONING, CLOSURE, AND POST-CLOSURE PHASE (Power Facility) 7-31
Figure 7.2-2 Monitoring Point of Noise & Vibration in CONSTRUCTION PHASE, DECOMMISSIONING, CLOSURE, AND POST-CLOSURE PHASE (Power Facility) 7-32
Figure 7.2-3 Monitoring Point of Air Quality in OPERATION PHASE (Power Facility) 7-36
Figure 7.2-4 Monitoring Point of Water Quality in the Project site in OPERATION PHASE (Power Facility) 7-37
Figure 7.2-5 Monitoring Point of Water Quality in Myitnge River in OPERATION PHASE (Power Facility) 7-37
Figure 7.2-6 Monitoring Point of Noise & Vibration in OPERATION PHASE (Power Facility) 7-38

Figure 7.2-7 Monitoring Point of Noise & Vibration in CONSTRUCTION PHASE, DECOMMISSIONING, CLOSURE, AND POST-CLOSURE PHASE (Gas Pipeline) 7-46

Figure 7.2-8 Monitoring Point of Water Quality in CONSTRUCTION PHASE, DECOMMISSIONING, CLOSURE, AND POST-CLOSURE PHASE (Water Pipeline)... 7-55

Figure 7.2-9 Monitoring Point of Noise & Vibration in CONSTRUCTION PHASE, DECOMMISSIONING, CLOSURE, AND POST-CLOSURE PHASE (Water Pipeline)............ 7-56

Figure 8.2-1 Photos of Notice Displayed in Village and Village Tract Offices....................................... 8-7

Figure 8.3-1 Photos of Public Consultation Meeting at Scoping Stage 8-9

Figure 8.4-1 Photos of Public Consultation Meeting at EIA Preparation Stage.................................... 8-12

LIST OF TABLES

Table 1.2-1 Members of EIA Study Team 1-2
Table 1.4-1 Structure of EIA Report 1-3
Table 2.1-1 Ten Principles of UN Global Compact 2-1
Table 2.2-1 Relevant Laws and Regulations on Land Acquisition and Resettlement 2-4
Table 2.2-2 Myanmar's Commitment to International Agreements on Environmental Issues 2-7
Table 2.3-1 Responsible Authority at Each Project Stage 2-15
Table 2.4-1 Air Emission Levels (for Thermal Power) 2-17
Table 2.4-2 Air Emissions (General Guidelines) 2-17
Table 2.4-3 Site Runoff and Wastewater Discharges (Construction Phase) 2-18
Table 2.4-4 Effluent Levels (Thermal Power) 2-18
Table 2.4-5 Effluent Levels (Waste Water Treatment Facilities) 2-18
Table 2.4-6 Applicable Noise Level Guidelines 2-19
Table 2.4-7 WBG Guideline for Air Emission 2-20
Table 2.4-8 WBG Guideline for Ambient Air Quality 2-20
Table 2.4-9 WBG Guideline for Effluent (Thermal Power Plant) 2-20
Table 2.4-10 WBG Guideline for Effluent (Wastewater Treatment) 2-21
Table 2.4-11 WBG Guideline for Ambient Noise Level 2-21
Table 2.4-12 Japanese Regulatory Standard Values for Vibration (L_{v10} [a]) 2-22
Table 2.4-13 Target Value for Emission Gas 2-22
Table 2.4-14 Target Value for Ambient Air Quality 2-22
Table 2.4-15 Target Value for Site Runoff and Wastewater Discharges (Construction Phase) 2-23
Table 2.4-16 Target Value for Effluent (Thermal Power) 2-23
Table 2.4-17 Target Value for Wastewater, Storm Water Runoff, Effluent and Sanitary Discharges 2-23
Table 2.4-18 Target Value for Noise (L_{Aeq} [a]) 2-24
Table 2.4-19 Target Value for Noise (L_{V10} [a]) 2-25
Table 3.1-1 Physical Components of the Project related to Environmental and Social Considerations 3-2
Table 3.1-2 Coordination of the Power Facilities 3-4
Table 3.1-3 Coordination of the Existing Transmission Line 3-5
Table 3.1-4 Coordination of the Relocated Transmission Line 3-5
Table 3.1-5 Coordination of the Gas Pipeline 3-7
Table 3.1-6 Coordination of the Water Pipeline 3-9
Table 3.1-7 Coordination of the Electricity Line 3-12
Table 3.1-8 Shwe Gas Composition 3-15
Table 3.1-9 Construction Schedule 3-16
Table 3.1-10 Construction Machineries of Earthwork 3-16

Table 3.2-1 Result of Alternative Study of the Project Site 3-18
Table 3.2-2 Result of Alternative Studies of the Water Resource and Pipeline 3-20
Table 3.2-3 Alternative Studies of Detour Route for Ancient City 3-22
Table 3.2-4 Checking list with requirement of IFC performance standard 3-23
Table 3.2-5 Result of Alternative Study of the Cooling System 3-24
Table 3.3-1 (1) Result of Soil Parameters at Borehole No.1 3-27
Table 3.3-2 Major Features of Myitnge River 3-29
Table 4.1-1 Field Survey Items for Environmental Baseline Survey 4-1
Table 4.2-1 Monthly Average of Maximum and Minimum Temperature of Mandalay City (2005-2015) 4-3
Table 4.2-2 Average Monthly Rainfall in Mandalay City (2005-2015) 4-4
Table 4.2-3 Location of Meteorology Survey 4-5
Table 4.2-4 Sampling Duration for Meteorology Survey 4-5
Table 4.2-5 Sampling and Analysis Method for Meteorology 4-6
Table 4.2-6 Survey Results of Meteorology 4-6
Table 4.2-7 Parameter for Surface Water Quality Survey 4-12
Table 4.2-8 Sampling Point of Surface Water Quality 4-13
Table 4.2-9 Survey time for Surface Water Quality 4-14
Table 4.2-10 Field Equipment for Surface Water Quality Survey 4-14
Table 4.2-11 Location of Ground Water Bore Holes 4-15
Table 4.2-12 Ground Water Level Measurement Schedule 4-15
Table 4.2-13 Field Equipment for Groundwater Level 4-15
Table 4.2-14 Survey Results of Surface Water Quality 4-16
Table 4.2-15 Survey Results of Groundwater Level of Bore Holes 4-16
Table 4.2-16 Location of Noise and Vibration Survey 4-17
Table 4.2-17 Sampling duration for Noise and Vibration 4-21
Table 4.2-18 Instrument for Measurement of Noise and Vibration Level 4-22
Table 4.2-19 Survey Results of Equivalent Noise Level (L_{Aeq}) 4-22
Table 4.2-20 Survey Results of Vibration Level 4-23
Table 4.2-21 Classification of Vehicle Types 4-23
Table 4.2-22 Location of Traffic Volume Survey Point 4-23
Table 4.2-23 Survey Period for Traffic Volume Survey 4-24
Table 4.2-24 Result of Vehicle Traffic Volume Survey 4-24
Table 4.2-25 Location of Air Quality Survey 4-27
Table 4.2-26 Sampling Duration for Air Quality Survey 4-27
Table 4.2-27 Sampling and Analysis Method for Air Quality 4-28
Table 4.2-28 Result of Air Quality Survey (Daily Average) at AQ1 4-28
Table 4.2-29 Result of Air Quality Survey (Daily Average) at AQ2-5 4-28

Table 4.3-1 World Database on Protected Areas – Myanmar. 4-29
Table 4.3-2 Survey Duration of Flora and Fauna Survey 4-34
Table 4.3-3 List of Recorded Plant Species 4-37
Table 4.3-4 List of Recorded Bird Species 4-45
Table 4.3-5 List of Recorded Mammal Species 4-49
Table 4.3-6 List of Recorded Herpeto Species 4-51
Table 4.3-7 List of Recorded Butterfly Species 4-53
Table 4.3-8 List of Recorded Dragonfly Species 4-55
Table 4.3-9 List of Recorded Beetle Species 4-57
Table 4.3-10 List of Recorded Snail Species 4-59
Table 4.3-11 List of Recorded Fish Species 4-61
Table 4.4-1 Ethnic Group of Sintgaing Township 4-65
Table 4.4-2 Household in Sintgaing Township 4-66
Table 4.4-3 Population in Sintgaing Township 4-67
Table 4.4-4 Population in Taung Yin, Na Be Bin and Shan Gan Village, Sintgaing Township 4-67
Table 4.4-5 House, Household and Population in Three Villages 4-68
Table 4.4-6 Religion in Sintgaing Township (2018) 4-68
Table 4.4-7 Religion Taung Yin, Na Be Bin and Shan Gan Villages, Sintgaing Township 4-68
Table 4.4-8 Education Status in Sintgaing Township (2018) 4-69
Table 4.4-9 Educational Institution in Three Villages 4-69
Table 4.4-10 Production Rate of Main Crops (April-September 2018) 4-70
Table 4.4-11 Production Rate of Main Crops in Three Villages 4-70
Table 4.4-12 Occupational Status of Sintgaing Township 4-71
Table 4.4-13 Income Level in Sintgaing Township 4-71
Table 4.4-14 Income level of Taung Yin, Na Be Bin and Shan Gan Villages 4-71
Table 4.4-15 Health Condition of Sintgaing Township 4-72
Table 4.4-16 Morbidity and Mortality of Diseases in Sintgaing Township 4-72
Table 4.4-17 Health related Status of Three Villages 4-72
Table 4.4-18 Land Use in Sintgaing Township 4-73
Table 4.4-19 Educational infrastructures in Sintgaing Township 4-73
Table 4.4-20 Health Facilities in Sintgaing Township 4-74
Table 4.4-21 Health Facilities in Three Villages 4-75
Table 4.5-1 Religious Buildings in Sintgaing Township 4-76
Table 4.5-2 Historical Buildings in Sintgaing Township 4-76
Table 4.5-3 Traditional Zones in Sintgaing Township 4-80
Table 4.5-4 Two Pagodasa in Matkharyar Traditional Zone 4-80
Table 4.5-5 Detailed Information of Cultural Assets in Buffer Zone 4-81

Table 4.5-6 Religious Buildings in Taung Yin, Na Be Bin and Shan Gan Villages 4-86
Table 5.1-1 Scoping for Environmental and Social Impact Assessment 5-1
Table 5.1-2 Temporal Category 5-5
Table 5.2-1 Construction Machinery of Earthwork 5-7
Table 5.2-2 Assessment of Air Quality in Construction Phase 5-7
Table 5.2-3 Conditions of Flue Gas for Dispersion Model 5-8
Table 5.2-4 Future Concentration of Nitrogen Oxides (long term) 5-10
Table 5.2-5 Future Concentration of Nitrogen Oxides (short term) 5-12
Table 5.2-6 Assessment of Air Quality in Operation Phase 5-12
Table 5.2-7 Construction Machinery of Demolition 5-13
Table 5.2-8 Assessment of Air Quality in Decommissioning, Closure, and Post-closure Phases 5-14
Table 5.2-9 Assessment of Water Quality in Construction Phase 5-16
Table 5.2-10 Target Value for Effluent (Thermal Power) 5-18
Table 5.2-11 Target Value for Wastewater, Storm Water Runoff, Effluent and Sanitary Discharges 5-18
Table 5.2-12 Comparison Table of Flow Rate 5-19
Table 5.2-13 Temperature of Underground and River 5-19
Table 5.2-14 Assessment of Water Quality in Operation Phase 5-20
Table 5.2-15 Assessment of Water Quality in Decommissioning, Closure, and Post-closure Phases ... 5-21
Table 5.2-16 Solid Waste in Construction Phase 5-22
Table 5.2-17 Assessment of Solid Waste in Construction Phase 5-23
Table 5.2-18 Solid Waste in Operation Phase 5-24
Table 5.2-19 Assessment of Solid Waste in Operation Phase 5-25
Table 5.2-20 Solid Waste in Demolition Phase 5-25
Table 5.2-21 Assessment of Solid Waste in Decommissioning, Closure, and Post-closure Phases 5-26
Table 5.2-22 Construction Machinery of Civil Works 5-28
Table 5.2-23 Sound Power Level of Noise Sources of Construction Machinery 5-29
Table 5.2-24 Result of Noise Forecasting ($L_{Aeq}{}^{a}$) 5-30
Table 5.2-25 Assessment of Noise and Vibration in Construction Phase 5-30
Table 5.2-26 Major Noise Sources and Noise Level 5-31
Table 5.2-27 Result of Noise Forecasting ($L_{Aeq}{}^{a}$) 5-34
Table 5.2-28 Assessment of Noise and Vibration in Operation Phase 5-34
Table 5.2-29 Construction Machinery of Demolition 5-36
Table 5.2-30 Assessment of Noise and Vibration in Demolition Phase 5-36
Table 5.2-31 Assessment of Subsidence in Construction Phase 5-37
Table 5.2-32 Offensive Odor in Operation Phase 5-38
Table 5.2-33 Assessment of Offensive Odor in Operational Phase 5-39
Table 5.2-34 Assessment of Flora, Fauna and Biodiversity in Construction Phase 5-42

Table 5.2-35 Assessment of Flora, Fauna and Biodiversity in Operational Phase 5-43

Table 5.2-36 Assessment of Flora, Fauna and Biodiversity in Decommissioning, Closure, and Post-closure Phases 5-44

Table 5.2-37 Maximum Daily Rainfall at Kyaukse Township from 2011 to 2017............................... 5-45

Table 5.2-38 Probable Daily Rainfall at Kyaukse Township.. 5-45

Table 5.2-39 Assessment of Hydrology in Operation Phase 5-46

Table 5.2-40 Possible Impact on Land Acquisition at Pre-construction and Construction Phases........ 5-48

Table 5.2-41 Assessment of Land Acquisition in Pre-construction and Construction Phases 5-49

Table 5.2-42 Assessment of Poverty in Pre-construction Phase 5-51

Table 5.2-43 Assessment of Poverty in Construction Phase... 5-51

Table 5.2-44 Assessment of Poverty in Operational Phase 5-52

Table 5.2-45 Assessment of Poverty in Decommissioning Phase 5-54

Table 5.2-46 Assessment of Poverty in Demolition Phase 5-54

Table 5.2-47 Assessment of Local Economy (Employment) in Construction Phase 5-56

Table 5.2-48 Assessment of Local Economy (Employment) in Operational Phase 5-57

Table 5.2-49 Assessment of Local Economy (Employment) in Decommissioning and Closure Phases .. 5-59

Table 5.2-50 Assessment of Local Economy (Livelihood) in Pre-construction Phase.......................... 5-60

Table 5.2-51 Assessment of Local Economy (Livelihood) in Construction Phase................................ 5-61

Table 5.2-52 Assessment of Land Use and Utilization of Local Resources during Pre-construction and Construction Phases.. 5-62

Table 5.2-53 Assessment of Water Usage in Construction Phase... 5-64

Table 5.2-54 Assessment of Water Usage in Operation Phase 5-65

Table 5.2-55 Assessment of Water Usage in Decommissioning, Closure, and Post-closure Phases..... 5-66

Table 5.2-56 Assessment of Existing Social Infrastructure and Service in Construction Phase 5-68

Table 5.2-57 Assessment of Existing Social Infrastructure and Service in Operation Phase 5-69

Table 5.2-58 Assessment of Gender in Construction Phase 5-70

Table 5.2-59 Assessment of Gender in Operation Phase.. 5-71

Table 5.2-60 Assessment of Gender in Decommissioning Phase... 5-72

Table 5.2-61 Assessment of Children's Rights in Construction Phase 5-73

Table 5.2-62 Assessment of Children's Rights in Operation Phase.. 5-75

Table 5.2-63 Assessment of Children's Rights on Decommissioning 5-76

Table 5.2-64 Assessment of Infectious Disease and HIV/AIDS in Construction Phase 5-77

Table 5.2-65 Health Condition of Sintgaing Township 5-78

Table 5.2-66 Health Condition of Village Groups (previous 6 months)... 5-79

Table 5.2-67 Assumed Health Impact.. 5-79

Table 5.2-68 Assessment of Infectious Community Health in Operation Phase 5-80

Table 5.2-69 Assessment of Infectious Disease and HIV/AIDS in Decommissioning, Closure, and Post-closure Phases.. 5-81

Table 5.2-70 Assessment of Occupational Health and Safety in Construction Phase 5-83
Table 5.2-71 Assessment of Occupational Health and Safety in Operation Phase 5-84
Table 5.2-72 Assessment of Occupational Health and Safety in Decommissioning Phase 5-85
Table 5.2-73 Assessment of Accidents in Construction Phase 5-87
Table 5.2-74 Assessment of Accidents in Operational Phase 5-88
Table 5.2-75 Assessment of Accidents in Decommissioning Phase 5-89
Table 5.2-76 Assessment of Cross-border Impact, Climate Change in Construction Phase 5-90
Table 5.2-77 Input Value to the JICA Climate FIT 5-91
Table 5.2-78 Input Value to the JICA Climate FIT 5-91
Table 5.2-79 Assessment of Cross-border Impact, Climate Change in Operational Phase 5-92
Table 5.2-80 Assessment of Cross-border Impact, Climate Change in Decommissioning Phase 5-93
Table 5.2-81 Assessment of Impact on Ruins in heritage zone during Construction Phase 5-96
Table 5.2-82 Assessment Cultural Heritage in Construction Phase 5-96
Table 5.2-83 Assessment Cultural Heritage in Operational Phase 5-97
Table 5.2-84 Assessment Cultural Heritage in Decommissioning Phase 5-98
Table 5.2-85 Assessment of Landscape in Construction Phases 5-101
Table 5.2-86 Assessment of Landscape in Operational Phase 5-102
Table 5.2-87 Assessment of Landscape in Decommissioning Phase 5-103
Table 5.2-88 Summary of Impact Assessment 5-104
Table 7.1-1 Mitigation Measures for Identified Potential Negative Impacts at CONSTRUCTION PHASE (Power Facility) 7-2
Table 7.1-2 Mitigation Measures for Identified Potential Negative Impacts at the OPERATION PHASE (Power Facility) 7-5
Table 7.1-3 Mitigation Measures for Identified Potential Negative Impacts at the DECOMMISSIONING, CLOSURE, AND POST-CLOSURE PHASE (Power Facility) 7-9
Table 7.1-4 Mitigation Measures for Identified Potential Negative Impacts at the PRE-CONSTRUCTION PHASE (Gas Pipeline) 7-12
Table 7.1-5 Mitigation Measures for Identified Potential Negative Impacts at CONSTRUCTION PHASE (Gas Pipeline) 7-13
Table 7.1-6 Mitigation Measures for Identified Potential Negative Impacts at the OPERATION PHASE (Gas Pipeline) 7-16
Table 7.1-7 Mitigation Measures for Identified Potential Negative Impacts at the DECOMMISSIONING, CLOSURE, AND POST-CLOSURE PHASE (Gas Pipeline) 7-16
Table 7.1-8 Mitigation Measures for Identified Potential Negative Impacts at the PRE-CONSTRUCTION PHASE (Water Pipeline) 7-19
Table 7.1-9 Mitigation Measures for Identified Potential Negative Impacts at CONSTRUCTION PHASE (Water Pipeline) 7-20
Table 7.1-10 Mitigation Measures for Identified Potential Negative Impacts at the DECOMMISSIONING, CLOSURE, AND POST-CLOSURE PHASE (Water Pipeline) 7-24
Table 7.2-1 Environmental Monitoring Plan at CONSTRUCTION PHASE (Power Facility) 7-28

Table 7.2-2 Environmental Monitoring Plan at OPERATION PHASE (Power Facility) 7-33

Table 7.2-3 Environmental Monitoring Plan at DECOMMISSIONING, CLOSURE, AND POST-CLOSURE PHASE (Power Facility) 7-39

Table 7.2-4 Environmental Monitoring Plan at Pre-CONSTRUCTION PHASE (Gas Pipeline) 7-42

Table 7.2-5 Environmental Monitoring Plan at CONSTRUCTION PHASE (Gas Pipeline)................ 7-43

Table 7.2-6 Environmental Monitoring Plan at OPERATION PHASE (Gas Pipeline) 7-47

Table 7.2-7 Environmental Monitoring Plan at DECOMMISSIONING, CLOSURE, AND POST-CLOSURE PHASE (Gas Pipeline) 7-48

Table 7.2-8 Environmental Monitoring Plan at PRE-CONSTRUCTION PHASE (Water Pipeline)..... 7-50

Table 7.2-9 Environmental Monitoring Plan at CONSTRUCTION PHASE (Water Pipeline)............ 7-51

Table 7.2-10 Environmental Monitoring Plan at DECOMMISSIONING, CLOSURE, AND POST-CLOSURE PHASE (Water Pipeline) 7-57

Table 8.1-1 Public Consultation Meetings for Scoping and EIA Study 8-1

Table 8.2-1 Pre-meeting with Village Tract Leaders and other Stakeholders..................... 8-1

Table 8.2-2 Record of 1st Meeting with Village Tract Leaders..................... 8-2

Table 8.2-3 Record of 2nd Meeting with Village Tract Leaders..................... 8-3

Table 8.2-4 Record of 3rd Meeting with Village Tract Leaders and other Stakeholders..................... 8-4

Table 8.2-5 Record of 4th Meeting with Village Tract Leaders 8-5

Table 8.2-6 The List of Invitees for PCM..................... 8-6

Table 8.3-1 Summary of Public Consultation Meeting at Scoping Stage 8-8

Table 8.3-2 Main Question and Response at All Sessions of PCMs at the Scoping Stage..................... 8-9

Table 8.3-3 Major Comments in Feedback Form at Scoping Stage 8-10

Table 8.4-1 Summary of Public Consultation Meeting at EIA Preparation Stage..................... 8-11

Table 8.4-2 Main Question and Response at All Sessions of PCMs at the EIA Preparation Stage....... 8-12

Table 8.4-3 Major Comments in Feedback Form at EIA Preparation Stage 8-14

LIST OF ABBREVIATIONS AND ACRONYMS

Abbreviations and Acronyms	Definition
˚C	Degree Celsius
A-RAP	Abbreviated Resettlement Action Plan
AIDS	Acquired Immunodeficiency Syndrome
AOI	Area of Influence
ADB	Asian Development Bank
ARI	Acute Respiratory Infections
As	Arsenic
ASEAN	Association of South-East Asian Nations
ASJ	Acoustical Society of Japan
ASME	American Society of Mechanical Engineers
BCF	Billion Cubic Feet
BOD	Biological Oxygen Demand
CCPP	Combined-Cycle Power Plant
Cd	Cadmium
CEMS	Continuous Emission Monitoring System
CITES	Convention and International Trade in Endangered Species
CO	Carbon monoxide
COD	Chemical Oxygen Demand
Cr	Chromium
CSO	Civil Society Organizations
Cu	Copper
dB	Decibel
DEM	Digital Elevation Model
DO	Dissolved Oxygen
DOANM	Department of Archaeology, National Museum and Library
DTPSC	Department of Power Transmission and System Control
EA	Environmental Assessment
EC	Electricity Conductivity
ECC	Environmental Compliance Certificate
ECL	Environmental Conservation Law
ECD	Environmental Conservation Department
ECRs	Environmental Conservation Rules
EHS	Environmental, Health, and Safety
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMoP	Environmental Monitoring Plan
EPAS	Environmental Perimeter Air Station
EPGE	Electric Power Generation Enterprise
ERT	Emergency Response Team
Fe	Iron
GAD	General Administration Department
GHG	Green House Gas
GIS	Geographic Information System
GPS	Global Positioning System
GRM	Grievance Redress Mechanism
GTCC	Gas Turbine Combined Cycle
HAZOP	Hazard and Operability Analysis
HDPE	High-density polyethylene
HIA	Health Impact Assessment
HIV	Human Immunodeficiency Virus

Abbreviations and Acronyms	Definition
Hg	Mercury
HSE	Health, Safety and Environment
HQ	Head Quarters
IEC	International Electrotechnical Commission
IEE	Initial Environmental Examination
IFC	International Finance Corporation
ILO	International Labour Organization
IPP	Independent Power Plant
ISO	International Organization for Standardization
IUCN	International Union for Conservation of Nature
IWUMD	Irrigation and Water Utilization Management Department
JICA	Japan International Cooperation Agency
km	Kilometer
kV	Kilovolt
L	Litre
LAeq	A-weighted equivalent continuous sound level
LCCC	Land and Crop Compensation Committee
LPG	Liquefied Petroleum Gas
Lv	Vibration Level
MCDC	Mandalay City Development Committee
MESC	Mandalay Electricity Supply Corporation
MKI	Myanmar Koei International Ltd.
mg	Milligram
mm	Millimeter
mmscfd	Millions of Standard Cubic Feet per Day
MOC	Ministry of Construction
MOECAF	Ministry of Environmental Conservation and Forestry
MOEE	Ministry of Electricity and Energy
MOGE	Ministry of Oil and Gas Enterprise
MONREC	Ministry of Natural Resources and Environmental Conservation
MoI	Ministry of Industry
MORAC	Ministry of Religious Affairs and Culture
MRG	Mandalay Region Government
MW	Mega Watt
NBSAP	National Biodiversity Strategy and Action Plan
NEQG	National Environmental Quality (Emission) Guidelines
NK	Nippon Koei Co., Ltd.
NO	Nitrogen monoxide
NO_2	Nitrogen dioxides
NOx	Nitrogen Oxides
NT	Near Threatened
OHS	Occupational Safety and Health
O&M	Operation & Maintenance
PAPs	Project Affected Peoples
P&ID	Piping and Instrument Diagram
Pb	Lead
PCM	Public Consultation Meeting
$PM_{2.5}$	Particle Matter 2.5
PM_{10}	Particle Matter 10
PMU	Project Management Unit
PS	Performance Standards

Abbreviations and Acronyms	Definition
QRA	Quantitative Risk Assessment
REM	Resource and Environment Myanmar Co., Ltd.
ROW	Right of Way
SO_2	Sulfur dioxide
STDs	Sexually Transmitted Diseases
TB	Tuberculosis
ToR	Term of Reference
TSS	Total Suspended Solid
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
U.S. EPA	United States Environmental Protection Agency
VEC	Valued Environmental Components
WBG	World Bank Group
WDPA	World Database on Protected Areas
WHO	World Health Organization
Zn	Zinc

မြန်မာနိုင်ငံ ကျောက်ဆည် သဘာဝဓာတ်ငွေ့နှင့်စွန့်ပစ်အပူသုံး ပေါင်းစပ်ဓာတ်အားပေးစက်ရုံတည်ဆောက်ခြင်းစီမံကိန်းအတွက် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းအစီရင်ခံစာ

အကျဉ်းချုပ်အစီရင်ခံစာ

မတ် ၂၀၂၀

လျှပ်စစ်ဓာတ်အားထုတ်လုပ်ရေးလုပ်ငန်း
လျှပ်စစ်နှင့်စွမ်းအင်ဝန်ကြီးဌာန

မာတိကာ

၁. နိဒါန်း … 1
၁.၁. နောက်ခံအကြောင်းအရာ … 1
၁.၂. ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လေ့လာမှု … 1
၁.၃. နိဂုံး … 2
၂. မူဝါဒ၊ ဥပဒေဆိုင်ရာ နှင့် အဖွဲ့အစည်း ဆိုင်ရာ ဖွဲ့စည်းပုံ … 2
၂.၁. ဥပဒေဆိုင်ရာဖွဲ့စည်းပုံ … 2
၂.၂. အဖွဲ့အစည်း ဆိုင်ရာ ဖွဲ့စည်းပုံ … 4
၃. စီမံကိန်း ဖော်ပြချက် … 6
၃.၁. တည်နေရာ နှင့် အဓိက လုပ်ငန်းနေရာများ … 6
၃.၂. ဆောက်လုပ်ရေးအစီအစဉ် … 11
၃.၃. အခြားနည်းလမ်းလေ့လာချက် … 11
၄. စီမံကိန်း နေရာ၏ အနီးဝန်းကျင် … 13
၅. ထိခိုက်မှု ဆန်းစစ်ခြင်း အကြောင်းအရာ အကျဉ်းချုပ် … 16
၆. ဆက်စပ်သက်ရောက်မှု ဆန်းစစ်ခြင်း … 26
၆.၁. ဓာတ်အားပေးစက်ရုံမှ ထုတ်လွှတ်မှုများ … 26
၆.၂. မြစ်ငယ်မြစ်အတွင်း စွန့်ပစ်ရေ စွန့်ထုတ်မှု … 26
၇. ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှု အစီအစဉ် အကျဉ်းချုပ် … 27
၇.၁. ပတ်ဝန်းကျင်ဆိုင်ရာ ထိခိုက်မှုလျော့ကျစေရေး နည်းလမ်းများ … 27
၇.၂. ပတ်ဝန်းကျင်ဆိုင်ရာ စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးမှု အစီအစဉ် … 46
၈. **အများပြည်သူတွေ့ဆုံဆွေးနွေးခြင်းနှင့် ထုတ်ဖော်ပြသခြင်း** … 60
၈.၁. နယ်ပယ်တိုင်းတာသတ်မှတ်သည့်ကာလအတွင်း အများပြည်သူတွေ့ဆုံဆွေးနွေးခြင်းမှ ရလဒ်များ . 60
၈.၂. ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်းအစီရင်ခံစာ ပြုလုပ်သည့်ကာလအတွင်း အများပြည်သူတွေ့ဆုံဆွေးနွေးခြင်းမှရလဒ်များ … 64
၉. ဖွံ့ဖြိုးရေး အစီအစဉ်များ အကျဉ်းချုပ် … 70
၉.၁. ငလျင်ဒဏ်ခံအစီအစဉ် … 70
၉.၂. အရေးပေါ်တုန့်ပြန်ရေးအစီအစဉ် … 71
၉.၃. ရေရယူမှုစီမံခန့်ခွဲမှုအစီအစဉ် … 71
၉.၄. စွန့်ပစ်ပစ္စည်းစီမံခန့်ခွဲမှုအစီအစဉ် … 71

၉.၅. ရပ်ရွာကျန်းမာရေးနှင့်လုံခြုံမှုအစီအစဉ် 72
၉.၆. စက်မှုအန္တရာယ်စီမံခန့်ခွဲမှုအစီအစဉ် 72
၉.၇. ရပ်ရွာဖွံ့ဖြိုးရေးအစီအစဉ် 72
၉.၈. လုပ်ငန်းခွင်ကျန်းမာရေးနှင့်အန္တရာယ်ကင်းရှင်းရေးစီမံခန့်ခွဲမှုအစီအစဉ် 72
၉.၉. မကျေနပ်ချက်နှင့် ဖြေရှင်းခြင်းလုပ်ငန်းစဉ် 73
၉.၁၀. ဓာတ်ငွေ့ပိုက်လိုင်းအတွက် လုံခြုံရေးစီမံခန့်ခွဲမှုအစီအစဉ် 73
၉.၁၁. ယဉ်ကျေးမှုအမွေအနှစ်နယ်မြေအတွင်း ပိုက်လိုင်းတပ်ဆင်ခြင်းအတွက် စီစဉ်စဉ်းစားခြင်း 73
၉.၁၂. တာဝန်သိလူမှုအကျိုးပြုလုပ်ငန်းများ(CSR)အစီအစဉ် 73

မြန်မာနိုင်ငံ ကျောက်ဆည် သဘာဝဓာတ်ငွေ့နှင့်စွန့်ပစ်အပူသုံး ပေါင်းစပ်ဓာတ်အားပေးစက်ရုံတည်ဆောက်ခြင်းစီမံကိန်းအတွက် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းအစီရင်ခံစာ၏ အကျဉ်းချုပ်အစီရင်ခံစာ

၁. နိဒါန်း

၁.၁. နောက်ခံအကြောင်းအရာ

ယခုနှစ်များအတွင်း မြန်မာနိုင်ငံတွင် ဒီမိုကရေစီလူ့ဘောင်အဖွဲ့အစည်းသို့ ကူးပြောင်းလာခြင်းနှင့်အတူ ဖွံ့ဖြိုးရေးလုပ်ငန်းများနှင့် ရင်းနှီးမြှုပ်နှံမှုလုပ်ငန်းများ ပိုမိုများပြားလာခြင်းကြောင့် မြန်မာနိုင်ငံ၏ လျှပ်စစ်ဓာတ်အားလိုအပ်ချက်မှာ လျင်မြန်စွာ များပြားလာခဲ့ပါသည်။ လက်ရှိ လျှပ်စစ်ဓာတ်အားထုတ်လုပ်နိုင်မှုမှာ ၂၀၁၉ တွင် ၄၆၀၀ မဂ္ဂါဝပ် ဖြစ်ပြီး၊ ပိုမိုလိုအပ်လာမည့် လျှပ်စစ်ဓာတ်အားဖြည့်ဆည်းနိုင်ရန် လျှပ်စစ်ဓာတ်အားထုတ်လုပ်ရေးလုပ်ငန်း၊ လျှပ်စစ်နှင့်စွမ်းအင်ဝန်ကြီးဌာနသည် ၂၀၂၂ တွင် ၅၇၀၀မဂ္ဂါဝပ် ထုတ်လုပ်နိုင်ရန် ရည်ရွယ်ထားပါသည်။ ၎င်းအပြင် စွမ်းအင်ဖူလုံရေး ရှုထောင့်မှကြည့်ပါက ရေအားလျှပ်စစ်၊ သဘာဝဓာတ်ငွေ့၊ ကျောက်မီးသွေး နှင့် ပြည့်ဖြိုးမြဲ စွမ်းအင်စသည့် စွမ်းအင်အရင်းအမြစ် အမျိုးမျိုးကို အသုံးချဖို့လိုအပ်ပါသည်။ လျှပ်စစ်ထောက်ပံ့မှုပိုမိုတိုးမြင့်နိုင်ရန်အတွက် သဘာဝဓာတ်ငွေ့အပူမှ ထုတ်လုပ်သော လျှပ်စစ်သည် အခြားနည်းစနစ်များနှင့်နှိုင်းယှဉ်ပါက အချိန်တိုအတွင်း လျင်လျင်မြန်မြန် စတင်ထုတ်လုပ်နိုင်ခြင်းကြောင့် ပိုမိုလုပ်ဆောင်သင့်သော လျှပ်စစ်ထုတ်လုပ်ရေး တစ်ခု ဖြစ်သည်ပါသည်။

လျှပ်စစ်ဓာတ်အားထုတ်လုပ်ရေးလုပ်ငန်း၊ လျှပ်စစ်နှင့်စွမ်းအင်ဝန်ကြီးဌာန အနေဖြင့် အခြေအနေများကို စဉ်းစားပြီး ၃၀၀ မဂ္ဂါဝပ် ထုတ်လုပ်နိုင်သော သဘာဝဓာတ်ငွေ့ နှင့် စွန့်ပစ်အပူသုံး ပေါင်းစပ်ဓာတ်အားပေးစက်ရုံကို ကျောက်ဆည်မြို့တွင် ဂျပန်နိုင်ငံ၏ ODA ချေးငွေရယူအသုံးပြု၍ အကောင်အထည်ဖော်ရန် စီစဉ်ထားပါသည်။

၎င်းနှင့် ပတ်သက်၍ ဂျပန်အပြည်ပြည်ဆိုင်ရာ ပူးပေါင်းဆောင်ရွက်ရေးအေဂျင်စီ (JICA)ကကြိုတင်ပြင်ဆင်မှုပြုလုပ်ရေးဆိုင်ရာ စစ်တမ်းပြုလုပ်ခဲ့ပြီး၊ ယင်းစစ်တမ်းတွင်သဘာဝပတ်ဝန်းကျင် နှင့်လူမှုဝန်းကျင်အခြေအနေများ ထည့်သွင်းစဉ်းစားခြင်း စစ်တမ်း ကောက်ယူခြင်းလည်း ပါဝင်ပါသည်။

၁.၂. ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လေ့လာမှု

ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း(EIA) ပြုလုပ်သည့်အဖွဲ့မှာ ဂျပန်နိုင်ငံ နိပ္ပွန်ကိုအိ ကုမ္ပဏီလီမိတက် (Nippon Koei Co., Ltd., (NK) of Tokyo, Japan) ဖြစ်ပြီး မြန်မာကိုအိ အပြည်ပြည်ဆိုင်ရာ ကုမ္ပဏီလီမိတက် (Myanmar Koei International Ltd. (MKI)) နှင့် သယံဇာတနှင့် ဝန်းကျင်မြန်မာ ကုမ္ပဏီလီမိတက် (Resource & Environment Myanmar Co., Ltd. (REM)) တို့ နှင့် ပူးပေါင်း ဆောင်ရွက်ပါသည်။

ယခုစီမံကိန်းအတွက် EIA အစီရင်ခံစာကို ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း လုပ်ထုံးလုပ်နည်း (ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးနှင့် သစ်တောရေးရာ ဝန်ကြီးဌာန ၏အမိန့်ကြော်ငြာစာအမှတ် ၆၁၆/၂၀၁၅) နှင့်အညီ ပြုစုထားပြီး ယေဘုယျ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း လမ်းညွှန်ချက် (တတိယ အကြိမ်မြောက်)(စက်တင်ဘာ၂၀၁၇) ကို မှီငြမ်းထားပါသည်။ EIA လေ့လာမှု၏ ရည်ရွယ်ချက်မှာ လျှပ်စစ်ဓာတ်အား ထုတ်လုပ်ရေး လုပ်ငန်း (EPGE) မှ အကောင်အထည်ဖော်ဆောင်ရွက်သော စီမံကိန်း၏ ပတ်ဝန်းကျင် နှင့် လူမှုရေး ဆိုင်ရာ ထိခိုက်မှုများကို လေ့လာဆန်းစစ်ရန်နှင့် စီမံကိန်းကြောင့်ဖြစ်ပေါ်လာသော ဆိုးကျိုးများကို လျှော့ချမည့်နည်းလမ်းများပါဝင်သော ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှု အစီအစဉ် (EMP) ကို ပြုစုရန် ဖြစ်ပါသည်။

၁.၃. နိဂုံး

စီမံကိန်းသည် သဘာဝပတ်ဝန်းကျင်နှင့် လူမှုပတ်ဝန်းကျင်ဆိုးကျိုးသက်ရောက်မှုများရှိနိုင်သော်လည်း ၎င်းသက်ရောက်မှုများအား လျော့ပါးသက်သာစေရန် အကောင်အထည်ဖော်ရမည့် စီမံခန့်ခွဲမှုအစီစဉ်များနှင့် စောင့်ကြပ်ရမည့်လုပ်ဆောင်မှုများအား EIA အစီရင်ခံစာတွင်ဖော်ပြထားပါသည်။ ထို့အပြင် စီမံကိန်း၏ ကောင်းကျိုးသက်ရောက်မှုများရှိနိုင်ပြီး ၎င်းတို့ကို တိုက်ရိုက်အကျိုးစီးပွားအဖြစ် ဝေမျှသွားမည်ဖြစ်သည်။ စီမံကိန်းသည် နိုင်ငံတိုးတက်ရေးအတွက် အစွမ်းကုန်ဝေမျှပေးဆပ်သွားပါမည်။

၂. မူဝါဒ၊ ဥပဒေဆိုင်ရာ နှင့် အဖွဲ့အစည်း ဆိုင်ရာ ဖွဲ့စည်းပုံ

၂.၁. ဥပဒေဆိုင်ရာဖွဲ့စည်းပုံ

စီမံကိန်း ကိုမြန်မာ့ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ဥပဒေ (၂၀၁၂) နှင့် အညီ ဆောင်ရွက်မည်ဖြစ်ပြီး အခြား သက်ဆိုင်သည့်ဒေသဆိုင်ရာ ပတ်ဝန်းကျင် နှင့် လူမှုဝန်းကျင် ဆိုင်ရာ ကာကွယ်ရေးစည်းမျဉ်းများ ကိုလည်း ထည့်သွင်းစဉ်းစားမည်ဖြစ်ပါသည်။
ပတ်ဝန်းကျင်နှင့်လူမှုဝန်းကျင်ဆိုင်ရာအလေးထားမှုနှင့်ဆက်စပ်နေသောအဓိကကျသည့်ဥပဒေများနှင့် စည်းမျဉ်းစည်းကမ်းများကို ဇယား ၁တွင် ဖော်ပြထားပါသည်။

ဇယား (၁) မြန်မာနိုင်ငံရှိ ကျန်းမာရေး၊ ပတ်ဝန်းကျင်နှင့် လူမှုဝန်းကျင်ဆိုင်ရာ အလေးထားမှုများ နှင့်ဆက်စပ်နေသည့် အဓိကကျသည့် ဥပဒေများနှင့် စည်းမျဉ်းစည်းကမ်းများ

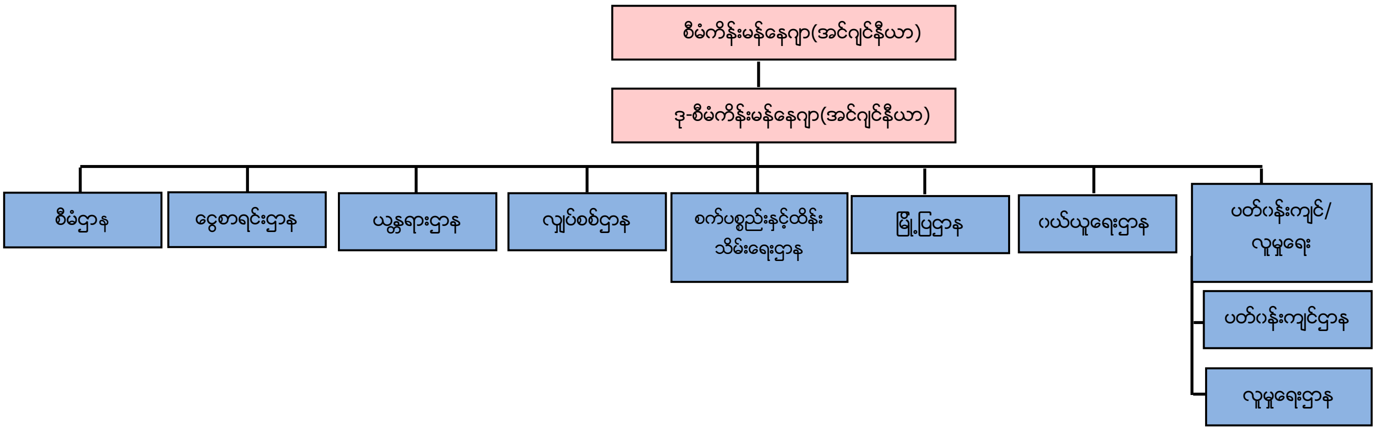
စဉ်	ဥပဒေများနှင့် စည်းမျဉ်းစည်းကမ်းများ
ပတ်ဝန်းကျင်ဆိုင်ရာ ဖွဲ့ စည်းမှုဘောင်	
၁	ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ဥပဒေ (၂၀၁၂)
၂	ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး နည်းဥပဒေ (၂၀၁၄)
ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း/ ပတ်ဝန်းကျင်ဆိုင်ရာစံချိန်စံညွှန်းများ	
၃	ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်းများ (ဒီဇင်ဘာ၊ ၂၀၁၅)
၄	အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာအရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များ (ဒီဇင်ဘာ၊ ၂၀၁၅)

စဉ်	ဥပဒေများနှင့် စည်းမျဉ်းစည်းကမ်းများ
သစ်တော/ဇီဝမျိုးစုံမျိုးကွဲ	
၅	သစ်တော ဥပဒေ (၁၉၉၂)
၆	တောရိုင်းတိရစ္ဆာန် နှင့် သဘာဝအပင်များ ကာကွယ်ရေးနှင့် သဘာဝ နယ်မြေများ ထိန်းသိမ်းရေး ဥပဒေ (၁၉၉၄
ရေအရင်းအမြစ်	
၇	ရေအရင်းအမြစ်နှင့် မြစ်ချောင်းများ ထိန်းသိမ်းရေး ဥပဒေ (၂၀၀၆)
မြေအသုံးချမှု	
၈	မြေယာသိမ်းယူမှု အက်ဥပဒေ (၁၈၉၄)
၉	လယ်ယာမြေ ဥပဒေ (၂၀၁၂)
၁၀	လယ်ယာမြေ နည်းဥပဒေ (၂၀၁၂)
၁၁	မြေလွတ်၊ မြေလပ် နှင့် မြေရိုင်းများ စီမံခန့်ခွဲရေး ဥပဒေ (၂၀၁၂)
၁၂	မြေလွတ်၊ မြေလပ် နှင့် မြေရိုင်းများ စီမံခန့်ခွဲရေး နည်းဥပဒေများ (၂၀၁၂)
၁၃	အမျိုးသားမြေယာအသုံးပြုမှုမူဝါဒ (၂၀၁၆)
ယဉ်ကျေးမှုအမွေအနှစ်	
၁၄	ယဉ်ကျေးမှု အမွေအနှစ်ဒေသများ ကာကွယ်ထိန်းသိမ်းရေး ဥပဒေ (၁၉၉၈၊ ၂၀၁၉ ခုနှစ်တွင် ပြန်လည် စီစစ်ခဲ့ပါသည်။)
လူထုကျန်းမာရေး	
၁၅	ပြည်သူ့ကျန်းမာရေးဆိုင်ရာ ဥပဒေ (၁၉၇၂)
၁၆	ကူးစက်ရောဂါများ ကာကွယ်နှိမ်နင်းရေး ဥပဒေ (၁၉၉၅၊ ၂၀၁၁ ခုနှစ်တွင် ပြန်လည် စီစစ်ခဲ့ပါသည်။)
၁၇	လုပ်ငန်းခွင် ကျန်းမာရေးနှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေး ဥပဒေ (၂၀၁၉)
လုပ်ငန်းခွင်ဝန်းကျင်	
၁၈	အလုပ်သမား လျော်ကြေးအက်ဥပဒေ (၁၉၂၃)
၁၉	အလုပ်ရုံများ အက်ဥပဒေ (၁၉၅၁)
၂၀	အလုပ်သမား အဖွဲ့အစည်း ဥပဒေ (၂၀၁၁)
၂၁	လူမှုဖူလုံရေး ဥပဒေ (၂၀၁၂)
၂၂	အနည်းဆုံး အခကြေးငွေ ဥပဒေ (၂၀၁၃)
အရေးပေါ်အခြေအနေ	
၂၃	သဘာဝဘေးအန္တရာယ်ဆိုင် စီမံခန့်ခွဲမှု ဥပဒေ (၂၀၁၃)

အရင်းအမြစ်။ EIA လေ့လာရေးအဖွဲ့

၂.၂. အဖွဲ့အစည်း ဆိုင်ရာ ဖွဲ့စည်းပုံ

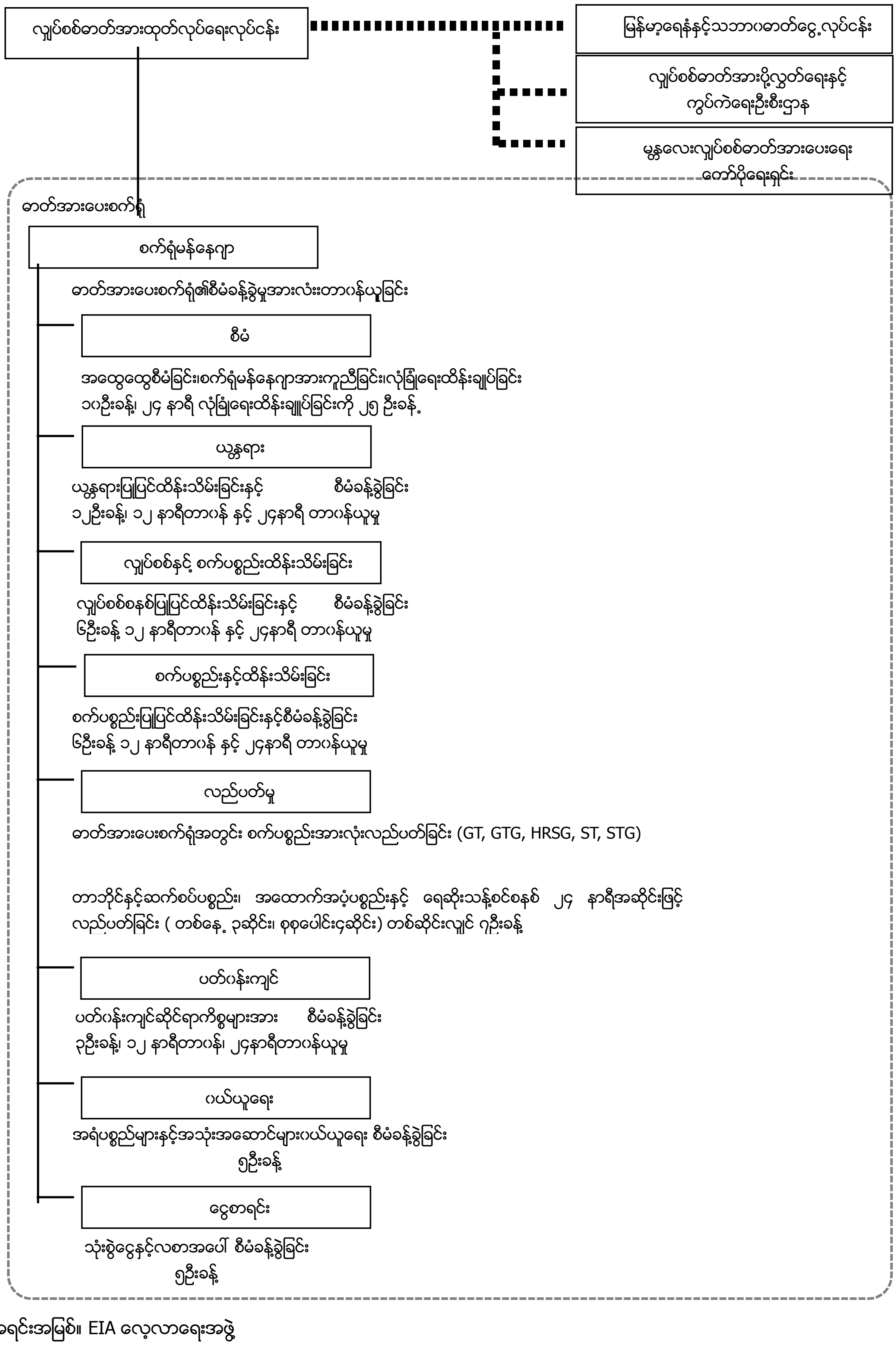
စီမံကိန်းကိုတည်ဆောက်ရေးလုပ်ငန်းများ မတိုင်မီ နှင့် တည်ဆောက်ဆဲကာလ အတွင်း အောက်တွင် ဖော်ပြထားသော စီမံကိန်း စီမံခန့်ခွဲမှု အဖွဲ့ ဖြင့် လုပ်ငန်းများ ဆောင်ရွက်သွားမည်ဖြစ်သည်။



အရင်းအမြစ်။ EIA လေ့လာရေးအဖွဲ့

ပုံ(၁) စီမံကိန်း စီမံခန့်ခွဲမှုအဖွဲ့ ဖွဲ့စည်းပုံ

စီမံကိန်း လည်ပတ်သည့် ကာလတွင် လည်ပတ်မည့်အဖွဲ့ အစည်းသည် ဓာတ်အားပေးရုံလည်ပတ်ခြင်းနှင့် စီမံခန့်ခွဲခြင်းတို့ကို လုပ်ဆောင်သွားမည်ဖြစ်သည်။ ၎င်းအဖွဲ့ အစည်း၏ ဖွဲ့ စည်းပုံကို ပုံ (၂) တွင် ဖော်ပြထား ပါသည်။



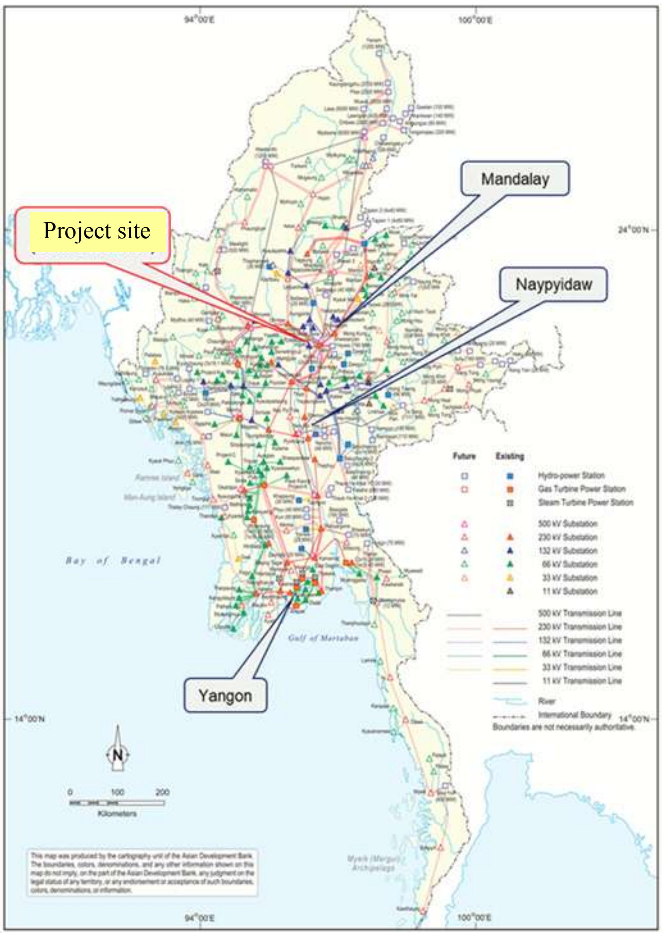
အရင်းအမြစ်။ EIA လေ့လာရေးအဖွဲ့

ပုံ (၂) လုပ်ငန်းလည်ပတ်သည့် အဆင့် အတွက် ဓာတ်အားပေးစက်ရုံ၏ စီမံခန့်ခွဲမှုဖွဲ့စည်းပုံ

# ၃.	စီမံကိန်း ဖော်ပြချက်

## ၃.၁.	တည်နေရာ နှင့် အဓိက လုပ်ငန်းနေရာများ

စီမံကိန်းလုပ်ငန်း တည်နေရာသည် ပုံ ၃တွင် ပြထားသည့်အတိုင်း မန္တလေးမှ အရှေ့တောင်ဘက် ၃၀ ကီလိုမီတာ အကွာတွင်ရှိပြီး ကျောက်ဆည်ခရိုင် စဉ့်ကိုင်မြို့နယ်ဘယ်လင်းကျေးရွာအုပ်စု အတွင်းတွင် တည်ရှိပါသည်။ စီမံကိန်းနေရာသည် လက်ရှိ ဘယ်လင်း ဓာတ်အားပေးရုံခွဲ အနီးတွင် တည်ရှိပါသည်။စီမံကိန်းမှနေ၍ ၃၀၀ မဂ္ဂါဝပ်ခန့် ဓာတ်အား ထွက်ရှိမည်ဖြစ်သည်။ လျှပ်စစ်ဓာတ်အားကို သဘာဝဓာတ်ငွေ့နှင့် စွန့်ပစ်အပူသုံး ပေါင်းစပ်စက်ရုံမှ ထုတ်လုပ်မည်ဖြစ်ပါသည်။ ဇယား ၂ နှင့် ပုံ ၄ တွင် စီမံကိန်း၏ အဓိက စက်ရုံများ နှင့် ၎င်းတို့၏ တည်နေရာများကို ဖော်ပြထားပါသည်။ ၎င်းတို့သည် ပတ်ဝန်းကျင် နှင့် လူမှုဝန်းကျင် ဆိုင်ရာ ကိစ္စရပ်များ စဉ်းစားပေးရန် လိုအပ်သော အဓိက နေရာများဖြစ်ပါသည်။



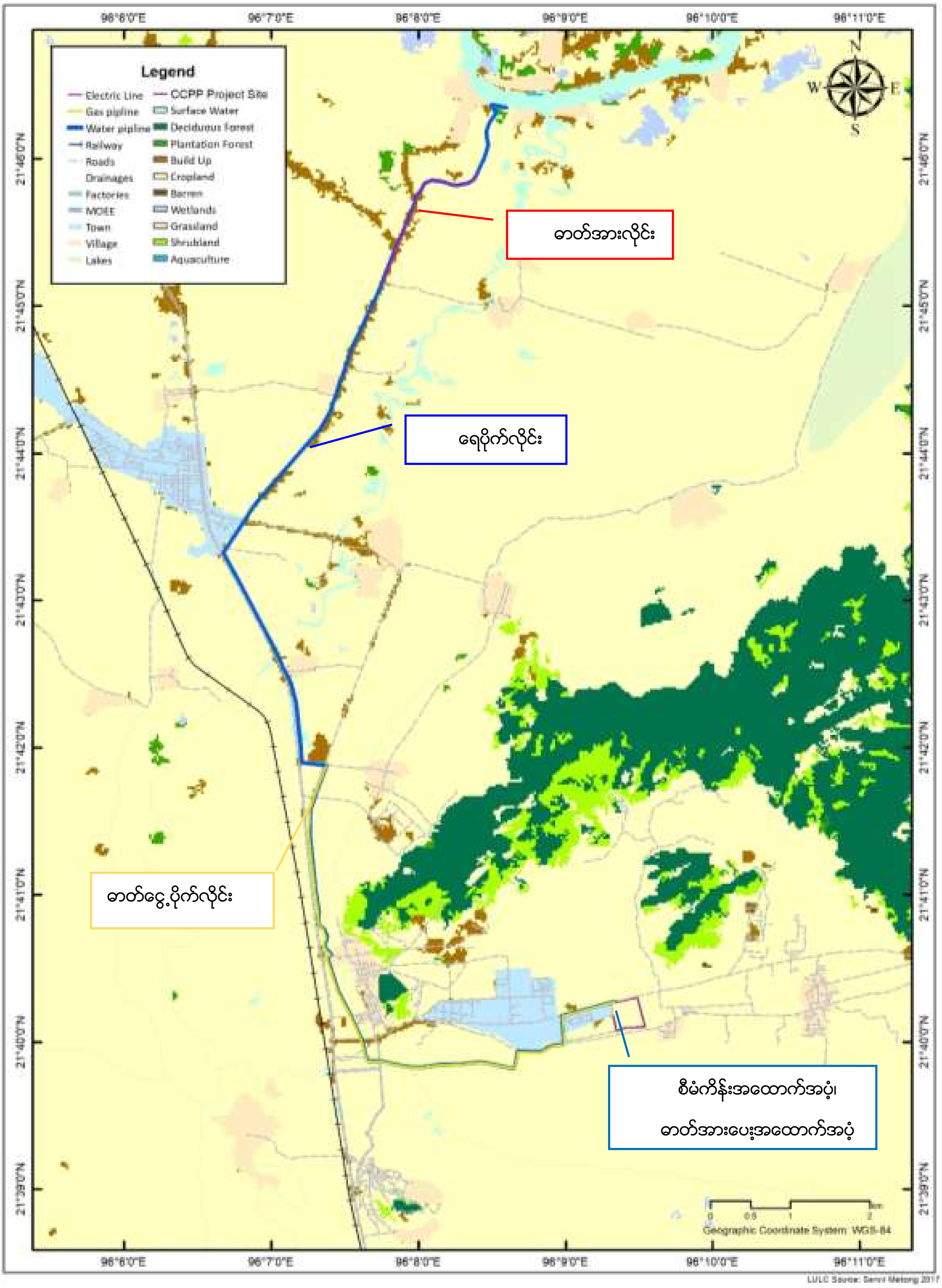
အရင်းအမြစ်။ EIA လေ့လာရေးအဖွဲ့ (မြန်မာစွမ်းအင်ကဏ္ဍကနဦးဆန်းစစ်ချက်၊ အေဒီဘီ။ ၂၀၁၂ခုနှစ် အောက်တိုဘာလမှ ပြင်ဆင်ထားခြင်း)

ပုံ (၃) စီမံကိန်းတည်နေရာ

ဇယား (၂) ပတ်ဝန်းကျင် နှင့်လူမှုဝန်းကျင်ဆိုင်ရာ အကြောင်းအရာများ နှင့် ဆက်စပ်ဆက်နွယ်သည့် စီမံကိန်းတွင် ပါဝင်သော အဓိကအစိတ်အပိုင်းများ

အထောက်အပံ့ပစ္စည်းများ	အထောက်အပံ့ပစ္စည်းများ၏ အသေးစိတ်ဖော်ပြချက်
ဓာတ်အားပေးစက်ရုံ	၃၀၀ မဂ္ဂါဝပ် ပေါင်းစပ်ဓာတ်အားပေးစက်ရုံ ၂၀၀ မဂ္ဂါဝပ် ဓာတ်ငွေ့တာဘိုင် ၁၀၀ မဂ္ဂါဝပ် ရေနွေးငွေ့တာဘိုင် ဓာတ်အားပေးလောင်စာ နိုက်ထရိုဂျင်ဖြိုခွဲသည့်စက် သဘာဝဓာတ်ငွေ့လောင်စာ ထောက်ပံ့ပေးသည့်စနစ် လည်ပတ်ရေသန့်စင်သည့်စက် စွန့်ပစ်ရေသန့်စင်စက် ထုတ်လွှတ်ခြင်းနှင့် ပြောင်းလဲသည့်စက် ဆက်သွယ်ရေးစက်
ပေးပို့ဓာတ်အားလိုင်းစနစ်	မြေအောက်ပိုက်လိုင်း၊ စီမံကိန်းနေရာအတွင်း လက်ရှိဓာတ်အားလိုင်းအား နေရာရွှေ့ပြောင်းခြင်း။
ဓာတ်ငွေ့ပိုက်လိုင်း	ခန့်မှန်း ၇.၄ ကီလိုမီတာ φ ၁၆လက်မ x ၁
ရေပိုက်လိုင်း	ခန့်မှန်း ၁၇.၆ ကီလိုမီတာ φ ၃၀၀မီလီမီတာx ၁
ဓာတ်အားလိုင်း	ခန့်မှန်း ၂ ကီလိုမီတာ

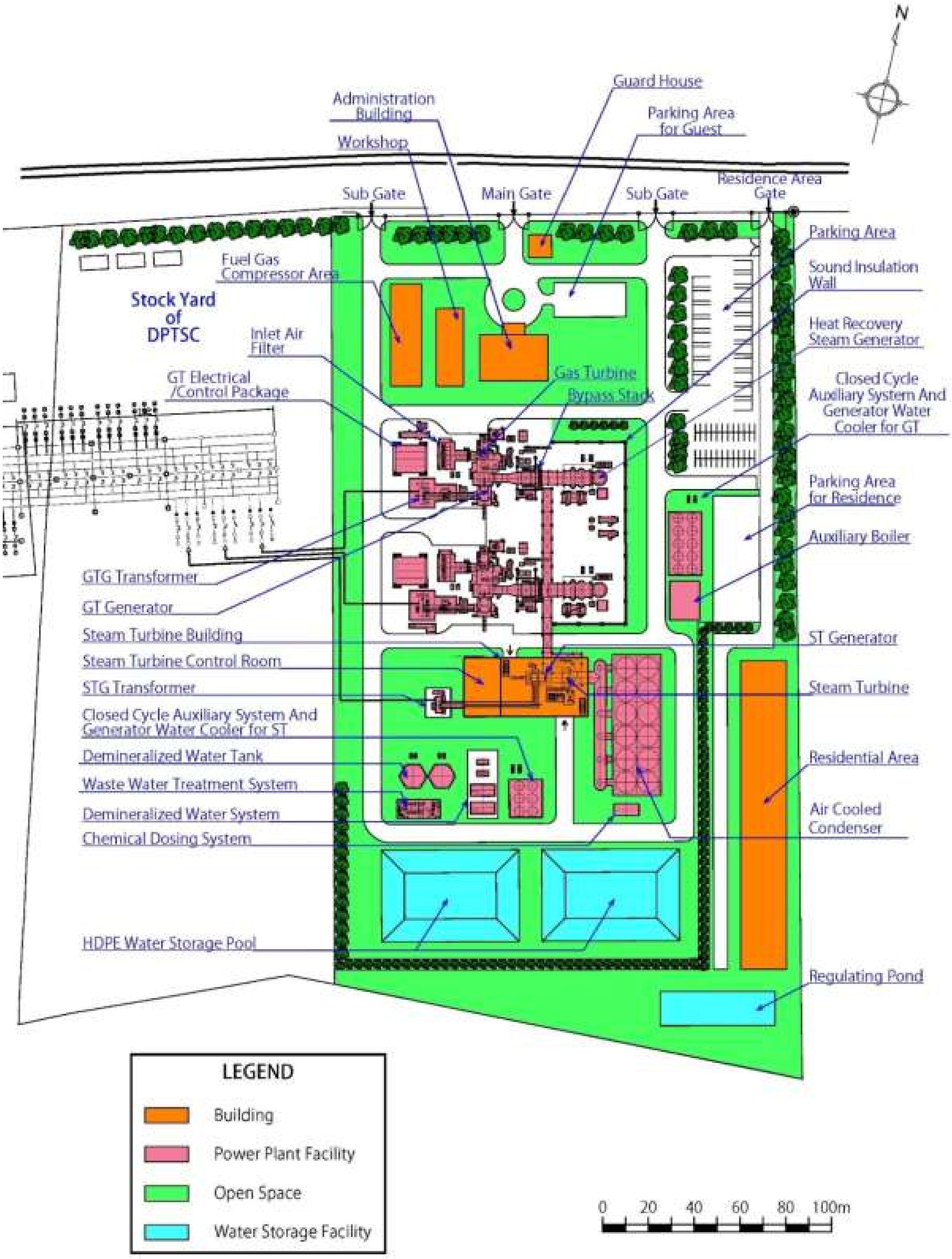
အရင်းအမြစ်။ EIA လေ့လာရေးအဖွဲ့



အရင်းအမြစ်။ EIA လေ့လာရေးအဖွဲ့

ပုံ (၄) စီမံကိန်းအထောက်အပံ့ပစ္စည်းများတည်နေရာပြပုံ

စီမံကိန်းလုပ်ငန်းနေရာ ဖွဲ့စည်းပုံကို ပုံ ၅ တွင် ပြထားပါသည်။ ဓာတ်ငွေ့တာဘိုင်နှစ်ခုနှင့် ရေနွေးငွေ့တာဘိုင်တစ်ခုကို စီမံကိန်းနေရာ၏ အလယ်တွင် တပ်ဆင်သွားမည်။ ရေနွေးငွေ့အအေးခံသည့် အအေးခံတာဝါများကို စီမံကိန်းနေရာ၏ အရှေ့ဘက်တွင် ထားရှိမည်။ စီမံကိန်းနေရာ၏ တောင်ဘက်တွင် ရေလှောင်ကန်ကို တည်ဆောက်သွားမည်။



အရင်းအမြစ်။ EIA လေ့လာရေးအဖွဲ့

ပုံ(၅) စီမံကိန်းလုပ်ငန်းနေရာဖွဲ့စည်းပုံ

၃.၂. ဆောက်လုပ်ရေးအစီအစဉ်

စီမံကိန်းအထောက်အပံ့ပစ္စည်းများတည်ဆောက်ရန် ကာလကို ၃ နှစ်ခန့် ကြာမြင့်မည်ဟု ခန့်မှန်းပါသည်။ ဆောက်လုပ်ရေး လုပ်ငန်း အချိန်ဇယားကို ဇယား (၃) တွင် ဖော်ပြထားပါသည်။

ဇယား (၃) ဆောက်လုပ်ရေးလုပ်ငန်း အချိန်ဇယား

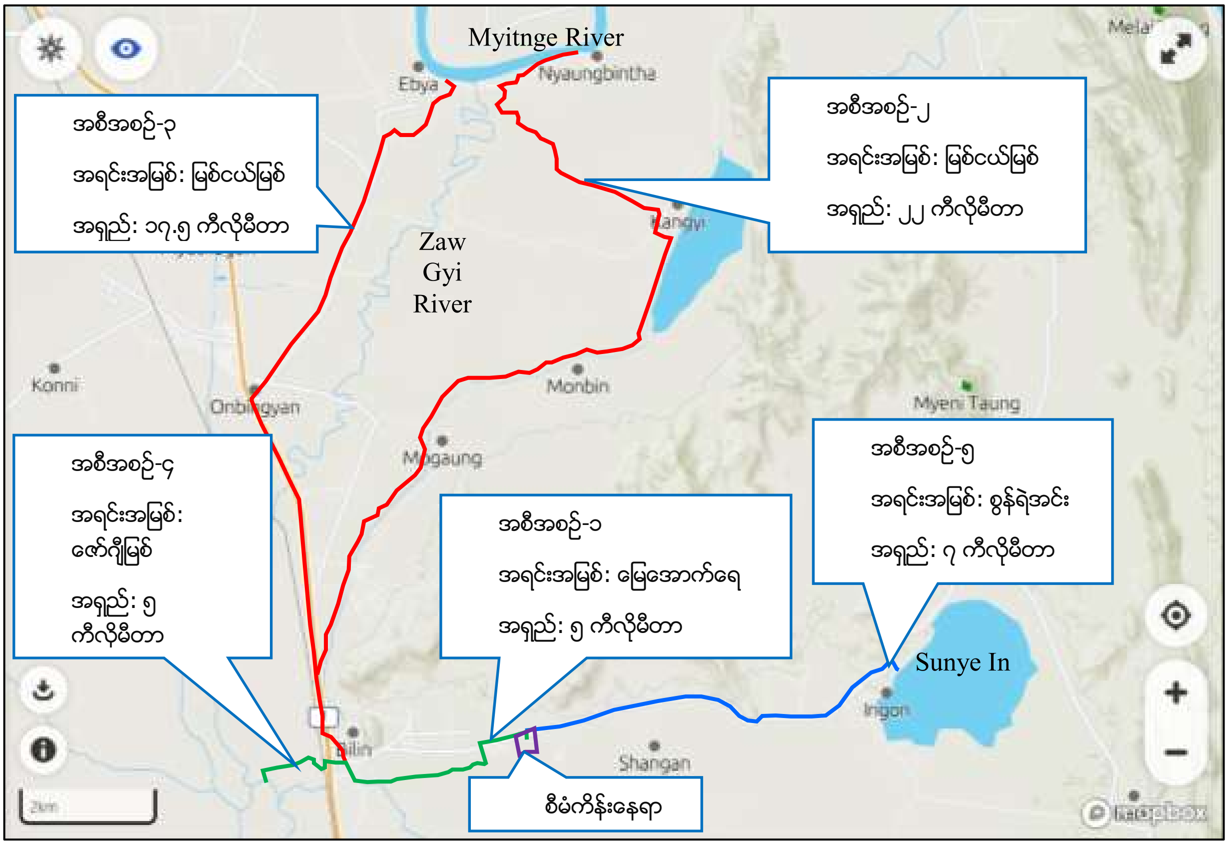
ဆောက်လုပ်ရေး	ပထမနှစ်												ဒုတိယနှစ်												တတိယနှစ်											
	၁				၅	၆	၇	၈	၉	၁၀	၁၁	၁၂	၁၃	၁၄	၁၅	၁၆	၁၇	၁၈	၁၉	၂၀	၂၁	၂၂	၂၃	၂၄	၂၅	၂၆	၂၇	၂၈	၂၉	၃၀	၃၁	၃၂	၃၃	၃၄	၃၅	၃၆
ဓာတ်အားပေးစက်ရုံ၊ ပုံစံ (Design)၊ ထုတ်လုပ်ရေး၊ ဖြန့်ဝေရေး																																				
ဆောက်လုပ်ရေး																																				
ရေပိုက်လိုင်းများနှင့် လျှပ်စစ်လိုင်းများ																																				
ဂတ်စ်ပိုက်လိုင်းများ																																				
လျှပ်စစ်ပိုင်းဆိုင်ရာ တပ်ဆင်မှုလုပ်ငန်းများ (ဓာတ်အားလိုင်းများ ပြန်လည်နေရာချထားရေး)																																				
Power Plant ကိရိယာ တပ်ဆင်မှုလုပ်ငန်းများ																																				
ဓာတ်အားပေးစက်ရုံ တည်ဆောက်ခြင်း၊ လုပ်ငန်းစမ်းသပ် အပ်နှံခြင်း																																				

အရင်းအမြစ်။ EIA လေ့လာရေးအဖွဲ့

၃.၃. အခြားနည်းလမ်းလေ့လာချက်

စီမံကိန်းနေရာနှင့် တပ်ဆင်ထားသည့် အထောက်အပံ့များကို ရွေးချယ်ရန်အတွက် အခြားလေ့လာချက် နည်းလမ်း သုံးခုဖြစ်သည့် (၁) စီမံကိန်းနေရာရွေးချယ်ခြင်း၊ (၂) ရေအရင်းအမြစ်နှင့် ပိုက်လိုင်း (၃) အအေးခံစနစ် စသည်တို့ကို လေ့လာခဲ့ပါသည်။ အခြားနည်းလမ်းလေ့လာချက်တွင် နည်းပညာကဏ္ဍ၊ စီးပွားရေးဆိုင်ရာ၊ လူမှုရေးဆိုင်ရာနှင့် ပတ်ဝန်းကျင်ဆိုင်ရာ ကဏ္ဍရပ်များကို ထည့်သွင်းစဉ်းစားထားသည့် ရှုထောင့်မှတစ်ဆင့် ထည့်သွင်းစဉ်းစား၍

ပြည့်ပြည့်စုံစုံ ဆောင်ရွက်ခဲ့ပါသည်။ ရေအရင်းအမြစ် နှင့် ရေပိုက်လိုင်း၏ အခြားနည်းလမ်းလေ့လာချက်အပေါ် ဖော်ပြချက်ကို ပုံ ၆ တွင် ဖော်ပြထားပြီး ရလဒ်ကို ဇယား ၄ တွင် ဖော်ပြထားပါသည်။



အရင်းအမြစ်။ EIA လေ့လာရေးအဖွဲ့ (http://www.maps-of-the-world.net မှ မြေပုံအားအခြေခံထားသည်။)

ပုံ (၆) ရေအရင်းအမြစ်နှင့် ရေပိုက်လိုင်း၏ အခြားနည်းလမ်းများ

ဇယား (၄) ရေအရင်းအမြစ်နှင့် ရေပိုက်လိုင်း၏ အခြားနည်းလမ်းလေ့လာချက်ရလဒ်အကျဉ်းချုပ်

အမျိုးအစား	အစီအစဉ် - ၁	အစီအစဉ် - ၂	အစီအစဉ် - ၃	အစီအစဉ် - ၄	အစီအစဉ် - ၅
ရေအရင်းအမြစ်	မြေအောက်ရေ	မြစ်ငယ်မြစ် (ပိုက်လိုင်း ၂၂ ကီလိုမီတာ)	မြစ်ငယ်မြစ် (ပိုက်လိုင်း ၁၇ ကီလိုမီတာ)	ဇော်ဂျီမြစ် (ပိုက်လိုင်း ၅ ကီလိုမီတာ)	စွန်ရဲအင်း (ပိုက်လိုင်း ၇ ကီလိုမီတာ)
မြေအသုံးချမှု	ရေတွန်းဌာနမှလွဲ၍ လက်ရှိမြေနေရာအသုံးပြုမှု အများစုမှာ ပြောင်းလဲမည် မဟုတ်ပါ။	အစီအစဉ် (၁) အတိုင်း ဖြစ်ပါသည်။	အစီအစဉ် (၁) အတိုင်း ဖြစ်ပါသည်။	အစီအစဉ် (၁) အတိုင်း ဖြစ်ပါသည်။	အစီအစဉ် (၁) အတိုင်း ဖြစ်ပါသည်။
နည်းပညာ နှင့် စီးပွားရေး	ထုံးကျောက်ပါဝင်မှုကြောင့်နည်းပညာလိုအပ်ချက်နှင့် ငွေကြေးကုန်ကျမှု	ရေအရည်အသွေးကောင်းသောကြောင့် ငွေကြေးနှင့်	ရေအရည်အသွေးကောင်းသောကြောင့် ငွေကြေးနှင့်	ရေနောက်ကျိမှုကြောင့် နည်းပညာလိုအပ်ချက်နှင့် ငွေကြေးကုန်ကျမှု မြင့်မား ပါလိမ့်မည်။	ရေအရည်အသွေးကောင်းသောကြောင့် ငွေကြေးနှင့်

အမျိုးအစား	အစီအစဉ် - ၁	အစီအစဉ် - ၂	အစီအစဉ် - ၃	အစီအစဉ် - ၄	အစီအစဉ် - ၅
	မြင့်မားပါလိမ့်မည်။	နည်းပညာ လိုအပ်ချက် များလိမ့်မည် မဟုတ်ပါ။	နည်းပညာ လိုအပ်ချက် များလိမ့်မည် မဟုတ်ပါ။		နည်းပညာ လိုအပ်ချက် များလိမ့်မည် မဟုတ်ပါ။
ရေအရင်းအမြစ် ပုံမှန်ရရှိမှု	မရရှိပါ	ပုံမှန်ရရှိပါသည်။	ပုံမှန်ရရှိပါသည်။	ပုံမှန်မရှိပါ။	ပုံမှန်မရှိပါ။
ပတ်ဝန်းကျင်နှင့် လူမှုဝန်းကျင်ဆိုင်ရာ သက်ရောက်မှု	မြေအောက်ရေအပေါ် သိသာသော သက်ရောက်မှု	အစီအစဉ် - ၃ ထက် ဆောက်လုပ်ရေး လုပ်ငန်းစဉ်အတွင်း ကြီးမားသော ထိခိုက်မှု အနည်းငယ်သာ	ပိုက်လိုင်းတိုသော ကြောင့် အစီအစဉ် - ၂ ထက် သက်ရောက်မှု ပိုနည်းပါသည်။	ဇော်ဂျီမြစ်မှ ရေအသုံးပြုမှုကြောင့် လူမှုရေးဆိုင်ရာ ထိခိုက်မှု ရှိနိုင်ပါသည်။	စွန်ရဲကန်မှ ရေအသုံးပြုမှုကြောင့် လူမှုရေးဆိုင်ရာ နှင့် ပတ်ဝန်းကျင်ဆိုင်ရာ သက်ရောက်မှု ရှိပါသည်။
နိဂုံး	မရွေးချယ်ပါ။	မရွေးချယ်ပါ။	ရွေးချယ်ပါသည်။	မရွေးချယ်ပါ။	မရွေးချယ်ပါ။

၄. စီမံကိန်း နေရာ၏ အနီးဝန်းကျင်

စီမံကိန်းနေရာနှင့် အနီးဝန်းကျင်ရှိ လက်တလော ပတ်ဝန်းကျင်နှင့် လူမှုဝန်းကျင်ဆိုင်ရာ အခြေအနေ အချက်အလက်များကို ဇယား ၅ တွင် ဖော်ပြထားပါသည်။ အခြေခံအချက်အလက်များအတွက် လေထု အရည်အသွေး၊ ရေအရည်အသွေး၊ ဆူညံသံနှင့် တုန်ခါနှုန်း၊ ယဉ်သွားလာမှု၊ အပင်နှင့်သတ္တဝါ ဆိုင်ရာတို့ကို စီမံကိန်းနေရာနှင့် အနီးပတ်ဂန်းကျင်တွင် လက်တွေ့ စစ်တမ်းကောက်ယူခဲ့ပါသည်။ အခြား ပတ်ဝန်းကျင် နှင့် လူမှုဝန်းကျင်ဆိုင်ရာ အချက်အလက်များကို လက်ရှိအချက်အလက် (သို့) စုဆောင်းထားသော အချက်အလက်များမှ ရယူထားပါသည်။

ဇယား (၅) စီမံကိန်းနေရာနှင့် အနီးဝန်းကျင်ရှိ လက်ရှိ ပတ်ဝန်းကျင်နှင့် လူမှုဝန်းကျင်ဆိုင်ရာ အခြေအနေ အချက်အလက်များ

အမျိုးအစား	ဖော်ပြချက်
သက်ရှိဝန်းကျင် (ညစ်ညမ်းမှု အခြေအနေ)	
လေအရည်အသွေး	စီမံကိန်းတည်နေရာနှင့် ဝန်းကျင် (၅)နေရာတွင် လေအရည်အသွေး စစ်ဆေးကြည့်ရှုခြင်းကို CO, NO_2, NO, SO_2, $PM_{2.5,}$ and PM_{10} တို့အတွက် ပြုလုပ်ခဲ့ပါသည်။ ခြောက်သွေ့ရာသီအတွင်း NO_2, CO နှင့် အမှုန် ပါဂင်နှုန်းမှာ မိုးရာသီအတွင်းပါဂင်နှုန်းထက် များပြားနေခဲ့ပါသည်။ (အမျိုးသား ပတ်ဝန်းကျင် အရည်အသွေး (ထုတ်လွှတ်မှု) စံချိန်စံညွှန်း၊ ၂၀၁၅) နှင့် နှိုင်းယှဉ်ကြည့်ရှုလျှင် လေ့လာ တွေ့ရှိရသော ညစ်ညမ်းမှု အခြေအနေများမှာ ထိုစံချိန်စံညွှန်းများ နှင့် ကိုက်ညီကြောင်း တွေ့ရပါသည်။ ခြောက်သွေ့သော ရာသီတွင် စီမံကိန်းနေရာတွင် တိုင်းတာမှု ပြုလုပ်သည့် ရက် (၁) ရက်တွင်သာ $PM_{2.5}$ ပမာဏသည် သတ်မှတ် စံညွှန်းထက် ကျော်လွန်နေသည်ကို တွေ့ရှိပါသည်။
ရေအရည်အသွေး	မြစ်ငယ်မြစ်တွင် ခြောက်သွေ့ရာသီနှင့် စိုစွတ် ရာသီတို့တွင် ရေအရည်အသွေး နမူနာ ကောက်ယူခြင်းများ

အမျိုးအစား	ဖော်ပြချက်
	ပြုလုပ်ခဲ့ပါသည်။ မြစ်ငယ်မြစ်၏ ရေအရည်အသွေးမှာ ယေဘုယျအားဖြင့် ကောင်းမွန်ပါသည်။ မိုးရာသီတွင် BOD ပမာဏမှာ 2.5mg/l ရှိပြီး Nitrate -Nitrogen ပမာဏမှာ 4.82 mg/l ရှိပါသည်။ ရေအရည်အသွေး အချက်အလက်များမှာ အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေးလမ်းညွှန်ချက်များ (၂၀၁၅)နှင့် World Bank တို့၏ စံသတ်မှတ်တန်ဖိုးများအတွင်းသာရှိပါသည်။
မြေဆီလွှာ အရည်အသွေး	စီမံကိန်းနေရာ နှင့် အနီးတစ်ဝိုက်တွင် မြေဆီလွှာ အရည်အသွေးအတွက် မူလအခြေခံ အချက်အလက်များ မရှိပါ။ စီမံကိန်းနေရာရှိ အပေါ်ယံမြေဆီလွှာမှာ သတ္တုဓာတ်များကြောင့် ညစ်ညမ်းနေခြင်းမျိုး မရှိပါ။
ဆူညံသံနှင့် တုန်ခါနှုန်း	ဆူညံသံနှင့် တုန်ခါနှုန်းအတွက် ခြောက်သွေ့ရာသီတွင် နေရာ ၇ နေရာ၌တိုင်းတာမှုများ ပြုလုပ်ခဲ့ပါသည်။ ပတ်ဝန်းကျင်ဆူညံမှု စစ်တမ်းအရ နေ့အချိန်တွင်းနေရာ ၄နေရာ နှင့် ညအချိန်တွင်း နေရာ ၁နေရာ တို့တွင် တိုင်းတာရရှိသော ဆူညံသံပမာဏမှာ အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေးလမ်းညွှန်ချက်များ (၂၀၁၅)၏ သတ်မှတ်စံချိန်ထက် အနည်းငယ်ကျော်လွန်နေသည်ကို တွေ့ရှိရပါသည်။ တိုင်းတာမှုပြုလုပ်ရာ အမှတ်တိုင်းတွင် တုန်ခါနှုန်း အဆင့်အတန်းမှာ ဂျပန်နိုင်ငံ၏ သတ်မှတ် စံညွှန်းနှင့် ကိုက်ညီပါသည်။
သဘာဝဝန်းကျင်	
မြေမျက်နှာသွင်ပြင်	ဒေသ၏ ယေဘုယျ မြေမျက်နှာသွင်ပြင် အနေအထားမှာ မြေပြန့်လွင်ပြင်နှင့် သီးခြားရှိနေသော တောင်တန်းတို့ ဖြစ်သည်။ အဆိုပြု စီမံကိန်းနေရာသည် ပင်လယ်ရေ မျက်နှာပြင်အထက် ၉၀ ကီလိုမီတာခန့်တွင် ရှိသည်။ ထိုဒေသ၏ ထင်ရှားသော မြေမျက်နှာသွင်ပြင် အနေအထားမှာ ကိန္နရာမြေနီ တောင်တန်း (၄၆၇မီတာ) ရှိပြီး စီမံကိန်း၏ မြောက်ဘက်တွင် တည်ရှိပါသည်။
ဘူမိဗေဒ	စီမံကိန်းနေရာနှင့် အနီးတစ်ဝိုက်တွင် တွေ့ရသော ကျောက်များ၏ မူလပုံသဏ္ဍာန်မှာ အတော်အတန် ပျက်စီးနေပြီး အသွင်ပြောင်းလဲလျက်ရှိပါသည်။ အသွင်ပြောင်းမီးသင်းကျောက်နှင့် Upper Paleozoic မှ Mesozoic သက်တမ်းရှိ အသွင်ပြောင်းအနည်ကျ ကျောက်များကို ကျောက်ဆည်တောင်၊ ရှမ်းတောင်ဦး - သံတော်မြတ်တောင်တန်း နှင့် မင်းမွှေးတောင်တန်း တစ်လျှောက်တွင် တွေ့ရပါသည်။ ဘယ်လင်းတောင်တန်းတွင် မီးသင်းကျောက် ကျောက်ဆိုင် ဖြစ်ပေါ်လျက်ရှိပြီး biotite granite၊ granodiorite နှင့် diorite အမျိုးအစား ကျောက်များကို အဓိက ကျောက်များအနေဖြင့် တွေ့ရပါသည်။
ရာသီဥတုနှင့် ဇလဗေဒ	၂၀၀၅ ခုနှစ်မှ ၂၀၁၅ ခုနှစ်အတွင်း မန္တလေးမြို့၏ မိုးလေဝသ အချက်အလက်များအရ မန္တလေးမြို့၏ အမြင့်ဆုံး ပျမ်းမျှနေ့အပူချိန်မှာ ၃၄ ဒီဂရီ ဆဲလ်စီယပ် ဖြစ်ပြီး အနိမ့်ဆုံး ပျမ်းမျှ ညအပူချိန်မှာ ၂၃ ဒီဂရီ ဆဲလ်စီယပ် ဖြစ်သည်။ ဧပြီလရှိ အမြင့်ဆုံးအပူချိန်မှာ ၃၉ ဒီဂရီ ဆဲလ်စီယပ် ဖြစ်ပြီး ဇန်နဝါရီလရှိ အနိမ့်ဆုံးအပူချိန်မှာ ၁၅ ဒီဂရီ ဆဲလ်စီယပ် ဖြစ်သည်။ တစ်နှစ်တာ၏ လစဉ် ပျမ်းမျှမိုးရေချိန်မှာ ၅၀.၆ မီလီမီတာ ဖြစ်၍ ဩဂုတ်လတွင် မိုးရေချိန်အမြင့်ဆုံးရရှိပြီး ၁၂၆.၉ မီလီမီတာ ရှိသည်။ နှိုင်းရစိုထိုင်းစမှာရာခိုင်နှုန်းမှာ ၆၆ ဖြစ်သည်။စီမံကိန်းနေရာတွင် မိုးလေဝသ စောင့်ကြည့်လေ့လာမှုများအရ ခြောက်သွေ့ရာသီ နှင့် မိုးရာသီတို့တွင် (၇) ရက် ဆက်တိုက် လေ့လာမှုများ ပြုလုပ်ခဲ့ပါသည်။ နေရောင်ခြည် ရရှိမှုမှာ မိုးရာသီတွင် ပိုမို နည်းပါး ပါသည်။ မိုးရာသီတွင် လေတိုက်နှုန်းမှာ 1.17 m/s ဖြစ်ပြီး ခြောက်သွေ့ရာသီတွင် 0.22 m/s ဖြစ်ပါသည်။
အပင်၊ သတ္တဝါ နှင့် ဇီဝမျိုးစုံကွဲ	ကွင်းဆင်းလေ့လာတိုင်းတာချက် ရလဒ်အရ အပင်မျိုးစိတ် (၁၅၁)၊ ငှက်မျိုးစိတ် (၅၀) မျိုး၊ လိပ်ပြာ မျိုးစိတ် (၂၆) မျိုး၊ ပုဇဉ်း မျိုးစိတ် (၁၁) မျိုး၊ ပိုးတောင်မာ မျိုးစိတ် (၄) မျိုး၊ ခရု မျိုးစိတ် (၃) မျိုး၊ နို့တိုက်သတ္တဝါ မျိုးစိတ် (၁၀) မျိုး၊ တွားသွားနှင့် ကုန်းနေရေနေသတ္တဝါ မျိုးစိတ် (၁၈) မျိုး၊ ငါးမျိုးစိတ် (၄၄) မျိုး တို့ကို စီမံကိန်း ဧရိယာ နေရာ နှင့် အနီးဝန်းကျင်တဝိုက်တွင် လေ့လာတွေ့ရှိရပါသည်။ IUCN Red List of Threatened Species (2018) အရ ငှက်မျိုးစိတ် (၂)မျိုး နှင့် ငါးမျိုးစိတ် (၅)မျိုးတို့သည် မျိုးသုဉ်းလုနီးပါးဖြစ်နေသော မျိုးစိတ်များ ဖြစ်ကြောင်းတွေ့ရှိရပါသည်။
လူမှုဝန်းကျင်	
လူဦးရေ	၂၀၁၈ ခုနှစ်တွင် စဉ့်ကိုင်မြို့နယ်ရှိ လူဦးရေမှာ ၁၃၄၉၀၄ ဦး ဖြစ်သည်။ မြို့ပေါ်ရှိ လူဦးရေမှာ ၆ ရာခိုင်နှုန်းခန့်ရှိပြီး ကျေးရွာနေလူဦးရေမှာ ၉၄ ရာခိုင်နှုန်းခန့် ဖြစ်သည်။

အမျိုးအစား	ဖော်ပြချက်
လူမျိုး	စဉ့်ကိုင်မြို့နယ်တွင် နေထိုင်သော လူအများစုမှာ ဗမာလူမျိုးများဖြစ်ပြီး၊ ၎င်းနောက်တွင် ရှမ်း၊ ကရင်၊ ချင်း နှင့် ကချင် လူမျိုးများ ဖြစ်သည်။ ရခိုင်နှင့် မွန်လူမျိုး အနည်းငယ်လည်း နေထိုင်ကြသည်။
ဘာသာရေး	စဉ့်ကိုင်မြို့နယ်တွင် နေထိုင်ကြသော လူဦးရေ ၉၈ ရာခိုင်နှုန်းအထက်မှာ ဗုဒ္ဓဘာသာဝင်များ ဖြစ်ကြသည်။
မြေအသုံးပြုမှု	စဉ့်ကိုင်မြို့နယ်တွင် မြေယာအဓိက အသုံးပြုမှုမှာ လယ်ယာမြေများဖြစ်နေပြီး(၆၂.၅%)၊ ထွန်ယက်စိုက်ပျိုးခြင်း မရှိသော မြေများ (၃၇.၂%)နှင့် မြေလွပ်မြေရိုင်း (၀.၃%)လည်း ရှိသည်။ မြို့နှင့် ကျေးရွာရှိ အခြေချနေထိုင်မှုအတွက် မြေနေရာမှာ ၃.၂ ရာခိုင်နှုန်း ခန့်သာ ရှိပြီး၊ ၎င်းတွင် မစိုက်ပျိုးသည့် မြေများပါဝင်သည်။
ဒေသတွင်း စီးပွားရေး နှင့် စားဝတ်နေရေး	စဉ့်ကိုင်မြို့နယ်ရှိ ဒေသနေပြည်သူများမှ စိုက်ပျိုးရေးကို အဓိက လုပ်ကိုင်ကြသည်။ မွေးမြူရေးလုပ်ငန်းကို လည်း လုပ်ကိုင်လေ့ရှိပြီး အထူးသဖြင့် နွား၊ ကျွဲ၊ ဝက်၊ ဆိတ်၊ ကြက်၊ ဘဲ နှင့် သိုးများကိုလည်း မွေးမြူကြသည်။ အိမ်ထောင်စုများအနေအဖြင့် ဝက်၊ ကြက်၊ ဘဲ များကို အိမ်တွင်စားသုံးရန် မွေးလေ့ရှိပြီး ရံဖန်ရံခါလည်း ရောင်း ချလေ့ ရှိပါသည်။ ယေဘုယျအားဖြင့် ကျွဲ နှင့် နွား များကို ဆန်၊ စပါး စိုက်ပျိုးသည့်အခါ သုံးလေ့ရှိပါသည်။ မြို့နယ်၏ အဓိက ထုတ်ကုန်မှာ ဆန် ဖြစ်ပြီး မန္တလေးသို့ တင်ပို့ပါသည်။
လူထုကျန်းမာရေး	စဉ့်ကိုင်မြို့နယ်ရှိ ၂၀၁၈ ကျန်းမာရေးမှတ်တမ်းအရ အဓိကရောဂါများအတွက် ကာကွယ်ဆေးထိုးနှုန်းမှာ ရာနှုန်းပြည့် ရှိပါသည်။ ၂၀၁၈ ခုနှစ်တွင် ကလေးမွေးဖွားနှုန်းမှာ လူ၁၀၀၀ လျှင် ၉.၇၄ ရာခိုင်နှုန်းခန့်ရှိသည်။
ယဉ်ကျေးမှု အမွေအနှစ်	စီမံကိန်းနေရာနှင့် အနီးတစ်ဝိုက်တွင် ကုလသမဂ္ဂ ပညာရေး၊ သိပ္ပံနှင့် ယဉ်ကျေးမှုအဖွဲ့ (UNESCO) သို့ မြန်မာအစိုးရမှ သတ်မှတ်ထားသော ယဉ်ကျေးမှု အမွေအနှစ်နေရာများ မရှိနေပါ။ မက္ခရာ ရှေးဟောင်းဒေသဟု အမည်ရသော ရှေးဟောင်းဒေသ တစ်ခုသာ စီမံကိန်းနေရာ၏ မြောက်ဘက် ၁၁.၅ ကီလိုမီတာ ခန့်တွင် ရှိနေပါသည်။ ဒေသခံများ အလေးအမြတ်ပြုကြသော ဘုရား (၂) ဆူမှာ (၁) ရွှေဘုန်းပွင့် ဘုရား (၂) ရွှေဆည်ကုန်း ဘုရား တို့ဖြစ်ပြီး ရှေးဟောင်းဒေသအတွင်းတွင် တည်ရှိပါသည်။
မြင်ကွင်း	စီမံကိန်းနေရာနှင့် အနီးတစ်ဝိုက်သည် ပင်လယ်ရေမျက်နှာပြင်အထက် မီတာ (၈၀) တွင် တည်ရှိပါသည်။ ယေဘုယျအားဖြင့် မြေပြန့်လွင်ပြင်များနှင့် ကျေးရွာမြင်ကွင်းများ ပေါင်းစပ်လျှက် ရှိပါသည်။စီမံကိန်းနေရာ ၏ မြောက်ဘက် တွင် တောင်တန်းများ ရှိပြီး တောင်ဘက်တွင် လယ်ကွင်းများ ရှိပါသည်။ မြောက်ဘက်တွင် အနီးဆုံး တောင်မှာ နွားလယ်တောင် ဖြစ်ပြီး စီမံကိန်း နေရာမှ မီတာ (၅၀၀) အကွာတွင် တည်ရှိသည်။ ထို တောင် ၏ အမြင့်ဆုံး နေရာသည် ၂၈၉ မီတာ ရှိပါသည်။
သဘာဝဘေးအန္တရာယ်	စီမံကိန်းနေရာဝန်းကျင်တွင် ရေကြီးရေလျှံခြင်းကို သတိထားရမည့် သဘာဝဘေးအန္တရာယ်အဖြစ် သတ်မှတ်ရမည်။စဉ့်ကိုင်မြို့နယ်တွင် မြစ်ငယ်မြစ်နားရှိ မြစ်ငယ်မြို့တွင် ရုတ်တရက် ရေကြီးရေလျှံခြင်းကို ၂၀၁၆ ခုနှစ်တွင် ကြုံတွေ့ရပါသည်။ စီမံကိန်းဧရိယာ နှင့် အနီးပတ်ဝန်းကျင်သည် မြစ်မှ ဝေးသော နေရာတွင် တည်ရှိသောကြောင့် ရေကြီးခြင်း အန္တရာယ်ကို ကြုံရနိုင်ချေ နည်းပါး ပါသည်။

အရင်းအမြစ်။ EIA လေ့လာရေးအဖွဲ့

၅. ထိခိုက်မှု ဆန်းစစ်ခြင်း အကြောင်းအရာ အကျဉ်းချုပ်

စီမံကိန်း၏ ပတ်ဝန်းကျင်နှင့် လူမှုဝန်းကျင်ဆိုင်ရာ ထိခိုက်မှုများကို ဆန်းစစ်ရန်အလို့ငှာ စီမံကိန်းကြောင့် ဖြစ်ပေါ်နိုင်သည်ဟု ကြိုတင်တွက်ဆနိုင်သော ပတ်ဝန်းကျင်နှင့် လူမှုဝန်းကျင်ဆိုင်ရာ ဆိုးကျိုးသက်ရောက်မှုများကို စီမံကိန်းဖော်ပြချက် နှင့် စီမံကိန်း ပတ်ဝန်းကျင်ရှိ ပတ်ဝန်းကျင်နှင့် လူမှုဝန်းကျင်ဆိုင်ရာ အခြေအနေ တစ်ခုလုံးအပေါ် မူတည်၍ သတ်မှတ်ထားပါသည်။ စီမံကိန်း၏ အကြိုတည်ဆောက်ခြင်း၊ ဆောက်လုပ်ခြင်း၊ လုပ်ငန်းလည်ပတ်ခြင်းနှင့် ပိတ်သိမ်းခြင်း တို့ကြောင့် သဘာဝဝန်းကျင်၊ လူမှုဝန်းကျင်များ၏ ခန့်မှန်းထိခိုက်မှုများကို အောက်ပါစံနှုန်း သတ်မှတ်ချက်များနှင့်အညီ (က) မှ (ဃ) ထိ သတ်မှတ်ထားပါသည်။

၁) က- : သိသာထင်ရှားသည့် ဆိုးကျိုးသက်ရောက်မှု   က+ : သိသာထင်ရှားသည့် ကောင်းကျိုးသက်ရောက်မှု

၂) ခ- : ဆိုးကျိုးသက်ရောက်မှုအချို့   ခ+ : ကောင်းကျိုးသက်ရောက်မှုအချို့

၃) ဂ : ထိခိုက်မှုများမှာ မရှင်းလင်းပါ။ထပ်မံဆန်းစစ်ရပါမည်

၄) ဃ : ထိခိုက်မှုမရှိပါ (သို့) ထိခိုက်မှုများမှာ မပြောပလောက်ပါ၊ ထပ်မံလေ့လာရန်မလိုအပ်ပါ။

ထိခိုက်မှု ဆန်းစစ်ခြင်း အချက်အလက် အကျဉ်းချုပ်ကို ဇယား (၆) တွင် ဖော်ပြထားပါသည်။

ဇယား (၆) ထိခိုက်မှုဆန်းစစ်ခြင်း ရလာဒ် အကျဉ်းချုပ်

အမျိုးအစား		သက်ရောက်မှုများ	ခန့်မှန်း ရလဒ်များ			ဆန်းစစ်ခြင်း ရလဒ်များ			အကဲဖြတ်ခြင်းအတွက် အကြောင်းပြချက်များ
			PC/CO	OP	CL	PC/CO	OP	CL	
ညစ်ညမ်းမှုထိန်းချုပ်ရေးနည်းလမ်းများ	၁	လေအရည်အသွေး	ခ-	ခ-	ခ-	ခ-	ခ-	ခ-	PC/CO, CL: ဖုန်မှုန့်များ ထွက်နိုင်သည်ဟု ခန့်မှန်းပါသည်။ ထိုသက်ရောက်မှုသည် လေလမ်းကြောင်း အောက်ဘက်တွင်သာ သက်ရောက်နိုင်မည်ဖြစ်ပြီး ယာယီသဘောသာ ဖြစ်သည်။ OP: နိုက်ထရိုဂျင်အောက်ဆိုက်ဒ်သက်ရောက်မှု ရှိမည်ဟု ခန့်မှန်းပါသည်။ သို့သော် ခန့်မှန်းရလဒ်အနေဖြင့် သတ်မှတ်စံနှုန်းနှင့် လျော်ညီသည်ကို တွေ့ရှိရပါသည်။
	၂	ရေအရည်အသွေး	ခ-	ခ-	ခ-	ခ-	ဃ	ခ-	PC/CO, CL: မြေငယ်မြစ်မှ ရေသွယ်ယူစနစ် တည်ဆောက်ခြင်း (သို့) ဖျက်သိမ်းခြင်းတို့ကြောင့် ရေနောက်ကျိမှု ရှိမည်ဟု

အမျိုးအစား		သက်ရောက်မှုများ	ခန့်မှန်း ရလဒ်များ			ဆန်းစစ်ခြင်း ရလဒ်များ			အကဲဖြတ်ခြင်းအတွက် အကြောင်းပြချက်များ
			PC/CO	OP	CL	PC/CO	OP	CL	
									ခန့်မှန်းရပါသည်။ သို့သော် ယင်း ထိခိုက်မှုကို coffer dam တည်ဆောက်ခြင်း အားဖြင့် လျှော့ချနိုင်ပါသည်။ OP: မြစ်ငယ်မြစ်အတွင်းသို့ စွန့်ပစ်မည့်ရေအား ရေဆိုးသန့်စင်စနစ်ဖြင့် စီမံမည်ဖြစ်သဖြင့် မြစ်ငယ်မြစ်ရေ အပေါ်တွင် သက်ရောက်မှု မရှိနိုင်ဟု ခန့်မှန်းပါသည်။
	၃	စွန့်ပစ်ပစ္စည်း	ခ-	ခ-	ခ-	ခ-	ခ-	ခ-	PC/CO, CL: အစိုင်အခဲ စွန့်ပစ်ပစ္စည်းထွက်ရှိမှု အနည်းငယ်သာရှိပါသည်။ ထိခိုက်မှုကို လျော့ပါးသက်သာ စေနိုင်ပါသည်။
	၄	မြေသားညစ်ညမ်းမှု	ခ-	ဃ	ဃ	ဃ	ဃ	ဃ	PC/CO, OP, CL: မြေသားညစ်ညမ်းမှုဖြစ်ပေါ်စေနိုင်မည့် မည်သည့်လုပ်ငန်းကိုမျှ စီစဉ်မထားပါ။
	၅	ဆူညံသံနှင့် တုန်ခါမှု	ခ-	ခ-	ခ-	ခ-	ခ-	ခ-	PC/CO, CL: ဆောက်လုပ်ရေးလုပ်ငန်းသုံးစက်ယန္တယားများကြောင့် ဆူညံသံနှင့် တုန်ခါမှု နှုန်းမှာ သတ်မှတ်စံချိန် အောက်တွင်သာ ရှိပါသည်။ OP: ဓာတ်အားပေးစက်ရုံမှ ပတ်ဝင်းကျင်ရွာများသို့ ဆူညံသံရောက်နိုင်မည်ဟုခန့်မှန်းသော်လည်း၊ ဆူညံသံထွက်ရှိမှု နှုန်းမှာ စံချိန် အောက်တွင်သာ ရှိမည်ဟုခန့်မှန်းပါသည်။
	၆	မြေကျွံ့ခြင်း	ခ-	ဃ	ဃ	ခ-	ဃ	ဃ	PC/CO: ဆောက်လုပ်ရေးလုပ်ငန်းများကြောင့် မြေကျွံခြင်း ဖြစ်ပေါ်နိုင်ပါသည်။ ထို သက်ရောက်မှု လျော့ကျစေရန် အတွက် ကန်ထရိုက်တာက ကြပ်မတ်ဆောင်ရွက်နိုင်ပါသည်။ OP, CL: မြေသားနိမ့်ဆင်းခြင်း ဖြစ်ပေါ်မည့် မည်သည့် လုပ်ငန်းကိုမျှ စီစဉ်မထားပါ။
	၇	အနံ့ဆိုး	ဃ	ခ-	ဃ	ဃ	ခ-	ဃ	PC/CO, CL: ဆောက်လုပ်ရေးလုပ်ငန်းအတွင်း အနံ့အသက်ဆိုး ထွက်ရှိမည့် မည်သည့်လုပ်ငန်းကိုမျှ စီစဉ်မထားပါ။ OP: ရေဆိုးသန့်စင်သည့်လည်ပတ်ရေးမှ အနံ့သက်ရောက်မှုကို

အမျိုးအစား		သက်ရောက်မှုများ	ခန့်မှန်း ရလဒ်များ			ဆန်းစစ်ခြင်း ရလဒ်များ			အကဲဖြတ်ခြင်းအတွက် အကြောင်းပြချက်များ
			PC/ CO	O P	C L	PC/ CO	O P	CL	
									မျှော်မှန်းထားပါသည်။စီမံကိန်း အဆိုပြုသူက ကြီးကြပ်၍ ထို သက်ရောက်မှုကို လျှော့ချနိုင်ပါသည်။
	၈	အောက်ခြေ အနည်ထိုင်မှု	ဃ	ဃ	ဃ				PC/CO, CL: ညစ်ညမ်းမှုများကို ဖြစ်စေနိုင်သည့် မြစ်ရေ အနည်ကျစေမည့် မည်သည့်လုပ်ငန်းကိုမျှ စီစဉ်မထားပါ။ OP: စွန့်ပစ်ရေကြောင့် မြစ်အောက်ခြေတွင် အနည်ထိုင်ခြင်း အပေါ်သက်ရောက်မှုကို မမျှော်လင့်ပါ။
သဘာဝဝန်း ကျင်	၉	ကာကွယ်တော	ဃ	ဃ	ဃ	ဃ	ဃ	ဃ	စီမံကိန်းဒေသအတွင်း ကာကွယ်တောမရှိပါ။
	၁၀	အပင်/သတ္တဝါနှင့် ဇီဝမျိုးစုံမျိုးကွဲ	ခ-	ခ-	ခ-	ခ-	ခ-	ခ-	PC/CO, CL: အပင်/သတ္တဝါ နှင့် ဇီဝမျိုးစုံမျိုးကွဲ အပေါ်တွင် သက်ရောက်မှု အကန့်အသတ်ရှိမည်ဟု ခန့်မှန်းပါသည်။ သဘာဝပေါက်ပင် ထိခိုက်ပြောင်းလဲမှုမှာ မပြောပလောက်ပါ။ ရေနေသတ္တဝါများ ထိခိုက်မှုကို သင့်လျော်သော ထိခိုက်မှု လျော့ပါးရေး နည်းလမ်းများကို ကန်ထရိုက်တာမှ အသုံးပြုကာ လျှော့ချနိုင်ပါသည်။ OP: ရေဆိုင်ရာ ဂေဟာစနစ်အပေါ်တွင် ထိခိုက်မှုရှိမည်ဟု ခန့်မှန်းပါသည်။ ရေအရည်အသွေးအပေါ် ထိခိုက်မှုကို လျစ်လျူရှုနိုင်ပါသည်။ ထို့ကြောင့် ရေသတ္တဝါများအပေါ် ထိခိုက်မှု ရှိမည်မဟုတ်ပါ။
	၁၁	ဇလဗေဒ	ဃ	ခ-	ဃ	ဃ	ခ-	ဃ	PC/CO, CL: စီဆင်းရေပြောင်းလဲမှုကို ဖြစ်ပေါ်စေနိုင်သော မည်သည့် လုပ်ငန်းကိုမျှ စီစဉ်မထားပါ။ OP: စီမံကိန်းနေရာအတွင်း မြေညှိခြင်းကြောင့် စီးဆင်းရေအပေါ် ထိခိုက်မှု ရှိနိုင်သည်ဟု ခန့်မှန်းပါသည်။ ထို ထိခိုက်မှုကို လုံလောက်သော စွမ်းရည်ရှိသည့် ထိန်းညှိပေးသည့် ကန် တည်ဆောက်ခြင်း (regulation pond) ဖြင့် လျှော့ချနိုင်ပါသည်။

အမျိုးအစား		သက်ရောက်မှုများ	ခန့်မှန်းရလဒ်များ			ဆန်းစစ်ခြင်းရလဒ်များ			အကဲဖြတ်ခြင်းအတွက် အကြောင်းပြချက်များ
			PC/CO	OP	CL	PC/CO	OP	CL	
	၁၂	မြေမျက်နှာသွင်ပြင်နှင့် ဘူမိဗေဒ	ဃ	ဃ	ဃ	ဃ	ဃ	ဃ	မြေမျက်နှာသွင်ပြင်နှင့် ဘူမိဗေဒဆိုင်ရာ သွင်ပြင်များအပေါ် ဆိုးကျိုးသက်ရောက်မှုရှိစေမည့် မည်သည့် လုပ်ငန်းကိုမျှ မစီစဉ်ထားပါ။
လူမှုဝန်းကျင်	၁၃	ဆန္ဒမပါသောပြောင်းရွှေ့နေရာချထားမှု	ခ -	ဃ	ဃ	ခ -	ဃ	ဃ	PC/CO: မြေယာသိမ်းဆည်းမှု နှင့် ယာယီ အလုပ်အကိုင် ဖြစ်ပေါ်ခြင်းဆိုင်ရာသက်ရောက်မှု ရှိလိမ့်မည် ဟုမျှော်လင့်ထားပါသည်။ ယင်းထိခိုက်မှုကို ပြန်လည်နေရာချထားရေး လုပ်ငန်းအစီအစဉ်တွင်ပါရှိသည့် နည်းလမ်းများအတိုင်း စီမံကိန်းသက်ရောက်ခံလူထုနှင့် တိုင်ပင်ဆွေးနွေးကာ လျှော့ချနိုင်မည်ဟု ခန့်မှန်းပါသည်။ OP, CL: အသက်မွေးဝမ်းကြောင်းမှုအပေါ် ထိခိုက်စေနိုင်သော ဆန္ဒမပါသောပြောင်းရွှေ့နေရာချထားမှု(သို့) အခြားလုပ်ဆောင်မှုများအား မမျှော်လင့် ထားပါ။
	၁၄	ဆင်းရဲမွဲတေမှု	ခ +	ခ +	ခ +	ခ -	ခ +	ခ - ၊ ခ +	PC: ဒေသခံလူထု အပေါ်တွင် ဆင်းရဲမွဲတေမှု နှင့် ပတ်သက်၍ ဆိုးကျိုးသက်ရောက်မှု ရှိမည်ဟု ခန့်မှန်းရပါသည်။ သို့သော် သိမ်းဆည်းမည့် ဧရိယာမှာ နည်းပါးသောကြောင့် ယင်းသက်ရောက်မှုသည်လည်း သေးငယ်မည်ဟု ခန့်မှန်းပါသည်။ CO: ဆင်းရဲမွဲတေမှုဆိုင်ရာ ဆိုးကျိုးသက်ရောက်မှုအနေဖြင့် ယာယီမြေပိုင်ဆိုင်မှုများ အပေါ်တွင် သက်ရောက်မှုရှိနိုင်မည်ဟု ခန့်မှန်းပါသည်။ အခြားတစ်ဘက်တွင်လည်း ဒေသခံများကို အလုပ်ခန့်ထားနိုင်မည့် ကောင်းကျိုးသက်ရောက်မှုလည်း ရှိနိုင်မည်ဟု ခန့်မှန်းပါသည်။ OP: ဒေသခံများကို အလုပ်ခန့်ထားနိုင်မည့် ကောင်းကျိုး သက်ရောက်မှု ရှိလိမ့်မည်ဟု ခန့်မှန်းပါသည်။ CL: ဓာတ်အားပေးစက်ရုံ လည်ပတ်မှုဆိုင်ရာ အလုပ်အကိုင်

အမျိုးအစား		သက်ရောက်မှုများ	ခန့်မှန်း ရလဒ်များ			ဆန်းစစ်ခြင်း ရလဒ်များ			အကဲဖြတ်ခြင်းအတွက် အကြောင်းပြချက်များ
			PC/CO	OP	CL	PC/CO	OP	CL	
						ခ- / ခ +			အခွင့်အလမ်းများ ပျောက်ကွယ်နိုင်ပါသည်။ အခြားတစ်ဘက်တွင်မူ စီမံကိန်းမှနေ၍ အလုပ်အကိုင်အခွင့်အလမ်းများ ပိုမို များပြားလာစေမည်ဟု ခန့်မှန်းပါသည်။
	၁၅	တိုင်းရင်းသား လူနည်းစု နှင့် ဒေသခံ တိုင်းရင်းသားများ	ဂ	ဂ	ဂ	ဃ	ဃ	ဃ	PC/CO, OP, CL: တိုင်းရင်းသား လူနည်းစုနှင့် ဒေသခံတိုင်းရင်းသားများအပေါ် ထိခိုက်နိုင်ခြင်းမရှိဟု ယူဆပါသည်။ အဘယ်ကြောင့်ဆိုသော် အတည်ပြုအိမ်ထောင်စု ၃စုသည် ဗမာလူမှုအဖွဲ့အစည်းအတွင်း အသားကျနေထိုင်သူများအဖြစ် စဉ်းစားထားသောကြောင့်ဖြစ်သည်။
	၁၆	ဒေသတွင်း စီးပွားရေး (အလုပ်အကိုင်)	ခ +	ခ +	ခ +	ခ +	ခ +	ခ - ၊ ခ +	PC/CO, OP: ဒေသတွင်းအလုပ်အကိုင်ဖန်တီးပေးခြင်းကဲ့သို့သော ကောင်းကျိုးသက်ရောက်မှုများရှိစေမည်ဟု မျှော်မှန်းထားပါသည်။ CL: ဓာတ်အားပေးစက်ရုံ လည်ပတ်ရန်အတွက် အလုပ်ခန့်ထားမှုများ ရပ်တန့်သွားမည်ဟု ခန့်မှန်းပါသည်။ တစ်ပြိုင်တည်းမှာပင် ဖြိုချဖျက်ဆီးရေးဆိုင်ရာ ဆောက်လုပ်ရေးလုပ်ငန်းများအတွက် ယာယီအလုပ်အကိုင် အခွင့်အလမ်းများ ရရှိနိုင်သည်ဟု ခန့်မှန်းပါသည်။
		ဒေသတွင်း စီးပွားရေး (အသက်မွေး ဝမ်းကြောင်း)	ခ -	ဃ	ဃ	ခ -	ဃ	ဃ	PC: ယာယီ မြေနေရာ သိမ်းဆည်းခြင်းကြောင့် ဝင်ငွေအရင်းအမြစ် အပေါ် သက်ရောက်မှု ရှိမည်ဟု ခန့်မှန်းပါသည်။ CO: ဈေးဆိုင်ငယ်များနှင့် လယ်သမားများအပေါ် သက်ရောက်မှုရှိမည်ဟု ခန့်မှန်းပါသည်။ တစ်ဖက်တွင်လည်း ဒေသတွင်း အလုပ်အကိုင် ဖန်တီးပေးမှု ကောင်းကျိုးများ ရှိနိုင်မည်ဟု ခန့်မှန်းပါသည်။ OP: မြစ်ငယ်မြစ်တွင် အသေးစားတစ်နိုင်တစ်ပိုင် ငါးဖမ်းယူမှု

အမျိုးအစား		သက်ရောက်မှုများ	ခန့်မှန်းရလဒ်များ			ဆန်းစစ်ခြင်းရလဒ်များ			အကဲဖြတ်ခြင်းအတွက် အကြောင်းပြချက်များ
			PC/CO	OP	CL	PC/CO	OP	CL	
						ခ +			များကို အိမ်ထောင်စု စားသုံးရန်အတွက် ဖမ်းဆီးမှုများရှိပြီး၊ စီမံကိန်းကြောင့် ရေအရည်အသွေး မထိခိုက်နိုင်ပါ။ CL: အသက်မွေးဝမ်းကြောင်းအပေါ် ဆိုးကျိုးသက်ရောက်နိုင်သည့် မည်သည့်လုပ်ငန်းမျိုးကိုမှ မမျှော်လင့်ထားပါ။
	၁၇	မြေယာအသုံးချခြင်းနှင့် ဒေသသယံဇာတအသုံးချခြင်း	ခ -	ဃ	ဃ	ခ -	ဃ	ဃ	PC/CO: မြေယာအသုံးချမှုအပေါ် သက်ရောက်မှု ရှိမည်ဟု ခန့်မှန်းပါသည်။ ယာယီမြေအသုံးချမှုသည် လွန်စွာနည်းပါးပါသည်။ OP, CL: မြေယာအသုံးချမှု သက်ရောက်မှုမရှိဟု ခန့်မှန်းရပါသည်။။
	၁၈	ရေအသုံးပြုခြင်း	ခ -	ခ -	ခ -	ခ -	ခ -	ခ -	PC/CO, CL: ဆောက်လုပ်ရေးလုပ်ငန်းကာလအတွင်း ရေအသုံးချမှုမှာ နည်းပါးပြီး မြစ်ငယ်မြစ်ရေ သုံးစွဲရန်အတွက် ရေအရည်အသွေးဆိုင်ရာ ထိခိုက်မှုမှာ အနည်းငယ်သာ ရှိမည်ဟု ခန့်မှန်းပါသည်။ OP: ရေသုံးစွဲမှုကို ထိန်းချုပ်ခြင်းအားဖြင့် ဒေသတွင်း ရေအသုံးပြုမှုအပေါ်တွင် ထိခိုက်မှု မရှိနိုင်ပါ။
	၁၉	လက်ရှိ လူမှုရေးဆိုင်ရာ အခြေခံအဆောက်အအုံနှင့် ဝန်ဆောင်မှု	ခ -	ခ -	ဃ	ခ -	ခ -	ဃ	PC/CO: ဆောက်လုပ်ရေး လုပ်ငန်းများ ဆောင်ရွက်ရန် ယာယီမြေယာသုံးစွဲမှု ထိန်းချုပ်ခြင်းနှင့် ယာယီယာဉ်ကြောရှုပ်ထွေးမှု ရှိနိုင်မည်ဟု ခန့်မှန်းပါသည်။ ကန်ထရိုက်တာကကြီးကြပ်၍ ထိခိုက်မှုလျော့ပါးရေးလုပ်ငန်းများ လုပ်ခြင်းဖြင့် ထိခိုက်မှုလျော့ချနိုင်ပါသည်။ OP: ကျောင်းလှူပ်ရှားမှု လုပ်ငန်းများ အပေါ်သက်ရောက်မှု ရှိနိုင်သည်ဟု ခန့်မှန်းပါသည်။ သို့သော် မူလတန်းကျောင်းတွင် တိုင်းတာရရှိသော ဆူညံမှု နှုန်းမှာ ကန့်သတ်ပမာဏအောက် လျော့နည်းသောကြောင့် ထိခိုက်မှုမှာလည်း အနည်းငယ်သာ ရှိပါသည်။

အမျိုးအစား		သက်ရောက်မှုများ	ခန့်မှန်း ရလဒ်များ			ဆန်းစစ်ခြင်း ရလဒ်များ			အကဲဖြတ်ခြင်းအတွက် အကြောင်းပြချက်များ
			PC/ CO	O P	C L	PC/ CO	O P	CL	
									CL: လက်ရှိ လူမှုရေးဆိုင်ရာ အခြေခံအဆောက်အအုံနှင့် ဝန်ဆောင်မှုကို မည်သည့် သက်ရောက်မှုကို မမျှော်မှန်းထားပါ။
	၂၀	လူမှုရေးဆိုင်ရာ အခြေခံ အဆောက်အဦ နှင့် ဒေသဆိုင်ရာ လူမှုရေးဖွဲ့စည်းမှု ပုံစံ	ယ	ယ	ယ	ယ	ယ	ယ	လူမှုရေးဆိုင်ရာနှင့် ဒေသဆိုင်ရာ ဖွဲ့စည်းမှုပုံစံကို ထိခိုက်စေသည့် မည်သည့်ဆောင်ရွက်ချက်ကိုမှ စီစဉ်ထားခြင်း မရှိပါ။
	၂၁	ပျက်စီးမှုနှင့်အကျိုး ရလဒ် မျှတမှု မရှိခြင်း	ယ	ယ	ယ	ယ	ယ	ယ	ပျက်စီးမှုနှင့် အကျိုးရလဒ် မျှတမှုမရှိခြင်းကို ဖြစ်စေသည့် မည်သည့် ဆောင်ရွက်ချက်ကိုမှ ရည်ရွယ်ထားခြင်း မရှိပါ။
	၂၂	ရရှိလာမည့် အကျိုးအမြတ် နှင့် ပတ်သက်သည့်ဒေသ တွင်းသဘောထား ကွဲလွဲမှု	ယ	ယ	ယ	ယ	ယ	ယ	ဒေသတွင်း သဘောထားကွဲလွဲမှုကို ဖြစ်စေသည့် မည်သည့် ဆောင်ရွက်ချက်ကိုမှ စီစဉ်ထားခြင်းမရှိပါ။
	၂၃	ယဉ်ကျေးမှုဆိုင်ရာ အမွေအနှစ်	ခ -	ခ -	ခ -	ခ -	ခ -	ခ -	PC/CO: ပိုက်လိုင်းများမြှုပ်နှံခြင်းကြောင့် ရှေးဟောင်း ယဉ်ကျေးမှုအမွေအနှစ် (မြို့ရိုးဟောင်း) အားထိခိုက်နိုင်မည်ဟု မျှော်လင့်ပါသည်။ သာသနာရေးနှင့်ယဉ်ကျေးမှုဝန်ကြီးဌာနသည် EPGE နှင့် ကန်ထရိုက်တာတို့ လိုက်နာဆောင်ရွက်ရမည့် အခြေအနေများနှင့်အတူ သဘောတူထားပြီးဖြစ်ပါသည်။ ထိုလျော့ပါးစေရေးနည်းလမ်းများကို အကောင်ထည်ဖော်ခြင်းဖြင့် မြို့ရိုးဟောင်းအား ထိခိုက်နိုင်မှု နည်းပါးပါမည်။ PC/CO, OP, CL: ဘာသာရေးဆိုင်ရာ လုပ်ငန်းရပ်များတွင် သွယ်ဝိုက်သောနည်းအားဖြင့် ထိခိုက်မှုများ ရှိနိုင်ပါသည်။ ဆူညံမှုနှုန်း ခန့်မှန်းချက် ရလဒ်အရ ဆူညံမှု နှုန်းမှာ သေးငယ်ပြီး လျော့ပါးရေးနည်းလမ်းများ အသုံးပြုခြင်းအားဖြင့် ပပျောက်အောင် လုပ်ဆောင်နိုင်ပါသည်။
	၂၄	မြင်ကွင်း	ခ -	ခ -	ခ -	ခ -	ခ -	ခ -	PC/CO, CL: မြင်ကွင်း အပေါ်တွင် ထိခိုက်မှု ရှိမည်ဟု ခန့်မှန်းပါသည်။ သင့်လျော်သော လျော့ကျရေး နည်းလမ်း

အမျိုးအစား		သက်ရောက်မှုများ	ခန့်မှန်း ရလဒ်များ			ဆန်းစစ်ခြင်း ရလဒ်များ			အကဲဖြတ်ခြင်းအတွက် အကြောင်းပြချက်များ
			PC/ CO	O P	C L	PC/ CO	O P	CL	
									များဖြင့် လျှော့ချနိုင်ပါသည်။ OP: မြင်ကွင်း အပေါ်တွင် ထိခိုက်မှု ရှိမည်ဟု ခန့်မှန်းပါသည်။ စီမံကိန်းနေရာ ဝန်းကျင်တွင် စိမ်းလန်းစိုပြည်ရေး လုပ်ငန်းများ လုပ်ခြင်းနှင့် သစ်ပင်စိုက်ခြင်းများ ဆောင်ရွက်နိုင် ပါသည်။
	၂၅	ကျား၊မ အမျိုးအစား	ဂ	ဂ	ဂ	ခ -	ခ -	ခ -	PC/CO, OP: အလုပ်အကိုင်အခွင့်အလမ်းအတွက် ကျား၊ မ ခွဲခြား ဆက်ဆံမှု ရှိနိုင်မည်ဟု ခန့်မှန်းပါသည်။ သင့်လျော်သော ထိခိုက်မှုလျှော့ပါးရေး လုပ်ငန်းများလုပ်ဆောင်ခြင်းဖြင့် ထိခိုက်မှု လျှော့ချနိုင်ပါသည်။
	၂၆	ကလေးသူငယ် အခွင့်အရေးများ	ဂ	ဂ	ဂ	ခ -	ခ -	ခ -	PC/CO, OP: ကလေးသူငယ်အလုပ်သမားငှားရမ်းမှု ရှိနိုင်မည်ဟု ခန့်မှန်းပါသည်။ ထိရောက်သော ထိခိုက်မှု လျှော့ပါးရေးလုပ်ငန်းများ လုပ်ဆောင်ခြင်းဖြင့် ထိခိုက်မှု လျှော့ချနိုင်ပါသည်။
	၂၇	လူထုကျန်းမာရေး၊ ကူးစက်ရောဂါနှင့် HIV/AIDS	ခ -	ဃ	ခ -	ခ -	ခ-	ခ -	PC/CO, CL: ကူးစက်ရောဂါ နှင့် HIV/AIDS ဖြစ်ပေါ်နိုင်ခြေရှိပါသည်။ ယင်းအန္တရာယ်ကို လုံလောက်သော ပညာပေး လုပ်ငန်းများ ဆောင်ရွက်ခြင်းဖြင့် လျှော့ချနိုင်ပါသည်။ OP: ဓာတ်ငွေ့ထုန်လွှတ်မှုနှင့် ရေဆိုးစွန့်ထုတ်မှုတို့ကြောင့် လူထုကျန်းမာရေးအား ထိခိုက်နိုင်ပါသည်။ ယင်းအန္တရာယ်အား လေထုအရည်အသွေး ပြန်လည် တိုင်းတာခြင်းနှင့် ရေဆိုးသန့်စင်စနစ်များတပ်ဆင် လည်ပတ်ခြင်းဖြင့် လျှော့ချနိုင်ပါသည်။
	၂၈	လုပ်ငန်းခွင်ဆိုင်ရာ ကျန်းမာရေးနှင့် ဘေးအန္တရာယ် ကင်းရှင်းရေး	ခ -	ခ -	ခ -	ခ -	ခ -	ခ -	PC/CO, OP, CL: လုပ်ငန်းခွင်ဆိုင်ရာ ကျန်းမာရေးနှင့် ဘေးအန္တရာယ် ကင်းရှင်းရေးဆိုင်ရာ ထိခိုက်မှု ရှိနိုင်မည်ဟု ခန့်မှန်းပါသည်။ သင့်လျော်သော ထိခိုက်မှု လျှော့ပါးရေး လုပ်ငန်းများ ဖြင့် ထိခိုက်မှု လျှော့ချနိုင်ပါသည်။

အမျိုးအစား		သက်ရောက်မှုများ	ခန့်မှန်းရလဒ်များ			ဆန်းစစ်ခြင်းရလဒ်များ			အကဲဖြတ်ခြင်းအတွက် အကြောင်းပြချက်များ
			PC/CO	OP	CL	PC/CO	OP	CL	
အခြား	၂၉	မတော်တဆထိခိုက်မှု	ခ -	ဂ	ခ -	ခ -	ခ -	ခ -	PC/CO, CL: စက်ယန္တရား သွားလာမှုကြောင့် ထိခိုက်မှုရှိနိုင်မည်ဟု ခန့်မှန်းပါသည်။ ဆောက်လုပ်ရေး လုပ်သားများကို သင်တန်းပေးခြင်းနှင့် လုံလောက်သော သတင်းအချက်အလက်များ မျှဝေပေးခြင်းအားဖြင့် စီမံကိန်းအနီးဝန်းကျင်ရှိ ဒေသခံများကို ထိခိုက်မှု လျှော့ချနိုင်ပါသည်။ OP: အန္တရာယ်ရှိသော ပစ္စည်းများ သိုလှောင်ခြင်း၊ ကိုင်တွယ်ဆောင်ရွက်ခြင်း၊ သယ်ယူပို့ဆောင်ရေးများ ဆောင်ရွက်ခြင်း (ပိုက်လိုင်းများ အသုံးပြုခြင်း) ကြောင့် ထိခိုက်မှုရှိနိုင်သည်ဟု ခန့်မှန်းပါသည်။ ယင်းကဲ့သို့ ထိခိုက်မှုဖြစ်နိုင်ခြေကို အန္တရာယ်လျော့ပါးစေရေး လက်စွဲစာအုပ်များ စသည်ကို အသုံးပြု လိုက်နာခြင်းအားဖြင့် လျှော့ချနိုင်ပါသည်။
	၃၀	နယ်စပ်ဖြတ်ကျော် သက်ရောက်မှု နှင့် ရာသီဥတု ပြောင်း လဲခြင်း	ခ -	ခ -	ခ -	ခ -	ခ -	ခ -	PC/CO, CL: Greenhouse gases (GHGs) များထုတ်လွှတ်နိုင်သော်လည်း သိသာထင်ရှားသော ထိခိုက်မှုများမရှိနိုင်ပါ။ အဘယ်ကြောင့်ဆိုသော် ဆောက်လုပ်ရေး (သို့) ဖျက်သိမ်းခြင်းလုပ်ငန်းများမှာ သေးငယ်မည်ဟုယူဆရပြီး၊ ထုတ်လွှတ်သော Greenhouse gases (GHGs) များမှာလည်း နည်းပါးမည်ဖြစ်သောကြောင့်ဖြစ်သည်။ OP: Greenhouse gases (GHGs) ထွက်ရှိမည်ဟုယူဆရသော်လည်း၊ ထွက်ရှိမှုပမာဏအားလျှော့ချနိုင်ပါသည်။ အဘယ်ကြောင့်ဆိုသော် ပေါင်းစပ်လည်ပတ်စနစ် (combined cycle system) အားအသုံးပြုမည်ဖြစ်သည့်အပြင် စွမ်းဆောင်ရည်မြင့်မားစေရန် သင့်တော်သောပြုပြင်ထိန်းသိမ်းမှုများကိုလည်း လုပ်ဆောင်မည်ဖြစ်သည်။

အရင်းအမြစ်။ EIA လေ့လာရေးအဖွဲ့

မှတ်ချက်။ PC (အကြိုတည်ဆောက်ရေးကာလ) ၊ CO (ဆောက်လုပ်ရေးကာလ) ၊ PO (လုပ်ငန်းလည်ပတ်ရေးကာလ)

ဆန်းစစ်ခြင်း။ က- : သိသာထင်ရှားသည့်ဆိုးကျိုးသက်ရောက်မှု　က+ : သိသာထင်ရှားသည့် ကောင်းကျိုးသက်ရောက်မှု

ခ- : ဆိုးကျိုးသက်ရောက်မှုအချို့　ခ- : ကောင်းကျိုးသက်ရောက်မှု အချို့

ဂ : ထိခိုက်မှုများမှာ မရှင်းလင်းပါ။ထပ်မံဆန်းစစ်ရပါမည်

ဃ : ထိခိုက်မှုမရှိပါ (သို့) ထိခိုက်မှုများမှာ မပြောပလောက်ပါ၊ ထပ်မံလေ့လာရန်မလိုအပ်ပါ

၆. ဆက်စပ်သက်ရောက်မှု ဆန်းစစ်ခြင်း

ကျောက်ဆည် ၁၃၅မဂါဝပ် ဓာတ်ငွေ့ဓာတ်အားပေးစက်ရုံစီမံကိန်း (IPP စီမံကိန်း) အား ထည့်သွင်းစဉ်းစား၍ ဆက်စပ်သက်ရောက်မှုအား ဆန်းစစ်ထားပါသည်။ IPP စီမံကိန်းသည် တည်ဆောက်မည့်စီမံကိန်းနေရာ၏ အနောက်ဘက် ၂၅ဝမီတာအကွာတွင်တည်ရှိပြီး၊ ၂ဝ၁၉ မတ်လမှစတင်ကာလည်ပတ်လျှက်ရှိပါသည်။

၆.၁. ဓာတ်အားပေးစက်ရုံမှ ထုတ်လွှတ်မှုများ

IPP စီမံကိန်းမှ တင်ဒါ အချက်အလက်များအရ ဓာတ်အားသုံးစွဲနိုင်ခွင့် ကာလမှ စီးပွားရေးလုပ်ငန်း စတင်လည်ပတ်သည့် နေ့မှစ၍ ၅ နှစ် ဖြစ်ပါသည်။ IPP စီမံကိန်းသည် ၂ဝ၁၉ မတ်လတွင် စတင်ခဲ့ခြင်းကြောင့် ၂ဝ၂၄ တွင် ပြီးဆုံးမည်ဖြစ်သည်။ စီမံကိန်းကို ၂ဝ၂၅ တွင် လုပ်ငန်းလည်ပတ်မှုများ စတင်မည်ဟု ရည်ရွယ်ထားသည်။ ထို့အပြင် EPGE သည် IPP သို့သွယ်တန်းထားသော ဓာတ်ငွေ့လိုင်းအား စီမံကိန်းသို့ ၂ဝ၂၄နောက်ပိုင်းတွင် ပြောင်းရွှေ့သွယ်တန်းရန်စီစဉ်နေပါသည်။ ထို့ကြောင့် လုပ်ငန်းလည်ပတ်ရေးကာလများမှာ တစ်ခုနှင့်တစ်ခု ပြိုင်တူဖြစ်ပေါ်မည်မဟုတ်ဘဲ ဆက်စပ်သက်ရောက်မှုများမှာလည်း ဖြစ်ပေါ်နိုင်ခြေ မရှိပါ။

၆.၂. မြစ်ငယ်မြစ်အတွင်း စွန့်ပစ်ရေ စွန့်ထုတ်မှု

အောက်ဖော်ပြပါ လက်လာဆန်းစစ်မှုများအရ ရေအရည်အသွေးအပေါ်တွင် ရေရှည် ရေတို ထိခိုက်သက်ရောက်မှုများ မရှိနိုင်ပါ။ IPP စီမံကိန်းမှ မြစ်ငယ်မြစ်အတွင်းသို့ စွန့်ထုတ်ရေမရှိပါ။ ထို့အပြင် ရေအရည်အသွေးဆိုင်ရာ ထိခိုက်မှုဆန်းစစ်ခြင်း ရလဒ်အရ၊ စီမံကိန်းကြောင့် ဖြစ်ပေါ်သော ထိခိုက်မှုမှာ လျစ်လျူရှုနိုင်သော အခြေအနေဖြစ်ပါသည်။ အကြောင်းရင်းမှာ မြစ်ငယ်မြစ်အတွင်းသို့ စီးဆင်းမှု နှုန်းမှာ လွန်စွာ နည်းပါးသောကြောင့်ဖြစ်သည်။ (မြစ်ငယ်မြစ် စီးဆင်းနှုန်း ၅ဝ ရာခိုင်နှုန်းတွင် စွန့်ပစ်ရေ စွန့်ထုတ်မှု နှုန်းမှာ ဝ.ဝ၁၂၆ ရာခိုင်နှုန်းသာ ရှိပါသည်။) စွန့်ထုတ်ရေများအားလည်း သန့်စင်စနစ်များဖြင့် သန့်စင်မည်ဖြစ်သည်။

ရေရှည်အနေဖြင့် မြစ်ငယ်မြစ်အတွင်း သတ္တုအပိုင်းအစများ စုပုံအနည်ထိုင်ခြင်း ဖြစ်နိုင်ပါသည်။ သို့ရာတွင် မြန်မာနိုင်ငံနှင့်အပြည်ပြည်ဆိုင်ရာ အဖွဲ့အစည်းများ၏ ပတ်ဝန်းကျင်ရေအရည်အသွေးပေါ် ချမှတ်ထားသော စံချိန်စံညွှန်းများအား စီမံကိန်းမှလိုက်လာမည်ဖြစ်သဖြင့် ထိုဆက်စပ်သက်ရောက်မှုမှာ လစ်လျူရှုနိုင်ပါသည်။

အကျိုးဆက်အားဖြင့် စွန့်ထုတ်ရေရှိသော်လည်း လစ်လျူရှုနိုင်ပြီး၊ ရေအရည်အသွေးအပေါ် ဆက်စပ်သက်ရောက်မှုမှာ ရေတိုရေရှည်အနေဖြင့် ပတ်ဝန်းကျင်ရေထုသို့ သက်ရောက်မှုမရှိနိုင်ပါ။

၇. ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှု အစီအစဉ် အကျဉ်းချုပ်

၇.၁. ပတ်ဝန်းကျင်ဆိုင်ရာ ထိခိုက်မှုလျော့ကျစေရေး နည်းလမ်းများ

EIA အစီရင်ခံစာတွင် ပတ်ဂန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှုအစီအစဉ်အား ဓာတ်အားပေးစက်ရုံ၊ ရေပိုက်လိုင်းနှင့် ဓာတ်ငွေ့ပိုင်လိုင်းစသည့် အစိတ်အပိုင်း ၃ခုအတွက် ပြင်ဆင်ထားပြီး၊ အစီရင်ခံစာ၏ အခန်းငယ် ၇.၁တွင် ဖော်ပြထားပါသည်။ အောက်ဖော်ပြပါဇယား (၇)မှ (၁၀)သည် ဓာတ်အားပေးစက်ရုံအတွက် စီမံကိန်းအဆင့်ဆင့်တွင် လုပ်ဆောင်ရမည့် လျော့ကျစေရေးနည်းလမ်းများနှင့် အကောင်အထည်ဖော်မည့် အဖွဲ့အစည်းများအား နမူနာအနေဖြင့် ထုတ်နုတ်တင်ပြထားခြင်းဖြစ်သည်။

ဇယား (၇) ဆောက်လုပ်ရေး ကာလ မတိုင်မီ ဖြစ်ပေါ်နိုင်သော ဆိုးကျိုးသက်ရောက်မှုများ နှင့် ၎င်းတို့၏ ဆိုးကျိုးသက်ရောက်မှု လျော့ကျစေသော နည်းလမ်းများ အကျဉ်းချုပ်

အမျိုးအစား	ဖြစ်ပေါ်နိုင်သော ဆိုးကျိုးသက်ရောက်မှု	ထိခိုက်မှု လျော့ပါးစေသော နည်းလမ်းများ	သက်ဆိုင်ရာ အချက်အလက်	သက်ဆိုင်ရာ အစိတ်အပိုင်း	အကောင်အထည် ဖော်မည့် အဖွဲ့အစည်း	တာဝန်ခံ အဖွဲ့အစည်း	အကြမ်းဖျဉ်း ခန့်မှန်း ကုန်ကျစရိတ် (USD)
၁. လူမှုဂန်းကျင်							
ဆန္ဒမပါသော ပြောင်းရွှေ့နေရာချထားမှု	- ရေတွန်းစက်နေရာနှင့် ဓာတ်တိုင်များအတွက် မြေယာသိမ်းဆည်းမှု	- ပြန်လည်နေရာ ချထားရေး အတွက် အပြည့်အစုံ လျော်ကြေးပေးချေမှု	အမြဲ (သို့) ယာယီ မြေနေရာရယူခြင်း	ရေပိုက်လိုင်း	PMU, MRG, မြို့နယ်	EPGE	-

အမျိုးအစား	ဖြစ်ပေါ်နိုင်သော ဆိုးကျိုးသက်ရောက်မှု	ထိခိုက်မှု လျော့ပါးစေသော နည်းလမ်းများ	သက်ဆိုင်ရာ အချက်အလက်	သက်ဆိုင်ရာ အစိတ်အပိုင်း	အကောင်အထည် ဖော်မည့် အဖွဲ့အစည်း	တာဝန်ခံ အဖွဲ့အစည်း	အကြမ်းဖျဉ်း ခန့်မှန်း ကုန်ကျစရိတ် (USD)
	- စီမံကိန်းနေရာရှိ သီးပင်စားပင် နှင့် သစ်ပင်များမှ ဝင်ငွေ ဆုံးရှုံးမှု	- သီးပင်စားပင် နှင့် သစ်ပင်များ အတွက် လက်ရှိ ဈေးကွက်ပေါက်ဈေး ၏ ၃ ဆ နှင့် ညီမျှသော လျော်ကြေး ငွေပေးချေမှု (အပင်များကို ခုတ်လှဲခြင်း ပြုသည့် အခါမှသာ လျော်ကြေးငွေ ပေးပါမည်၊ အလေ့ကျ ပေါက်ရောက် နေသော အပင်များ အတွက် လျော်ကြေးငွေ ပေးချေမည် မဟုတ်ပါ။)	အမြဲ (သို့) ယာယီ မြေနေရာရယူခြင်း	ရေနှင့် ဓာတ်ငွေ့ ပိုက်လိုင်း	PMU, MRG, မြို့နယ်	EPGE	ပြည်လည် နေရာချထား ရေးအစီအစဉ် တွင်ပါဝင် ပါသည်။
	- ဆောက်လုပ်ရေး လုပ်ငန်းများကြောင့် ခိုင်ခံ့အဆောက်အဦး များ ဆုံးရှုံးမှု	- အပြီးအစီး ပြန်လည် နေရာချ ထားရေး ဆိုင်ရာ ကုန်ကျ စားရိတ် ကို အဆောက်အအုံ တစ်ခုလုံး အတွက် လျော်ကြေးပေး ချေမည် ဖြစ်သည်။ - အဆောက်အအုံ၏ တစ်ပိုင်းတစ်စ ကိုသာ ထိခိုက်မည် ဖြစ်ပြီး ကျန်ရှိသော အပိုင်းသည် ဆက်လက် အသုံးချ၍ ရနိုင်ပါက ထိခိုက်ခံရသော အပိုင်း အတွက်သာ လျော်ကြေးငွေ ပေးချေမည် ဖြစ်ပါသည်။	အမြဲ (သို့) ယာယီ မြေနေရာရယူခြင်း	ရေနှင့် ဓာတ်ငွေ့ ပိုက်လိုင်း	PMU, MRG, မြို့နယ်	EPGE	ပြည်လည် နေရာချထား ရေးအစီအစဉ် တွင်ပါဝင် ပါသည်။
ဆင်းရဲမွဲတေမှု	- အပြီးအပိုင် မြေယာသိမ်းဆည်းမှု ကြောင့် ဖြစ်ပေါ်သော ဆင်းရဲမွဲတေမှု	- ဆန္ဒမပါသော ပြောင်းရွှေ့နေရာချ ထားမှု အတိုင်း	အမြဲ (သို့) ယာယီ မြေနေရာရယူခြင်း	ရေပိုက်လိုင်း	PMU, MRG, Township	EPGE	-
ဒေသ စီးပွားရေး (အသက်မွေး ဝမ်းကျောင်း)	- မြေယာသိမ်းဆည်းမှု သို့မဟုတ် လယ်မြေယာယီသုံးစွဲမှု ကြောင့်ဖြစ်ပေါ်လာမည့် ဝင်ငွေ လျော့နည်းမှု	- ဆန္ဒမပါသော ပြောင်းရွှေ့နေရာချ ထားမှု အတိုင်း	အမြဲ (သို့) ယာယီ မြေနေရာရယူခြင်း	ရေပိုက်လိုင်း	PMU, MRG, မြို့နယ်	EPGE	-

အမျိုးအစား	ဖြစ်ပေါ်နိုင်သော ဆိုးကျိုးသက်ရောက်မှု	ထိခိုက်မှု လျော့ပါးစေသော နည်းလမ်းများ	သက်ဆိုင်ရာ အချက်အလက်	သက်ဆိုင်ရာ အစိတ်အပိုင်း	အကောင်အထည် ဖော်မည့် အဖွဲ့အစည်း	တာဝန်ခံ အဖွဲ့အစည်း	အကြမ်းဖျဉ်း ခန့်မှန်း ကုန်ကျစရိတ် (USD)
မြေယာ အသုံးချမှု နှင့် ဒေသခံ သယံဇာတ ထုတ်ယူသုံးစွဲမှု	- ဓာတ်တိုင်များနှင့် ဆောက်လုပ်ရေး လုပ်ငန်းများအတွက် မြေနေရာရယူခြင်း ကြောင့် လယ်မြေအသုံးချမှု အပေါ် အမြဲနှင့်ယာယီ ကန့်သတ်ခြင်း	- ဆန္ဒမပါသော ပြောင်းရွှေ့နေရာချ ထားမှု အတိုင်း	အမြဲ မြေနေရာရယူခြင်း	ရေပိုက်လိုင်း	PMU, MRG, မြို့နယ်	EPGE	

PMU : စီမံကိန်းစီမံခန့်ခွဲရေးအဖွဲ့

MRG : မန္တလေးတိုင်းဒေသကြီးအစိုးရအဖွဲ့

EPGE : လျှပ်စစ်ဓာတ်အားထုတ်လုပ်ရေးလုပ်ငန်း

အရင်းအမြစ်။ EIA လေ့လာရေးအဖွဲ့

ဇယား (၈) ဆောက်လုပ်ရေး ကာလတွင် ဖြစ်ပေါ်နိုင်သော ဆိုးကျိုးသက်ရောက်မှုများ နှင့် ၎င်းတို့၏ ဆိုးကျိုးသက်ရောက်မှု လျော့ကျစေသော နည်းလမ်းများ အကျဉ်းချုပ်

အမျိုးအစား	ဖြစ်ပေါ်နိုင်သော ဆိုးကျိုးသက်ရောက်မှု	ထိခိုက်မှု လျော့ပါးစေသော နည်းလမ်းများ	သက်ဆိုင်ရာ အချက်အလက်	သက်ဆိုင်ရာ အစိတ်အပိုင်း	အကောင်အထည် ဖော်မည့် အဖွဲ့အစည်း	တာဝန်ခံ အဖွဲ့အစည်း	အကြမ်းဖျဉ်း ခန့်မှန်း ကုန်ကျစရိတ် (USD)
၁. ညစ်ညမ်းမှု							
လေအရည်အသွေး	- မြေ အစိုင်အခဲများ ကို ကိုင်တွယ် အသုံးပြုရာမှ ဖုန်မှုန့်/မြေမှုန့် များ ယာယီထွက်လာခြင်း - မြေကားများဖြင့် မြေသယ်ခြင်း ကဲ့သို့သော သယ်ယူပို့ဆောင်ရေး လုပ်ငန်းများကြောင့် ယာယီအားဖြင့်	- ဆောက်လုပ်ရေး လုပ်ငန်းသုံး ယာဉ်များကို တစ်ပြိုင်နက်တည်း တွင် အမြောက်အများ သုံးစွဲခြင်းမှ ရှောင်ကြဉ်ခြင်း - လေပြင်း တိုက်ချိန်တွင် မြေနှင့် ဆက်စပ်သော လုပ်ငန်းများ	မြေသားလုပ်ငန်းများ	ဓာတ်အားပေး အဆောက်အအုံ၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	ကန်ထရိုက်တာ	EPGE	ကားဆေး သည့် စနစ် အတွက် လစဉ် USD500 လမ်းများ

အမျိုးအစား	ဖြစ်ပေါ်နိုင်သော ဆိုးကျိုးသက်ရောက်မှု	ထိခိုက်မှု လျော့ပါးစေသော နည်းလမ်းများ	သက်ဆိုင်ရာ အချက်အလက်	သက်ဆိုင်ရာ အစိတ်အပိုင်း	အကောင်အထည် ဖော်မည့် အဖွဲ့အစည်း	တာဝန်ခံ အဖွဲ့အစည်း	အကြမ်းဖျင်း ခန့်မှန်း ကုန်ကျစရိတ် (USD)
	ဖုန်ထစေခြင်း	လုပ်ကိုင်ခြင်းကို ရှောင်ကြဉ်ခြင်း - ယာယီ မြေကြီး ပုံများကို အဖုံးအကာများဖြင့် ဖုံးကာထားခြင်း - မြေကားများကို ဆေးကြောမှု စနစ်တစ်ခု ထားရှိခြင်း - ဖုန်ထခြင်းကို လျော့ကျစေရန် လမ်းများကို မနက်ခင်း အချိန်တွင် ရေဖြန်းထားခြင်း					ရေဖြန်းခြင်း အတွက် လစဉ် USD3,500
ရေအရည်အသွေး	- မြစ်ငယ်မြစ်မှ ရေသွယ်ယူခြင်း လုပ်ငန်းနေရာ တည်ဆောက်ခြင်း ကြောင့် ဖြစ်ပေါ်လာသော ရေညစ်ညမ်းမှု (ရွံ့ရေ)	- စတီးပိုက်များကို Coffer dam တွင် တပ်ဆင်အသုံးပြုခြင်း - Coffer dam ပတ်လည်တွင် နံးကို စစ်ထုတ်သော အကာအကွယ်များ အသုံးပြုခြင်း - လုပ်ငန်းဆောင်ရွက်ရာ နေရာအတွင်း ရေအသုံးချမှု အတွက် ယာယီ နံး အနည်ထိုင်ကန်များ တည်ဆောက်အသုံးပြုခြင်း	ဆောက်လုပ်ရေး လုပ်ငန်းအားလုံး	ရေပိုက်လိုင်း	ကန်ထရိုက်တာ	EGEP	Cofferdam အတွက် USD 166,000 နွန်းတား အတွက် USD 36,000 အနည်ထိုင် ကန် အတွက် USD 3,000
စွန့်ပစ်ပစ္စည်း	- ဆောက်လုပ်ရေး လုပ်ငန်းများမှ စွန့်ပစ်ပစ္စည်းများ ထွက်ရှိခြင်း	- ဆောက်လုပ်ရေး လုပ်ငန်းခွင်ကို သန့်ရှင်းသပ်ရပ်အောင် ထားရှိခြင်း - စွန့်ပစ်မြေများကို ပြန်လည်အသုံးပြု ခြင်းကို အားပေးရန် သီးသန့်အမှိုက်ပုံရာ နေရာများထားရှိခြင်း - အနံ့ဆိုးများ ထွက်ရှိခြင်းမှ ကာကွယ်ရန် အမှိုက်ပုံရာ နေရာများကို သင့်လျော်သော စီမံခန့်ခွဲမှု ပြုလုပ်ခြင်း - စွန့်ပစ်ပစ္စည်းသိုလှောင်ရာနေရာတွင် အမျိုးအစားခွဲခြားခြင်းအား ပုံမှန် စစ် ဆေးခြင်း - ကန်ထရိုက်တာသည် ဓာတ်အားပေး စက်ရုံနေရာသို့သယ်ယူမည့် မြေကြီးမှ	ဆောက်လုပ်ရေး လုပ်ငန်းအားလုံး	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	ကန်ထရိုက်တာ	EPGE	ဆောက်လုပ် ရေးစရိတ်တွင် ပါဝင်သည်။

အမျိုးအစား	ဖြစ်ပေါ်နိုင်သော ဆိုးကျိုးသက်ရောက်မှု	ထိခိုက်မှု လျော့ပါးစေသော နည်းလမ်းများ	သက်ဆိုင်ရာ အချက်အလက်	သက်ဆိုင်ရာ အစိတ်အပိုင်း	အကောင်အထည် ဖော်မည့် အဖွဲ့အစည်း	တာဝန်ခံ အဖွဲ့အစည်း	အကြမ်းဖျဉ်း ခန့်မှန်း ကုန်ကျစရိတ် (USD)
		လွဲ၍ ရေပိုက်လိုင်းနှင့် ဓာတ်ငွေ့ ပိုင်းလိုင်းတည်ဆောက်ခြင်းမှ ထွက်ရှိလာသော အစိုင်အခဲစွန့်ပစ်ပစ္စည်းများကို သယ်ဆောင်သင့်သည်။ - ကန်ထရိုက်တာသည် မိမိကိုယ်တိုင် (သို့) တတိယအဖွဲ့အစည်းမှ ထပ်မံအသုံးပြုနိုင်အောင် မလုပ်ဆောင်နိုင်သော စွန့်ပစ်ပစ္စည်းများ အား သက်ဆိုင်ရာဥပဒေအတိုင်း စွန့်ပစ်ရမည်။					
မြေဆီလွှာညစ်ညမ်းမှု	- လောင်စာနှင့်ဆီများ ဖိတ်စင်ခြင်းကြောင့်မြေဆီလွှာညစ်ညမ်းခြင်း	- ဆောက်လုပ်ရေးနေရာတွင် မြေအတွင်း မစိမ့်ဝင်နိုင်ရန် ပြုလုပ်ထားခြင်း	ဆောက်လုပ်ရေး လုပ်ငန်းအားလုံး	ဓာတ်အားပေး အထောက်အပံ့	ကန်ထရိုက်တာ	EPGE	ဆောက်လုပ်ရေးစရိတ်တွင် ပါဝင်သည်။
ဆူညံသံ နှင့် တုန်ခါမှု	- ဆောက်လုပ်ရေး လုပ်ငန်းများ နှင့် ပစ္စည်းများ ကိုင်တွယ်အသုံးပြုခြင်းမှ ဆူညံသံ နှင့် တုန်ခါမှုများ ဖြစ်ပေါ်စေခြင်း - မြေသယ်ကားများဖြင့် မြေကြီးများ သယ်ယူပို့ဆောင်ရာမှ ဆူညံသံနှင့် တုန်ခါမှုများ ဖြစ်ပေါ်စေခြင်း	- ဆောက်လုပ်ရေး ဆိုင်ရာ စက်ယန္တရားများကို စုပြုံ အသုံးပြုခြင်းမှ ရှောင်ကြဉ်ခြင်း - ဆောက်လုပ်ရေး လုပ်ငန်းများ လုပ်ဆောင်ချိန် ကို သတ်မှတ်ထားခြင်း (ဥပမာ - နေ့အချိန်၊ ၇း၀၀ မှ ၂၂း၀၀ထိ) - လုပ်ငန်းဆောင်ရွက်သူများအနေဖြင့် ငြိမ်သာစွာ ဆောင်ရွက်ကြရန် နှိုးဆော်ခြင်း - ဆောက်လုပ်ရေး လုပ်ငန်းများ ဆောင်ရွက်ချိန်အတွင်း တောင်ဘက် နှင့် အရှေ့ဘက်ကို ယာယီ အကာအကွယ်နံရံများ တည်ဆောက်တပ်ဆင်ခြင်း	ဆောက်လုပ်ရေး လုပ်ငန်းအားလုံး	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	ကန်ထရိုက်တာ	EPGE	ယာယီ အလုံပိတ် နံရံ အတွက် USD 77,000
မြေကျံ့မှု	- ဓာတ်ငွေ့ ပိုက်လိုင်း နှင့် ရေပိုက်လိုင်းများ မြေပြင်အောက်တွင် တပ်ဆင်ပြီးနောက်တွင် မြေကြီးကို ကျစ်ကျစ်လစ်လစ် ပြန်လည်	- ပိုက်လိုင်းများအပေါ်တွင် မြေဖို့ရာတွင် အမှိုက်နှင့် ရွှံ့များ အသုံးပြုခြင်းမှ ရှောင်ကြဉ်ခြင်း - ပိုက်လိုင်း အပေါ်တွင် မြေဖို့ခြင်းကို ကျစ်လျစ်စွာ ဆောင်ရွက်ခြင်း	မြေပြန်ဖို့ခြင်း	ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	ကန်ထရိုက်တာ	EPGE	-

အမျိုးအစား	ဖြစ်ပေါ်နိုင်သော ဆိုးကျိုးသက်ရောက်မှု	ထိခိုက်မှု လျော့ပါးစေသော နည်းလမ်းများ	သက်ဆိုင်ရာ အချက်အလက်	သက်ဆိုင်ရာ အစိတ်အပိုင်း	အကောင်အထည် ဖော်မည့် အဖွဲ့အစည်း	တာဝန်ခံ အဖွဲ့အစည်း	အကြမ်းဖျင်း ခန့်မှန်း ကုန်ကျစရိတ် (USD)
	မဖို့တင်းသောကြောင့် မြေသားကျွံကျမှု ဖြစ်ပေါ်ခြင်း						
၂. သဘာဂပတ်ဂန်းကျင်							
အပင်၊ သတ္တဝါ နှင့် ဇီဝမျိုးစုံမျိုးကွဲ	- ဆောက်လုပ်ရေးလုပ်ငန်းများကြောင့် အပင်များ ပြောင်းလဲ ပျက်စီးနိုင်ခြင်း - စီမံကိန်းလုပ်ငန်းများကြောင့် ကျက်စားရာဒေသများ ဆုံးရှုံးခြင်း နှင့်/သို့မဟုတ် အရေးပါသော မျိုးစိတ်များ ဆုံးရှုံးမှုဖြစ်ပေါ်ခြင်း - စီမံကိန်းကြောင့် ဇီဝမျိုးစုံမျိုးကွဲ နှင့် ဂေဟစနစ်အပေါ် သက်ရောက်မှု ဖြစ်ပေါ်ခြင်း	- ပေါက်ပင် နှင့် ခြုံပင်များ ပျက်စီးခြင်းကဲ့သို့သော မြေပြင်ပြောင်းလဲမှုများကို အနည်းဆုံးဖြစ်အောင်ပြုလုပ်ခြင်း	ဆောက်လုပ်ရေး လုပ်ငန်းအားလုံး	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	ကန်ထရိုက်တာ	EPGE	ဆောက်လုပ် ရေးစရိတ်တွင် ပါဂင်သည်။
၃. လူမှုပတ်ဂန်းကျင်							
ယဉ်ကျေးမှု အမွေအနှစ်	- ယဉ်ကျေးမှုအမွေအနှစ်နယ်မြေတွင် မြို့ဟောင်းအား ထိခိုက်နိုင်မှု	- ပိုက်လိုင်းများမြုပ်နှံရန်အတွက် မြို့ရိုးဟောင်းအနီးတွင် လူအားဖြင့် တူးခြင်း - သာသနာရေးနှင့်ယဉ်ကျေးမှုဂန်ကြီးဌာန၏ခွင့်ပြုထားသော အခြေအနေများ အတိုင်းဆောင်ရွက်ရန်	ပိုက်လိုင်းများ တပ်ဆင်ခြင်း	ရေပိုက်လိုင်း	ကန်ထရိုက်တာ	EPGE	
	- ယဉ်ကျေးမှု အမွေအနှစ် (ဘုရားကျောင်း၊ ဘုရားစေတီ) များတွင် ပြုလုပ်သော ဘာသာရေး လှုပ်ရှားမှုများအပေါ် ဆူညံသံ နှင့် တုန်ခါမှုမှ ထိခိုက်မှု ဖြစ်ပေါ်စေခြင်း	- "ဆူညံသံ နှင့် တုန်ခါမှု" ကဏ္ဍမှ ပုံစံ အတိုင်း	ဆောက်လုပ်ရေး လုပ်ငန်းအားလုံး	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	ကန်ထရိုက်တာ	EPGE	-
မြင်ကွင်း	- ဆောက်လုပ်ရေး ယန္တယားများ နှင့် ပစ္စည်းများ သိုလှောင်ရန် နေရာများ ယူခြင်းကြောင့် မြင်ကွင်းအပေါ် ယာယီ ဆိုးကျိုး သက်ရောက်မှု ဖြစ်ပေါ်စေနိုင်ခြင်း	- ဆောက်လုပ်ရေး လုပ်ငန်းများ လုပ်ဆောင်စဉ်အတွင်း စီမံကိန်း နေရာ၏ တောင်ဘက် နှင့် အရှေ့ဘက်ကို ယာယီ အကာအကွယ် နံရံများ တည်ဆောက်ခြင်း - စီမံကိန်း နေရာ ပတ်ဝန်းကျင်ကို	အဓိက ဆောက်လုပ်ရေး ယန္တရားများနှင့် သိုလှောင်ပစ္စည်းများ	ဓာတ်အားပေး အထောက်အပံ့	ကန်ထရိုက်တာ	EPGE	ဆူညံသံ လျော့ပါးစေရန် ယာယီ အလုံပိတ် နံရံ တပ်ဆင်သည်။

အမျိုးအစား	ဖြစ်ပေါ်နိုင်သော ဆိုးကျိုးသက်ရောက်မှု	ထိခိုက်မှု လျော့ပါးစေသော နည်းလမ်းများ	သက်ဆိုင်ရာ အချက်အလက်	သက်ဆိုင်ရာ အစိတ်အပိုင်း	အကောင်အထည် ဖော်မည့် အဖွဲ့အစည်း	တာဝန်ခံ အဖွဲ့အစည်း	အကြမ်းဖျဉ်း ခန့်မှန်း ကုန်ကျစရိတ် (USD)
		စိမ်းလန်းစိုပြည်အောင်ပြုလုပ်ခြင်း နှင့် သစ်ပင်ပန်းမန်များ စိုက်ပျိုးခြင်း					စိမ်းလန်းရေး အတွက် USD 142,000
ကျား၊မ အခြေအနေ	- အလုပ်အခွင့်အလမ်းတွင် ကျား၊မ ဆိုင်ရာ ခွဲခြားမှု ရှိလာနိုင်ခြင်း	- ကျား၊ မ မခွဲခြားဘဲ အလုပ်အကိုင်အခွင့်အလမ်းများ ထောက်ပံ့ပေးခြင်း	အလုပ်အကိုင်များ အားလုံး	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	ကန်ထရိုက်တာ	EPGE	-
ကလေးသူငယ် အခွင့်အရေး	- ဆောက်လုပ်ရေး ဆိုင်ရာ လုပ်ငန်းများတွင် ကလေး အလုပ်သမားများ ခန့်ထား သုံးစွဲနိုင်ချေရှိမှု	- တင်ဒါ အချက်အလက်များတွင် ကလေးသူငယ် အလုပ်ခန့်ထားရေး နှင့် ပတ်သက်သည့် အချက်အလက်ကိုပါ ထည့်သွင်းပြုစုခြင်း	အလုပ်အကိုင်များ အားလုံး	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	ကန်ထရိုက်တာ	EPGE	-
ဆင်းရဲမွဲတေမှု	- အမြဲ(သို့)ယာယီ အလုပ်အကိုင်များ ကြောင့် ဆင်းရဲသူများအား ထိခိုက်နိုင်မှု	- အတတ်နိုင်ဆုံး သီးနှံရိတ်သိမ်းပြီးချိန် မှသာ ဆောက်လုပ်ရေးလုပ်ငန်း စတင်ခြင်း - အလုပ်သမားများအဖြစ် ဒေသခံ ပြည်သူများအား ဦးစားပေးခန့်ထားခြင်း	ဆောက်လုပ်ရေး လုပ်ငန်းအားလုံး	ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	PMU, ကန်ထရိုက်တာ	EPGE	-
ဒေသစီးပွားရေး (အသက်မွေး ဝမ်းကျောင်း)	- လယ်ယာလုပ်ငန်းများကို အမြဲ (သို့) ယာယီ အနှောက်အယှက်ဖြစ်စေမှု	- တတ်နိုင်သ၍သီးနှံများရိတ်သိမ်းပြီးသည့် အချိန်မှသာ ဆောက်လုပ်ရေးလုပ်ငန်းများကိုစတင်ခြင်း (ဥပမာ - ရေ/ဓာတ်ငွေ့ ပိုက်လိုင်း)	ဆောက်လုပ်ရေး လုပ်ငန်းအားလုံး	ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	PMU, ကန်ထရိုက်တာ	EPGE	-
	- ဈေးဆိုင်များဖွင့်လှစ်မှုကို ယာယီ အနှောက်အယှက်ဖြစ်စေမှု	- ဈေးဆိုင်များကို အနီးဆုံး နေရာများတွင် ယာယီ ပြန်လည်နေရာချထားပေးခြင်း နှင့် ရွှေ့ပြောင်းစရိတ်ကို စီမံကိန်း အဆိုပြုသူမှ ထောက်ပံ့ရမည် (သို့) - ဈေးဆိုင်များ ဖွင့်လှစ်ရောင်းချခြင်းမရှိသော်လည်း ဆောက်လုပ်ချိန်အတွင်း ယာယီရွှေ့ပြောင်းခြင်းအတွက် ထောက်ပံ့ကြေးပေးရန်။	ဆောက်လုပ်ရေး လုပ်ငန်းအားလုံး	ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	PMU	EPGE	-
မြေယာ အသုံးချမှု နှင့် ဒေသ သယံဇာတများ ထုတ်ယူသုံးစွဲမှု	- ဆောက်လုပ်ရေးလုပ်ငန်းများ ဆောင်ရွက်စဉ်တွင် လယ်ယာမြေများတွင်	- "ဒေသစီးပွားရေး (အသက်မွေးဝမ်းကျောင်း)" ကဏ္ဍ နှင့် အတူ	ဆောက်လုပ်ရေး လုပ်ငန်းအားလုံး	ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	PMU, ကန်ထရိုက်တာ	EPGE	-

အမျိုးအစား	ဖြစ်ပေါ်နိုင်သော ဆိုးကျိုးသက်ရောက်မှု	ထိခိုက်မှု လျော့ပါးစေသော နည်းလမ်းများ	သက်ဆိုင်ရာ အချက်အလက်	သက်ဆိုင်ရာ အစိတ်အပိုင်း	အကောင်အထည် ဖော်မည့် အဖွဲ့အစည်း	တာဝန်ခံ အဖွဲ့အစည်း	အကြမ်းဖျဉ်း ခန့်မှန်း ကုန်ကျစရိတ် (USD)
	လုပ်ကိုင်ခြင်းကို အမြဲ (သို့) ယာယီ အနှောက်အယှက်ဖြစ်ပေါ်စေခြင်း						
ရေအသုံးချမှု	- စီမံကိန်းတွင် ဆောက်လုပ်ရေး ကာလအတွင်း ရေအသုံးချမှု	- "ရေ အရည်အသွေး" ကဏ္ဍ မှ ပုံစံအတိုင်း	ရေတွန်းစက် တပ်ဆင်ခြင်း	ရေပိုက်လိုင်း	ကန်ထရိုက်တာ	EPGE	-
လက်ရှိ လူမှု အဆောက်အဦးများ နှင့် ဝန်ဆောင်မှုများ	- ယာဉ်အသွားအလာများမှုကြောင့် ယာယီ ယာဉ်ကြောပိတ်ဆို့မှု ဖြစ်ပေါ်နိုင်ခြင်း - ဘုရားစေတီကဲ့သို့သော လူမှုရေး အဆောက်အဦးများသို့ သွားလာခြင်း ကန့်သတ်မှု ဖြစ်ပေါ်နိုင်ခြင်း	- စတီးပြားများကို အကာအကွယ်အဖြစ် အသုံးပြု၍ ဆောက်လုပ်ရေး ဧရိယာ ကန့်သတ်ခြင်းအားဖြင့် ကျေးရွာလမ်း ပိတ်ဆို့မှုကို ကာကွယ်ခြင်း - လူမှုရေး အဆောက်အဦးများဆီ သွားလာနိုင်ရန် လူသွားလမ်း ကို လိုအပ်သလို စီစဉ်ပေးခြင်း - အနီးဝန်းကျင်ရှိ ဒေသခံများကို ဆောက်လုပ်ရေး ဆိုင်ရာ လုပ်ငန်း များ နှင့် လုပ်ငန်း အချိန်ဇယားကို ကြိုတင် အသိပေး အကြောင်းကြားခြင်း	ဆောက်လုပ်ရေး လုပ်ငန်းအားလုံး	ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	ကန်ထရိုက်တာ	EPGE	ဆောက်လုပ် ရေးစရိတ်တွင် ပါဝင်သည်။
ကျန်းမာရေး (HIV/AIDS စသောကူးစက်ရောဂါ များ)	- စီမံကိန်းနေရာများတွင် ဆောက်လုပ်ရေး လုပ်သားများ လာရောက်နေထိုင်ခြင်းမှ ကူးစက်ရောဂါများ ဖြစ်လာနိုင်ခြေ ရှိမှု	- စီမံကိန်း အလုပ်သမားများ နှင့် အနီးဝန်းကျင် ဒေသခံများအား ကူးစက်တတ်သော ရောဂါများနှင့် ပတ်သက်သည့် အသိပညာ များ မျှဝေပေးခြင်း - အလုပ်သမားများ နာမကျန်းဖြစ်မှုကို ကာကွယ်ရန် ကျန်းမာရေးဆိုင်ရာ အသိပညာ ဗဟုသုတများ ဖြန့်ဝေပေးခြင်း	ဆောက်လုပ်ရေး လုပ်ငန်းအားလုံး	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	ကန်ထရိုက်တာ	EPGE	-
လုပ်ငန်းခွင် ကျန်းမာရေး နှင့် ဘေးကင်းလုံခြုံမှု	- ဆောက်လုပ်ရေး လုပ်ငန်းများကြောင့် ထိခိုက်ခြင်းများ ဖြစ်ပေါ်မှု မြင့်တက်လာနိုင်ခြင်း	- လုပ်ငန်းခွင် ကျန်းမာရေး နှင့် ဘေးကင်းလုံခြုံမှု ဆိုင်ရာ သင်တန်းအစီအစဉ်များ ပြုလုပ်ပေးခြင်း နှင့် အရေးပေါ် လုပ်ထုံးလုပ်နည်းများကို မျှဝေပေးခြင်း - ထိရောက်သော ကျန်းမာရေး စောင့်ရှောက်မှု အခွင့်အရေးများ နှင့် ရှေးဦးသူနာပြုစုရေး ပစ္စည်းများကို	ဆောက်လုပ်ရေး လုပ်ငန်းအားလုံး	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	ကန်ထရိုက်တာ	EPGE	ဆောက်လုပ် ရေးစရိတ်တွင် ပါဝင်သည်။

အမျိုးအစား	ဖြစ်ပေါ်နိုင်သော ဆိုးကျိုးသက်ရောက်မှု	ထိခိုက်မှု လျော့ပါးစေသော နည်းလမ်းများ	သက်ဆိုင်ရာ အချက်အလက်	သက်ဆိုင်ရာ အစိတ်အပိုင်း	အကောင်အထည် ဖော်မည့် အဖွဲ့အစည်း	တာဝန်ခံ အဖွဲ့အစည်း	အကြမ်းဖျဉ်း ခန့်မှန်း ကုန်ကျစရိတ် (USD)
		စီမံကိန်းနေရာအတွင်း ထောက်ပံ့ပေးခြင်း					
၄. အခြား							
မတော်တဆထိခိုက်မှု	- စီမံကိန်းနေရာ နှင့် စီမံကိန်းအနီးဝန်းကျင် တွင် ဆောက်လုပ်ရေး လုပ်ငန်းများကြောင့် ထိခိုက်နိုင်မှုများ မြင့်တက်လာနိုင်ခြင်း	- ထိရောက်သော ကျန်းမာရေး စောင့်ရှောက်မှု အခွင့်အရေးများ နှင့် ရှေးဦးသူနာပြုစုရေး ပစ္စည်းများကို စီမံကိန်းနေရာအတွင်း ထောက်ပံ့ပေးခြင်း - အလုပ်သမားများအား လုပ်ငန်းခွင် ကျန်းမာရေး နှင့် ဘေးကင်းလုံခြုံမှု ဆိုင်ရာ သင်တန်းအစီအစဉ်များ ပြုလုပ်ပေးခြင်း - စီမံကိန်းအနီးဝန်းကျင်လူထုများကို ဆောက်လုပ်ရေး လုပ်ငန်းများ နှင့် ဘေးကင်းလုံခြုံမှုဆိုင်ရာ သတင်းအချက်အလက် နှင့် လမ်းညွှန်ချက်များ ထောက်ပံ့ပေးခြင်း	ဆောက်လုပ်ရေး လုပ်ငန်းအားလုံး	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	ကန်ထရိုက်တာ	EPGE	ဆောက်လုပ် ရေးစရိတ်တွင် ပါဝင်သည်။
နယ်စပ်ဖြတ်ကျော် သက်ရောက်မှု နှင့် ရာသီဥတု ပြောင်းလဲခြင်း	- ဆောက်လုပ်ရေးလုပ်ငန်းများကြောင့် greenhouse gas (GHG) ထုတ်လွှတ်ခြင်းများ မြင့်တက်လာနိုင်ခြင်း	- ဆောက်လုပ်ရေး အလုပ်သမားများ နှင့် ဒရိုင်ဘာများကို ဆောက်လုပ်ရေး ယန္တယားများနှင့် ကားများကို မလိုအပ်ဘဲ အသုံးပြုခြင်း မပြုရန် အသိပညာ မျှဝေခြင်း - လုပ်ငန်း လှုပ်ရှားမှုများ အလွန်အကျွံ ပြုလုပ်ခြင်း	ဆောက်လုပ်ရေး လုပ်ငန်းအားလုံး	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	ကန်ထရိုက်တာ	EPGE	ဆောက်လုပ် ရေးစရိတ်တွင် ပါဝင်သည်။

အရင်းအမြစ်။ EIA လေ့လာရေးအဖွဲ့

ဇယား (၉) လုပ်ငန်းလည်ပတ်မှုကာလတွင် ဖြစ်ပေါ်နိုင်သော ဆိုးကျိုးသက်ရောက်မှုများ နှင့် ၎င်းတို့၏ ဆိုးကျိုးသက်ရောက်မှု လျော့ကျစေသော နည်းလမ်းများ အကျဉ်းချုပ်

အမျိုးအစား	ဖြစ်ပေါ်နိုင်သော ဆိုးကျိုးသက်ရောက်မှု	ထိရောက်မှု လျော့ပါးစေသော နည်းလမ်းများ	သက်ဆိုင်ရာ အချက်အလက်	သက်ဆိုင်ရာ အစိတ်အပိုင်း	အကောင်အထည်ဖော်မည့် အဖွဲ့အစည်း	တာဝန်ခံ အဖွဲ့အစည်း	ခန့်မှန်း ကုန်ကျစရိတ် (USD)
၁. ညစ်ညမ်းမှု							
လေ အရည်အသွေး	- ဓာတ်အားပေးစက်ရုံ လည်ပတ်ချိန်တွင် မီးခိုးခေါင်းတိုင်မှ ထုတ်လွှတ်မှုများ - ဓာတ်ငွေ့တာဘိုင်မှ ထွက်ရှိသော နိုက်ထရိုဂျင် ဒိုင်အောက်ဆိုဒ် ကို အဓိကထားပြီး စိုးရိမ်ရခြင်း၊ ယေဘုယျအားဖြင့် သဘာဝဓာတ်ငွေ့ တွင် ဆာလဖာ ဒိုင်အောက်ဆိုဒ် ပမာဏ အနည်းငယ်သာပါဝင်ပါသည်။ ထို့ကြောင့် ထုတ်လွှတ်ခြင်းတွင် ဆာလဖာဒိုင်အောက်ဆိုဒ် မပါဝင်ပါ။ ထို့အပြင် ထုတ်လွှတ်သော ဓာတ်ငွေ့ထဲတွင် အမှုန်အမွှားပါဝင်မှုမှာ သာမန်လောင်ကျွမ်းမှု အခြေအနေအောက် လျော့နည်းပါသည်။	- မီးခိုးခေါင်းတိုင် အမြင့် တပ်ဆင်၍ လေထုညစ်ညမ်းမှုပစ္စည်း ပျံ့လွင့်မှုကို လျော့ချခြင်း - မီးခိုးခေါင်းတိုင် အဝ ကို ကျဉ်းမြောင်းစေခြင်း - နိုင်ထရိုဂျင် ဒိုင်အောက်ဆိုဒ် အနည်းငယ်သာထွက်သော ဓာတ်ငွေ့ တာဘိုင်များတပ်ဆင်ခြင်း*	မီးခိုးခေါင်းတိုင်မှ ထွက်သော ဓာတ်ငွေ့	ဓာတ်အားပေး အထောက်အပံ့	EPGE	MOEE	ခေါင်းတိုင် အတွက် USD 550,000
ရေအရည်အသွေး	- ဓာတ်အားပေး စက်ရုံ နှင့် အစိတ်အပိုင်းများမှ စွန့်ပစ်မှုများကြောင့် ရေ ညစ်ညမ်းမှု ဖြစ်ပေါ်နိုင်ခြင်း	- ရေသန့်စနစ် တပ်ဆင်ခြင်း နှင့် သင့်လျော်ကောင်းမွန်သော လည်ပတ်မှုစနစ် ရှိစေခြင်း - ရေသန့်စနစ်တွင် ရောဂါပိုး	စက်ရုံအစိတ်အပိုင်း များနှင့် အိမ်သုံးရေ မှစွန့်ပစ်ရေ	ဓာတ်အားပေး အထောက်အပံ့၊	EPGE	MOEE	ရေဆိုးသန့်စင်စနစ် အတွက် USD 1,400,000

အမျိုးအစား	ဖြစ်ပေါ်နိုင်သော ဆိုးကျိုးသက်ရောက်မှု	ထိခိုက်မှု လျော့ပါးစေသော နည်းလမ်းများ	သက်ဆိုင်ရာ အချက်အလက်	သက်ဆိုင်ရာ အစိတ်အပိုင်း	အကောင်အထည်ဖော်မည့် အဖွဲ့အစည်း	တာဝန်ခံ အဖွဲ့အစည်း	ခန့်မှန်း ကုန်ကျစရိတ် (USD)
	- အလုပ်သမားများနေထိုင်ရာ နေရာများမှ အိမ်သုံးရေဆိုးများ ထွက်ရှိခြင်းကြောင့် ရေညစ်ညမ်းခြင်း	မကူးစက်နိုင်သော စနစ်များ တပ်ဆင်ခြင်း					
စွန့်ပစ်ပစ္စည်း	- ရေသန့်စနစ်မှ မြေမှုန် အစိုင်အခဲ စွန့်ပစ်ပစ္စည်းများ ထုတ်လွှတ်ခြင်း - လုပ်ငန်းလည်ပတ်ခြင်းမှ အစိုင်အခဲ စွန့်ပစ်ပစ္စည်းများ ထွက်ရှိခြင်း	- စီမံကိန်းနေရာကို သပ်ရပ်သန့်ရှင်းအောင်ထား ရှိခြင်း - စွန့်ပစ်ပစ္စည်းများကို ပြန်လည်အသုံးပြုနိုင်စေရန် ခွဲခြားစွန့်ပစ်သောစနစ် ရှိစေခြင်း - အစိုင်အခဲ စွန့်ပစ်ပစ္စည်းများ သန့်စင်ရန်နှင့် သက်ဆိုင်ရာမှ သတ်မှတ်ထား သောနေရာ တွင် စွန့်ပစ်ရန် လိုင်စင်ရ တတိယအဖွဲ့အစည်းနှင့် စာချုပ်ချုပ်၍ လုပ်ကိုင်ခြင်း - စွန်ပစ်ပစ္စည်းသိုလှောင်နေရာ များအား ပုံမှန်စစ်ဆေးခြင်း - လုပ်ငန်းမစတင်မီ တာဝန်ရှိ မြို့နယ်အာဏာပိုင်များထံမှ စဥ့်ကိုင်(သို့)ကျောက်ဆည် မြို့နယ်ရှိ အိမ်သုံးအမှိုက်များ စွန့်ပစ်ခွင့်ရယူခြင်း	စက်ရုံအစိတ်အပိုင်း များလည်ပတ်ခြင်း	ဓာတ်အားပေး အထောက်အပံ့	EPGE	MOEE	လုပ်ငန်းလည်ပတ် စရိတ်တွင် ပါဝင်သည်။
ဆူညံသံ နှင့် တုန်ခါမှု	- ဓာတ်အားပေးစက်ရုံ လည်ပတ်ခြင်းမှ ဆူညံသံ နှင့် တုန်ခါမှု ထွက်ရှိခြင်း။	- ဓာတ်ငွေ့ နှင့် ရေနွေးငွေ့ တာဘိုင်များ လည်ပတ်ခြင်းတွင် အသံလုံ စေရန် အသံလုံ စနစ် တပ်ဆင်ခြင်း - ဓာတ်အားပေးစက်ရုံကို ခိုင်မာသော အောက်ခြေဖြင့် တည်ဆောက်ပြီး တုန်ခါမှုကို လျော့နည်းစေခြင်း *	စက်ရုံအစိတ်အပိုင်း များလည်ပတ်ခြင်း	ဓာတ်အားပေး အထောက်အပံ့	EPGE	MOEE	ရေနွေးငွေ့စက် အသံလုံမှု အတွက် USD 370,000
အနံ့ဆိုး	- ရေဆိုးသန့်စင်မှု လုပ်ငန်းမှ	- ရေဆိုးသန့်စင်မှု လုပ်ငန်းကို	စက်ရုံအစိတ်အပိုင်း	ဓာတ်အားပေး	EPGE	MOEE	လုပ်ငန်းလည်ပတ်

အမျိုးအစား	ဖြစ်ပေါ်နိုင်သော ဆိုးကျိုးသက်ရောက်မှု	ထိခိုက်မှု လျော့ပါးစေသော နည်းလမ်းများ	သက်ဆိုင်ရာ အချက်အလက်	သက်ဆိုင်ရာ အစိတ်အပိုင်း	အကောင်အထည်ဖော်မည့် အဖွဲ့အစည်း	တာဝန်ခံ အဖွဲ့အစည်း	ခန့်မှန်း ကုန်ကျစရိတ် (USD)
	အနံ့ဆိုးများ ထွက်ရှိခြင်း	အချိန်မှန်မှန် ထိန်းသိမ်းမှုပြုလုပ်ခြင်း - စောင့်ကြည့်လေ့လာရာမှ တွေ့ရှိသော ရလဒ်များကို ပြန်လည်တင်ပြခြင်း နှင့် တုန့်ပြန်မှုများ ပြုလုပ်ခြင်း - အနံ့ဆိုးများ ပျံ့လွင့်မှုကို ထိန်းချုပ်ရန် စွန့်ပစ်ပစ္စည်းများ စွန့်ပစ်ရာနေရာကို အကာအကွယ်များ ထားရှိခြင်း	များမှစွန့်ပစ်ရေ	အထောက်အပံ့			စရိတ်တွင် ပါဝင်သည်။
၂. သဘာဝပတ်ဝန်းကျင်							
အပင်၊ သတ္တဝါ နှင့် ဇီဝမျိုးစုံမျိုးကွဲ	- မြစ်ငယ်မြစ်အတွင်းသို့ ရေဆိုးထုတ်လွှတ်မှုကြောင့် ရေနေသတ္တဝါများကို ထိခိုက်မှုဖြစ်စေခြင်း	- ရေဆိုးသန့်စင်မှုစနစ် ထားရှိခြင်း နှင့် သင့်လျော်သော လည်ပတ်မှု ရှိခြင်း	စက်ရုံအစိတ်အပိုင်း များနှင့် အိမ်သုံးရေ မှစွန့်ပစ်ရေ	ဓာတ်အားပေး အထောက်အပံ့	EPGE	MOEE	ရေဆိုးသန့်စင် စနစ်ထားရှိခြင်းသည် ရေအရည်အသွေး တိုင်းတာမှု နှင့်တူညီသည်။
ဇလဗေဒ	- စီမံကိန်းနေရာမှ ရေစီးဆင်းမှု များပြားလာခြင်း	- လုံလောက်သော ပမာဏဂင်ဆံ့သည့် ရေကန်ထားရှိခြင်း	စီမံကိန်းနေရာမှ စီးဆင်းရေ	ဓာတ်အားပေး အထောက်အပံ့	ကန်ထရိုက်တာ	EPGE	ရေကန်အတွက် USD 150,000
၃. လူမှုပတ်ဝန်းကျင်							
ရေအသုံးချမှု	- ဓာတ်အားပေး စက်ရုံမှ ရေဆိုးများ မြစ်ငယ်မြစ်အတွင်းသို့ စွန့်ထုတ်ခြင်း	- ရေဆိုးသန့်စင်မှုစနစ် ထားရှိခြင်း နှင့် သင့်လျော်သော လည်ပတ်မှု ရှိခြင်း	စက်ရုံအစိတ်အပိုင်း များနှင့် အိမ်သုံးရေ မှစွန့်ပစ်ရေ	ဓာတ်အားပေး အထောက်အပံ့	EPGE	MOEE	ရေဆိုးသန့်စင် စနစ်ထားရှိခြင်းသည် ရေအရည်အသွေး တိုင်းတာမှု နှင့်တူညီသည်။
လူမှုရေးအဆောက်အဦးများ နှင့် ဝန်ဆောင်မှုများ	- အနီးနားဝန်းကျင်ရှိ ကျောင်းများအပေါ် ဆူညံသံ ထိခိုက်မှု ဖြစ်ပေါ်နိုင်ခြေရှိခြင်း	- ဓာတ်ငွေ့ နှင့် ရေနွေးငွေ့ တာဘိုင်များ လည်ပတ်ခြင်းတွင် အသံလုံ စေရန် အသံလုံ စနစ် တပ်ဆင်ခြင်း	စက်ရုံအစိတ်အပိုင်း များလည်ပတ် ခြင်းမှ ဆူညံသံ	ဓာတ်အားပေး အထောက်အပံ့	EPGE	MOEE	ဆူညံသံ လျော့ပါးစေရန် အသံလုံ စနစ်ထား ရှိမည်။
ယဉ်ကျေးမှု အမွေအနှစ်	- ဆောက်လုပ်ရေးဆိုင်ရာ စက်ယန္တရားများ နှင့်	- အသံဆူညံမှု နှင့် တုန်ခါခြင်း ကဏ္ဍတွင်	စက်ရုံအစိတ်အပိုင်း များလည်ပတ်	ဓာတ်အားပေး အထောက်အပံ့	EPGE	MOEE	အသံဆူညံမှု နှင့် တုန်ခါခြင်း ကဏ္ဍတွင်

အမျိုးအစား	ဖြစ်ပေါ်နိုင်သော ဆိုးကျိုးသက်ရောက်မှု	ထိခိုက်မှု လျော့ပါးစေသော နည်းလမ်းများ	သက်ဆိုင်ရာ အချက်အလက်	သက်ဆိုင်ရာ အစိတ်အပိုင်း	အကောင်အထည်ဖော်မည့် အဖွဲ့အစည်း	တာဝန်ခံ အဖွဲ့အစည်း	ခန့်မှန်း ကုန်ကျစရိတ် (USD)
	စက်ပစ္စည်းများ အသံဆူညံခြင်းကြောင့်၊ ယဉ်ကျေးမှု အမွေအနှစ် (ဘုရားများ) ဘာသာရေးဆိုင်ရာ လှုပ်ရှားမှုများတွင် သက်ရောက်နိုင်သည်။	ဆောင်ရွက်သည့်အတိုင်း	ခြင်းမှ ဆူညံသံ				ဆောင်ရွက်သည့်အတိုင်း
မြင်ကွင်း	- ဓာတ်အားပေး စက်ရုံအစိတ်အပိုင်းများကြောင့် ပတ်ဝန်းကျင်ဒေသရှိ မြင်ကွင်းများအပေါ် ဆိုးကျိုးသက်ရောက်မှု ဖြစ်စေနိုင်ခြင်း	- စီမံကိန်းနေရာဝန်းကျင် တွင် လက်ရှိ/ပေါက်ရောက် နေသော အပင်များ သင့်လျော်စွာ ထိန်းသိမ်းထားခြင်း	အဓိက စက်ရုံ ခေါင်းတိုင်	ဓာတ်အားပေး အထောက်အပံ့	EPGE	MOEE	လုပ်ငန်းလည်ပတ် စရိတ်တွင် ပါဝင်သည်။
ကျားမ အခြေအနေ	- အလုပ်အကိုင်အခွင့်အလမ်းများ တွင် ကျားမ ခွဲခြားမှု ရှိနိုင်ခြင်း	- အစိုးရ၏ မူဝါဒများ နှင့် အညီ ညီမျှသော အလုပ်အကိုင်အခွင့်အလမ်းများ ဖန်တီးပေးခြင်း	အလုပ်အကိုင်များ အားလုံး	ဓာတ်အားပေး အထောက်အပံ့	EPGE	MOEE	-
ကလေးသူငယ်အခွင့်အရေး	- စီမံကိန်းနှင့်ပတ်သက်သည့် လုပ်ငန်းများ လည်ပတ်မှု နှင့် ထိန်းသိမ်းမှု လုပ်ငန်းများတွင် ကလေးအလုပ်သမားများ ခန့်ထားမှု ရှိနိုင်ခြင်း	- ပေါ့ပါးသော အလုပ်များပင် ဖြစ်စေကာမူ ယင်းလုပ်ငန်းများတွင် ကလေးသူငယ်များကို ခန့်ထားခြင်းကို တားမြစ်ခြင်း - သက်ဆိုင်ရာ အဖွဲ့အစည်းများတွင် ကလေးသူငယ်အလုပ်ခန့်ထားခြင်း ဆိုင်ရာ အသိပညာများကို မျှဝေခြင်း	အလုပ်အကိုင်များ အားလုံး	ဓာတ်အားပေး အထောက်အပံ့	EPGE	MOEE	-
ကျန်းမာရေး (HIV/AIDS စသောကူးစက်ရောဂါ များ)	- ထုတ်လွှတ်ဓာတ်ငွေ့နှင့် စွန့်ပစ်ရေများကြောင့် လူထု ကျန်းမာရေးအား ထိခိုက်နိုင်ခြင်း	- မီးခိုးခေါင်းတိုင် အမြင့် တပ်ဆင်၍ လေထုညစ်ညမ်းမှုပစ္စည်း ပျံ့လွင့်မှုကို လျော့ချခြင်း - မီးခိုးခေါင်းတိုင် အဝ ကို ကျဉ်းမြောင်းစေခြင်း - နိုင်ထရိုဂျင် ဒိုင်အောက်ဆိုဒ်	မီးခိုးခေါင်းတိုင်မှ ထွက်သော ဓာတ်ငွေ့ စက်ရုံအစိတ်အပိုင်း များနှင့် အိမ်သုံးရေ မှစွန့်ပစ်ရေ	ဓာတ်အားပေး အထောက်အပံ့	EPGE	MOEE	-

အမျိုးအစား	ဖြစ်ပေါ်နိုင်သော ဆိုးကျိုးသက်ရောက်မှု	ထိခိုက်မှု လျော့ပါးစေသော နည်းလမ်းများ	သက်ဆိုင်ရာ အချက်အလက်	သက်ဆိုင်ရာ အစိတ်အပိုင်း	အကောင်အထည်ဖော်မည့် အဖွဲ့အစည်း	တာဝန်ခံ အဖွဲ့အစည်း	ခန့်မှန်း ကုန်ကျစရိတ် (USD)
		အနည်းငယ်သာထွက်သော ဓာတ်ငွေ့ တာဘိုင်များတပ်ဆင်ခြင်း* - ရေသန့်စနစ် တပ်ဆင်ခြင်း နှင့် သင့်လျော်ကောင်းမွန်သော လည်ပတ်မှုစနစ် ရှိစေခြင်း - ရေသန့်စနစ်တွင် ရောဂါပိုး မကူးစက်နိုင်သော စနစ်များ တပ်ဆင်ခြင်း					
လုပ်ငန်းခွင် ကျန်းမာရေး နှင့် ဘေးကင်းလုံခြုံမှု	- ဓာတ်အားပေးစက်ရုံ လည်ပတ်ခြင်း နှင့် ထိန်းသိမ်းရေး လုပ်ငန်းများကြောင့် ထိခိုက်မှုများ ဖြစ်ပေါ်နိုင်ခြင်း	- လုပ်ငန်းခွင် ကျန်းမာရေး နှင့် ဘေးကင်းလုံခြုံမှု ဆိုင်ရာ သင်တန်းအစီအစဉ်များ ပြုလုပ်ပေးခြင်း နှင့် အရေးပေါ် လုပ်ထုံးလုပ်နည်းများကို မျှဝေပေးခြင်း - ထိရောက်သော ကျန်းမာရေး စောင့်ရှောက်မှု အခွင့်အရေးများ နှင့် ရှေးဦးသူနာပြုစုရေး ပစ္စည်းများကို စီမံကိန်းနေရာအတွင်း ထောက်ပံ့ပေးခြင်း	အလုပ်သမားများ ၏ လုပ်ဆောင်မှု အားလုံး	ဓာတ်အားပေး အထောက်အပံ့	EPGE	MOEE	လုပ်ငန်းလည်ပတ် စားရိတ်တွင် ပါဝင်သည်။
၄. အခြား							
မတော်တဆထိခိုက်မှု	- အန္တရာယ်ရှိသော ပစ္စည်းများ ကိုင်တွယ်အသုံးပြုခြင်း နှင့် သိုလှောင်ခြင်းကြောင့် ထိခိုက်မှုများ ဖြစ်ပေါ်နိုင်ခြင်း	- ဓာတ်အားပေးစက်ရုံ လည်ပတ်မှုကြောင့် ထိခိုက်မှုများ ဖြစ်ပေါ်ခြင်းမှ ကာကွယ်ရန် လုပ်ငန်းခွင်အတွင်း ဘေးကင်းလုံခြုံမှု စံချိန်စံညွှန်းများ ထားရှိခြင်း	အလုပ်သမားများ ၏ လုပ်ဆောင်မှု အားလုံး	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း	EPGE	MOEE	-
နယ်စပ်ဖြတ်ကျော် သက်ရောက်မှု နှင့် ရာသီဥတု ပြောင်းလဲခြင်း	- ဓာတ်အားပေးစက်ရုံ လည်ပတ်ခြင်းကြောင့် greenhouse gas (GHG) ထုတ်လွှတ်ခြင်းများ	- combined cycle system ကို မြင့်မားသော စွမ်းဆောင်ရည်ရှိအောင် စီစဉ်ထားရှိခြင်း	အဓိက တာဘိုင် ခေါင်းတိုင်မှ ထွက်သော ဓာတ်ငွေ့	ဓာတ်အားပေး အထောက်အပံ့	EPGE	MOEE	-

အမျိုးအစား	ဖြစ်ပေါ်နိုင်သော ဆိုးကျိုးသက်ရောက်မှု	ထိခိုက်မှု လျော့ပါးစေသော နည်းလမ်းများ	သက်ဆိုင်ရာ အချက်အလက်	သက်ဆိုင်ရာ အစိတ်အပိုင်း	အကောင်အထည်ဖော်မည့် အဖွဲ့အစည်း	တာဝန်ခံ အဖွဲ့အစည်း	ခန့်မှန်း ကုန်ကျစရိတ် (USD)
	မြင့်တက်လာနိုင်ခြင်း	- လုပ်ငန်းခွင်အတွင်း လျှပ်စစ်နှင့် စွမ်းအင်ချွေတာခြင်း					

*ယင်း ထိခိုက်သက်သက်မှုလျော့ပါးစေသောနည်းလမ်းများကို စီမံကိန်းပုံစံရေးဆွဲစဉ်က ထည့်သွင်းရေးဆွဲထားပြီး၊ ဆောက်လုပ်ရေးကာလတွင် အကောင်အထည်ဖော်ပါသည်။

အရင်းအမြစ်။ EIA လေ့လာရေးအဖွဲ့

ဇယား (၁၀) လုပ်ငန်းရပ်တန့်ခြင်း၊ ပိတ်သိမ်းခြင်းနှင့် ပိတ်သိမ်းပြီးနောက်ပိုင်းကာလတွင် ဖြစ်ပေါ်နိုင်သော ဆိုးကျိုးသက်ရောက်မှုများ နှင့် ၎င်းတို့၏ ဆိုးကျိုးသက်ရောက်မှု လျော့ကျစေသော နည်းလမ်းများ အကျဉ်းချုပ်

အမျိုးအစား	ဖြစ်ပေါ်နိုင်သော ဆိုးကျိုးသက်ရောက်မှု	ထိခိုက်မှု လျော့ပါးစေသော နည်းလမ်းများ	သက်ဆိုင်ရာ အချက်အလက်	သက်ဆိုင်ရာ အစိတ်အပိုင်း	အကောင်အထည်ဖော်မည့် အဖွဲ့အစည်း	တာဝန်ခံ အဖွဲ့အစည်း	ခန့်မှန်းကုန်ကျစရိတ် (USD)
၁. ညစ်ညမ်းမှု							
လေအရည်အသွေး	- မြေအစိုင်အခဲများကိုကိုင်တွယ်အသုံးပြုရာမှဖုန်မှုန့်/မြေမှုန့်များ ယာယီထွက်လာခြင်း - စွန့်ပစ်ပစ္စည်း သယ်ယူပို့ဆောင်ရေးလုပ်ငန်းများ ဆောင်ရွက်သောအခါ ဖုန်မှုန့်များ ယာယီအားဖြင့် မြင့်တက်လာနိုင်ခြင်း	- ဆောက်လုပ်ရေး စက်ယန္တရားများကို များပြားစွာ တစ်ပြိုင်တည်း အသုံးပြုခြင်းမှ ရှောင်ကြဉ်ခြင်း - အဆောက်အဦးဖြိုဖျက်ခြင်း လုပ်ငန်းများကို လေတိုက်အားပြင်းသောအခါ လုပ်ဆောင်ခြင်းမှ ရှောင်ကြဉ်ခြင်း - အဆောက်အဦး ဖြိုဖျက်ခြင်း ပြုလုပ်သည့် နေရာတွင် ရေဖြန်းခြင်း - မြေကားများကို ဆေးကြောမှု စနစ်တစ်ခု ထားရှိခြင်း	ဖြိုဖျက်ခြင်း လုပ်ငန်းများ အားလုံး	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	အဆောက်အဦးဖြိုဖျက်ခြင်းဆိုင်ရာ ကန်ထရိုက်တာ	EPGE	ကားဆေးသည့် စနစ် အတွက် လစဉ် USD500 လမ်းများ ရေဖြန်းခြင်း အတွက် လစဉ် USD3,500
ရေအရည်အသွေး	- မြစ်ငယ်မြစ်မှ ရေသွယ်ယူခြင်း လုပ်ငန်းနေရာ ဖြိုဖျက်ခြင်းကြောင့် ဖြစ်ပေါ်လာသော ရေညစ်ညမ်းမှု (ရွံ့ရေ)	- စတီးပိုက်များကို Coffer dam တွင် တပ်ဆင်အသုံးပြုခြင်း - Coffer dam ပတ်လည်တွင် နံ့ကို စစ်ထုတ်သော အကာအကွယ်များ အသုံးပြုခြင်း - လုပ်ငန်းဆောင်ရွက်ရာ နေရာအတွင်း ရေအသုံးချမှု	ရေသွယ်ယူခြင်း လုပ်ငန်းနေရာ ဖြိုဖျက်ခြင်း	ရေပိုက်လိုင်း	အဆောက်အဦးဖြိုဖျက်ခြင်းဆိုင်ရာ ကန်ထရိုက်တာ	EPGE	အတွက် USD 166,000 နုန်းတား အတွက် USD 36,000 အနည်ထိုင် ကန်

အမျိုးအစား	ဖြစ်ပေါ်နိုင်သော ဆိုးကျိုးသက်ရောက်မှု	ထိခိုက်မှု လျော့ပါးစေသော နည်းလမ်းများ	သက်ဆိုင်ရာ အချက်အလက်	သက်ဆိုင်ရာ အစိတ်အပိုင်း	အကောင်အထည်ဖော်မည့် အဖွဲ့အစည်း	တာဝန်ခံ အဖွဲ့အစည်း	ခန့်မှန်းကုန်ကျစရိတ် (USD)
		အတွက် ယာယီ နံး အနည်ထိုင်ကန်များ တည်ဆောက်အသုံးပြုခြင်း					အတွက် USD 3,000
စွန့်ပစ်ပစ္စည်း	- အဆောက်အဦး ဖြိုဖျက်ခြင်း လုပ်ငန်းများမှ စွန့်ပစ်ပစ္စည်းများ ထွက်ရှိခြင်း	- အဆောက်အဦးဖြိုဖျက်ရာ နေရာကို သေသပ်စွာ ထားရှိခြင်း - စွန့်ပစ်မြေများကို ပြန်လည်အသုံးပြု ခြင်းကို အားပေးရန် သီးသန့်အမှိုက်ပုံရာ နေရာများထားရှိခြင်း - ကန်ထရိုက်တာသည် ဓာတ်အားပေး စက်ရုံနေရာသို့သယ်ယူမည့် မြေကြီးမှ လွှဲ၍ ရေပိုက်လိုင်းနှင့် ဓာတ်ငွေ့ ပိုင်းလိုင်းတည်ဆောက်ခြင်းမှ ထွက်ရှိ လာသော အစိုင်အခဲစွန့်ပစ်ပစ္စည်းများကို သယ်ဆောင်သင့်သည်။ - စွန့်ပစ်ပစ္စည်းသိုလှောင်ရာနေရာ တွင် အမျိုးအစားခွဲခြားခြင်းအား ပုံမှန် စစ် ဆေးခြင်း - ကန်ထရိုက်တာသည် မိမိကိုယ်တိုင် (သို့) တတိယအဖွဲ့အစည်းမှ ထပ်မံအသုံးပြုနိုင်အောင် မလုပ်ဆောင်နိုင်သော စွန့်ပစ်ပစ္စည်းများ အား သက်ဆိုင်ရာဥပဒေအတိုင်း စွန့်ပစ်ရမည်။	ဖြိုဖျက်ခြင်း လုပ်ငန်းများ အားလုံး	ဓာတ်အားပေး အဆောက်အအုံ၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	အဆောက်အဦးဖြိုဖျက်ခြင်း ဆိုင်ရာ ကန်ထရိုက်တာ	EPGE	ဖြိုဖျက်ခြင်း လုပ်ငန်း ကုန်ကျစရိတ် တွင်ပါဝင်သည်။
ဆူညံသံ နှင့် တုန်ခါမှု	- ဆောက်လုပ်ရေး လုပ်ငန်းများ နှင့် ပစ္စည်းများ ကိုင်တွယ် အသုံးပြုခြင်းမှ ဆူညံသံ နှင့် တုန်ခါမှုများ ဖြစ်ပေါ်စေခြင်း - မြေသယ်ကားများဖြင့် မြေကြီးများ	- ဆောက်လုပ်ရေး ဆိုင်ရာ စက်ယန္တရားများကို စုပြုံ အသုံးပြုခြင်းမှ ရှောင်ကြဉ်ခြင်း - ဆောက်လုပ်ရေး လုပ်ငန်းများ လုပ်ဆောင်ချိန် ကို	ဖြိုဖျက်ခြင်း လုပ်ငန်းများ အားလုံး	ဓာတ်အားပေး အဆောက်အအုံ၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	အဆောက်အဦးဖြိုဖျက်ခြင်း ဆိုင်ရာ ကန်ထရိုက်တာ	EPGE	ယာယီ အလုံပိတ် နံရံ အတွက် USD 77,000

အမျိုးအစား	ဖြစ်ပေါ်နိုင်သော ဆိုးကျိုးသက်ရောက်မှု	ထိခိုက်မှု လျော့ပါးစေသော နည်းလမ်းများ	သက်ဆိုင်ရာ အချက်အလက်	သက်ဆိုင်ရာ အစိတ်အပိုင်း	အကောင်အထည်ဖော်မည့် အဖွဲ့အစည်း	တာဝန်ခံ အဖွဲ့အစည်း	ခန့်မှန်းကုန်ကျစရိတ် (USD)
	သယ်ယူပို့ဆောင်ရာမှ ဆူညံသံနှင့် တုန်ခါမှုများ ဖြစ်ပေါ်စေခြင်း	သတ်မှတ်ထားခြင်း (ဥပမာ - နေ့အချိန်၊ ၇း၀၀ မှ ၂၂း၀၀ထိ) - လုပ်ငန်းဆောင်ရွက်သူများအနေဖြင့် ငြင်သာစွာ ဆောင်ရွက်ကြရန် နှိုးဆော်ခြင်း - ဆောက်လုပ်ရေး လုပ်ငန်းများ ဆောင်ရွက်ချိန်အတွင်း တောင်ဘက် နှင့် အရှေ့ဘက်ကို ယာယီ အကာအကွယ်နံရံများ တည်ဆောက်တပ်ဆင်ခြင်း					
၂. သဘာဝပတ်ဝန်းကျင်							
အပင်၊ သတ္တဝါ နှင့် ဇီဝမျိုးစုံမျိုးကွဲ	- ဆောက်လုပ်ရေးလုပ်ငန်းများကြောင့် အပင်များ ပြောင်းလဲပျက်စီးနိုင်ခြင်း - စီမံကိန်းလုပ်ငန်းများကြောင့် ကျက်စားရာဒေသများ ဆုံးရှုံးခြင်း နှင့်/သို့မဟုတ် အရေးပါသော မျိုးစိတ်များ ဆုံးရှုံးမှုဖြစ်ပေါ်ခြင်း - စီမံကိန်းကြောင့် ဇီဝမျိုးစုံမျိုးကွဲ နှင့် ဂေဟစနစ်အပေါ် သက်ရောက်မှု ဖြစ်ပေါ်ခြင်း	- ရေသတ္တဝါများအတွက် “ရေအရည်အသွေး” ကဏ္ဍ တွင် ဆောင်ရွက်သကဲ့သို့ ဆောင်ရွက်ပေးခြင်း - စုပုံထားရန်နေရာအတွက် သစ်ပင်ငယ်များအား ရှင်းလင်းခြင်းစသော မြေမျက်နှာသွင်ပြင်ပြောင်းလဲမှုများအား လျော့ချခြင်း	ဖြိုဖျက်ခြင်း လုပ်ငန်းများ အားလုံး	ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	အဆောက်အဦးဖြိုဖျက်ခြင်း ဆိုင်ရာ ကန်ထရိုက်တာ	EPGE	ကန်ထရိုက် စရိတ် တွင်ပါဝင်သည်။
၃. လူမှုပတ်ဝန်းကျင်							
ဆင်းရဲမွဲတေမှု	- ဓာတ်အားပေးစက်ရုံလည်ပတ်ခြင်း နှင့် ထိန်းသိမ်းခြင်းနှင့် သက်ဆိုင်သည့် အလုပ်အကိုင်အခွင့်အလမ်းများ ဆုံးရှုံးခြင်း	- ကျွမ်းကျင်မှုမလိုအပ်သော လုပ်ငန်းများတွင် ဒေသခံများကို ဦးစားပေး ခန့်ထားခြင်း	အလုပ်အကိုင်များ အားလုံး	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	အဆောက်အဦးဖြိုဖျက်ခြင်း ဆိုင်ရာ ကန်ထရိုက်တာ	EPGE	-
ဒေသစီးပွားရေး (အသက်မွေးဝမ်းကြောင်း)	- ဓာတ်အားပေးစက်ရုံလည်ပတ်ခြင်း နှင့် ထိန်းသိမ်းခြင်းနှင့် သက်ဆိုင်သည့် အလုပ်အကိုင်အခွင့်အလမ်းများ ဆုံးရှုံးခြင်း	- ကျွမ်းကျင်မှုမလိုအပ်သော လုပ်ငန်းများတွင် ဒေသခံများကို ဦးစားပေး ခန့်ထားခြင်း	အလုပ်အကိုင်များ အားလုံး	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	အဆောက်အဦးဖြိုဖျက်ခြင်း ဆိုင်ရာ ကန်ထရိုက်တာ	EPGE	-
ရေအသုံးချမှု	- မြစ်ငယ်မြစ်မှ ရေသွယ်ယူခြင်း လုပ်ငန်းနေရာ ဖြိုဖျက်ခြင်း	- “ရေအရည်အသွေး” ကဏ္ဍ တွင် ဆောင်ရွက်သည့်အတိုင်း	ရေယူချင်း အထောက်အပံ့များ	ရေပိုက်လိုင်း	အဆောက်အဦးဖြိုဖျက်ခြင်း ဆိုင်ရာ ကန်ထရိုက်တာ	EPGE	“ရေအရည်အသွေး” ကဏ္ဍ အတိုင်း

အမျိုးအစား	ဖြစ်ပေါ်နိုင်သော ဆိုးကျိုးသက်ရောက်မှု	ထိခိုက်မှု လျော့ပါးစေသော နည်းလမ်းများ	သက်ဆိုင်ရာ အချက်အလက်	သက်ဆိုင်ရာ အစိတ်အပိုင်း	အကောင်အထည်ဖော်မည့် အဖွဲ့အစည်း	တာဝန်ခံ အဖွဲ့အစည်း	ခန့်မှန်းကုန်ကျစရိတ် (USD)
	ကြောင့် ဖြစ်ပေါ်လာသော ရေအသုံးချမှု		ဖြိုဖျက်ခြင်း လုပ်ငန်းများ အားလုံး				
ယဉ်ကျေးမှု အမွေအနှစ်	- ဆောက်လုပ်ရေးဆိုင်ရာ စက်ယန္တရားများ နှင့် စက်ပစ္စည်းများ အသံဆူညံခြင်းကြောင့်၊ ယဉ်ကျေးမှု အမွေအနှစ် (ဘုရားများ) ဘာသာရေးဆိုင်ရာ လှုပ်ရှားမှုများတွင် သက်ရောက်နိုင်သည်။	- အသံဆူညံမှု နှင့် တုန်ခါခြင်း ကဏ္ဍတွင် ဆောင်ရွက်သည့်အတိုင်း	ဖြိုဖျက်ခြင်း လုပ်ငန်းများ အားလုံး	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	အဆောက်အဦးဖြိုဖျက်ခြင်း ဆိုင်ရာ ကန်ထရိုက်တာ	EPGE	-
မြင်ကွင်း	- ဆောက်လုပ်ရေးဆိုင်ရာ စက်ယန္တရားများ နှင့် စက်ပစ္စည်းများ ကြောင့် အမြင် အနှောက်အယှက်များ ယာယီ သက်ရောက်မှု ရှိနိုင်သည်။	- ဆောက်လုပ်ရေး လုပ်ငန်းများ ဆောင်ရွက်ချိန်အတွင်း တောင်ဘက် နှင့် အရှေ့ဘက်ကို ယာယီ အကာအကွယ်နံရံများ တည်ဆောက်တပ်ဆင်ခြင်း	အဓိက ဆောက်လုပ်ရေး ယန္တရားများနှင့် သိုလှောင်အမိုက် များ	ဓာတ်အားပေး အထောက်အပံ့	အဆောက်အဦးဖြိုဖျက်ခြင်း ဆိုင်ရာ ကန်ထရိုက်တာ	EPGE	ဆူညံသံ လျော့ပါးစေရန် ယာယီ အလုံပိတ် နံရံများတပ်ဆင်မည်။
ကျား၊မ အခြေအနေ	- အလုပ်အခွင့်အလမ်းတွင် ကျား၊မ ဆိုင်ရာ ခွဲခြားမှု ရှိလာနိုင်ခြင်း	- ကျား၊ မ မခွဲခြားဘဲ အလုပ်အကိုင်အခွင့်အလမ်းများ ထောက်ပံ့ပေးခြင်း	အလုပ်အကိုင်များ အားလုံး	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	အဆောက်အဦးဖြိုဖျက်ခြင်း ဆိုင်ရာ ကန်ထရိုက်တာ	EPGE	-
ကလေးသူငယ် အခွင့်အရေး	- ဆောက်လုပ်ရေး ဆိုင်ရာ လုပ်ငန်းများတွင် ကလေး အလုပ်သမားများ ခန့်ထား သုံးစွဲနိုင်ချေရှိမှု	- တင်ဒါ အချက်အလက်များတွင် ကလေးသူငယ် အလုပ်ခန့်ထားရေး နှင့် ပတ်သက်သည့် အချက်အလက်ကိုပါ ထည့်သွင်းပြုစုခြင်း	အလုပ်အကိုင်များ အားလုံး	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	အဆောက်အဦးဖြိုဖျက်ခြင်း ဆိုင်ရာ ကန်ထရိုက်တာ	EPGE	-
ကျန်းမာရေး (လူထုကျန်းမာ ရေး၊ HIV/AIDS နှင့်ကူးစက် ရောဂါ များ)	- စီမံကိန်းနေရာများတွင် ဆောက်လုပ်ရေး လုပ်သားများ လာရောက်နေထိုင်ခြင်းမှ ကူးစက်ရောဂါများ ဖြစ်လာနိုင်ခြေ ရှိမှု	- စီမံကိန်း အလုပ်သမားများ နှင့် အနီးဝန်းကျင် ဒေသခံများအား ကူးစက်တတ်သော ရောဂါများနှင့် ပတ်သက်သည့် အသိပညာ များ မျှဝေပေးခြင်း - အလုပ်သမားများ နာမကျန်းဖြစ်မှုကို ကာကွယ်ရန် ကျန်းမာရေးဆိုင်ရာ အသိပညာ	ဖြိုဖျက်ခြင်း လုပ်ငန်းများ အားလုံး	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	အဆောက်အဦးဖြိုဖျက်ခြင်း ဆိုင်ရာ ကန်ထရိုက်တာ	EPGE	-

အမျိုးအစား	ဖြစ်ပေါ်နိုင်သော ဆိုးကျိုးသက်ရောက်မှု	ထိခိုက်မှု လျော့ပါးစေသော နည်းလမ်းများ	သက်ဆိုင်ရာ အချက်အလက်	သက်ဆိုင်ရာ အစိတ်အပိုင်း	အကောင်အထည်ဖော်မည့် အဖွဲ့အစည်း	တာဝန်ခံ အဖွဲ့အစည်း	ခန့်မှန်းကုန်ကျစရိတ် (USD)
		ဗဟုသုတများ ဖြန့်ဝေပေးခြင်း					
လုပ်ငန်းခွင် ကျန်းမာရေး နှင့် ဘေးကင်းလုံခြုံမှု	- ဖြိုဖျက်ခြင်း လုပ်ငန်းများကြောင့် ထိခိုက်ခြင်းများ ဖြစ်ပေါ်မှု မြင့်တက်လာနိုင်ခြင်း	- လုပ်ငန်းခွင် ကျန်းမာရေး နှင့် ဘေးကင်းလုံခြုံမှု ဆိုင်ရာ သင်တန်းအစီအစဉ်များ ပြုလုပ်ပေးခြင်း နှင့် အရေးပေါ် လုပ်ထုံးလုပ်နည်းများကို မျှဝေပေးခြင်း - ထိရောက်သော ကျန်းမာရေး စောင့်ရှောက်မှု အခွင့်အရေးများ နှင့် ရှေးဦးသူနာပြုစုရေး ပစ္စည်းများကို စီမံကိန်းနေရာအတွင်း ထောက်ပံ့ပေးခြင်း	ဖြိုဖျက်ခြင်း လုပ်ငန်းများ အားလုံး	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	အဆောက်အဦးဖြိုဖျက်ခြင်း ဆိုင်ရာ ကန်ထရိုက်တာ	EPGE	ကန်ထရိုက် စရိတ် တွင်ပါဝင်သည်။
၄. အခြား							
မတော်တဆ ထိခိုက်မှု	- စီမံကိန်းနေရာ နှင့် စီမံကိန်းအနီးဝန်းကျင် တွင် ဖြိုဖျက်ခြင်း လုပ်ငန်းများကြောင့် ထိခိုက်နိုင်မှုများ မြင့်တက်လာနိုင်ခြင်း	- ထိရောက်သော ကျန်းမာရေး စောင့်ရှောက်မှု အခွင့်အရေးများ နှင့် ရှေးဦးသူနာပြုစုရေး ပစ္စည်းများကို စီမံကိန်းနေရာအတွင်း ထောက်ပံ့ပေးခြင်း - အလုပ်သမားများအား လုပ်ငန်းခွင် ကျန်းမာရေး နှင့် ဘေးကင်းလုံခြုံမှု ဆိုင်ရာ သင်တန်းအစီအစဉ်များ ပြုလုပ်ပေးခြင်း - စီမံကိန်းအနီးဝန်းကျင်လူထုများ ကို ဆောက်လုပ်ရေး လုပ်ငန်းများ နှင့် ဘေးကင်းလုံခြုံမှုဆိုင်ရာ သတင်းအချက်အလက် နှင့် လမ်းညွှန်ချက်များ ထောက်ပံ့ပေးခြင်း	ဖြိုဖျက်ခြင်း လုပ်ငန်းများ အားလုံး	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	အဆောက်အဦးဖြိုဖျက်ခြင်း ဆိုင်ရာ ကန်ထရိုက်တာ	EPGE	ကန်ထရိုက် စရိတ် တွင်ပါဝင်သည်။
နယ်စပ်ဖြတ်ကျော် သက်ရောက်မှု နှင့်	- ဆောက်လုပ်ရေးလုပ်ငန်းများ ကြောင့် greenhouse gas	- ဆောက်လုပ်ရေး အလုပ်သမားများ နှင့်	ဖြိုဖျက်ခြင်း လုပ်ငန်းများ အားလုံး	ဓာတ်အားပေး အထောက်အပံ့၊	အဆောက်အဦးဖြိုဖျက်ခြင်း ဆိုင်ရာ ကန်ထရိုက်တာ	EPGE	စာချုပ်စားရိတ် တွင်ပါဝင်သည်။

အမျိုးအစား	ဖြစ်ပေါ်နိုင်သော ဆိုးကျိုးသက်ရောက်မှု	ထိခိုက်မှု လျော့ပါးစေသော နည်းလမ်းများ	သက်ဆိုင်ရာ အချက်အလက်	သက်ဆိုင်ရာ အစိတ်အပိုင်း	အကောင်အထည်ဖော်မည့် အဖွဲ့အစည်း	တာဝန်ခံ အဖွဲ့အစည်း	ခန့်မှန်းကုန်ကျစရိတ် (USD)
ရာသီဥတု ပြောင်းလဲခြင်း	(GHG) ထုတ်လွှတ်ခြင်းများ မြင့်တက်လာနိုင်ခြင်း	ဒရိုင်ဘာများကို ဆောက်လုပ်ရေးယဥ္ဇယားများ နှင့် ကားများကို မလိုအပ်ဘဲ အသုံးပြုခြင်းမပြုရန် အသိပညာမှုပေးခြင်း - လုပ်ငန်း လှုပ်ရှားမှုများ အလွန်အကျွံ ပြုလုပ်ခြင်း		ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း			

အရင်းအမြစ်။ EIA လေ့လာရေးအဖွဲ့

၇.၂. ပတ်ဝန်းကျင်ဆိုင်ရာ စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးမှု အစီအစဉ်

ဇယား (၁၁)မှ (၁၄) တွင်ဖော်ပြထားသော ပတ်ဝန်းကျင်ဆိုင်ရာ စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးမှု အစီအစဉ်တွင် စီမံကိန်းကာလ တစ်ခုချင်းစီ၏ စောင့်ကြပ်စစ်ဆေးမှု အမျိုးအစားများ၊ တည်နေရာ၊ အကြိမ်အရေအတွက် နှင့် တာဝန်ခံမှု တို့ပါဝင်ပါသည်။ အဆင့်တစ်ဆင့်ချင်းစီအတွက် တာဝန်ယူထားသော အဖွဲ့အစည်းသည် စောင့်ကြည့်လေ့လာရေး ရလဒ်များကို အကဲဖြတ်ပြီး အကယ်၍ ရလဒ်များသည် သတ်မှတ်စံညွှန်းများနှင့် လိုက်လျောညီထွေမှုမရှိပါက လိုအပ်သော ဆောင်ရွက်မှုများ ပြုလုပ်ရန်လိုအပ်ပါသည်။ စောင့်ကြည့်လေ့လာရေး ရလဒ်များကို MONREC နှင့် JICA ထံသို့ အစီရင်ခံ တင်ပြရပါမည်။

ဇယား (၁၁) ဆောက်လုပ်ရေးကာလမတိုင်မီ ပတ်ဝန်းကျင်စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးခြင်း အစီအစဉ်အကျဉ်းချုပ်

အမျိုးအစား	စောင့်ကြပ်စစ်ဆေးမှု အမျိုးအစား	စောင့်ကြပ်စစ်ဆေးမည့် နည်းလမ်း	စောင့်ကြပ်စစ်ဆေးမည့် နေရာ	အကြိမ်	ကာလ	သက်ဆိုင်ရာ အစိတ်အပိုင်း	တာဝန်ခံ အဖွဲ့အစည်း	အကြမ်းဖျဉ်း ခန့်မှန်း ကုန်ကျစရိတ် (USD)
၁. လူမှုပတ်ဝန်းကျင်								
ဆန္ဒမပါသော ပြောင်းရွှေ့နေရာချထားမှု	မြေယာသိမ်းဆည်းခြင်း နှင့် ပေးအပ်ခြင်း (သို့) နေရာရှင်းလင်းခြင်း တိုးတက်မှု	ပေးအပ်ခြင်းမှတ်တမ်းနှင့် မြေယာသိမ်းဆည်းခြင်း (သို့) နေရာရှင်းလင်းခြင်း တို့အားစစ်ဆေးခြင်း	ဓာတ်တိုင်နှင့် ရေပိုက်လိုင်း (သို့) ဓာတ်ငွေ့ပိုက်လိုင်း အနီးအနား	လစဉ်	လျော်ကြေးငွေ ပေးအပ်ခြင်းနှင့် မြေနေရာရယူခြင်း ပြီးဆုံးသည့်တိုင်	ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	PMU	ပြည်လည်နေရာချထားရေးအစီအစဉ် တွင်ပါဝင်ပါသည်။

အမျိုးအစား	စောင့်ကြပ်စစ်ဆေးမှု အမျိုးအစား	စောင့်ကြပ်စစ်ဆေးမည့် နည်းလမ်း	စောင့်ကြပ်စစ်ဆေးမည့် နေရာ	အကြိမ်	ကာလ	သက်ဆိုင်ရာ အစိတ်အပိုင်း	တာဝန်ခံ အဖွဲ့အစည်း	အကြမ်းဖျဉ်း ခန့်မှန်း ကုန်ကျစရိတ် (USD)
	မကျေနပ်ချက်	မကျေနပ်ချက်မှတ်တမ်း များစစ်ဆေးခြင်း	ဓာတ်တိုင်နှင့် ရေပိုက်လိုင်း (သို့) ဓာတ်ငွေ့ပိုက်လိုင်း အနီးအနား	လစဉ်	အသက်မွေး ဝမ်းကျောင်း ပုံမှန်ပြန် ဖြစ်သည်အထိ	ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	PMU	ပြည်လည် နေရာချထား ရေးအစီအစဉ် တွင်ပါဝင် ပါသည်။
ဆင်းရဲမွဲတေမှု	လျော်ကြေးပေးအပ်ခြင်း လုပ်ငန်းစဉ်တိုးတက်မှု	ပေးအပ်မှုမှတ်တမ်းအား စစ်ဆေးခြင်း	ဓာတ်တိုင်နှင့် ရေပိုက်လိုင်း အနီးအနား	လစဉ်	လျော်ကြေးပေးအပ်ခြင်း ပြီးဆုံးသည်အထိ	ရေပိုက်လိုင်း	PMU	ပြည်လည် နေရာချထား ရေးအစီအစဉ် တွင်ပါဝင် ပါသည်။
ဒေသ စီးပွားရေး (အသက်မွေး ဝမ်းကျောင်း)	လျော်ကြေးပေးအပ်ခြင်း လုပ်ငန်းစဉ်တိုးတက်မှု	ပေးအပ်မှုမှတ်တမ်းအား စစ်ဆေးခြင်း	ဓာတ်တိုင်နှင့် ရေပိုက်လိုင်း အနီးအနား	လစဉ်	လျော်ကြေးပေးအပ်ခြင်း ပြီးဆုံးသည်အထိ	ရေပိုက်လိုင်း	PMU	ပြည်လည် နေရာချထား ရေးအစီအစဉ် တွင်ပါဝင် ပါသည်။
	ဝင်ငွေပုံမှန်ပြန်လည် ရရှိခြင်း တိုးတက်မှု	ပြန်လည်ထူထောင်ခြင်းအား စစ်ဆေးခြင်း	ဓာတ်တိုင်နှင့် ရေပိုက်လိုင်း (သို့) ဓာတ်ငွေ့ပိုက်လိုင်း အနီးအနား	လစဉ်	အသက်မွေး ဝမ်းကျောင်း ပုံမှန်ပြန် ဖြစ်သည်အထိ	ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	PMU	ပြည်လည် နေရာချထား ရေးအစီအစဉ် တွင်ပါဝင် ပါသည်။
မြေယာ အသုံးချမှု	ယာယီမြေနေရာ ရယူခြင်းအတွက် မြေယာသိမ်းဆည်းမှု (သို့) နေရာရှင်းလင်းခြင်း တိုးတက်မှု	မြေယာသိမ်းဆည်းမှု (သို့) နေရာရှင်းလင်းခြင်း မှတ်တမ်းအား စစ်ဆေးခြင်း	ဓာတ်တိုင်နှင့် ရေပိုက်လိုင်း အနီးအနား	လစဉ်	နေရာရှင်းလင်းခြင်း ပြီးဆုံးသည်အထိ	ရေပိုက်လိုင်း	PMU	ပြည်လည် နေရာချထား ရေးအစီအစဉ် တွင်ပါဝင် ပါသည်။

အရင်းအမြစ်။ EIA လေ့လာရေးအဖွဲ့

ဇယား (၁၂) ဆောက်လုပ်ရေးကာလ ပတ်ဝန်းကျင်စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးခြင်း အစီအစဉ်အကျဉ်းချုပ်

အမျိုးအစား	စောင့်ကြပ်စစ်ဆေးမှု အမျိုးအစား	စောင့်ကြပ်စစ်ဆေးမည့် နည်းလမ်း	စောင့်ကြပ်စစ်ဆေးမည့် နေရာ	အကြိမ်	ကာလ	သက်ဆိုင်ရာ အစိတ်အပိုင်း	တာဝန်ခံ အဖွဲ့အစည်း	အကြမ်းဖျဉ်း ခန့်မှန်း ကုန်ကျစရိတ် (USD)[a]
၁. ညစ်ညမ်းမှု								
လေအရည်အသွေး	ဖုန်မှုန့်	ဖုန်မှုန့်အတွက် တိုင်ကြားမှုများအားစစ်ဆေးခြင်း	စီမံကိန်းနေရာ အနီးဆုံး ရွာ(၁)ရွာ	(၄) လတစ်ကြိမ်	ဆောက်လုပ်ရေး ကာလတစ်လျှောက်	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	ကန်ထရိုက်တာ	ကန်ထရိုက်တာ၏စီမံခန့်ခွဲမှု စရိတ်တွင် ပါဝင်သည်။
	PM_{10}	နေရာတိုင်းတာမှု				ရေပိုက်လိုင်း		တစ်ကြိမ်လျှင် USD 1200
ရေအရည်အသွေး	SS, BOD5, COD, Oil and grease, pH, Total coliform bacteria	နေရာတိုင်းတာမှု	ရေသွယ်ယူအစိတ်အပိုင်း၏မြစ်အထက်နှင့် အောက်ပိုင်း ၂နေရာ	၂ ကြိမ် (coffe dam တည်ဆောက်ခြင်း နှင့်ဖျက်သိမ်းခြင်း)	coffe dam တည်ဆောက်ခြင်း နှင့်ဖျက်သိမ်းခြင်း	ရေပိုက်လိုင်း	ကန်ထရိုက်တာ	တစ်ကြိမ်လျှင် USD 700
စွန့်ပစ်ပစ္စည်း	စွန့်ပစ်ပစ္စည်းနှင့် နေရာ မှတ်တမ်း	ဆောက်လုပ်ရေးနေရာ - စွန့်ပစ်ပစ္စည်းအမျိုးအစား၊ ပမာဏနှင့် စွန့်ပစ်သည့်စနစ် မှတ်တမ်းစစ်ဆေးခြင်း အလုပ်သမားရိပ်သာ - အစိုင်အခဲစွန့်ပစ်ပစ္စည်းများ အားမျက်မြင်စစ်ဆေးခြင်း နှင့်လိုင်စင်ရအမှိုက်သိမ်းသူ မှသိမ်းဆည်းပါက မှတ်တမ်းအား စစ်ဆေးခြင်း	ဓာတ်အားပေး အထောက်အပံ့နေရာ	အပတ်စဉ်	ဆောက်လုပ်ရေး ကာလတစ်လျှောက်	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	ကန်ထရိုက်တာ	ဆောက်လုပ် ရေးစရိတ် တွင် ပါဝင်သည်။
မြေဆီလွှာ ညစ်ညမ်းမှု	မြေအတွင်း မစိမ့်ဝင်နိုင်ရန် ပြုလုပ်ထားသည့် အထောက်အပံ့	မြေအတွင်း မစိမ့်ဝင်နိုင်ရန် ပြုလုပ်ထားသည့် အထောက်အပံ့အား စစ်ဆေးခြင်း	ဓာတ်အားပေး အထောက်အပံ့နေရာ	(၄) လတစ်ကြိမ်	ဆောက်လုပ်ရေး ကာလတစ်လျှောက်	ဓာတ်အားပေး အထောက်အပံ့	ကန်ထရိုက်တာ	ကန်ထရိုက်တာ၏စီမံခန့်ခွဲမှု စရိတ်တွင် ပါဝင်သည်။

အမျိုးအစား	စောင့်ကြပ်စစ်ဆေးမှု အမျိုးအစား	စောင့်ကြပ်စစ်ဆေးမည့် နည်းလမ်း	စောင့်ကြပ်စစ်ဆေးမည့် နေရာ	အကြိမ်	ကာလ	သက်ဆိုင်ရာ အစိတ်အပိုင်း	တာဝန်ခံ အဖွဲ့အစည်း	အကြမ်းဖျဉ်း ခန့်မှန်း ကုန်ကျစရိတ် (USD)[a]
ဆူညံသံ နှင့် တုန်ခါမှု	ဆူညံသံ၊ တုန်ခါမှု၊ ယဉ်သွားလာမှု	တိုင်းကြားချက်မှတ်တမ်းများစစ်ဆေးခြင်း (ဆူညံသံ နှင့်တုန်ခါမှု) နေရာတိုင်းတာမှု	ဓာတ်အားပေး အထောက်အပံ့နေရာ အတွက် - ၂နေရာ (စီမံကိန်နေရာ ၁ နေရာနှင့် ဆက်သွယ်ရေး လမ်းတလျှောက် ၁နေရာ) ဓာတ်ငွေ့ပိုက်လိုင်း အတွက် - ဓာတ်ငွေ့ ပိုက်လိုင်းအနီး ၁ နေရာ ရေပိုက်လိုင်း အတွက် - ၂ နေရာ (ရေသွင်းနေရာ နှင့် ရေပိုက်လိုင်း)	(၄) လတစ်ကြိမ် (ဆောက်လုပ်ရေး လုပ်ငန်း အပြင်းထန်ဆုံး လုပ်သည့် နေ့အချိန် ၁၅နာရီအတွင်း တစ်ကြိမ်)	ဆောက်လုပ်ရေး ကာလတစ်လျှောက်	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	ကန်ထရိုက်တာ	တစ်ကြိမ်လျှင် USD 3100
မြေကျွံမှု	မြေအနိမ့်အမြင့် အခြေအနေ	တိုင်းကြားချက်မှတ်တမ်းများစစ်ဆေးခြင်း (မြေကျွံမှု)	ရေပိုက်လိုင်း အနီးအနား	(၄) လတစ်ကြိမ်	ဆောက်လုပ်ရေး ကာလတစ်လျှောက်	ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	ကန်ထရိုက်တာ	ကန်ထရိုက်တာ၏စီမံခန့်ခွဲမှု စရိတ်တွင် ပါဝင်သည်။
၂. သဘာဝပတ်ဝန်းကျင်								
အပင်၊ သတ္တဝါ နှင့် ဇီဝမျိုးစုံမျိုးကွဲ	ဂေဟစနစ် အခြေအနေ	ဂေဟစနစ် အား အကြို ကွင်းဆင်းလေ့လာခြင်း	စီမံကိန်းနေရာ အနီးအနား	တစ်နှစ်လျှင် (၂) ကြိမ် (မိုးရာသီနှင့် ခြောက်သွေ့ရာသီ)	ဆောက်လုပ်ရေး ကာလတစ်လျှောက်	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	ကန်ထရိုက်တာ	တစ်ကြိမ်လျှင် USD 3000
၃. လူမှုပတ်ဝန်းကျင်								

အမျိုးအစား	စောင့်ကြပ်စစ်ဆေးမှု အမျိုးအစား	စောင့်ကြပ်စစ်ဆေးမည့် နည်းလမ်း	စောင့်ကြပ်စစ်ဆေးမည့် နေရာ	အကြိမ်	ကာလ	သက်ဆိုင်ရာ အစိတ်အပိုင်း	တာဝန်ခံ အဖွဲ့အစည်း	အကြမ်းဖျဉ်း ခန့်မှန်း ကုန်ကျစရိတ် (USD)[a]
ယဉ်ကျေးမှု အမွေအနှစ်	ကန်ထရိုက်တာမှ လုပ်ဆောင်ရမည့် လုပ်ငန်းနှင့် ရှေးဟောင်း အမွေအနှစ်ပစ္စည်းများ တွေ့ရှိမှု မှတ်တမ်း	တွေ့ရှိချက်မှတ်တမ်းများ စစ်ဆေးခြင်း	ရေပိုက်လိုင်းဝန်းကျင်	အပတ်စဉ်	ဆောက်လုပ်ရေး ကာလတစ်လျှောက်	ရေပိုက်လိုင်း	ကန်ထရိုက်တာ	ကန်ထရိုက်တာ ၏စီမံခန့်ခွဲမှု စရိတ်တွင် ပါဝင်သည်။
	ပတ်ဝန်းကျင်လူထုမှ တိုင်ကြားချက်	တိုင်ကြားချက်မှတ်တမ်း များစစ်ဆေးခြင်း	ဓာတ်အားပေး အထောက်အပံ့နေရာ ဝန်းကျင်	အပတ်စဉ်	ဆောက်လုပ်ရေး ကာလတစ်လျှောက်	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	ကန်ထရိုက်တာ	ကန်ထရိုက်တာ ၏စီမံခန့်ခွဲမှု စရိတ်တွင် ပါဝင်သည်။
မြင်ကွင်း	ယာယီအလုံပိတ် နံရံများ တပ်ဆင်ခြင်း	နေရာ အခြေအနေ စစ်ဆေးခြင်း၊ ယာယီအလုံပိတ် နံရံများ တပ်ဆင်ခြင်းအား စစ်ဆေးခြင်း	ဓာတ်အားပေး အထောက်အပံ့နေရာ	(၄) လတစ်ကြိမ်	ဆောက်လုပ်ရေး ကာလတစ်လျှောက်	ဓာတ်အားပေး အထောက်အပံ့	ကန်ထရိုက်တာ	ကန်ထရိုက်တာ ၏စီမံခန့်ခွဲမှု စရိတ်တွင် ပါဝင်သည်။
ကျား၊မ အခြေအနေ	ပတ်ဝန်းကျင်လူထုမှ တိုင်ကြားချက်	တိုင်ကြားချက်မှတ်တမ်း များစစ်ဆေးခြင်	ဓာတ်အားပေး အထောက်အပံ့နေရာ	အပတ်စဉ်	ဆောက်လုပ်ရေး ကာလတစ်လျှောက်	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	ကန်ထရိုက်တာ	ကန်ထရိုက်တာ ၏စီမံခန့်ခွဲမှု စရိတ်တွင် ပါဝင်သည်။
ကလေးသူငယ် အခွင့်အရေး	အလုပ်မှတ်တမ်း	အလုပ်သမားများ၏ အလုပ်မှတ်တမ်းအား စစ်ဆေးခြင်း	ဓာတ်အားပေး အထောက်အပံ့နေရာ	အပတ်စဉ်	ဆောက်လုပ်ရေး ကာလတစ်လျှောက်	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	ကန်ထရိုက်တာ	ကန်ထရိုက်တာ ၏စီမံခန့်ခွဲမှု စရိတ်တွင် ပါဝင်သည်။
ကျန်းမာရေး (HIV/AIDS စသောကူးစက် ရောဂါ များ)	ကူးစက်ရောဂါများ အတွက်အသိပညာ ပေးခြင်း	ကူးစက်ရောဂါများ အတွက်အသိပညာပေး လှုပ်ရှားမှုမှတ်တမ်းများ အားစစ်ဆေးခြင်း	ဓာတ်အားပေး အထောက်အပံ့နေရာ	အပတ်စဉ်	ဆောက်လုပ်ရေး ကာလတစ်လျှောက်	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	ကန်ထရိုက်တာ	ကန်ထရိုက်တာ ၏စီမံခန့်ခွဲမှု စရိတ်တွင် ပါဝင်သည်။

အမျိုးအစား	စောင့်ကြပ်စစ်ဆေးမှု အမျိုးအစား	စောင့်ကြပ်စစ်ဆေးမည့် နည်းလမ်း	စောင့်ကြပ်စစ်ဆေးမည့် နေရာ	အကြိမ်	ကာလ	သက်ဆိုင်ရာ အစိတ်အပိုင်း	တာဝန်ခံ အဖွဲ့အစည်း	အကြမ်းဖျဉ်း ခန့်မှန်း ကုန်ကျစရိတ် (USD)[a]
လုပ်ငန်းခွင် ကျန်းမာရေး နှင့် ဘေးကင်းလုံခြုံမှု	ဆောက်လုပ်ရေးလုပ်ငန်း ခွင်အတွင်း မတော်တဆ ထိခိုက်မှုမှတ်တမ်း။ အကာကွယ်ပစ္စည်းများ အသုံးပြုမှု။ အလုပ်သမားများအား ဘေးကင်းလုံခြုံမှု ပညာပေးမှတ်တမ်း။	ဆောက်လုပ်ရေးလုပ်ငန်း ခွင်အတွင်း မတော်တဆ ထိခိုက်မှုမှတ်တမ်းအား စစ်ဆေးခြင်း။ အကာကွယ်ပစ္စည်းများ အသုံးပြုမှု စောင့်ကြည့်ခြင်း။ ဘေးကင်းလုံခြုံမှု ပညာပေးမှတ်တမ်းအား စစ်ဆေးခြင်း။	ဓာတ်အားပေး အထောက်အပံ့နေရာ	အပတ်စဉ်	ဆောက်လုပ်ရေး ကာလတစ်လျှောက်	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	ကန်ထရိုက်တာ	ကန်ထရိုက်တာ ၏စီမံခန့်ခွဲမှု စရိတ်တွင် ပါဝင်သည်။
၄. အခြား								
မတော်တဆ ထိခိုက်မှု	ပတ်ဝန်းကျင်ရှိ ယာဉ်မတော်တဆမှု မှတ်တမ်း။ ဘေးကင်းရေးအတွက် ဆောက်လုပ်ရေးလုပ်ငန်း အချက်အလက်များ ဖြန့်ဖြူးခြင်းမှတ်တမ်း။။ ဘေးကင်းရေးအတွက် ပညာပေးလှုပ်ရှားမှု မှတ်တမ်း။	ပတ်ဝန်းကျင်ရှိ ယာဉ်မတော်တဆမှု မှတ်တမ်းအား စစ်ဆေးခြင်း။ ဘေးကင်းရေးအတွက် ဆောက်လုပ်ရေးလုပ်ငန်း အချက်အလက်များ ဖြန့်ဖြူးခြင်းမှတ်တမ်းအား စစ်ဆေးခြင်း။ ဘေးကင်းရေးအတွက် ပညာပေးလှုပ်ရှားမှု မှတ်တမ်းအား စစ်ဆေးခြင်း။	ဆက်သွယ်ရေးလမ်း တလျှောက်	အပတ်စဉ်	ဆောက်လုပ်ရေး ကာလတစ်လျှောက်	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	ကန်ထရိုက်တာ	ကန်ထရိုက်တာ ၏စီမံခန့်ခွဲမှု စရိတ်တွင် ပါဝင်သည်။
နယ်စပ်ဖြတ်ကျော် သက်ရောက်မှု နှင့် ရာသီဥတု ပြောင်းလဲခြင်း	ထိရောက်သော လောင်စာဆီ အသုံးပြုမှု။ လောင်စာဆီ ပမာဏ။	လောင်စာဆီသုံးစွဲမှု မှတ်တမ်းအား စစ်ဆေးခြင်း။ ထိရောက်သော လောင်စာဆီ အသုံးပြုမှု အတွက် ပညာပေးလှုပ်ရှားမှု မှတ်တမ်းအား စစ်ဆေးခြင်း	ဓာတ်အားပေး အထောက်အပံ့နေရာ	အပတ်စဉ်	ဆောက်လုပ်ရေး ကာလတစ်လျှောက်	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	ကန်ထရိုက်တာ	ကန်ထရိုက်တာ ၏စီမံခန့်ခွဲမှု စရိတ်တွင် ပါဝင်သည်။

မှတ်ချက်။ a) လေ့လာတိုင်းတာမှု တစ်ကြိမ်အတွက်ခန့်မှန်းတွက်ချက်ထားပါသည်။ သွားလာနေထိုင်မှုစားရိတ်များမပါဝင်ပါ။

အရင်းအမြစ်။ EIA လေ့လာရေးအဖွဲ့

ဇယား (၁၃) လုပ်ငန်းလည်ပတ်မှုကာလ ပတ်ဝန်းကျင်စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးခြင်း အစီအစဉ်အကျဉ်းချုပ်

အမျိုးအစား	စောင့်ကြပ်စစ်ဆေးမှု အမျိုးအစား	စောင့်ကြပ်စစ်ဆေးမည့် နည်းလမ်း	စောင့်ကြပ်စစ်ဆေးမည့် နေရာ	အကြိမ်	ကာလ	သက်ဆိုင်ရာ အစိတ်အပိုင်း	တာဝန်ခံ အဖွဲ့အစည်း	အကြမ်းဖျဉ်း ခန့်မှန်း ကုန်ကျစရိတ် (USD)[a]
၁. ညစ်ညမ်းမှု								
လေအရည်အသွေး (ပတ်ဝန်းကျင်)	NO_2	နေရာတိုင်းတာမှု	ဓာတ်အားပေး အထောက်အပံ့နေရာ ပတ်ဝန်းကျင် (၃) နေရာ	(၄)လတစ်ကြိမ် (တစ်ကြိမ်လျှင် ၁ပတ်)	လုပ်ငန်းလည်ပတ် သည့်အချိန်မှ ၂နှစ် အထိ	ဓာတ်အားပေး အထောက်အပံ့	EPGE	တစ်ကြိမ်လျှင် USD 3000
လေအရည်အသွေး (ထုတ်လွှတ်မှု)	NO_2	နေရာတိုင်းတာမှု	၂ နေရာ (ဓာတ်ငွေ့ တာဘိုင် ခေါင်းတိုင်)	(၄) လတစ်ကြိမ်	လုပ်ငန်းလည်ပတ် သည့်အချိန်မှ ၂နှစ် အထိ	ဓာတ်အားပေး အထောက်အပံ့	EPGE	တစ်ကြိမ်လျှင် USD 2400
ရေအရည်အသွေး (ဓာတ်အားပေး အထောက်အပံ့မှ သန့်စင်ပြီး စွန့်ထုတ်ရေ)	အပူစွမ်းအင်သုံး ဓာတ်အားပေးစက်ရုံ အချက်အလက် (၅.၂.၁.၂. ကိုကြည့်ပါ)	နေရာတိုင်းတာမှု	ဓာတ်အားပေး အထောက်အပံ့မှ စွန့်ထုတ်ရေ ၁ နေရာ	(၄) လတစ်ကြိမ်	လုပ်ငန်းလည်ပတ် သည့်အချိန်မှ ၂နှစ် အထိ	ဓာတ်အားပေး အထောက်အပံ့	EPGE	တစ်ကြိမ်လျှင် USD 600
ရေအရည်အသွေး (အိမ်သုံးရေမှ သန့်စင်ပြီး စွန့်ထုတ်ရေ)	ပတ်ဝန်းကျင်ရေနှင့် ရေဆိုးအတွက် အချက်အလက် (၅.၂.၁.၂. ကိုကြည့်ပါ)	နေရာတိုင်းတာမှု	အိမ်သုံးစွန့်ထုတ်ရေ ၁ နေရာ	(၄) လတစ်ကြိမ်	လုပ်ငန်းလည်ပတ် သည့်အချိန်မှ ၂နှစ် အထိ	ဓာတ်အားပေး အထောက်အပံ့	EPGE	တစ်ကြိမ်လျှင် USD 900
ရေအရည်အသွေး (မြစ်ငယ်မြစ်)	ပတ်ဝန်းကျင်ရေနှင့် ရေဆိုးအတွက် အချက်အလက် (၅.၂.၁.၂. ကိုကြည့်ပါ)	နေရာတိုင်းတာမှု	၃ နေရာ -မြစ်ငယ်မြစ်သို့ စွန့်ထုတ်ရာနေရာ -မြစ်အထက်ပိုင်းနှင့်	(၄) လတစ်ကြိမ်	လုပ်ငန်းလည်ပတ် သည့်အချိန်မှ ၂နှစ် အထိ	ဓာတ်အားပေး အထောက်အပံ့	EPGE	တစ်ကြိမ်လျှင် USD 2000

အမျိုးအစား	စောင့်ကြပ်စစ်ဆေးမှု အမျိုးအစား	စောင့်ကြပ်စစ်ဆေးမည့် နည်းလမ်း	စောင့်ကြပ်စစ်ဆေးမည့် နေရာ	အကြိမ်	ကာလ	သက်ဆိုင်ရာ အစိတ်အပိုင်း	တာဝန်ခံ အဖွဲ့အစည်း	အကြမ်းဖျင်း ခန့်မှန်း ကုန်ကျစရိတ် (USD)[a]
			စွန့်ထုတ်ရာနေရာမှ မြစ်အောက်ပိုင်း ၁၀၀ မီတာအကွာ					
စွန့်ပစ်ပစ္စည်း	စွန့်ပစ်ပစ္စည်းနှင့် နေရာ မှတ်တမ်း	မှတ်တမ်းစစ်ဆေးမှု	ဓာတ်အားပေး အထောက်အပံ့နေရာ	လစဉ်	လုပ်ငန်းလည်ပတ် သည့်အချိန်မှ ၂နှစ် အထိ	ဓာတ်အားပေး အထောက်အပံ့	EPGE	လုပ်ငန်း လည်ပတ် စရိတ်တွင် ပါဝင်သည်။
ဆူညံသံ နှင့် တုန်ခါမှု	ဆူညံသံ၊ တုန်ခါမှု၊ ယဉ်သွားလာမှု	နေရာတိုင်းတာမှု	ဓာတ်အားပေး အထောက်အပံ့နေရာ ပတ်ဝန်းကျင် (၃) နေရာ	(၄) လတစ်ကြိမ် (၂၄နာရီ နေ့အချိန် နှင့် ညအချိန်)	လုပ်ငန်းလည်ပတ် သည့်အချိန်မှ ၂နှစ် အထိ	ဓာတ်အားပေး အထောက်အပံ့	EPGE	တစ်ကြိမ်လျှင် USD 2100
အနံ့ဆိုး	ပတ်ဝန်းကျင် လူထုမှ တိုင်ကြားမှု	တိုင်ကြားချက်မှတ်တမ်း များစစ်ဆေးခြင်း (အနံ့ဆိုး)	ဓာတ်အားပေး အထောက်အပံ့နေရာ	(၄) လတစ်ကြိမ်	လုပ်ငန်းလည်ပတ် သည့်အချိန်မှ ၂နှစ် အထိ	ဓာတ်အားပေး အထောက်အပံ့	EPGE	-
၂. သဘာဝပတ်ဝန်းကျင်								
အပင်၊ သတ္တဝါ နှင့် ဇီဝမျိုးစုံမျိုးကွဲ	ဂေဟစနစ် အခြေအနေ	ဂေဟစနစ် အား အကြီး ကွင်းဆင်းလေ့လာခြင်း	စီမံကိန်းနေရာ အနီးအနား	တစ်နှစ်လျှင် (၂) ကြိမ် (မိုးရာသီနှင့် ခြောက်သွေ့ရာသီ)	လုပ်ငန်းလည်ပတ် သည့်အချိန်မှ ၂နှစ် အထိ	ဓာတ်အားပေး အထောက်အပံ့	EPGE	တစ်ကြိမ်လျှင် USD 900
ဇလဗေဒ	မြောင်းအောက်ပိုင်း နေထိုင်သူများ၏ တိုင်ကြားချက်များ။ ရေထိန်းကန်များ၏ ဝင်ဆံ့ပမာဏနှင့် ထိန်းသိမ်းမှုအား စောင့်ကြပ်ခြင်း	တိုင်ကြားချက်မှတ်တမ်း များစစ်ဆေးခြင်း (ရေကြီးခြင်း)။ ထိန်းသိမ်းမှုမှတ်တမ်းအား စစ်ဆေးခြင်း။	ဓာတ်အားပေး အထောက်အပံ့နေရာမှ စီးဆင်းရာမြောင်း အောက်ပိုင်း	မိုးရာသီအတွင်း လစဉ်	လုပ်ငန်းလည်ပတ် သည့်အချိန်မှ ၂နှစ် အထိ	ဓာတ်အားပေး အထောက်အပံ့	EPGE	လုပ်ငန်း လည်ပတ် စရိတ်တွင် ပါဝင်သည်။

အမျိုးအစား	စောင့်ကြပ်စစ်ဆေးမှု အမျိုးအစား	စောင့်ကြပ်စစ်ဆေးမည့် နည်းလမ်း	စောင့်ကြပ်စစ်ဆေးမည့် နေရာ	အကြိမ်	ကာလ	သက်ဆိုင်ရာ အစိတ်အပိုင်း	တာဝန်ခံ အဖွဲ့အစည်း	အကြမ်းဖျဉ်း ခန့်မှန်း ကုန်ကျစရိတ် (USD)[a]
၃. လူမှုပတ်ဝန်းကျင်								
ရေအသုံးချမှု	ပတ်ဝန်းကျင် လူထုမှ တိုင်ကြားမှု	တိုင်ကြားချက်မှတ်တမ်း များစစ်ဆေးခြင်း	မြစ်ငယ်မြစ် (စွန့်ထုတ်နေရာမှ မြစ်အောက်ဘက် ၁၀၀ မီတာအကွာ)	(၂) ပတ်တစ်ကြိမ်	လုပ်ငန်းလည်ပတ်သည့်အချိန်မှ ၂နှစ် အထိ	ဓာတ်အားပေး အထောက်အပံ့	EPGE	လုပ်ငန်း လည်ပတ် စရိတ်တွင် ပါဝင်သည်။
လူမှုရေးအဆောက် အဦးများ နှင့် ဝန်ဆောင်မှုများ	ပတ်ဝန်းကျင် လူထုမှ တိုင်ကြားမှု	တိုင်ကြားချက်မှတ်တမ်း များစစ်ဆေးခြင်း	ဓာတ်အားပေး အထောက်အပံ့နေရာ အနီးအနား	(၂) ပတ်တစ်ကြိမ်	လုပ်ငန်းလည်ပတ်သည့်အချိန်မှ ၂နှစ် အထိ	ဓာတ်အားပေး အထောက်အပံ့	EPGE	လုပ်ငန်း လည်ပတ် စရိတ်တွင် ပါဝင်သည်။
ယဉ်ကျေးမှု အမွေအနှစ်	ပတ်ဝန်းကျင်လူထုမှ တိုင်ကြားချက်	တိုင်ကြားချက်မှတ်တမ်း များစစ်ဆေးခြင်	ဓာတ်အားပေး အထောက်အပံ့နေရာ အနီးအနား	(၂) ပတ်တစ်ကြိမ်	လုပ်ငန်းလည်ပတ်သည့်အချိန်မှ ၂နှစ် အထိ	ဓာတ်အားပေး အထောက်အပံ့	EPGE	လုပ်ငန်း လည်ပတ် စရိတ်တွင် ပါဝင်သည်။
မြင်ကွင်း	စိုက်ပျိုးခြင်းနှင့် စိမ်းလမ်း စိုပြေခြင်း အခြေအနေ	နေရာ အခြေအနေ စစ်ဆေးခြင်း	ဓာတ်အားပေး အထောက်အပံ့နေရာ အနီးအနား	(၄) လတကြိမ်	လုပ်ငန်းလည်ပတ်သည့်အချိန်မှ ၂နှစ် အထိ	ဓာတ်အားပေး အထောက်အပံ့	EPGE	လုပ်ငန်း လည်ပတ် စရိတ်တွင် ပါဝင်သည်။
ကျားမ အခြေအနေ	ပတ်ဝန်းကျင် လူထုမှ တိုင်ကြားမှု	တိုင်ကြားချက်မှတ်တမ်း များစစ်ဆေးခြင်	ဓာတ်အားပေး အထောက်အပံ့နေရာ အနီးအနား	(၂) ပတ်တစ်ကြိမ်	လုပ်ငန်းလည်ပတ်သည့်အချိန်မှ ၂နှစ် အထိ	ဓာတ်အားပေး အထောက်အပံ့	EPGE	လုပ်ငန်း လည်ပတ် စရိတ်တွင် ပါဝင်သည်။
ကလေးသူငယ် အခွင့်အရေး	ပတ်ဝန်းကျင် လူထုမှ တိုင်ကြားမှု	တိုင်ကြားချက်မှတ်တမ်း များစစ်ဆေးခြင်	ဓာတ်အားပေး အထောက်အပံ့နေရာ အနီးအနား	(၂) ပတ်တစ်ကြိမ်	လုပ်ငန်းလည်ပတ်သည့်အချိန်မှ ၂နှစ် အထိ	ဓာတ်အားပေး အထောက်အပံ့	EPGE	လုပ်ငန်း လည်ပတ် စရိတ်တွင် ပါဝင်သည်။

အမျိုးအစား	စောင့်ကြပ်စစ်ဆေးမှု အမျိုးအစား	စောင့်ကြပ်စစ်ဆေးမည့် နည်းလမ်း	စောင့်ကြပ်စစ်ဆေးမည့် နေရာ	အကြိမ်	ကာလ	သက်ဆိုင်ရာ အစိတ်အပိုင်း	တာဝန်ခံ အဖွဲ့အစည်း	အကြမ်းဖျဉ်း ခန့်မှန်း ကုန်ကျစရိတ် (USD)[a]
ကျန်းမာရေး (HIV/AIDS စသောကူးစက်ရောဂါ များ)	ပတ်ဝန်းကျင်ရွာများ၏ ကျန်းမာရေး အခြေအနေ	ကျန်းမာရေး အခြေအနေ မှတ်တမ်း	ဓာတ်အားပေး အထောက်အပံ့နေရာ အတွင်းနှင့် အနီးအနား	(၄)လတစ်ကြိမ်	လုပ်ငန်းလည်ပတ် သည့်အချိန်မှ ၂နှစ် အထိ	ဓာတ်အားပေး အထောက်အပံ့	EPGE	နေရာ တိုင်းတာခြင်း အား အခြား အချက်များတွင် လုပ်ဆောင် ပါမည်။
လုပ်ငန်းခွင် ကျန်းမာရေး နှင့် ဘေးကင်းလုံခြုံမှု	ဆောက်လုပ်ရေးလုပ်ငန်း ခွင်အတွင်း မတော်တဆ ထိခိုက်မှုမှတ်တမ်း။ အကာကွယ်ပစ္စည်းများ အသုံးပြုမှု။	ဆောက်လုပ်ရေးလုပ်ငန်း ခွင်အတွင်း မတော်တဆ ထိခိုက်မှုမှတ်တမ်းအား စစ်ဆေးခြင်း။ အကာကွယ်ပစ္စည်းများ အသုံးပြုမှု စောင့်ကြည့်ခြင်း။	ဓာတ်အားပေး အထောက်အပံ့နေရာ	(၂) ပတ်တစ်ကြိမ်	လုပ်ငန်းလည်ပတ် သည့်အချိန်မှ ၂နှစ် အထိ	ဓာတ်အားပေး အထောက်အပံ့	EPGE	လုပ်ငန်း လည်ပတ် စားရိတ်တွင် ပါဝင်သည်။
၄. အခြား								
မတော်တဆ ထိခိုက်မှု	မတော်တဆမှု မှတ်တမ်း။ ဓာတ်ငွေ့ယိုစိမ့်မှု စောင့်ကြည့်ခြင်း မှတ်တမ်း။	မတော်တဆမှု မှတ်တမ်းအား စစ်ဆေးခြင်း။ ဓာတ်ငွေ့ယိုစိမ့်မှု စောင့်ကြည့်ခြင်း မှတ်တမ်းအား စစ်ဆေးခြင်း။	ဓာတ်အားပေး အထောက်အပံ့နေရာ၊ ဓာတ်ငွေ့ပိုက်လိုင်း တစ်လျှောက်	(၂) ပတ်တစ်ကြိမ်	လုပ်ငန်းလည်ပတ် သည့်အချိန်မှ ၂နှစ် အထိ	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း	EPGE	လုပ်ငန်း လည်ပတ် စရိတ်တွင် ပါဝင်သည်။
နယ်စပ်ဖြတ်ကျော် သက်ရောက်မှု နှင့် ရာသီဥတု ပြောင်းလဲခြင်း	လောင်စာဆီ အသုံးပြုမှု ပမာဏနှင့် လျှပ်စစ် ထုတ်လုပ်မှု	လုပ်ငန်းလည်ပတ်မှု မှတ်တမ်းအား စစ်ဆေးခြင်း	ဓာတ်အားပေး အထောက်အပံ့နေရာ အနီးအနား	(၄) လတကြိမ်	လုပ်ငန်းလည်ပတ် သည့်အချိန်မှ ၂နှစ် အထိ	ဓာတ်အားပေး အထောက်အပံ့	EPGE	လုပ်ငန်း လည်ပတ် စရိတ်တွင် ပါဝင်သည်။

မှတ်ချက်။ a) လေ့လာတိုင်းတာမှု တစ်ကြိမ်အတွက်ခန့်မှန်းတွက်ချက်ထားပါသည်။ သွားလာနေထိုင်မှုစားရိတ်များမပါဝင်ပါ။

အရင်းအမြစ်။ EIA လေ့လာရေးအဖွဲ့

ဇယား (၁၄) လုပ်ငန်းရပ်တန့်ခြင်း၊ ပိတ်သိမ်းခြင်းနှင့် ပိတ်သိမ်းပြီးနောက်ပိုင်းကာလ ပတ်ဝန်းကျင်စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးခြင်း အစီအစဉ်အကျဉ်းချုပ်

အမျိုးအစား	စောင့်ကြပ်စစ်ဆေးမှု အမျိုးအစား	စောင့်ကြပ်စစ်ဆေးမည့် နည်းလမ်း	စောင့်ကြပ်စစ်ဆေးမည့် နေရာ	အကြိမ်	ကာလ	သက်ဆိုင်ရာ အစိတ်အပိုင်း	တာဝန်ခံ အဖွဲ့အစည်း	အကြမ်းဖျဉ်း ခန့်မှန်း ကုန်ကျစရိတ် (USD)[a]
၁. ညစ်ညမ်းမှု								
လေအရည်အသွေး	ဖုန်မှုန့် (PM10)	ဖုန်မှုန့်အတွက် တိုင်ကြားမှုများအားစစ်ဆေးခြင်း	စီမံကိန်းနေရာ အနီးဆုံး ရွာ(၁)ရွာ	(၄) လတစ်ကြိမ်	လုပ်ငန်းရပ်တန့်ခြင်း ကာလတစ်လျှောက်	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	အဆောက်အဦး ဖြိုဖျက်ခြင်း ဆိုင်ရာ ကန်ထရိုက်တာ	တစ်ကြိမ်လျှင် USD 1200
ရေအရည်အသွေး	SS, BOD5, COD, Oil and grease, pH, Total coliform bacteria	နေရာတိုင်းတာမှု	ရေသွယ်ယူအစိတ်အပိုင်း၏မြစ်အထက်နှင့် အောက်ပိုင်း ၂နေရာ	၂ ကြိမ် (coffe dam တည်ဆောက်ခြင်း နှင့်ဖျက်သိမ်းခြင်း)	လုပ်ငန်းရပ်တန့်ခြင်း ကာလတစ်လျှောက်	ရေပိုက်လိုင်း	အဆောက်အဦး ဖြိုဖျက်ခြင်း ဆိုင်ရာ ကန်ထရိုက်တာ	တစ်ကြိမ်လျှင် USD 700
စွန့်ပစ်ပစ္စည်း	စွန့်ပစ်ပစ္စည်းပမာဏနှင့် နေရာအခြေအနေ	ဆောက်လုပ်ရေးနေရာ - စွန့်ပစ်ပစ္စည်းအမျိုးအစားနှင့် ပမာဏ မှတ်တမ်းစစ်ဆေးခြင်း အလုပ်သမားရိပ်သာ - အစိုင်အခဲစွန့်ပစ်ပစ္စည်းများ အားမျက်မြင်စစ်ဆေးခြင်း	စီမံကိန်းနေရာ	အပတ်စဉ်	လုပ်ငန်းရပ်တန့်ခြင်း ကာလတစ်လျှောက်	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	အဆောက်အဦး ဖြိုဖျက်ခြင်း ဆိုင်ရာ ကန်ထရိုက်တာ	ကန်ထရိုက်တာ ၏စီမံခန့်ခွဲမှု စရိတ်တွင် ပါဝင်သည်။
ဆူညံသံ နှင့် တုန်ခါမှု	ဆူညံသံ၊ တုန်ခါမှု၊ ယဉ်သွားလာမှု	တိုင်ကြားချက်မှတ်တမ်း များစစ်ဆေးခြင်း (ဆူညံသံ နှင့်တုန်ခါမှု) နေရာတိုင်းတာမှု	ဓာတ်အားပေး အထောက်အပံ့နေရာ အတွက် - ၂နေရာ (စီမံကိန်နေရာ ၁ နေရာနှင့် ဆက်သွယ်ရေး လမ်းတလျှောက် ၁နေရာ) ဓာတ်ငွေ့ပိုက်လိုင်း	(၄) လတစ်ကြိမ် (ဖြိုဖျက်ခြင်း လုပ်ငန်း အပြင်းထန်ဆုံး လုပ်သည့် အချိန်တွင် တစ်ကြိမ်)	လုပ်ငန်းရပ်တန့်ခြင်း ကာလတစ်လျှောက်	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	အဆောက်အဦး ဖြိုဖျက်ခြင်း ဆိုင်ရာ ကန်ထရိုက်တာ	တစ်ကြိမ်လျှင် USD 3100

အမျိုးအစား	စောင့်ကြပ်စစ်ဆေးမှု အမျိုးအစား	စောင့်ကြပ်စစ်ဆေးမည့် နည်းလမ်း	စောင့်ကြပ်စစ်ဆေးမည့် နေရာ	အကြိမ်	ကာလ	သက်ဆိုင်ရာ အစိတ်အပိုင်း	တာဝန်ခံ အဖွဲ့အစည်း	အကြမ်းဖျဉ်း ခန့်မှန်း ကုန်ကျစရိတ် (USD)[a]
			အတွက် - ဓာတ်ငွေ့ ပိုက်လိုင်းအနီး ၁ နေရာ ရေပိုက်လိုင်း အတွက် - ၂ နေရာ (ရေသွင်းနေရာ နှင့် ရေပိုက်လိုင်း)					
၂. သဘာဝပတ်ဝန်းကျင်								
အပင်၊ သတ္တဝါ နှင့် ဇီဝမျိုးစုံမျိုးကွဲ	ဂေဟာစနစ် အခြေအနေ	ဂေဟာစနစ် အား အကြီး ကွင်းဆင်းလေ့လာခြင်း	ဓာတ်ငွေ့ပိုက်လိုင်း အတွက် - ဓာတ်ငွေ့ ပိုက်လိုင်း တစ်လျှောက် ရေပိုက်လိုင်းအတွက် - ရေသွင်းအထောက်အပံ့ နေရာ၊ ဓာတ်တိုင်နှင့် ရေပိုက်လိုင်း (ဓာတ်ငွေ့ ပိုက်လိုင်းအပိုင်းမပါဝင်)	တစ်နှစ်လျှင် (၂) ကြိမ် (မိုးရာသီနှင့် ခြောက်သွေ့ရာသီ)	လုပ်ငန်းရပ်တန့်ခြင်း ကာလတစ်လျှောက်	ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	အဆောက်အဦး ဖြိုဖျက်ခြင်း ဆိုင်ရာ ကန်ထရိုက်တာ	တစ်ကြိမ်လျှင် USD 2100
၃. လူမှုပတ်ဝန်းကျင်								
ဆင်းရဲမှု	ပတ်ဝန်းကျင် လူထုမှ တိုင်ကြားမှု	တိုင်ကြားချက်မှတ်တမ်း များစစ်ဆေးခြင်း	စီမံကိန်းနေရာ	အပတ်စဉ်	လုပ်ငန်းရပ်တန့်ခြင်း ကာလတစ်လျှောက်	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	အဆောက်အဦး ဖြိုဖျက်ခြင်း ဆိုင်ရာ ကန်ထရိုက်တာ	ကန်ထရိုက်တာ ၏စီမံခန့်ခွဲမှု စရိတ်တွင် ပါဝင်သည်။
ဒေသတွင်း စီးပွားရေး (အလုပ်အကိုင်)	ပတ်ဝန်းကျင် လူထုမှ တိုင်ကြားမှု	တိုင်ကြားချက်မှတ်တမ်း များစစ်ဆေးခြင်း	စီမံကိန်းနေရာ	အပတ်စဉ်	လုပ်ငန်းရပ်တန့်ခြင်း ကာလတစ်လျှောက်	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	အဆောက်အဦး ဖြိုဖျက်ခြင်း ဆိုင်ရာ ကန်ထရိုက်တာ	ကန်ထရိုက်တာ ၏စီမံခန့်ခွဲမှု စရိတ်တွင် ပါဝင်သည်။

အမျိုးအစား	စောင့်ကြပ်စစ်ဆေးမှု အမျိုးအစား	စောင့်ကြပ်စစ်ဆေးမည့် နည်းလမ်း	စောင့်ကြပ်စစ်ဆေးမည့် နေရာ	အကြိမ်	ကာလ	သက်ဆိုင်ရာ အစိတ်အပိုင်း	တာဝန်ခံ အဖွဲ့အစည်း	အကြမ်းဖျဉ်း ခန့်မှန်း ကုန်ကျစရိတ် (USD)[a]
ရေအသုံးချမှု	ပတ်ဝန်းကျင် လူထုမှ တိုင်ကြားမှု	တိုင်ကြားချက်မှတ်တမ်း များစစ်ဆေးခြင်း	မြစ်ငယ်မြစ် (စွန့်ထုတ် နေရာမှ မြစ်အောက်ဘက် ၁၀၀ မီတာအကွာ)	အပတ်စဉ်	လုပ်ငန်းရပ်တန့်ခြင်း ကာလတစ်လျောက်	ရေပိုက်လိုင်း	အဆောက်အဦး ဖြိုဖျက်ခြင်း ဆိုင်ရာ ကန်ထရိုက်တာ	ကန်ထရိုက်တာ ၏စီမံခန့်ခွဲမှု စရိတ်တွင် ပါဝင်သည်။
ယဉ်ကျေးမှု အမွေအနှစ်	ပတ်ဝန်းကျင်လူထုမှ တိုင်ကြားချက်	တိုင်ကြားချက်မှတ်တမ်း များစစ်ဆေးခြင်	စီမံကိန်းနေရာ	အပတ်စဉ်	လုပ်ငန်းရပ်တန့်ခြင်း ကာလတစ်လျောက်	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	အဆောက်အဦး ဖြိုဖျက်ခြင်း ဆိုင်ရာ ကန်ထရိုက်တာ	ကန်ထရိုက်တာ ၏စီမံခန့်ခွဲမှု စရိတ်တွင် ပါဝင်သည်။
မြင်ကွင်း	ယာယီအလုံပိတ် နံရံများ တပ်ဆင်ခြင်း	နေရာ အခြေအနေ စစ်ဆေးခြင်း၊ ယာယီအလုံပိတ် နံရံများ တပ်ဆင်ခြင်းအား စစ်ဆေးခြင်း	စီမံကိန်းနေရာ	(၄) လတစ်ကြိမ်	လုပ်ငန်းရပ်တန့်ခြင်း ကာလတစ်လျောက်	ဓာတ်အားပေး အထောက်အပံ့	အဆောက်အဦး ဖြိုဖျက်ခြင်း ဆိုင်ရာ ကန်ထရိုက်တာ	ကန်ထရိုက်တာ ၏စီမံခန့်ခွဲမှု စရိတ်တွင် ပါဝင်သည်။
ကျား၊မ အခြေအနေ	ပတ်ဝန်းကျင်လူထုမှ တိုင်ကြားချက်	တိုင်ကြားချက်မှတ်တမ်း များစစ်ဆေးခြင်	စီမံကိန်းနေရာ	အပတ်စဉ်	လုပ်ငန်းရပ်တန့်ခြင်း ကာလတစ်လျောက်	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	အဆောက်အဦး ဖြိုဖျက်ခြင်း ဆိုင်ရာ ကန်ထရိုက်တာ	ကန်ထရိုက်တာ ၏စီမံခန့်ခွဲမှု စရိတ်တွင် ပါဝင်သည်။
ကလေးသူငယ် အခွင့်အရေး	အလုပ်မှတ်တမ်း	အလုပ်သမားများ၏ အလုပ်မှတ်တမ်းအား စစ်ဆေးခြင်း	စီမံကိန်းနေရာ	အပတ်စဉ်	လုပ်ငန်းရပ်တန့်ခြင်း ကာလတစ်လျောက်	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	အဆောက်အဦး ဖြိုဖျက်ခြင်း ဆိုင်ရာ ကန်ထရိုက်တာ	ကန်ထရိုက်တာ ၏စီမံခန့်ခွဲမှု စရိတ်တွင် ပါဝင်သည်။
ကျန်းမာရေး (HIV/AIDS စသောကူးစက်ရော ဂါ များ)	ကူးစက်ရောဂါများ အတွက်အသိပညာ ပေးခြင်း	ကူးစက်ရောဂါများ အတွက်အသိပညာပေး လှုပ်ရှားမှုမှတ်တမ်းများ အားစစ်ဆေးခြင်း	စီမံကိန်းနေရာ	အပတ်စဉ်	လုပ်ငန်းရပ်တန့်ခြင်း ကာလတစ်လျောက်	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	အဆောက်အဦး ဖြိုဖျက်ခြင်း ဆိုင်ရာ ကန်ထရိုက်တာ	ကန်ထရိုက်တာ ၏စီမံခန့်ခွဲမှု စရိတ်တွင် ပါဝင်သည်။

အမျိုးအစား	စောင့်ကြပ်စစ်ဆေးမှု အမျိုးအစား	စောင့်ကြပ်စစ်ဆေးမည့် နည်းလမ်း	စောင့်ကြပ်စစ်ဆေးမည့် နေရာ	အကြိမ်	ကာလ	သက်ဆိုင်ရာ အစိတ်အပိုင်း	တာဝန်ခံ အဖွဲ့အစည်း	အကြမ်းဖျဉ်း ခန့်မှန်း ကုန်ကျစရိတ် (USD)[a]
လုပ်ငန်းခွင် ကျန်းမာရေး နှင့် ဘေးကင်းလုံခြုံမှု	ဆောက်လုပ်ရေးလုပ်ငန်း ခွင်အတွင်း မတော်တဆ ထိခိုက်မှုမှတ်တမ်း။ အကာကွယ်ပစ္စည်းများ အသုံးပြုမှု။	စောင့်ကြပ်ကြည့်ရှုရမည့် အချက်အလက်များအား စစ်ဆေးခြင်း၊ နေရာ စောင့်ကြည့်ခြင်း။	စီမံကိန်းနေရာ	အပတ်စဉ်	လုပ်ငန်းရပ်တန့်ခြင်း ကာလတစ်လျှောက်	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	အဆောက်အဦး ဖြိုဖျက်ခြင်း ဆိုင်ရာ ကန်ထရိုက်တာ	ကန်ထရိုက်တာ၏စီမံခန့်ခွဲမှု စရိတ်တွင် ပါဝင်သည်။
၄. အခြား								
မတော်တဆ ထိခိုက်မှု	ယာဉ်မတော်တဆမှု မှတ်တမ်း၊ ပညာပေးလှုပ်ရှားမှု။	စောင့်ကြပ်ကြည့်ရှုရမည့် အချက်အလက်များအား စစ်ဆေးခြင်း၊	ဆက်သွယ်ရေးလမ်း တလျှောက်	အပတ်စဉ်	လုပ်ငန်းရပ်တန့်ခြင်း ကာလတစ်လျှောက်	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	အဆောက်အဦး ဖြိုဖျက်ခြင်း ဆိုင်ရာ ကန်ထရိုက်တာ	ကန်ထရိုက်တာ၏စီမံခန့်ခွဲမှု စရိတ်တွင် ပါဝင်သည်။
နယ်စပ်ဖြတ်ကျော် သက်ရောက်မှု နှင့် ရာသီဥတု ပြောင်းလဲခြင်း	မြင့်တင်ရေး လှုပ်ရှားမှု မှတ်တမ်း၊ လောင်စာဆီ အသုံးပြုမှု မှတ်တမ်း။	စောင့်ကြပ်ကြည့်ရှုရမည့် အချက်အလက်များအား စစ်ဆေးခြင်း၊	စီမံကိန်းနေရာ	အပတ်စဉ်	လုပ်ငန်းရပ်တန့်ခြင်း ကာလတစ်လျှောက်	ဓာတ်အားပေး အထောက်အပံ့၊ ဓာတ်ငွေ့ပိုက်လိုင်း၊ ရေပိုက်လိုင်း	အဆောက်အဦး ဖြိုဖျက်ခြင်း ဆိုင်ရာ ကန်ထရိုက်တာ	ကန်ထရိုက်တာ၏စီမံခန့်ခွဲမှု စရိတ်တွင် ပါဝင်သည်။

မှတ်ချက်။ a) လေ့လာတိုင်းတာမှု တစ်ကြိမ်အတွက်ခန့်မှန်းတွက်ချက်ထားပါသည်။ သွားလာနေထိုင်မှုစားရိတ်များမပါဝင်ပါ။
အရင်းအမြစ်။ EIA လေ့လာရေးအဖွဲ့

၈. အများပြည်သူတွေ့ဆုံဆွေးနွေးခြင်းနှင့် ထုတ်ဖော်ပြသခြင်း

၈.၁. နယ်ပယ်တိုင်းတာသတ်မှတ်သည့်ကာလအတွင်း အများပြည်သူတွေ့ဆုံဆွေးနွေးခြင်းမှ ရလဒ်များ

၈.၁.၁. တွေ့ဆုံဆွေးနွေးခြင်းများ အကျဉ်းချုပ်

တွေ့ဆုံဆွေးနွေးခြင်းများ အကျဉ်းချုပ်ကို ဇယား (၁၅) တွင် ပြသထားပါသည်။ မှတ်တမ်းဓာတ်ပုံများကို ပုံ (၇) တွင် ပြသထားပါသည်။

ဇယား (၁၅) စီမံကိန်းနယ်ပယ်တိုင်းတာသတ်မှတ်သည့်ကာလအတွင်း အများပြည်သူတွေ့ဆုံဆွေးနွေးခြင်းမှ ရလဒ်များ

အချိန် နှင့် နေ့ရက်	စနေနေ့၊ ၂၀၁၈ ခုနှစ် အောက်တိုဘာလ ၆ ရက် ပထမအပိုင်း - မနက် ၉ နာရီခွဲမှ၁၁နာရီအထိ၊ ဒုတိယအပိုင်း - မွန်းလွဲ ၁ နာရီခွဲမှ ၃ နာရီထိ တနင်္ဂနွေနေ့၊ ၂၀၁၈ ခုနှစ် အောက်တိုဘာလ ၇ ရက် တတိယအပိုင်း - မနက်၉ နာရီ ခွဲမှ၁၁နာရီအထိ၊ စတုတ္ထပိုင်း - မွန်းလွဲ ၁ နာရီခွဲမှ ၃ နာရီထိ
နေရာ	ပထမပိုင်း၊ ကုန်းမြင့်သာ ဘုန်းကြီးကျောင်း ဒုတိယပိုင်း၊ အုန်းပင်ခြံကျေးရွာ ဓမ္မာရုံ တတိယပိုင်း၊ နဘဲပင်ကျေးရွာ ဓမ္မာရုံ စတုတ္ထပိုင်း၊ တောင်ဦးကျေးရွာ ဓမ္မာရုံ
ဖိတ်ကြားထားသည့် လူများ	ညွှန်ကြားရေးမှူး၊ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ဦးစီးဌာန၊ မန္တလေးတိုင်းဒေသကြီး ဦးစီးမှူး၊ အထွေထွေအုပ်ချုပ်ရေး ဦးစီးဌာန၊ စဉ့်ကိုင်မြို့နယ် ဦးစီးအရာရှိ၊မြေယာစီမံခန့်ခွဲရေးနှင့် စာရင်းအင်းဌာန၊ စဉ့်ကိုင်မြို့နယ် ဦးစီးအရာရှိ၊ ဆည်မြောင်းနှင့် ရေအသုံးချ စီမံခန့်ခွဲမှုဦးစီးဌာန၊ စဉ့်ကိုင်မြို့နယ် ဦးစီးအရာရှိ၊ကျေးလက်ဒေသဖွံ့ဖြိုးတိုးတက်ရေး ဦးစီးဌာန၊ စဉ့်ကိုင်မြို့နယ် ဦးစီးအရာရှိ၊လမ်းဦးစီးဌာန၊ စဉ့်ကိုင်မြို့နယ် ဦးစီးအရာရှိ၊ပြန်ကြားရေးနှင့်ပြည်သူ့ဆက်ဆံရေးဦးစီးဌာန၊ စဉ့်ကိုင်မြို့နယ် ပြည်သူ့လွှတ်တော်၊ အမျိုးသားလွှတ်တော်နှင့် တိုင်းဒေသကြီးလွှတ်တော် ကိုယ်စားလှယ်များ အမျိုးသမီးရေးရာ၊ စဉ့်ကိုင်မြို့နယ် စီမံကိန်းနေရာအနီးဂန်ကျင်ကျေးရွာများမှ အုပ်ချုပ်ရေးမှူးများ စီမံကိန်းနေရာ အနီးဝန်းကျင်တွင် နေထိုင်သည့် ဒေသနေပြည်သူများ စီမံကိန်းကို စိတ်ဝင်စားသော အခြားအဖွဲ့အစည်းများနှင့် စိတ်ပါဝင်စားသူများ
တက်ရောက်သူများ	ပထမပိုင်း၊ ၇၉ ယောက် (ရွာသား ၆၇) ဒုတိယပိုင်း၊ ၈၆ ယောက် (ရွာသား ၇၈) တတိယပိုင်း၊ ၆၃ ယောက် (ရွာသား ၅၂) စတုတ္ထပိုင်း၊ ၅၄ ယောက် (ရွာသား၄၃) စုစုပေါင်း -၂၈၂ ယောက် (ရွာသား၂၄၀)
အစီအစဉ်	• စီမံကိန်းအကြောင်းအရာ ဖော်ပြချက်ကို ရှင်းလင်းပြောကြားခြင်း • နယ်ပယ်အတိုင်းအတာသတ်မှတ်ချက်ရလဒ်မူကြမ်းအရ အဓိက ကောင်းကျိုး၊ ဆိုးကျိုး တွေ့ရှိချက်များ • ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်လေ့လာခြင်း၏ နယ်ပယ်အတိုင်းအတာ ဆောင်ရွက်ရမည့် ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း လုပ်ငန်းစဉ်

အသုံးပြုမည့် ဘာသာစကား	ဒေသသုံးစကား၊ မြန်မာဘာသာစကား
အမေးအဖြေ ကဏ္ဍ	ပူးပေါင်းပါဝင်သူများမှ စုစုပေါင်း မေးခွန်း (၇) ခု မေးမြန်းရာတွင် စီမံကိန်းအဆိုပြုသူနှင့် ပူးပေါင်းအဖွဲ့အစည်းများမှ ပြန်လည်ဖြေရှင်းဆွေးနွေးခဲ့ပါသည်။
အကြံပြုလွှာများ	လူထုတွေ့ဆုံပွဲလေးခုမှ သဘောထားမှတ်ချက် စုစုပေါင်း ၁၅၂ ခုကို တင်သွင်းခဲ့ပါသည်။

အရင်းအမြစ်။ EIA လေ့လာရေးအဖွဲ့

ရှင်းလင်းမှုပြုလုပ်ခြင်း (၁)	ရှင်းလင်းမှုပြုလုပ်ခြင်း (၂)
အမေး၊ အဖြေ ပြုလုပ်ခြင်း	သဘောထားမှတ်ချက်စာရွက်တွင် ဖြည့်သွင်းခြင်း (EPGE ဝန်ထမ်းများက ကူညီဖြည့်သွင်းပေးသည်။)

အရင်းအမြစ်။ EIA လေ့လာရေးအဖွဲ့

ပုံ ၇ နယ်ပယ်တိုင်းတာသတ်မှတ်ခြင်းအဆင့်တွင် အများပြည်သူ တွေ့ဆုံဆွေးနွေးခြင်း မှတ်တမ်းဓာတ်ပုံများ

၈.၁.၂. နယ်ပယ်တိုင်းတာ သတ်မှတ်ခြင်း အဆင့်တွင် အများပြည်သူတွေ့ဆုံဆွေးနွေးခြင်း ရလဒ်များ

မေးခွန်းများ နှင့် ပြန်လည်ဖြေကြားမှုများ အကျဉ်းချုပ်ကို ဇယား ၁၆ တွင် ဖော်ပြထားပါသည်။ အစည်းအဝေးတက်ရောက်သူများထံမှ စုစုပေါင်း မေးခွန်း ၇ ခု မေးမြန်း၍ စီမံကိန်းအဆိုပြုသူနှင့် ဆွေးနွေးခဲ့ပါသည်။ ဇယား ၁၆ မှ ထင်မြင်ချက် နံပါတ် ၇ သည် ဒေသခံ ရွာသားများ ၏ စိုးရိမ်ပူပန်မှုများတိုးတက်လာခြင်းအကြောင်းဖြစ်ပြီး ယင်းအချက်ကို EPGE နှင့် MOGE တို့ နှင့် ဆွေးနွေးခဲ့ပါသည်။

ဇယား (၁၆) နယ်ပယ် အတိုင်းအတာ သတ်မှတ်ခြင်း အဆင့်အများ ပြည်သူနှင့် တွေ့ဆုံဆွေးနွေးပွဲများမှ အဓိက အကြံဉာဏ် မေးခွန်းများနှင့် ပြန်လည်ဖြေကြားချက်များ

စဉ်	ထင်မြင်ချက်/မေးခွန်း	ပြန်လည်ဖြေကြားခြင်း
၁	ဓာတ်ငွေ့ပိုက်လိုင်းအကယ်၍ ပေါက်ကွဲသွားမယ်ဆိုရင် ပေါက်ကွဲ မှုနှုန်းရဲ့ကီလိုမီတာကိုသိချင်ပါတယ်။ စီမံကိန်းကြောင့် ရွာသူရွာသားများ အပေါ် ထိခိုက်မှု ရှိခဲ့ရင်ဘယ်လိုများ ဆောင်ရွက်ပေးသွားပါမလဲ။	ယခု နောက်ပိုင်း တည်ဆောက်တဲ့ ဓာတ်ငွေ့ပိုက်လိုင်း တွေက အဆင့်မြင့် လာပါတယ်။ အဓိက ဓာတ်ငွေ့ ပိုက်လိုင်း ပေါက်ကွဲရတဲ့ အကြောင်းရင်းက ပိုက်အတွင်းမှာ သုံးတဲ့ ဓာတ်ငွေ့ရဲ့ pressureက သုံးတာ များရင်၊ လိုအပ်တဲ့ pressure ထက်ပိုပြီး ပိုက်လိုင်း ထဲကို လွှတ်လိုက်ရင် နှစ်ပေါင်းများစွာ ကြာလာရင် ပြုပြင်မှု အားနည်းတဲ့အတွက် ပိုက်တွေက တဖြေးဖြေး ပါးပြီး ပေါက်လာတာ ဖြစ်ပါတယ်။ ယခုစီမံကိန်းက အန္တရာယ် ကင်းရှင်းရေးကို ဦးစားပေး ဆောင်ရွက်ထား တာဖြစ်ပါတယ်။ ယခုပိုက်လိုင်းက အန္တရာယ်ကင်းရမယ်။ နှစ်ရှည်ခံရမယ် လိုအပ်တဲ့အချိန်မှာ ပြုပြင်မှုတွေ ပြုလုပ်ရမယ်ဆိုတဲ့ အစီအစဉ်တွေနဲ့ ဆောင်ရွက် ဖြစ်ပါတယ်။ အန္တရာယ်တော့ မရှိနိုင်ပါဘူး။ ကျွန်တော်တို့ ပိုက်လိုင်းသည် မြေအောက်မှာ တည်ဆောက်တာ ဖြစ်တဲ့အတွက် အကယ်၍ ဓာတ်ငွေ့ ပိုက်လိုင်း ပေါက်ခဲ့ရင်တောင် ပတ်ဝန်းကျင်ကို အများကြီး မထိခိုက်နိုင်ပါဘူး။ ကျွန်တော်တို့ ပိုက်လိုင်းကို ပြုပြင်မှုတွေ အမြဲ ပြုလုပ်သွားမှာပါ။ အခုလို အစည်းအဝေး ကျင်းပရတာကလည်း အများပြည်သူတွေ စိုးရိမ်မှု ကင်းအောင်၊ ဖြစ်လာနိုင်တဲ့ ပြဿနာတွေကို ဘယ်လိုဖြေရှင်းရ မလဲ မေးမြန်းနိုင်အောင်ကျင်းပရခြင်း ဖြစ်ပါတယ်။ ကျွန်တော်တို့မှာ တစ်ခုခုချို့ယွင်းရင် ချက်ချင်းပြန်ပိတ်တဲ့ စနစ် ရှိပါတယ်။ အခု ကျွန်တော်တို့ တည်ဆောက်တဲ့ ပိုက်လိုင်း သည် အရည်အသွေး ပြည့်မီတဲ့ ပိုက်တွေကို အသုံးပြုထားတာ ဖြစ်တဲ့ အတွက် အန္တရာယ် မရှိနိုင်ပါဘူး။
၂	ယခုပိုက်လိုင်းက ကျွန်တော်တို့ ဆည်မြောင်း ဘေးက ဖြတ်သန်းသွားမှာ တွေ့ရှိပါတယ်။ ရေစီးရေလာ နှောင့်ယှက်နိုင်တာ တွေလည်းရှိပါတယ်။ ဆရာတို့ ပိုက်လိုင်းက ၁.၃ မီတာ အနက်တူးပြီး မြှုပ်ဆိုရင်တော့ ကျွန်တော်တို့နဲ့ လွတ်သွားနိုင်တယ်။ တူးမြောင်းပေါ်မှာ ဖြတ်သန်းသွားမယ် ဆိုရင်လည်း ကျွန်တော်တို့ စက်ယန္တယားတွေနဲ့ maintain ပြုလုပ်တဲ့အခါ ထိခိုက်သွားနိုင်တွေ ရှိနိုင်ပါတယ်၊ အဲ့အချက်ကိုထည့်သွင်း စဉ်းစားချင်ပါတယ်။	ယနေ့ကျင်းပတဲ့ အစည်းဝေးက ပတ်ဝန်းကျင် ထိခိုက်မှု ဆန်းစစ်ခြင်းအတွက် ပဏာမပြည်သူ လူထုကိုကြို်ပြီး လာပြောပြတာ ဖြစ်ပါတယ်။ အဲ့ဒါပြီးမှ အချက်အလက်တွေကို ကောက်ယူမှာ ဖြစ်ပါတယ်။ ပိုက်လိုင်း တည်ဆောက်တာနဲ့ ပတ်သက်ပြီး မြေယာ ထိခိုက်မှုတွေရှိရင် နောက်တစ်ကြိမ် အစည်းဝေး ကျရင် ရှင်းပြမှာဖြစ်ပါတယ်။ အခုပိုက်လိုင်း တစ်လျှောက်ကို ဘယ်သူတွေ ဘယ်လောက် ထိခိုက်နိုင်တယ် ဆိုတာကို ကွင်းဆင်းပြီးတော့ လေ့လာနေ တာရှိပါတယ်။ ပိုက်လိုင်းမြှုပ်မည့်နေရာကလည်း ပိုက်လိုင်း မြှုပ်ပြီးသွားရင် တောင်သူတွေ အနေနဲ့ပြန်လည် စိုက်ပျိုးလို့ရပါတယ်။ ထိခိုက်မှု စာရင်းအတိကျရရင် နောက်တစ်ကြိမ် အစည်းအဝေး ထပ် ကျင်းပမှာဖြစ်ပါတယ်။
၃	လုပ်ငန်း လည်ပတ်တဲ့အချိန်မှာ ရေကို အသုံးမည့် အတွက် စွန့်ပစ်ရေကို ဘယ်မှာ ပစ်မှာလဲ။ ထွက်ရှိလာမည့် လေထုရဲ့	ကျွန်တော်တို့စီမံကိန်းကရေကို သန့်စင်ပြီးတော့မှ အသုံးပြုမှာပါ။ ပြန်လည်ထွက်ရှိ လာတဲ့ရေတွေကို သင့်လျော်သော သန့်စင်သည့်

စဉ်	ထင်မြင်ချက်/မေးခွန်း	ပြန်လည်ဖြေကြားခြင်း
	အညစ်ကြေး ဘယ်လိုများ ရှိနိုင်ပါသလဲ ဆိုတာကို သိချင်ပါတယ်။	စနစ်ဖြင့် သန့်စင်ပြီးမှ မြစ်ငယ်မြစ် အတွင်းသို့ ပြန်လည်စွန့်ထုတ်ပါမည်။ လေထုကိုဖြစ်စေ၊ ရေထဲကိုဖြစ်စေ ပြန်လည်စွန့်ပစ်တာ မျိုးတွေ ရှိခဲ့ရင် ပတ်ဂန်းကျင်ကို မထိခိုက်အောင် သတ်မှတ်ထားသော စံချိန်စံညွှန်းတွေအတိုင်း လုပ်ဆောင်သွားမှာဖြစ်ပါတယ်။
၄	ကျွန်တော့အနေနဲ့ ဘဲလင်းပင်မှ ဓာတ်အားခွဲရုံ တည်ဆောက်စဉ်က မြေသိမ်းခံရတဲ့ တောင်သူတွေ ကိုယ်စား တင်ပြချင်တာရှိပါတယ်။ ၂၀၀၄ခုနှစ်မှာ ပထမ အကြိမ် ၄၅.၃၄ ဧက သိမ်းခံရပါတယ်။ ဒုတိယ အကြိမ်မှ ၂၈.၇၇ ဧကသိမ်းခံခဲ့ရပါတယ်။ ကျွန်တော်တို့ သီးနှံတွေ ဆုံးရှုံးခဲ့ရပါတယ်။ ရွာသားတွေအနေနဲ့ တောင်သူတွေကနေ နေ့စားဘဝ ကိုရောက်ခဲ့ရပါတယ်။ ကျွန်တော်တို့ နစ်နာတာကို တင်ပြခြင်းဖြစ်ပါတယ်။ ကျွန်တော်တို့နစ်နာတဲ့ တောင်သူ ၂၅ဦး ရှိပါတယ်။ ယခု စီမံကိန်းမှ ဝန်ထမ်း လိုရင်အဲ့၂၅ ဦးကို ဦးစားပေး အလုပ်အကိုင် ပေးစေချင်ပါတယ်။ အခြားရွာမှာလည်း ပညာတတ်ကလေး တွေရှိပါတယ်။ ဒီဝန်းကျင် လူတွေကို အလုပ်ကိုင်ဦးစားပေး စေချင်ပါတယ်။	ဦးလေးတို့ သိမ်းခံရတာကို ကိုယ်ချင်းစာပါတယ်။ အဲ့တုန်းက အနေထားကိုတော့ ကျွန်တော်အနေနဲ့ မှတ်ချက် မပေးချင်ပါဘူး။ အရင်ခေတ်နဲ့ အခုနဲ့တော့ မတူတော့ပါဘူး။ စီမံကိန်း တစ်ခုခု လုပ်တော့မယ်ဆိုရင် စီမံကိန်း မစခင်ထဲက ပြည်သူတွေနဲ့ပြေလည်အောင် အရင်ညှိနှိုင်းပြီးမှ ဆောင်ရွက်ရတာ ဖြစ်ပါတယ်။ ကျွန်တော်တို့စီမံကိန်းကြောင့်ထိခိုက်မှု တွေရှိရင် နစ်နာမှုမရှိအောင် ဆောင်ရွက်ပေးသွား မှာဖြစ်ပါတယ်။ ကျွန်တော်တို့ကလည်း ဒေသခံတွေ အလုပ်ကိုင်ရရှိဖို့ကို အဓိကထားပါတယ်။ စက်ရုံတည်ဆောက်ရင် ဖြစ်ဖြစ် စက်ရုံပြီးလို့ လည်ပတ်တဲ့ အချိန်မှာလည်း ဒေသခံတွေကို အလုပ်အကိုင်အခွင့်လမ်း ဦးစားပေးရမယ်လို့ ညွှန်ကြား ထားတာလည်း ရရှိပါတယ်။
၅	ယခုစီမံကိန်းက ကျွန်တော်တို့ ရွာအနီးနားမှာရှိမှာ ဖြစ်တဲ့အတွက် ကောင်းကျိုးဆိုးကျိုးကို သိချင်ပါတယ်။ Gas အသုံးပြုပြီး လည်ပတ်တာ ဖြစ်တဲ့အတွက် အပူလိုင်းတွေဖြတ်တာတွေ ဂေဟာစနစ်တွေ ပျက်စီးနိုင် စိုးရိမ်ပါတယ်။ ကျွန်တော်တို့ အခြားဘီလပ်မြေစက်ရုံ ဘက်မှာတွေ အပူငွေ့တွေထွက်နေတာတွေ ရှိတယ်လို့ ကြားဖူးပါတယ်။ အဲ့လိုဖြစ်လာရင် ဘယ်သူက တာဝန်ယူမှု တာဝန်ခံ လုပ်ပေးမလဲဆိုတာ သိချင်ပါ တယ်။	အစ်ကိုတို့ အနေနဲ့ စိုးရိမ်ပူပန်မှု တွေရှိနိုင်ပါတယ်။ အဲဒါကြောင့် ကျွန်မတို့ ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်တဲ့ အဖွဲ့တွေက လက်ရှိ ရေအရည်သွေးတွေ၊ လေအရည်သွေးတွေ ဘယ်လိုရှိလဲ ဆိုတာကို လေ့လာနေပါတယ်။ နောက်တစ်ကြိမ် အစည်းအဝေးမှာ ကျွန်မတို့ လေ့လာထားတဲ့ တွေ့ရှိချက်တွေကိုပြန်လည်တင်ပြ သွားမှာဖြစ်ပါတယ်။ ယခုစက်ရုံက အစိုးရစီမံကိန်း ဖြစ်တဲ့အတွက် တာဝန်ယူမှုအပိုင်းကိုတော့ အစိုးရကဘဲလုပ်ဆောင်သွားမှာ ဖြစ်ပါတယ်။ ရန်ကုန်မှာ အခု စက်ရုံလိုဘဲ ၅ ရုံရှိပါတယ်။ လူတွေနေထိုင်တဲ့ ရပ်ကွက်မှာ ဘဲတည်ဆောက်ထားတာဖြစ်ပါတယ်။ ကျွန်တော်တို့ ဝန်ထမ်းတွေကလည်း အဲ့စက်ရုံဝန်းထဲမှာ ဘဲနေထိုင်ကြတာပါ။ အစ်ကိုစိုးရိမ်သလို ဘာမှမဖြစ်ပါဘူး။ ဓာတ်ငွေ့ဆိုတာက မီသိန်း ဖြစ်ပါတယ်။ အောက်စီဂျင်နဲ့တွေ့ရင် လောင်ကျွမ်းသွား ပါတယ်။ လူကို အန္တရာယ်ဖြစ်နိုင်တဲ့ အဆိပ်တောက် ဘာမှမဖြစ် နိုင်ပါဘူး။ ရေဆိုးများကို သင့်လျော်သော သန့်စင်သည့် စနစ်ဖြင့် သန့်စင်ပြီးမှသာ စွန့်ထုတ်ပါတယ်။
၆	ကျွန်တော်တို့ အစည်း အဝေးကို စဉ့်ကိုင်မြို့မှာ လည်း တက်ခဲ့ရပါတယ်။ အခုက ပိုက်လိုင်းက ဘယ်ကသွားပြီး ဘယ်သူ့ လယ်တွေကို ဖြတ်မယ်ဆိုတာ အတိကျသိဖို့လိုပါတယ်။ ပတ်ဝန်းကျင် ထိခိုက်မှုတွေ ဆိုတာက ကျေးရွာက လူတွေအတွက် အလှမ်းဝေးပါတယ်။ ယခုစီမံကိန်းက	ယခုစီမံကိန်းက ဘဲလင်းဓာတ်အားပေး စက်ရုံဝန်း ထဲမှာဘဲ နိုင်ငံပိုင် ၃၀၀ မီဂါဝပ် ဓာတ်အားပေး စက်ရုံတည်ဆောက်မှာ ဖြစ်ပါတယ်။ ကျွန်တော်တို့ စီမံကိန်းက လုပ်မယ်ဆိုရင် ၅နှစ်လောက် အချိန်ယူရမှာဖြစ်ပါတယ်။ တည်ဆောက်ရေးကာလ၊ EIA လုပ်တာတွေရော အားလုံး အချိန်ယူရပါတယ်။ မြေယာကိစ္စနဲ့ပတ်သက်ရင်

စဉ်	ထင်မြင်ချက်/မေးခွန်း	ပြန်လည်ဖြေကြားခြင်း
	နိုင်ငံတော်စီမံကိန်း ဖြစ်တဲ့အတွက် ကန့်ကွက်စရာ အကြောင်းမရှိပါ ဘူး။ တောင်သူတွေ အနေနဲ့ နစ်နာမှု တွေ့ရှိနိုင်ပါတယ်။ နစ်နာသွားတဲ့ တောင်သူတွေကိုကြားခံလူ မရှိဘဲ ပွင့်လင်းမြင်သာမှုရှိအောင် ညှိနှိုင်း စေချင်ပါတယ်။	အခုကျွန်မတို့အဖွဲ့က ကွင်းဆင်းပြီး တိုင်းတာနေတာ တွေရှိပါတယ်။ နောက်ထပ် အစည်းအဝေးကျရင် ကျွန်မတို့ တင်ပြသွားမှာ ဖြစ်ပါတယ်။
၇	အခုလက်ရှိလမ်းကြောင်းနားမှာဘဲ Gas ပိုက်လိုင်းဆွဲထားတာရှိပါတယ်၊အရင်လ ထဲမှာ Gas ပိုက်လိုင်းသွယ်ဖို့အစည်းအဝေး လုပ်တာ ရှိပါတယ်။ အဲ့ပိုက်လိုင်းနဲ့အခုပိုက်လိုင်း တူလား မတူဘူးလားဆို တာသိချင်ပါတယ်။	ဟုတ်ကဲ့မတူပါဘူး။ အဲ့တာကကျွန်တော် ခုနကပြောတဲ့ short term Project အတွက် MOGE ကတည်ဆောက်မည့်စီမံကိန်း ဖြစ်ပါတယ်။ ကျွန်တော်တို့အနေနဲ့ MOGEနှင့် ပိုက်လိုင်းလမ်းကြောင်းကို ပြန်လည် ညှိနှိုင်းဖို့ရှိပါတယ်။

အရင်းအမြစ်။ EIA လေ့လာရေးအဖွဲ့

တက်ရောက်သူများမှ တင်ပြခဲ့သော အကြံပြုစာများရှိ အမြင်များ၊ သဘောထားမှတ်ချက်များမှာ စုစုပေါင်း ၁၅၂ ခုရှိပြီး အဓိက အမြင်များ၊ သဘောထားမှတ်ချက်များ အကျဉ်းချုပ်ကို ဇယား ၁၇ တွင် ဖော်ပြထားပါသည်။

အများစုမှာ စီမံကိန်းကို ထောက်ခံခြင်းဖြစ်သော်လည်း၊ အချို့ သဘောထားအမြင်များမှာ ဆောက်လုပ်ရေးကာလနှင့် လုပ်ငန်းလည်ပတ်သည့် ကာလအတွင်း ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်းလေ့လာမှု (EIA) ဆိုင်ရာ ToR တွင် ထည့်သွင်းစဉ်းစားသင့်ပါသည်။ ယင်း သဘောထားအမြင်များကို EIA အစီရင်ခံစာတွင် ထည့်သွင်းဖော်ပြထားပြီး နောက်ထပ်ပြုလုပ်သည့် (EIA အဆင့်) အများပြည်သူတွေ့ဆုံဆွေးနွေးပွဲတွင် ရှင်းလင်းတင်ပြခဲ့ပါသည်။

ဇယား(၁၇) အကြံပြုပုံစံမှရရှိသောအဓိကအမြင်များ၊သဘောထားမှတ်ချက်များ

စဉ်	အများအမြင်သဘောထားမှတ်ချက်များ	အရေအတွက်
၁	စီမံကိန်းမှာကောင်းပါသည်။	၄၀
၂	အလုပ်အကိုင်အခွင့်အလမ်း(ဒေသခံများကိုအလုပ်ခန့်ထားရန်မျှော်လင့်ခြင်း)	၁၉
၃	စီမံကိန်း၏ဘေးကင်းလုံခြုံရေးကိုစိုးရိမ်ပူပန်သည်။	၁၅
၄	မကန့်ကွက်ပါ။ (ထိခိုက်မှုမရှိရင်)	၁၃
၅	မှတ်ချက်ပေးရန်မရှိ။	၁၂

မှတ်ချက်။ အဓိကအကြံပြုချက်များကိုသာ ယခုဇယားတွင်ဖော်ပြထားခြင်းဖြစ်သည်။ သို့ဖြစ်ပါ၍ အနုတ်လက္ခဏာဆောင်သော ထင်မြင်ယူဆချက်များအား ယခုဇယားတွင်တွေ့မြင်ရမည်မဟုတ်ပါ။

အရင်းအမြစ်။ EIA လေ့လာရေးအဖွဲ့

၈.၂. ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်းအစီရင်ခံစာ ပြုလုပ်သည့်ကာလအတွင်း အများပြည်သူတွေ့ဆုံဆွေးနွေးခြင်းမှရလဒ်များ

၈.၂.၁. တွေ့ဆုံဆွေးနွေးခြင်းများ အကျဉ်းချုပ်

တွေ့ဆုံဆွေးနွေးခြင်းများ အကျဉ်းချုပ်ကို ဇယား ၁၈ တွင် ဖော်ပြထားပြီး မှတ်တမ်းတင် ဓာတ်ပုံများကို ပုံ ၈ တွင် ဖော်ပြထားပါသည်။

ဇယား (၁၈) ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ချက် ပြုလုပ်သည့်ကာလအတွင်းအများပြည်သူတွေ့ဆုံဆွေးနွေးခြင်း အကျဉ်းချုပ်

အချိန် နှင့် နေ့ရက်	စနေနေ့ ၂၀၁၉ ခုနှစ်ဧပြီလ ၂၀ ရက် ပထမအပိုင်း - မနက် ၉ နာရီခွဲမှ၁၁နာရီအထိ၊ ဒုတိယအပိုင်း - မွန်းလွဲ ၁ နာရီခွဲမှ ၃ နာရီထိ တနင်္ဂနွေနေ့၂၀၁၉ ခုနှစ် ဧပြီလ ၂၁ ရက် တတိယအပိုင်း - မနက်၉ နာရီ ခွဲမှ၁၁နာရီအထိ၊ စတုတ္ထပိုင်း - မွန်းလွဲ ၁ နာရီခွဲမှ ၃ နာရီထိ စနေနေ့၂၀၂၀ ခုနှစ် ဇန်နဝါရီလ ၂၅ ရက် ပဉ္စမအပိုင်း - မွန်းလွဲ ၁ နာရီမှ ၂ နာရီထိ
နေရာ	ပထမပိုင်း၊ ကုန်းမြင့်သာ ဘုန်းကြီးကျောင်း ဒုတိယပိုင်း၊ အုန်းပင်ခြံကျေးရွာ ဓမ္မာရုံ တတိယပိုင်း၊ နဘဲပင်ကျေးရွာ ဓမ္မာရုံ စတုတ္ထပိုင်း၊ တောင်ဦးကျေးရွာ ဓမ္မာရုံ ပဉ္စမအပိုင်း၊ ကုန်းမြင့်သာ ဘုန်းကြီးကျောင်း
ဖိတ်ကြားထားသည့် လူများ	လက်ထောက်ညွှန်ကြားရေးမှူး၊ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ဦးစီးဌာန၊ မန္တလေးတိုင်းဒေသကြီး ဒုဦးစီးမှူး၊ အထွေထွေအုပ်ချုပ်ရေး ဦးစီးဌာန၊ စဉ့်ကိုင်မြို့နယ် ဦးစီးမှူး၊ ပညာရေးဦးစီးဌာန၊ စဉ့်ကိုင်မြို့နယ် စီမံကိန်းနေရာ အနီးဝန်းကျင်ရှိ ရွာများ နှင့် ကျေးရွာအုပ်စုများ၏ အုပ်ချုပ်ရေးမှူးများ စီမံကိန်းနေရာ အနီးဝန်းကျင်တွင် နေထိုင်သည့် ဒေသနေပြည်သူများ စီမံကိန်းကို စိတ်ဝင်စားသော အခြားအဖွဲ့အစည်းများနှင့် စိတ်ပါဝင်စားသူများ
တက်ရောက်သူများ	ပထမပိုင်း၊ ၆၈ ယောက် (ရွာသား - ၅၁ ယောက်) ဒုတိယပိုင်း၊ ၃၉ ယောက် (ရွာသား - ၂၆ ယောက်) တတိယပိုင်း၊ ၇၀ ယောက် (ရွာသား - ၅၇ ယောက်) စတုတ္ထပိုင်း၊ ၃၈ ယောက် (ရွာသား - ၂၅ ယောက်) ပဉ္စမအပိုင်း၊ ၄၅ ယောက် (ရွာသား - ၁၈ ယောက်) စုစုပေါင်း၊ ၂၆၀ ယောက် (ရွာသား - ၁၇၇ ယောက်)
အစီအစဉ်	စီမံကိန်းအကြောင်းအရာများနှင့် မိတ်ဆက်ခြင်း ယခင်တွေ့ဆုံဆွေးနွေးပွဲများမှ တုံ့ပြန်ချက်များ သဘာဝနှင့်လူမှုဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း လေ့လာမှု လျော့ပါးစေရေးနည်းလမ်းများ စသည် ထပ်မံတွေ့ဆုံဆွေးနွေးပွဲလုပ်ရခြင်း ရည်ရွယ်ချက် (ပဉ္စမအပိုင်းအတွက်သာ)
အသုံးပြုမည့် ဘာသာစကား	ဒေသသုံးစကား၊ မြန်မာဘာသာစကား
အမေးအဖြေ ကဏ္ဍ	ပူးပေါင်းပါဝင်သူများမှ စုစုပေါင်း မေးခွန်း (၁၈) ခု မေးမြန်းရာတွင် စီမံကိန်းအဆိုပြုသူနှင့် ပူးပေါင်းအဖွဲ့အစည်းများမှ ပြန်လည်ဖြေရှင်း ဆွေးနွေးခဲ့ပါသည်။
အကြံပြုလွှာများ	လူထုတွေ့ဆုံပွဲလေးခုမှ သဘောထားမှတ်ချက် စုစုပေါင်း ၁၀၂ ခုကို တင်သွင်းခဲ့ပါသည်။

အရင်းအမြစ်။ EIA လေ့လာရေးအဖွဲ့

ရှင်းလင်းမှုပြုလုပ်ခြင်း (၁)	ရှင်းလင်းမှုပြုလုပ်ခြင်း (၂)
အမေး၊ အဖြေ ပြုလုပ်ခြင်း	သဘောထားမှတ်ချက်စာရွက်တွင် ဖြည့်သွင်းခြင်း (EPGE ဝန်ထမ်းများက ကူညီဖြည့်သွင်းပေးသည်။)

အရင်းအမြစ်။ EIA လေ့လာရေးအဖွဲ့

ပုံ (၈) ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ချက် ပြုလုပ်ခြင်း အဆင့်၊ အများ ပြည်သူ တွေ့ဆုံဆွေးနွေးခြင်း မှတ်တမ်းတင်ဓာတ်ပုံများ

၈.၂.၂. ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ချက် ပြုလုပ်သည့် ကာလအတွင်း အများပြည်သူတွေ့ဆုံဆွေးနွေးပွဲမှ ရလဒ်များ

ဇယား ၁၉ တွင် မေးခွန်းများ နှင့် ပြန်လည်ဖြေကြားချက်များကို အကျဉ်းချုပ်ဖော်ပြထားပါသည်။ တက်ရောက်သူများထံမှ မေးခွန်း ၁၈ ခု မေးမြန်း၍ စီမံကိန်း အဆိုပြုသူ နှင့် ဆွေးနွေးခဲ့ပါသည်။ ဇယား ၁၉ မှ ထင်မြင်ချက် နံပါတ် ၈ သည် ဒေသခံရွာသားများ အနေဖြင့် ဓာတ်ငွေ့ပိုက်လိုင်းများ အပြိုင်ထားရှိမှုအပေါ် စိုးရိမ်ပူပန်မှု အကြောင်းဖြစ်ပြီး၊ ယင်းအချက်ကို EPGEသည် သက်ဆိုင်ရာ အစိုးရဌာနများနှင့် ပြန်လည်ညှိနှိုင်းပြီးဖြစ်ကာ ပိုက်လိုင်းလမ်းကြောင်းအား အများပြည်သူပိုင်နေရာများအတွင်း အဖြစ်နိုင်ဆုံးပြောင်းလဲထားခဲ့ပါသည်။

ဇယား (၁၉) ပတ်ဝန်းကျင် ထိခိုက်မှု ဆန်းစစ်ခြင်း အများပြည်သူနှင့် တွေ့ဆုံဆွေးနွေးပွဲများမှ အဓိကအကြံဉာဏ်မေးခွန်းများနှင့်ပြန်လည်ဖြေကြားချက်များ

စဉ်	ထင်မြင်ချက်/မေးခွန်း	ပြန်လည်ဖြေကြားခြင်း
၁	မြစ်ကမ်းပြိုမှု နဲ့ ပတ်သက်ပြီး စိုးရိမ်ရတာရှိပါတယ်။	ရေသွယ်ယူရာ နေရာများ မတည်ဆောက်ခင်မှာ

စဉ်	ထင်မြင်ချက်/မေးခွန်း	ပြန်လည်ဖြေကြားခြင်း
	ဒါနဲ့ပတ်သက်ပြီး ထိခိုက်မှု ရှိနိုင်ပါသလား ။	ယင်းနေရာတစ်ဝိုက်မှာ ကမ်းထိန်းနံရံများ တည်ဆောက်ပါမယ်။
၂	ဘာဖြစ်လို့ မကွေရာ ကျေးရွာကို ဖြတ်ပြီးတော့ ရေပိုက်သွယ်ဖို့ စဉ်းစားတာပါလဲ။ အဲဗျကျေးရွာအနီးက လမ်းကို ဖြတ်ပြီး ရေပိုက်လိုင်း သွယ်ရင်ဖြစ်နိုင်ပါတယ်။	ဖြစ်နိုင်ခြေ လေ့လာမှုစစ်တမ်းအရ ဆိုရင် အခု အဆိုပြုထားတဲ့ လမ်းကြောင်းက အခြား ရွေးချယ်စရာတွေထက်စာရင် ပိုမို ကောင်းမွန်မှုရှိပါတယ်။ ဒါ့ကြောင့်မို့ ယခု အဆိုပြုထားတဲ့ လမ်းကြောင်းကို ရွေးချယ်ခဲ့တာဖြစ်ပါတယ်။
၃	မုန့်ပေါင်း ကျေးရွာ အနားမှာ IP 1 (Intermediate Pump station) station ရှိပါသလား။ တကယ်လို့ IP 1 တည်ဆောက်ခဲ့မယ်ဆိုရင် မြေပိုင်ရှင်က သဘောတူမှာ မဟုတ်ပါဘူး။	ဟုတ်ကဲ့ပါ။ Intermediate Pump station ကို နယ်ပယ်တိုင်းတာ သတ်မှတ်ခြင်း အဆင့်မှာ စဉ်းစားခဲ့တာပါ။ ဒါပေမယ့် အခု အဲ့ဒါကို တည်ဆောက်တော့မှာ မဟုတ်ပါဘူး။
၄	ပင်ချား တံတား အနားက ပိုက်လိုင်းက ဘယ်နားလောက်မှာ ရှိလဲဆိုတာ ပြပေးပါ။ ဓာတ်အားပေးစက်ရုံကို ဘယ်နှစ်နှစ် တည်ဆောက်မလဲဆိုတာ သိချင်ပါတယ်။ ဘယ်အချိန်မှာ တည်ဆောက်ရေး လုပ်ငန်းတွေ စမှာ ပါလဲ။ တကယ်လို့ ဆောက်တော့မယ်ဆိုရင် လာရောက်အသိပေး ပေးပါ။ သီးနံ့စိုက်ပျိုးရေး နဲ့ ပတ်သက်ပြီးတော့ စိုးရိမ်လို့ပါ။	စီမံကိန်းကာလ က (၅) နှစ်ပါ။ စီမံကိန်း အချိန်ဇယားကို လာရောက် ရှင်းလင်းပေးမှာ ဖြစ်ပါတယ်။
၅	ဓာတ်ငွေ့ပိုက်လိုင်းက ဘယ်နားမှာ ပါလဲ။ အဲ့ ပိုက်လိုင်းက လယ်မြေတွေကို ဖြတ်သန်းပြီး ဆောက်မှာပါလား။ ပိုက်လိုင်းတူးဖော်ပြီးတဲ့ အခါကျရင် ဆောက်လုပ်ရေး ကာလတွင် ပိုက်လိုင်းများ အချိန်ကြာ ထားရှိခြင်းကြောင့် မြောင်းတွေ ဖြစ်ကျန်ခဲ့နိုင်ပါလား။ ဒီလိုဆိုရင် လယ်ယာလုပ်ငန်းများ လုပ်ကိုင်ဖို့ အတားအဆီးတွေ ဖြစ်လာနိုင်ပါတယ်။	ရည်ညွှန်းဧရိယာအနီးမှာတော့ ရေပိုက်ကိုသာ ရေပေးဝေရေး ဆည်မြောင်းတစ်လျှောက်မှာ ထားသွားမှာဖြစ်ပါတယ်။ အကောင်းဆုံး ကန်ထရိုက်တာကို ရွေးချယ်သွားပါမယ်။ ဘယ်လင်း ဓာတ်အားခွဲရုံမှာလည်း တိုင်ကြားစာပေးနိုင်ဖို့ ဌာနတစ်ခု ထားရှိသွားမှာဖြစ်ပါတယ်။ ဒေသခံ ရွာသားများ နဲ့ ဆက်သွယ်ဆောင်ရွက်ချင်ပါတယ်။ တကယ်လို့ အခက်အခဲတွေ၊ ပြဿနာတွေ ဖြစ်လာရင် တိုင်ကြားမှုတွေလာပြီး ပြုလုပ်နိုင်ပါတယ်။
၆	ဒေသခံလယ်သမားတွေ ကိုယ်စား ပြောချင်ပါတယ်။ ဘယ်လင်း ဓာတ်အားခွဲရုံ တည်ဆောက်ဖို့အတွက် မြေယာသိမ်းဆည်းမှုနဲ့ ပတ်သက်ပြီးတော့ ပြောချင်ပါတယ်။ ပထမဆုံး အနေနဲ့ ၂၀၁၄ မှာ မြေ ၄၅.၃၄ ဧက ကို အစိုးရက သိမ်းယူခဲ့ပါတယ်။ ဒုတိယအကြိမ်အနေနဲ့ မြေဧက ၂၈.၇၇ ဧက ကို သိမ်းယူခဲ့ပါတယ်။ စိုက်ပျိုးသီးနံ့တွေ ဆုံးရှုံးခဲ့ပါတယ်။ လယ်သမားတွေ ဘဝကနေပြီး ကျပန်း သမားတွေ အဖြစ်ကို ပြောင်းလဲကုန်ပါတယ်။ သက်ရောက်ခံ လယ်သမား ၂၅ ယောက် ရှိပါတယ်။ တကယ်လို့ ဒီစီမံကိန်းမှာ အလုပ်သမား လိုအပ်ခဲ့လို့ရှိရင် အဲ့ဒီ လယ်သမား ၂၅ ယောက်ကို ဦးစားပေး ပြီး စဉ်းစားပေးစေလိုပါတယ်။ အခြားရွာတစ်ရွာမှာလည်း ပညာတတ်လူငယ်တွေရှိပါတယ်။ ဒေသခံတွေကို	မြေဆုံးရှုံးမှုတွေအတွက် စိတ်မကောင်းပါဘူး။ ဖြစ်ပြီးတဲ့ ကိစ္စတွေ နဲ့ ပတ်သက်ပြီး သဘောထားမှတ်ချက်မပေးလိုပါဘူး။ ယခင် နဲ့ ယခုက မတူတော့ပါဘူး။ စီမံကိန်းတစ်ခု လုပ်ပြီဆိုရင် အများပြည်သူနဲ့တွေ့ဆုံဆွေးနွေးပွဲတွေပြုလုပ်ပြီးမှ ဆောင်ရွက်ရတာဖြစ်ပါတယ်။ တကယ်လို့ စီမံကိန်းကြောင့် ထိခိုက်နစ်နာမှုတွေရှိမယ်ဆို ဒေသခံတွေဘက်က နစ်နာမှုတွေမရှိအောင် ဆာင်ရွက်မှာဖြစ်ပါတယ်။ဆောက်လုပ်ရေး လုပ်ငန်းကာလနဲ့ စက်ရုံလည်ပတ်တဲ့ ကာလတွေမှ ဒေသခံတွေကို အလုပ်အကိုင်အခွင့်အလမ်းတွေ ဦးစားပေးပြီး ခန့်ထား ပေးသွားမှာ ဖြစ်ပါတယ်။

စဉ်	ထင်မြင်ချက်/မေးခွန်း	ပြန်လည်ဖြေကြားခြင်း
	အလုပ်အကိုင်အခွင့်အလမ်းတွေ ဦးစားပေးပြီး ပေးသင့်ပါတယ်။	
၇	ကျွန်ုပ်တို့ နဘဲပင် ရွာသားတွေကို အလုပ်အကိုင်အခွင့်အလမ်းတွေ ဖန်တီးပေးဖို့ တောင်းဆိုချင်ပါတယ်။ ဘာ့ကြောင့်လည်းဆိုတော့ ရွာမှာ ဘွဲ့ရတဲ့ သူတွေအများကြီးရှိလို့ပါ။	ဟုတ်ကဲ့ပါ။ ပညာတတ် ဒေသခံ ရွာသားတွေကို ဆောက်လုပ်ရေးကာလ နဲ့ လုပ်ငန်းလည်ပတ်တဲ့ ကာလတွေမှာ အလုပ်အကိုင် ပေးသွားမှာဖြစ်ပါတယ်။ ကျေးရွာအုပ်ချုပ်ရေးမှူးဆီကို အလုပ်ခေါ်စာတွေ ပေးပို့သွားမှာဖြစ်လို့ အဲ့ဒီအခါကျရင် လာရောက်လျှောက်ထားနိုင်ပါတယ်။
၈	ဒီစီမံကိန်းနဲ့ ပတ်သက်ပြီးတော့ သဘောမတူပါဘူး။ ဘာ့ကြောင့်လဲဆိုတော့ ဓာတ်ငွေ့ ပိုက်လိုင်းကြောင့် မြေအသုံးချမှု ပြောင်းလဲသွားမှာကို မလိုလားလို့ပါ။	ဒီတွေ့ဆုံပွဲဟာ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်းရဲ့ ရလဒ်တွေကို အသိပေးဖို့ ကျင်းပခြင်းဖြစ်ပါတယ်။ ဒီစီမံကိန်းကို အစိုးရက ပိုင်ပါတယ်။ အခုလို ပြောကြားချက်ကို မှတ်တမ်းတင်ပြီး EIA အစီရင်ခံစာ ထဲမှာ ထည့်သွင်းဖော်ပြပေးသွားပါမယ်။
၉	အကယ်၍ ပိုက်လိုင်းကို မြောင်းဘောင်ထဲမှာ ထည့်ထားမယ်ဆိုရင် ရေပေးဝေချိန်မှာ အနှောင့်အယှက်ဖြစ်နိုင်ပါတယ်။ ရေပိုက်ကို ပြုပြင်ထိန်းသိမ်းချိန်အတွက်ပါ ထည့်သွင်းစဉ်းစားဖို့လိုအပ်ပါတယ်။	အခုကတော့ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းရဲ့ ချေးငွေအဆိုပြုတဲ့အဆင့်မှာပဲရှိပါသေးတယ်။ EIA အစီရင်ခံစာကို ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနက လက်ခံလိုက်ပြီဆိုတော့မှ နည်းပညာပိုင်းဆိုင်ရာ အကြံပေးပညာရှင်တွေ ငှားရမ်းသွားမှာဖြစ်ပြီး၊ JICA နဲ့ ချေးငွေစာချုပ် ချုပ်ဆိုမှာဖြစ်ပါတယ်။ ချေးငွေအတည်ဖြစ်ပြီဆိုတော့မှ သင့်တော်တဲ့ဒီဇိုင်းကို သက်ဆိုင်ရာပညာရှင်တွေနဲ့ တိုင်ပင်ပြီး ဆက်လက်ဆောင်ရွက်မှာ ဖြစ်ပါတယ်။ ဒါကြောင့် အခုအခြေအနေမှာ ဒီဇိုင်းကို အတိအကျ မဖော်ပြပေးနိုင်တာပါ။ ဒါပေမယ့် ရေပေးဝေရေးကို အနှောင့်အယှက်မဖြစ်အောင် ဆောင်ရွက်မှာဖြစ်ပါတယ်။ ပညာရှင်များ၊ အကြံပေးများနဲ့တိုင်ပင်ပြီး ပိုင်လိုင်းတလျှောက်ကို အသေးစိပ် ကွင်းဆင်းလေ့လာသွားမှာဖြစ်ပါတယ်။ ရေပိုက်တောင်မှ လုံးဝ ရေစိမ့်မထွက်တဲ့ နည်းပညာကို အသုံးပြုသွားဖို့ရှိပါတယ်။
၁၀	အချို့သူတွေက သူတို့မြေနေရာမှာ ဓါတ်ငွေ့ပိုက်လိုင်းတပ်ဆင်မှာကို မလိုလားကြသူတွေလည်း ရှိတဲ့အတွက် ရေပိုက်လိုင်းထက် ဓါတ်ငွေ့ပိုက်လိုင်းကို ပိုပြီးစိုးရိမ်မိပါတယ်။	ဓါတ်ငွေ့ပိုက်လိုင်းကိုဆန့်ကျင်တဲ့ မြေပိုင်ရှင်တွေရဲ့ မြေနေရာတွေကို အတတ်နိုင်ဆုံးရှောင်ပြီး စီမံကိန်းကို ဆောင်ရွက်ထားပါတယ်။ လုပ်ငန်းစဉ်များအတွင်း ဓါတ်ငွေ့ပိုက်လိုင်းကို လမ်းကြောင်းအသစ်အနေနဲ့ တူးမြောင်းတလျှောက်နေရာကို ရွှေ့ပြောင်းထားပြီးဖြစ်ပါတယ်။
၁၁	မြစ်ဘေးနားတွင် (ရွာသားအမည်)ဖြင့် မြေကွက်လပ်လေးတခုရှိတယ်။ အဲ့ဒီမြေနေရာလေးနဲ့ ပတ်သက်ပြီး ရှင်းပြချင်လို့ပါ။ ဒီမြေလေးက (လူပုဂ္ဂိုလ်အမည်) ပိုင်တဲ့မြေမဟုတ်ပါဘူး။ ရွာရှိ လူမှုရေးအဖွဲ့ ပိုင်တဲ့မြေဖြစ်ပါတယ်။ ဒါကြောင့် အဲ့ဒီမြေကို (ရွာအမည်) နဲ့ တွဲဖက်ကျေးရွာပိုင်မြေအဖြစ် ထားပေးစေချင်ပါတယ်။	မှတ်ထားလိုက်ပါပြီ။
၁၂	(လူပုဂ္ဂိုလ်အမည်) နာမည်နဲ့မြေအတွက် လျော်ကြေးပေးတဲ့	ဟုတ်ကဲ့။ လျော်ကြေးပေးတဲ့အခါ သက်ဆိုင်ရာ အဖွဲ့အစည်း၊

စဉ်	ထင်မြင်ချက်/မေးခွန်း	ပြန်လည်ဖြေကြားခြင်း
	အခါ ကျေးရွာမှလူကြီးတွေကိုသာ ပေးစေချင်ပါတယ်။	ကျေးရွာမှ တာဝန်ရှိလူကြီးတွေနဲ့ တိုင်ပင်ပြီး ဆောင်ရွက်သွားမှာဖြစ်ပါတယ်။ အဲ့ဒီမြေနေရာကိုလဲ ပြည်သူပိုင်မြေနေရာအဖြစ်အသုံးပြုသွားဖို့ စီစဥ်ထားပါတယ်။
၁၃	စီမံကိန်းမှာ ခြံစည်းရိုးလေးထိနိုင်လို့ ဘယ်လိုတာဝန်ယူပေးမလဲသိချင်ပါတယ်။	စီမံကိန်းမှ ထိခိုက်တဲ့ ခြံစည်းရိုးကို ပြန်လည်ပြုပြင်ဖို့ သင့်လျော်တဲ့ နှုန်းထားနဲ့ ပေးလျော်သွားမှာပါ။
၁၄	စီမံကိန်းက ရေအရင်းအမြစ်တွေကို ထိခိုက်နိုင်လား သိချင်ပါတယ်။	စီမံကိန်းက ရေသုံးစွဲမှုကို လျှော့ချဖို့အတွက် လေနဲ့ အအေးခံစနစ်ကို အသုံးပြုသွားမှာဖြစ်ပါတယ်။ စီမံကိန်းက မြစ်ငယ်မြစ်မှ ရေကိုအသုံးပြုမှာဖြစ်ပြီး ရေကို အတတ်နိုင်ဆုံး ခြွေတာ သုံးစွဲမှာဖြစ်ပါတယ်။ ရေကို အများဆုံး တနေ့ ဂါလံ ထောင်ဂဏန်းလောက်သာ အသုံးမှာဖြစ်ပါတယ်။
၁၅	စီမံကိန်းက အစိုးရကပြုလုပ်တဲ့ စီမံကိန်းလား။	ဟုတ်ကဲ့။ ဒီစီမံကိန်းက အစိုးရနဲ့ JICA တို့ ချေးငွေရယူပြီး ပူးပေါင်းဆောင်ရွက်တဲ့ စီမံကိန်း ဖြစ်ပါတယ်။ သဘာဝပတ်ဝန်းကျင်အပေါ် သက်ရောက်မှုကို အများဆုံးလျှော့ချနိုင်ဖို့ သဘာဝဓါတ်ငွေ့နဲ့ စွန့်ပစ်အပူသုံး ဂတ်စ်တာပိုင်ကို အသုံးပြုသွားမှာဖြစ်ပါတယ်။
၁၆	စီမံကိန်းကြောင့် လမ်းတွေထိခိုက်ရင် ပြန်လည်ပြုပြင်ပေးဖို့ ပြောချင်ပါတယ်။	ဟုတ်ကဲ့။ စီမံကိန်းမှ ရရှိလာတဲ့ အမြတ်ရဲ့ ၂ရာခိုင်နှုန်းကို လူမှုရေးဆိုင်ရာ တာဝန်ယူမှု၊ တာဝန်သိတတ်မှု အနေနဲ့ ပြန်လည်အသုံးပြုသွားမှာ ဖြစ်တဲ့အတွက် လူကြီးမင်းရဲ့ အကြံပြုချက်က လူမှုတာဝန်ယူမှု၊ တာဝန်ခံမှု အစီအစဉ်ထဲမှာ တခုအပါအဝင် ဖြစ်ပါတယ်။
၁၇	စီမံကိန်းကြောင့် လျှပ်စစ်ဓါတ်အားခ အပြောင်းအလဲဖြစ်နိုင်ပါသလား။	အများပြည်သူအတွက် လျှပ်စစ်ဓါတ်အားဖြန့်ဖြူးပေးဖို့ ရည်ရွယ်ပြီး အစိုးရအနေနဲ့ ဂတ်စ်တာဘိုင်တခုလုံးကို အကုန်အကျခံပြီး ဆောင်ရွက်တာဖြစ်ပါတယ်။ ဒါကြောင့် ဂတ်စ်တာဘိုင် တည်ဆောက်တဲ့ ကုန်ကျစရိတ်ကြောင့် လျှပ်စစ်ဓါတ်အားခကို အပြောင်းအလဲဖြစ်စေမှာ မဟုတ်ပါဘူး။ အစိုးရရဲ့ သတ်မှတ်နှုန်းထား အတိုင်းသာ ပေးဆောင်ရမှာ ဖြစ်ပါတယ်။
၁၈	စီမံကိန်းမှ ထုတ်လွှတ်မယ့် ဓါတ်ငွေ့တွေရှိပါသလား။	အခုစီမံကိန်းက Dry Low NOx လောင်ကျွမ်းခြင်း (DLN) လို့ခေါ်တဲ့ ဂျပန် နည်းပညာကို အသုံးပြုသွားမှာဖြစ်ပါတယ်။ ဒီ လောင်ကျွမ်းစက်ကနေ ထွက်လာတဲ့ နိုက်ထရိုဂျင်အောက်ဆိုဒ်ဟာ မြင့်မားတဲ့ အပူချိန်နဲ့ အဲ့ဒီစက်ထဲမှာပဲ ဖြတ်ပါတယ်။ မြန်မာနိုင်ငံ သဘာဝ ပတ်ဝန်းကျင် အရည်အသွေးဆိုင်ရာ ထုတ်လွှတ်မှု လမ်းညွှန်ချက်များရဲ့ သတ်မှတ်စံညွှန်းတွေအောက်မှာပဲ နိုက်ထရိုဂျင်အောက်ဆိုဒ်ကို ထုတ်လွှတ်မှာဖြစ်ပါတယ်။ ဒါဟာ နိုက်ထရိုဂျင်အောက်ဆိုဒ် ထုတ်လွှတ်မှု သုညရာခိုင်နှုန်းလို့ မဆိုလိုပါဘူး။ ဒါ့အပြင် သဘာဝပတ်ဝန်းကျင် စောင့်ကြည့်လေ့လာရေး အစီရင်ခံစာကိုလဲ ဆောင်ရွက်သွားမှာ ဖြစ်ပါတယ်။ သဘာဝပတ်ဝန်းကျင် စောင့်ကြည့်လေ့လာရေး အစီရင်ခံစာကို ပုံမှန်တင်သွင်းသွားမှာ ဖြစ်ပါတယ်။

အရင်းအမြစ်။ EIA လေ့လာရေးအဖွဲ့

အကြံပြုပုံစံစာရွက်များပေါ်တွင် ထင်မြင်ချက် ၁၀၂ ချက်ကို ဖော်ပြခဲ့ကြပါသည်။ အဓိက ထင်မြင်ချက်များကို ဇယား ၂၀ တွင် အကျဉ်းချုပ်ပြီး ဖော်ပြပေးထားပါသည်။ အတွေ့ရအများဆုံး ထင်မြင်ချက်မှာ စီမံကိန်းကို ထောက်ခံသည့် အကြောင်းအရာများဖြစ်ပါသည်။ သဘာဝပတ်ဝန်းကျင် နှင့် လူမှုဝန်းကျင်အပေါ် ထိခိုက်မှုတွေအတွက် စိုးရိမ်ပူပန်မှု အချို့လည်းရှိပါသည်။ ယခု ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း အစီရင်ခံစာတွင် ပါဝင်သော ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်အတိုင်း ကန်ထရိုက်တာနှင့် စီမံကိန်းအဆိုပြုသူတို့သည် စီမံကိန်းကာလတစ်လျှောက်လုံး အပြည့်အဝ လိုက်နာဆောင်ရွက်ရန်အရေးကြီးပါသည်။

ဇယား (၂၀) ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းအဆင့် အကြံပြုပုံစံမှရရှိသောအဓိကအမြင်များ၊ သဘောထားမှတ်ချက်များ

စဉ်	အမြင်များ၊ သဘောထားမှတ်ချက်များ	အရေအတွက်
၁	ကန့်ကွက်ရန် မရှိပါ။	၁၁
၂	ထောက်ခံပါသည်။	၉
၃	ပိုက်လိုင်း လမ်းကြောင်း (အများပိုင်မြေကို အသုံးပြုခြင်းသည် လယ်သမားများအတွက် ပိုမိုကောင်းမွန်ပါသည်။)	၈
၄	စီမံကိန်း လုပ်ငန်းများမှ ဆူညံသံ နှင့်တုန်ခါမှုတို့နှင့် ပတ်သက်သော စိုးရိမ်ပူပန်မှုများ။	၈
၅	အလုပ်အကိုင်အခွင့်အလမ်း (ဒေသခံများကို အလုပ်ခန့်ထားရန် မျှော်လင့်ခြင်း)။	၇

မှတ်ချက်။ အဓိကအကြံပြုချက်များကိုသာ ယခုဇယားတွင်ဖော်ပြထားခြင်းဖြစ်သည်။ သို့ဖြစ်ပါ၍ အနုတ်လက္ခဏာဆောင်သော ထင်မြင်ယူဆချက်များအား ယခုဇယားတွင်တွေ့မြင်ရမည်မဟုတ်ပါ။

အရင်းအမြစ်။ EIA လေ့လာရေးအဖွဲ့

၉. ဖွံ့ဖြိုးရေး အစီအစဉ်များ အကျဉ်းချုပ်

စီမံကိန်း၏လုံခြုံပြီးထိရောက်သော အကောင်အထည်ဖော်မှုအတွက် ယခင်အခန်းများတွင် တင်ပြထားသည့် စီမံခန့်ခွဲမှုနှင့်စောင့်ကြပ်ကြည့်ရှုမှု အစီအစဉ်များအပြင် ဖွံ့ဖြိုးရေးအစီအစဉ်များစွာကို ပြင်ဆင်အကောင်အထည်ဖော်ရန်အကြံပြုပါသည်။

ဤအခန်းတွင်တာဝန်ရှိအဖွဲ့အစည်းများက ဖော်ဆောင်မည့်ထိုအစီအစဉ်များ၏ အဓိကအကြောင်းအရာများကို အကြံပြုပါသည်။ ထည့်သွင်းရမည့်အချက်များ၊ ဥပဒေမူဘောင်များနှင့် တာဝန်ရှိအဖွဲ့အစည်းများပါဝင်သော ဖွံ့ဖြိုးရေးစီမံကိန်းမူကြမ်းအား အဓိကအစီရင်ခံစာ၏နောက်ဆက်တွဲ G တွင်အသေးစိတ်ဖော်ပြထားသည်။

၉.၁. ငလျင်ဒဏ်ခံအစီအစဉ်

ငလျင်ဒဏ်ခံနိုင်ရည်ရှိသောအစီအစဉ်သည် ငလျင်ဒီဇိုင်းနှင့် အခြေခံအဆောက်အအုံများတည်ဆောက်ခြင်း၏ အခြေခံမူဝါဒကိုမြို့ပြနှင့် ဗိသုကာအဆောက်အဦး၏ ငလျင်ဒီဇိုင်းအတွက် မြန်မာအမျိုးသားအဆောက်အအုံမှု (MNBC) နှင့်အညီတင်ပြသင့်သည်။ အစီရင်ခံစာတွင်ရေးဆွဲထားသော ကနဦးအစီအစဉ်သည် ကြိုတင်ပြင်ဆင်မှု စစ်တမ်း၏ရလဒ်ပေါ် အခြေခံ၍တွက်ချက်ထားသော ငလျင်ဒီဇိုင်းအတွက် မြေပြင်ငလျင်လှိုင်းသွားအရှိန် (PGA) အပါအဝင်အဓိကအဂ်ါရပ်များကို တင်ပြထားသည်။ ကြိုတင်ပြင်ဆင်ထားသည့် စစ်တမ်းကောက်ယူမှုတွင်ပြုလုပ်ခဲ့သော သဲရည်ပျော်မှုလေ့လာဆန်းစစ်ခြင်း ရလဒ်အရ စီမံကိန်းဧရိယာအတွင်း သဲရည်ပျော်ခြင်းဖြစ်ပေါ်နိုင်ချေမှာ နည်းပါးပါသည်။ ဤရလဒ်များကိုအခြေခံ၍

စီမံကိန်း၏ ကြီးမားသောအဆောက်အအုံကို (PGA) နှင့်အညီ ဒီဇိုင်းဆွဲသင့်သည်။ ဆောက်လုပ်ရေးကာလအတွင်း အင်ဂျင်နီယာသည် ကန်ထရိုက်တာမှတင်ပြသော ဆောက်လုပ်ရေးရေးဆွဲမှုများကို စစ်ဆေးအတည်ပြုပြီး (MNBC)တွင်ဖော်ပြသော နည်းလမ်းများအပေါ်အခြေခံ၍ဆောက်လုပ်ရေးလုပ်ငန်းများကိုကြီးကြပ်မည်ဖြစ်သည်။ လုပ်ငန်းလည်ပတ်စဉ်ကာလအတွင်း ငလျင်ကြီးလှုပ်လျှင် သင့်လျော်သောတန်ပြန်အစီအမံများကို လုပ်ဆောင်ရန်နှင့် ဆိုးဝါးသောပျက်စီးမှုများကို ရှောင်ရှားနိုင်ရန်အတွက် အော်ပရေတာသည် နေ့စဉ်စစ်ဆေးခြင်းအပြင် အရေးပေါ်စစ်ဆေးခြင်းများကိုပြုလုပ်သင့်သည်။

၉.၂. အရေးပေါ်တုန့်ပြန်ရေးအစီအစဉ်

လုပ်ငန်းလည်ပတ်နေစဉ်အတွင်း ပေါ်ပေါက်နိုင်သည့် အရေးပေါ်အခြေအနေများကို ချက်ချင်း တုန့်ပြန်နိုင်ရန်အတွက် အရေးပေါ်တုံ့ပြန်ရေးအစီအစဉ်ကိုရေးဆွဲရန်လိုအပ်သည်။ ဆက်စပ်အဖွဲ့အစည်းများနှင့် အေဂျင်စီများ၊ အရေးပေါ်တုံ့ပြန်ရေးအတွက်ယာယီအဖွဲ့အစည်း၊ အုပ်ချုပ်သူအရာရှိ၊ ညှိနှိုင်းဆောင်ရွက်ပေးသူများ၊ မီးသတ်အဖွဲ့များနှင့် ဘေးလွတ်ရာသို့ရွှေ့ပြောင်းပေးသည့်အဖွဲ့များ၏အဓိကတာဝန်ယူမှုများ၊ လုပ်ငန်းဆောင်တာများကိုထည့်သွင်းဖော်ပြသင့်သည်။ အစီအစဉ်တွင်အရေးပေါ်အဆင့်ခွဲခြားခြင်း၊ အစီရင်ခံခြင်း၊ ဖြစ်ပေါ်နိုင်သောအရေးပေါ်အတွက်ပြင်ဆင်မှု၊ လေ့ကျင့်ရေးနှင့်စောင့်ကြည့်ခြင်းအစီအစဉ် စသည့်အစီအစဉ်များကိုအသေးစိတ်ရေးဆွဲသင့်သည်။

၉.၃. ရေရယူမှုစီမံခန့်ခွဲမှုအစီအစဉ်

မြစ်ငယ်မြစ်မှရေရယူမှုအတွက် သင့်လျော်သောစီမံခန့်ခွဲမှုအစီအစဉ်ကိုရေးဆွဲသင့်သည်။ ရေရယူရာတွင် centrifugal pumps, pontoon, control panel နှင့် မြစ်ကမ်းဘေးနှင့်မြစ်ကြမ်းပြင်ကာကွယ်ခြင်းတို့ပါဝင်ပြီး လိုအပ်သောကာကွယ်မှုများဖြင့် လုံခြုံစွာလည်ပတ်နိုင်အောင် ဒီဇိုင်းပြုလုပ်ထားရမည်။ လုပ်ငန်းလည်ပတ်မှုအဆင့်တွင် ပုံမှန်အခြေအနေအပြင် ရေလွှမ်းမိုးခြင်းနှင့်မိုးခေါင်ခြင်း အခြေအနေများအတွက်ပါ ရေရယူမှုစီမံခန့်ခွဲမှုအစီအစဉ်ကိုရေးဆွဲသင့်သည်။ ထို့အပြင်အနည်အနှစ်များ ဖယ်ရှားခြင်းနှင့်သန့်ရှင်းရေးလုပ်ခြင်းလုပ်ငန်းများကို နေ့စဉ်စောင့်ကြည့်ခြင်းနှင့် မှတ်တမ်းတင်ခြင်း လုပ်ဆောင်ချက်များအတိုင်း အကောင်အထည်ဖော်သင့်သည်။

၉.၄. စွန့်ပစ်ပစ္စည်းစီမံခန့်ခွဲမှုအစီအစဉ်

စီမံကိန်းအဆင့်အားလုံးမှထွက်ရှိသော စွန့်ပစ်ပစ္စည်းများကို သင့်လျော်စွာစီမံခန့်ခွဲနိုင်ရန်အတွက် စွန့်ပစ်ပစ္စည်းစီမံခန့်ခွဲမှုအစီအစဉ်ကို သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဥပဒေ(၂၀၁၂)၊ သဘာဝပတ်ဝန်းကျင် ထိန်းသိမ်းရေးနည်းဥပဒေများ(၂၀၁၄)နှင့် အခြားသက်ဆိုင်သည့်အမျိုးသားနှင့်ဒေသဆိုင်ရာဥပဒေများနှင့် စည်းမျဉ်းများအရ စနစ်တကျရေးဆွဲရန်လိုအပ်သည်။ ဆောက်လုပ်ရေးကာလအတွင်းကန်ထရိုက်တာသည် အနံ့ဆိုးများ သို့မဟုတ် အစိုင်အခဲစွန့်ပစ်ပစ္စည်းများကဲ့သို့ပတ်ဝန်းကျင်အပေါ်ဆိုးကျိုးသက်ရောက်မှုများကို ကာကွယ်နိုင်ရန်အတွက် စွန့်ပစ်ပစ္စည်းသိုလှောင်ရုံကိုတပ်ဆင်ပြီး စွန့်ပစ်ပစ္စည်းသိုလှောင်ခြင်းအခြေအနေကို ပုံမှန်စစ်ဆေးသင့်သည်။ စွန့်ပစ်ပစ္စည်းပမာဏကိုနောက်ဆုံးစွန့်ပစ်သည့်နေရာများအထိ မှတ်တမ်းတင်ပြီး စောင့်ကြည့်စစ်ဆေးသင့်သည်။

၉.၅. ရပ်ရွာကျန်းမာရေးနှင့်လုံခြုံမှုအစီအစဉ်

စီမံကိန်းပတ်ဝန်းကျင်ရှိလူထုများအပေါ် ဆိုးကျိုးသက်ရောက်စေသည့် ကျန်းမာရေးနှင့်ဘေးကင်းရေးဆိုင်ရာ သက်ရောက်မှုများကိုအနည်းဆုံးဖြစ်စေရန် လူထု၏ကျန်းမာရေးနှင့်ဘေးကင်းလုံခြုံရေးအစီအစဉ်ကိုရေးဆွဲရန် လိုအပ်သည်။ အဆိုပါအစီအစဉ်ကို ပြည်သူ့ကျန်းမာရေးဥပဒေ (၁၉၇၂)၊ အမျိုးသားကျန်းမာရေးမူဝါဒ(၁၉၉၃) နှင့် ပြည်သူ့ကျန်းမာရေးနှင့်ဘေးကင်းရေးနှင့်သက်ဆိုင်သည့် အခြားပြည်နယ်နှင့်တိုင်းဒေသကြီးများ၏ စည်းမျဉ်းများနှင့်အညီ ရေးဆွဲသင့်သည်။ ရေးဆွဲထားသည့်အစီအစဉ်တွင် စီမံကိန်း၏အခြေခံအဆောက်အအုံ တည်ဆောက်ရေးဆိုင်ရာလုံခြုံရေး၊ မီးဘေးအန္တရာယ်၊ ယာဉ်အန္တရာယ်ကင်းရှင်းရေးနှင့် ရောဂါကာကွယ်တားဆီးရေးတို့ပါဝင်သင့်သည်။

၉.၆. စက်မှုအန္တရာယ်စီမံခန့်ခွဲမှုအစီအစဉ်

လုပ်ငန်းလည်ပတ်စဉ်အတွင်း လောင်စာဆီထောက်ပံ့မှုပြတ်တောက်ခြင်း၊ ရေရယူမှု၊ တာဘိုင်ချွတ်ယွင်းခြင်းနှင့် လျှပ်စစ်ဓာတ်အားပေးစက်ရုံ၏အခြားအခြေခံအဆောက်အအုံများချွတ်ယွင်းခြင်းတို့ကို စီမံနိုင်ရန်အတွက် စက်မှုအန္တရာယ်စီမံခန့်ခွဲမှုအစီအစဉ်ကိုရေးဆွဲရန်လိုအပ်သည်။ ထိုအစီအစဉ်ကို ISO 31000 နှင့် ISO/IEC 31010 နှင့်အညီအကောင်ထည်ဖော်သင့်သည်။ စက်မှုအန္တရာယ်စီမံခန့်ခွဲမှုအစီအစဉ်ကို အကောင်ထည်ဖော်ရာတွင် စီမံကိန်းနှင့်ပတ်သက်၍ သီးခြားဖြစ်ပေါ်လာနိုင်သောအန္တရာယ်များကို ဆန်းစစ်ရန်နှင့်အကဲဖြတ်ရန်လိုအပ်သည်။ အထက်တွင်ဖော်ပြထားသော စည်းကမ်းချက်များကိုအခြေခံ၍ လျှပ်စစ်ဓာတ်အားထုတ်လုပ်ရေးလုပ်ငန်း (EPGE)သည် စီမံကိန်းကာလတစ်လျှောက်လုံးအတွက် စောင့်ကြည့် လေ့လာပြီးမှတ်တမ်းတင်သင့်သည်။

၉.၇. ရပ်ရွာဖွံ့ဖြိုးရေးအစီအစဉ်

ရပ်ရွာဖွံ့ဖြိုးတိုးတက်မှုအစီအစဉ်အား စီမံကိန်းကြောင့်သက်ရောက်မှုခံရနိုင်သည့် ကျေးရွာလူထုအတွက် တိုက်ရိုက်အကျိုးဖြစ်ထွန်းစေမည့် ဖွံ့ဖြိုးတိုးတက်ရေးအစီအစဉ်များကို စီမံကိန်း၏အကျိုးအမြတ်အချို့ကို မျှဝေသုံးစွဲ၍အကောင်ထည်ဖော်ရန်လိုအပ်သည်။ ထို့ကဲ့သို့သောအစီအစဉ်အတွက် ရေးဆွဲထားသောစည်းမျဉ်း စည်းကမ်းများမရှိပါက ကမ္ဘာ့ဘဏ်ကဲ့သို့သောနိုင်ငံတကာအဖွဲ့အစည်းများ၏ လုပ်ငန်းလည်ပတ်မှု လမ်းညွှန်ချက်များအတိုင်း ကိုးကားဆောင်ရွက်နိုင်သည်။

၉.၈. လုပ်ငန်းခွင်ကျန်းမာရေးနှင့်အန္တရာယ်ကင်းရှင်းရေးစီမံခန့်ခွဲမှုအစီအစဉ်

လုပ်ငန်းခွင်ကျန်းမာရေးနှင့် အန္တရာယ်ကင်းရှင်းရေးစီမံခန့်ခွဲမှုအစီအစဉ်ကို စီမံကိန်းနှင့်သက်ဆိုင်သည့် လုပ်ငန်းခွင်ကျန်းမာရေးနှင့် လုံခြုံရေးဆိုင်ရာလုပ်ဆောင်ချက်များကို မြင့်တင်နိုင်ရန်အတွက် ထိရောက်စွာရေးဆွဲရန်လိုအပ်သည်။ အဆိုပါအစီအစဉ်သည်လုပ်ငန်းခွင်မတော်တဆမှုများနှင့် ရောဂါများကို ကာကွယ်ရန်ရည်ရွယ်သည့်လုပ်ငန်းခွင် အန္တရာယ်ကင်းရှင်းရေးနှင့် ကျန်းမာရေးဥပဒေ(၂၀၁၉)ကို လိုက်နာသင့်သည်။ IFC မှချမှတ်ထားသော ပတ်ဝန်းကျင်ကျန်းမာရေးနှင့်လုံခြုံရေးလမ်းညွှန်ချက်များကို စီမံကိန်းရေးဆွဲရာတွင် ကိုးကားအသုံးပြုနိုင်သည်။ ဆောက်လုပ်ရေးလုပ်ငန်းနှင့် လုပ်ငန်းလည်ပတ်သည့်ကာလများအတွင်း အမြင့်မှပြုတ်ကျခြင်း၊ ပေါက်ကွဲခြင်း၊ လျှပ်စစ်အန္တရာယ်ကဲ့သို့သော

လုပ်ငန်းခွင်အန္တရာယ်များကိုကာကွယ်ရန် အစီအမံများကိုတင်ပြရေးဆွဲသင့်သည်။ အစီအစဉ်တွင် တန်ပြန်အစီအမံများနှင့် စောင့်ကြည့်ကြီးကြပ်ရေးအစီအစဉ်များကိုလည်း ထည့်သွင်း တင်ပြသင့်သည်။

၉.၉. မကျေနပ်ချက်နှင့် ဖြေရှင်းခြင်းလုပ်ငန်းစဉ်

စီမံကိန်းနှင့်သက်ဆိုင်သည့်မကျေနပ်ချက်များ သို့မဟုတ် တိုင်ကြားမှုများကိုဖြေရှင်းရန်အတွက် မကျေနပ်ချက်တိုင်းကြားခြင်းနှင့် ဖြေရှင်းခြင်းလုပ်ငန်းစဉ်များကို ရေးဆွဲရန်လိုအပ်သည်။ ထိုလုပ်ငန်းစဉ်တွင် မတူညီသောမကျေနပ်မှုများနှင့်တိုင်ကြားမှုများကို စီမံကိန်းအကောင်အထည်ဖော်မှုအဆင့်ဆင့်တွင် ထည့်သွင်းစဉ်းစားရန်လိုအပ်သည်။ မြေယာသိမ်းဆည်းခြင်းနှင့်ပြန်လည်နေရာချထားခြင်းလုပ်ထုံးလုပ်နည်းများနှင့် ပေါ်ပေါက်လာနိုင်သောပြဿနာ များကိုကိုင်တွယ်ဖြေရှင်းရန်အတွက် ဆောက်လုပ်ရေးအကြိုအဆင့်တွင် မြေယာသိမ်းဆည်းခြင်း အက်ဥပဒေ(၁၈၉၄)ကိုလိုက်နာသင့်သည်။

၉.၁၀. ဓာတ်ငွေ့ပိုက်လိုင်းအတွက် လုံခြုံရေးစီမံခန့်ခွဲမှုအစီအစဉ်

စီမံကိန်းနှင့်ဆက်စပ်သောဓာတ်ငွေ့ပိုက်လိုင်းကိုလုံခြုံစွာတပ်ဆင်ခြင်း၊ လည်ပတ်ခြင်းနှင့်ဖြိုဖျက်ခြင်းတို့အတွက် လုံခြုံရေးစီမံခန့်ခွဲမှုအစီအစဉ်ကို ရေးဆွဲရန်လိုအပ်သည်။ ဓာတ်ငွေ့ပိုက်လိုင်း၏လုံခြုံရေးစီမံခန့်ခွဲမှု အစီအစဉ်သည် ISO 13623 နှင့် ASME B31.8 ကို အခြေခံ၍ပြဋ္ဌာန်းခဲ့သော မြန်မာရေနံနှင့် သဘာဝဓာတ်ငွေ့လုပ်ငန်း (MOGE) ၏ လမ်းညွှန်ချက်များနှင့်အညီ လိုက်နာသင့်သည်။ အစီအစဉ်တွင် ဓာတ်ငွေ့ပိုက်လိုင်းနှင့်သက်ဆိုင်သော အန္တရာယ်များဖြစ်သည့် အတွင်းပိုင်းမှပျက်စီးခြင်း၊ စက်ပစ္စည်းနှင့် ဆောက်လုပ်ရေးလုပ်ငန်းချို့ယွင်းမှု၊ ပုံမှန်မဟုတ်သောလည်ပတ်မှု၊ ပြင်ပပျက်စီးမှုများ၊ ရာသီဥတုနှင့် သဘာဝဘေးအန္တရာယ်တို့အတွက် လျော့ချသောနည်းလမ်းများ ပါဝင်သင့်သည်။

၉.၁၁. ယဉ်ကျေးမှုအမွေအနှစ်နယ်မြေအတွင်း ပိုက်လိုင်းတပ်ဆင်ခြင်းအတွက် စီစဉ်စဉ်းစားခြင်း

ယခုစီမံကိန်း၏ ဖြစ်မြောက်နိုင်စွမ်းလေ့လာမှုအဆင့်တွင် လျာထားသောရေပိုက်လိုင်းလမ်းကြောင်းပေါ်တွင် ယဉ်ကျေးမှုအမွေအနှစ်နယ်မြေတစ်ခုရှိကြောင်း သိရှိခဲ့ပါသည်။ ထို့ကြောင့် မြို့ဟောင်းတစ်ခုအားရှောင်လွှဲနိုင်ရန် ရေပိုက်လိုင်းလမ်းကြောင်းအား ပြောင်းလဲလိုက်သော်လည်း၊ ရွေးချယ်မှု(ခ)အဖြစ် သတ်မှတ်ထားသော ရေပိုက်လမ်းကြောင်းသည်လည်း နောက်မြို့ဟောင်းတစ်ခုအား ဖြတ်သန်းနေဆဲဖြစ်ပါသည်။ ယခုအစီအစဉ်၏ ရည်ရွယ်ချက်မှာ ရေပိုက်လိုင်းတည်ဆောက်နေစဉ်အတွင်း ရှေးဟောင်းယဉ်ကျေးမှု အမွေအနှစ်များအား ထိန်းသိမ်းစောင့်ရှောက်ရန် ရည်ရွယ်ပါသည်။ ကန်ထရိုက်တာသည် စီမံကိန်း၏ရေပိုက်လိုင်း တည်ဆောက်နေစဉ်တွင် ၎င်းအစီအစဉ်များကို လိုက်နာရမည်ဖြစ်သည်။ အသေးစိတ်အား နောက်ဆက်တွဲ G-52 တွင်ကြည့်ပါ။

၉.၁၂. တာဝန်သိလူမှုအကျိုးပြုလုပ်ငန်းများ(CSR)အစီအစဉ်

အဖွဲ့အစည်းများအားလုံးသည် ၎င်းတို့၏လုပ်ရှားမှုများနှင့် ပက်သက်ဆက်နွယ်ခြင်းများမှတဆင့် စဉ်ဆက်မပြတ် ဖွံ့ဖြိုးတိုးတက်ရေးပန်းတိုင်ရောက်ရှိရန် အကောင်းနှင့်အဆိုးမျှဝေခြင်းများကို ပြုလုပ်ရမည်။ ထိုပန်းတိုင်သို့ ရောက်ရန် အဖွဲ့အစည်းများသည် အဓိကအခန်းကဏ္ဍအဖြစ် ရှိရမည်။

တာဝန်သိလူမှုအကျိုးပြုလုပ်ငန်းလုပ်ဆောင်မှုများနှင့် အစီရင်ခံခြင်းများသည် စီးပွားရေး၊ ပတ်ဝန်းကျင်နှင့် လူမှုထိခိုက်မှုများအပေါ် အဖွဲ့အစည်းတစ်ခု၏ ပွင့်လင်းမြင်သာစွာလုပ်ဆောင်မှုဖြစ်သောကြောင့် ၎င်းတို့၏ မျှဝေခြင်းများသည် စဉ်ဆက်မပြတ် ဖွံ့ဖြိုးတိုးတက်ရေးပန်းတိုင်သို့ ဦးတည်နေပါသည်။

Environmental Impact Assessment Report for Kyaukse Gas Combined-Cycle Power Plant Construction Project in Myanmar

EXECUTIVE SUMMARY

March 2020

Electric Power Generation Enterprise,
Ministry of Electricity and Energy

Executive Summary Table of Contents

1. Introduction ... 1
  1.1. Background ... 1
  1.2. EIA Study ... 1
  1.3. Conclusion ... 1
2. Policy, Legal and Institutional Framework ... 2
  2.1. Legal Framework ... 2
  2.2. Institutional Framework ... 3
3. Project Overview ... 5
  3.1. Location and Main Facilities ... 5
  3.2. Construction plan ... 9
  3.3. Comparison and Selection of Alternative ... 9
4. Surrounding environment ... 11
5. The Summary of Impact Assessment ... 13
6. Cumulative Impact Assessment ... 19
  6.1. Emission from Power Plant ... 19
  6.2. Effluent Discharge to Myitnge River ... 19
7. Summary of Environmental Management Plan ... 20
  7.1. Environmental Mitigation Measures ... 20
  7.2. Environmental Monitoring Plan ... 32
8. Public Consultations and Disclosure ... 40
  8.1. Results of Consultations During Project Scoping ... 40
  8.2. Results of Consultations During the Preparation of EIA Report ... 43
9. Summary of Development Plans ... 47
  9.1. Seismic Resistant Plan ... 47
  9.2. Emergency Response Plan ... 47
  9.3. Water Intake Management Plan ... 47
  9.4. Waste Management Plan ... 47
  9.5. Community Health and Safety Plan ... 48
  9.6. Industrial Risk Management Plan ... 48
  9.7. Community Development Plan ... 48
  9.8. Occupational Health and Safety Management Plan ... 48
  9.9. Grievance and Redress Mechanism ... 48
  9.10. Safety Management Plan of Gas Pipeline ... 48
  9.11. Planning Considerations for Pipeline Installation in Heritage Zone ... 49
  9.12. Corporate Social Responsibility (CSR) Plan ... 49

Executive Summary of EIA Report for Kyaukse Gas Combined-Cycle Power Plant Construction Project in Myanmar

1. Introduction

1.1. Background

In recent years, the electricity demand of Myanmar has been growing rapidly because of increasing development activities and investments after drastic transition into democratic society. To meet the growing demand, the Electric Power Generation Enterprise (EPGE), Ministry of Electricity and Energy aims at increasing generation capacity up to 5,700 MW by 2022, whereas the current capacity is 4,600 MW in 2019. Furthermore, from the energy security point of view, it is ideal to use various energy sources, such as hydro, gas thermal, coal thermal and renewable energy. To respond to increasing pressure onto the power supply, gas thermal is expected to be a preferable generation method for Myanmar, as it can start generating electricity with shorter development period compared to other methods.

Considering the situation, EPGE is planning to develop a 300 MW-class gas combined-cycle power plant in Kyaukse, and requested a Japanese Official Development Assistance (ODA) loan.

In this context, the Japan International Cooperation Agency (JICA) conducted a preparatory survey for Kyaukse gas combined-cycle power plant project, which includes the environmental and social considerations survey.

1.2. EIA Study

The organization that implemented Environmental Impact Assessment is Nippon Koei Co., Ltd., (NK) of Tokyo, Japan in association with Myanmar Koei International Ltd. (MKI) and Resource & Environment Myanmar Co., Ltd. (REM). The EIA report for the Project is prepared in accordance with Environmental Impact Assessment Procedure in Myanmar (Ministry of Environmental Conservation and Forestry Notification No. 616 / 2015), and in reference to General Environmental Impact Assessment Guidelines (Version 3) (September 2017). The purpose of EIA study is to assess the environmental and social impacts of "the Project" operated by Electric Power Generation Enterprise (EPGE) and formulate the Environmental Management Plan (EMP) including mitigation measures to reduce and minimize the negative impacts caused by the Project.

1.3. Conclusion

Although the Project has possible negative environmental and social impacts to some extent, their impacts can be minimized and mitigated by implementing management plans and monitoring activities and development plans presented in the EIA report. In addition, there are positive impacts of the Project that will be shared to direct beneficiaries, and the Project will ultimately contribute the inclusive growth of the country.

2. Policy, Legal and Institutional Framework

2.1. Legal Framework

The Project has to be conducted in compliance with the Myanmar Environmental Conservation Law (2012), and it should take into account other relevant regional and local environmental and social safeguard measures. The relevant regulations are as shown in Table 1.

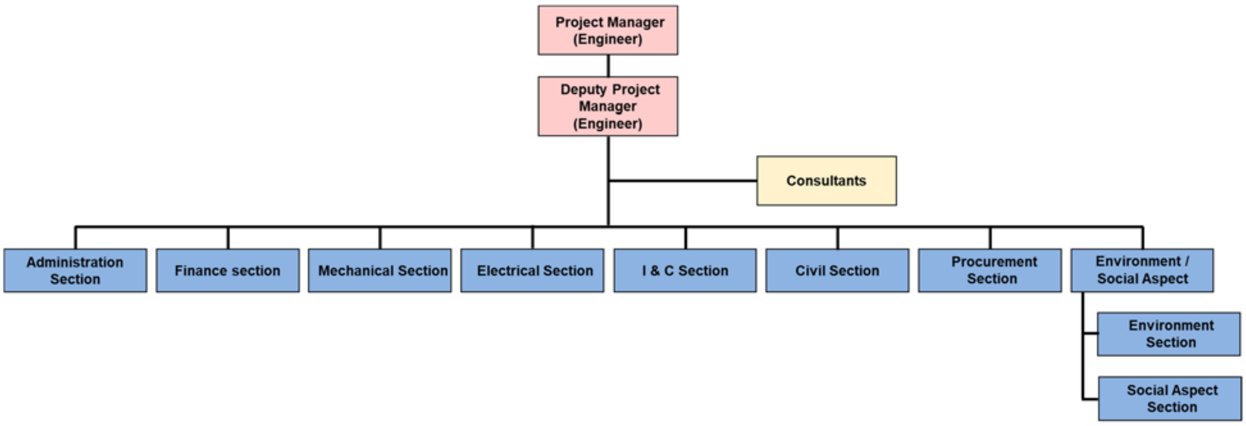
Table 1 List of Fundamental Laws and Regulations Related to Environmental and Social Considerations in Myanmar

No.	Laws and Regulations
Environmental Framework	
1	The Environmental Conservation Law (2012)
2	The Environmental Conservation Rules (2014)
EIA/Environmental Standards	
3	Environmental Impact Assessment Procedures (December 2015)
4	National Environmental Quality (Emission) Guidelines (December 2015)
Forestry/Biodiversity	
5	The Forest Law (1992)
6	The Protection of Wildlife and Wild Plants and Conservation of Natural Areas Law (1994)
Water Resources	
7	The Conservation of Water Resources and Rivers Law (2006)
Land Use	
8	The Land Acquisition Act (1894)
9	The Farmland Law (2012)
10	The Farmland Rules (2012)
11	The Vacant, Fallow and Virgin Lands Management Law (2012)
12	The Vacant, Fallow and Virgin Lands Management Rules (2012)
13	The National Land Use Policy (2016)
Heritage	
14	The Protection and Preservation of Cultural Heritage Regions Law (1998, Revised 2019)
Public Health	
15	The Public Health Law (1972)
16	The Prevention and Control of Communicable Diseases Law (1995, revised in 2011)
17	Occupational Safety and Health Law (2019)
Working Environment	
18	The Workmen's Compensation Act (1923)
19	The Factories Act (1951)
20	The Labour Organization Law (2011)
21	The Social Security Law (2012)
22	The Minimum Wage Law/Rules (2013)
Emergency	
23	The Natural Disaster Management Law (2013)

Source: EIA Study Team

2.2. Institutional Framework

The Project will be implemented before and during construction by the Project Management Unit (PMU). The organizational structure of PMU is as shown below.

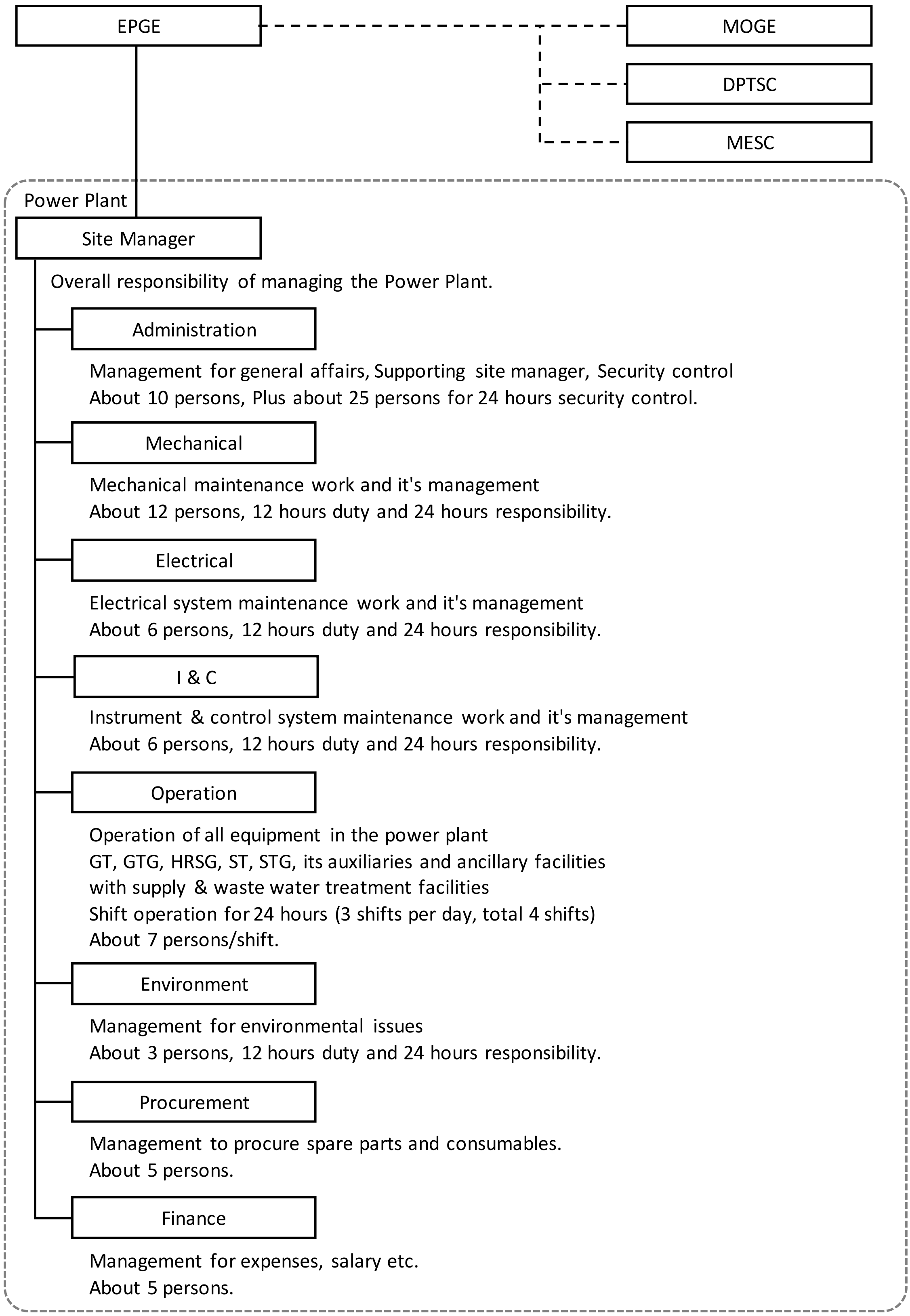


Note: I&C : Instrument and Control

Source: EIA Study Team

Figure 1 Organization Chart of PMU

For the operation stage, an operational organization will operate and manage the power plant. The organization structure for operation & management is as shown in Figure 2.



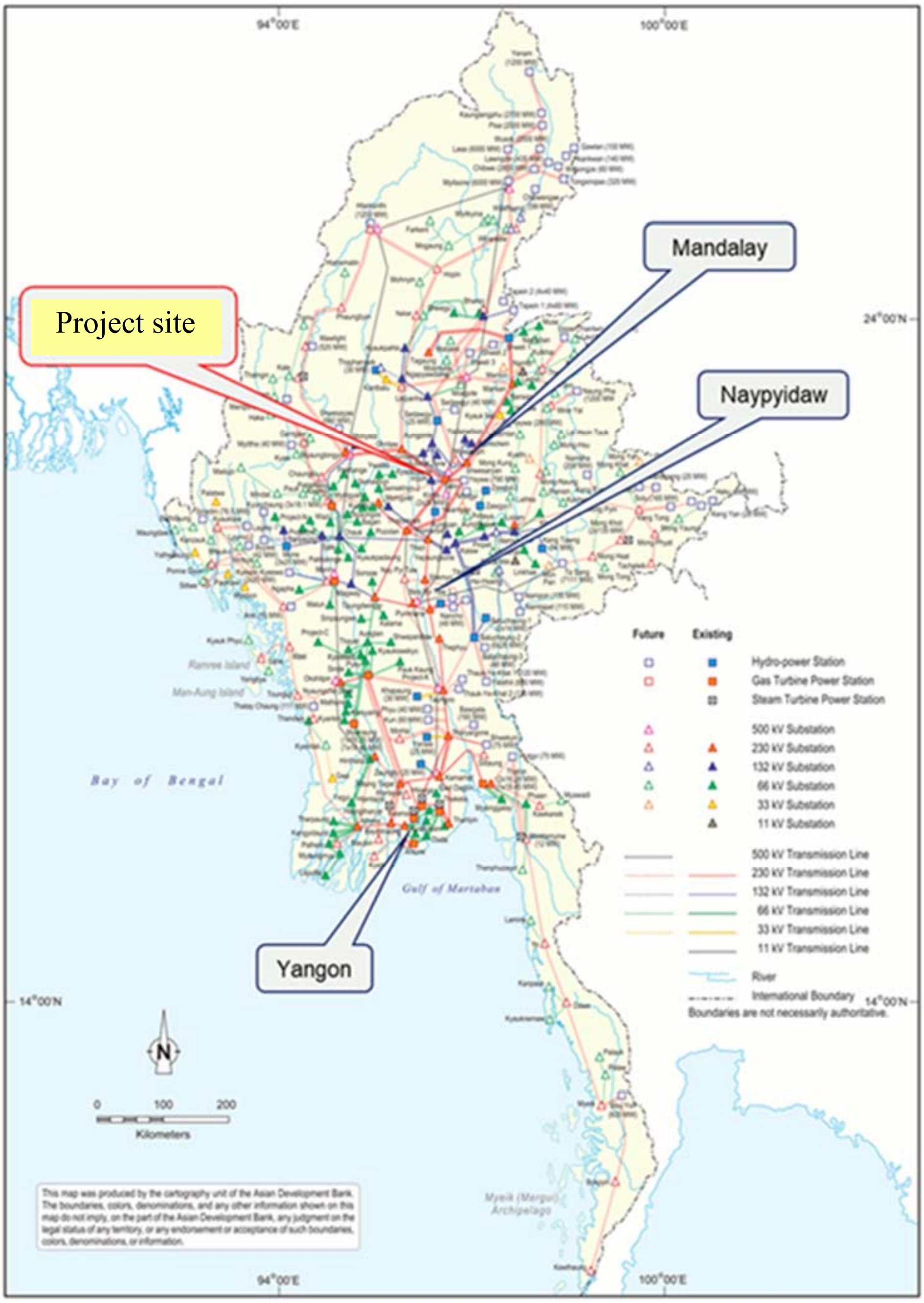
Source: EIA Study Team

Figure 2 Organization of Power Plant for Operation Stage

3. Project Overview

3.1. Location and Main Facilities

Project location is Be Lin Village Tract, Sintgaing Township, Kyaukse District, Mandalay Region. It is 30 km southeast from the central area of Mandalay, as shown in Figure 3. The Project site is adjacent to the existing Belin substation. The generation capacity of the Project is approximately 300 MW. Electricity will be produced by Combined Cycle of Gas Turbine. Table 2 and Figure 4 list the main facilities of the Project, which are the target of environmental and social considerations.



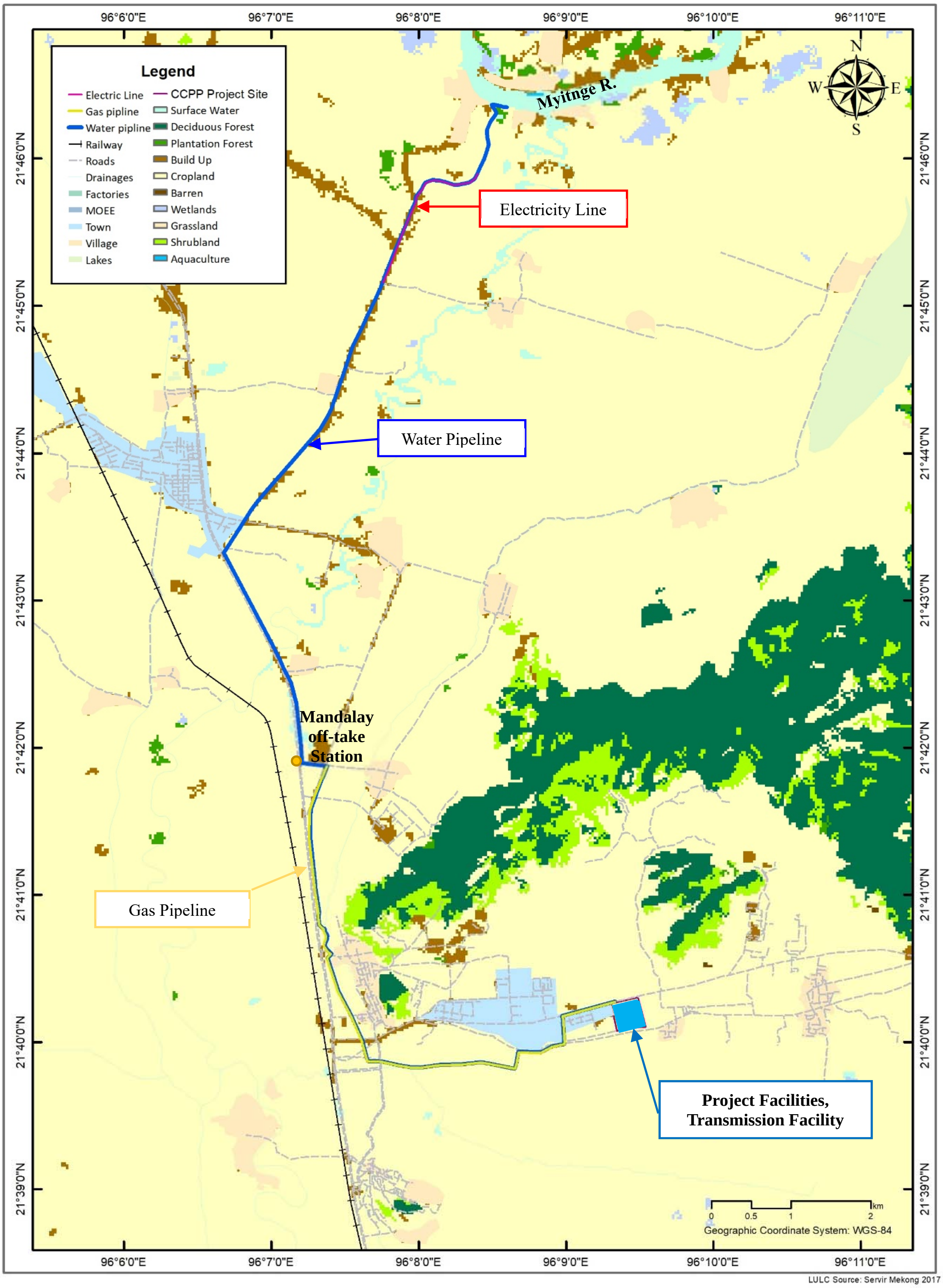
Source: EIA Study Team prepared from Myanmar Energy Sector Initial Assessment, ADB, October 2012

Figure 3 Location of the Project Site

Table 2 Main Facilities of the Project Related to Environmental and Social Considerations

Facilities	Detail of the Facility
Power facilities	300 MW Combined Cycle Power Plant 200 MW Gas Turbine 100 MW Steam Turbine Flue gas denitrification facility Natural fuel gas supply system Circulating water treatment facility Wastewater treatment facility Transmission and transformation facility Communication facility
Transmission facility	Underground Cable, relocation of existing transmission line within the Project site.
Gas Pipeline	Approx. 7.4 km φ16 inch x 1
Water Pipeline	Approx. 17.6 km φ300 ㎜ x 2
Electricity line	Approx. 2 km

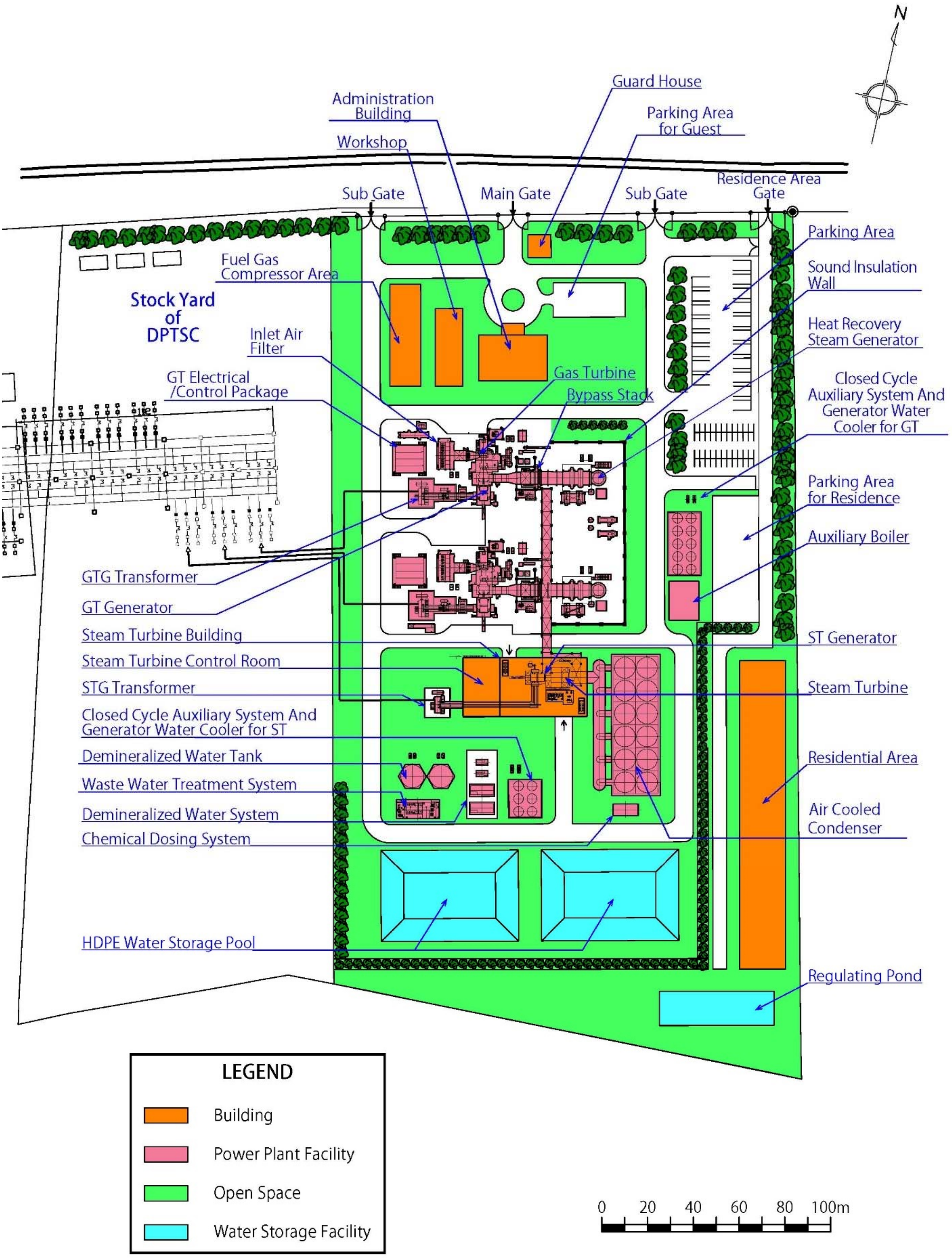
Source: EIA Study Team



Source: EIA Study Team

Figure 4 Location of the Project Facilities

The facility layout plan is shown in Figure 5. Two Gas turbines and one steam turbine will be installed in the center of the project site. Cooling towers for steam condenser will be installed in the east side of the project site. Water storage pool will be installed in the south side of the site.



Source: EIA Study Team

Figure 5 Facility Layout Plan

3.2. Construction plan

The construction period for proposed facilities is estimated as approximately 3 years. Table 3 shows the construction schedule of the Project.

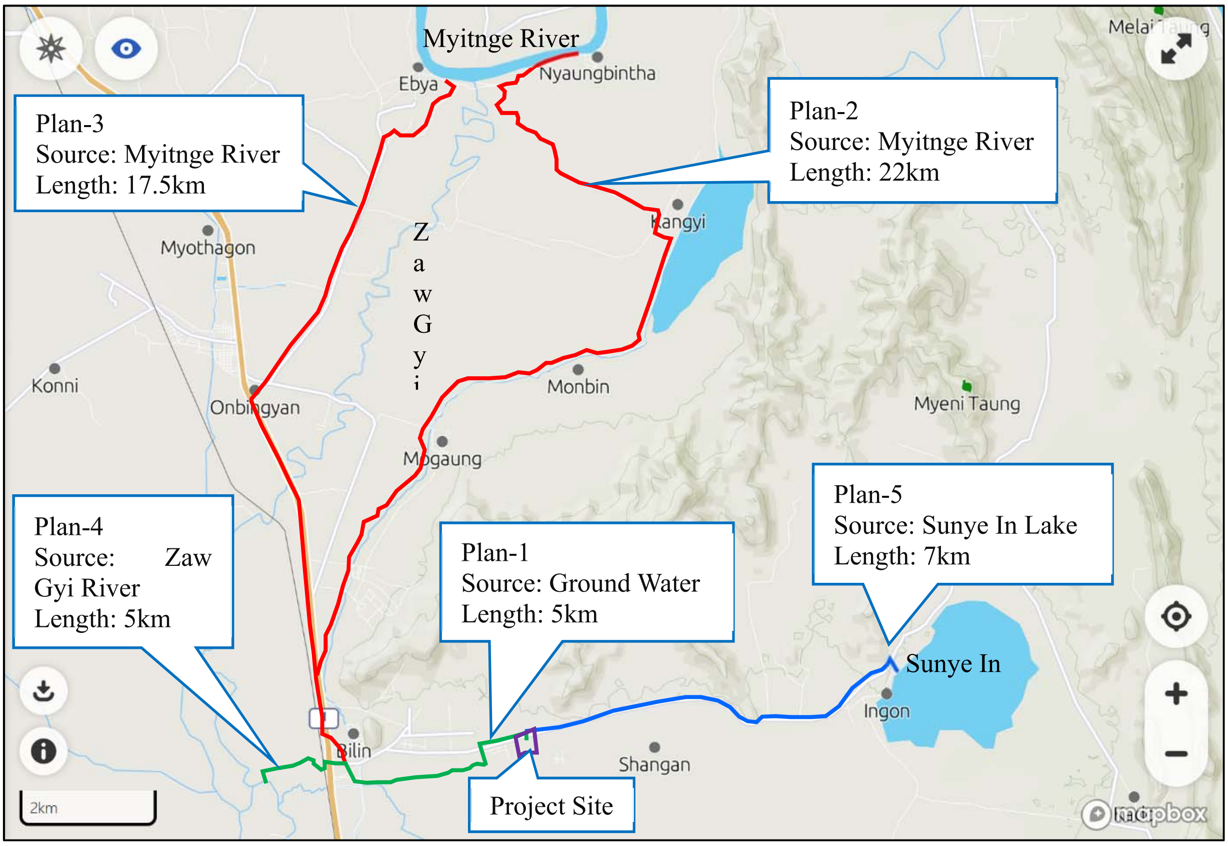
Table 3 Construction Schedule

Construction	1st Year												2nd Year												3rd Year											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Design, Manufacturing, Delivering	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■													
Civil Work								■	■	■	■	■	■	■	■	■	■	■	■	■	■	■														
Water Pipeline and Electricity Line																	■	■	■	■	■															
Gas Pipeline																			■	■	■															
Electrical installation Work (Substation & Relocation Transmission)																			■	■	■															
Power plant equipment installation work																			■	■	■	■	■	■	■	■	■	■	■							
Commissioning Test																														■	■	■				

Source: EIA Study Team

3.3. Comparison and Selection of Alternative

In order to select the project area and installed facilities, alternative studies were made in three modes: (i) site selection, (ii) water resource and pipeline, and (iii) cooling system. Alternative studies were performed comprehensively from the viewpoint of technical aspect, economical aspect, and social and environmental consideration. Considered alternatives of water resource and water pipeline are shown in Figure 6, and the results of alternative study is summarized in Table 4.



Source: EIA Study Team, based on the map from webpage http://www.maps-of-the-world.net.

Figure 6 Alternatives of Water Source and Water Pipeline

Table 4 Summary of Alternative Study of the Water Resource and Pipeline

Item	Plan-1	Plan-2	Plan-3	Plan-4	Plan-5
Water Source	Ground water	Myitnge river (pipeline 22 km)	Myitnge river (pipeline 17.5 km)	Zaw Gyi river (pipeline 5 km)	Sunye In lake (pipeline 7 km)
Land use	Most of the existing land use will not be changed except the area of pump station.	Same as plan 1	Same as plan 1	Same as plan 1	Same as plan 1
Technology & Economy	High cost and technology will be necessary because of contained lime.	Not necessity of much cost and technology for good water quality	Not necessity of much cost and technology for good water quality	High cost and technology will be necessary because of turbid water	Not necessity of much cost and technology for good water quality
Stability of the water source	Not available	Stable	Stable	Not stable	Not stable
Environmental & Social impact	significant impact on ground water	Slightly large Impact on during construction than plan-3	Smaller impact than plan-2 because of the shorter pipeline	Social impact on water usage of Zaw Gyi river	Social & environmental impact on water usage of Sunye In Lake
Conclusion	Not selected	Not selected	Selected	Not selected	Not selected

4. Surrounding environment

The summary of the baseline of the surrounding environment and social conditions are shown in Table 5. For the baseline data, field survey for air quality, water quality, noise and vibration, traffic volume, and flora and fauna have been conducted in the project area and its surroundings. The supplemental information on natural and social environment was collected through the literature survey and/or reconnaissance survey.

Table 5 Summary of the Surrounding Environment and Social Status

Item	Description
1. Living Environment (Pollution Status)	
Air Quality	The measurement survey of CO, NO_2, NO, SO_2, $PM_{2.5}$, and PM_{10} for the ambient air quality was conducted in and around the Project site at 5 points. The concentrations of NO_2, CO, and particulate matter during the dry season were generally higher than those during the rainy season. Comparing with the tentative target values under the National Environmental Quality (Emission) Guidelines, 2015, the concentration of all pollutants complied with the standard, except concentration of $PM_{2.5}$ measure for one day in the project site during dry season exceeded the target value.
Water Quality	The surface water samples were collected at Myitnge River in each of the rainy and dry seasons. The water quality was good, for example, the BOD was 2.5 mg/l in rainy season and 1.4 mg/L for dry season. All the parameters complied with the target values (both National Environmental Quality (Emission) Guideline, 2015 and World Bank Group standard).
Soil Quality	There is no existing or secondary data for soil quality in and around project site. The surface soil in the project site may not be originally contaminated.
Noise and Vibration Level	Noise and vibration survey conducted at seven points during dry season. According to the result of noise survey, noise levels during day time at four points and that of during night time at one point were slightly higher than the target values under the National Environmental Quality (Emission) Guidelines, 2015. Vibration level at all survey points complied the target values under the Japanese regulatory standard.
2. Natural Environment	
Topography	The general topographic feature of the area is occupied by the plain and some isolated hills. The general elevation of the proposed project area is about 90 m above sea level. The remarkable topographic feature of the area is Keinnaya-Myeni Range (467 m) and located in north of the project area.
Geology	The rocks encountered in the project area and vicinity are highly deformed and metamorphosed. Meta-igneous rocks and Upper Paleozoic to Mesozoic metasedimentary rocks are well exposed along the Kyaukse Ridge, Shantaung-U - Thandawmywet Range and Minmwe Hill. A large igneous body is occurred at Belin Hill and biotite granite, granodiorite and diorite are found as major rock types.
Climate and meteorology	According to the climate data of Mandalay City during 2005-2015, the maximum average temperature of day time of Mandalay is 34 °C and the minimum average temperature of night time is 23 °C. The highest temperature is 39 °C in April and the lowest temperature is 15 °C in January. The average annual monthly rainfall is about 50.6 mm and the highest monthly rainfall is 126.9 mm in August. Mean relative humidity is 66 %. According to the meteorological survey in the Project site for continuous seven days in each of the rainy and dry seasons, solar radiation was lesser in rainy season. Average wind speed during rainy season was 1.17 m/s while 0.22 m/s during dry season.
Flora, Fauna, and Biodiversity	According to the field survey result, there are 151 species of flora, 50 bird species, 26 different butterfly species, 11 dragonfly species, 4 Beetle, 3 species of snail, 10 of mammal species, 18 species of reptiles and amphibian and 44 species of fish were recorded during the survey period. In this survey, two species of Bird and five Fish species were near threatened according the IUCN Red List (2018).
3. Social Environment	
Population	In 2018, there are about 134,904 inhabitants in Sintgaing Township. The percentage of urban population is about only 6 % and rural population is about 94 %.
Ethnicity	Most of the people who live in Sintgaing Township are Burmese, followed by Shan, Kayin, Chin and Rakhine people. In addition, small number of Kachin and Mon reside in the area.
Religion	More than 90 % of the people living in Sintgaing Township are Buddhist.
Land Use	Sintgaing Townships mainly use its land as agricultural land (62.5 %) followed by non-cultivated land (37.2 %) and vacant land (0.3 %). Settlement land covers for town and village is about 3.2%, which is included in non-cultivated land.
Local Economy and Livelihood	In Sintgaing Township, the agriculture is major occupation of the local people. Livestock is also a common practice in the area, especially for cows, buffaloes, pigs, goats and breed chicken, duck and sheep. The households raise pigs and poultry such as chicken and ducks, for their own consumption and occasional sale. In general, buffalo and cow are used as draught animals in rice paddies. Township's main products are rice and export to Mandalay.

Item	Description
Public Health	According to the Township Health Profile 2018 of Sintgaing Township, most immunization rates for the major diseases cover 100 % in the township. Birth rate (per 1,000 live birth) is 9.74 in 2018.
Cultural Heritage	There is no cultural heritage site designated by the United Nations Educational, Scientific and Cultural Organization (UNESCO) or the Myanmar government in and around project site. There is only one traditional zone namely "Met Ka Ya Traditional Zone", located about 11.5 km north of project site. Two valuable pagodas (i) Shwe Bone Pwint Pagoda and (ii) Shwe Se Khone Pagoda are also located in this traditional zone.
Landscape	The general elevation of the project site and surrounding area about 80 m above mean sea level. Normally, the area is flat and occupied by grass and some vegetation. Mountainous area is occupied in the north of project area and paddy field are in the south. In the north, the nearest mountain is the Nwa Le Taung, distanced about 500 m from project site and the highest point of this mountain is 289 m.
Natural Disaster	Flood is identified as notable natural hazard around the project area. Sintgaing Township has experienced flash flooding in some places especially in Myitnge Town nearby Myitnge River in 2016. There is low probability for flooding to occur in and around the Project site because the location is far from the main river.

Source: EIA Study Team

5. The Summary of Impact Assessment

In order to assess environmental and social impacts of the Project, conceivable environmental and social impacts by the Project were identified based on the project description and overall environmental and social conditions in and around the Project area. The impacts of pre-construction (PC), construction (CO), operation (OP) and closure (CL) phases of the proposed project to natural environment and social environment were classified as A to D based on the following criteria:

1) A-: Significant Negative Impact A+: Significant Positive Impact
2) B-: Some Negative Impact B+: Some Positive Impact
3) C: Impacts are not clear, need more investigation
4) D: No Impacts or Impacts are negligible, no further study required.

The summary of impact assessment is presented in Table 6.

Table 6 Summary of Impact Assessment

Category		Impacts	Scoping Result			Assessment Result			Reasons for Assessment Result
			PC/CO	OP	CL	PC/CO	OP	CL	
Pollution control measures	1	Air quality	B-	B-	B-	B-	B-	B-	PC/CO, CL: Impact of dust generated is expected. The impact is limited to downwind area and temporally. OP: The impact of nitrogen oxides is expected; however, the prediction result satisfies the target value.
	2	Water quality	B-	B-	B-	B-	D	B-	PC/CO, CL: Impact of turbid water due to construction / demolition of the intake facility at the Myitnge River is expected. The generation amount of turbid water will be minimized by construction of coffer dam. OP: The quality of treated wastewater that to be discharged to Myitnge River can be well managed by wastewater facilities and the adverse impact is considered to be negligible.
	3	Waste	B-	B-	B-	B-	B-	B-	PC/CO, CL: Impact of solid waste is limited in the Project site. The mitigation of the impact is possible.
	4	Soil contamination	B-	D	D	D	D	D	PC/CO, OP, CL: No activity is planned that will cause soil contamination.
	5	Noise & vibration	B-	B-	B-	B-	B-	B-	PC/CO, CL: The noise level from the construction machinery is predicted to be below the target value.

Category		Impacts	Scoping Result			Assessment Result			Reasons for Assessment Result
			PC/CO	OP	CL	PC/CO	OP	CL	
									OP: Impact on noise to the residents at the surrounding areas of the power plant is assumed; though the noise level from the power plant is predicted to be below the target value.
	6	Ground subsidence	B-	D	D	B-	D	D	PC/CO: Subsidence from construction activity is expected. The mitigation measures are to be taken by contractor. OP, CL: No activity is planned that will cause ground subsidence.
	7	Offensive odor	D	B-	D	D	B-	D	PC/CO, CL: No activity is planned that will cause offensive odour during construction. OP: Offensive odor from operational activity is expected. The mitigation measure is capable of being enforced by Project proponent.
	8	Bottom sediment	D	D	D	D	D	D	PC/CO, CL: No activity is planned that will cause pollution to river bottom sediment. OP: Impact on bottom sediment due to discharge water is not expected.
Natural environment	9	Protected Area	D	D	D	D	D	D	No protected area within and around the project area.
	10	Flora/Fauna & Biodiversity	B-	B-	B-	B-	B-	B-	PC/CO, CL: The impact on flora / fauna, and biodiversity is expected. The change of vegetation is not significant. The impact to the aquatic biota is limited by proper mitigation measures. OP: The impact on aquatic ecosystem is expected due to discharge of wastewater. The impact on water quality is negligible as the quality of discharged water will be well treated.
	11	Hydrology	D	B-	D	D	B-	D	PC/CO, CL: No activity is planned that will cause variation of rain water run-off. OP: Impact on the increase of runoff water is expected due to the modification of land use at the project site. The impact is limited because the regulation pond with adequate capacity will be installed.
	12	Topography and Geology	D	D	D	D	D	D	No activity that will adversely affect the topography and geographical features is expected.
Social environment	13	Involuntary resettlement	B-	D	D	B-	D	D	PC/CO: Identified impact related to land acquisition and temporary occupation will be properly compensated in accordance with the contents in Abbreviated Resettlement Action Plan which will be prepared with due consultation with affected persons.

Category		Impacts	Scoping Result			Assessment Result			Reasons for Assessment Result
			PC/CO	OP	CL	PC/CO	OP	CL	
									OP, CL: Involuntary resettlement or other activities that will negatively impact the livelihood is not expected.
	14	Poverty	B+	B+	B+	B- / B-, B+	B+	B-, B+	PC: The impact on poverty groups is expected. The impact is considered as limited since the area to be acquired is small. CO: The impact on poverty group is expected from temporarily occupied land. On the other hand, positive impacts such as creation of local employment are predicted. OP: Positive impacts such as creation of local employment are predicted. CL: Employment related to operation of the power plant will be terminated. On the other hand, the Project will bring a positive impact such as increasing job opportunities.
	15	Ethnic minorities & indigenous peoples	C	C	C	D	D	D	PC/CO, OP, CL: Adverse impact on ethnic minorities and indigenous peoples is not assumed, because confirmed 3 households are considered as assimilated people into Burmese society
	16	Local economy (Employment)	B+	B+	B+	B+	B+	B-, B+	PC/CO, OP: Positive impacts such as creation of local employment are predicted. CL: Employment related to operation of the power plant will be terminated. Meanwhile, temporally job opportunities of demolition works are assumed.
		Local economy (Livelihood)	B-	D	D	B- / B-, B+	D	D	PC: The impact on income source is expected due to temporally land occupation. CO: The impact on kiosks and farmers is expected. On the other hand, positive impacts such as creation of local employment are predicted OP: In Myitnge River, small-scaled fishery activity is carried out only for domestic consumption and impact on the water quality from the Project is negligible. CL: No activity that will adversely affect the livelihood is expected.
	17	Land use and utilization of local resources	B-	D	D	B-	D	D	PC/CO: The impact on land use is expected. The acquired land / temporary land use is very small. OP, CL: No impact on land use is expected.
	18	Water usage	B-	B-	B-	B-	B-	B-	PC/CO, CL: The water demand during construction is small and impact to the water usage in Myitnge River is small according to the forecast result of water quality.

Category		Impacts	Scoping Result			Assessment Result			Reasons for Assessment Result
			PC/CO	OP	CL	PC/CO	OP	CL	
									OP: Amount of water consumption will be controlled without causing impact on local water usage.
	19	Existing social infrastructure and service	B-	B-	D	B-	B-	D	PC/CO: Temporally access limitation and temporally traffic congestion due to construction works are expected. The mitigation measures need to be taken by contractor. OP: The potential impact on school activity due to noise by construction works is expected. The impact is small because the noise level in primary school is less than the target value of noise. CL: No impact on existing social infrastructure and service is expected.
	20	Social institutions such as social infrastructure and local decision-making institutions	D	D	D	D	D	D	No activity is planned that will affect to the social and local institutions.
	21	Maldistribution of damage and benefit	D	D	D	D	D	D	No activity is planned that will cause maldistribution of the damage or benefit.
	22	Local conflict of interest	D	D	D	D	D	D	No activity is planned that will cause local conflict.
	23	Cultural heritage	B-	B-	B-	B-	B-	B-	PC/CO: The impact on heritage (ancient city wall) is expected due to installing pipelines. MORAC has already approved to install water pipeline with conditions which EPGE and contractor should be executed. By implementing those measures, impact on ancient city wall would be small PC/CO, OP, CL: The indirect impact on religious activity due to noise is expected. According to the result of prediction on noise, noise level is small and mitigation measures are possible to be executed.
	24	Landscape	B-	B-	B-	B-	B-	B-	PC/CO, CL: The impact on landscape due to temporary storage of construction machines and equipment is expected. The proper mitigation measure will be applied. OP: The impact on landscape is expected due to facilities of power plant. Greening and planting trees around the boundary of project site to screen off the facilities of power plant from surrounding area will minimize the impact.

Category		Impacts	Scoping Result			Assessment Result			Reasons for Assessment Result
			PC/CO	OP	CL	PC/CO	OP	CL	
	25	Gender	C	C	C	B-	B-	B-	PC/CO, OP: The gender discrimination of job opportunity is expected. The proper mitigation measure enforced.
	26	Children's rights	C	C	C	B-	B-	B-	PC/CO, OP: There are possibility of child labour because of the project activities. The proper mitigation measures should to be enforced.
	27	Health Community health, infectious disease and HIV/AIDS	B-	D	B-	B-	B-	B-	PC/CO, CL: The risk of infectious disease and HIV/AIDS is expected. The risk can be minimized by providing educational training to workers and surrounding communities. OP: Impact to the community health due to flue gas and effluent discharge is expected. The risk can be minimized by countermeasures for air pollution, and installation and proper operation of wastewater treatment facility.
	28	Occupational health & safety	B-	B-	B-	B-	B-	B-	PC/CO, OP, CL: The impact on occupational health & safety is expected. The proper mitigation measure is capable of being enforced.
Others	29	Accident	B-	C	B-	B-	B-	B-	PC/CO, CL: The increase risk of traffic accident is assumed. The risk will be minimized by providing training and sufficient information to construction workers and the surrounding communities. OP: The accident due to storing/ treating /transporting (using pipeline) the dangerous material is assumed as a potential impact. It is possible to reduce the possibility of accident by applying proper safety standard or manuals.
	30	Cross-border impact, climate change	B-	B-	B-	B-	B-	B-	PC/CO, CL: GHG will be emitted, but it would not cause significant impact, because the emission amount wouldn't be large since the assumed scale of the construction/ demolition works will be small. OP: GHG emission is assumed, but the amount of the emission will be minimized because the combined cycle system will be applied, and appropriate maintenance work will be done to keep its high efficiency.

Note: PC (Pre-construction phase), CO (Construction phase), OP (Operation phase), CL (Closure phase)

Evaluation : A-: Significant Negative Impact A+: Significant Positive Impact

: B-: Some Negative Impact B+: Some Positive Impact

: C: Impacts are not clear, need more investigation

: D: No impacts or impacts are negligible, no further study is required

Source: EIA Study Team

6. Cumulative Impact Assessment

Cumulative impact was assessed with the consideration of the project "Kyaukse 135MW Gas Engine Power Plant (the IPP project)". The IPP project site is located about 250 m west from the project site, and it has started to operate since March 2019.

6.1. Emission from Power Plant

According to the tender document of the IPP project, the concession period for the power generation is set for 5 years from commercial operation date. Based on the information, the IPP project will terminate the operation in the year 2024, whereas, the Project aims to commence operation in 2025. In addition, the EPGE is planning to allocate the fuel gas to the IPP to the Project after 2024. Therefore, as the operation period of these projects will not overlap, cumulative impact of simultaneous operation of power plants is not expected.

6.2. Effluent Discharge to Myitnge River

The short-term and long-term cumulative impact to water quality are evaluated to be negligible based on the following assessments. The IPP project does not discharge effluent to Myitnge River. In addition, according to the result of impact assessment on water quality, the impact of the Project to water quality is evaluated as negligible because the flow rate ratio of effluent to Myitnge River is very small as 0.0126 % (at 50 percentile value of flow rate of Myitnge River), and the effluent will be treated by the treatment facilities.

For long-term, accumulation of trace metals to the sediment of Myitnge River is expected. However, such accumulative impacts are assessed as negligible since guidelines of Myanmar and international organizations for ambient water quality are set based on such long-term toxicity of each chemical and effluent from the Project comply such target values.

Consequently, although there will be effluent discharge, those are negligible and cumulative impact on water quality is expected to be at the level that does not affect aquatic environment in short and long term.

7. Summary of Environmental Management Plan

7.1. Environmental Mitigation Measures

In the EIA report, EMP are arranged by three components namely power plant, water pipeline and gas pipeline, as defined in the section 7.1 of the main report. For the executive summary, all components are merged and presented in the table 7-10 covering the description of identified potential negative impacts, mitigation measures, relevant factors and implementing organization at each project phase.

Table 7 Summary of Identified Potential Negative Impact and Mitigation Measures at Pre-Construction Phase

Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Relevant Component	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
1. Social Environment							
Involuntary resettlement	- Land acquisition for intake station and electricity poles	- Compensation of the affected area in full replacement cost	Permanent/ temporary land occupation	Water pipeline	PMU, MRG, Township	EPGE	-
	- Loss of income from crops and trees on the construction site	- Compensation of trees and crops in 3 times of the value calculated based on the current market price (compensation for trees will be paid only if it is needed to be cut. Trees naturally grown are not eligible for compensation).	Permanent/ temporary land occupation	Gas pipeline, water pipeline	PMU, MRG, Township	EPGE	Covered in the ARAP
	- Loss of permanent structure by construction activities	- Compensation in full replacement cost to the entire structure if the affected portion is confirmed as not usable - Compensation in full replacement cost to the affected portion if the structure in the remaining portion is usable	Permanent/ temporary land occupation	Gas pipeline, water pipeline	PMU, MRG, Township	EPGE	Covered in the ARAP
Poverty	- Impact to poverty groups due to permanent land acquisition or temporary land occupation	- Same as "Involuntary resettlement"	Permanent/ temporary land occupation	Water pipeline	PMU, MRG, Township	EPGE	-
Local economy (Livelihood)	- Decrease of income due to permanent land acquisition or temporary occupation of farm land	- Same as "Involuntary resettlement"	Permanent/ temporary land occupation	Water pipeline	PMU, MRG, Township	EPGE	-

Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Relevant Component	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
Land use and utilization of local resource	- Permanent and temporary limitation on farm land use due to land acquisition for electricity poles and construction work	- Same as "Involuntary resettlement"	Permanent land occupation	Water pipeline	PMU, MRG, Township	EPGE	-

Source: EIA Study Team

Table 8 Summary of Identified Potential Negative Impact and Mitigation Measures at Construction Phase

Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Relevant Component	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
1. Pollution							
Air quality	- Temporary increase of small soil particle from earthworks - Temporary increase of dust from transportation activities such as carrying soil by dump trucks	- Avoiding the concentrated use of construction machineries - Avoiding earthworks during blowing of strong wind - Covering the temporarily soil storage by cover sheet - Applying car washing system for dump trucks - Spray water to the road in the morning for reducing dust	Mainly earth work	Power facility, gas pipeline, water pipeline	Contractor	EPGE	USD 500 / month for car washing system USD 3,500 / month for road sprinkler
Water quality	- Water pollution (muddy water) caused by the construction of the intake facility in the Myitnge river	- Installation of steel structured cofferdam (steel sheet pile) - Use silt barrier around coffer dam - Use temporary sedimentation tank for pumped up water in the working area	All construction activities	Water pipeline	Contractor	EPGE	USD 166,000 for cofferdam USD 36,000 for silt barrier USD 3,000 for sedimentation tank
Waste	- Generation of solid waste from construction works	- Keeping tidy in the construction site - Installation separate waste stockyard to promote the recycling and reuse the soil waste - Appropriate management of stockyard to prevent odor	All construction activities	Power facility, gas pipeline, water pipeline	Contractor	EPGE	Included in the construction costs

Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Relevant Component	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
		- Regular inspection of waste storage yard to check the status of segregation - Contractor should carry the generated solid waste from water pipeline and gas pipeline construction site except for the soil to the power plant site to segregate. - Contractor should properly dispose the waste which cannot be recycled by themselves or by third party in accordance with the relevant laws.					
Soil contamination	- Soil contamination by spilled fuel & oil	- Setting up paved refilling facility in the construction site	All construction activities	Power facility	Contractor	EPGE	Included in the construction costs
Noise & vibration	- Noise and vibration due to construction and material handling - Noise and vibration due to transportation activities such as dump trucks	- Avoiding the concentrated use of construction machineries - Time limitation of the civil works (e.g. daytime: 7:00 to 22:00) - Conducting awareness raising activity of gentle operation to the operators - Installation of temporary enclosure wall to the southern and east boundaries during construction	All construction activities	Power facility, gas pipeline, water pipeline	Contractor	EPGE	USD 77,000 for temporary enclosure wall
Ground subsidence	- Possibility of subsidence after burying water pipeline due to inadequate soil compaction for backfill	- Avoid using waste and clay for backfilling of the pipeline - Execution of adequate soil compaction for back filling of the pipeline	Back filling	Gas pipeline, water pipeline	Contractor	EPGE	-
2. Natural Environment							
Flora, fauna and biodiversity	- Change vegetation due to the construction works - Loss of important species and/or their	- Minimizing land surface change such as plantation and shrub land for stockyard	All construction activities	Power facility, gas pipeline, water pipeline	Contractor	EPGE	Included in the construction costs

Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Relevant Component	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
	habitats caused by the project development - Impact on biodiversity and ecosystem by the project development						
3. Social Environment							
Cultural heritage	- Impact on ruins of ancient city in heritage zone	- The manual excavation near the ancient wall for burying the pipelines - To comply with the conditions of approval from MORAC	Installation of the pipeline	water pipeline	Contractor	EPGE	-
	- Impact on religious activity in the cultural heritage (Temple, Pagoda) from the noise of construction work	- Same as "Noise and Vibration"	All construction activities	Power facility, gas pipeline, water pipeline	Contractor	EPGE	-
Landscape	- Possibility of temporary disturbance on surrounding landscape due to storing construction machines and materials	- Installation of temporary enclosure wall to the southern and east boundaries during the construction works - Greening and planting trees around the boundary of project site	Mainly construction machinery and stored materials	Power facility	Contractor	EPGE	Temporary enclosure wall is installed for noise mitigation USD 142,000 for Greening
Gender	- Possibility of discrimination of gender on job opportunity	- Providing job opportunity to all local people without discrimination of gender	All job offers	Power facility, gas pipeline, water pipeline	Contractor	EPGE	-
Children's rights	- Possibility of child labor to the project related construction works	- Including prohibition of child employment into the tender conditions	All job offers	Power facility, gas pipeline, water pipeline	Contractor	EPGE	-
Poverty	- Impact to poverty groups due to permanent/ temporary occupation	- Commencement of construction after harvest as much as possible - Prioritize the local people for hiring unskilled worker	All construction activity	Gas pipeline, water pipeline	PMU, contractor	EPGE	-
Local economy (Livelihood)	- Permanent/ temporary	- Commencement of construction after harvest	All construction activities	Gas pipeline, water pipeline	PMU, contractor	EPGE	-

Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Relevant Component	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
	disturbance of farm land						
	- Temporary disturbance of kiosk	- Temporary relocation of kiosks to the nearest available land and necessary cost for moving should be provided by the project proponents, or - Allowance for temporal relocation during construction work in case the kiosk is not in operation	All construction activities	Gas pipeline, water pipeline	PMU	EPGE	-
Land use and utilization of local resources	- Permanent/ temporary limitation of farmland use during the construction works	- Same as "Local economy (Livelihood)"	All construction activities	Gas pipeline, water pipeline	PMU, contractor	EPGE	-
Water usage	- Water usage caused by the project development in construction phase	- Same as "Water quality"	Installation of the intake station	Water pipeline	Contractor	EPGE	-
Existing social infrastructures and services	- Possibility of temporary traffic congestion due to temporary closure, detour - Access limitation to social infrastructure such as pagoda due to construction works	- Arranging a pedestrian way to secure access to social infrastructure as necessary - Informing contents of construction works and work schedule to the surrounding communities in advance - Setting up sign board on the road to show the construction term and location	All construction activities	Gas pipeline, water pipeline	Contractor	EPGE	Included in the construction costs
Health (Community Health, Infectious Disease and HIV/AIDS)	- Increasing risk of infectious disease due to influx of construction workers in the construction site	- Education workers and the surrounding communities on risks, prevention and available treatment on infectious disease - Prevention illness among workers by undertaking health awareness and education initiatives	All construction activity	Power facility, gas pipeline, water pipeline	Contractor	EPGE	-
Occupational health and safety	- Increase the risk of accidents related to the construction works	- Providing OHS training program and information of safe work practice and emergency procedure	All construction activities	Power facility, gas pipeline, water pipeline	Contractor	EPGE	Included in the construction costs

Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Relevant Component	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
		- Providing adequate health care facilities and first aid within the construction site					
4. Others							
Accident	- Increase the risk of accidents related to the construction works within the construction site and at the surrounding communities	- Providing adequate health care facilities and first aid within the construction site - Providing training to construction workers about OHS - Providing information and guidance on construction activities and safety to the surrounding communities	All construction activities	Power facility, gas pipeline, water pipeline	Contractor	EPGE	Included in the construction costs
Cross-border impact, climate change	- Possibility of increasing greenhouse gas (GHG) emission due to construction works	- Education for construction workers/drivers about stopping unnecessary idling for construction machines and vehicles - Avoiding excessive loading operation	All construction activities	Power facility, gas pipeline, water pipeline	Contractor	EPGE	Included in the construction costs

Source: EIA Study Team

Table 9 Summary of Identified Potential Negative Impact and Mitigation Measures at the Operation Phase

Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Relevant Component	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
1. Pollution							
Air quality	- Air emission from stacks during the operation of power plant - The key pollutant of concern from the gas turbine is nitrogen dioxide. In general, natural gas contained only a little amount of sulfur, so that emission gas does not include sulfur dioxide. In addition to this, the	- Applying high height stack to promote dispersion of air pollutant* - Narrowing the outlet of the stack to avoid the appearance of stack downwash phenomenon* - Installation of low nitrogen dioxide type of gas turbine*	Flue gas from gas turbine stacks	Power facility	EPGE	MOEE	USD 550,000 for installation of stacks

Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Relevant Component	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
	concentration of the particle matter in emission gas is also few under the normal combustion condition.						
Water quality	- Water pollution due to the effluent from the power plant facilities during the operation of the power plant - Water pollution due to the domestic wastewater from the staff quarters in the project site	- Installation of wastewater treatment facility and proper operation of treatment facility - Installation of disinfection process (e.g. chlorination process) to the wastewater treatment facility	Effluent from power facility and domestic used water	Power facility	EPGE	MOEE	USD 1,400,000 for wastewater treatment facilities
Waste	- Generation of soil waste (sludge) from the wastewater treatment facilities - Generation of solid waste from the operation and maintenance activity of power plant facilities and office activity	- Keeping tidy in the project site - Install separate waste stockyard to promote recycling and reuse the solid waste - Making contract with licensed third party about proper solid waste treatment and disposal to the site which was approved by authority - Regular inspection of waste storage yard to check the status of segregation - Obtaining a permission for disposing domestic wastes from Sintgaing Township or Kyaukse Township through discussions with responsible authority of both townships before commissioning.	Operation of the power facility	Power facility	EPGE	MOEE	Included in the operation costs
Noise and vibration	- Generation of noise and vibration from power plant operation.	- Installation of soundproof package for gas and steam turbine - Applying strong foundation of the power plant facilities for reduction of vibration*	Operation of the power facility	Power facility	EPGE	MOEE	USD 370,000 for steam turbine sound proof enclosure.

Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Relevant Component	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
Offensive odor	- Offensive odor generated from the waste water treatment activity	- Periodically maintenance of the waste water treatment facility - Feedback to the monitoring result to the operation of the treatment facility - Install separate and covered waste stock yard to reduce dispersion of the odor	Effluent and wastes from the power facility operation	Power facility	EPGE	MOEE	Included in the operation costs
2. Natural Environment							
Flora, fauna and biodiversity	- Possibility of impact to aquatic biota especially fish by wastewater to be discharged to the Myitnge River	- Installation of wastewater treatment facility and proper operation of the treatment facility	Effluent from power facility and domestic used water	Power facility	EPGE	MOEE	same as the wastewater treatment facility under water quality measure
Hydrology	- Increasing run-off water from the project site	- Installation of the regulation pond with adequate capacity	Run-off water from the project site	Power facility	Contractor	EPGE	USD 150,000 for the regulation pond
3. Social Environment							
Water use	- Wastewater generated from the power plant will be discharged to the Myitnge River	- Installation of the wastewater treatment facility and proper operation of the treatment facility	Effluent from power facility and domestic used water	Power facility	EPGE	MOEE	Same as the wastewater treatment facility under water quality measure
Existing social infrastructure and service	- Possibility of the noise impact to school located at the surrounding area	- Installation of soundproof package for gas and steam turbine	Noise from operation of the power facility	Power facility	EPGE	MOEE	Sound proof package is installed for noise mitigation.
Cultural heritage	- Impact on the religious activity in the cultural heritage (temple, pagoda) from noise of the power facility	- Same as "Noise and Vibration"	Noise from operation of the power facility	Power facility	EPGE	MOEE	Same as noise and vibration
Landscape	- Possibility of disturbance on surrounding landscape due to the power plant facility	- Appropriate maintenance of planted/ existing trees around the boundary of the project site	Mainly stacks of the power facility	Power facility	EPGE	MOEE	Included in the operation cost

Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Relevant Component	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
Gender	- The discrimination of gender on job opportunity	- Provision of equal job opportunity in accordance with the government policy.	All job offers	Power facility	EPGE	MOEE	-
Children's rights	- Possibility of child labor on the project related operation and maintenance works	- Prohibiting child employment - Awareness raising on child employment	All job offers	Power facility	EPGE	MOEE	-
Health (Community Health, Infectious Disease and HIV/AIDS)	- Impact to the community health due to flue gas and effluent discharge	- Applying a high height stack to promote dispersion of air pollutant - Narrowing the outlet of the stack to avoid the appearance of stack downwash - Installation of low nitrogen dioxide type of gas turbine - Installation of the wastewater treatment facility and proper operation of the treatment facility - Installation of disinfection process (e.g. chlorination process) to the waste water treatment facility	Flue gas from the stack Effluent from power facility and domestic used water	Power facility	EPGE	MOEE	-
Occupational health and safety	- Possibility of increase in the risk of accident related to operation and maintenance of the power plant	- Providing OHS training program - Providing adequate health care facilities in the power plant site	All activity for workers	Power facility	EPGE	MOEE	Included in the operation costs
4. Others							
Accident	- Accident caused by storing /treating hazardous or dangerous materials	- Applying the internal safety standard to prevent accident caused by power plant operation	All activity for workers	Power facility, gas pipeline	EPGE	MOEE	-
Cross-border impact, climate change	- Possibility of increasing greenhouse gas (GHG) emission due to the operation of the power plant	- Planned combined cycle system has high efficiency - Promoting saving energy and electricity in the site	Mainly flue gas from the gas turbine stacks	Power facility	EPGE	MOEE	-

Note: * These mitigation measures are actually incorporated into the project design at the time of project design, which will be implemented at the construction phase.
Source: EIA Study Team

Table 10 Summary of Potential Negative Impact and Mitigation Measures at the Decommissioning, Closure, and Post-Closure Phase

Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Relevant Component	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
1. Pollution							
Air quality	- Temporary increase of dust from earthworks - Temporary increase of dust from waste transportation activities	- Avoiding the concentrated use of construction machines - Avoiding demolition works during strong wind - Sprinkling water to the demolition area - Applying car wash system for dump trucks	All demolition activities	Power facility, gas pipeline, water pipeline	Contractor of demolition works	EPGE	USD 500 / month for car washing system USD 3,500 / month for road sprinkler
Water quality	- Water pollution (muddy water) caused by the demolition of the intake facility in the Myitnge river	- Installation of the steel structure cofferdam (steel sheet pile) - Applying the silt barrier around the coffer dam - Applying temporary sediment tank for pumped up water in the working area	Demolition activities of the intake facility	Water pipeline	Contractor of demolition works	EPGE	USD 166,000 for the cofferdam USD 36,000 for the silt barrier USD 3,000 for the sedimentation tank
Waste	- Generation of solid waste from demolition works	- Keeping tidy in the demolition site - Installing separated waste stockyard to promote the recycling and reuse of solid waste - Contractor should carry the generated solid waste except for the soil from water pipeline and gas pipeline construction site to the power plant site for segregation. - Regular inspection of waste storage yard to check the status of segregation - Contractor should properly dispose the waste which cannot be recycled by themselves or by third party in accordance with the relevant laws.	All demolition activities	Power facility, gas pipeline, water pipeline	Contractor of demolition works	EPGE	Included in the costs of contract for demolition works
Noise & vibration	- Noise and vibration due to demolition works and material handling	- Avoiding the concentrated use of construction machineries - Time limitation of the demolition works (e.g. daytime: 7:00 to 22:00)	All demolition activities	Power facility, gas pipeline, water pipeline	Contractor of demolition works	EPGE	USD 77,000 for temporary enclosure wall

Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Relevant Component	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
	- Noise and vibration due to transportation activities such as carrying soil by dump trucks	- Promoting awareness activity of gentle operation to the operators - Installation of temporary enclosure wall to the southern and east boundaries during construction					
2. Natural environment							
Flora, fauna and biodiversity	- Change vegetation due to the construction works - Loss of important species and/or their habitats caused by the project development - Impact on biodiversity and ecosystem by the project development	- Same as “water quality” for aquatic biota - Minimizing land surface change such as clearing shrub for stock yard	All demolition activities	Gas pipeline, water pipeline	Contractor of demolition works	EPGE	Included in the costs of contract
3. Social environment							
Poverty	- Loss of job opportunities related to operation and maintenance of the power plant	- To prioritize the local people for hiring unskilled worker	All job offers	Power facility, gas pipeline, water pipeline	Contractor of demolition works	EPGE	-
Local economy (employment)	- Loss of job opportunities related to operation and maintenance of the power plant	- To prioritize the local people for hiring unskilled worker	All job offers	Power facility, gas pipeline, water pipeline	Contractor of demolition works	EPGE	-
Water usage	- Water usage caused by the project demolition of the water intake facility	- Same as “Water quality”	Demolition activities of the intake facility	Water pipeline	Contractor of demolition works	EPGE	Same as water quality
Cultural heritage	- Impact on religious activity in the cultural heritage (Temple, Pagoda) from noise of demolition work	Same as “Noise and Vibration”	All demolition activities	Power facility, gas pipeline, water pipeline	Contractor of demolition works	EPGE	-
Landscape	- Possibility of temporary disturbance on surrounding landscape due to storing construction machines and debris	- Installation of temporary enclosure wall to the southern and east boundaries during the demolition work	Mainly by construction machineries and stored debris	Power facility	Contractor of demolition works	EPGE	Temporary enclosure wall is installed for noise mitigation

Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Relevant Component	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
Gender	- Possibility of discrimination of gender on job opportunity	- Providing job opportunity to all local people without discrimination of gender	All job offers	Power facility, gas pipeline, water pipeline	Contractor of demolition works	EPGE	-
Children's right	- Possibility of child labor on the project related demolition works	- Stipulating the term/condition to prohibit child employment into the tender/contract document	All job offers	Power facility, gas pipeline, water pipeline	Contractor of demolition works	EPGE	-
Health (including infectious disease such as HIV/AIDS)	- Increasing risk of infectious disease due to influx of construction workers in the construction site	- Educating workers and the surrounding communities on risks, prevention and available treatment on infectious disease - Preventing illness among workers by undertaking health awareness and education initiatives	All demolition activities	Power facility, gas pipeline, water pipeline	Contractor of demolition works	EPGE	-
Occupational health and safety	- Increase the risk of accidents related to the demolition works	- Providing OHS training program and information of safe work practice and emergency procedure - Providing adequate health care facilities and first aid within the demolition site	All demolition activities	Power facility, gas pipeline, water pipeline	Contractor of demolition works	EPGE	Included in the costs of contract
4. Others							
Accident	- Increase the risk of accidents related to the demolition works within the demolition site and at the surrounding communities	- Providing adequate health care facilities and first aid within the demolition site - Providing training to demolition workers about OHS - Providing information and guidance on demolition activities and safety to the surrounding communities	All demolition activities	Power facility, gas pipeline, water pipeline	Contractor of demolition works	EPGE	Included in the costs of contract
Cross-border impact, climate change	- Possibility of increasing greenhouse gas (GHG) emission due to demolition works	- Educating construction workers/drivers about stopping unnecessary idling for construction machines and vehicles - Avoiding excessive loading operation	All demolition activities	Power facility, gas pipeline, water pipeline	Contractor of demolition works	EPGE	Included in the costs of contract

Source: EIA Study Team

7.2. Environmental Monitoring Plan

The environmental monitoring plans are presented in Tables 11-14 include monitoring items, location, frequency, responsibility and monitoring forms at each project phase. The responsible organization for monitoring at each stage needs to review the monitoring results and takes necessary actions in case monitoring results do not satisfy the standard values. The monitoring results will be submitted to MONREC and JICA accordingly.

Table 11 Summary of Environmental Monitoring at Pre-Construction Phase

Item	Monitoring Item	Monitoring Method	Monitoring Place	Frequency	Term	Relevant Component	Responsibility	Roughly estimated cost (USD)
1. Social environment								
Involuntary resettlement	Progress of payment and land acquisition / site clearance	Check payment records and land acquisition / site clearance	Around the electricity pole and water/ gas pipeline	Monthly	Up to completion of compensation payment and land acquisition / site clearance	Gas pipeline, water pipeline	PMU	Covered in the ARAP
	Grievance	Checking record of grievance (reception, contents and status of the process)	Around the electricity pole and water/ gas pipeline	Monthly	Until the livelihood is restored	Gas pipeline, water pipeline	PMU	Covered in the ARAP
Poverty	Progress of compensation payment	Check payment records	Around the electricity pole and water pipeline	Monthly	Up to completion of compensation payment	Water pipeline	PMU	Covered in the ARAP
Local economy (Livelihood)	Progress of compensation payment	Check payment records	Around the electricity pole and water pipeline	Monthly	Up to completion of compensation payment	Water pipeline	PMU	Covered in the ARAP
	Progress of income restoration	Checking implementation of restoration (if executed)	Around the electricity pole and water/ gas pipeline	Monthly	Until the livelihood is restored	Water pipeline	PMU	Covered in the ARAP
Land use and utilization	Progress of land acquisition / site clearance for temporary land occupation	Check land acquisition / site clearance records	Around the electricity pole and water pipeline	Monthly	Up to completion o site clearance	Water pipeline	PMU	Covered in the ARAP

Source: EIA Study Team

Table 12 Summary of Environmental Monitoring at Construction Phase

Item	Monitoring Item	Monitoring Method	Monitoring Place	Frequency	Term	Relevant Component	Responsibility	Roughly estimated cost (USD) [a]
1. Pollution								
Air quality	Dust	Dust check records of complaint (for Dust)	1 nearest village around the project site	Quarterly	Entire construction phase	Power facility, gas pipeline, water pipeline	Contractor	Included in the administration cost of contractor
	PM_{10}	Site measurement				Power facility		USD 1,200 / survey
Water quality	SS, BOD5, COD, Oil and grease, pH, Total coliform bacteria	Site measurement	2 points upstream and downstream of water intake facility	Two times (during installation and removing coffer dam)	Construction/ demolition of coffer dam	Water pipeline	Contractor	USD 700 / survey
Waste	Record of waste disposal and site condition	[Construction Yard] Check records of the amount and type of waste, and disposal method [Worker's Camp] Visual check for solid waste on the camp site and check records if collected by the licenced vendor.	Power facility site	Weekly	Entire construction phase	Power facility, gas pipeline, water pipeline	Contractor	Included in the construction costs
Soil contamination	Installation of paved refilling facility	Check the installation of paved refilling facility	Power facility site	Quarterly	Entire construction phase	Power facility	Contractor	Included in the administration cost of contractor
Noise and vibration	Noise level (L_{Aeq}), Vibration level (L_{v10}) Traffic volume (for road side monitoring)	Check records of complaint (for noise and vibration) Site measurement	For power facility: 2 points (1 point near the project site, 1 point along the access road) For gas pipeline: 1 point near the gas pipeline For water pipeline: 2 points (near the intake facility, and water pipeline)	Quarterly for checking records, Once for measurement when construction work is at its peak (in daytime, 15hours)	Entire construction phase	Power facility, gas pipeline, water pipeline	Contractor	USD 3,100 / survey
Ground subsidence	Ground level condition	Check records of complaint (for ground subsidence)	Around the water pipeline	Quarterly	Entire construction phase	Gas pipeline, water pipeline	Contractor	Included in the administration cost of contractor

Item	Monitoring Item	Monitoring Method	Monitoring Place	Frequency	Term	Relevant Component	Responsibility	Roughly estimated cost (USD) [a]
2. Natural environment								
Flora, fauna and biodiversity	Condition of ecosystem	Field reconnaissance of ecosystem (e.g. vegetation, river water)	Around whole project site	2 times a year (rainy season and dry season)	Entire construction phase	Power facility, gas pipeline, water pipeline	Contractor	USD 3,000 / survey
3. Social environment								
Cultural heritage	Record of findings of archaeological objects and actions which had been taken by contractor	Check record of findings	Around the water pipeline	Weekly	Entire construction phase	Water pipeline	Contractor	Included in the administration cost of contractor
	Complaint from surrounding communities	Check complaint records	Around whole project site	Weekly	Entire construction phase	Power facility, gas pipeline, water pipeline	Contractor	Included in the administration cost of contractor
Landscape	Installation of temporally enclosure wall	Check the site condition Check the installation of enclosure wall	Power facility site	Quarterly	Entire construction phase	Power facility	Contractor	Included in the administration cost of contractor
Gender	Complaint from surrounding communities	Check complaint records	Power facility site	Weekly	Entire construction phase	Power facility, gas pipeline, water pipeline	Contractor	Included in the administration cost of contractor
Children's right	Working record	Check working records of workers	Power facility site	Weekly	Entire construction phase	Power facility, gas pipeline, water pipeline	Contractor	Included in the administration cost of contractor
Health (including infectious disease such as HIV/AIDS)	Awareness of infectious disease	Check records of awareness activities on infectious disease	Power facility site	Weekly	Entire construction phase	Power facility, gas pipeline, water pipeline	Contractor	Included in the administration cost of contractor
Occupational health and safety	Record of accidents in the construction site Usage of protective gears Record of safety education to workers	Check record of accidents in the construction site Observe usage of protective gears where applicable Check record of safety education	Power facility site	Weekly	Entire construction phase	Power facility, gas pipeline, water pipeline	Contractor	Included in the administration cost of contractor
4. Others								
Accident	Record of traffic accidents in the surrounding communities Record of information sharing of	Check records of traffic accidents in the surrounding communities Check record of information sharing of construction work for safety	Along access road	Weekly	Entire construction phase	Power facility, gas pipeline, water pipeline	Contractor	Included in the administration cost of contractor

Item	Monitoring Item	Monitoring Method	Monitoring Place	Frequency	Term	Relevant Component	Responsibility	Roughly estimated cost (USD) [a]
	construction work for safety Record of awareness rising activities for safety	Check record of awareness rising activities for safety						
Cross-border impact, climate change	Promote the efficient fuel use Amount of fuel use	Check records of fuel consumption Check record of awareness rising activities for efficient fuel use	Power facility site	Weekly	Entire construction phase	Power facility, gas pipeline, water pipeline	Contractor	Included in the administration cost of contractor

Note: a) Estimated by per one survey. Traveling cost and allowances such as accommodation expenses, etc. are not included
Source: EIA Study Team

Table 13 Summary of Environmental Monitoring at Operation Phase

Item	Monitoring Item	Monitoring Method	Monitoring Place	Frequency	Term	Relevant Component	Responsibility	Roughly estimated cost (USD) [a]
1. Pollution								
Air quality (Ambient)	NO_2	Site measurement	3 points around the Power facility site	Quarterly (each for 1 week)	2 years from starting operation	Power facility	EPGE	USD 3,000 / survey
Air quality (Emission gas)	NO_2	Site measurement	2 points (each stack of gas turbine)	Quarterly	2 years from starting operation	Power facility	EPGE	USD 2,400 / survey
Water quality (Treated effluent of power facility)	Parameters for thermal power plant effluent (see 5.2.1.2 Water quality for detail)	Site measurement	1 point of outlet of effluent of power facility	Quarterly	2 years from starting operation	Power facility	EPGE	USD 600 / survey
Water quality (Treated effluent of domestic usage)	Parameters for wastewater and ambient water quality (see 5.2.1.2 Water quality for detail)	Site measurement	1 point of outlet of effluent of domestic wastewater treatment facility	Quarterly	2 years from starting operation	Power facility	EPGE	USD 900 / survey
Water quality (Myitnge River)	Parameters for wastewater and ambient water quality (see 5.2.1.2 Water quality for detail)	Site measurement	3 points - Effluent at the discharge point to Myitnge river - River water at upstream and 100m	Quarterly	2 years from starting operation	Power facility	EPGE	USD 2,000 / survey

Item	Monitoring Item	Monitoring Method	Monitoring Place	Frequency	Term	Relevant Component	Responsibility	Roughly estimated cost (USD) [a]
			downstream of the discharge point					
Waste	Record of waste disposal and site condition	Check records	Power facility site	Monthly	2 years from starting operation	Power facility	EPGE	Included in the operation costs
Noise and Vibration	Noise level (L_{Aeq}), Vibration level (L_{v10})	Site measurement	3 points around the Power facility site	Quarterly (daytime and nighttime, 24 hours)	2 years from starting operation	Power facility	EPGE	USD 2,100 / survey
Offensive odor	Complaint from surrounding communities	Check complaint records (for offensive odor)	Power facility site	Quarterly	2 years from starting operation	Power facility	EPGE	-
2. Natural environment								
Flora, fauna and biodiversity	Condition of ecosystem (e.g. vegetation, river water)	Field reconnaissance of ecosystem	Around project site	2 times a year (rainy and dry season)	2 years from starting operation	Power facility	EPGE	USD 900 / survey
Hydrology	Complaint from villagers who live or cultivate along downstream of the channel Monitor for maintenance and capacity of the regulation pond	Check complaint records (for flooding) Check record of maintenance	Around downstream of the channel of the Power facility	Monthly during Rainy season	2 years from starting operation	Power facility	EPGE	Included in the operation costs
3. Social environment								
Water use	Complaint from surrounding communities	Check complaint records	Myitnge River (from discharge point to 100 m downstream)	Every 2 weeks	2 years from starting operation	Power facility	EPGE	Included in the operation costs
Existing social infrastructure and service	Complaint from surrounding communities	Check complaint records	Around the Power facility site	Every 2 weeks	2 years from starting operation	Power facility	EPGE	Included in the operation costs
Cultural heritage	Complaint from surrounding communities	Check complaint records	Around the Power facility site	Every 2 weeks	2 years from starting operation	Power facility	EPGE	Included in the operation costs
Landscape	Condition of Planting and Greening	Check the site condition	Around the Power facility site	Quarterly	One time after starting operation	Power facility	EPGE	Included in the operation costs
Gender	Complaint from surrounding communities	Check complaint records	Around the Power facility site	Every 2 weeks	2 years from starting operation	Power facility	EPGE	Included in the operation costs
Children's rights	Complaints from surrounding communities	Check complaint records	Around the Power facility site	Every 2 weeks	2 years from starting operation	Power facility	EPGE	Included in the operation costs

Item	Monitoring Item	Monitoring Method	Monitoring Place	Frequency	Term	Relevant Component	Responsibility	Roughly estimated cost (USD) [a]
Health (including infectious disease such as HIV/AIDS)	Health condition of surrounding village	Records of Health condition	In and around the Power facility site	Quarterly	2 years from starting operation	Power facility	EPGE	Site measurement will be conducted in other items
Occupational health and safety	Records of accidents in the power facility Usage of protective gears	Check records of accidents in the construction site Observe usage of protective gears where applicable	Power facility site	Every 2 weeks	2 years from starting operation	Power facility	EPGE	Included in the operation costs
4. Others								
Accident	Records of accidents Records of gas leakage monitoring activities	Check records of accidents Check records of gas leakage monitoring activities	Power facility site, along gas pipeline	Every 2 weeks	2 years from starting operation	Power facility, gas pipeline	EPGE	Included in the operation costs
Cross-border impact, climate change	Amount of fuel gas used, and electricity generated	Checking operation record	Around the Power facility site	Quarterly	2 years from starting operation	Power facility	EPGE	Included in the operation costs

Note: a) Estimated by per one survey. Traveling cost and allowances such as accommodation expenses are not included
Source: EIA Study Team

Table 14 Summary of Environmental Monitoring at Decommissioning, Closure, and Post-Closure Phase

Item	Monitoring Item	Monitoring Method	Monitoring Place	Frequency	Term	Relevant Component	Responsibility	Roughly estimated cost (USD) [a]
1. Pollution								
Air quality	Dust (PM10)	Site measurement Check records of complaint for dust	1 nearest village around the project site	Quarterly	Entire demolition phase	Power facility, gas pipeline, water pipeline	Contractor of demolition works	USD 1,200 / survey
Water quality	SS, BOD_5, COD, oil and grease, pH, total coliform bacteria	Site measurement	2 points (upstream and downstream of water intake facility)	Two times (during installation and removing coffer dam)	Entire demolition phase	Water pipeline	Contractor of demolition works	USD 700 / survey
Waste	Amount of waste disposal and site condition	[Construction Yard] Check records of amount and type of waste	Project site	Weekly	Entire demolition phase	Power facility, gas pipeline, water pipeline	Contractor of demolition works	Included in the administration cost of contractor

Item	Monitoring Item	Monitoring Method	Monitoring Place	Frequency	Term	Relevant Component	Responsibility	Roughly estimated cost (USD) [a]
		[Worker's Camp] Check solid waste						
Noise and vibration	Noise level (L_{Aeq}), Vibration level (L_{v10}), Traffic volume for road side monitoring	Check records of complaint (for noise and vibration) Site measurement	For power facility: 2 points (1 point near the project site, 1 point along the access road) For gas pipeline: 1 point near the gas pipeline For water pipeline: 2 points (near the intake facility, and water pipeline)	Records: quarterly, Measurement: once at the peak of demolition works	Entire demolition phase	Power facility, gas pipeline, water pipeline	Contractor of demolition works	USD 3,100 / survey
2. Natural Environment								
Flora, fauna and ecosystem	Condition of ecosystem	Field reconnaissance of ecosystem (e.g. vegetation, river water)	For gas pipeline: along gas pipeline For water pipeline: around the intake facility, electricity pole and water pipeline (except the section of the gas pipeline)	2 times a year (rainy season and dry season)	Entire demolition phase	Gas pipeline, water pipeline	Contractor of demolition works	USD 2,100 / survey
3. Social Environment								
Poverty	Complaint from surrounding communities	Check complaint records	Project site	Weekly	Entire demolition phase	Power facility, gas pipeline, water pipeline	Contractor of demolition works	Included in the administration cost of contractor
Local economy (Employment)	Complaint from surrounding communities	Check complaint records	Project site	Weekly	Entire demolition phase	Power facility, gas pipeline, water pipeline	Contractor of demolition works	Included in the administration cost of contractor
Water usage	Complaint from surrounding communities	Check complaint records	Myitnge River (100 m downstream from discharge point)	Weekly	Entire demolition phase	Water pipeline	Contractor of demolition works	Included in the administration cost of contractor
Cultural Heritage	Complaint from surrounding communities	Check complaint records	Project site	Weekly	Entire demolition phase	Power facility, gas pipeline, water pipeline	Contractor of demolition works	Included in the administration cost of contractor
Landscape	Condition of site, status of wall installation	Check the site condition Check the installation of enclosure wall	Project site	Quarterly	Entire demolition phase	Power facility	Contractor of demolition works	Included in the administration cost of contractor

Item	Monitoring Item	Monitoring Method	Monitoring Place	Frequency	Term	Relevant Component	Responsibility	Roughly estimated cost (USD) [a]
Gender	Complaint from surrounding communities	Check complaint records	Project site	Weekly	Entire demolition phase	Power facility, gas pipeline, water pipeline	Contractor of demolition works	Included in the administration cost of contractor
Children's rights	Working record	Check working records of workers	Project site	Weekly	Entire demolition phase	Power facility, gas pipeline, water pipeline	Contractor of demolition works	Included in the administration cost of contractor
Health (including infectious disease such as HIV/AIDS)	Awareness of infectious disease	Check records of awareness activities on infectious disease	Project site	Weekly	Entire demolition phase	Power facility, gas pipeline, water pipeline	Contractor of demolition works	Included in the administration cost of contractor
Occupational health and safety	Record of accidents and safety education to workers, usage of protective gears	Check records of monitoring items, Site observation	Project site	Weekly	Entire demolition phase	Power facility, gas pipeline, water pipeline	Contractor of demolition works	Included in the administration cost of contractor
4. Others								
Accident	Record of traffic accidents, awareness rising activities	Check records of monitoring items	Along access road	Weekly	Entire demolition phase	Power facility, gas pipeline, water pipeline	Contractor of demolition works	Included in the administration cost of contractor
Cross-border impact, climate change	Record of promotion activities, Record of fuel consumption	Check records of monitoring items	Project site	Weekly	Entire demolition phase	Power facility, gas pipeline, water pipeline	Contractor of demolition works	Included in the administration cost of contractor

Note: a) Estimated per one survey. Traveling cost and allowances such as accommodation expenses are not included
Source: EIA Study Team

8. Public Consultations and Disclosure

8.1. Results of Consultations During Project Scoping

8.1.1. Summary of Consultations Undertaken

The summary of consultations is shown in Table 15. Photos of the PCM are shown in Figure 7.

Table 15 Summary of Public Consultation Meeting at Scoping Stage

Time and Date	Saturday, 6 October 2018 1st session: 9:30 - 11:00 AM, 2nd session: 1:30 - 3:00 PM Sunday, 7 October 2018 3rd session: 9:30 - 11:00 AM, 4th session: 1:30 - 3:00 PM
Venue	1st session: Kone Myint Tharyar Religious Hall 2nd session: Ohn Pin Chan Village Religious Hall 3rd session: Na Be Bin Village Religious Hall 4th session: Taung U Village Religious Hall
Invitee	Director, Environmental Conservation Department, Mandalay Region Officer, General Administration Department, Sintgaing Township Officer, Department of Agriculture Land Management and Statistic, Sintgaing Township Officer, Irrigation and Water Utilization Management Department, Sintgaing Township Officer, Department of Rural Development, Sintgaing Township Officer, Department of Highways, Sintgaing Township Officer, Information and Public Relations Department, Sintgaing Township Members of Parliament (Pyithu Hluttaw, National Hluttaw and Regional Hluttaw) Myanmar Women's Affair Federation, Sintgaing Township Heads of villages and village tracts in and around the Project area Local residents in and around the Project area Other Organizations and individuals who are interested in the Project
Attendees	1st session: 79 persons (villagers: 67) 2nd session: 86 persons (villagers: 78) 3rd session: 63 persons (villagers: 52) 4th session: 54 persons (villagers: 43) Total: 282persons (villagers: 240)
Agenda	Explanation on the Project Description Major positive and negative findings on the draft scoping results Scope of EIA study Further schedule of EIA
Language used	Myanmar language
Q & A Session	In total 7 questions were raised from the participants and discuss with the Project Proponent and coordination organization.
Feedback Sheet	In total 152 comments in four PCM sessions were submitted.

Source: EIA Study Team

Explanation (1)	Explanation (2)
Question and Answer session	Filling feedback form (EPGE staff assists to write)

Source: EIA Study Team

Figure 7 Photos of Public Consultation Meeting at Scoping Stage

8.1.2. Results of Consultations During Scoping Stage

Summarized questions and responses are shown in Table 16. Overall, 7 questions were raised from the participants and discussed with the Project Proponent. Regarding the opinion No.7 in the Table 16, villager's concern about increasing number of gas pipeline was discussed between EPGE and MOGE.

Table 16 Main Question and Response at All Sessions of PCMs at the Scoping Stage

No.	Opinion/Question	Explanation and Response
1	How is the explosive distance if the gas pipeline exploded? How is the responsibility if there are impacts on villagers by the project?	Nowadays, technology of gas pipeline construction is higher than before. The main reason of gas pipeline explosion is that pipes become thin and explode because of using more pressure of gas which is applied in the pipe, transmitting more pressure into the pipe than it is needed and using many years with poor maintenance. Safety is prioritized for this project. This pipeline is planned to be safe, resist and repaired when it is needed. It won't be dangerous. Even if the pipeline is accidentally exploded, it would not be affected much to the surroundings because it is constructed underground. Pipeline maintenance will always be carried out. Holding this kind of meeting is intended to explain the question and reduce the worries of public. Auto shut down system is included if there will have accidental damage. It cannot be dangerous because the high-quality pipeline will be installed.

No.	Opinion/Question	Explanation and Response
2	It is found that pipeline will be passed beside irrigation canal. Pipeline can disturb the water flow. If the pipeline is buried at 1.3 m depth, it will be safe for irrigation canal. If the pipeline is passed over the tunnel, it can be damaged the pipeline while maintenance service performed for canal using machinery. Those points should be considered.	This meeting is intended to meet with public and make presentation as preliminary for environmental impact assessment. After that, baseline data collection will be conducted. If there has impacts on land concerned with pipeline construction, it will be presented in next meeting. At the moment, surveying along the pipeline is being conducted to know the affected land and people. After the pipeline is buried, the farmers can replant on their land. When the affected lists have been prepared, another meeting will be hold.
3	Where will waste water be discharged because water will be used in project operation phase? How is the pollution of air emission?	As the project, water will be used after treatment. Waste water will be discharged to the Myitnge River after proper treatment. There would not be negative impacts. Even if there is emission into air or water, these emissions will be satisfied with standards and guidelines.
4	Behalf of local farmers, I would like to explain about land acquisition for construction Be Lin Sub-Station. Firstly in 2004, 45.34 acres of land were occupied by government as well as 28.77 acres were also occupied secondly. We lost the crops. Villagers are being altered from farmers to daily labors. It is presented about villagers' grievances. There are 25 farmers who has affected. If the project is needed employees, those 25 farmers should be prioritized to hire. There are young educated persons in another village. The local people should be considered priority for works of the project.	We sympathize for land loss. I don't want to comment for past conditions. Past and present are not the same. If there is a project, it is carried out after public consultations before the project begins. If there have the impacts by the project, it will be performed not to have grievances. Local people are prioritized for work opportunity. It is already instructed to give the work opportunity to local people during plant construction phase and operation phase.
5	I would like to know the positive and negative impacts by the project because it is located near Na Be Bin village. Because natural gas is used in operation, heat wave and ecosystem degradation are being worried. We heard that gas emission is happening in other cement plants. If such kind of problems occur, who will be responsible for this?	The villagers may have that kind of worries. That's why environmental impact assessment team is surveying to know baseline air and water quality. The results will be presented in next meeting. This project is state-owned and thus the responsibility belongs to government. There are 5 power plants in Yangon. Those are constructed at residential area. EPGE employees are also living in that compound. Your worries will not be happened. Gas is mainly methane and it is burnt when it is with oxygen. Toxic which is dangerous for people cannot be formed. Wastewater will be discharged after proper treatment.
6	We Attended the meeting at Sintgaing Town. It is necessary to know exactly the route of pipeline and whose farms will be passed. Environmental impacts are quite far way to know for villagers. Because of the government project, there is no way to object. Affected farmers should be consulted and negotiated transparently.	300 MW power plant owned by government will be constructed in the Belin sub-station compound. The project will take about five years for construction. Construction phase and EIA implementation will also be taken time. Concerned with land, our team is now surveying. The results will be presented in next meeting.
7	One gas pipeline is already existed near your planned pipeline route. Meeting for new gas pipeline construction was carried out in last month. Are new gas pipeline and the planned pipeline of the project the same or not?	It is different. That new gas pipeline is for short term project operated by MOGE. EPGE will discuss with MOGE for pipeline route.

Source: EIA Study Team

On feedback form, 152 opinions or comments were submitted by the participants. The major opinions or comments are summarized in Table 17. Although the majority supports the Project, there were some opinions which should be considered on Terms of Reference (ToR) of EIA study during construction and operation phases. Those opinions were reflected in the EIA report and explained in the next (EIA stage) public consultation meeting.

Table 17 Major Comments in the Feedback Form

No.	Opinion/Comment	Number
1	Project is good.	40
2	Job opportunity (Hoping to employment of villagers)	19
3	Concern about safety of the project	15
4	No objection (if no impact)	13
5	No comment	12

Note: This table only shows major comments. Thus, negative opinion is not appeared in this table.
Source: EIA Study Team

8.2. Results of Consultations During the Preparation of EIA Report

8.2.1. Summary of Consultations Undertaken

The summary of consultations is shown in Table 18. Photos of the PCM are shown in Figure 8.

Table 18 Summary of Public Consultation Meeting at EIA Preparation Stage

Time and Date	Saturday, 20 April 2019 1st session: 9:30 - 11:00 AM, 2nd session: 1:30 - 3:00 PM Sunday, 21 April 2019 3rd session: 9:30 - 11:00 AM, 4th session: 1:30 - 3:00 PM Saturday, 25 January 2020 5th session: 1:00 – 2:00 PM
Venue	1st session: Kone Myint Tharyar Religious Hall 2nd session: Ohn Pin Chan Village Religious Hall 3rd session: Na Be Bin Village Religious Hall 4th session: Taung U Village Religious Hall 5th session: Kone Myint Tharyar Religious Hall
Invitee	Assistant Director, Environmental Conservation Department, Mandalay Region Deputy Administrator, General Administration Department, Sintgaing Township Officer, Education Department, Sintgaing Township Heads of villages and village tracts in and around the Project area Local residents in and around the Project area Other Organizations and individuals who are interested in the Project
Attendees	1st session: 68 persons (villagers: 51) 2nd session: 39 persons (villagers: 26) 3rd session: 70 persons (villagers: 57) 4th session: 38 persons (villagers: 25) 5th session: 45 persons (villagers: 18) Total: 260 persons (villagers: 177)
Agenda	Introduction and Outline of the Project Feedback of the Precious PCM Environmental and Social Impact Assessment Study Mitigation Measures, etc. Purpose of the Additional PCM (Only for 5th session)
Language used	Myanmar Language
Q & A Session	In total 18 questions were raised from the participants and discuss with the Project Proponent and coordination organization.
Feedback Sheet	In total 102 comments in four PCM sessions were submitted.

Source: EIA Study Team

Explanation (1)	Explanation (2)
Question and Answer session	Filling feedback form (EPGE staff assists to write)

Source: EIA Study Team

Figure 8 Photos of Public Consultation Meeting at EIA Preparation Stage

8.2.2. Results of Consultations During EIA Preparation Stage

Summarized questions and responses are shown in Table 19. Overall, 18 questions were raised from the participants and discussed with the Project Proponent. Based on the opinion No.8 in the Table 19: villager’s concern about the alignment of pipelines, EPGE had discussed with relevant organizations and the alignment was changed to use public area as much as possible.

Table 19 Main Question and Response at All Sessions of PCMs at the EIA Preparation Stage

No.	Opinion/Question	Explanation and Response
1	I worry about the river bank erosion, is it impact on river bank?	Before construction of intake water station, we have to build the retaining wall around that area.
2	Why did you consider the water pipeline across Met Ka Ya Village? Can you draw a water pipeline near E Bya village road?	According to the feasibility study, the proposed line route is more feasible for other option. So, we considered and selected the proposed line route.
3	Is there IP 1 (Intermediate Pump station) station near Mont Paung Village? If IP1 will be build, land owner doesn’t agree.	Actually, we planned Intermediate Pump station at scoping stage, but now we don’t plan to install that.
4	Where is pipeline area near Pin Char Bridge? Please show it. How many years do you build the Power Plant? When do you want to start the construction? Please come to explain and inform to me because we worried about the cultivation for seasonal crops.	Project period is about 5 years. Yes, we will inform and discuss the project schedule or timeline.

No.	Opinion/Question	Explanation and Response
5	Where is the gas pipeline and will it be across the farmland? During construction, is there any possibility that excavated trench will be left for a long time to install the pipes? If the situation happens, that will an obstacle for agricultural work.	Near the pointed area, only water pipelines will be installed along the irrigation cannel. We will choose the best contractor. We will set up the complaint center in Belin substation. We would like to communicate with local villagers. If you have any problems, please come to inform the complaint center.
6	Behalf of local farmers, I would like to explain about land acquisition for construction Belin Sub-Station. Firstly in 2004, 45.34 acres of land were occupied by government as well as 28.77 acres were also occupied secondly. We lost the crops. Villagers are being altered from farmers to daily labours. It is presented about villagers' grievances. There are 25 farmers who has affected. If the project is needed employees, those 25 farmers should be prioritized to hire. There are young educated persons in another village. The local people should be considered priority for works of the project.	We sympathize for land loss. I don't want to comment for past conditions. Past and present are not the same. If there is a project, it is carried out after public consultations before the project begins. If there have the impacts by the project, it will be performed not to have grievances. Local people are prioritized for job opportunity. It is already instructed to give the job opportunity to local people during plant construction phase and operation phase.
7	I would like to request to provide the job opportunities to my villagers, Na Be Bin. Because my village has many graduated persons.	Yes, we can provide the job opportunities to the educated villagers during construction and operation phase. We will send the labour announcement letter to Head of village and then you can apply the jobs.
8	I don't agree with this project because I cannot change land use due to existing gas pipeline.	This meeting is intended to inform that result of environmental impact assessment. This project is owned by Government. I can note your opinion and reflect in EIA report.
9	If the pipeline is installed in the embankment, the pipeline might disturb the water distribution. The maintenance will also need to be considered.	The project is at Loan Proposal Stage of EIA. We will hire technical consultants after ECD approve EIA report and carry out Loan Contract with JICA. After loan was approved, we will discuss with related professionals and consultants to create appropriate design. Therefore, we cannot show detail design at present, but we will not disturb the water distribution. We will carry out detail field survey along the pipelines by discussing with technicians and consultants. We will use the water pipeline technology which do not leak water for this project.
10	The gas pipeline is more concerning than the water pipeline as there are some persons who are against the installation of gas pipeline in their land.	The project has already avoided passing through the land where landowners are against the gas pipeline as much as possible. During the process, gas pipeline route has been shifted to new route along the canal.
11	There is a land marked as (villager's name)'s land beside the river. I wish to clarify that this land is not (person's name)'s property and it is owned by the village charity group. Therefore, I suggest marking this land as Village Land in addition to (villager's name)'s land.	Acknowledged the point.
12	I suggest compensation to village for (villager's name)'s land is necessary.	Yes, the compensation will be decided based on the discussions with relevant organizations, if the land is acquired. The pointed area is planned to use public area.
13	My fence might be impacted by the project and I want to know how the project will take responsibility.	If the project affects the fence, appropriate compensation will be paid to repair it.

No.	Opinion/Question	Explanation and Response
14	I want to know how this project will impact the water resource.	This project will apply air cooling system which can save water consumption. We will use Myitnge River water and save as much river water as possible by the project. This project will use at most thousands of gallons of water per day.
15	Is this government project?	Yes, this project is cooperation between government and JICA with loan. We will use Combine Cycle Gas Turbine to reduce environmental impacts as much as possible.
16	I suggest repairing of roads if the project will damage them.	Yes, this project will use 2 percent of profit as CSR. Therefore, your suggestion will be included in CSR program.
17	Are there any changes in electricity price due to the construction of gas turbine?	The government will bear the whole cost of the construction of gas turbine with the purpose of providing electricity to the public. The electricity bill will not be affected by the expense of the construction of the gas turbine and will be collected according to the defined rates by the government.
18	Are there any gas emissions from the project?	This project will use Japan Technology named Dry Low NOx Combustor (DLN). Nitrogen Oxide comes out from this combustor with high temperature. NOx will be emitted below NEQG, it doesn't mean NOx can be 0%. Moreover, we will plan to conduct environmental monitoring. We will submit monitoring report periodically.

Source: EIA Study Team

On feedback form, 102 opinions or comments were submitted by the participants. Major opinions or comments are summarized in Table 20. The most common opinion supports the Project, while there were some opinions which raise concerns on the negative environmental and social impacts of the project. It is important to fully comply with EMP proposed in this EIA by both contractor and project proponent throughout the whole process of the Project.

Table 20 Major Comments in Feedback Form at EIA Stage

No.	Opinion/Comment	Number
1	No objection	11
2	Recommended	9
3	Pipeline route (To use public land for pipelines is better for farmers.)	8
3	Concern about noise (& vibration) from the facilities	8
5	Job opportunity (Hoping to employ villagers)	7

Note: This table only shows major comments. Thus, negative opinion is not appeared in this table.
Source: EIA Study Team

9. Summary of Development Plans

For the safe and efficient implementation of the Project, it is recommended to prepare and implement several development plans in addition to management and monitoring plans presented in previous chapters. This chapter recommends key contents of those plans to be developed by institutions in charge. The draft of development plans that include items to be included, legislative frameworks and responsible institutions are elaborated in the Appendix G of the main report.

9.1. Seismic Resistant Plan

The seismic resistant plan should present basic policy of seismic design and initial inspection in compliance with the Myanmar National Building Code (MNBC) for the seismic design of civil and architectural structure. The preliminary plan developed in the report presents main features including Peak Ground Acceleration (PGA) for seismic design that are calculated based on the result of preparatory survey. The result of liquefaction analysis conducted in the preparatory survey shows the liquefaction potential in the project site is "low". Based on these results, the superstructure of the Project should be designed in accordance with the PGA. During the construction phase, the Engineer will check and approve the construction drawings submitted by the contractor and supervise construction works based on the methods mentioned in MNBC.

During operation phase, daily visual inspection should be conducted by the operator together with the emergency inspection in case of the huge earthquake to execute appropriate countermeasures and avoid fatal damage.

9.2. Emergency Response Plan

The emergency response plan needs to be developed for promptly respond to the emergency cases that may occur during operation phase. The plan should present related organizations and agencies to be involved, the provisional organization chart for emergency response team, principle responsibilities and tasks of incident commanders, coordinators, fire-fighting team and evacuation teams. Also, the plan should elaborate items to be developed under the plan such as classifications of emergency levels, reporting flow, scenario development for emergency preparation, training and monitoring plan on emergency response.

9.3. Water Intake Management Plan

The water intake management plan should be developed for proper management of water intake from Myitnge River. The water intake consists of centrifugal pumps, pontoon, control panel and river bank/bed protection, and designed to be operated safely with necessary protections. For operation phase, intake management plan should be developed for operation during normal condition as well as flood and drought cases. In addition, periodical activities such as sediment removal and cleaning should be developed and reflected to daily monitoring and recording activities.

9.4. Waste Management Plan

The waste management plan needs to be developed for proper management of waste produced through all phases of the Project in compliance with the Environmental Conservation Law (2012), the Environmental Conservation Rules (2014) and other related national and local laws, and regulations. During construction phase, the Contractor should install waste stockyard and regularly inspect the condition of waste storage, to prevent the adverse impact to surrounding areas such as dispersion of odor or solid waste. The amount of waste should be recorded and monitored up to final destinations such as disposal site.

9.5. Community Health and Safety Plan

The community health and safety plan needs to be developed to minimize adverse health and safety impacts to surrounding communities of the project site. The plan should be developed in compliance with the Public Health Law (1972), the National Health Policy (1993) and other related national and regional regulations related to public health and safety. The plan should cover structural safety of the project infrastructure, fire safety, traffic safety and prevention of diseases.

9.6. Industrial Risk Management Plan

The industrial risk management plan needs to be developed to manage industrial risk during operation phase that are caused by interruption of fuel supply, water intake, defect of turbine and other fundamental facilities of the power plant. The plan should be developed and implemented in accordance with ISO 31000 and ISO/IEC 31010. In development of the industrial risk management plan, specific risks under the Project need to be analysed and evaluated. Based on the preconditions mentioned above, EPGE should develop the plan, and monitor and record during entire project period.

9.7. Community Development Plan

The community development plan needs to be developed to elaborate a set of activities, which directly benefit to the community affected by the Project, and ultimately share the benefit of the Project to surrounding communities. As there is no specific regulation that stipulates requirements for such plan, operational guides provided by international organizations such as the World Bank may be referred.

9.8. Occupational Health and Safety Management Plan

The occupational health and safety management plan needs to be developed to promote occupational health and safety of project related activities, to ultimately contribute safe and efficient operation of the Project. The plan should comply with the Occupational Safety and Health Law (2019) that aims at prevention of occupational accidents and diseases. Environmental, Health, and Safety Guidelines provided by the IFC may be referred in development of the plan. It should present the measures to prevent occupational risks during construction and operation phases such as falling from height, explosion, electric shocks and other project specific risks such as electrical hazard. The plan should also present countermeasures and monitoring plans.

9.9. Grievance and Redress Mechanism

The grievance and redress mechanism need to be developed to deal with any grievances or complaints related to the Project. The mechanism should be developed in consideration of different types of grievances and complaints that may be raised in different phases of project implementation. The mechanism for pre-construction phase should comply with the Land Acquisition Act (1894) to deal with the issues raised related to land acquisition and resettlement procedures.

9.10. Safety Management Plan of Gas Pipeline

The plan needs to be developed for safe installation, operation and demolition of gas pipeline related to the Project. The safety management plan of gas pipeline should comply with MOGE's internal guidelines, which have been developed based on ISO 13623 and ASME B31.8. The plan should include mitigation measures for the risks related to gas pipeline, such as internal corrosion, material and construction defect, improper operations, external damages, weather conditions and natural disasters.

9.11. Planning Considerations for Pipeline Installation in Heritage Zone

On the stage of feasibility study of this project, heritage zone was identified on the route of planned water pipeline. Thus, the alignment of the water pipeline was changed to divert one ancient city though, the new pipeline route which is named as an Option-B is still through another ancient city. The purpose of this plan is to conserve old heritage during construction of water pipeline. Contractor should follow to this plan during construction of water pipeline of the project. See appendix G-52 for detail.

9.12. Corporate Social Responsibility (CSR) Plan

Through their activities and relationships, all organizations make positive and negative contributions toward the goal of sustainable development. Organizations therefore have a key role to play in achieving this goal.

Corporate Social Responsibility (CSR) activities and reporting are an organization's practice publicly on its economic, environmental, and/or social impacts, and hence its contributions towards the goal of sustainable development. See appendix G-59 for detail.

CHAPTER 1. INTRODUCTION

1.1. Presentation of the Project Proponent

1.1.1. Project Rationale

In recent years, the electricity demand of Myanmar has been growing rapidly because of increasing development activities and investments after drastic transition into ever growing economies. To meet the growing demand for power supply, the Electric Power Generation Enterprise (EPGE), Ministry of Electricity and Energy (MOEE) aims at increasing generation capacity up to 5,700 MW by 2022, whereas the current capacity is 4,600 MW in 2019. Furthermore, from the energy security point of view, it is ideal to utilize various energy sources, such as hydro, gas thermal, coal thermal and renewable energy. Considering the fact that the gas thermal can start generating electricity with shorter development period compare to other methods, it is expected to be a preferable generation method for Myanmar, as to respond to increasing demand.

1.1.2. Project Context

JICA conducted a Feasibility Study for Kyaukse Gas Combined-Cycle Power Plant Construction Project (the Project) as a Japanese loan project. The Project includes 300 MW gas combined cycle thermal power plant, modification of Belin substation, related transmission equipment, water intake and discharge pipeline, natural gas pipelines and electricity cable.

- Site for the power plant is next to Belin substation, Kyaukse City, Mandalay Region, Myanmar. Currently, the site is owned by MOEE.
- Commencement date of the surveys/works is May 2018.
- The Project proponent is Electric Power Generation Enterprise, Ministry of Electricity and Energy (EPGE).

Address: Building No. (27), Nay Pyi Taw, The Republic of the Union of the Myanmar

Phone Number: 067-8104282

E-mail: gtceoffice@gmail.com

Contact Person: U Soe Win

1.1.3. Related Projects and Developments

IPP project named Kyaukse 135MW Gas Engine Power Plant has recently started near the project site, which aims to supply electricity before starting operation of the Project. IPP project site is owned by MOEE and locates about 250 m west from the Project site. Duration of the IPP project will be from year 2019 to 2024, whereas the Project aims to operate from year 2025.

1.2. Presentation of Environmental and Social Experts

EIA Study Team consists of experts, mainly from the Nippon Koei Co., Ltd., (NK) of Tokyo, Japan in association with Myanmar Koei International Ltd. (MKI) and Resource & Environment Myanmar Co., Ltd. (REM). Table 1.2-1 shows members of the EIA Study Team.

Contact information of Nippon Koei:

Address: 1-14-6, Kudankita, Chiyoda-ku, Tokyo 102-8539, Japan

Phone Number: 81-3-3238-8030

E-mail: tanaka-sn@n-koei.jp

Contact Person: Shinji Tanaka

Table 1.2-1 Members of EIA Study Team

Organization	Name of Expert	Position	Background	Years of Experience
Nippon Koei Co., Ltd.	Ryosuke Ogawa	Team Leader	B.A (Forestry)	15 years
	Shinji Tanaka	Environmental Expert	B.E (Civil Engineering)	26 years
	Satoshi Miyaichi	Environmental Expert	M.E (Civil Engineering)	15 years
	Tomoko Ota	Social and Health Expert	MA Environment, Development and Policy	12 years
Myanmar Koei International Ltd.	Thin Thin Nwe	Environmental and Social Expert	Ph.D (Energy and Environment Science)	7 years
	Ni Lar Wynn	Environmental Expert	Ph.D (Environmental Engineering)	10 years
	Zin Win Mar	Public Relations Expert	M.E (Chemical Engineering)	1 year
Resource & Environment Myanmar Co., Ltd.	Zaw Naing Oo	Environmental Expert	M.Sc. (Geology)	16 years
	Thura Aung	Environmental Expert	M.Res. (Geology)	9 years
	Soe Yu Tun	Environmental Expert	B.Sc. (Geology)	7 years
	Chan Thar	Environmental Expert	B.Sc. (Geology)	4 years
	De Hlaing Zaw	Environmental Expert	M.Res. (Geology)	4 years
	Myo Thura	Environmental Expert	B.Sc. (Geology)	3 years
	Thet Naing Aung	Environmental Expert	B.Sc. (Zoology)	9 years
	Nyan Linn Maung	Environmental Expert	B.Sc. (Microbiology)	6 years
	Myat Ko Ko Hein	Environmental Expert	B.Sc. (Forestry)	5 years
	Wai Phyo Han	Environmental Expert	M.Sc. (Environmental Planning & Management)	3 years
	Naing Naing Win	Environmental Expert	M.Sc. (Zoology)	9 year
	Than Than Htay	Environmental Expert	M.Sc. (Zoology)	5 years
	Myat Thet Khaing	Environmental Expert	M.Res. (Zoology)	3 years
	Swe Wut Hmone	Environmental Expert	M.Sc. (Botany)	3 years
	Khin Ohnmar Htwe	Social Expert	M.A. (Geography)	10 years
	Nan Thazin Oo	Social Expert	B.A. (Geography)	7 years
	Kyaw Zin Win	GIS Expert	M.Sc. (Geographic Information Science & Systems)	18 years

Source: EIA Study Team

1.3. Project Proponent's Commitments

EPGE as the project proponent shall make the following two commitments.

- Implement the project in accordance with the EIA report.
- Implement the project in accordance with the concerned laws and regulations in Myanmar and Japan International Cooperation Agency (JICA) Guidelines for Environmental and Social Considerations (2010).

1.4. Structure of the EIA Report

This EIA report for the Project is prepared in accordance with the EIA Procedure (29 December 2015) in Myanmar, and also in reference to General Environmental Impact Assessment Guideline (Version 3) (September 2017). The structure of the report is shown in Table 1.4-1.

Table 1.4-1 Structure of EIA Report

Report Section	Key Contents
Executive Summary	Brief description of the project components and their environmental and social setting Summary of the key potential impacts Summary of environmental management plan
Introduction	Outline of the Project including the project proponent and EIA study team Structure of EIA report
Policy, Legal and Institutional Framework	Corporate environmental and social policies Myanmar policy and legal framework applicable to the Project International conventions and treaties relevant to the Project Myanmar Government institutional framework International policies, guidelines and standards
Project Description	Description of the Project and its objectives Description of the project size, installations, technology, infrastructure, use of materials and resources and generation of waste and emissions together with overview maps and site layout maps for the Project Methodology for alternative study Description of each alternative with evaluation of all major potential environmental and social impacts Reasons for selection of the preferred alternative
Description of the Surrounding Environment	Description of the administrative, physical, biological, social, economic, cultural and visual characteristics of the wider area surrounding the Project site, including the result of field survey Sensitive environmental, social, cultural and visual features within the study area
Impact and Risk Assessment and Mitigation Measures	Identification and assessment of environmental (including climate change) and social impacts Determination of mitigation measures
Cumulative Impact Assessment	Identifying other development projects to be concerned Assessment by project phase Management framework for cumulative impacts
Summary of Environmental Management Plan	Responsible organization Management procedures Management and monitoring plan Budget
Public Consultations and Disclosure	Outline of consultations Issues identified by stakeholders Response to comments and recommendations obtained during consultations
Summary of Development Plan	Compensation plan Public participation plan
Appendixes	Result of public consultation, field survey, etc.

Source: EIA Study Team

1.5. Survey Area

Survey area corresponds to the Area of Influence (AOI) of the Project, which is established in the Scoping report. The AOI of the Project is based on the type of the impact. Main influence area of ambient air quality is defined as 2 km radius from the boundary of power plant. The influence area of air quality is estimated based on simple dispersion model known as Satton's formula, to estimate the downwind distance from the stack to the maximum ground concentration point. The result of estimation showed about 1 km, thus influence area was set to 2 km in order to cover the estimated distance as shown in Figure

1.5-1. Influence area of ambient air quality from pipeline works is not so broad and expected to be within the area of AOI of the noise.

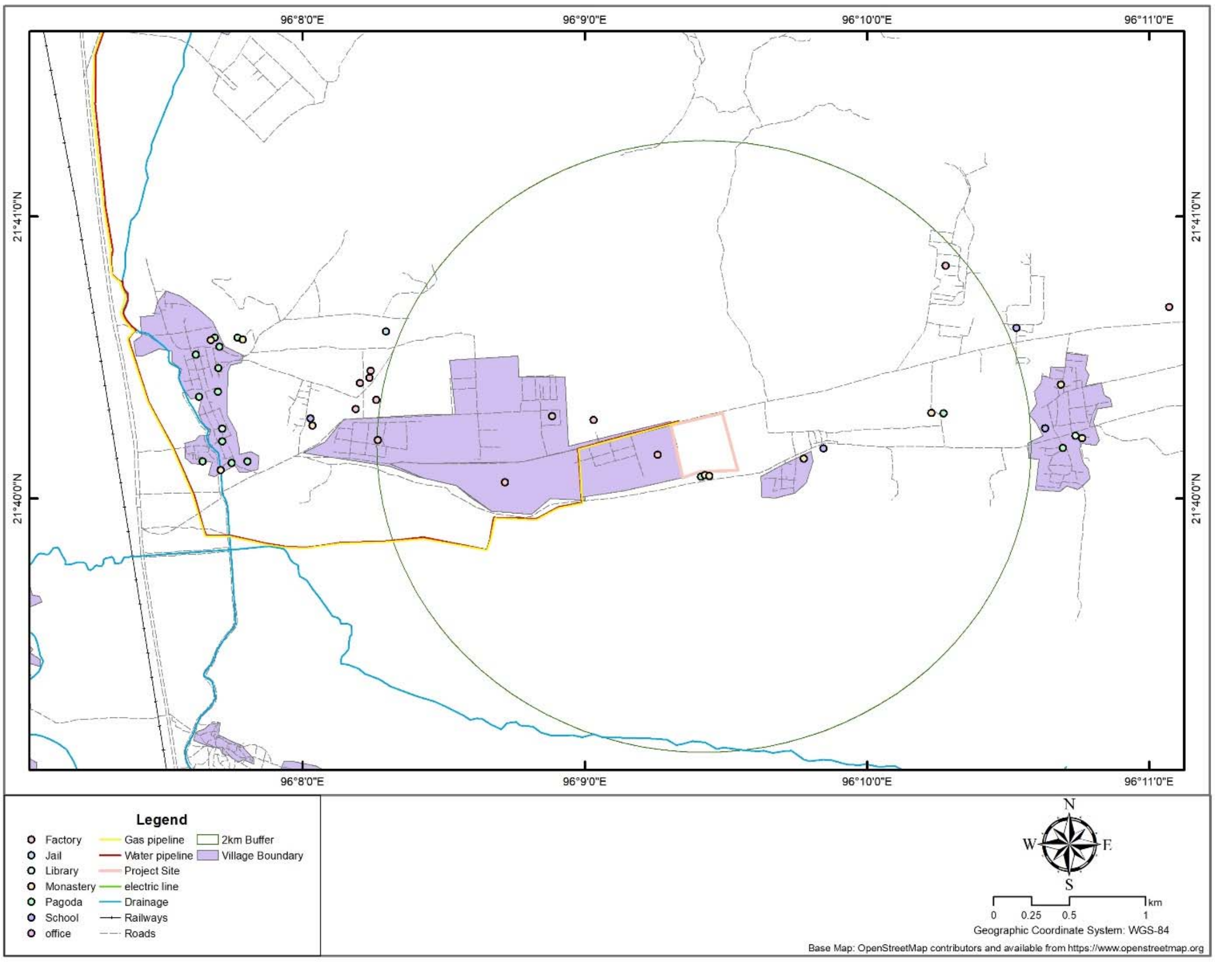
The main AOI of biodiversity impacts is defined as 500 m from the boundary of power plant, based on the experience in Japanese EIA study, which focused on fauna with wide home range as shown in Figure 1.5-2. Influence area of biodiversity from pipeline works is not so broad and expected to be within the area of AOI of the noise.

The AOI of noise is defined 200 m from the Project site boundary and pipelines. The influence area of noise was estimated based on sound attenuation theory. The reduction level of noise at a distance of 200 m from noise source is more than 45 dB, whereas general noise source is around 70 to 90 dB, thus the distance of 200 m from the noise source covers the area which will be considered in the estimation of noise impact as shown in Figure 1.5-3.

The socio-economic impact for the Project is defined to be the area within a 2 km radius of the center of the proposed power plant site and 200 m from the pipelines. This study area is large enough to cope with most potential social impact issues of the Project construction and operation.

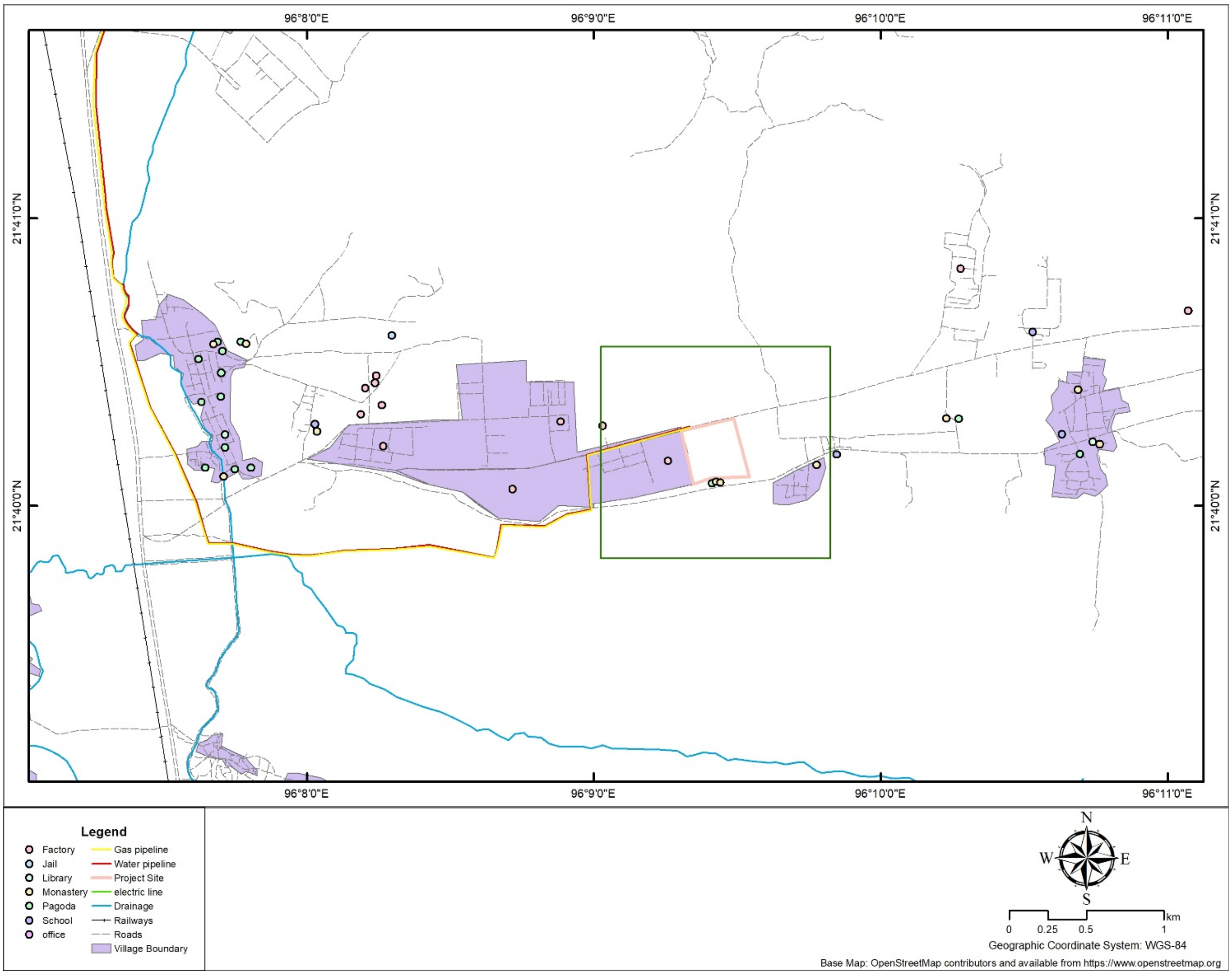
The AOI for the Project consists of the following aspects:

- Construction of power plant and associated infrastructure, switch yard and storage yards.
- Operation of the power plant and associated infrastructure.
- Cooling water intake and discharge (and extent of impacts from the cooling water discharge).



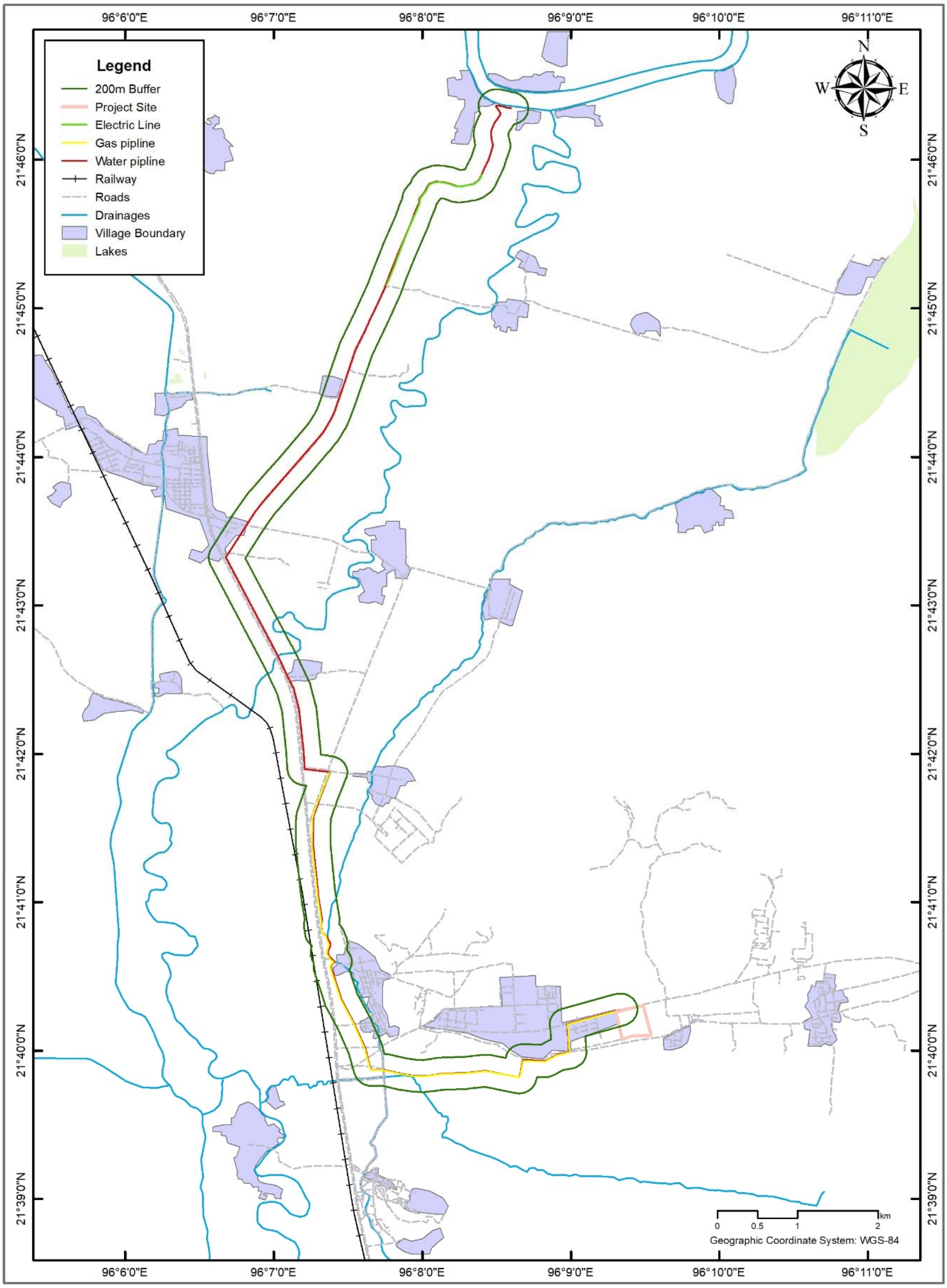
Source: EIA Study Team

Figure 1.5-1 Study Area for Ambient Air and Socio-Economic Impact



Source: EIA Study Team

Figure 1.5-2 Study Area for Biodiversity Impact



Source: EIA Study Team

Figure 1.5-3 Study Area for Noise Impact

CHAPTER 2. POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

2.1. Corporate Environmental and Social Policies

The project proponent is committed to comply with the UN Global Compact which is the largest corporate social responsibility initiative in the world and focuses on the areas of human rights, labour, environment and anti-corruption. The ten principles of UN Global Compact are listed in Table 2.1-1.

Table 2.1-1 Ten Principles of UN Global Compact

Area	Principals	
Human Rights	Principle 1:	Businesses should support and respect the protection of internationally proclaimed human rights; and
	Principle 2:	Make sure that they are not complicit in human rights abuses.
Labour	Principle 3:	Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining;
	Principle 4:	Elimination of all forms of forced and compulsory labour;
	Principle 5:	Effective abolition of child labour; and
	Principle 6:	Elimination of discrimination in respect of employment and occupation.
Environment	Principle 7:	Businesses should support a precautionary approach to environmental challenges;
	Principle 8:	Undertake initiatives to promote greater environmental responsibility; and
	Principle 9:	Encourage the development and diffusion of environmentally friendly technologies.
Anti-Corruption	Principle 10:	Businesses should work against corruption in all its forms, including extortion and bribery.

Source: UN Global Compact

2.2. Overview of National Policy and Legal Framework

For the last 50 years, Myanmar has been isolated from the international community with minimal economic development activities. Thus, Myanmar wants to systematically explore and exploit the various energy resources such as crude oil, natural gas, electricity, coal, and renewable energy, which are the main driving forces for economic development. To manage systematic exploitation of natural resources, national energy policy with short-term and long-term objectives are essential. The energy policy covers comprehensive development objectives including political, economic and social sectors. Myanmar aims to formulate effective development policy and programs in order to achieve sustainable energy supply at an affordable cost. At the same time, measures to minimize negative impacts on environment resulting from the energy resources exploration need to be addressed.

2.2.1. National Energy Policy (2014)

National Energy Policy was developed with the assistance of Asian Development Bank (ADB). Under the policy framework, 7 energy related ministries are cooperating under the National Energy Management Committee. The energy policy directs the pathway towards a comprehensive development program including political, economic and social sectors. The national energy policy aims to systematically explore the available natural resources of the country in order to meet the increasing domestic demand and to export as value added products the surplus resources, which ultimately contribute to sustainable improvement of livelihood of the citizens.

2.2.2. Legal Framework for Energy Sector

The fundamental laws including the Electricity Law, Boiler Law and Myanmar Energy Master Plan are described in the following.

The Electricity Law (2014)

In 2014, the Electricity Law of 1984 was replaced by the new Electricity Law, a comprehensive piece of legislation covering licensing, a new regulatory commission, standards, inspection, tariff, and restrictions. The Electricity Law classifies power generation projects into "small" (up to 10 MW), "medium" (between 10 MW to 30 MW) and large (above 30 MW); the states and regions can issue permits for small and medium power plants. In case these plants are not connected to the national grid, the Union Government Ministry is not the primary authority involved. The authorities have a legal right to use land for the purpose of power plants under the Electricity Law and have the right to expand and maintain their facilities. The law also provides that the authorities can build transmission lines in accordance with existing laws.

The Boiler Law (2015)

The Boiler Law was enacted in 2015 for prevention of the accidents related to the boiler, building up skill resources, and mitigation of the long-term environmental and health impacts generated from boilers. It describes that boilers to be used should meet international requirements.

Myanmar Energy Master Plan (2015)

The 2015 Myanmar Energy Master Plan had been developed by the Asian Development Bank and Myanmar Ministry of Energy in order to analyze and estimate energy demand from 2014 to 2035 based on five supply expansion scenarios. The result was reflected into a national investment strategy in energy sector infrastructure and form the basis for recommendation on institution building for Myanmar's future national energy planning. The plan envisions a 15% - 20% share of renewable energy in 2020 in the total installed capacity, most of which will be used to advance rural renewable energy purposes. The preferred energy scenario shows energy generation mix of 57% hydropower, 30% coal, 8% natural gas and 5% solar and wind by 2030.

Domestically, Myanmar's electricity sector accounts for around 55% to 60% of natural gas consumption. Other major gas users are the government-owned factories (20%), fertilizer plants (7.9%), a compressed natural gas facility (7.2%), and LPG production (0.9%). Industry is the largest single sector in terms of gas uses. Its share in total final consumption was more than 50% until 2011 but has then decreased, to about 40% by 2013.

Myanmar's natural gas is in demand internationally whereas locally, Myanmar's natural gas could potentially be allocated to fertilizer production, as a fuel for the production of refined petroleum products to industry, to the power sector. The existing (and under construction/development) capacity for gas-based power will be about 1,700 MW within a few years, which would consume over 200 mmscfd when simultaneously in operation. Given the relative uncertainty surrounding hydropower development with storage capacity, as reserve capacity needs increase by 2030, and if gas would be used to meet this capacity need, then total gas consumption could reach as high as 1,000 mmscfd. In principle however, power generation could comprise a gas plant capacity of less than 10% in 2030 if light fuel oil was used to fuel fast-acting reserve capacity plant. In this case, the total annual gas consumption by the power sector would be very modest; in 2020 only 18 BCF and in 2030 only 31 BCF.

2.2.3. Legal Framework for Environmental and Social Considerations

2.2.3.1. Environmental and Social Considerations

Environmental Conservation Law (2012)

Environmental Conservation Law (ECL) in Myanmar was prepared by MOECAF and Environmental Conservation and enacted in March 2012. Especially, Article 14 of the law stipulates responsibility of project proponent in environmental conservation. Followed by the law, Environmental Conservation Rules (ECRs) as detailed enforcement regulations for ECL were enacted in June 2014. ECRs stipulate basic policy and concept on EIA application in the development of projects (Article 55). Therefore, the project proponent shall adhere to the following policies based on ECL:

-To treat, emit, discharge, and deposit the substance which causes pollution in the environment in accordance with stipulated environmental standard (Article 14 in ECL).

-To be responsible to carry out activities that contribute to generated cash or in-kind to the relevant combined scheme for the environmental conservation including the management and treatment of waste including liquid, emission, solid (Article 16 (a) in ECL).

The EIA Procedure (2015)

The EIA Procedure formulated by MOECAF in coordination with the Asian Development Bank (ADB) was enacted in December 2015. This EIA Procedure covers the following contents: screening of projects, qualification for conducting the initial environmental examination (IEE)/EIA, categorization of projects for IEE/EIA/environmental management plan (EMP), preparation of IEE/EIA report and EMP, public involvement, procedure on how to get the approval of IEE/EIA report from the Environmental Conservation Department (ECD) under MOECAF, environmental compliance certificate (ECC), and monitoring process after getting the approval of the IEE/EIA report. Responsibility for all adverse impacts, monitoring and inspection by the ministry, relevant government departments and organizations, strategic environmental assessment and administrative punishment are stipulated in the EIA procedures. In addition, required contents of IEE/EIA of project are defined based on the type and size of the project.

National Environmental Quality (Emission) Guidelines (2015)

MOECAF formulated the National Environmental Quality (Emission) Guidelines (NEQG) in coordination with ADB in December 2015. The NEQG determines the guideline values for general emission such as air emissions, wastewater discharge, noise levels, odor, and those for sector-specific emission such as emission from forestry, agribusiness/food production, chemicals, oil and gas, infrastructure, general manufacturing, mining, and power.

The Conservation of Water Resources and Rivers Law (2006)

The aims of the law are as follows: (a) to conserve and protect the water resources and rivers system for beneficial utilization by the public; (b) to enable smooth and safe waterways navigation along rivers and creeks; (c) to contribute to the development of State economy through improving water resources and river system; and (d) to protect from environmental impact. However, this law is under the jurisdiction of MOECAF, as this law puts emphasis on transportation safety and its development. Also, it lacks actual numerical criterion for natural environmental protection.

2.2.3.2. Social

The Social Security Law (2012)

The Social Security Law, enacted in 2012, which amended the Social Security Act in 1954. It stipulates the formation and implementation of social security systems.

2.2.3.3. Forestry/Biodiversity/Agriculture

The Protection of Wildlife and Wild Plants and Conservation of Natural Areas Law (1994)

The objectives of this law are to implement the Government policy for wildlife protection and natural areas conservation, to carry out measures in accordance with the relevant international conventions, to protect endangered species of wildlife and their natural habitats, to contribute to the development of research on natural science, and to protect wildlife by the establishment of zoological/botanical gardens. It prescribes the formation of the committee for protection of wildlife and natural areas with its function and duties, the determination of natural areas and endangered species of wild animal which are to be protected.

2.2.3.4. Land Use

Overview of Legal System on Land Acquisition and Resettlement of Myanmar

Even though relevant laws and regulations in Myanmar have been developed as listed in Table 2.2-1, it can be evaluated that currently there is no law comprehensively stipulating land acquisition and resettlement regulations in Myanmar except EIA Notification (2015) of which the Article 7 stipulates as follows.

- Article 7. EIA Procedure does not address specific matters in relation to resettlement. Projects involving resettlement shall additionally comply with separate procedures issued by responsible ministries, and in the absence of such procedures, all such projects shall adhere to international best practice on involuntary resettlement."
- Therefore, the Project will also need to be consistent with international lender's safeguards policies, specifically the IFC Performance Standards (PS) and the JICA Guidelines.
- In addition, the JICA Guidelines, which is consistent with safeguard policies by the World Bank (OP4.12 Annex A Resettlement Plan), should be referred.

Steps for Farmland to be used for Public Purpose

In order to acquire farm land to be used for public purpose, two main steps are required as follows.

- First: the project owner must get approval from a Settlement and Land Record Department under Ministry of Agriculture and Irrigation at relevant township for conversion of land from agricultural land to other purposes.
- Second: the project owner must set compensation price in consultation with a compensation committee organized by General Administration Department (GAD) at relevant township.

Relevant laws and regulations

Relevant laws and regulations related to land tenure, land use, land acquisition, compensation of assets and losses in Myanmar are summarized in Table 2.2-1.

Table 2.2-1 Relevant Laws and Regulations on Land Acquisition and Resettlement

Law and Regulation	Description
Land Acquisition Act No. 1/1894	The act is still the legal basis for land acquisition which is considered in calculating a suitable amount of compensation. The compensation is to be made as quick as possible for affected person when the land is acquired by the government. Government has authority to acquire the land under this act not only for public purpose but also for business reasons for the companies.
Land Nationalization Act 1953	The act determines nationalization of farmlands and procedures for conversion of farmlands to other purposes (La Na 39), and had been repealed by the Farmland Law 2012.
Forest Law 8/92	The law includes the classification of type of land belonging to Forestry Department. The law supports conservation, sustainable forestry and socio-economic benefits. In addition, the law decentralizes forest management to some degree and encourages the private sector and community participation in forest management.
Union Government Notification No. 39/2011	The notification stipulates the application of right to use land owned by the government, government departments, organization, citizens.
Myanmar Special Economic Zone Law, 2011	The law defines that the developer shall bear the expenses of transferring and compensation of houses, buildings, farms and gardens, orchards/ fields, plantation on land permitted by the central body if these are required to be transferred.
Farmland Law 11/2012	The law introduces the right to use the land to farmers through land use certificate and acquiring the farmland for other purpose.
Farmland Rules 62/2012	The rules detail the eligibility of farmer or organization for the process of acquiring land use certificate, the role and responsibility of farm land committee in various level and the application process of land use certificate. The rules also regulate the requirement of indemnity and compensation to the affected person when it comes to the case of confiscating farms in the interests of the nation.

Law and Regulation	Description
Vacant, Fallow & Virgin Lands Management Law 10/2012	The law stipulates the procedures of claiming unused land into usable lands in form of agriculture, livestock, mining & government allowable other purpose.
Vacant, Fallow & Virgin Lands Management Rules 1/2012	The rules introduce the process of application and approval of the unused land for various purposes.
National Land Use Policy (2016)	The policy is the most updated guidance notes on land acquisition, but no procedures or laws have been defined.

Source: Government of Myanmar and EIA Study Team

2.2.3.5. Heritage

The Protection of Preservation of Cultural Heritage Region Law (1998, Revised 2009)

This law prescribes the determination of cultural heritage regions for protection and preservation so as not to deteriorate in case of natural disaster or manmade destruction.

The Preservation and Protection of Ancient Buildings (Pyidaungsu Hluttaw Law No. 51/2015)

The objectives of this Law are as follows:

(a) to implement the policy of protection and preservation for the perpetuation of ancient monuments;

(b) to protect and preserve ancient monuments so as not to deteriorate due to natural disaster or man-made destruction;

(c) to uplift hereditary pride and to cause dynamism of patriotic spirit by protecting and preserving ancient monuments;

(d) to have public awareness of the high value of ancient monuments;

(e) to protect and preserve ancient monuments from destruction;

(f) to search and maintain ancient monuments;

(g) to carry out in respect of protection and preservation of ancient monuments in conformity with the International Convention and Regional Agreement ratified by the State.

2.2.3.6. Public Health

The Public Health Law (1972)

The law is concerned with protection of people's health by controlling the quality and cleanliness of food, drugs, environmental sanitation, epidemic diseases and regulation of private clinics.

The Prevention and Control of Communicable Diseases Law (1995, revised in 2011)

This law describes functions and responsibilities of health personnel and citizens in relation to prevention and control of communicable diseases. It also describes measures to be taken in relation to environmental sanitation, reporting and control of outbreaks of epidemics and penalties for those failing to comply. The law also authorizes the Ministry of Health to issue rules and procedures when necessary with the approval of the government.

2.2.3.7. Working Environment

The Worker's Compensation Act (1923)

The act stipulates that employer is required to make payments to employees who become injured or who die in any accidents arising during and in consequence of their employment. Such compensation also must be made for diseases, which arise as a direct consequence of employment, such as carpal tunnel syndrome.

The Factory Act (1951)

The act stipulates the work condition of the workers in the factory such as working hours, worksite safety and health measures. According to the act, worker at the age of 18 or over shall not work longer than 8 working hours per day or 44 hours per week, and the working days shall not exceed 6 days per week. As for worksite safety, the factory shall be kept clean with proper ventilation, light and heat and the workspace shall be situated away from drains, latrines or other things which create a bad or unhealthy smell.

The Labour Organization Law (2011)

The Labour Organization Law replaced the Trade Union Act enacted in 1927 for protecting the rights of the workers, having good relations among the workers or between the employer and the worker, and formation and carrying out of the labour organizations systematically and independently. Under the law, the labour organization has the right to freely drawing up their constitution and rules. It has the right to negotiate and settle with the employer if the workers are unable to obtain the right of the workers contained in the labor laws. On the other hand, the employer shall recognize the labour organizations and assist as much as possible if the labour organizations request for help for the interest of his workers.

The Minimum Wage Law (2013)

The minimum wage law, passed in March 2013, replaced the 1949 Minimum Wage Act. The law provides a framework for minimum wage determination: the presidential office established a tripartite minimum wage committee to decide minimum wage with industrial variation based on a survey on living costs of workers possibly every two years. This also stipulates equal payment.

Occupational Safety and Health Law (2019)

The law stipulates that the employers or entrepreneurs shall be responsible to improve the productivity and health of workers by preventing the occurrence of occupational accidents and diseases by:

- providing the sufficient number of personal protective clothing, materials and facilities prescribed and approved by the department on free of charge basis and cause workers to wear them while working, and a clinic, appoint the registered doctors and nurses and provide medicines and supporting equipment.
- prescribing the precautionary plans for emergency and occupational safety and health instructions, danger signs, notices, posters and signage for directions in accordance with stipulations.
- arranging to prevent any persons in the workplace from occupational safety and health risks occurred due to materials, machines or wastes used in the workplace or process.

2.2.3.8. Emergency

The Natural Disaster Management Law (2013)

The Natural Disaster Management Law was enacted to implement natural disaster management programmes systematically and expeditiously in order to reduce disaster risks; to form the National Committee and Local Bodies in order to implement natural disaster management programmes systematically and expeditiously; to coordinate with national and international government departments and organizations, social organizations, other non-government organizations or international organizations and regional organizations in carrying out natural disaster management activities; to conserve and restore the environment affected by natural disasters; to provide health, education, social and livelihood programmes in order to bring about better living conditions for victims.

2.2.3.9. Myanmar Protected Areas

The first legal instrument related to protected areas, which designated a wildlife sanctuary in the environs of the Royal Mandalay City, was promulgated in 1859. The first piece of wildlife legislation to be enacted was the Wild Elephant Protection Act of 1879. The Forest Act of 1902 gave responsibility for wildlife

management to the Forest Department. Legislation specific to wild animals followed in 1927, and broader legislation followed nine years later with the Wildlife Protection Act of 1936. This provided for designation of wildlife sanctuaries with species-specific conservation objectives. Legislation was revised in 1994 with issue of the Protection of Wildlife and Wild Plants and Conservation of Natural Areas Law. The 1994 Law, which was issued by the State Law and Order Restoration Council, provides for:

- A Committee for the Protection of Wildlife and Wild Plants and Conservation of Natural Areas, which is to serve as an advisory body to the Minister of Forestry; supervise implementation of the Law; give guidance in matters of research, conserving species in danger of extinction and international cooperation
- Categories of 'natural areas' and zoological and botanical gardens, their declaration and uses

Categories of protected wild animals (almost the same as provided for under earlier law): completely protected, normally protected and seasonally protected:

- Hunting licenses
- Establishment of zoological and botanical gardens
- Registration of ownership of completely protected animals or trophies thereof
- Administrative actions
- Appeals
- Offences and penalties

The categories of so-called 'natural areas' are defined in the Law described above as:

- Scientific Nature Reserve
- National Park
- Marine National Park
- Nature Reserve
- Wildlife Sanctuary
- Geo-Physically Significant Reserve
- Other Nature Reserve Determined by the Minister

2.2.4. International Conventions, Treaties and Agreement

Myanmar is one of the parties signed more than 30 international and regional conventions and protocols. For the laws related to the present project refer to Table 2.2-2 for details.

Table 2.2-2 Myanmar's Commitment to International Agreements on Environmental Issues

No.	International Environmental Conventions/ Protocols/ Agreements	Date of Signature	Date of Ratification	Date of Member	Cabinet Approval Date
Regional					
1	ASEAN Agreement on Transboundary Haze Pollution	10/6/2002	13-3-2003 (Ratification)		7/2003 27-2-03
International					
1	United Nations Framework Convention on Climate Change, New York, 1992 (UNFCCC)	11/6/1992	25-11-1994 (Ratification)		41/94 9-11-94

No.	International Environmental Conventions/ Protocols/ Agreements	Date of Signature	Date of Ratification	Date of Member	Cabinet Approval Date
2	Vienna Convention for the Protection of the Ozone Layer, Vienna, 1985		24-11-1993 (Ratification)	22-2-1994	46/93
3	Montreal Protocol on Substances that Deplete the Ozone Layer, Montreal, 1987		24-11-1993 (Ratification)	22-2-1994	46/93
4	London Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer, London, 1990		24-11-1993 (Ratification)	22-2-1994	46/93
5	Convention on International Trade in Endangered Species of Wild Fauna and Flora, Washington, D.C., 1973; and this convention as amended in Bonn, Germany,1979 (CITES)		13-6-1997 (Accession)	11-9-1997	17/97 30-4-97
6	Kyoto Protocol to the Convention on Climate Change, Kyoto, 1997		13-8-2003 (Accession)		26/2003 16-7-03

Source: NBSAP Myanmar

2.2.5. JICA Guidelines for Environmental and Social Considerations

The Project is expected to be funded by JICA; therefore, the Project is required to fully comply with the JICA Guidelines for Environmental and Social Considerations (April 2010) (hereinafter referred to as “the JICA Guidelines”).

The objectives of the JICA Guidelines are to encourage project proponents to have appropriate consideration for environmental and social impacts, as well as to ensure appropriate information disclosure to the public. According to the JICA Guidelines, the “Environmental and Social Considerations Studies” means studies including socio-economic and natural environment baseline surveys, predicting and evaluating adverse impacts and likely impacts that projects are to cause on the environment and local society, and mitigation measures to avoid and minimize these impacts.

According to the JICA Guidelines, the Project is classified as Category A, which is likely to have significant adverse impacts on the environment and society; hence, information disclosure and consultation with stakeholders are mandatory to be held in the course of the EIA study of the Project. On the other hand, some significant gaps were found between relevant regulations of land acquisition and JICA Guidelines in terms of mandates such as sufficient compensation in replacement cost, and support for project-affected peoples (PAPs), preparation of action plan, consultations with PAPs, and appropriate and accessible grievance mechanisms, which have not been regulated in Myanmar. Therefore, the Project will be implemented by filling in the gaps between the JICA Guidelines and the relevant regulations in Myanmar. Regarding EIA, some small gaps were found between relevant regulations and JICA Guidelines in terms of responsibilities such as information disclosure of monitoring results.

2.3. Institutional Framework

2.3.1. Government Institutional Framework

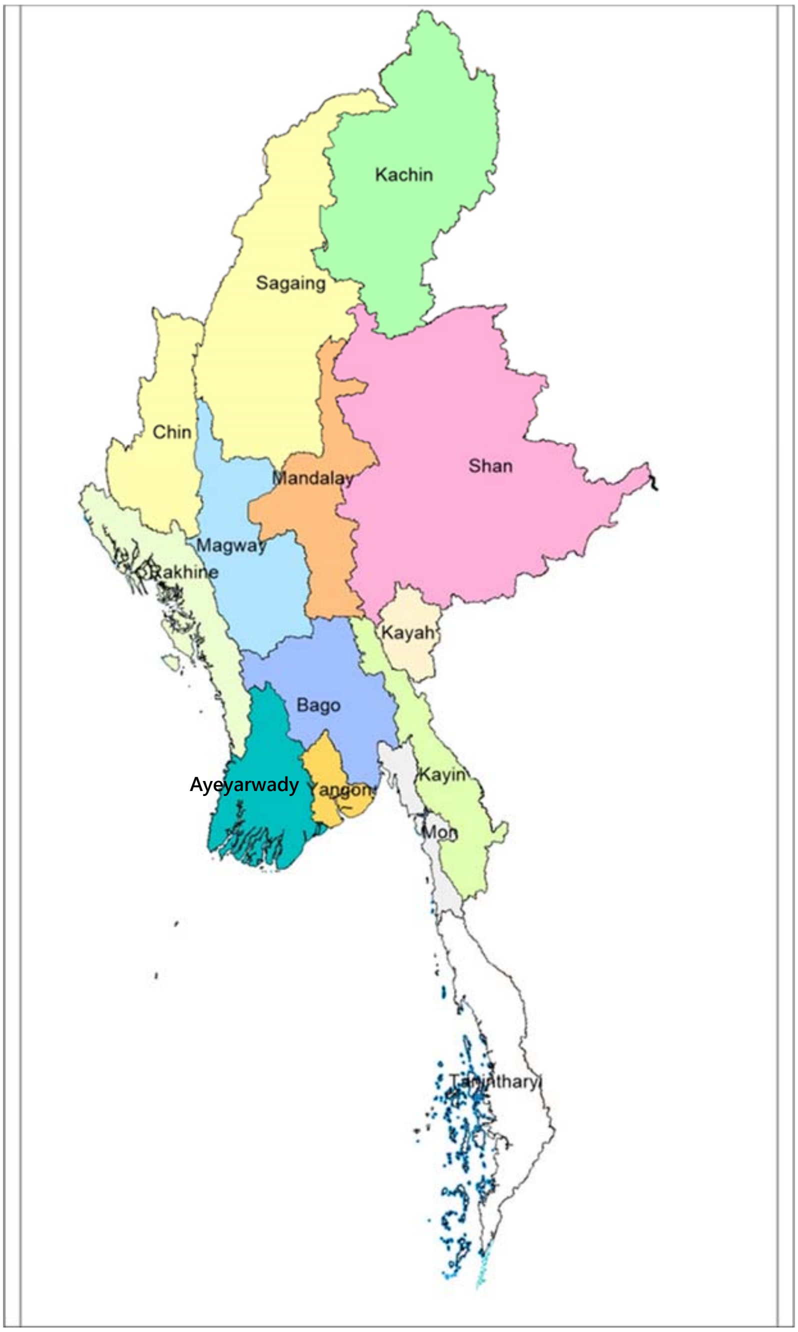
Under the 2008 Constitution, the Union of the Republic of Myanmar is composed of seven States and seven Regions (formerly known as Divisions). Total of 41 ethnic minorities live mostly in the seven States along the border of the country, and the ethnic majority Burman/Bamar people live mostly in the seven regions, which, with the exception of Tanintharyi and Sagaing Regions, mainly run through the middle of the country.

Myanmar is divided into seven regions (previously called divisions) (taing) and seven states (pyi-nè), classified by ethnic composition. The seven regions are Ayeyarwady Region, Bago Region, Magway Region, Mandalay Region, Sagaing Region, Tanintharyi Region and Yangon Region; the seven states are Chin State, Kachin State, Kayin State, Kayah State, Mon State, Rakhine State and Shan State. There are

also five Self-administrated zones and a Self-Administrated Division "for National races with suitable population" as shown in Figure 2.3-1.

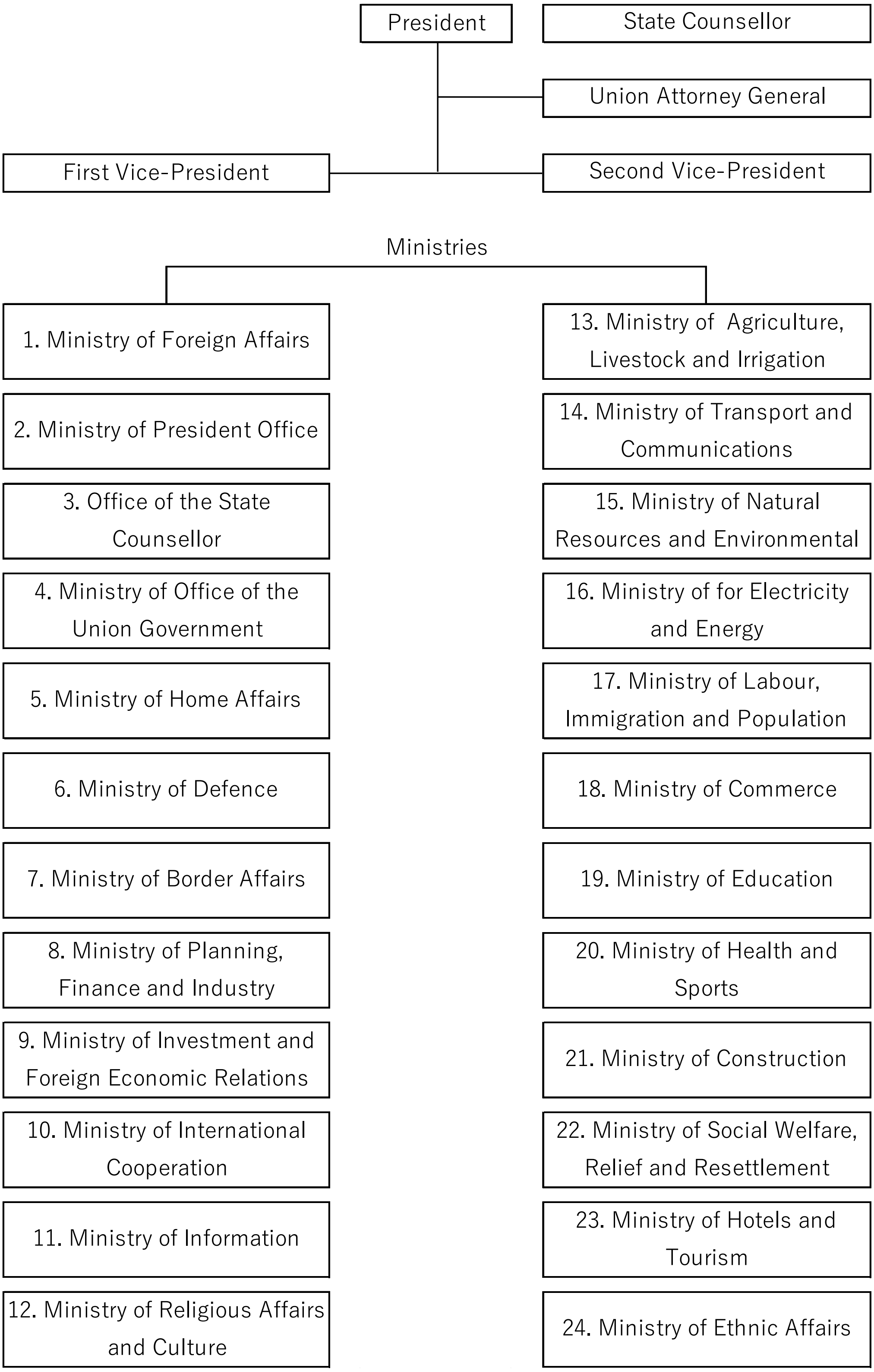
The Constitution provides that “the Union is the ultimate owner of all lands and all-natural resources above and below the ground, above and beneath the water and in the atmosphere in the Union” and therefore sets the approach for the Government’s management of Oil and Gas resources.

In 2016, Myanmar has 21 ministries under the President as of May 2016 and later extended to 24 ministries in 2017. The organization chart of the Myanmar Government is shown in Figure 2.3-2.



Source: EIA Study Team

Figure 2.3-1 States and Regions of the Republic of the Union of Myanmar.



Source: EIA Study Team

Figure 2.3-2 Organization Chart of the Republic of the Union of Myanmar.

2.3.2. Institutional Framework (Energy Sector)

Since the country initiated the move onto the path of democracy, a new civil government was elected in 2010. After the selected government, Ministry of Electricity and Energy (MOEE) was reformed by combining two ministries, Ministry of Electrical Power (MOEP) and Ministry of Energy (MOE). MOEE is the responsible ministry for the power sector. MOEE also has a role on oil and gas for procurement, production, and transportation. MOEE was established in April 2016 under the structural reform of the government, by merging the Ministry of Electric Power and Ministry of Energy.

Under MOEE, there are three departments, two state-owned enterprises, and two corporations in the electricity sector as follows.

<Department>

- Department of Electric Power Planning (DEPP, in charge of planning of electricity generation, transmission, and distribution)
- Department of Hydropower Implementation (DHPI, in charge of construction of new hydropower plants)
- Department of Electric Power Transmission and System Control (DPTSC)

<Enterprises>

- Electric Power Generation Enterprise (EPGE, in charge of operation and maintenance of power plants in Myanmar)
- Electricity Supply Enterprise (ESE, in charge of construction, operation and maintenance for 33kV or lower distribution system except Yangon Region and Mandalay Region)

<Corporations>

- Mandalay Electricity Supply Corporation (MESC, in charge of construction, operation and maintenance for 33kV or lower distribution system in Mandalay Region)
- Yangon Electricity Supply Corporation (YESC, in charge of construction, operation and maintenance for 33kV or lower distribution system in Yangon Region)
- There are one department and three state-owned enterprises in the energy sector as follows.

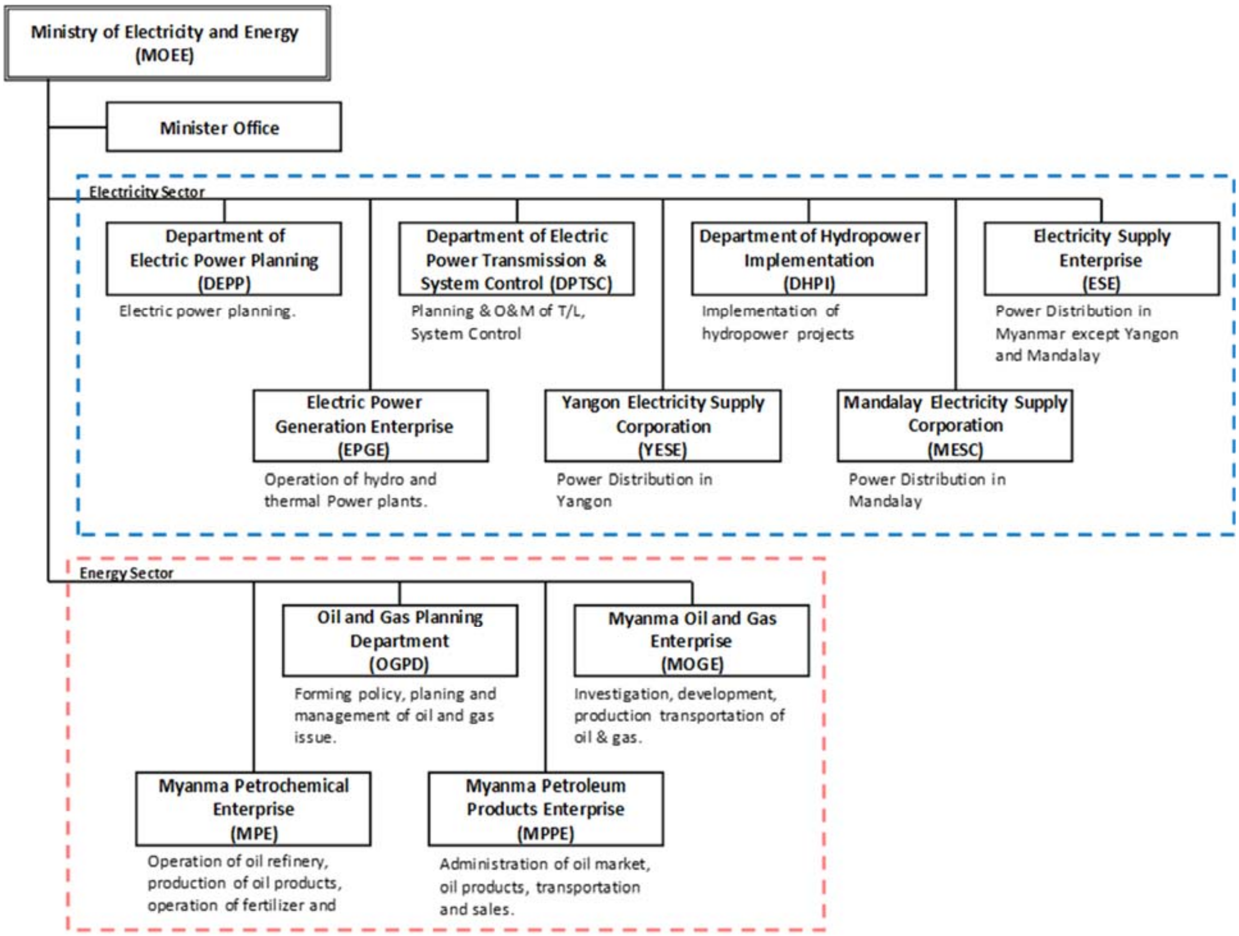
<Department>

- Oil and Gas Planning Department (OGPD, in charge of forming policy, planning and management of oil and gas issue)

<Enterprises>

- Myanma Oil and Gas Enterprise (MOGE, in charge of investigation, development, production and transportation of oil and gas)
- Myanma Petrochemical Enterprise (MPE, in charge of operation of oil refinery, production of oil products, operation of fertilizer and methanol factories)
- Myanma Petroleum Products Enterprise (MPPE, in charge of administration of oil market, oil products, transportation and sales).

The organization of MOEE is shown in Figure 2.3-3.



Source: MOEE and JST

Figure 2.3-3 Organization Chart of MOEE

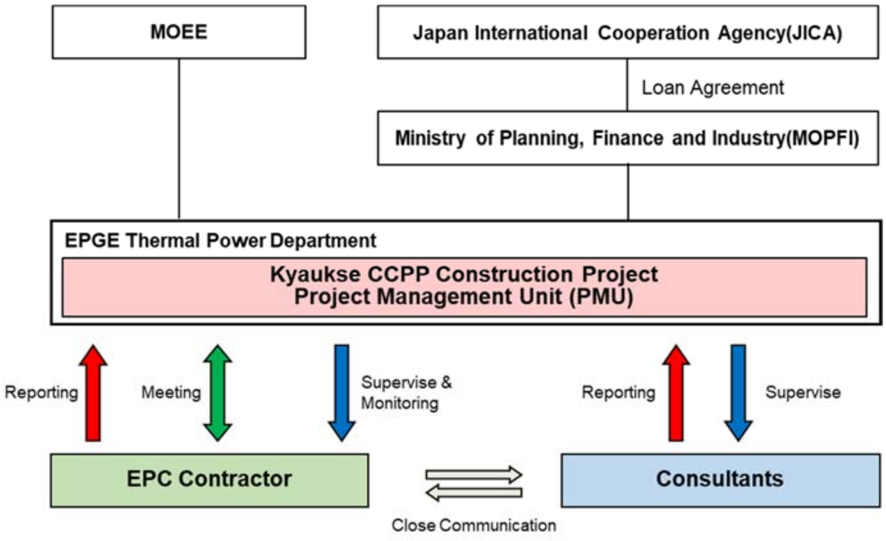
2.3.3. Institutional Framework (Environment and Social)

The leading ministry in-charge of environmental and social considerations is the Environmental Conservation Department of the Ministry of Natural Resources and Environmental Conservation (MONREC), which was reorganized with the former Ministry of Environmental Conservation and Forestry (MOECAF) and Ministry of Mines in April 2016. The MONREC is acting as the main ministry for the preparation of environmental related laws/rules/procedures/policies/guidance, the management of environmental issues, and the development of environmental friendly businesses and sustainable projects in Myanmar.

2.3.4. Organization of the Project

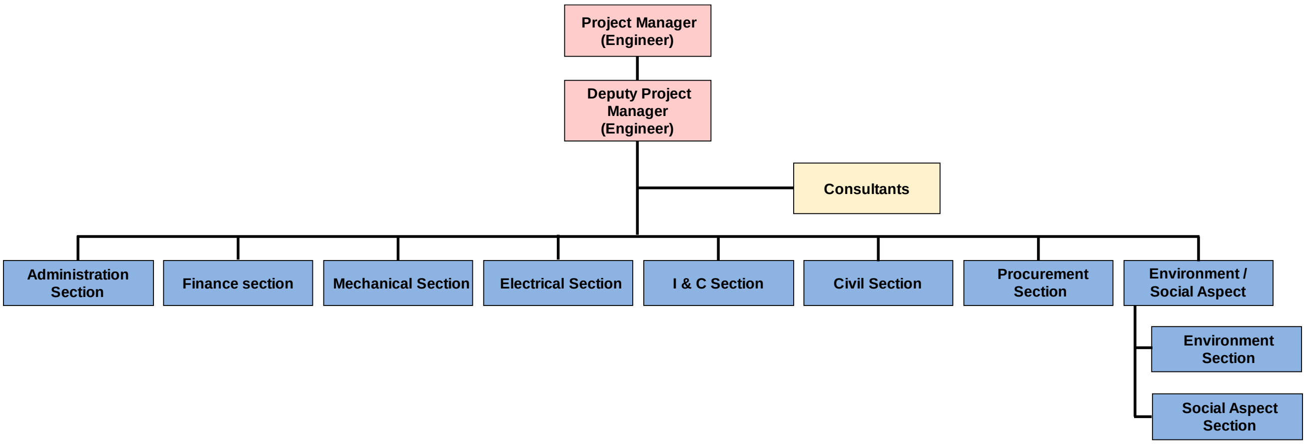
2.3.4.1. Construction Phase

The Project will be implemented by the organization shown in Figure 2.3-4. The Project will be implemented mainly by the Project Management Unit (PMU) established in EPGE. The PMU is organized as shown in Figure 2.3-5. It is considered that class of Chief engineer/Superintendent Engineer/ Senior Engineer will be assigned as the project manager. Finance, Technical Engineers (Mechanical, Electrical, I&C, Civil), Procurement and Environmental experts, selected and dispatched from each department of EPGE, are organized under the Project Manager for the PMU.



Source: Prepared by EIA Study Team

Figure 2.3-4 Project Management Unit for Kyaukse CCPP



Note: I&C : Instrument and Control

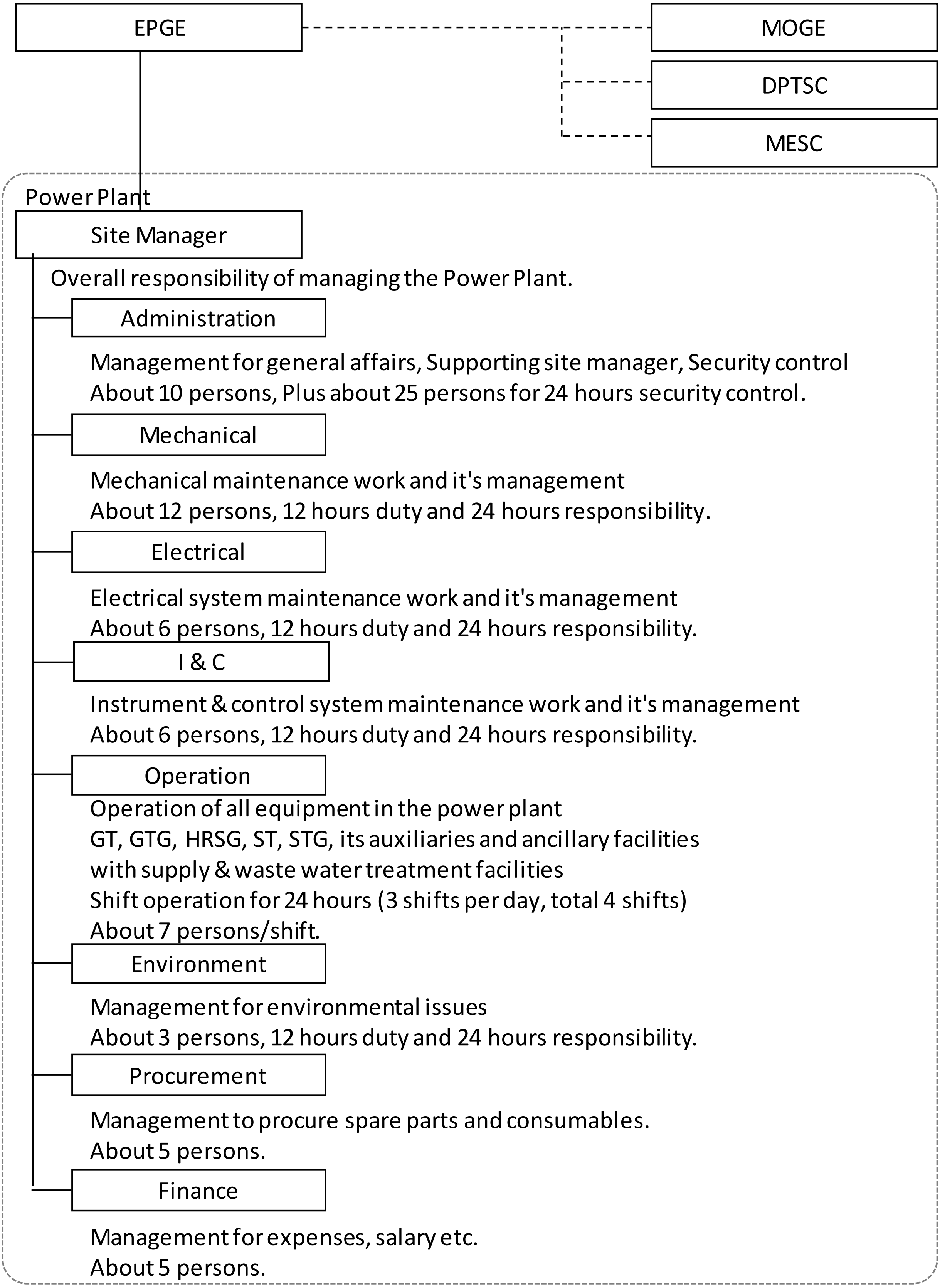
Source: Prepared by EIA Study Team

Figure 2.3-5 Organization of PMU

2.3.4.2. Operation Stage

Organizational structure during operation and maintenance stage for Kyaukse CCPP plant is shown in Figure 2.3-6. The organization for the operation stage shall be established and functioned well by the time of commencement of construction works at the site, in order to familiarize with whole equipment in the power plant.

Regarding other components related to the Project, relevant organization will be responsible for operation and maintenance management. All the relevant responsible organization including construction stage is shown in Table 2.3-1.



Source: EIA Study Team

Figure 2.3-6 Organization of Power Plant for Operation Stage

Table 2.3-1 Responsible Authority at Each Project Stage

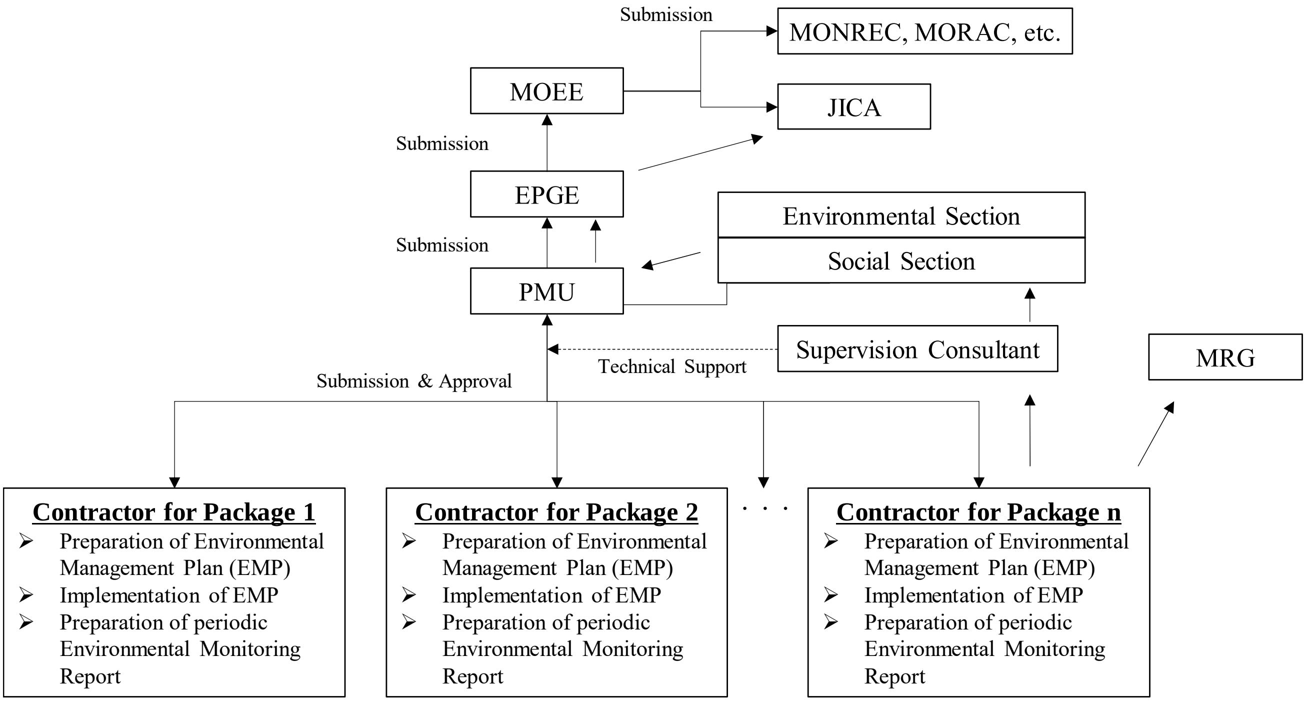
Project Component	Responsible Authority	
	Construction	Maintenance & Operation
Power facility	EPGE	EPGE
Transmission facility	EPGE	DPTSC
Substation (modified in the Project)	EPGE	DPTSC
Gas Pipeline	EPGE	MOGE
Water Pipeline	EPGE	EPGE
Electricity Line (incidental facility to the Water Pipeline)	EPGE	MESC

Source: EIA Study Team

2.3.5. Institutional Framework for Environmental Management

2.3.5.1. Construction Phase

During construction phase, the PMU for the Project is planned to be established in EPGE, in order to carry out the daily management of implementing the Project including overall management on environmental issues during the construction phase. The Project will be divided into some packages for construction, and a contractor will be selected for each package. Environmental monitoring and management during construction phase will be developed and implemented by the contractor of each package in accordance with the Environmental Management Plan, and PMU will supervise the planning and implementation of the Contractor.

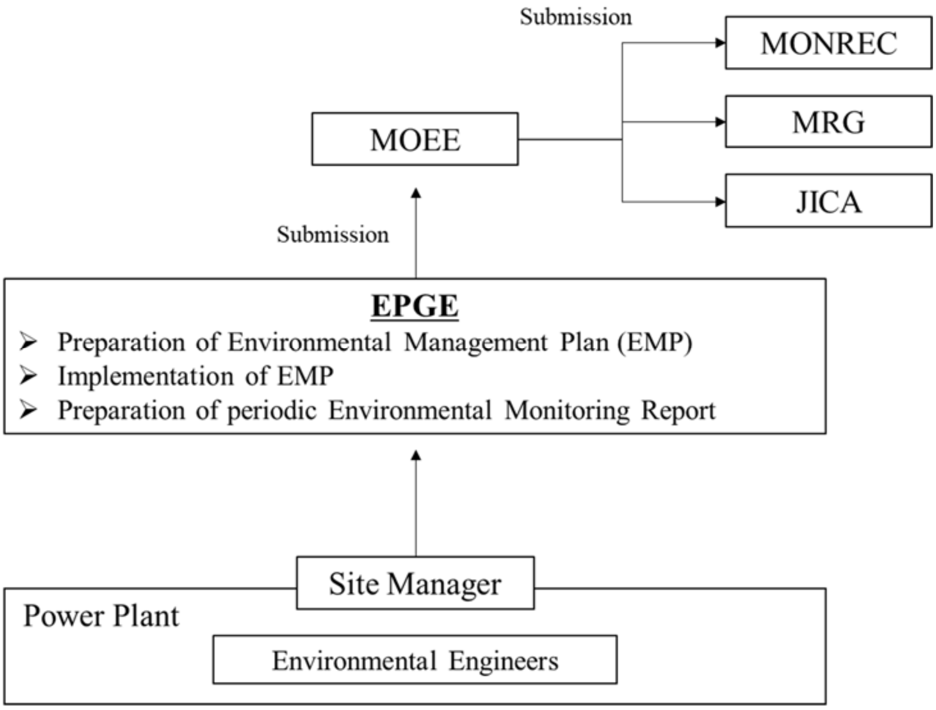


Source：EIA Study Team

Figure 2.3-7 Institutional Structure for Environmental Management in Construction Phase

2.3.5.2. Operation Phase

After the construction phase, each facility will be operated and managed by the responsible organization as explained in Table 2.3-1. Environmental monitoring and management will be implemented by EPGE, in accordance with the Environmental Management Plan to be prepared by EPGE.



Source： EIA study Team

Figure 2.3-8 Institutional Structure for Environmental Management in Operation Phase

2.4. National and International Environmental Guidelines and Standard

2.4.1. Myanmar National Environmental Quality (Emission) Guidelines

Emission guidelines and target values of ambient air quality, air emission, wastewater and noise levels were set in the National Environmental Quality (Emission) Guideline (NEQG) on 29 December 2015 by MONREC.

2.4.1.1. Air Quality

2.4.1.1.1. Air Emissions (Thermal power)

The following guideline applies to combustion processes fueled by gaseous, liquid, and solid fuels and biomass, and is designed to deliver electrical or mechanical power, steam, heat, or any combination of these, regardless of the fuel type (except for solid waste which is covered under the guideline for Waste Management Facilities), with a total rated heat input capacity above 50 MW thermal input on high heating value basis. It applies to boilers, reciprocating engines, and combustion turbines in new and existing facilities as shown in Table 2.4-1.

Table 2.4-1 Air Emission Levels (for Thermal Power)

Combustion Technology / Fuel	Parameter/Guideline Values		
	Particulate matter PM_{10} [a]	Sulfur Dioxide	Nitrogen Oxides
Combustion turbine			
Fuels other than natural gas (unit > 50MW [c])	50 mg/Nm^3 [b]	Use of ≤ 1 % sulfur fuel	310 mg/Nm^3
Natural gas (all turbine types; unit > 50 MW)	-	-	100 mg/Nm^3
Boiler			
Natural gas	-	-	240 mg/Nm^3
Reciprocating engine			
Natural gas	-	-	200 mg/Nm^3

Note: [a] Particulate matter 10 micrometers or less in diameter
[b] Milligrams per normal cubic meter at specified temperature and pressure
[c] Megawatt
Source: National Environmental Quality (Emission) Guidelines, 2015

2.4.1.1.2. Ambient Air

Projects with significant sources of air emissions, and potential of significant impacts to ambient air quality, should prevent or minimize impacts by ensuring that:

a. emissions do not result in concentrations that reach or exceed national ambient quality guidelines and standards, or in their absence, the current World Health Organization (WHO) Air Quality Guidelines[1] for the most common pollutants as summarized below; and

b. emissions do not contribute a significant portion to the attainment of relevant ambient air quality guidelines or standards (i.e. not exceeding 25 percent of the applicable air quality standards) to allow additional, future sustainable development in the same air shed.

Industry-specific guidelines summarized hereinafter shall be applied by all projects to ensure that air emissions conform to good industry practice. Reference should be made to WHO's Air Quality Guidelines for Europe[2] for air pollutants which is not included in Table 2.4-2.

Table 2.4-2 Air Emissions (General Guidelines)

Parameter	Averaging Period	Guideline Value μg/m^3
Nitrogen dioxide	1-year 1-hour	40 200
Ozone	8-hour daily maximum	100
Particulate matter PM_{10}[a]	1-year 24-hour	20 50
Particulate matter $PM_{2.5}$[b]	1-year 24-hour	10 25
Sulfur dioxide	24-hour 10-minute	20 500

Note: [a] Particulate matter 10 micrometers or less in diameter
[b] Particulate matter 2.5 micrometers or less in diameter
Source: National Environmental Quality (Emission) Guidelines, 2015

1 Air quality guidelines global update. 2005. World Health Organization.
2 Air quality guidelines for Europe. 1997. WHO regional publications, European series No. 23. World Health Organization.

2.4.1.2. Water Quality

2.4.1.2.1. Site Runoff and Wastewater Discharges (Construction Phase)

During the construction phase, the following guideline values will be applied to storm water, surface water, and sanitary wastewater discharges from all project sites as shown in Table 2.4-3.

Table 2.4-3 Site Runoff and Wastewater Discharges (Construction Phase)

Parameter	Unit	Maximum Concentration
Biological oxygen demand	mg/L	30
Chemical oxygen demand	mg/L	125
Oil and grease	mg/L	10
pH	S.U. [a]	6-9
Total coliform bacteria	MPN/100 mL	400
Total nitrogen	mg/L	10
Total phosphorus	mg/L	2
Total suspended solids	mg/L	50

Note: [a] Standard Unit
Source: National Environmental Quality (Emission) Guidelines, 2015

2.4.1.2.2. Effluent Levels (Thermal Power)

These guideline values apply to effluents from combustion processes fueled by gaseous, liquid, solid fuels and biomass, and are designed to deliver electrical or mechanical power, steam, heat, or any combination of these regardless of the fuel type (except for solid waste which is covered under the guideline for Waste Management Facilities), with a total rated heat input capacity above 50 MW thermal input on high heating value basis. These apply to boilers, reciprocating engines, and combustion turbines in new and existing facilities as shown in Table 2.4-4.

Table 2.4-4 Effluent Levels (Thermal Power)

Parameter	Unit	Guideline Value
Arsenic	mg/L	0.5
Cadmium	mg/L	0.1
Iron	mg/L	1
Lead	mg/L	0.5
Mercury	mg/L	0.005
Oil and grease	mg/L	10
pH	S.U [a]	6-9
Temperature increase	ºC	<3 [b]
Total residual chlorine	mg/L	0.2
Total suspended solids	mg/L	50
Chromium (total)	mg/L	0.5
Copper	mg/L	0.5
Zinc	mg/L	1

Note: [a] Standard unit
[b] Temperature increase due to discharge of once-through cooling water
Source: National Environmental Quality (Emission) Guidelines, 2015

2.4.1.2.3. Effluent Levels (Waste Water Treatment Facilities)

The guideline values apply to centralized wastewater treatment facilities receiving wastewater from residential, commercial and industrial users. Guideline values are applicable to treated sewage and contaminated storm water before being discharged to surface water as shown in Table 2.4-5.

Table 2.4-5 Effluent Levels (Waste Water Treatment Facilities)

Parameter	Unit	Guideline Value
5-day Biochemical oxygen demand	mg/L	50
Ammonia	mg/L	10

Parameter	Unit	Guideline Value
Arsenic	mg/L	0.1
Cadmium	mg/L	0.1
Chemical oxygen demand	mg/L	250
Chlorine (total residual)	mg/L	0.2
Chromium (hexavalent)	mg/L	0.1
Chromium (total)	mg/L	0.5
Copper	mg/L	0.5
Cyanide (free)	mg/L	0.1
Cyanide (total)	mg/L	1
Fluoride	mg/L	20
Heavy metals (total)	mg/L	10
Iron (total)	mg/L	3.5
Lead	mg/L	0.1
Mercury	mg/L	0.01
Nickel	mg/L	0.5
Oil and grease	mg/L	10
pH	S.U. [a]	6-9
Phenols	mg/L	0.5
Selenium	mg/L	0.1
Silver	mg/L	0.5
Sulphide	mg/L	1
Temperature increase	°C	<3 [b]
Total coliform bacteria	MPN/100mL	400
Total phosphorus	mg/L	2
Total suspended solids	mg/L	50
Zinc	mg/L	2

Note: [a] Standard Unit
[b] At the edge of a scientifically established mixing zone which takes into account ambient water quality, receiving water use, potential receptors and assimilative capacity; when the zone is not defined, use 100 meters from point of discharge.
Source: National Environmental Quality (Emission) Guidelines, 2015

2.4.1.3. Noise

Noise level guidelines applicable to the project are as shown in Table 2.4-6. Noise levels should not exceed those values or result in a maximum increase in background levels of not more than three decibels at the nearest receptor location off-site. Noise prevention and mitigation measures should be taken by all projects where predicted or measured noise impacts from a project facility or operation exceed the applicable noise level guideline at the most sensitive point of reception.

Table 2.4-6 Applicable Noise Level Guidelines

Receptor	One Hour LAeq[a] (dB)	
	Daytime 07:00 - 22:00 (10:00 - 22:00 for Public holidays)	Nighttime 22:00 - 07:00 (22:00 - 10:00 for Public holidays)
Residential, institutional, educational	55	45
Industrial, commercial	70	70

Note: [a] Equivalent continuous sound level in decibels
Source: National Environmental Quality (Emission) Guidelines, 2015

2.4.1.4. Odor[3]

Point and diffuse source odors from industries should be minimized using available prevention and control techniques as described in the IFC EHS industry-specific guidelines. Point source activities are those that involve stack emissions of odor and which generally can be controlled using waste reduction, waste

[3] Industrial odor control. 2002. Environmental guideline No.9, Danish Environmental Protection Agency, Ministry of Environment.

minimization and cleaner production principles or conventional emission control equipment. Diffuse source activities are generally dominated by area or volume source emissions of odor (e.g. intensive agricultural activities), which can be more difficult to control. Project operators should control odors to ensure that offensive or unacceptable odors to neighbors do not occur. Generally, odor levels should not exceed five to ten odorant units at the edge of populated areas in the vicinity of a project. Projects with multiple odorous points, diffuse releases, or complex odors should conduct an odor impact assessment to determine ground-level maximum concentrations considering site-specific factors including proximity to populated areas.

2.4.2. WBG EHS Guidelines for Thermal Power Plants

2.4.2.1. Air Quality

2.4.2.1.1. Air Emissions Guidelines

World Health Organization (WHO) Air Emissions Guidelines as specified in WBG EHS General Guidelines is shown in Table 2.4-7.

Table 2.4-7 WBG Guideline for Air Emission

Combustion Technology/Fuel	Nitrogen Oxide (NOx)	Reference Oxygen Content
Natural gas (all turbine types of Unit >50MWth)	51 mg/Nm^3 (25 ppm)	15%, dry gas

Source: Table 6(B), WBG EHS Guidelines for Thermal Power Plants.

2.4.2.1.2. Ambient Air Quality Guidelines

World Health Organization (WHO) Ambient Air Quality Guidelines as specified in WBG EHS General Guidelines are shown in Table 2.4-8.

Table 2.4-8 WBG Guideline for Ambient Air Quality

Parameter	Averaging Period	Guideline Value in µg/m^3
Sulphur dioxide (SO_2)	24-hour 10-minute	20 500
Nitrogen dioxide (NO_2)	1-year 1-hour	40 200
Particulate matter (PM_{10})	1-year 24-hour	20 50
Particulate matter ($PM_{2.5}$)	1-year 24-hour	10 25

Source: Table 1.1.1, WBG EHS General Guidelines.

2.4.2.2. Water Quality

2.4.2.2.1. Effluent Guidelines for Thermal Power Plant

Table 2.4-9 lists the effluent discharge guideline limits applicable to the facility as per the WBG EHS Guidelines for Thermal Power Plants. These standards apply to the discharge of effluent at the end of the outlet prior to release into the receiving waters.

Table 2.4-9 WBG Guideline for Effluent (Thermal Power Plant)

Parameter	mg/L, except pH and temperature
pH	6-9
TSS	50
Oil and grease	10
Total residual chlorine	0.2
Chromium – Total (Cr)	0.5
Copper (Cu)	0.5

Parameter	mg/L, except pH and temperature
Iron (Fe)	1.0
Zinc (Zn)	1.0
Lead (Pb)	0.5
Cadmium (Cd)	0.1
Mercury (Hg)	0.005
Arsenic (As)	0.5
Temperature increase by thermal discharge from cooling system	Site specific requirement to be established by the Environmental Assessment (EA). Elevated temperature areas due to discharge of once-through cooling water (e.g., 1 Celsius above, 2 Celsius above, 3 Celsius above ambient water temperature) should be minimised by adjusting intake and outfall design through the project specific EA depending on the sensitive aquatic ecosystem around the discharge point.

Source: Table 5, WBG EHS Guidelines for Thermal Power Plants.

2.4.2.2.2. Effluent Guidelines for Wastewater Treatment

Table 2.4-10 lists the effluent discharge guidelines applicable to the facility as per the WBG EHS Guidelines for Wastewater Treatment. These standards apply to the discharge of effluent at the end of the outlet prior to discharge into the water bodies.

Table 2.4-10 WBG Guideline for Effluent (Wastewater Treatment)

Parameter	Units	Guideline Value
pH	pH	6-9
BOD	mg/L	30
COD	mg/L	125
Total Nitrogen	mg/L	10
Total Phosphorous	mg/L	2
Oil and grease	mg/L	10
Total suspended solids	mg/L	50
Total coliform bacteria	MPN [b]/100mL	400 [a]

Note: [a] Not applicable to centralized, municipal, wastewater treatment systems which are included in EHS Guidelines for Water and Sanitation.
[b] MPN = Most Probable Number
Source: Table 1.3.1, WBG EHS Guidelines for Wastewater and ambient water quality.

2.4.2.3. Noise Levels Guidelines

Ambient conditions (beyond the facility boundary): Table 2.4-11 presents the ambient noise level guidelines indicated in the WBG EHS General Guidelines. Noise impact should not exceed the levels presented in Table 2.4-11, or result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site.

Table 2.4-11 WBG Guideline for Ambient Noise Level

Receptor	One Hour LAeq (dB)	
	Daytime (07:00 – 22:00)	Nighttime (22:00 – 07:00)
Residential, institutional, educational	55	45
Industrial, commercial	70	70

Source: Table 1.7.1, WBG EHS General Guidelines.

2.4.3. Japanese Guideline Value Related to Vibration

There is no ambient vibration standard in Myanmar or in Southeast Asia and international organizations such as WHO and IFC. On the other hand, Japan has a set of regulatory standards for vibration regarding specific factory/plant and road traffic under the Vibration Regulation law. The regulatory standards were established by the ordinance of enforcement regulations of vibration regulation law as shown in Table 2.4-12.

Table 2.4-12 Japanese Regulatory Standard Values for Vibration (L_{v10} [a])

Source of Vibration	Receptor	L_{v10} (dB)	
		Daytime (07:00 – 22:00)	Nighttime (22:00 – 07:00)
Road traffic	Residential area (at road side)	65	60
	Industrial, Commercial area (at road side)	70	65
Factory/ Plant	Residential area (at Factory/Plant boundary)	60 to 65	55 to 60
	Industrial, Commercial area (at Factory/Plant boundary)	65 to 70	60 to 65

Note: [a] 10-percentile value of vibration level
Source: EIA Study Team prepared based on vibration regulation law.

2.4.4. Applicable Target Value for the Project

The target value for this project is determined by comparing NEQG and WBG EHS Guidelines. In case gaps was found between NEQG and WBG EHS Guidelines, the stricter standards were selected. For vibration, the Japanese standard is selected as it is not included in the NEQG and WBG EHS Guidelines.

2.4.4.1. Air Quality

2.4.4.1.1. Emission Gas

The target value of emission gas for this project is shown in Table 2.4-13.

Table 2.4-13 Target Value for Emission Gas

Parameter	NEQG	WBG guideline	Target value
NOx	100 mg/Nm^3	51 mg/Nm^3	51 mg/Nm^3

Note: Table 6(B), WBG EHS Guidelines for Thermal Power Plants.
Source:National Environmental Quality (Emission) Guidelines, 2015

2.4.4.1.2. Ambient Air

The target value of ambient air quality for this project is shown in Table 2.4-14.

Table 2.4-14 Target Value for Ambient Air Quality

Parameter	Averaging period	NEQG	WBG guideline	Target value
SO_2	24-hour 10 minutes	20 µg/m^3 500 µg/m^3	20 µg/m^3 500 µg/m^3	20 µg/m^3 500 µg/m^3
NO_2	1-year 1-hour	40 µg/m^3 200 µg/m^3	40 µg/m^3 200 µg/m^3	40 µg/m^3 200 µg/m^3
PM_{10}	1-year 24-hour	20 µg/m^3 50 µg/m^3	20 µg/m^3 50 µg/m^3	20 µg/m^3 50 µg/m^3
$PM_{2.5}$	1-year 24-hour	10 µg/m^3 25 µg/m^3	10 µg/m^3 25 µg/m^3	10 µg/m^3 25 µg/m^3
Ozone	8-hour daily maximum	100 µg/m^3	100 µg/m^3	100 µg/m^3

Note: [a] Particulate matter 10 micrometers or less in diameter
[b] Particulate matter 2.5 micrometers or less in diameter
Source:National Environmental Quality (Emission) Guidelines, 2015
Table 1.1.1, WBG EHS General Guidelines.

2.4.4.2. Water Quality

2.4.4.2.1. Site Runoff and Wastewater Discharges (Construction Phase)

The target values of site runoff and waste water discharges (Construction Phase) is decided by NEQG as shown in Table 2.4-15, as there are no comparable international standards.

Table 2.4-15 Target Value for Site Runoff and Wastewater Discharges (Construction Phase)

Parameter	Unit	NEQG	Target Value
Biological oxygen demand	mg/L	30	30
Chemical oxygen demand	mg/L	125	125
Oil and grease	mg/L	10	10
pH	S.U. [a]	6-9	6-9
Total coliform bacteria	MPN/100 mL	400	400
Total nitrogen	mg/L	10	10
Total phosphorus	mg/L	2	2
Total suspended solids	mg/L	50	50

Note: [a] Standard Unit
Source: National Environmental Quality (Emission) Guidelines, 2015

2.4.4.2.2. Effluent (Thermal power)

The target values of effluent from the thermal power plant is shown in Table 2.4-16.

Table 2.4-16 Target Value for Effluent (Thermal Power)

Parameter	Unit	NEQG	WBG guideline	Target Value
Arsenic	mg/L	0.5	0.5	0.5
Cadmium	mg/L	0.1	0.1	0.1
Iron	mg/L	1	1.0	1
Lead	mg/L	0.5	0.5	0.5
Mercury	mg/L	0.005	0.005	0.005
Oil and grease	mg/L	10	10	10
pH	S.U [a]	6-9	6-9	6-9
Temperature increase	ºC	<3 [b]	-	<3[b]
Total residual chlorine	mg/L	0.2	0.2	0.2
Total suspended solids	mg/L	50	50	50
Chromium (total)	mg/L	0.5	0.5	0.5
Copper	mg/L	0.5	0.5	0.5
Zinc	mg/L	1	1.0	1

Note: [a] Standard unit
[b] Temperature increase due to discharge of once-through cooling water
Source: National Environmental Quality (Emission) Guidelines, 2015
Table 5, WBG EHS Guidelines for Thermal Power Plants.

2.4.4.2.3. Wastewater, Storm Water Runoff, Effluent and Sanitary Discharges

Target values of wastewater, storm water runoff, effluent and sanitary discharges for this project are shown in Table 2.4-17.

Table 2.4-17 Target Value for Wastewater, Storm Water Runoff, Effluent and Sanitary Discharges

Parameter	Unit	NEQG	WBG guideline	Target value
5-day Biochemical oxygen demand	mg/L	50	30	30
Ammonia	mg/L	10	-	10
Arsenic	mg/L	0.1	-	0.1
Cadmium	mg/L	0.1	-	0.1

Parameter	Unit	NEQG	WBG guideline	Target value
Chemical oxygen demand	mg/L	250	125	125
Chlorine (total residual)	mg/L	0.2	-	0.2
Chromium (hexavalent)	mg/L	0.1	-	0.1
Chromium (total)	mg/L	0.5	-	0.5
Copper	mg/L	0.5	-	0.5
Cyanide (free)	mg/L	0.1	-	0.1
Cyanide (total)	mg/L	1	-	1
Fluoride	mg/L	20	-	20
Heavy metals (total)	mg/L	10	-	10
Iron (total)	mg/L	3.5	-	3.5
Lead	mg/L	0.1	-	0.1
Mercury	mg/L	0.01	-	0.01
Nickel	mg/L	0.5	-	0.5
Oil and grease	mg/L	10	10	10
pH	S.U. [a]	6-9	6-9	6-9
Phenols	mg/L	0.5	-	0.5
Selenium	mg/L	0.1	-	0.1
Silver	mg/L	0.5	-	0.5
Sulphide	mg/L	1	-	1
Temperature increase	°C	<3[b]	-	<3
Total coliform bacteria	MPN[d]/100mL	400	400 [c]	400
Total Nitrogen	mg/L	-	10	10
Total phosphorus	mg/L	2	2	2
Total suspended solids	mg/L	50	50	50
Zinc	mg/L	2	-	2

Note: [a] Standard Unit
[b] At the edge of a scientifically established mixing zone which takes into account ambient water quality, receiving water use, potential receptors and assimilative capacity; when the zone is not defined, use 100 meters from point of discharge.
[c] Not applicable to centralized, municipal, wastewater treatment systems which are included in EHS Guidelines for Water and Sanitation.
[d] MPN = Most Probable Number
Source: National Environmental Quality (Emission) Guidelines, 2015
Table 1.3.1, WBG EHS Guidelines for Wastewater and ambient water quality.

2.4.4.3. Noise

The target value of noise for this project is shown in Table 2.4-18.

Table 2.4-18 Target Value for Noise (L_{Aeq} [a])

Receptor	time	NEQG	WBG guideline	Target Value
Residential, institutional, educational	Daytime 07:00 - 22:00	55 dB	55 dB	55 dB
	Nighttime 22:00 - 07:00	45 dB	45 dB	45 dB
Industrial, commercial	Daytime 07:00 - 22:00	70 dB	70 dB	70 dB
	Nighttime 22:00 - 07:00	70 dB	70 dB	70 dB

Note: [a] Equivalent continuous sound level in decibels
Source: National Environmental Quality (Emission) Guidelines, 2015 Table 1.7.1, WBG EHS General Guidelines.

2.4.4.4. Vibration

Japanese vibration standard are adopted for this project as shown in Table 2.4-19.

Table 2.4-19 Target Value for Noise (L_{V10} [a])

Source of Vibration	Receptor	time	NEQG	Japanese standard	Target Value
Road traffic	Industrial, Commercial area (at road side)	Daytime 07:00 - 22:00	-	70 dB	70 dB
		Nighttime 22:00 - 07:00	-	65 dB	65 dB
Factory/ Plant	Industrial, Commercial area (at Factory/Plant boundary)	Daytime 07:00 - 22:00	-	65 dB	65 dB
		Nighttime 22:00 - 07:00	-	60 dB	60 dB

Note: [a] 10-percentile value of vibration level
Source: EIA Study Team prepared based on vibration regulation law.

CHAPTER 3. PROJECT DESCRIPTION

3.1. Presentation of the Project and Description of Alternatives

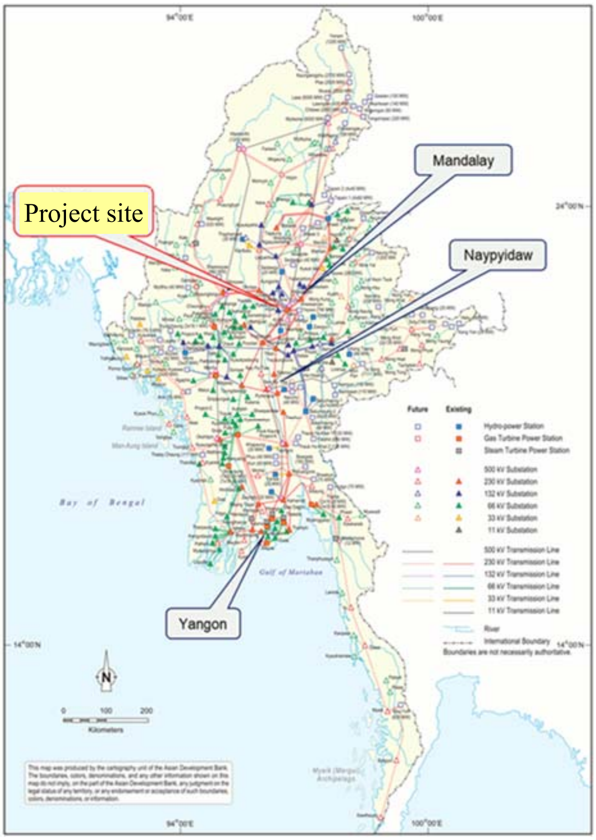
3.1.1. Project Rationale and Background

In recent years, the electricity demand of Myanmar has been growing rapidly because of increasing development activities and investments after drastic transition into ever growing economies. To meet the growing demand for power supply, the Electric Power Generation Enterprise (EPGE), Ministry of Electricity and Energy aims at increasing generation capacity up to 5,700 MW by 2022, whereas the current capacity is 4,600 MW (2019). Furthermore, from the energy security point of view, it is ideal to utilize various energy sources, such as hydro, gas thermal, coal thermal and renewable energy. Since the gas thermal can start generating electricity with shorter development period compared to other methods, it is expected to be a preferable generation method for Myanmar, as to respond increasing demand.

In this context, JICA conducted a Feasibility Study for Kyaukse Gas Combined-Cycle Power Plant Construction Project (the Project) as a Japanese loan project. The Project consists of 300 MW gas combined cycle thermal power plant, modification of Belin Substation, development of related transmission equipment, water intake and discharge pipelines, natural gas pipelines and electricity cable installation. Proposed site for the power plant is next to Belin substation, Kyaukse City, Mandalay Region, Myanmar, which is currently owned by MOEE.

3.1.2. Project Location, Overview Map and Site Layout Maps

Project site is located at Be Lin Village Tract, Sintgaing Township, Kyaukse District, Mandalay Region. It is 30 km southeast from the central area of Mandalay. The project site is adjacent to the existing Belin Substation. The location map is shown in Figure 3.1-1. The land is owned by MOEE and the land has been permitted to be used for power generation.



Source： EIA Study Team prepared from Myanmar Energy Sector Initial Assessment, ADB, October 2012

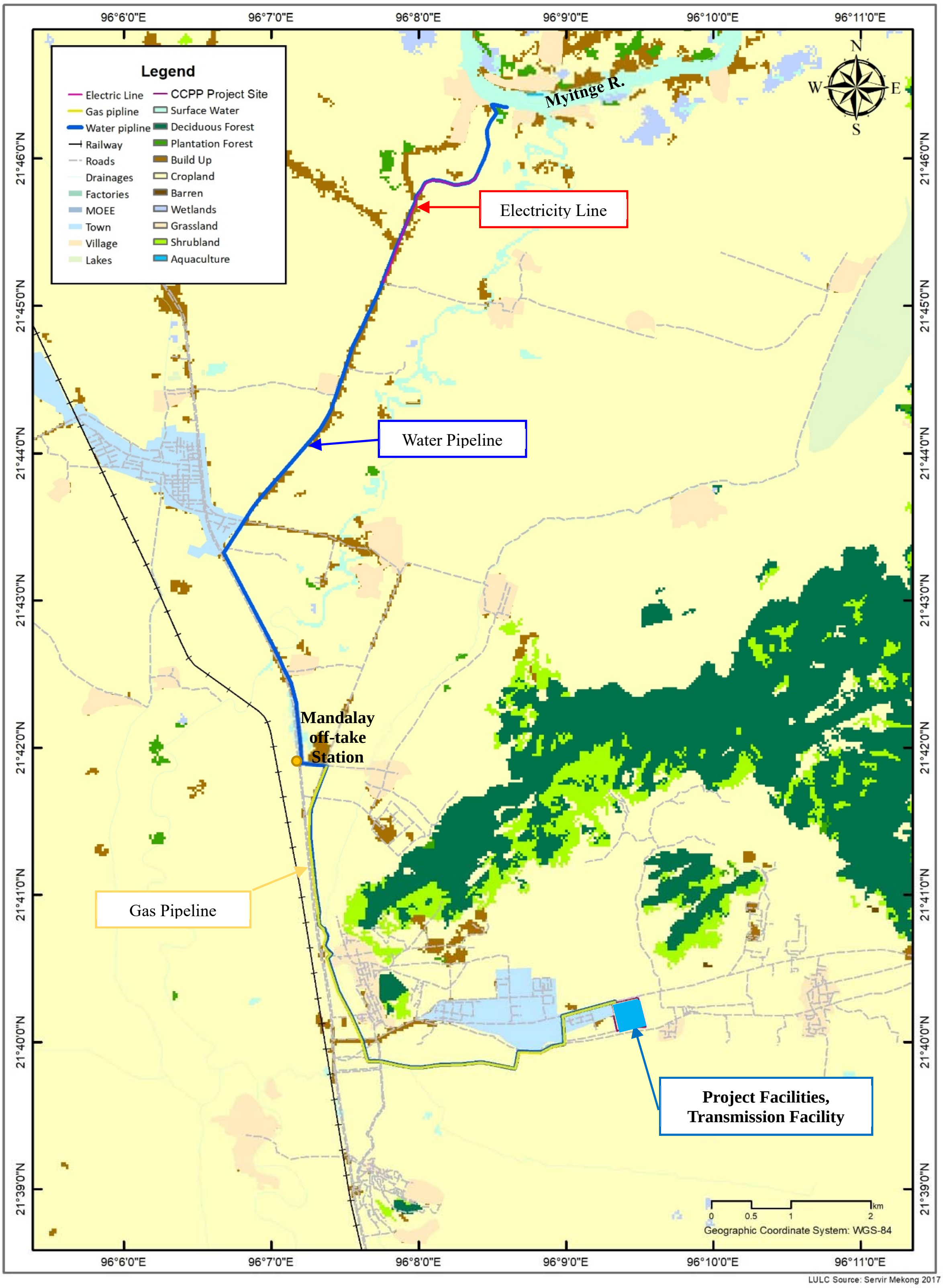
Figure 3.1-1 Location of the Project Site

Generation capacity of the Project is approximately 300 MW. Electricity will be produced by combined cycle of gas turbine. Table 3.1-1 lists the physical components of the Project, which are the target of environmental and social considerations. Layout of these components are shown in Figure 3.1-2.

Table 3.1-1 Physical Components of the Project related to Environmental and Social Considerations

Facilities	Details of the Facility
Power facilities	300 MW Combined Cycle Power Plant 200 MW Gas Turbine 100 MW Steam Turbine Flue gas denitrification facility Natural fuel gas supply system Circulating water treatment facility Wastewater treatment facility Transmission and transformation facility Communication facility
Transmission facility	Underground cables, within the Power facility site, relocation of existing transmission line within the Project site
Gas Pipeline	Underground, Approx. 7.4 km φ16inches x 1
Water Pipelines	Underground, Approx. 17.6 km φ300 ㎜ x 2
Electricity line	Overhead line, Approx. 2.0 km

Source: EIA Study Team



Source: EIA Study Team

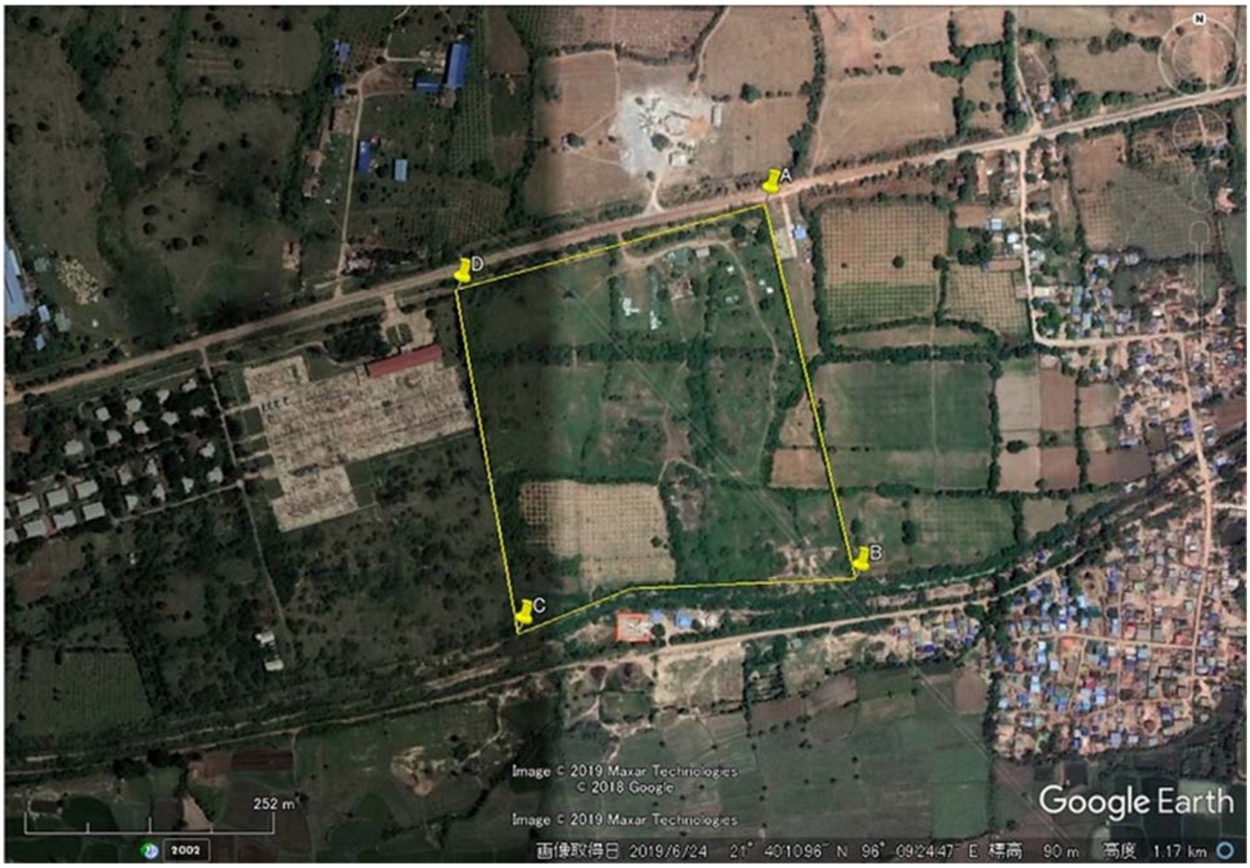
Figure 3.1-2 Location of the Project Facilities

(1) Power facilities

The power generation method is combined cycle system which uses gas turbine and steam turbine. The capacity of generation is approximately 300 MW, which is derived from gas turbine (200 MW) and steam turbine (100 MW).

Generated electricity from the power facilities will be sent to the Belin Substation, which will be expanded under the Project. After that, electricity will be transmitted to the transmission network in Myanmar.

Detail of location is shown in Figure 3.1-3 and Table 3.1-2. Land acquisition is not necessary for the power facility, since the area is owned by MOEE.



Source: EIA Study Team based on the image by Google Earth Pro

Figure 3.1-3 Detail of the Location of Power Facilities

Table 3.1-2 Coordination of the Power Facilities

Point	Latitude	Longitude	Remarks
A	21°40'18.53"N	96° 9'29.41"E	Northeast
B	21°40'6.23"N	96° 9'32.61"E	Southeast
C	21°40'4.48"N	96° 9'20.76"E	Southwest
D	21°40'15.64"N	96° 9'18.61"E	Northwest

Source: EIA Study Team

(2) Transmission facility

There are existing over-head 33 kV transmission line in the project site for power facilities. These lines need to be relocated before the construction of power plant. The relocation will be implemented within the project site for power facilities.

Detail of the location is shown in Figure 3.1-4, Table 3.1-3, and Table 3.1-4. Land acquisition is not necessary for the transmission facilities.

Source: EIA Study Team based on the image by Google Earth Pro

Figure 3.1-4 Detail of the Location of Transmission Line

Table 3.1-3 Coordination of the Existing Transmission Line

Point	Latitude	Longitude	Remarks
A	21°40'13.17"N	96° 9'11.95"E	Start point at Belin substation.
B	21°40'17.99"N	96° 9'13.28"E	
C	21°40'18.35"N	96° 9'18.46"E	
D	21°40'15.48"N	96° 9'22.57"E	
E	21°40'11.43"N	96° 9'26.56"E	
F	21°40'7.30"N	96° 9'30.62"E	
G	21°40'3.06"N	96° 9'34.83"E	

Source: EIA Study Team

Table 3.1-4 Coordination of the Relocated Transmission Line

Point	Latitude	Longitude	Remarks
A	21°40'13.17"N	96° 9'11.95"E	Start point at Belin substation.
B	21°40'17.99"N	96° 9'13.28"E	
C	21°40'18.35"N	96° 9'18.46"E	Between C and D1 is overhead line.
D1	21°40'15.96"N	96° 9'21.92"E	Between D1 and F1 is underground line. Exact latitude/longitude for new tower and underground cable way to be determined at later stage (detail design stage).
E1	21°40'16.56"N	96° 9'23.06"E	same as above.
E2	21°40'16.74"N	96° 9'23.96"E	same as above.
E3	21°40'17.24"N	96° 9'23.84"E	same as above.
E4	21°40'18.17"N	96° 9'29.14"E	same as above.
E5	21°40'6.64"N	96° 9'32.29"E	same as above.
F1	21°40'6.24"N	96° 9'31.66"E	same as above.
G	21°40'3.06"N	96° 9'34.83"E	

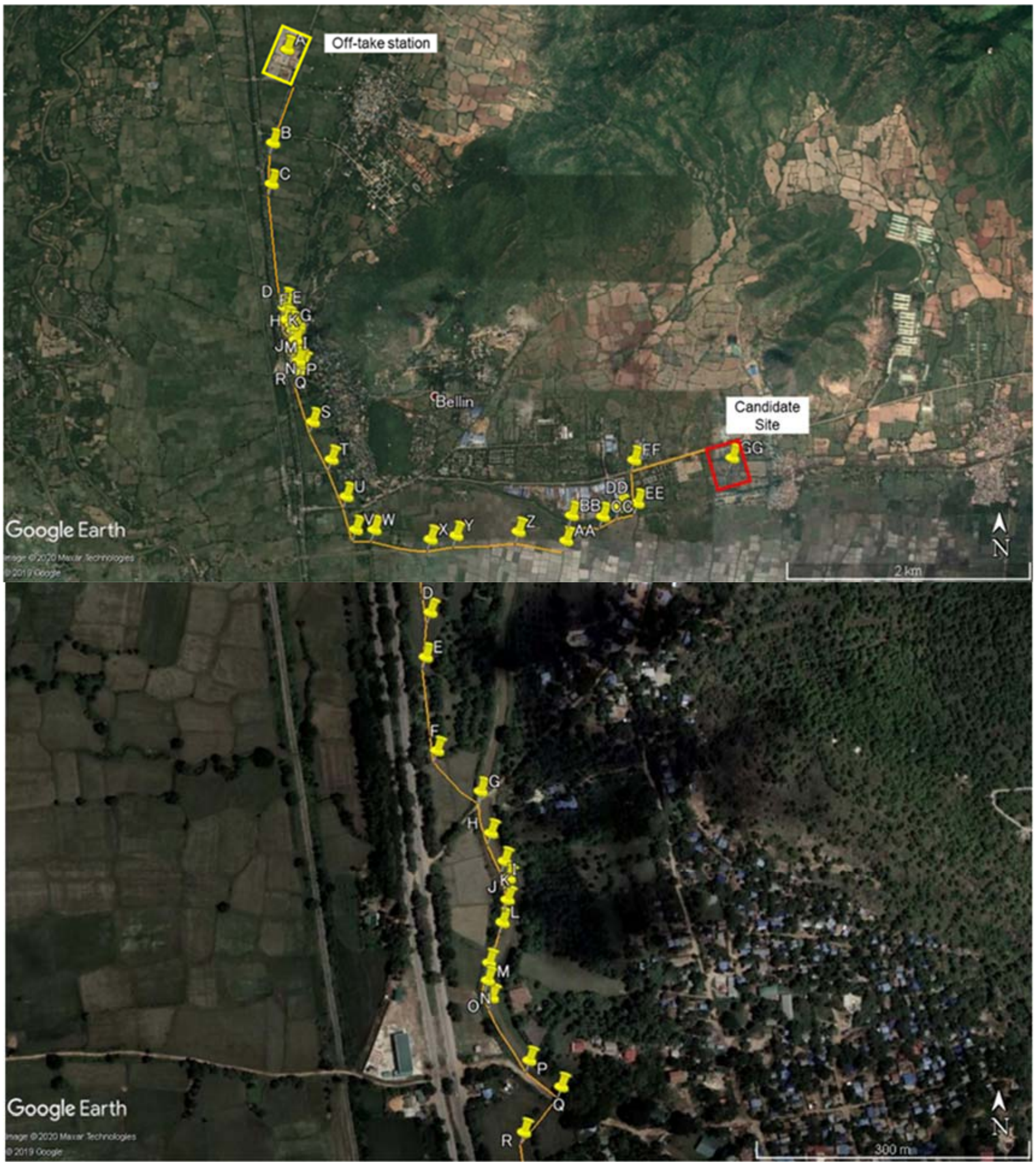
Source: EIA Study Team

(3) Gas pipeline

The fuel gas will be supplied from Mandalay off-take station of Shwe-China gas pipeline. In the Project, new gas pipe line will be installed underground along an existing pipeline which is used for another project. For land clearance plan, if trees cannot be avoided to be cut, tree cut permission will be obtained before commencement of construction. If crops and properties such as structures in private owned land will be affected, compensation will be done based on the A-RAP.

For approval documents for excavation work during the installation of gas pipeline, they will not be necessary at the EIA stage but will be required in basic/detailed design stage.

Detail of the location is shown in Figure 3.1-5 and Table 3.1-5. Land acquisition is not necessary for the gas pipelines, but temporal occupation will be necessary for installing pipeline.



Source: EIA Study Team based on the image by Google Earth Pro

Figure 3.1-5 Detail of the Location of Gas Pipeline

Table 3.1-5 Coordination of the Gas Pipeline

Point	Latitude	Longitude	Remarks
A	21°41'59.34"N	96° 7'19.76"E	Start point at gas pipeline off-take station Exact latitude/longitude for the connection point and connection way to be determined at later stage.
B	21°41'34.61"N	96° 7'15.71"E	
C	21°41'23.74"N	96° 7'15.32"E	
D	21°40'52.48"N	96° 7'19.25"E	
E	21°40'50.90"N	96° 7'19.08"E	
F	21°40'47.59"N	96° 7'19.51"E	
G	21°40'46.15"N	96° 7'21.17"E	
H	21°40'44.68"N	96° 7'21.56"E	
I	21°40'43.68"N	96° 7'22.08"E	
J	21°40'43.07"N	96° 7'22.23"E	
K	21°40'42.30"N	96° 7'22.19"E	
L	21°40'41.51"N	96° 7'22.00"E	
M	21°40'40.09"N	96° 7'21.49"E	
N	21°40'39.47"N	96° 7'21.44"E	
O	21°40'38.86"N	96° 7'21.59"E	
P	21°40'36.66"N	96° 7'23.02"E	
Q	21°40'35.73"N	96° 7'24.23"E	
R	21°40'34.14"N	96° 7'22.82"E	
S	21°40'20.56"N	96° 7'27.09"E	
T	21°40'10.61"N	96° 7'32.37"E	
U	21°40'0.78"N	96° 7'36.66"E	
V	21°39'52.03"N	96° 7'39.32"E	
W	21°39'52.01"N	96° 7'44.59"E	
X	21°39'49.46"N	96° 8'0.60"E	
Y	21°39'50.48"N	96° 8'7.92"E	
Z	21°39'51.52"N	96° 8'25.64"E	
AA	21°39'49.08"N	96° 8'39.24"E	
BB	21°39'55.78"N	96° 8'40.83"E	
CC	21°39'55.49"N	96° 8'49.68"E	
DD	21°39'58.00"N	96° 8'54.36"E	
EE	21°39'59.06"N	96° 8'59.51"E	
FF	21°40'10.45"N	96° 8'58.61"E	
GG	21°40'11.04"N	96° 9'26.54"E	End point at candidate site Exact latitude/longitude for the connection point and connection way to be determined at later stage.

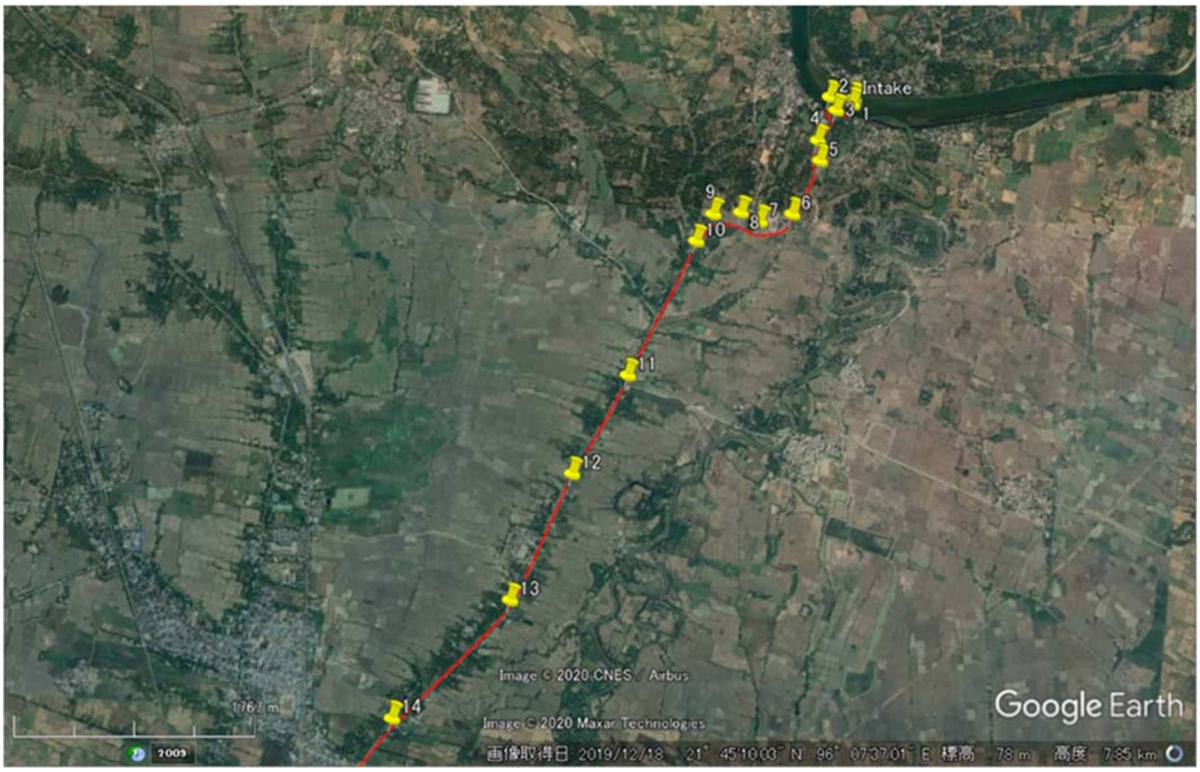
Source: EIA Study Team

(4) Water pipelines

The Project requires the water mainly for the steam turbine. Myitnge River which flows 11 km north of the project site is planned as the water source. The river has enough flow rate for water usage in the Project and the river water is available stably throughout the year. Other than this, there is no available water source near the site. The water transportation route is planned mainly along the existing irrigation canal, road and cultivated land, and the water pipelines will be laid underground. Intake and discharge station will be installed at the river bank as shown in Figure 3.1-6 and Table 3.1-6. Land acquisition is not necessary for the water pipeline and intake facility; however, temporal occupation will be necessary for installing pipeline. For land clearance plan, if trees cannot be avoided to be cut, tree cut permission will be obtained before commencement of construction. If crops and properties such as structures in private owned land will be affected, compensation will be done based on the A-RAP.

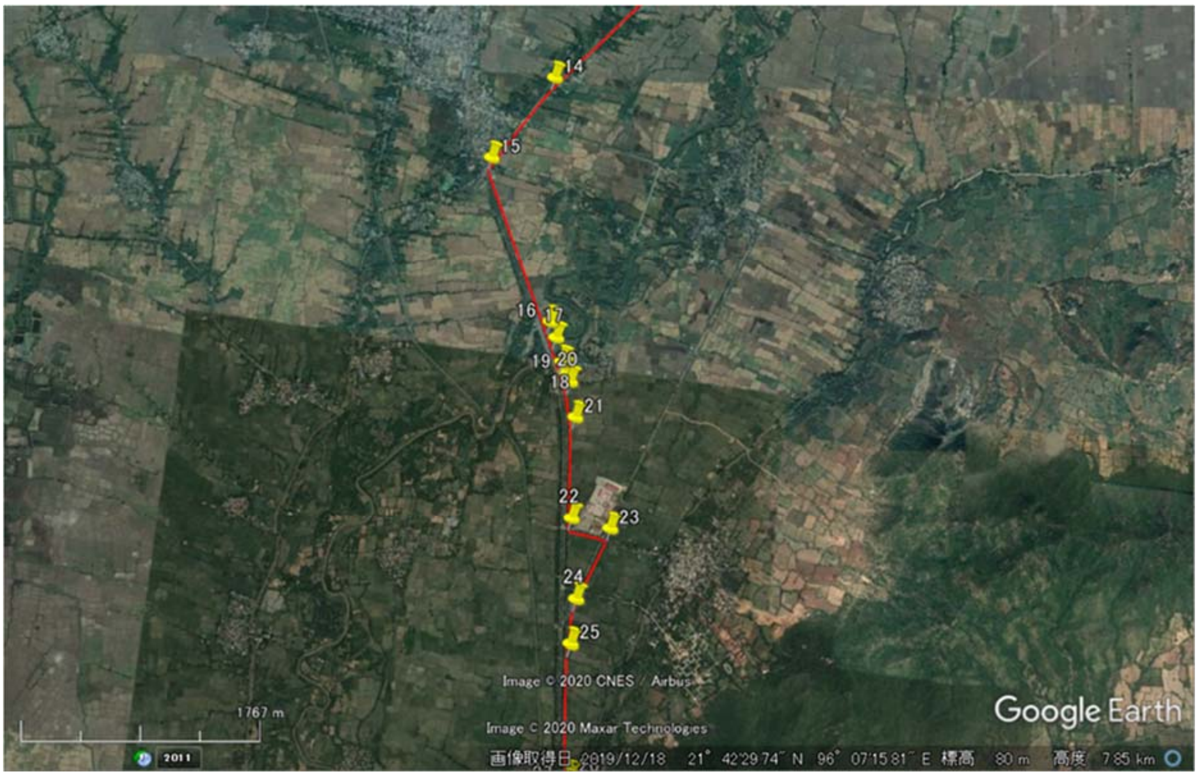
For approval documents for excavation work during the installation of water pipeline, the section in heritage zone in Met Ka Ya and E Bya villages has been approved by MORAC and approved documents

are attached in Appendix G. For the other section, approval documents will not be necessary at the EIA stage but will be required in basic/detailed design stage.



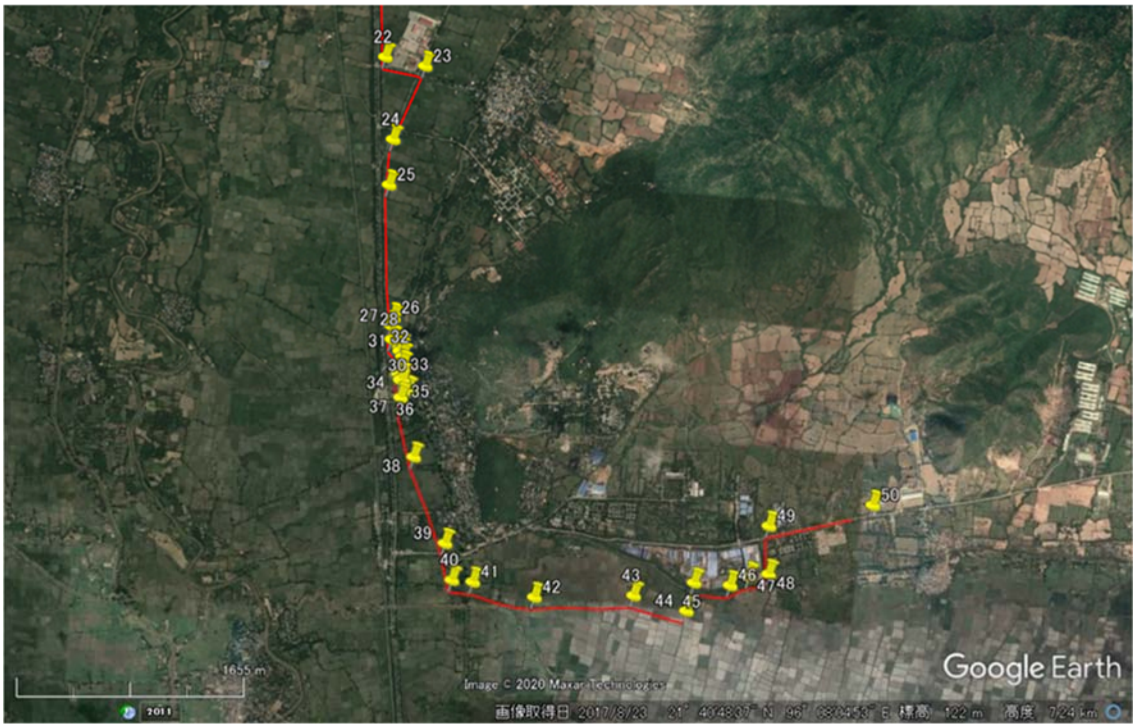
Source: EIA Study Team based on the image by Google Earth Pro

Figure 3.1-6(1) Detail of the Location of Water Pipeline



Source: EIA Study Team based on the image by Google Earth Pro

Figure 3.1-6(2) Detail of the Location of Water Pipeline



Source: EIA Study Team based on the image by Google Earth Pro

Figure 3.1-6(3) Detail of the Location of Water Pipeline

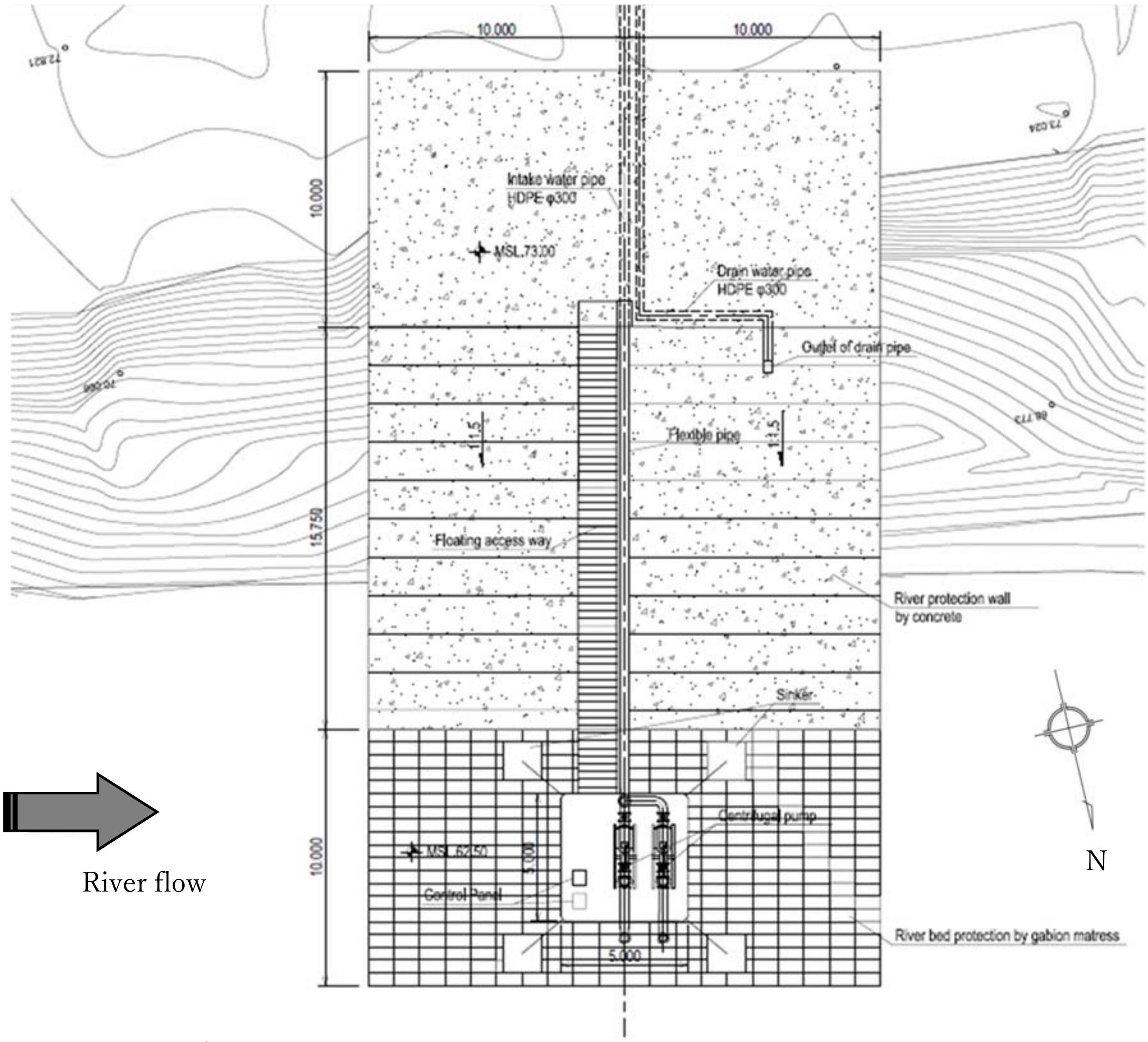
Table 3.1-6 Coordination of the Water Pipeline

Point	Latitude	Longitude	Remarks
Intake	21°46'22.0"N	96°8'36.0"E	Intake Point
1	21°46'20.7"N	96°8'35.8"E	
2	21°46'21.8"N	96°8'29.7"E	
3	21°46'18.7"N	96°8'31.7"E	
4	21°46'10.7"N	96°8'27.7"E	
5	21°46'5.8"N	96°8'28.8"E	
6	21°45'51.9"N	96°8'23"E	
7	21°45'49.2"N	96°8'14.8"E	
8	21°45'50.9"N	96°8'9.6"E	
9	21°45'49.8"N	96°8'2.5"E	
10	21°45'42.7"N	96°7'58.8"E	
11	21°45'8.2"N	96°7'44.9"E	
12	21°44'43.1"N	96°7'33.4"E	
13	21°44'11.6"N	96°7'21.3"E	
14	21°43'40.8"N	96°6'54.8"E	
15	21°43'19.4"N	96°6'40.7"E	
16	21°42'40.5"N	96°7'1.1"E	
17	21°42'36.8"N	96°7'3.1"E	
18	21°42'31.2"N	96°7'5.4"E	
19	21°42'28.6"N	96°7'6.5"E	
20	21°42'26.6"N	96°7'8.1"E	
21	21°42'18.2"N	96°7'10.5"E	
22	21°41'53.8"N	96°7'12.5"E	
23	21°41'52.4"N	96°7'22.8"E	Meeting point with gas pipeline
24	21°41'34.6"N	96°7'16.1"E	
25	21°41'23.9"N	96°7'16"E	
26	21°40'52.8"N	96°7'19.6"E	
27	21°40'50.9"N	96°7'19.2"E	
28	21°40'47.7"N	96°7'19.6"E	
29	21°40'46.2"N	96°7'21.3"E	
30	21°40'46.1"N	96°7'21.8"E	
31	21°40'45.1"N	96°7'21.9"E	
32	21°40'43.8"N	96°7'22.7"E	

Point	Latitude	Longitude	Remarks
33	21°40'41.8"N	96°7'22.8"E	
34	21°40'39.7"N	96°7'21.9"E	
35	21°40'37.7"N	96°7'22.8"E	
36	21°40'35.9"N	96°7'24.6"E	
37	21°40'34.1"N	96°7'23.0"E	
38	21°40'33.4"N	96°7'23.2"E	
39	21°40'20.4"N	96°7'27.4"E	
40	21°40'0.7"N	96°7'37"E	
41	21°39'52.2"N	96°7'39.5"E	
42	21°39'52.2"N	96°7'44.8"E	
43	21°39'49.6"N	96°8'0.7"E	
44	21°39'51.8"N	96°8'25.7"E	
45	21°39'49.1"N	96°8'39.3"E	
46	21°39'55.9"N	96°8'40.7"E	
47	21°39'55.9"N	96°8'49.9"E	
48	21°39'58.3"N	96°8'54.4"E	
49	21°39'59.3"N	96°8'59.4"E	
50	21°40'17.3"N	96°9'24.3"E	The Project site

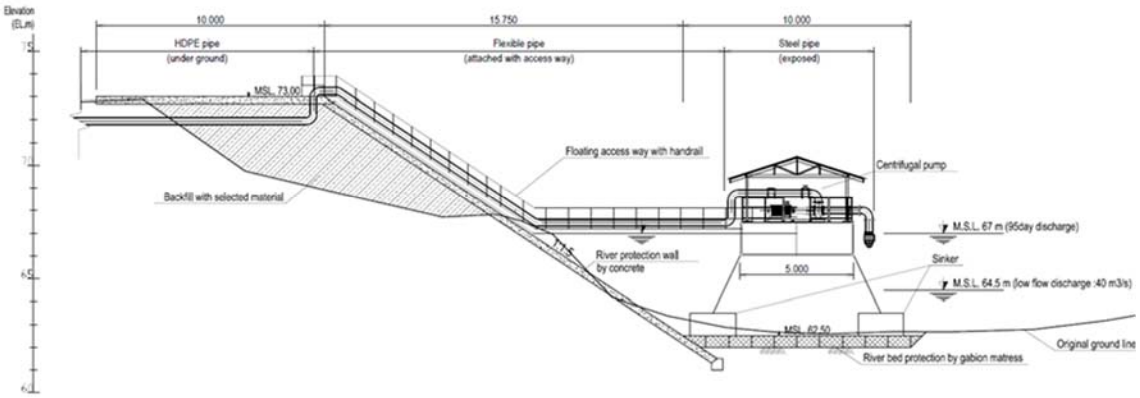
Source: EIA Study Team

Intake and discharge facility will be installed at Myitnge River, which will occupy approximately 200 m^2 on the riverbank on the land currently owned by MOC. Plan and section view of the intake and discharge facility are shown in Figure 3.1-7 and Figure 3.1-8.



Source: EIA Study Team

Figure 3.1-7 Intake and Discharge Structure (Plan)



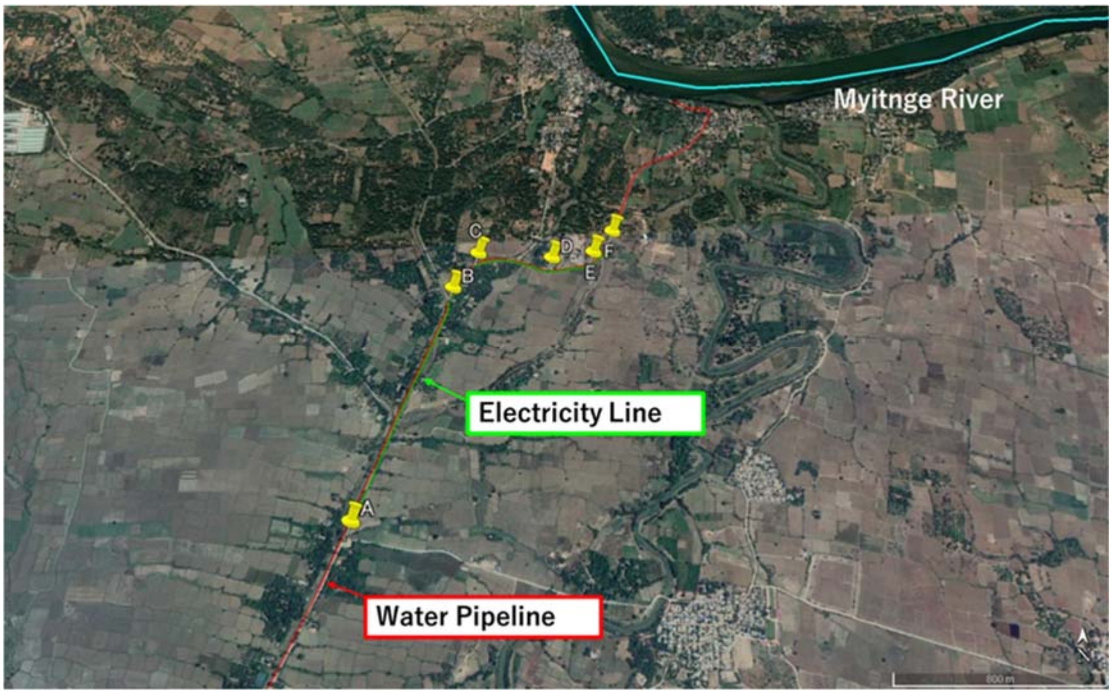
Source: EIA Study Team

Figure 3.1-8 Intake and Discharge Structure (Section)

(5) Electricity line

For the intake pump station, electricity will be distributed by 6.6 kV electricity line from the project site. There is a section approximately of 2 km, where 6.6 kV electricity line is currently not installed. For this section, installing of power pole and an electricity line will be necessary to supply electricity for operation of the intake pump station.

Detail of the location is shown in Figure 3.1-9 and Table 3.1-7. Land acquisition is necessary for the electric poles for 2 km. For each pole, about 1 m^2 of land is necessary at every 20 m.



Source: EIA Study Team based on the image by Google Earth Pro

Figure 3.1-9 Detail of the Location of Electricity Line

Table 3.1-7 Coordination of the Electricity Line

Point	Latitude	Longitude	Remarks
A	21°45'9.36"N	96° 7'45.62"E	Start point
B	21°45'44.16"N	96° 7'59.04"E	
C	21°45'49.97"N	96° 8'2.90"E	
D	21°45'49.23"N	96° 8'14.42"E	

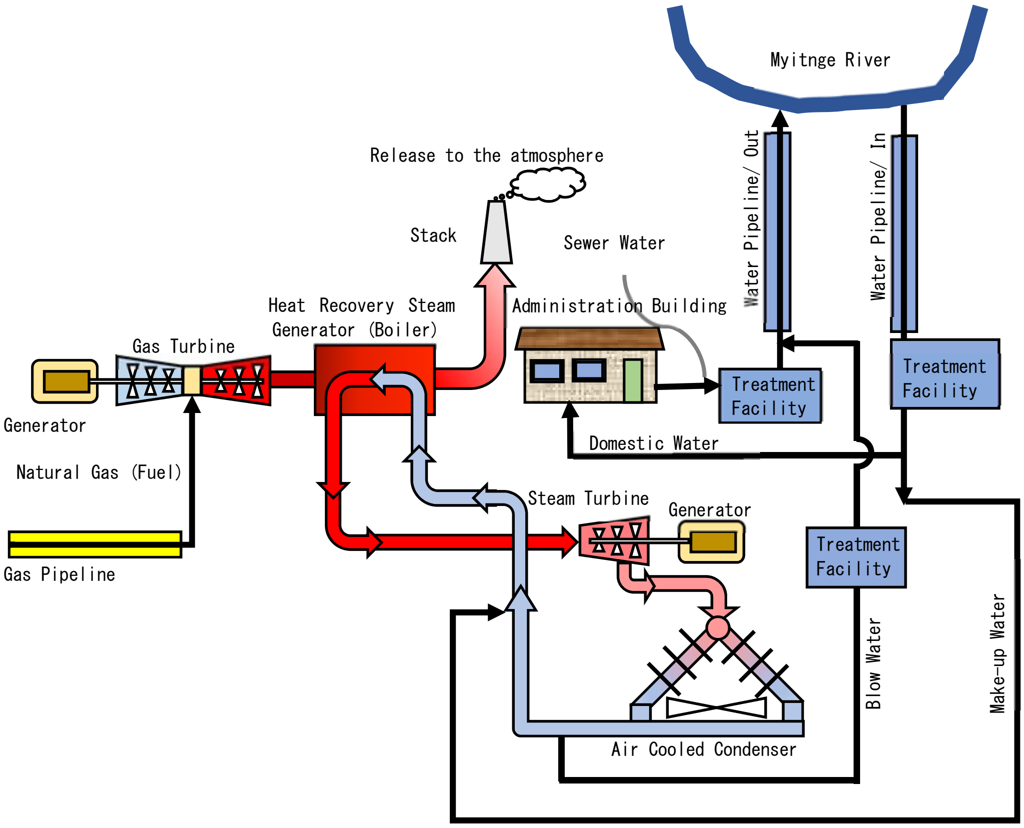
E	21°45'50.23"N	96° 8'20.94"E	
F	21°45'53.83"N	96° 8'24.09"E	End point

Source: EIA Study Team

Regarding the construction and operation of the facilities mentioned above, there is no special permission or license to be obtained; because the installation will be executed under the authority of MOEE.

3.1.3. Power Generation Process

In a CCPP, the heat of the exhaust gas from gas turbine will be used to generate steam by passing through a heat recovery steam generator (boiler). The conceptual diagram of combined cycle system is shown in Figure 3.1-10. The generated high-pressure steam is used to drive a steam turbine which then generates electricity. The effluent gas is emitted to the atmosphere via stack. The designed stack height is 30 m which was determined from the study of ambient air quality in Chapter 5. On impact forecasting of ambient air quality, Gaussian plume dispersion model which is analytical solution of diffusion equation was applied according to the modeling method with referring to Total Volume Control Manual on Emission of Nitrogen Oxides in Japan. In this modeling, observed meteorological condition was used. The forecasted concentration of the nitrogen oxides was below the target value which was determined from the World Bank standard. As conclusion, the stack height is fixed as 30 m.



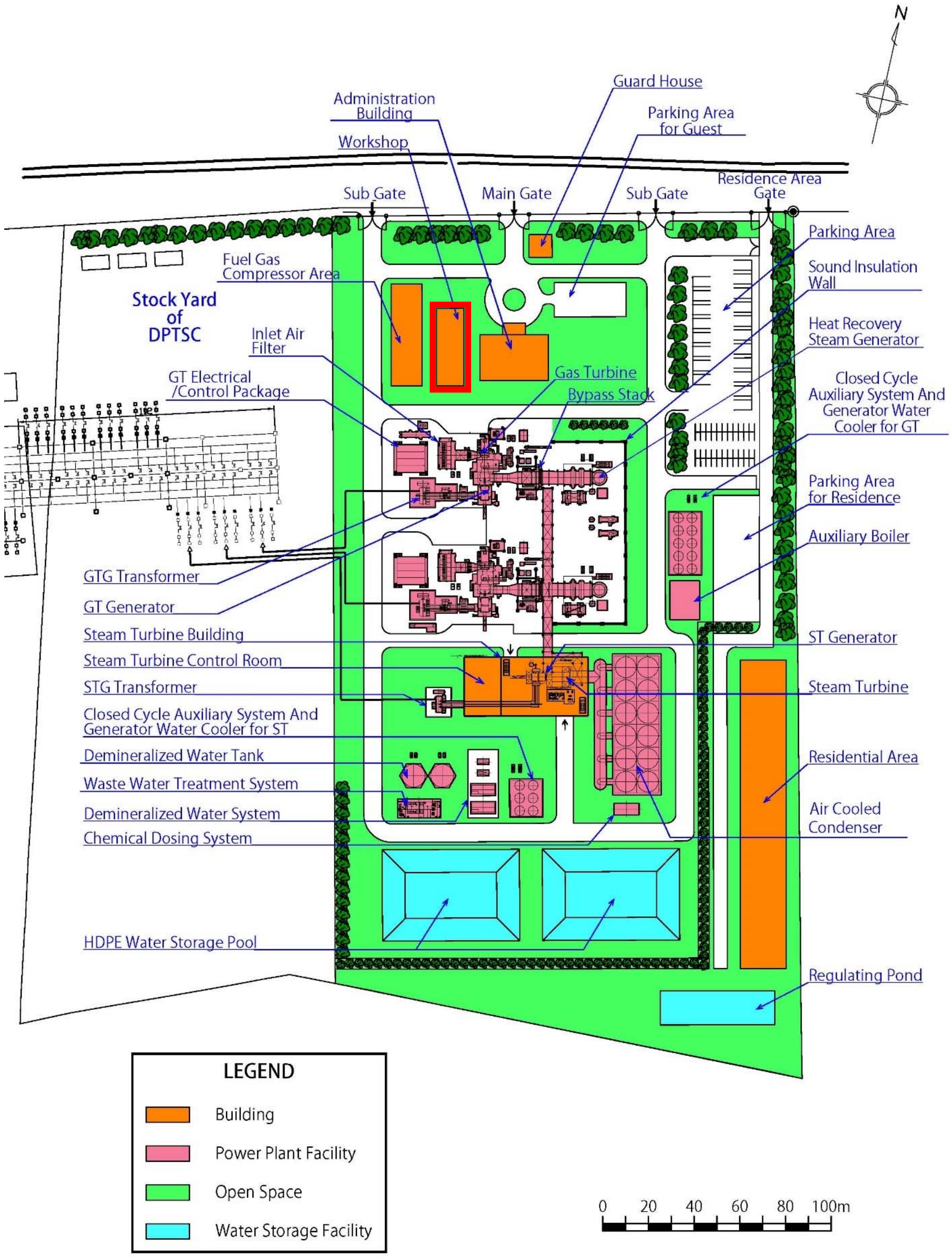
Source: EIA Study Team

Figure 3.1-10 Conceptual Diagram of Combined Cycle System

3.1.4. Facility Layout

The facility layout plan is shown in Figure 3.1-11. Two gas turbines and one steam turbine will be installed in the center of the project site. Cooling towers for steam condenser will be installed in the east side of the project site. Water storage pool will be installed in the south side of the site. Raw materials for plant operation will be stored in the workshop building which is marked by red frame near main gate in Figure 3.1-11.

In the Project, main raw materials for operation will be Ammonia (NH_3), Hydrazine ($2H_2$) and Sodium Phosphate (Na_3PO_4). The amount of the raw materials to be stored depends on the status of supply chain in the region and the procurement plan.



Source: EIA Study Team

Figure 3.1-11 Facility Layout Plan

3.1.4.1. Fuel Plan

Project site is located near Mandalay off-take station, on Shwe - China gas pipeline. The gas from the Shwe gas field will be utilized as source of fuel.

For the allocation of the Shwe Gas Field for domestic use, two new rental-based power plants of 135 MW and 90 MW capacities are in operation in Kyaukse City and in Myingyan City, respectively. They are gas engine-powered stations, and they will be in operation for five years since its inauguration (i.e., 2019 - 2024). The amounts of gas to be used are 30 mmscfd for Kyaukse City and 20 mmscfd for Myingyan City. After power generation will be stopped in 2024, 50 mmscfd of gas will be allocated to the Project. Composition of the gas from Shwe Gas Field is shown in Table 3.1-8.

Table 3.1-8 Shwe Gas Composition

Component Name	Mole Percent	BTU Gross	Relative Density
C6 + 47/ 35/ 17	0.0199	1.05	0.0007
Propane	0.0297	0.75	0.0005
i- Butane	0.0109	0.36	0.0002
n- Butane	32.2 ppm	0.11	0.0001
i- Pentane	49.7 ppm	0.2	0.0001
n- Pentane	0.0000	0.00	0.0000
Nitrogen	0.2218	0.00	0.0021
Methane	99.5529	1007.81	0.5514
Carbon Dioxide	0.0491	0.00	0.0007
Ethane	0.1073	1.9	0.0011
Total	100	1012.18	0.557

Compressibility Factor (1/7) @ 14.73000 PSIA & 60.0 DEG.F = 1.100198

Base Pressures =	14.73	
Gross Dry BTU =	1014.19	Corrected/ Z
Real Relative Density Gas =	0.5578	
Un-normalized Mole Percent =	99.874	
WOBBE =	1357.91	

Source: EIA Study Team based on the data provided by EPGE

3.1.4.2. Water Plan

The water to be used for the Project will be taken from Myitnge River. The total amount of daily intake will be about 1,600m^3/day. The wastewater will be treated in the project site and discharged to Myitnge River. The total amount of daily discharge will be about 1,200 m^3/day. Intake and discharge operation will be conducted around 8 hours in a day. The average flow rate of intake and discharge will be 0.0521 m^3/s and 0.0469 m^3/s respectively, whereas 50th percentile value of flow rate of Myitnge River is 325 m^3/s. Consequently, ratio of flow rate of intake/ discharge to Myitnge River will be 0.016 % and 0.014 %.

The intake river water will be transported to the project site through the water pipelines as shown in Figure 3.1-10. After receiving raw water into the site, it will be supplied for domestic use and process use of the power facility. As for the process use water, demineralization process will be applied, then demineralized water will be supplied to the steam turbine cycle process. Parallelly, the blow water will be generated from the steam turbine cycle process that will contain metal ions (copper and iron from metal pipe), silica, and oil in thicker concentration than that of intake water. In case the blow water needs to be recycled to the water purification system forming a closed cycle, it will deteriorate the function and performance of the water purification system. Thus, the full recycling of the process water is not applicable to the Project.

Wastewater from the domestic use and the process use will be treated separately in the Project site and sent through by the pipeline as shown in Figure 3.1-10.

3.1.4.3. Construction Plan

There are several work components in the Project such as transmission relocation, pipeline installation, water intake construction and civil works in addition to the construction of the main power facility. Entire

construction period is estimated to be approximately three years from design phase, civil works, installation of water and gas pipelines, electrical installation, power plant installation and commissioning test.

Table 3.1-9 shows the construction schedule of the Project.

Table 3.1-9 Construction Schedule

Construction	1st Year												2nd Year												3rd Year											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Design, Manufacturing, Delivering	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■													
Civil Work								■	■	■	■	■	■	■	■	■	■	■	■	■	■	■														
Water Pipeline and Electricity Line																	■	■	■	■	■															
Gas Pipeline																			■	■	■															
Electrical installation Work (Substation & Relocation Transmission)																			■	■	■															
Power plant equipment installation work																			■	■	■	■	■	■	■	■	■	■	■							
Commissioning Test																														■	■	■				

Source: EIA Study Team

3.1.4.3.1. Main Equipment for Construction

Main construction machineries, which will be applied for each construction of facilities are shown in Table 3.1-10. From the viewpoint of environmental consideration, the impact derived from earth works of power facilities is the main concern due to extent of its scale.

Table 3.1-10 Construction Machineries of Earthwork

Facility	Type of work	Main construction machinery
Power Facility	Earth work	Excavator, Bulldozer, Compaction roller, Dump truck
	Building work	Crane truck, Mobile concrete pump, Dump truck, concrete mixer truck
	Facility work	Crane truck, Trailer truck
Transmission line	Facility work	Crane truck, Trailer truck
Gas pipeline	Earth work	Excavator, Compaction roller, Dump truck
Water pipeline, Intake/ discharge facility	Earth work	Excavator, Compaction roller, Dump truck
	Building/ Facility work	Crane truck, Mobile concrete pump, Dump truck, concrete mixer truck
Electricity line	Facility work	Excavator, Crane truck,

Source: EIA Study Team

3.1.4.3.2. Main Materials for Civil Construction Work

As a basic designing policy of the Project, construction materials are planned to be purchased from the domestic market of Myanmar as much as possible, under the condition that the quality and the quantity satisfy the requirements.

The sources for the procurement of the major materials are summarized in the following sections.

3.1.4.3.2.1. Cement

Local cement companies produce cement in Myanmar; however, the quality of the cement products is not homogenous. The high-quality cement products imported from Thailand are available from the domestic market.

3.1.4.3.2.2. Concrete

In Mandalay City, a ready-mixed concrete supply company operates concrete batching plants. The distance between the ready-mixed concrete supply company and the project site is about 35 km and it takes about 70 minutes for transportation. The maximum supply capacity of the ready-mix concrete company is 1,800 m^3/day, which can satisfy the technical requirement of the Project.

3.1.4.3.2.3. Aggregates, Crushed Stone and Sand

Aggregates, crushed stone and armour stone are available from quarries in Ohn Chaw (Htone Bo Village), located within 40 km from the project site, and there are about 50 quarries. For the reclamation, sand from Ayeyarwady River near the project site can be used.

3.1.4.3.2.4. Steel Materials (Reinforcing Bars, Steel Pipe Piles, Steel Materials)

The reinforcing bars, steel pipe piles, and steel materials are available in Myanmar. However, they are made in China and other countries, and the quality is poor and unreliable. Moreover, there is no large-diameter steel pipe piles and steel sheet piles available from local market.

As alternative, a Japanese steelmaker has established a joint venture in recent years, and some steel materials are available from them.

3.2. Comparison and Selection of Alternative

Beforehand the detailed designing of the Project, analysis of alternatives was conducted with the focus on project site selection, water pipeline route and cooling method for steam condenser, including without project option.

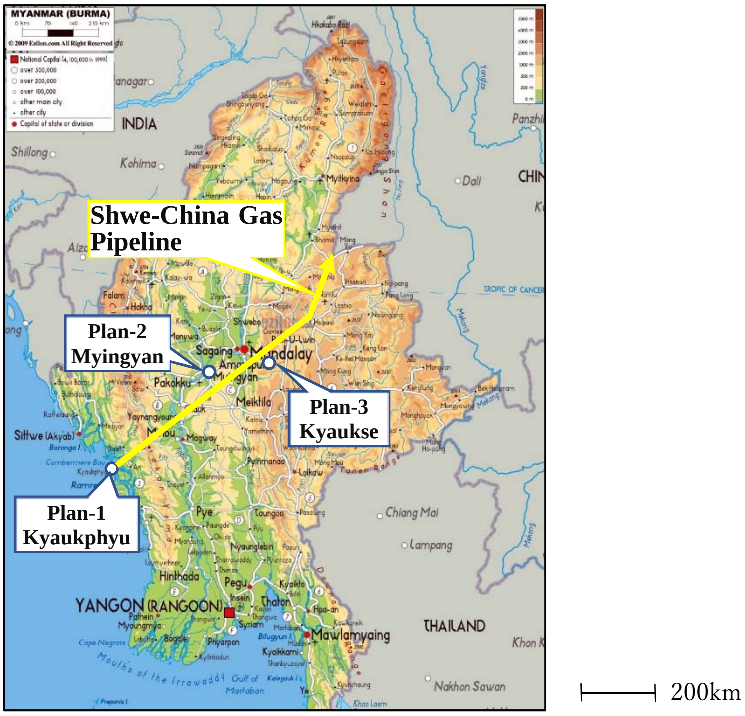
3.2.1. Methodology

In order to select the project site and location for installing facilities, alternative studies were conducted for three modes: (i) site selection, (ii) water resource and pipeline, and (iii) cooling system. Alternative studies were performed comprehensively from the viewpoint of technical aspect, economical aspect, and social and environmental considerations. The results of those alternative studies are also discussed in the following section.

3.2.2. Comparison and Selection of Alternative

3.2.2.1. Site Selection

Three locations were considered as alternatives for the project site, since those areas have potentials to access to gas pipeline. Among these alternative sites, Kyaukse was selected since it was evaluated to have less impact on land acquisition and environment compared with the others, and also the most economical. The alternative locations are as shown in Figure 3.2-1. The result of the alternative study of the project site is shown in Table 3.2-1.



Source: EIA Study Team, based on the map from webpage http://www.maps-of-the-world.net.

Figure 3.2-1 Alternatives of the Project Site

Table 3.2-1 Result of Alternative Study of the Project Site

Item	Plan-0	Plan-1	Plan-2	Plan-3 (Selected)
Outline of planning	Without the project	Implementation project in Kyaukphyu	Implementation project in Myingyan	Implementation project in Kyaukse
Land use	No change in land use.	Current land use of the project site is a vacant area owned by MoEE.	Current land use of the project site is a vacant area owned by MoI.	Current land use of the project site is a vacant area owned by MoEE.
Technology	No issues	It is possible to use sea water as water source. Improvement of the gas offtake station and transmission line is required.	It is possible to use river as water source. Improvement of the gas offtake station and transmission line is required.	It is possible to use river as water source. Improvement of the gas offtake station and transmission line is not required.
Economy (Cost)	No additional cost	Project cost is higher than Plan-3.	Project cost is higher than Plan-3.	Cost advantage because there is no need to improve offtake station and transmission line
Environmental and Social Impact				
Around the Site	No issues	The distance to the nearest residence from the site is approx. 100 m. Impact on noise and air pollution is expected. The expected degree of impact of pollution is the second smallest.	The distance to the nearest residence from the site is approx. 1.3 km. Impact on air pollution is expected. The expected degree of impact of pollution is the smallest.	The distance to the nearest residence from the site is approx. 70 m. Impact on noise and air pollution is expected. The expected degree of impact of pollution is slightly larger than Plan-1.
Existing pollution source	No issues	There are some sources of air and noise pollution near the road, but they are not significant. The scale of existing pollution sources is the slightest.	There are some significant sources of air and noise pollution such as power plants (95 MW gas-fire power and 225 MW CCPP) and electric furnace for steel and steel mill. Existing pollution sources are the most significant.	There are some sources of air and noise pollution near the small factory and road, but they are not significant. Existing pollution sources are the second slightest.

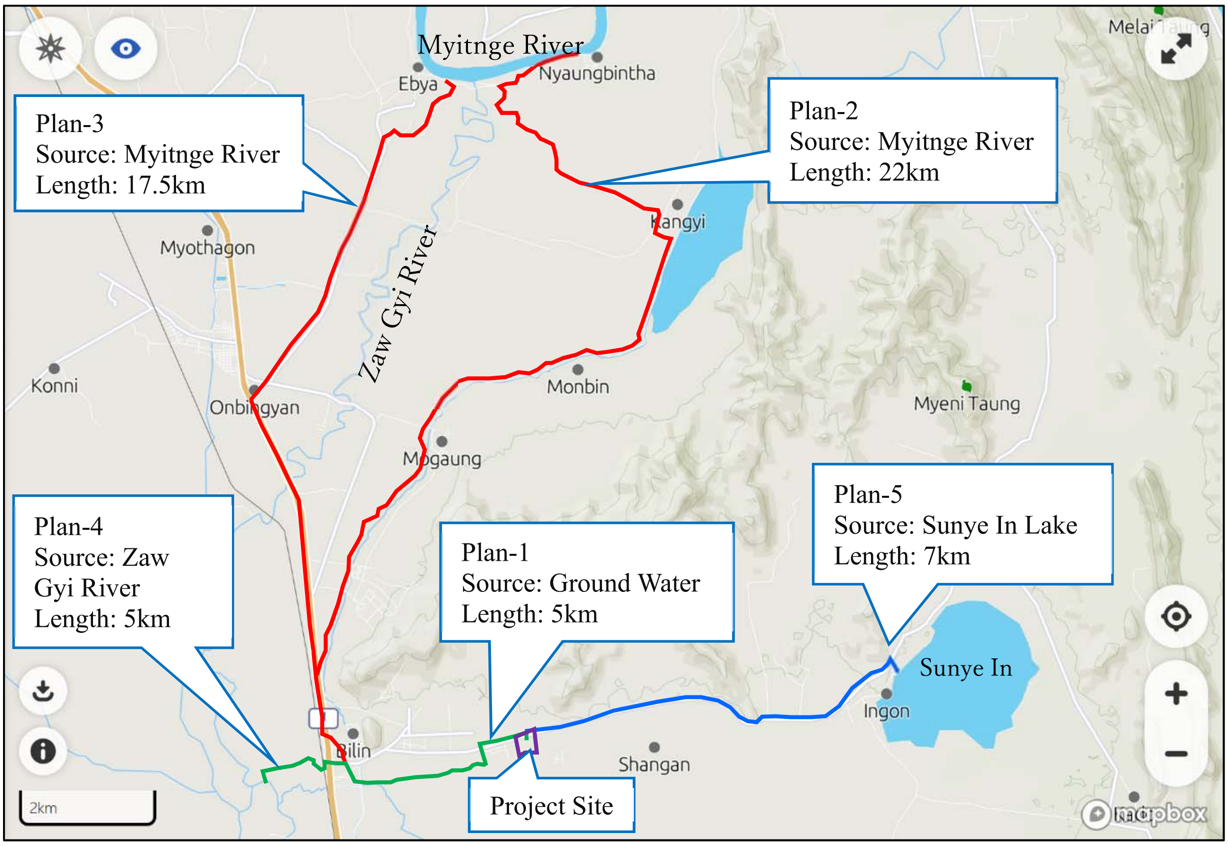
Item		Plan-0	Plan-1	Plan-2	Plan-3 (Selected)
	Protected area	No issues	The nearest protected area (Shwesettaw W.S) is located about 100 km away from the site. Impact is not expected.	The nearest protected area (Minzontaung W.S) is located about 50 km away from the site. Impact is not expected.	The nearest protected area (Minwuntaung Wildlife Sanctuary) is located about 50 km away from the site. Impact is not expected.
	Deforestation	No issues	Deforestation is not assumed as the site is a vacant area.	Same as Plan-1.	Same as Plan-1.
	Vegetation	No issues	There are some trees and shurubs in the site.	There is no vegetation in the site.	Same as Plan-1.
	GHG	No emissions	It is unavoidable to emit GHG. However, the emission amount will be fewer than the facilities which have no combined cycle system.	Same as Plan-1.	Same as Plan-1.
	Existing transmission line	No issues	Improvement of the existing transmission line is necessary because of small capacity. Environmental and social impacts are expected.	Same as Plan-1.	Improvement of the existing transmission line is not necessary. Environmental and social impacts are not expected.
	Gas offtake station	No issues	Improvement of the existing offtake station is necessary. Environmental and social impacts are expected.	Same as Plan-1.	Improvement of the existing offtake station is not necessary. Environmental and social impacts are not expected.
	Gas pipeline	No issues	Installation of the new gas pipeline of 2 km will be required from the existing offtake station. Environmental and social impacts are expected. The expected degree of impact is the smallest.	Installation of the new gas pipeline of 17 km will be required from the existing offtake station. Environmental and social impacts are expected. The expected degree of impact is the largest.	Installation of the new gas pipeline of 6 km will be required from the existing offtake station. Environmental and social impacts are expected. The expected degree of impact is the second smallest.
Achievability of the project goal		This plan 0 cannot accomplish the goal which is to produce necessary electricity for the improvement of the lives of Myanmar people.	This plan can accomplish the goal which is to produce necessary electricity for the improvement of the lives of Myanmar people.	Same as Plan-1.	Same as Plan-1.
Comparative Conclusion		This plan cannot meet the increasing electricity demand. Therefore, economic development will be obstructed. Moreover, there is a risk that the demand will be met by the construction of other power plants which have lower efficiency and higher environmental load.	Plan-1 has the second least environmental and social adverse impact, and the plan is not economical compared to Plan-3. The expected adverse impact is not negligible, appropriate mitigation measures should be taken.	Plan-2 has the biggest environmental and social adverse impact, and the plan is not economical compared to Plan-3. The expected adverse impact is not negligible, adequate mitigation measures should be taken.	This plan is selected. Plan-1 and Plan-3 have less environmental and social adverse impact, Plan-3 is better among them because Plan-1 has larger adverse impact from ancillary facilities improvement and Plan-3 is the most economical. However, the expected adverse impact is not negligible, appropriate mitigation measures should be taken.

Source: EIA Study Team

3.2.2.2. Water Source and Pipeline Route

Five plans on the combination of water source and water pipeline were considered as alternatives for the Project. Among these alternatives, the Myitnge River was selected as the water source, since this option was evaluated to have the least impact on the environment, and the most stable water quality and quantity were expected. For water pipeline, the shorter route was selected since it has the least impact on social

and environment aspects of surrounding area. Alternatives of water intake point and alignment of water pipeline are shown in Figure 3.2-2. The result of the alternative study is summarized in Table 3.2-2.



Source: EIA Study Team, based on the map from webpage http://www.maps-of-the-world.net.

Figure 3.2-2 Alternatives of Water Source and Water Pipeline

Table 3.2-2 Result of Alternative Studies of the Water Resource and Pipeline

Item	Plan-1	Plan-2	Plan-3 (Selected)	Plan-4	Plan-5
Outline of plan	Source: groundwater Pipeline: to Zaw Gyi River (5 km)	Source: Myitnge River Pipeline: to Myitnge River (22 km)	Source: Myitnge River Pipeline: to Myitnge River (17.5 km)	Source: Zaw Gyi River Pipeline: to Zaw Gyi River (5 km)	Source: Sunye In Lake Pipeline: to Sunye Inlake (7 km)
Land acquisition	Land acquisition for discharge facility will be needed because there are no trench or sewage adjacent to the project site. Land use of discharge facility will be changed.	Land acquisition will be needed for intake / discharge facility. Land use of the intake / discharge facility will be changed.	Same as Plan-2.	Same as Plan-2.	Same as Plan-2.
Technical aspect	Special water treatment will be needed due to high amount of lime.	Water quality is good because water is derived from the dam reservoir.	Same as Plan-2.	Amount of sludge from the water treatment will be large, due to high turbidity.	Water quality is good because the water is from lake.
Economical aspect	Water treatment cost will be large.	Water treatment cost will be small but cost for construction will be largest due to its length.	Water treatment cost will be small, cost for construction fee will be the second largest.	Water treatment and disposal of sludge cost will be large	Water treatment cost will be small

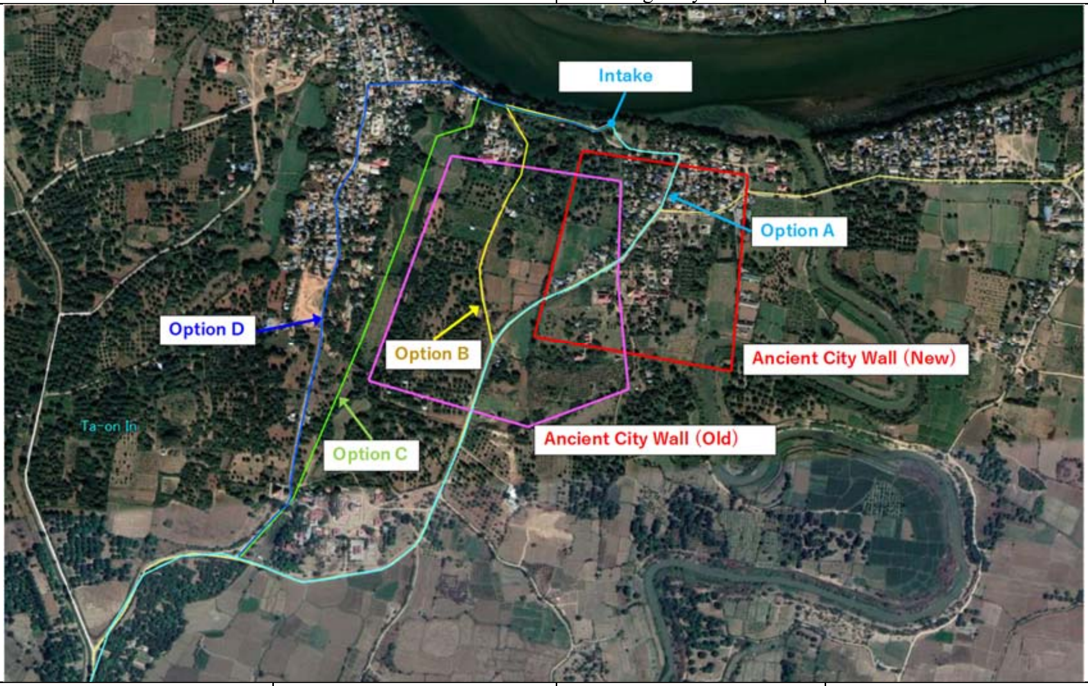
Item	Plan-1	Plan-2	Plan-3 (Selected)	Plan-4	Plan-5
Water resource	Availability of resources is not clear.	Possible to use stably because the river is large and there is dam reservoir upstream from the intake point.	Same as Plan-2.	Availability of water resources is not clear because flow rate will change due to operation of sluices.	Availability of the water resources is not clear because the depth of lake is shallow.
Environmental & social consideration	Some adverse impacts on subsidence of the ground and availability of groundwater around the Project site will be concerned.	Adverse effects on surrounding environment will be the smallest because the river is large.	Same as Plan-2.	Adverse effects on environmental aspect will be bigger than Plan-2, because the river is small.	Adverse effects on environmental aspect will bigger especially for water quality because the lake is closed water area.
	Adverse effects on social aspect will be smallest because the pipeline is only for discharge and length is the shortest.	Adverse impact on social aspect will be the biggest because the length of pipeline is the longest and will cross 64 irrigation outlets. Rural narrow road adjacent to pipeline will be closed to traffic unavoidably during construction.	Adverse impact on social aspect will be smaller than Plan-2 due to its length of pipeline and number of irrigation outlets to be crossed (25). Road will not be closed to traffic.	Adverse impact on social aspect will be the second smallest, due to its length of pipeline.	Adverse impact on social aspect will be the third smallest, due to its length of pipeline.
Comparative Conclusion	Not suitable for the water resource and adverse environmental impact will not be negligible.	Environmental impact can be minimized, but inferior to plan 3 in economical aspect because of the length of the pipeline.	This plan is selected because the environmental impact can be minimized and economically more feasible than Plan-2.	Same as Plan-1.	Same as Plan-1.

Source: EIA Study Team

3.2.2.3. Detour route of an ancient city ruin

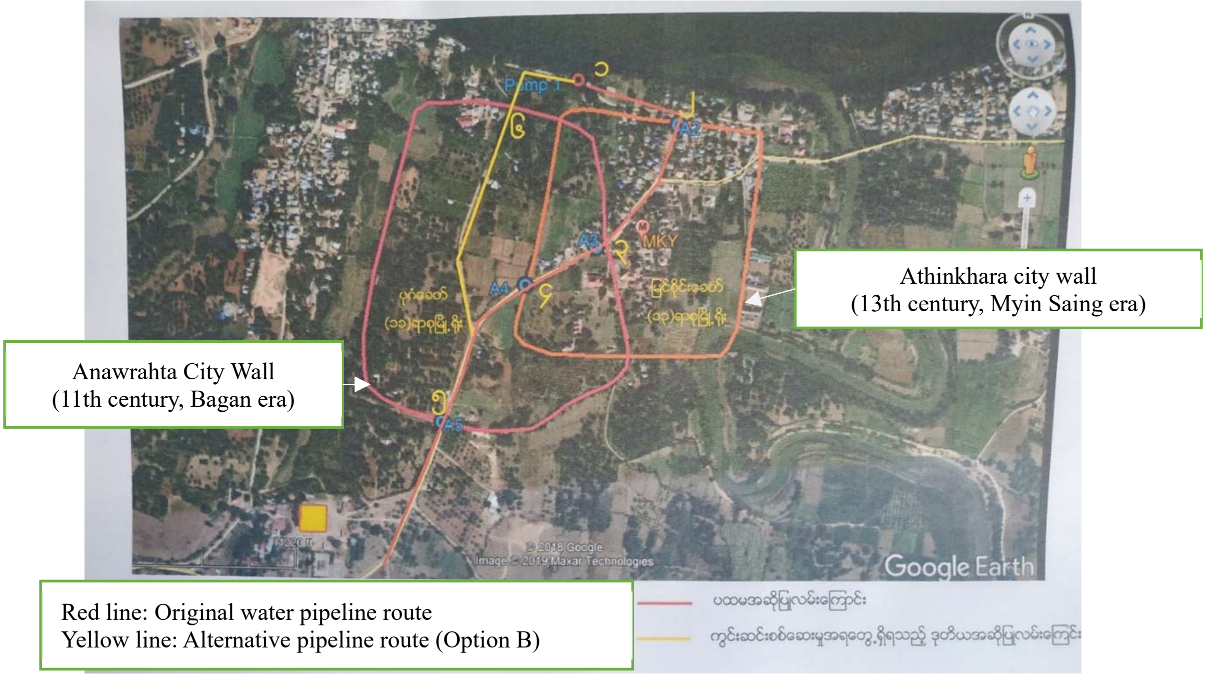
After selection of the water resource (intake point) and water pipeline route, it was identified that there is ancient city ruin in the cultural heritage zone near the intake. That was not identified from the literature survey because the information of ancient city has not been disclosed. It was pointed out from Ministry of Religious Affairs and Culture (MORAC) that there is undesignated ruin under the proposed alignment. MORAC requested to change the part of the water pipeline route based on their Heritage Impact Assessment (HIA). Then EPGE shown the original route and other routes as alternative to MORAC.

Table 3.2-3 Alternative Studies of Detour Route for Ancient City

Item	Option A (Original route)	Option B	Option C	Option D
Pipeline route	· Water pipelines will be installed under the existing village road which pass through the both ancient cities.	· Water pipelines will be installed under the existing village road which pass through the old ancient city.	· Water pipelines will be installed under the road and the field area located at the west side of the old ancient city. · The field of this route is usually submerged during rainy season.	· Water pipelines will be installed under the road located at the west side of the old ancient city. · ·The road pass through dense residential area compared to Option A and B.
	 			
Technical aspect	· Pipelines will be installed under village road. · There is no technical issue for installation.	· Pipelines will be installed under village road. · There is no technical issue for installation.	· Most of the route is in the field which is usually submerged during rainy season. · Construction period will be limited during dry season. · Special consideration will be necessary to prevent pipe floating. · Anti-floating will be a large-scale works. · This plan has difficulty to execute maintenance work during rainy season.	·
Land acquisition	· The water pipeline will be installed under village road and no land acquisition is required.	· The water pipeline will be installed under village road and no land acquisition is required.	· Land acquisition is necessary to install in the field since it is private land.	· The water pipeline will be installed under village road. Temporary land occupation will be necessary because of the narrow road condition.
Impact on traffic	· Impact on local traffic is less.	· Impact on local traffic is less.	· Impact on local traffic is less.	· Since pipeline pass through dense residential area and narrow village road, impact on local traffic is significant.
Impact on heritage	· Impact on heritage could be avoidable by using proper construction method	· Impact on heritage could be avoidable by using proper construction method	· No impact	· No impact
Comparative Conclusion	· Though pipeline will pass through two ancient cities, this plan is feasible with less impact on heritage.	· Though pipeline will pass through one ancient city, this plan is feasible with less impact on heritage.	· This plan is technically infeasible because of the difficulty of the installation and difficulty of the inspection during operation.	· This plan is infeasible because of the social impact on village traffic.

Source: EIA Study Team

MORAC issued the approval for the alternative water pipeline (Option B). Figure 3.2-3 shows detour and original route of water pipeline.



Source: Provided by MORAC

Figure 3.2-3 Detour Route of Ancient City

The water pipeline route in heritage zone has been already approved by MORAC. However, to demonstrate the adequacy of the approved pipeline route, it is possible to check the requirements of the performance standard 8 of International Finance Corporation (IFC) on cultural heritage shown in following table.

Table 3.2-4 Checking list with requirement of IFC performance standard

	Checking item	Result of the check
1	There are no technically or financially feasible alternatives	There is no other pipeline route which is technically feasible.
2	Comply with defined national or local cultural heritage regulations	The approval of pipeline route was issued by MORAC in accordance with the Law on Preservation and Protection of Ancient Buildings.
3	Comply with the protected area management plans	There is no management plan for conservation of the heritage zone. EPGE should comply with the conditions of approval from MORAC.
4	Consult the protected area sponsors and managers, local communities and other key stakeholders on the proposed project	Additional public consultation had done in the village near heritage zone. There is no objection about pipeline route in heritage zone from the community and other stake holders.
5	Implement additional programs, as appropriate, to promote and enhance the conservation aims of the protected area	EPGE will discuss with Department of Archaeology and National Museum (DOANM) to get confirmation after basic design of the pipeline before the selection of contractor.

Source: EIA Study Team

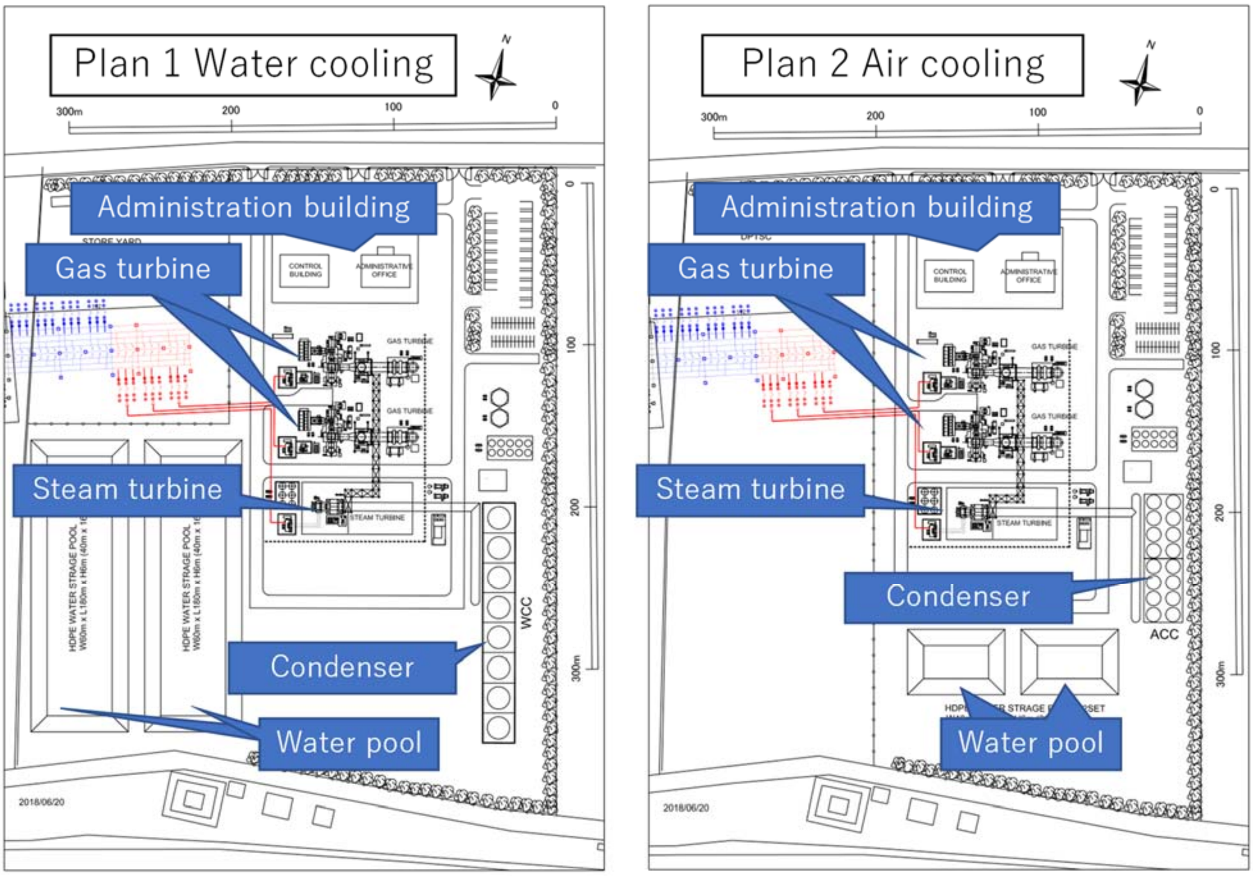
From the result of that checking, it is considered that the route of water pipeline in the heritage zone is adequately meeting with international criteria.

3.2.2.4. Cooling System

Two cooling systems were considered as alternative study for the Project, as the limiting factor for the study is the availability of water. The project site is located at the dry zone of central Myanmar; therefore, the amount of available water in and around the project site is limited. Considering the location of the Project and water availability, the cooling system that requires abundant water resource was not an option. Instead, the cooling tower installation was considered as suitable system for the Project.

In certain conditions, the water-cooling system that utilizes heat of vaporization for cooling can be another option. However, the system requires to refill water as it is vaporized, thus, it requires more water and facilities to process water are bulky, requires larger space than the air-cooling system. Moreover, operation and maintenance of these larger facilities including auxiliary machine will be more complex compared with the air-cooling system.

Although generating efficiency of water-cooling system is about 1% to 2% higher than the air-cooling system and construction cost will be smaller (i.e. about 10% lower than air cooling system), it has greater impact on river environment and requires higher operational and maintenance cost and capacity. Considering these, the air-cooling system (Plan-2) is selected. The layout plan of alternatives is shown in Figure 3.2-4. The result of the alternative study is summarized in Table 3.2-5.



Source: EIA Study Team, based on the map from webpage http://www.maps-of-the-world.net.

Figure 3.2-4 Alternatives of Cooling System

Table 3.2-5 Result of Alternative Study of the Cooling System

Item	Plan 1	Plan 2 (Selected)
Outline of the plan	Water cooling	Air cooling
Required land	Land use will be changed from vacant field to plant site, but the land owner will remain the same, actual impact is not expected.	Land use will be changed from vacant field to plant site, but the land owner will remain the same, actual impact is not expected.

Item	Plan 1	Plan 2 (Selected)
	There will be less vacant lot, future expansion of land will fade.	There will be a room for future expansion.
Technical aspect	Approximately 10 times water will be required compared with Plan 2. Due to the usage water volume, facilities dealing with water become bigger and maintenance of these bigger facilities including auxiliary machine will be more complex. Assumed water intake: 15,000 m^3/day Assumed water discharge: 1,500 m^3/day Assumed water discharge: 1,500 m3/day The climate conditions of the site match for the water cooling method.	Facilities dealing with water will become smaller, due to less usage of water. Maintenance of these facilities will be simpler than plan 1. Assumed water intake: 1,500 m^3/day Assumed water discharge: 1,350 m^3/day Air cooling method conforms to site climate condition. Plant performance will be lower than that of Plan 1 because of low condenser vacuum.
Economical aspect	Construction cost will be approximately 10% less than Plan 2.	Construction cost will be higher than Plan 1.
Efficiency of generation	Generating efficiency will be approximately 1% to 2% higher than Plan 2.	Generating efficiency will be lower than Plan 1.
GHG	Emission amount of GHG will be lower than Plan 2 due to generating efficiency.	Emission amount of GHG will be higher than Plan 1.
Environmental & social consideration	Environmental impact on river will be much bigger than Plan 2 due to usage of large amount of water. Volume of sludge derived from water treatment will be larger than Plan 2.	Environmental impact on the river will be smaller than plan 1. Volume of sludge will be smaller than Plan 1.
	Social impact will be larger than Plan 2 because diameter of pipeline is more than three times larger than Plan 2. Also, temporary land use area will be larger during construction.	Social impact will be smaller than Plan 1.
Comprehensive conclusion	Although generating efficiency will be higher while construction cost will be lower, environmental impact on the river and waste, and its social impact will be larger. Maintenance of facility will be complex.	This plan is selected because environmental and social impact will be smaller, and maintenance of facilities will be easier, although the construction cost will be larger.

Source: EIA Study Team

3.3. Description of the Selected Alternative

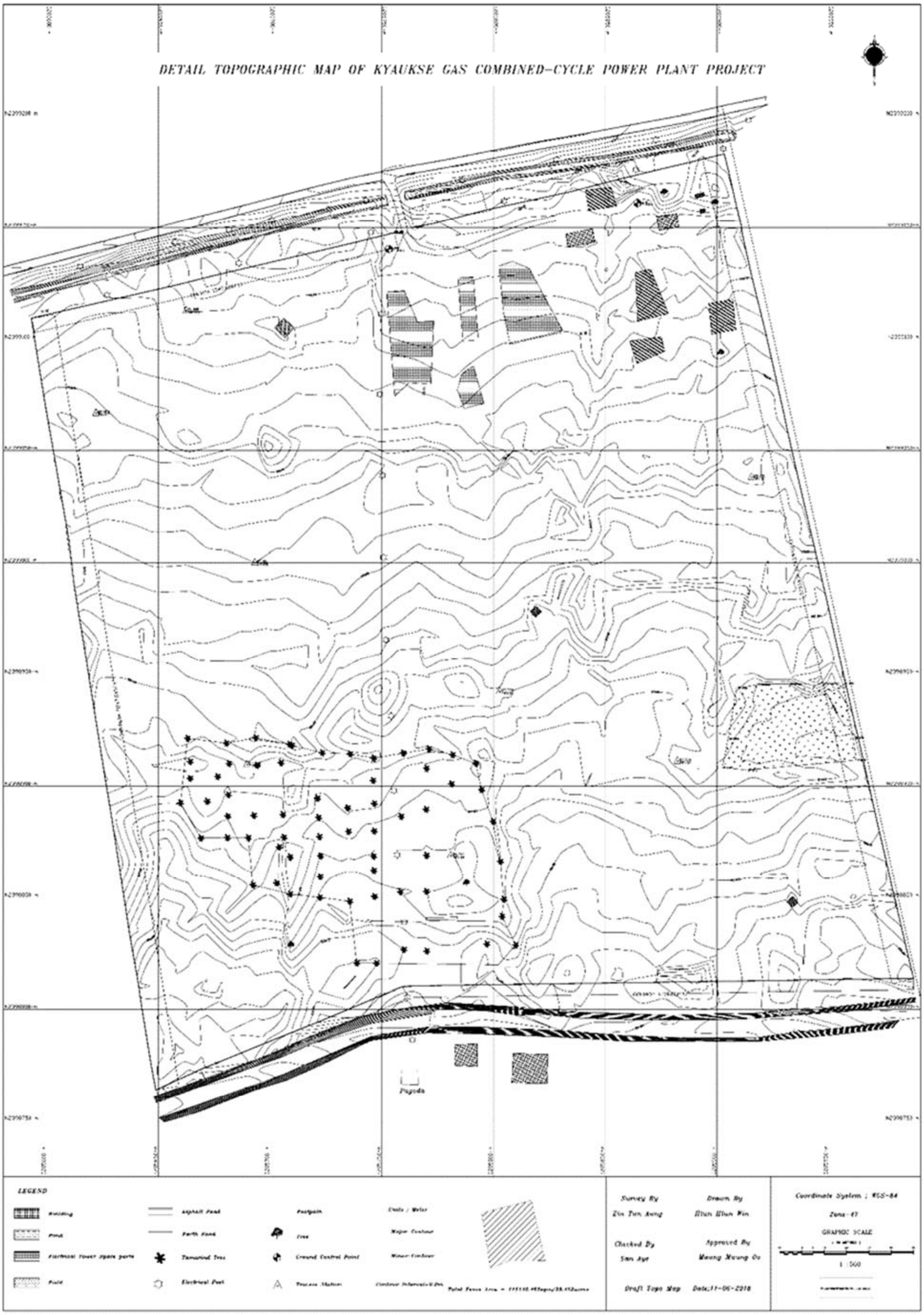
3.3.1. Project Site

3.3.1.1. Surrounding Environment

Details of surrounding environment of the project site are described in Chapter 4, which includes physical, biological, socio-economic, cultural and visual components.

3.3.1.2. Topography of the Project Site

Topographic survey was conducted to clarify the ground elevation project site. Figure 3.3-1 shows the topographic map inside candidate site. Ground elevation is EL. 85 to 92 m. Total area of candidate site is 11.5 ha.



Source: EIA Study Team

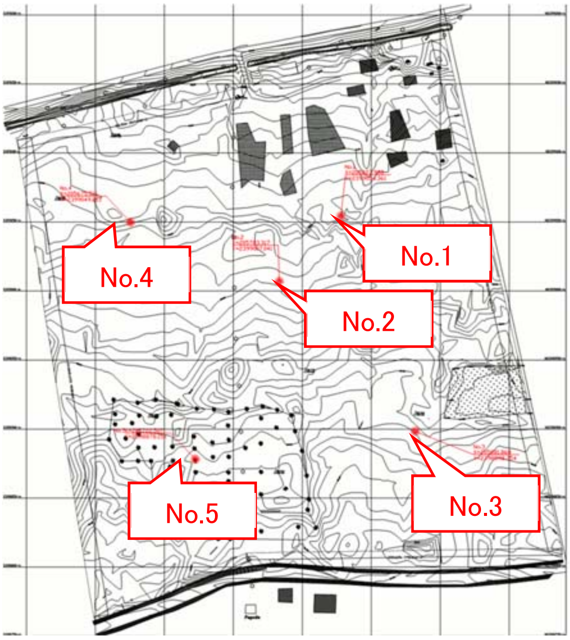
Figure 3.3-1 Topographic Map

3.3.1.3. Geology of the Project Site

Geological survey was conducted to acquire specific soil parameter of the project site. Geological survey consists of boring survey and laboratory test.

3.3.1.3.1. Boring Survey

Five (5) borehole locations were determined to grasp the ground condition of the project site. Location of boreholes is shown in Figure 3.3-2.



Source: EIA Study Team

Figure 3.3-2 Locations of Boreholes

According to the results of borehole log, hard sand and clay are appeared on the original ground. Also, hard foundation soil that N-value is larger than 50 are found at the approximately 30 m depth from the ground level.

3.3.1.3.2. Laboratory Test

Result of laboratory test are shown in Table 3.3-1, which represent summary of soil parameters of each layers.

Table 3.3-1 (1) Result of Soil Parameters at Borehole No.1

Layer No.	Depth (m)	Soil Type	N-Average	Unit weight (kNm^3)		Cohesion Cu (kNm^2)		Friction Angle (Degree)	
				γ	γ'	Lab	SPT	Lab	SPT
1	0-5.5	Sandy SILT (I)	40	19.91	10.10	35	160	-	-
2	5.5-7.6	Slightly silty SAND	21	20.10	10.20	5	-	22	30
3	7.6-17.9	Sandy SILT (II)	32	19.62	9.81	47	160	-	-
4	17.9-21.7	Sandy CLAY (I)	26	19.23	9.42	78	100	15	-
5	21.7-23.5	Silty SAND	32	18.25	8.44	4	-	26	35
6	23.5-27.9	Sandy CLAY (II)	34	18.25	8.44	51	160	9	-
7	27.9-33.5	Silty SAND (II)	62	20.99	11.18	7	-	37	40

Source: EIA Study Team

Table 3.3-1 (2) Result of Soil Parameters at Borehole No.2

Layer No.	Depth (m)	Soil Type	N-Average	Unit weight (kNm^3)		Cohesion Cu (kNm^2)		Friction Angle (Degree)	
				γ	γ'	Lab	SPT	Lab	SPT
1	0-2.6	Clayey SAND	34	19.03	9.22	-	-	-	35
2	2.6-8.9	Sandy CLAY (I)	13	19.03	9.22	39	50	9	-
3	8.9-12.6	Gravelly SAND	25	18.15	8.34	1	-	33	35
4	12.6-20.6	Sandy CLAY (II)	27	18.05	8.24	66	100	11	-
5	20.6-29.6	Sandy CLAY (III)	42	18.84	9.03	101	160	20	-
6	29.6-34.5	SAND	64	18.54	8.73	3	-	31	40

Source: EIA Study Team

Table 3.3-1 (3) Result of Soil Parameters at Borehole No.3

Layer No.	Depth (m)	Soil Type	N-Average	Unit weight (kNm^3)		Cohesion Cu (kNm^2)		Friction Angle (Degree)	
				γ	γ'	Lab	SPT	Lab	SPT
1	0-5.5	Sandy CLAY (I)	16	19.23	9.42	56	50	1	-
2	5.5-7.6	Sandy CLAY (II)	35	20.40	10.59	106	160	17	-
3	7.6-17.9	Silty SAND (I)	38	20.60	10.79	2	-	24	35
4	17.9-21.7	Sandy CLAY (III)	38	19.82	10.01	8	160	-	-
5	21.7-23.5	Silty SAND (II)	26	19.33	9.52	5	-	21	30
6	23.5-27.9	Sandy CLAY (IV)	66	20.99	11.81	51	200	-	-

Source: EIA Study Team

Table 3.3-1 (4) Result of Soil Parameters at Borehole No.4

Layer No.	Depth (m)	Soil Type	N-Average	Unit weight (kNm^3)		Cohesion Cu (kNm^2)		Friction Angle (Degree)	
				γ	γ'	Lab	SPT	Lab	SPT
1	0-19.0	Sandy CLAY (I)	16	19.42	9.61	44.43	50	11.33	-
2	19.0-23.0	Sandy CLAY (II)	33	18.74	8.93	99.06	160	19.51	-
3	23.0-28.9	Clayey SILT	39	18.84	9.03	47.50	160	-	-
4	28.9-33.5	Sandy CLAY (III)	62	18.15	8.34	5.93	200	25.31	-

Source: EIA Study Team

Table 3.3-1 (5) Result of Soil Parameters at Borehole No.5

Layer No.	Depth (m)	Soil Type	N-Average	Unit weight (kNm^3)		Cohesion Cu (kNm^2)		Friction Angle (Degree)	
				γ	γ'	Lab	SPT	Lab	SPT
1	0-10.5	Sandy CLAY (I)	17	20.21	10.40	56.84	50	11.94	-
2	10.5-17.8	Silty SAND (I)	25	20.70	10.89	1.10	-	23.99	30
3	17.8-21.7	Sandy CLAY (II)	37	20.31	10.50	107.36	160	21.00	-
4	21.7-22.5	Slightly silty SAND	46	17.85	8.04	3.72	-	24.79	35
5	22.5-32.5	Sandy SILT	56	17.95	8.14	73.5	200	-	-

Source: EIA Study Team

3.3.2. Water Source and Pipeline

3.3.2.1. Water Source

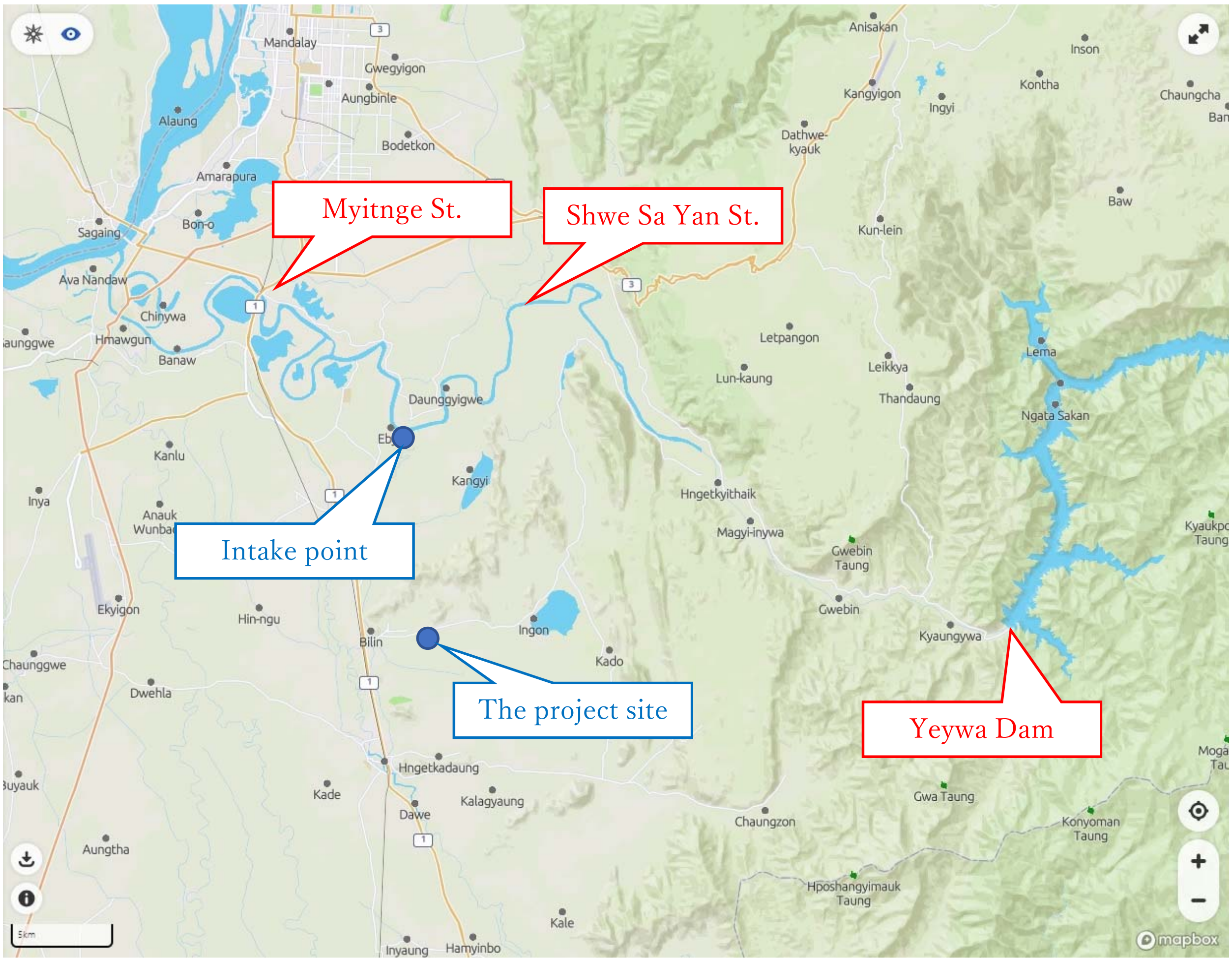
Myitnge River is selected for water source of the Project. Myitnge River locates north from the project site and major features are shown in Table 3.3-2. Myitnge River has two water gauge stations (Shwe Sa Yan Station and Myitnge Station) and Yeywa Dam is located upstream of the intake point of the Project.

The locations are shown in Figure 3.3-3. Based on these data, slope of the Myitnge River is assumed as 0.015 % (1/6,700).

Table 3.3-2 Major Features of Myitnge River

Description	Amount	Note
River Width	190 m	Roughly measured by EIA Study Team
Height of embankment	7 m	Roughly measured by EIA Study Team
Minimum Discharge	40 m^3/s	Estimated from discharge record at Shwe Sa Yan Station
Slope	1/6,700	Estimated from water level record at Myitnge Station and Shwe Sa Yan Station

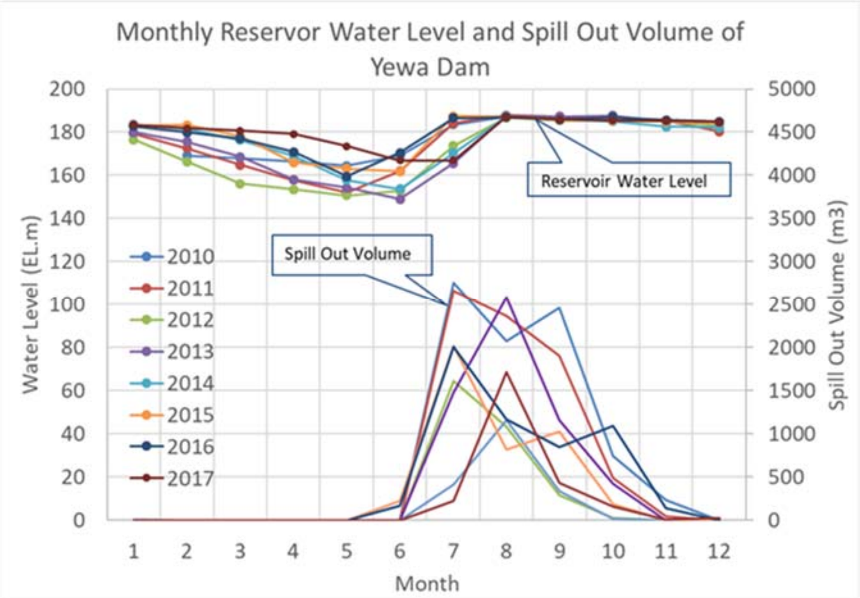
Source: Prepared by EIA Study Team based on the information provided by Kyaukse District Office of Irrigation and Water Utilization Management Department (IWUMD)



Source: EIA Study Team, based on the map from webpage https://mapcarta.com.

Figure 3.3-3 Locations of Shwe Sa Yan Station and Myitnge Station

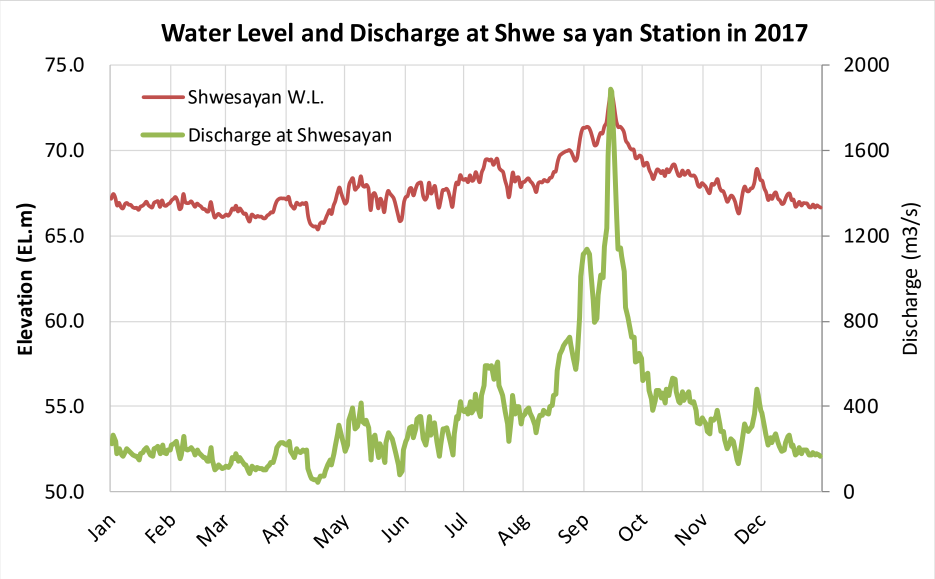
The Yeywa Dam was constructed in 2010 at the upstream side of the Myitnge River. The location of Yeywa Dam is shown in Figure 3.3-3. The Yeywa Dam is single purpose hydropower dam. Reservoir operation of the dam affects the profile of Myitnge River discharge. Figure 3.3-4 shows monthly reservoir water level and spill out volume of the Yeywa Dam. Reservoir water level declines from January to June to maximize the power generation. During rainy season, reservoir water level reach to the highest level and excess water is spilled out. Consequently, water flow of the Myitnge River during dry season is regulated by reservoir operation, whereas it is not during rainy season.



Source: EPGE

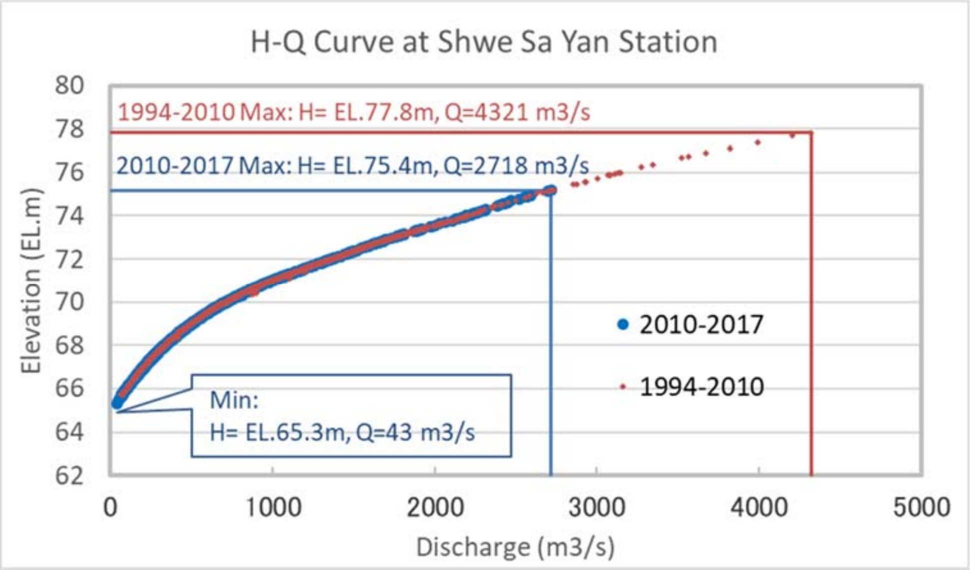
Figure 3.3-4 Monthly Reservoir Water Level of Yeywa Dam

Water level and discharge at Shwe Sa Yan Station in 2017 is shown in Figure 3.3-5. Spilled out discharge during rainy season affect the Myitnge River water level. H-Q curve at Shwe Sa Yan Station from 1994 to 2017 is shown in Figure 3.3-6. Lowest discharge was 43 m^3/s. After completion of the Yeywa Dam (from 2010 to 2017), maximum discharge decreased to 2,718 m^3/s. Prior to the dam construction, the maximum discharge from 1994 to 2017 was 4,321 m^3/s (October 10, 2006). As mentioned above, such floods have occurred during rainy season.



Source: Prepared by EIA Study Team based on the data from Kyaukse District Office of Irrigation and Water Utilization Management Department (IWUMD)

Figure 3.3-5 Water Level and Discharge at Shwe Sa Yan Station in 2017



Source: Prepared by EIA Study Team based on the data from Kyaukse District Office of Irrigation and Water Utilization Management Department (IWUMD)

Figure 3.3-6 H-Q Curve at Shwe Sa Yan Station

3.3.2.2. Water Pipeline

3.3.2.2.1. Material

Generally, steel, ductile iron and High-density polyethylene (HDPE) are used for water supply pipe. Compared to other materials, HDPE is lower cost and easily handled, while it has disadvantages such as low threshold pressure and weatherability. For this project, estimated internal pressure of pipeline is lower than design pressure of HDPE. Also, almost all the section of water pipeline will be installed underground. Therefore, HDPE is selected because of its high construction workability and cost effectiveness. In the portion that water pipe designed to be exposed to the ambient, HDPE pipes should be replaced by steel pipe or ductile iron pipe.

3.3.2.2.2. Diameter

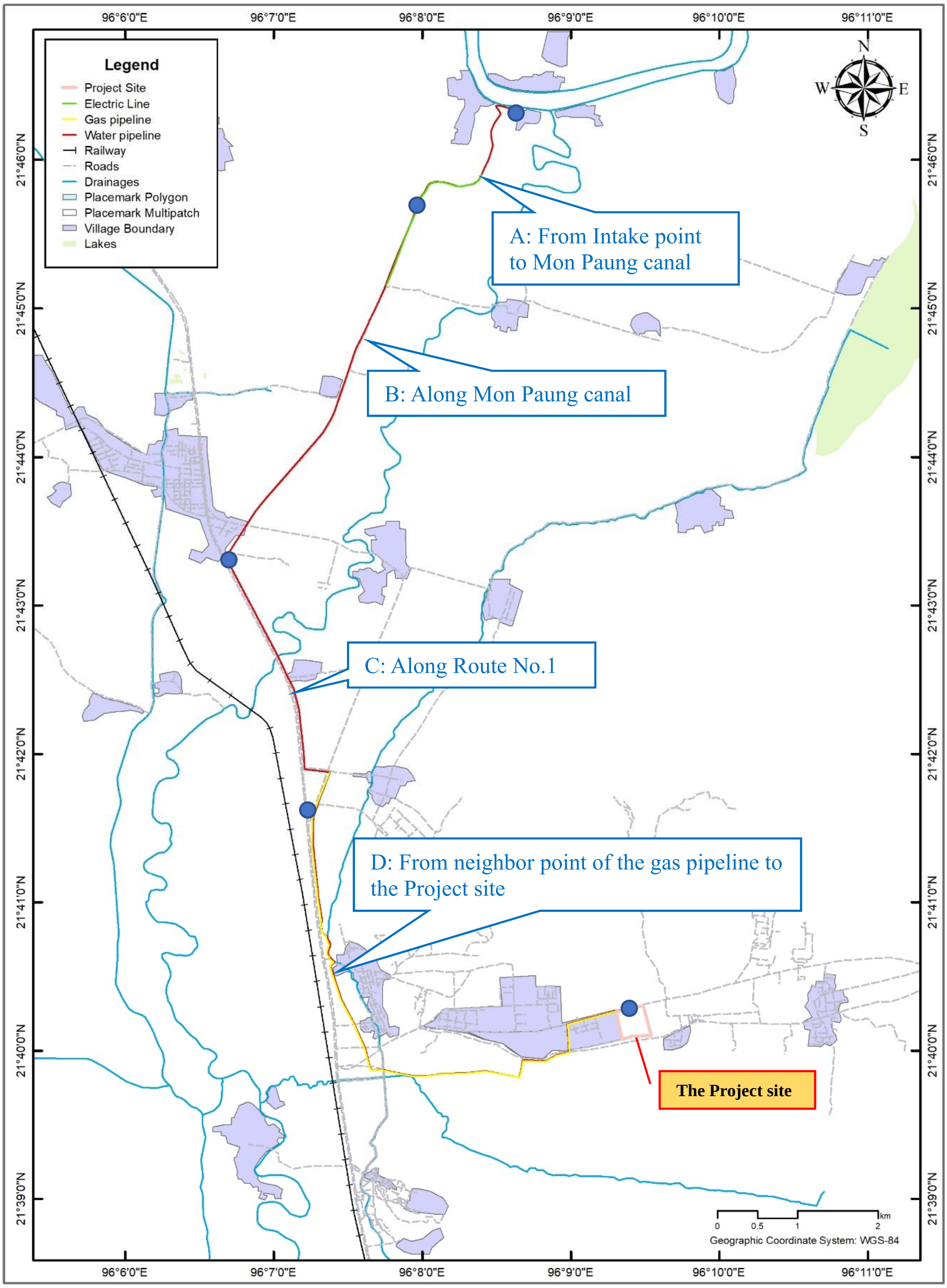
Generally, pipe diameter is determined with combination of parameters such as water velocity, cost, head loss and pump capacity. For the Project, minimum required water velocity is 0.6 m/s to prevent retention of solids. Considering the cost and minimum velocity, appropriate inner diameter is estimated as 300 mm based on the available information at this stage. This should be reviewed based on the market price of the pipe and pipe size optimized by supplier’s products in the detailed design stage.

3.3.2.2.3. Coverage

For pipe protection from load, minimum 0.6 m coverage is required. In addition, for cultivation area, about 1 m coverage is required for safety.

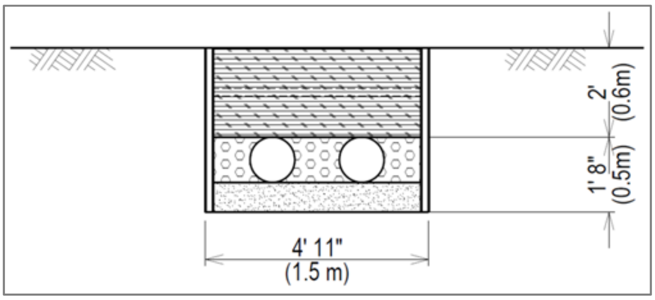
3.3.2.2.4. Typical Section of Water Pipe

Route of pipeline can be divided into 4 types of areas (areas A, B, C and D), as shown in Figure 3.3-7. Typical cross sections in these areas are shown in Figure 3.3-8 to Figure 3.3-11. For area A, water pipeline will be installed inside Sint Twin Village and Mat Kayar Village, where existing road is not wide. For the impact to traffic, temporary support such as steel sheet pile will be used to minimize work area in consideration of hindering traffic during installation.



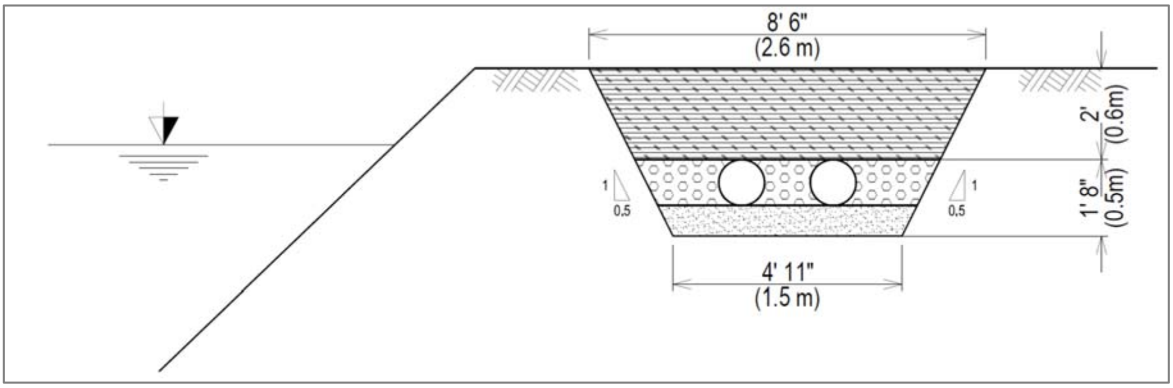
Source: EIA Study Team

Figure 3.3-7 Typical Areas of Pipeline Route



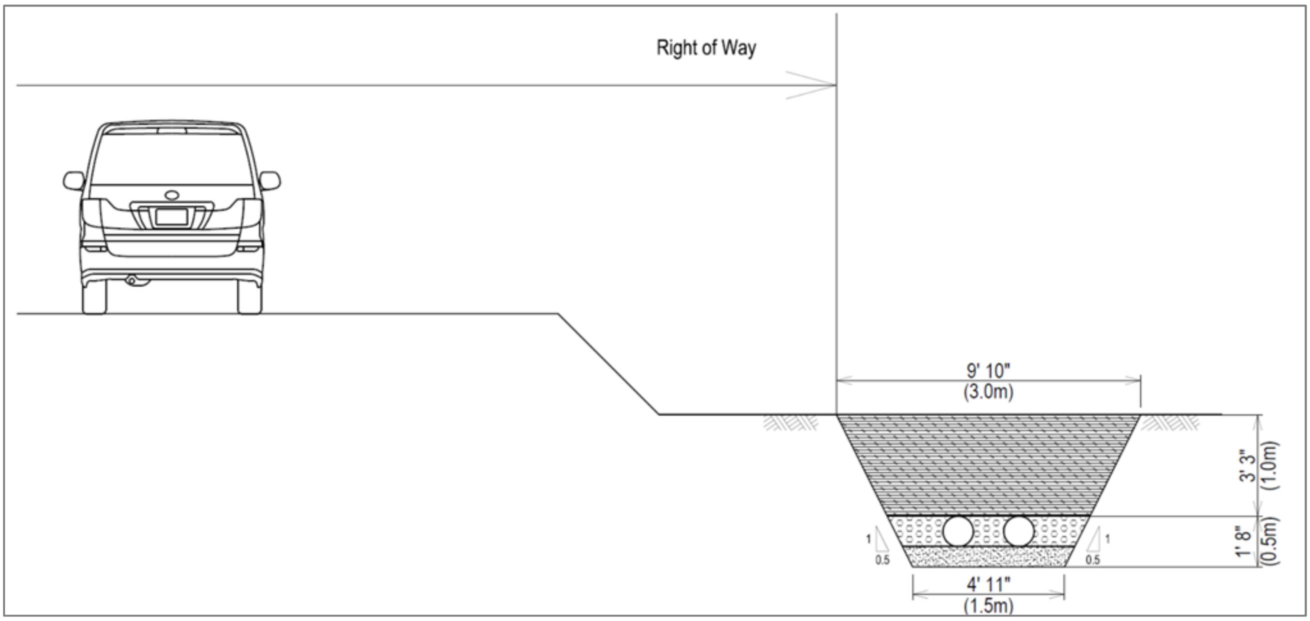
Source: EIA Study Team

Figure 3.3-8 Typical Section of Water Pipeline for Area A



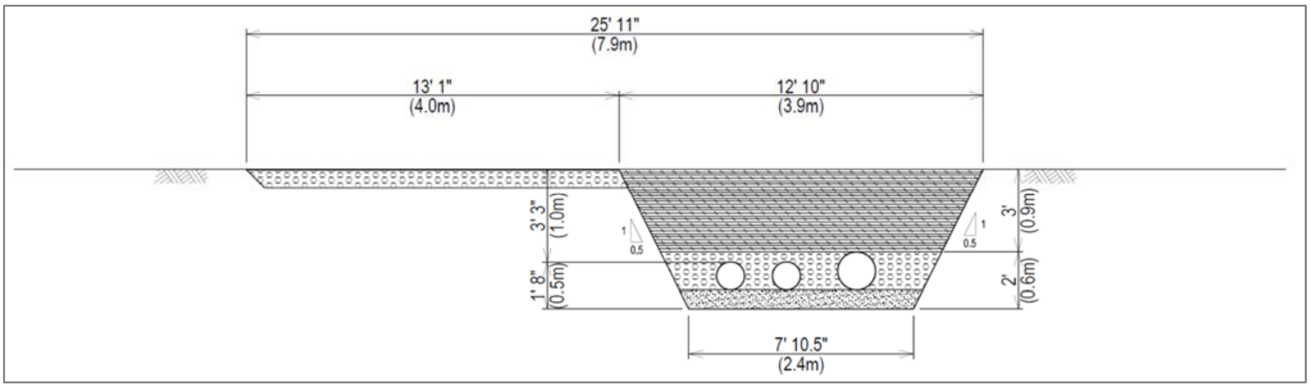
Source: EIA Study Team

Figure 3.3-9 Typical Section of Water Pipeline for Area B



Source: EIA Study Team

Figure 3.3-10 Typical Section of Water Pipeline for Area C

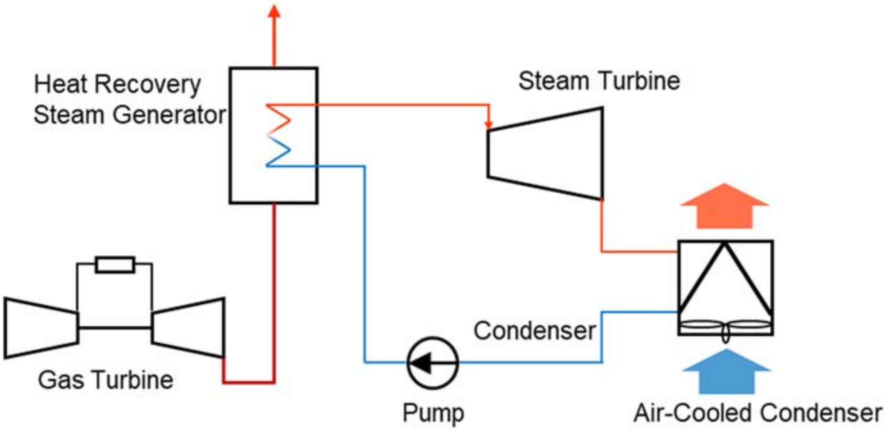


Source: EIA Study Team

Figure 3.3-11 Typical Section of Water Pipeline for Area D

3.3.3. Cooling System

Air cooling system is selected for the Project, which indirectly performs heat exchange with ambient air. The conceptual diagram of this method is shown in Figure 3.3-12.



Source: EIA Study Team

Figure 3.3-12 Conceptual Diagram of Air-Cooled Condenser System

CHAPTER 4. Description of the Surrounding Environment

4.1. Setting Study Limit

The Area of Influence (AOI) of this project is defined based on the type of the estimated impacts. The AOI have been set by considering expected impact and shown in Section 1.5.

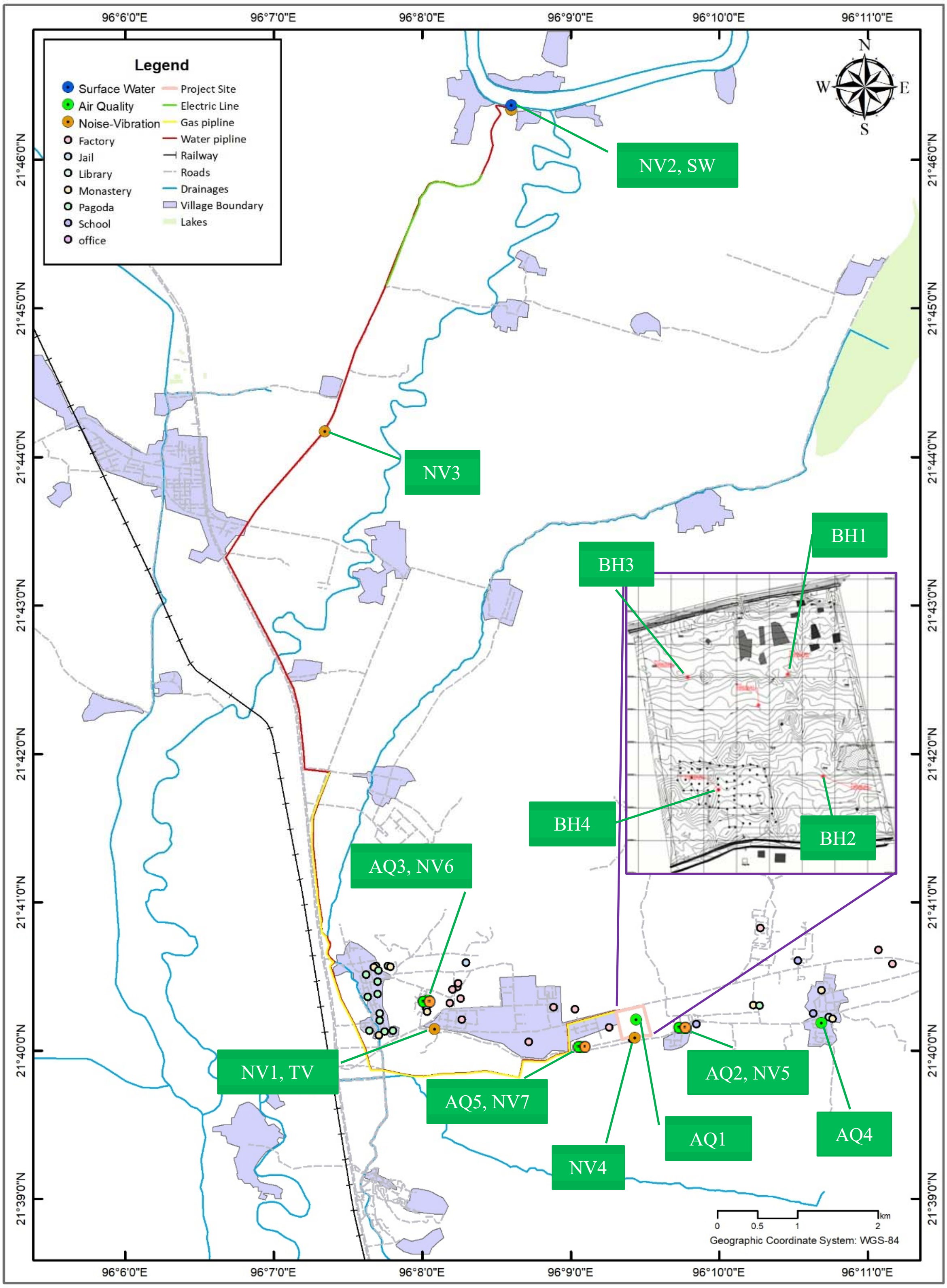
According to the AOI, field survey of physical and biological components was conducted to complement the baseline data from literature survey. Field survey items are shown in Table 4.1-1.

Table 4.1-1 Field Survey Items for Environmental Baseline Survey

Survey Item	Locations and Description	Duration
Air Quality and Climate Parameter	5 stations AQ1: Project site, Na Be Bin, AQ2: Na Be Bin, AQ3: Taung Yin, AQ4: Shan Gan, AQ5: IPP project site, Na Be Bin (see Table 4.2-25 for detail)	AQ1: Continuous 7 days in 2 seasons (Dry and Rainy season), others: 1day in dry season
Noise and Vibration Level	7 stations NV1: Beside Bellin-Yeywa road (Taung Yin), NV2: Met Ka Ya, NV3: Mont Paung, NV4: Na Be Bin, NV5: Na Be Bin, NV6: Taung Yin, NV7: IPP project site (see Table 4.2-16 for detail)	NV1,4: daytime and night time, NV2,3,5,6,7: daytime (1 weekday in dry season)
Traffic Volume	1 station TV: Beside Bellin-Yeywa road (Taung Yin) (Same as NV1, see Table 4.2-22 for detail)	24 hours (1 weekday in dry season)
Surface Water Quality	1 station SW: Myitnge river near intake/discharge point (Met Ka Ya) (see Table 4.2-8 for detail)	2 seasons (Dry and Rainy Season)
Ground Water Level	4 existing boreholes (in the Project site, Na Be Bin) BH-1, 2,3 and 4 in the project site (see Table 4.2-11 for detail)	4 times (from August 2018 to November 2018, once a month)
Flora and Fauna	Project site and surrounding, intake/discharge point, along gas/water pipeline	2 seasons (Dry and Rainy Season)
Landscape	Project site and surrounding	1 season (Dry season)

Source: EIA Study Team

Location of the stations and points listed in Table 4.1-1 are shown in Figure 4.1-1 .



Note: AQ :Air Quality, NV :Noise & Vibration, SW :Surface Water Quality, TV : Traffic Volume, BH : Borehole

Source: EIA Study Team

Figure 4.1-1 Location Map of Field Survey Sampling Locations

4.2. Physical Component

4.2.1. Climate and Meteorology

4.2.1.1. Literature Survey

The meteorology and climate of Myanmar is driven by the great monsoon circulation system of South East Asia with detailed influence by topographic peculiarities. The mountain ranges in Myanmar are generally running N-S, whereby presenting effective climate barriers for the SW monsoon in the summer and the NE monsoon in the winter. Therefore, the central part of the Inner Myanmar Tertiary Basin (Central Dry Zone) lies in a rain shadow during the summer monsoon (June to September) and receives less than 500 mm of precipitation. The considerable differences in relief along the path of the monsoon lead to the formation of the following climatic zones.

- Subtropical monsoon and subtropical mountain climates (the higher sections of the Indo-Myanmar and of the Shan Massif, north of 23° to 24° N), with mean temperatures of January is below 18°C and occasional frost during the winter months in the higher and northerly situated mountain regions: about 40 km (24.85 miles) in the western ranges and 190 km (118.06 miles) in the eastern plateau are in subtropical monsoon climate and 70 km (43.49 miles) in the eastern plateau is in subtropical mountain climatic condition.
- Typical climate of Mandalay is designated as a tropical wet and dry climate under the Köppen climate classification, with noticeably warmer and cooler periods of the year. Mandalay is very hot during the months of April and May, with average high temperatures easily exceeding 35 °C. Mandalay also features wet and dry seasons of nearly equal length, with the wet season running from May through October and the dry season covering the remaining six months.

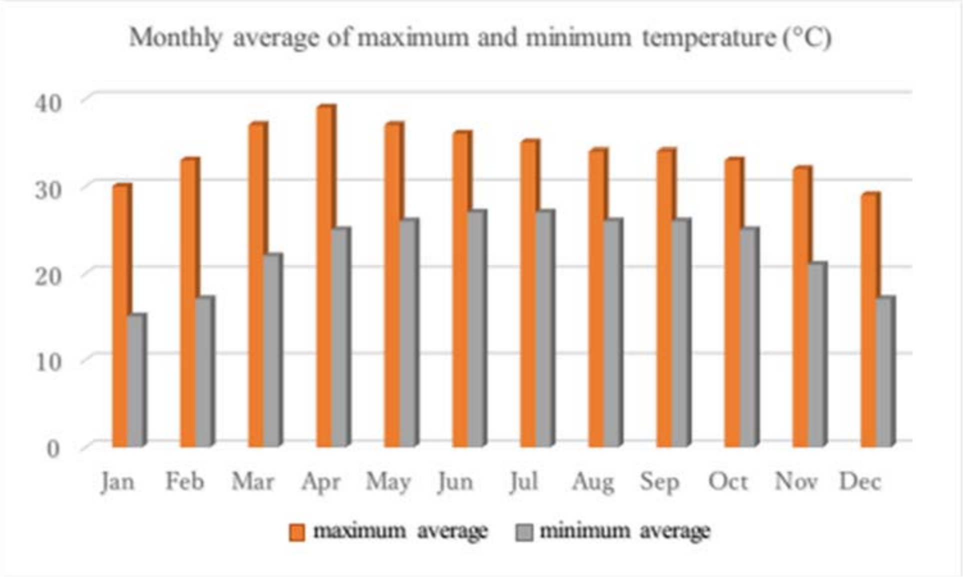
Sintgaing Township is situated in southern part of Mandalay Region and in the dry zone of Central Myanmar. Therefore, temperature is relatively high, and rainfall is relatively low. The nearest meteorology station is in Mandalay city. According to the climate data of Mandalay city during 2005 - 2015 (Ref: https://www.timeanddate.com/weather/myanmar/mandalay/climate), the maximum average temperature of Mandalay is 34°C and the minimum average temperature is 23°C. The highest temperature is 39°C in April and the lowest temperature is 15°C in January (see Table 4.2-1 and Figure 4.2-1). The average annual monthly rainfall is about 50.6 mm and the highest monthly rainfall is 126.9 mm in August (see Table 4.2-2 and Figure 4.2-2), with mean relative humidity of 66%.

Table 4.2-1 Monthly Average of Maximum and Minimum Temperature of Mandalay City (2005-2015)

Unit: °C

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
Day	30	33	37	39	37	36	35	34	34	33	32	29	34
Night	15	17	22	25	26	27	27	26	26	25	21	17	23

Source: https://www.timeanddate.com/weather/myanmar/mandalay/climate



Source: https://www.timeanddate.com/weather/myanmar/mandalay/climate

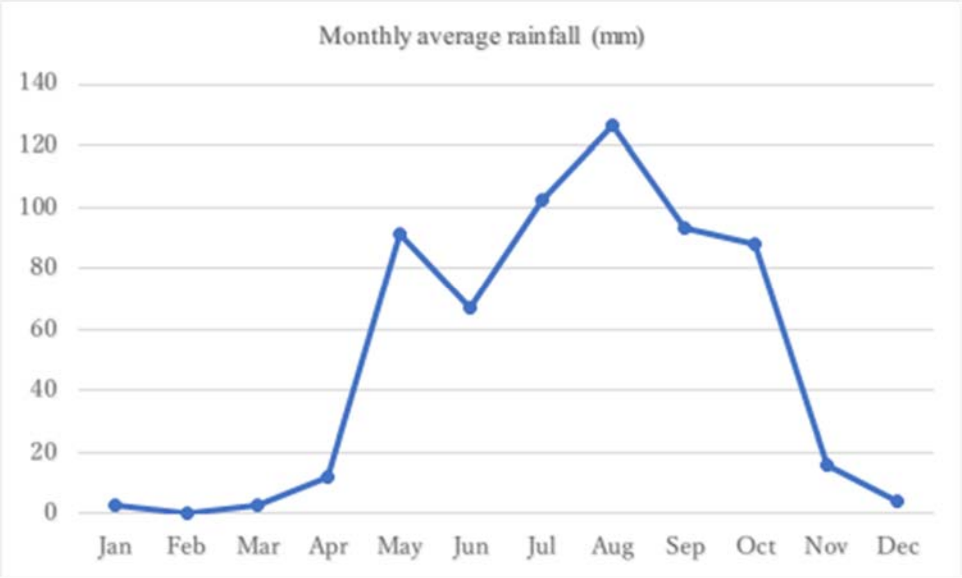
Figure 4.2-1 Monthly Average Maximum and Minimum Temperature of Mandalay City (2005-2015)

Table 4.2-2 Average Monthly Rainfall in Mandalay City (2005-2015)

Unit: °C

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
Mandalay	2.8	0.5	2.6	12.2	91.4	67.3	102.4	126.9	92.9	87.7	16.2	4.0	50.6

Source: https://www.timeanddate.com/weather/myanmar/mandalay/climate



Source: https://www.timeanddate.com/weather/myanmar/mandalay/climate

Figure 4.2-2 Monthly Average Rainfall of Mandalay City (2005-2015)

4.2.1.2. Field Survey

4.2.1.2.1. Methodology

4.2.1.2.1.1. Survey Items

Climate parameters, such as temperature, humidity, rainfall, solar radiation, wind speed and direction were also monitored during field survey. WatchDog Weather Station (Model- 2800) has been used to collect the climate parameter. Sampling rate or climate data will be measured automatically for every hour and directly read and recorded on site. The recorded wind data have been analyzed by using the WRPLOT View of AERMOD View (ver. 7.0).

4.2.1.2.1.2. Survey Location

The brief description of the monitoring points is presented in Table 4.2-3. Survey location is in the project site, located next to Belin sub-station. Belin-Yeywa road is located at the north of survey point and distanced about 50 m. The surrounding area is flat. Sampling location is shown in Figure 4.2-3.

Table 4.2-3 Location of Meteorology Survey

Survey Point	Survey Parameter	Coordinates	Detailed Description of Survey Point
AQ1	Meteorology	21°40'16.38"N 96° 9'26.06"E	In the project site, located at about 50 m from Belin-Yeywa road, Sintgaing Township (Na Be Bin Village)

Source: EIA Study Team

Source: EIA Study Team

Figure 4.2-3 Scene of Meteorology Survey at AQ1

4.2.1.2.1.3. Survey Period

Air quality and climate monitoring survey was conducted for seven consecutive days during the rainy season (August 2018) and dry season (October 2018). The measurement duration is shown in Table 4.2-4.

Table 4.2-4 Sampling Duration for Meteorology Survey

Sampling Point	Rainy Season	Dry Season
AQ 1	18 (Sat) - 25 (Sat) August 2018	4 (Thu) - 11 (Thu) October 2018

Source: EIA Study Team

4.2.1.2.1.4. Survey Method

WatchDog Weather Station (Model- 2800) was used to collect the climate parameters. Sampling rate and climate data were measured automatically for every an hour and directly read and recorded on site for the parameters shown in Table 4.2-5. Observation height of the wind sensor from the ground level is about 5 m. The recorded wind data were analyzed by using the WRPLOT View of AERMOD View (ver. 7.0) in which calm wind is defined below 0.5 m/s.

Table 4.2-5 Sampling and Analysis Method for Meteorology

No.	Parameter	Analysis Method
1	Wind Speed	Data logging
2	Wind Direction	Data logging
3	Rainfall	Data logging
4	Solar Radiation	Data logging
5	Temperature	Data logging
6	Humidity	Data logging

Source: EIA Study Team

4.2.1.2.2. Survey Result

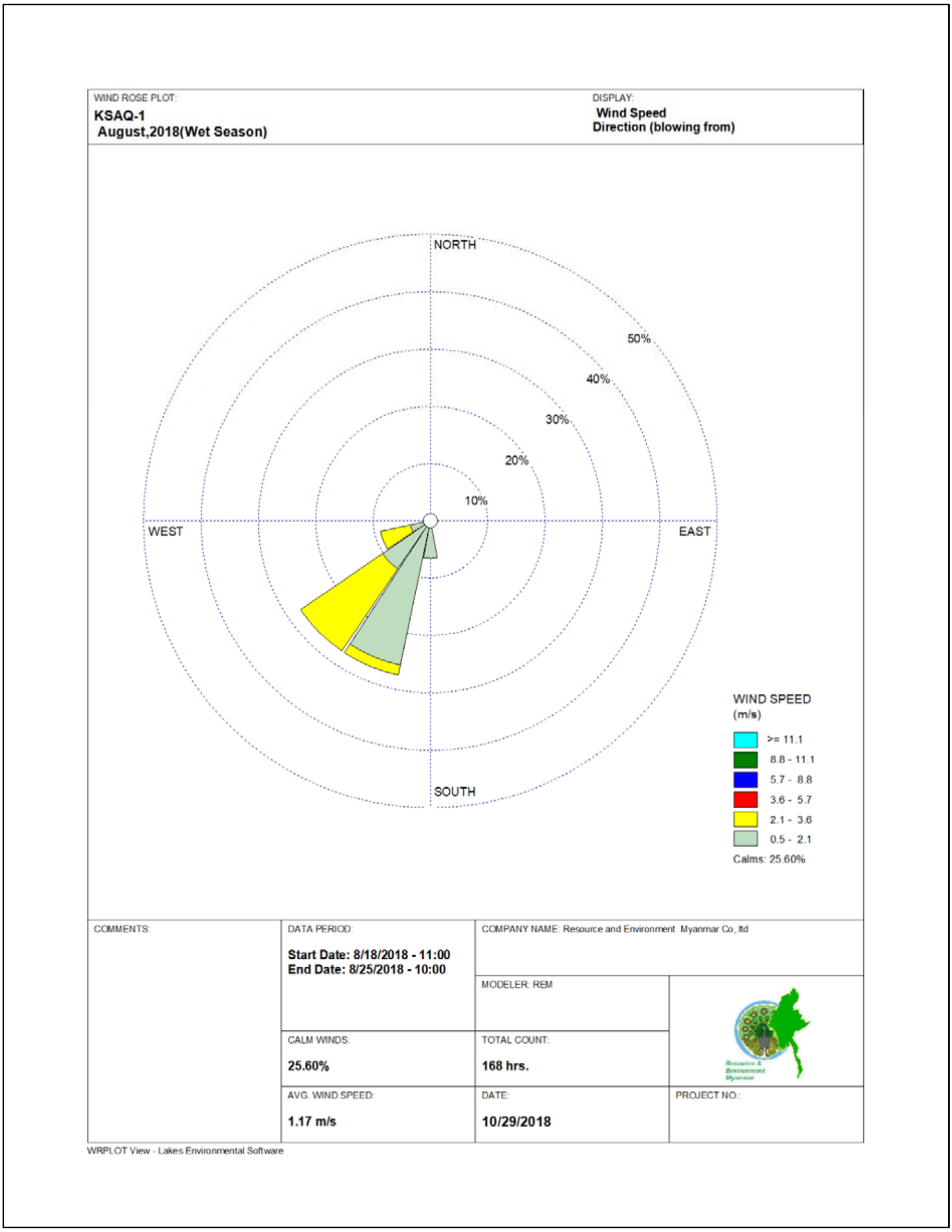
The results of climate parameter measurement are presented in Table 4.2-6. Because some days were rainy and cloudy during dry season, precipitation is higher than that of during rainy season as well as solar radiation were lower than during rainy season.

According to the wind rose analysis, the average wind speed during rainy season was 1.17 m/s and prevailing wind direction was from southwest as shown in Figure 4.2-4. During dry season, the prevailing wind direction was from northwest with 0.22 m/s average wind speed as shown in Figure 4.2-5. Clam wind was 25.6% during rainy season and 75.0% during dry season.

Table 4.2-6 Survey Results of Meteorology

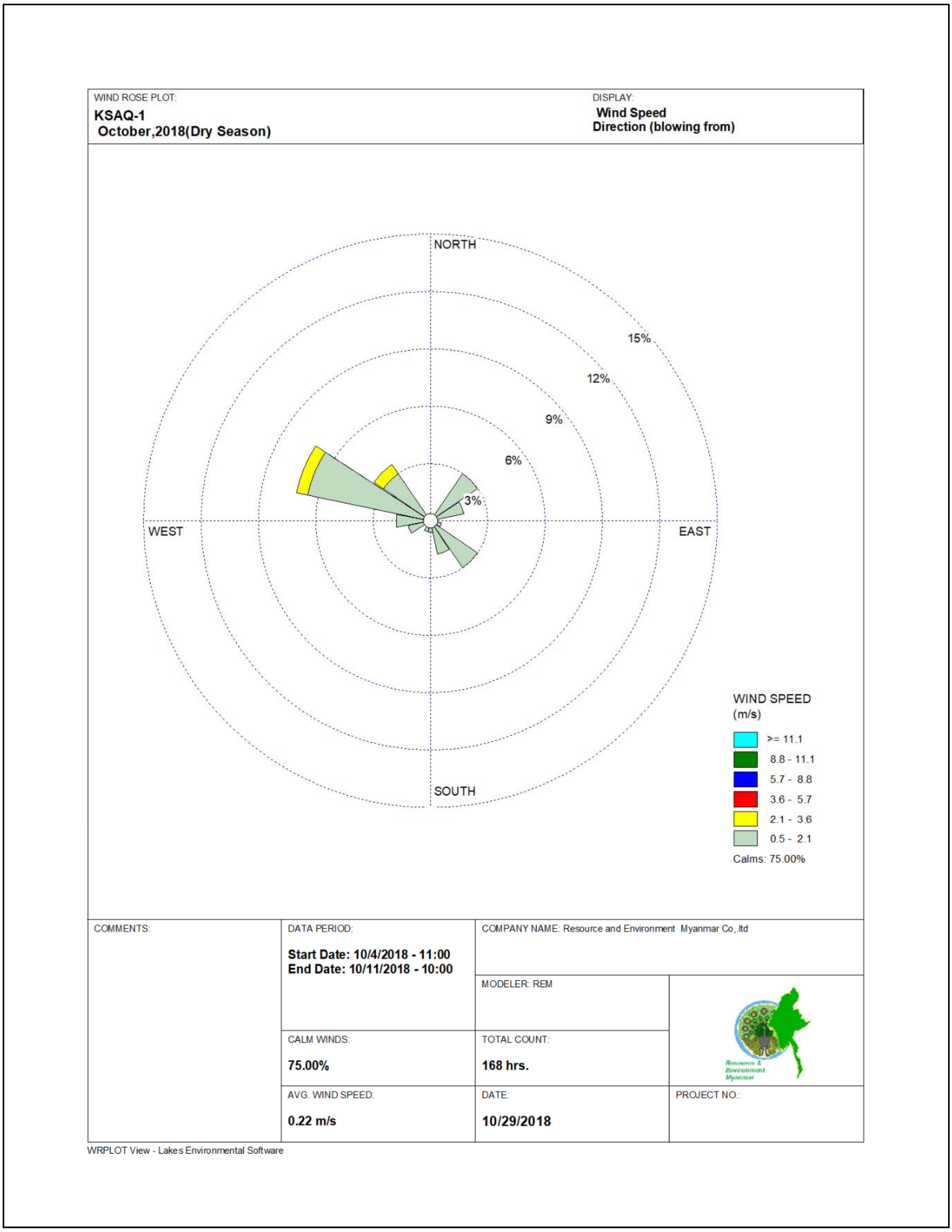
Season	Date	Temperature	Humidity	Precipitation	Solar Radiation
		°C	%	mm	watt/m^2
Rainy	18-19 Aug	26.53	83.56	0.2	243
	19-20 Aug	28.14	73.91	0.3	216
	20-21 Aug	28.40	69.90	0.0	214
	21-22 Aug	26.65	81.15	0.0	165
	22-23 Aug	28.61	69.91	0.0	230
	23-24 Aug	27.07	75.76	0.0	144
	24-25 Aug	26.73	77.99	0.0	222
Dry	4-5 Oct	25.67	85.52	3.1	160
	5-6 Oct	28.32	75.26	5.3	112
	6-7 Oct	27.88	82.56	13.2	85
	7-8 Oct	26.98	83.43	10.3	58
	8-9 Oct	25.36	86.73	9.1	66
	9-10 Oct	24.34	89.25	7.3	71
	10-11 Oct	23.63	85.31	5.0	178

Note: Temperature, humidity and solar radiation are daily average, while precipitation is total for one day.
Source: EIA Study Team



Source: EIA Study Team

Figure 4.2-4 Wind Rose Diagram for Rainy Season Survey



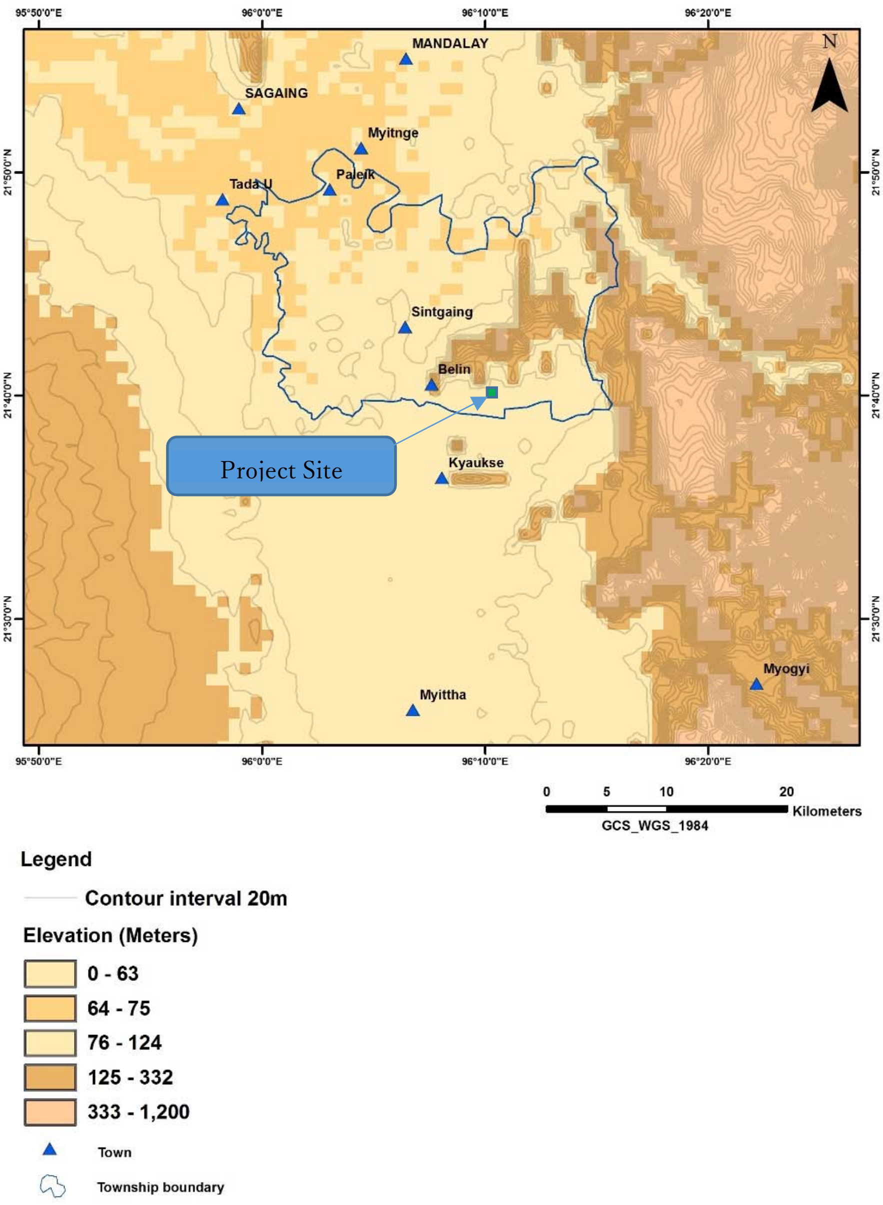
Source: EIA Study Team

Figure 4.2-5 Wind Rose Diagram for Dry Season Survey

4.2.2. Topography

4.2.2.1. Literature Survey

The project area is located in Sintgaing Township which is situated in the Dry Zone of Central Myanmar, between latitudes 21°39'N and 22°51'N, longitudes 95°57'E and 96°16'E. The area coverage of the township is about 173.18 sq. mi (448.54 km^2). Based on the Digital Elevation Map (DEM) shown in Figure 4.2-6, the general topographic features of the area are mostly plain with some isolated hills. The general elevation of the project area is about 90 m above sea level. The main topographic feature of the area is Keinnaya-Myeni Range (467 m) located north of the Project area.



Source: EIA Study Team

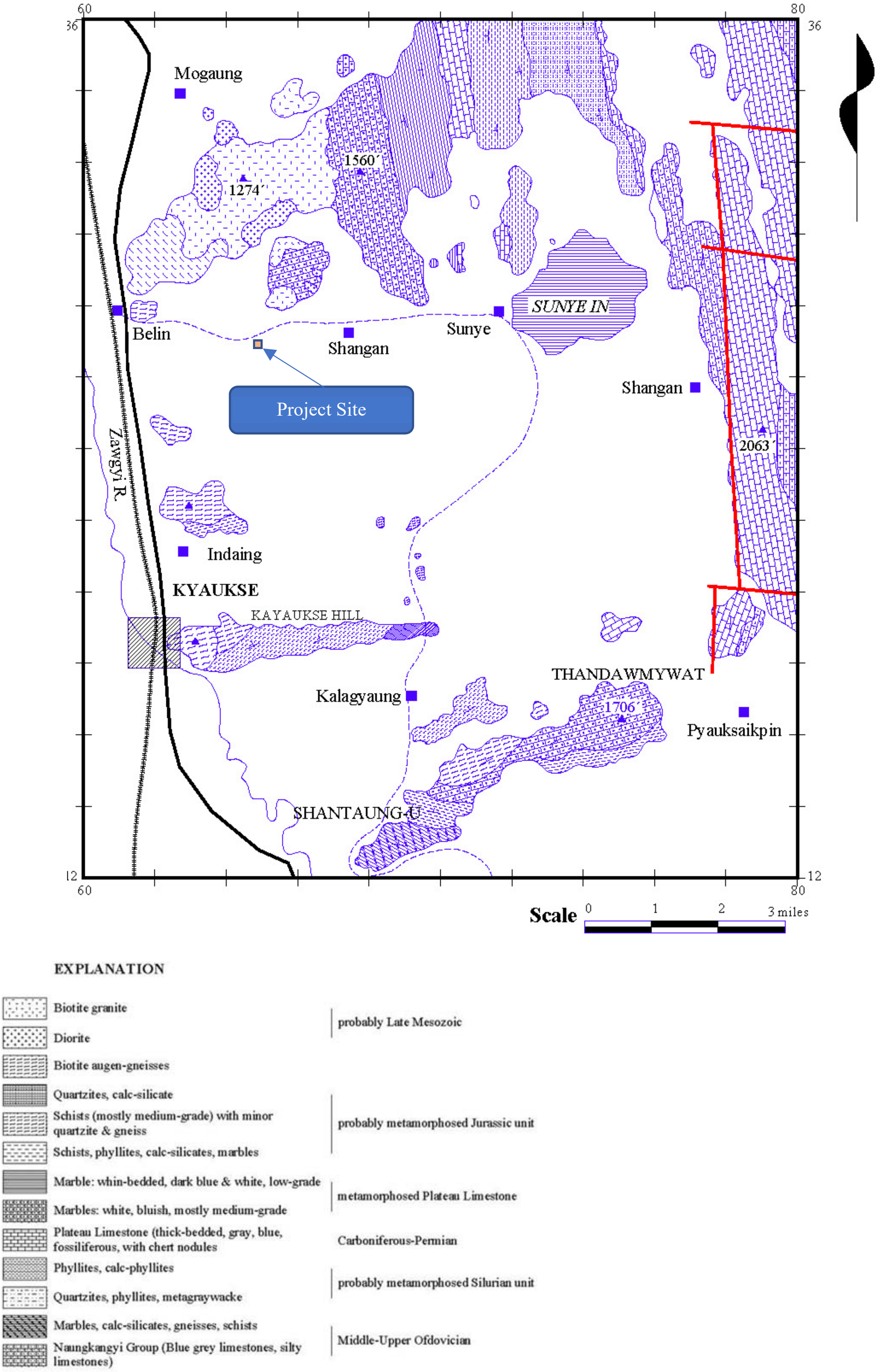
Figure 4.2-6 DEM of the Project Site

4.2.3. Geology

4.2.3.1. Literature Survey

According to Maung Thein (1973, 1983, 2010), Myanmar is geomorphologically and geotectonically divided into four main belts. These four belts are from East to West: (1) Eastern High Lands (Shan – Tanintharyi Block), (2) Central Lowland (Central Cenozoic Belt), (3) Western Ranges (Western Fold Belt) and (4) Rakhine Coastal Plain (Rakhine Coastal Belt). The project area is located at the foothill of the Eastern High Lands (Shan-Tannintharyi Block). The average elevation of the Eastern Highlands is about 1,000 m in Shan State sloping down to the south. The Eastern Highlands comprises the plateau of the Shan State in the north and its southern continuation through Kayin, Mon into the Tanintharyi Ranges, which ultimately pass on into Peninsular Malaysia. Eastern Highland is largely composed of older rock groups containing plateau limestone and metamorphic complex.

The rocks encountered in the project area and vicinity are highly deformed and metamorphosed. Meta-igneous rocks and Upper Paleozoic to Mesozoic metasedimentary rocks are well exposed along the Kyaukse ridge, Shantaung-U - Thandawmywet range and Minmwe hill. A large igneous body occurs at Belin Hill and biotite granite, granodiorite and diorite are found as major rock types. The ENE-WSW trending Keinnaya-Myeni Range is situated in the northern part of the project site and is built up with Upper Paleozoic to Jurassic metasedimentary and sedimentary rocks. Dattaw Range and Nwalegawk Hill are composed with Upper Paleozoic carbonate rocks. The regional geologic setting of the study area is shown in Figure 4.2-7.



Source: Aung Zaw Myint, Universities Research Journal 2011, Vol.4, No.5

Figure 4.2-7 Regional Geology Map of the Project Site

4.2.4. Soil Quality

4.2.4.1. Literature Survey

There is no existing or secondary data for soil quality in and around the project site.

4.2.5. Natural Disasters

4.2.5.1. Literature Survey

Myanmar has been experiencing changing weather events in almost every year during the last two to three decades. These include the onset, withdrawal, duration and intensity of monsoon and the frequency of the monsoon depressions[1]. The frequency of hot days and nights is expected to increase, while the frequency of cold days/nights will decrease.

Sintgaing Township has experienced flash flooding in some places especially in Myitnge Town nearby Myitnge River in 2016[2]. There is low probability for flooding to occur in and around the project site because the location is far from the main river. There is no information about drought described in the Township Profile (2017), Sintgaing Township General Administration Department (GAD).

4.2.6. Water Quality

4.2.6.1. Literature Survey

There is no existing or secondary data for surface and ground water quality in and around the Project site.

4.2.6.2. Field Survey

4.2.6.2.1. Methodology

4.2.6.2.1.1. Water Quality

4.2.6.2.1.1.1. Survey Items

The Project requires the water for domestic use in the site and for the steam turbine. In this project, water of Myitnge River is planned as the water source and thus surface water from Myitnge River was collected for the primary baseline data.

The river water depth, velocity and surface channel width were recorded at water quality sampling stations during baseline data collection, and parameter for water quality are shown in Table 4.2-7.

Table 4.2-7 Parameter for Surface Water Quality Survey

No.	Item	Analysis Method
1	Temperature	On site reading (HI7609829-1 Sensor)
2	pH	On site reading (HI7609829-1 Sensor)
3	Dissolved Oxygen (DO)	On site reading (HI7609829-2 Sensor)
4	Electrical Conductivity (EC)	On site reading (HI7609829-4 Sensor)
5	Depth	On site reading (Depth sounder)
6	Flow rate	On site reading (Flow rate meter)
7	Ammonia-Nitrogen	APHA-AWWA-WEF Method
8	Arsenic	AAS – Graphite Hydride Method
9	BOD_5	5210B. 5 Days BOD Test
10	COD	Close Reflux, Titrimetric Method
11	Cadmium	APHA-AWWA-WEF Method
12	Chromium (trivalent)	AAS – Graphite Furnace Method
13	Chromium (hexavalent)	AAS – Graphite Furnace Method

1 Tun Lwin, Khin and Cho Cho Shein, 2006. Hydrology and Meteorology Report of Myanmar
2 Township Profile (2017), Sintgaing Township General Administration Department

No.	Item	Analysis Method
14	Chromium (total)	AAS – Graphite Furnace Method
15	Copper	AAS – Graphite Furnace Method
16	Cyanide (free)	APHA-AWWA-WEF Method
17	Cyanide (total)	APHA-AWWA-WEF Method
18	Fluoride	APHA-AWWA-WEF Method
19	Iron	AAS – Graphite Furnace Method
20	Lead	AAS – Graphite Furnace Method
21	Mercury	APHA-AWWA-WEF Method
22	Nickel	APHA-AWWA-WEF Method
23	Nitrate-Nitrogen	APHA-AWWA-WEF Method
24	Nitrite-Nitrogen	APHA-AWWA-WEF Method
25	Oil & Grease	APHA-AWWA-WEF Method
26	Phenols	APHA-AWWA-WEF Method
27	Phosphate (total)	APHA-AWWA-WEF Method
28	Phosphorous (total)	APHA-AWWA-WEF Method
29	Residual Chlorine	APHA-AWWA-WEF Method
30	Selenium	APHA-AWWA-WEF Method
31	Sliver	APHA-AWWA-WEF Method
32	Sulfide	APHA-AWWA-WEF Method
33	Suspended Solids	Gravimetric Method
34	Total Nitrogen	APHA-AWWA-WEF Method
35	Zinc	AAS – Graphite Furnace Method
36	Total Coliform	APHA-AWWA-WEF Method
37	E. Coliform	APHA-AWWA-WEF Method

Source: EIA Study Team

4.2.6.2.1.1.2. Survey Location

The brief description of surface water point is presented in Table 4.2-8. The detail of the sampling point is described below.

Table 4.2-8 Sampling Point of Surface Water Quality

Sampling Point	Category	Coordinates	Description of Sampling Point
SW	Surface water	21°46'22.00"N 96° 8'36.10"E	Myitnge river, near proposed intake station 0.4km downstream from river junction of Myitnge and Zawgyi

Source: EIA Study Team

SW is located at Myitnge River, Makayar Village, Sintgaing Township, Mandalay Region, where the river is flowing from east to west. The sampling point is close to the southern bank of Myitnge River. Zawgyi River is flowing into the Myitnge River at upstream of the sampling point. The surrounding environment of the station is residential area and paddy field. The surface water was collected at the Myitnge River, about 0.4 km downstream from river junction of Myitnge River and Zawgyi River. Scene of the survey is shown in Figure 4.2-8.

Source: EIA Study Team

Figure 4.2-8 Scene of Surface Water Survey

4.2.6.2.1.1.3. Survey Period

Sampling and measuring of the surface water quality was conducted for both seasons on 19 August 2018 and 7 October 2018, as shown in Table 4.2-9.

Table 4.2-9 Survey time for Surface Water Quality

Category	Survey Point	Rainy Season	Dry Season
Surface Water	SW	19 August 2018	7 October 2018

Source: EIA Study Team

4.2.6.2.1.1.4. Survey Method

Water samples were taken by Alpha horizontal water sampler, collected in plastic bottles and sterilized in glass sample containers. All sampling was done in accordance with recognized standard procedures. The parameters as pH, temperature, dissolved oxygen (DO) and electrical conductivity (EC), including the odor and color in visual analysis were measured on site concurrently with sample collection. Some samples were preserved using the chemicals following to the standard procedure for laboratory analysis. All samples were kept in iced boxes and were transported to the laboratory. Moreover, the flow rate and depth of river were also measured using flow meter and depth sounder. Equipment applied for surface water quality analysis are as shown in Table 4.2-10.

Table 4.2-10 Field Equipment for Surface Water Quality Survey

No.	Equipment	Model/Serial No.	Manufacturer
1	Multi parameter for water quality	SmarTROLL MP SN-346054	In-Situ Inc.
2	Multi Parameters for water quality	HI 9829	HANNA
3	Alpha Bottle (Water Sampler)	Wildco P/N-1120-G45	Wildlife Supply Company®
4	Flow Meter	FB211 Serial -1449006336	GLOBAL WATER
5	Depth Sounder	FP211/1136160536	HONDEX

Source: EIA Study Team

Water samples were sent to REM-UAE Laboratory in Yangon, UAE Thailand and SGS Thailand for laboratory analysis.

4.2.6.2.1.2. Ground Water

4.2.6.2.1.2.1. Survey Items

Ground Water level was measured.

4.2.6.2.1.2.2. Survey Location

There are four existing ground water boreholes in the project site, which were dug during feasibility study. As the baseline survey, ground water level measurement was also done monthly at each borehole for 4 continuous months. The brief description of each locations is presented in Table 4.2-11. Scene of the survey is shown in Figure 4.2-9.

Table 4.2-11 Location of Ground Water Bore Holes

Category	Sampling Point	Coordinates	Description of Sampling Point
Ground water	BH-1	21°40'13.84"N 96° 9'26.78"E	At north eastern part of project site
	BH-2	21°40'8.80"N 96° 9'28.75"E	At south eastern part of project site
	BH-3	21°40'13.58"N 96° 9'21.50"E	At north western part of project site
	BH-4	21°40'8.06"N 96° 9'23.24"E	At southwestern part of project site

Source: EIA Study Team

Source: EIA Study Team

Figure 4.2-9 Scene of Ground Water Level Measurement

4.2.6.2.1.2.3. Survey Period

Ground water level measurement were conducted monthly for four times as shown in Table 4.2-12.

Table 4.2-12 Ground Water Level Measurement Schedule

1st Time	2nd Time	3rd Time	4th Time
19 August 2018	21 September 2018	7 October 2018	9 November 2018

Source: EIA Study Team

4.2.6.2.1.2.4. Survey Method

Survey method is shown in Table 4.2-13. Groundwater level of the existing borehole are measured by using water level meter which can measure up to 50 m in depth.

Table 4.2-13 Field Equipment for Groundwater Level

No.	Equipment	Model/Serial No.	Manufacturer
1	Water Level Meter	101B	Solinst

Source: EIA Study Team

4.2.6.2.2. Survey Result

4.2.6.2.2.1. Surface Water

Results of surface water quality survey are shown in Table 4.2-14.

Table 4.2-14 Survey Results of Surface Water Quality

No.	Parameter	Unit	Rainy	Dry	Target Value
1	Temperature	ºC	27.94	26.8	-
2	pH	-	7.58	7.9	6-9
3	Dissolved Oxygen (DO)	mg/l	7.8	7.4	-
4	Electrical Conductivity (EC)	µs	363.9	332.9	-
5	Depth	m	7.6	7.8	-
6	Flow rate	m/s	1.1	1.3	-
7	Ammonia-Nitrogen	mg/l	0.078	0.08	10
8	Arsenic	mg/l	0.0015	0.0003	0.1
9	BOD_5	mg/l	2.5	1.4	30
10	COD	mg/l	ND	ND	125
11	Cadmium	mg/l	ND	ND	0.1
12	Chromium (trivalent)	mg/l	ND	ND	-
13	Chromium (hexavalent)	mg/l	ND	ND	0.1
14	Chromium (total)	mg/l	ND	ND	0.5
15	Copper	mg/l	ND	ND	0.5
16	Cyanide (free)	mg/l	ND	ND	0.1
17	Cyanide (total))	mg/l	ND	ND	1
18	Fluoride	mg/l	0.42	0.38	20
19	Iron	mg/l	0.313	0.228	1
20	Lead	mg/l	ND	ND	0.1
21	Mercury	mg/l	ND	0.0002	0.005
22	Nickel	mg/l	ND	ND	0.5
23	Nitrate-Nitrogen	mg/l	4.82	0.13	-
24	Nitrite-Nitrogen	mg/l	0.03	ND	-
25	Oil & Grease	mg/l	ND	ND	10
26	Phenols	mg/l	ND	ND	0.5
27	Phosphate (total)	mg/l	ND	ND	-
28	Phosphorous (total)	mg/l	ND	ND	2
29	Residual Chlorine	mg/l	ND	ND	0.2
30	Selenium	mg/l	ND	ND	0.1
31	Sliver	mg/l	ND	0.004	0.5
32	Sulfide	mg/l	ND	ND	1
33	Suspended Solids	mg/l	10.2	10.2	50
34	Total Nitrogen	mg/l	5.58	0.48	10
35	Zinc	mg/l	ND	ND	2
36	Total Coliform	MPN/100ml	240	170	400
37	E. Coliform	MPN/100ml	<1.1	16	-

Source: EIA Study Team

4.2.6.2.2.2. Ground Water

Results of monthly measurement for ground water level is presented in Table 4.2-15.

Table 4.2-15 Survey Results of Groundwater Level of Bore Holes

Unit: m

Bore Hole	1st Time (19 August 2018)	2nd Time (21 September 2018)	3rd Time (7 October 2018)	4th Time (9 November 2018)
BH-1	7.7	7.85	7.85	7.84
BH-2	4.93	5.0	4.95	4.83
BH-3	8.14	8.15	8.18	8.14
BH-4	5.53	5.6	5.65	5.58

Source: EIA Study Team

4.2.7. Noise and Vibration

4.2.7.1. Literature Survey

There is no existing or secondary data for noise and vibration level in and around the project site.

4.2.7.2. Field Survey

4.2.7.2.1. Methodology

4.2.7.2.1.1. Survey Items

The Project is located in a rural area and the dominant source of noise is from human and livestock activities. The primary sources of noise and vibration are mainly the road traffic from the nearby main road and factories. Sound Pressure Level (L_{Aeq} dB) and Vibration level (L_{v10} dB) have been measured.

During the field survey, seven points for noise and vibration, divided into two types of noise and vibration were monitored. The first three points were installed to monitor both noise and vibration generated along the roads. The remaining four survey points were established to measure environmental noise and vibration. The details of the survey points are shown in Table 4.2-16. These survey locations were set to grasp the baseline data and to assess the environmental impact from the Project.

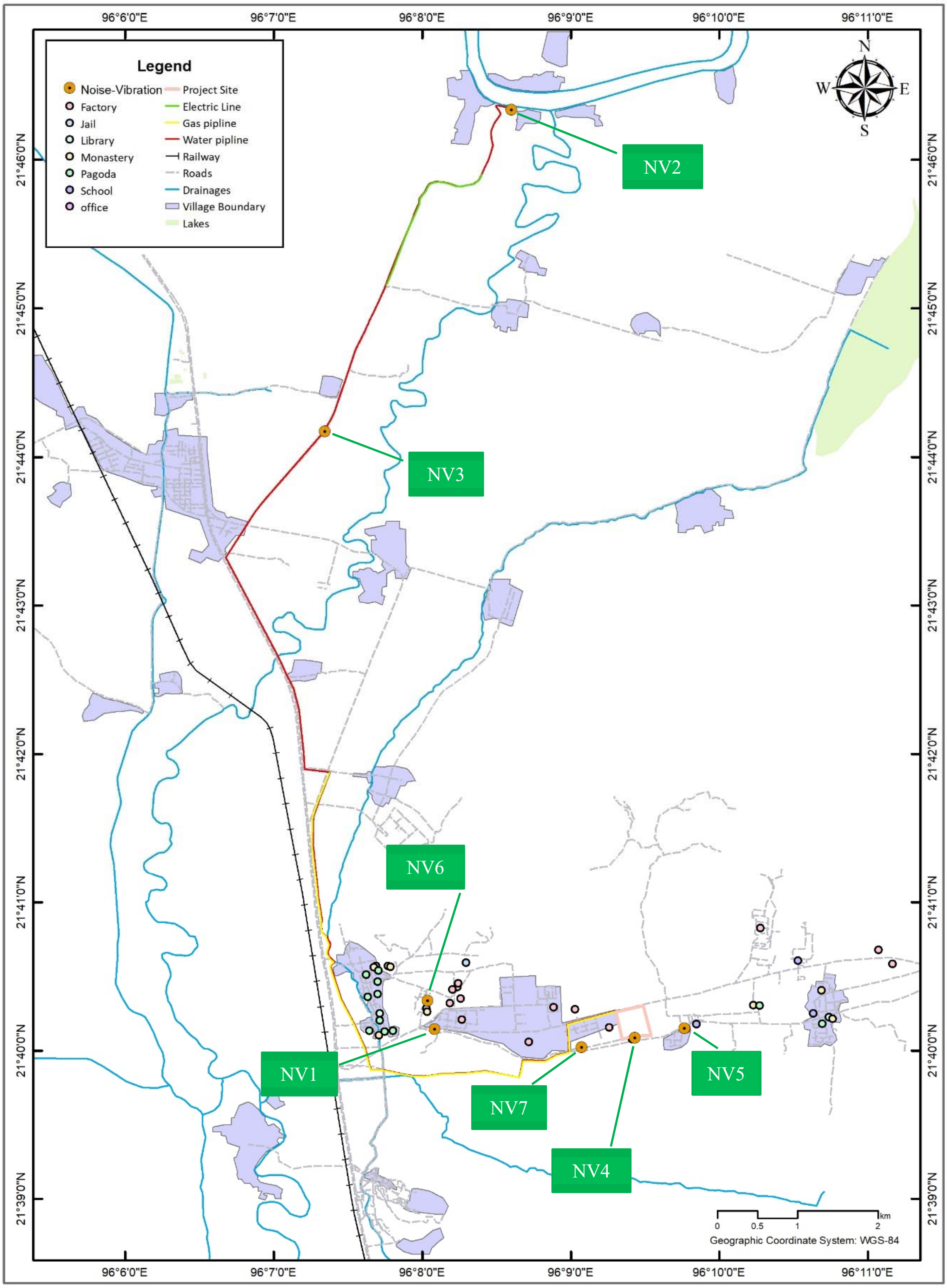
Table 4.2-16 Location of Noise and Vibration Survey

Survey point	**Survey item**	**Coordinates**	**Description**
NV1[a)]	Noise, Vibration	21°40'8.70"N 96° 8'5.10"E	Beside of Bellin-Yeywa Road, about 2 km west of the project site boundary (Taung Yin Village)
NV2	Noise, Vibration	21°46'20.20"N 96° 8'36.10"E	Intake station; about 11 km north of the project site boundary (Met Ka Ya Village)
NV3	Noise, Vibration	21°44'10.20"N 96° 7'20.80"E	Intermediate pump station 1; about 8 km north of the project site boundary (Mont Paung Village)
NV4	Noise, Vibration	21°40'5.10"N 96° 9'26.00"E	Monastery:25 m south of the project site boundary (Na Be Bin Village)
NV5	Noise, Vibration	21°40'8.89"N 96° 9'45.93"E	Monastery; 0.4 km east of the project site boundary (Na Be Bin Village)
NV6	Noise, Vibration	21°40'20.14"N 96° 8'2.22"E	Primary school; 2.2 km west of the project site boundary (Taung Yin Village)
NV7	Noise, Vibration	21°40'1.21"N 96° 9'4.44"E	IPP Project site; 0.5 km west of the project site boundary (Na Be Bin Village)

Note: a) Traffic volume survey was also conducted
Source: EIA Study Team

4.2.7.2.1.2. Survey Location

Survey locations of noise and vibration are shown in Figure 4.2-10.



Note: NV: Noise & Vibration
Source: EIA Study Team

Figure 4.2-10 Location Map of Noise and Vibration Survey

NV1 was installed in an open area beside Bellin-Yeywa Road, Sintgaing Township, Mandalay Region. The road is paved with asphalt, and medium to highly traffic activities in daytime and low traffic activity in night time period. Belin sub-station is distance about 2 km from the survey point. Noise and vibration may be come mainly from vehicle traffic activities. Scene of the survey is shown in Figure 4.2-11.

Source: EIA Study Team

Figure 4.2-11 Scene of Noise and Vibration Measurement at NV1

NV2 was monitored in an open area, near proposed intake station, Met Ka Ya Village, Sintgaing Township, Mandalay Region. The road is paved with earth and low traffic activities. The survey point is about 3 m away from the road as well as 10 m from the nearest house. Noise may be come from traffic activities, residential activities, sound of rain and sound speaker from monastery during measurement. Scene of the survey is shown in Figure 4.2-12.

Source: EIA Study Team

Figure 4.2-12 Scene of Noise and Vibration Measurement at NV2

NV3 was monitored in an open area beside Sintgaing-Met Ka Ya Road, Sintgaing Township, Mandalay Region. The road is paved with earth and moderately traffic activities. Proposed intermediate pump station is distance about 80 m from the survey point. Noise may be come from traffic such as light track and motorbike and sound of rain during monitoring. Scene of the survey is shown in Figure 4.2-13.

Source: EIA Study Team

Figure 4.2-13 Scene of Noise and Vibration Measurement at NV3

NV4 was measured at the "Kin" pagoda compound of Na Be Bin village, Sintgaing Township, Mandalay Region. NV4 is located about 0.31 km southeast of Bellin Substation and 0.38 km west of Na Be Bin Village. NV4 is very close to southern fence of the project site. Noise may be come from residential activities and sound of rain. Scene of the survey is shown in Figure 4.2-14.

Source: EIA Study Team

Figure 4.2-14 Scene of Noise and Vibration Measurement at NV4

NV5 is situated at the monastery of Na Be Bin Village, located at east of project site and distanced about 500 m from project site. The surrounding is residential houses and flat. Possible sources are from the traffic activities along access road within the village.

NV6 is situated in the primary school compound of Taung Yin Village, located at west of project site and distanced about 2.3 km from the project site. The surrounding is residential houses and geographical features are mostly flat. Possible emission sources are from the traffic activities along access road within the village.

NV 7 is situated in the compound of 135 MW Kyaukse IPP, located at west of project site and distanced about 500 m from project site. The surrounding is flat. The emission gas from the gas turbines which has a possibility of causing significant impact on air, but there is no major emission source such as heavy industries around the monitoring point. The surrounding environment of NV 5 to NV 7 is as shown in Figure 4.2-15

NV5	NV6
NV7	

Source: EIA Study Team

Figure 4.2-15 Scene of Noise and Vibration Measurement at NV5, NV6, and NV7

4.2.7.2.1.3. Survey Period

Noise and vibration survey were conducted for 24 hours (daytime and night time) at two stations (NV1, NV4) and 15 hours (daytime) at two stations (NV2, NV3), and three times for 2 hours duration at other three station (NV5, NV6, NV7). The measurement dates and duration are as shown in Table 4.2-17.

Table 4.2-17 Sampling duration for Noise and Vibration

Survey Point	Period
NV1	Fri, 5 to 6 Oct (daytime and night time), 2018
NV2	Mon, 8 Oct (daytime), 2018
NV3	Tue, 9 Oct (daytime), 2018
NV4	Wed, 10 to 11 Oct (daytime and night time), 2018
NV5	Wed. 23 Oct. (daytime), 2019
NV6	Wed. 23 Oct. (daytime), 2019
NV7	Wed. 23 Oct. (daytime), 2019

Source: EIA Study Team

4.2.7.2.1.4. Survey Method

Measurement of noise and vibration level was conducted by referring to the recommendation of International Organization for Standardization (ISO), i.e. ISO 1996-1:2003 and ISO 1996-2:2007. The instruments used for the survey are as shown in Table 4.2-18.

Table 4.2-18 Instrument for Measurement of Noise and Vibration Level

Parameter	Instrument	Model	Manufacture
Noise	Sound level meter	SL-4023SD	Lutron
Vibration	Vibration level meter	VM-55	Rion Co. Ltd. (Japan)

Source: EIA Study Team

The instrument used for noise measurement was set at the height of 1.2 m. A-weighted loudness equivalent level was measured automatically every 10 minutes and recorded in a memory card. One-hour L_{Aeq} was calculated by using the following array formula.

10*LOG10 (AVERGAE (10^ ((RANGE)/10)))

The vibration instrument used was the VM-55 Vibration Level Meter accompanied by a 3-axis accelerometer which was placed on solid soil ground near the roads. Vertical vibration (Z axis), L_v, was hourly measured and recorded. L_v (dB) vibration levels were recorded as $L_{v,max}$, $L_{v,min}$, L_{v5}, L_{v10}, L_{v50}, L_{v90}, L_{v95}, and L_{veq}. L_{v10} was the vibration level used in accordance with referred standard.

4.2.7.2.2. Survey Result

4.2.7.2.2.1. Noise Level

The results of equivalent noise level (L_{Aeq}) measurement are presented in Table 4.2-19. The noise level at NV1 and NV7 were compared with "Industrial, commercial" of National Environmental Quality (Emission) Guideline, 2015, where daytime and night-time noise level complied with target value. Most of noise levels at the remaining five stations compared with target value, which applies to "Residential, institutional, education", are higher than the target value, except daytime of NV4 and NV5.

Table 4.2-19 Survey Results of Equivalent Noise Level (L_{Aeq})

Survey Point	Equivalent Noise Level (L_{Aeq}, dB)		***Target Value (L_{Aeq}, dB)***	
	Daytime (7:00 AM - 10:00 PM)	Nighttime (10:00 PM - 7:00 AM)	Daytime (7:00 AM - 10:00 PM)	Nighttime (10:00 PM - 7:00 AM)
NV1	68	62	***70***	***70***
NV2	57	-	***55***	***45***
NV3	60	-	***55***	***45***
NV4	51	48	***55***	***45***
NV5	47	-	***55***	***45***
NV6	56	-	***55***	***45***
NV7	69	-	***70***	***70***

Source: EIA Study Team

4.2.7.2.2.2. Vibration Level

Vibration level (Lv_{10}) at each point are presented in Table 4.2-20. The vibration level at NV1 and NV7 were compared with target value from Japanese standard of road traffic vibration, which daytime and nighttime vibration level complied with target value. Vibration levels at the remaining five stations also complied with target value which is applied for "Road side level of residential area" vibration of Japanese standard.

Table 4.2-20 Survey Results of Vibration Level

Survey Point	Vibration Level (L_{v10}, dB)		Target value (L_{v10}, dB)	
	Daytime (7:00 AM - 10:00 PM)	Nighttime (10:00 PM - 7:00 AM)	Daytime (7:00 AM - 10:00 PM)	Nighttime (10:00 PM - 7:00 AM)
NV1	30	25	***70***	***65***
NV2	25	-	***65***	***60***
NV3	29	-	***65***	***60***
NV4	Less than 25	16	***65***	***60***
NV5	Less than 25	-	***65***	***60***
NV6	Less than 25	-	***65***	***60***
NV7	25	-	**70**	**65**

Source: EIA Study Team

4.2.8. Traffic Volume

4.2.8.1. Literature Survey

There is no existing or secondary data for traffic volume in and around the Project site.

4.2.8.2. Field Survey

4.2.8.2.1. Methodology

4.2.8.2.1.1. Survey Items

The Project site is located beside car road which is connecting between National Highway No.1 and Yeywa Dam. In order to fulfil the environmental consideration, traffic volume survey was conducted as the same schedule at NV1. Traffic volume was recorded by three types of vehicles, shown in Table 4.2-21. Hourly quantities of each type of vehicle and direction (i.e., from National Highway No.1 (Yangon-Mandalay) or to National Highway No.1) were recorded.

Table 4.2-21 Classification of Vehicle Types

No.	Classification	Description
1	Two-wheeled vehicle	Motorbike,
2	Four-wheeled light vehicle	Pick-up car, Jeep, Taxi, Saloon car, Light truck
3	Four-wheeled heavy vehicle	Medium bus, Express, Big bus, Medium truck, Heavy truck

Source: EIA Study Team

4.2.8.2.1.2. Sampling Location

The survey location is described in Table 4.2-22.

Table 4.2-22 Location of Traffic Volume Survey Point

Survey point	Survey item	Coordinates	Description	Note
TV	Traffic volume	21°40'8.70"N 96° 8'5.10"E	Beside of Bellin-Yeywa Road near Bellin Substation (Taung Yin Village) Distanced about 1.1 km from National Highway No.1 (Yangon-Mandalay)	Same location of NV1

Source: EIA Study Team

The location of the survey point and its relationship with the transportation network in the area is shown in Figure 4.2-16.

Source: EIA Study Team

Figure 4.2-16 Scene of Traffic Volume Survey at TV

4.2.8.2.1.3. Survey Period

The vehicle traffic survey was conducted for a weekday during the dry season in October 2015 at the same time as the traffic noise and vibration level survey at NV1. Detail of the survey period is shown in Table 4.2-23.

Table 4.2-23 Survey Period for Traffic Volume Survey

Survey Point	Survey Period
TV	5 Oct (7:00 AM) - 6 Oct (7:00 AM)

Source: EIA Study Team

4.2.8.2.1.4. Survey Method

Number of vehicles and direction were recorded by observation and tally counters.

4.2.8.2.2. Survey Result

Traffic volume recorded at the survey point is presented in Table 4.2-24. The table shows that the number of all types of vehicle during 24-hour survey period. Among three types of vehicles, two-wheel vehicle is highest because of local people mostly use the motorbike. Both types of four-wheel vehicle are nearly same.

Table 4.2-24 Result of Vehicle Traffic Volume Survey

Unit : number of vehicles / 24 hours

Survey Point	Survey Period	Direction	Two-wheel vehicle	Four-wheel light vehicle	Four-wheel heavy vehicle	Total
TV	5 Oct (7:00 AM) - 6 Oct (7:00 AM)	From National Highway No.1	2,389	324	132	2,845
		To National Highway No.1	2,658	312	133	3,103

Source: EIA Study Team

4.2.9. Air Quality

4.2.9.1. Literature Survey

There is no existing or secondary data for ambient air quality in and around the project site.

4.2.9.2. Field Survey

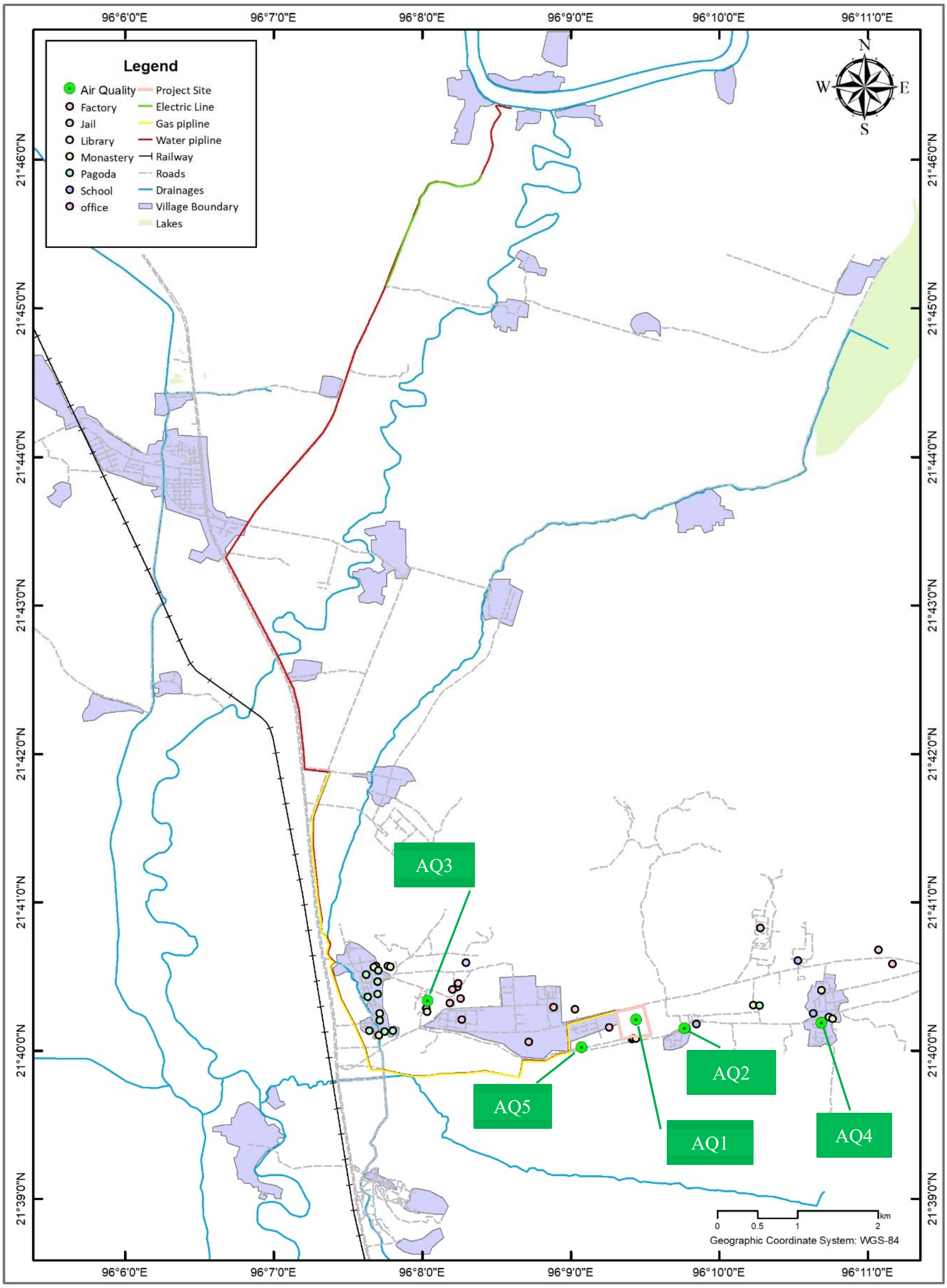
4.2.9.2.1. Methodology

4.2.9.2.1.1. Survey Items

Primary data on ambient air quality measurement was done in the project site compound during field survey. 7 consecutive days monitoring was conducted for both rainy and dry seasons, and the monitored parameters are Sulfur dioxide (SO_2), Nitrogen dioxide (NO_2), Nitrogen monoxide (NO), Carbon monoxide (CO), Particulate matter 2.5 ($PM_{2.5}$), Particulate matter 10 (PM_{10}). Those ambient air quality will be monitored by the portable Haz-Scanner (Model - Environmental Perimeter Air Station (EPAS)) which provides direct reading in real time with data-logging capabilities. Sampling rate or air quality data will be measured automatically every minute and directly read and recorded onsite.

4.2.9.2.1.2. Survey Location

Survey locations of air quality are shown in Figure 4.2-17 .



Source: EIA Study Team

Figure 4.2-17 Location Map of Air Quality Survey

The brief description of the monitoring point is presented in Table 4.2-25. Survey location AQ1 is selected to conduct a full measurement of seven consecutive days during rainy and dry seasons. AQ1 is situated in the project site, located next to Belin Sub-station. Belin-Yeywa Road is located at the north of survey point and distanced about 160 m. The surrounding area is flat. Possible emission sources are from traffic activities at Belin-Yeywa Road, factories around the site and human activities in nearby village such as cultivation. Since the emission gas from gas turbines which has a possibility of causing significant impact on air quality, one survey location was selected to grasp the condition of air quality around power plant. In addition, AQ2 to AQ5 are selected in accordance with other items such as noise and violation survey to observe influence of the project on air quality of surrounding area with 24 hours measurements. These monitoring points are more than enough to grasp the baseline and to study the environmental impact. Sampling location is shown in Figure 4.2-18.

Table 4.2-25 Location of Air Quality Survey

Survey Point	Survey Parameter	Coordinates	Detailed Description of Survey Point
AQ1	Air Quality	21°40'12.40"N 96° 9'26.40"E	At the centre of the project site, located at 160 m from Belin-Yeywa Noad, Sintgaing Township (Na Be Bin Village)
AQ2	Air Quality	21°40'8.89"N 96° 9'45.93"E	Monastery; 0.4 km east of the project site boundary of (Na Be Bin Village, same as NV5)
AQ3	Air Quality	21°40'20.14"N 96° 8'2.22"E	Primary school; 2.2 km west of the project site boundary (Taung Yin Village, same as NV6)
AQ4	Air Quality	21°40'11.04"N 96°10'41.41"E	In the pagoda compound of Shan Gan Village, located at east of project site (Shan Gan Village)
AQ5	Air Quality	21°40'1.21"N 96° 9'4.44"E	IPP Project site; 0.5 km west of the project site boundary (Na Be Bin Village , same as NV7)

Source: EIA Study Team

AQ1

AQ4

Source: EIA Study Team

Figure 4.2-18 Scene of Air Quality Survey at AQ

4.2.9.2.1.3. Survey Period

Air quality and climate monitoring survey was conducted for seven consecutive days during the rainy season in August 2018 and dry season in October 2018 for AQ1 and 24 hours in dry season for the rest of sampling points. The measurement duration and dates of each station are as shown in Table 4.2-26.

Table 4.2-26 Sampling Duration for Air Quality Survey

Sampling Point	Rainy Season	Dry Season
AQ 1	18 (Sat) - 25 (Sat) August 2018	4 (Thu.) - 11(Thu.) October 2018
AQ 2	-	22(Tue.) - 23(Wed.) October, 2019
AQ 3	-	21(Mon.) - 22(Tue.) October, 2019

AQ 4	-	24(Thu.) – 25(Fri.) October, 2019
AQ 5	-	23(Wed.) – 24(Thu.) October, 2019

Source: EIA Study Team

4.2.9.2.1.4. Survey Method

Sampling and analysis of ambient air quality were conducted with reference to the recommendation of the United States Environmental Protection Agency (U.S. EPA). A Haz-Scanner (Model - Environmental Perimeter Air Station (EPAS)) was used to collect ambient air for measurement. Sampling rate and air quality data were measured automatically every minute and directly read and recorded onsite as shown in Table 4.2-27.

Table 4.2-27 Sampling and Analysis Method for Air Quality

No.	Parameter	Analysis Method
1	Sulfur dioxide (SO_2)	Data logging
2	Nitrogen dioxide (NO_2)	Data logging
3	Nitrogen monoxide (NO)	Data logging
4	Carbon monoxide (CO)	Data logging
5	Particulate Matter 2.5 ($PM_{2.5}$)	Data logging
6	Particulate Matter 10 (PM_{10})	Data logging

Source: EIA Study Team

4.2.9.2.2. Survey Result

Results of ambient air quality measurement are presented in Table 4.2-28. The concentrations of NO_2, CO, and particulate matter during the dry season were generally higher than those during the rainy season. Comparing with the tentative target value based on the National Environmental Quality (Emission) Guideline, 2015, the concentration of all pollutants during both seasons complied with the standards, except the concentration of $PM_{2.5}$ for during dry season.

Table 4.2-28 Result of Air Quality Survey (Daily Average) at AQ1

Season	Date	SO_2	NO_2	NO	CO	$PM_{2.5}$	PM_{10}
		μg/m³	μg/m³	μg/m³	μg/m³	μg/m³	μg/m³
Rainy	18-19 Aug	8.45	21.03	11.26	23.84	9.07	12.58
	19-20 Aug	3.39	10.88	9.12	28.95	11.32	11.11
	20-21 Aug	1.65	13.10	8.32	27.38	12.57	13.10
	21-22 Aug	2.80	17.14	7.45	24.14	8.99	13.92
	22-23 Aug	1.31	9.37	7.63	30.69	10.84	11.55
	23-24 Aug	0.35	11.34	5.28	31.02	10.18	13.33
	24-25 Aug	1.78	20.03	10.91	23.26	7.61	12.00
Dry	4-5 Oct	5.04	21.32	7.09	40.62	9.94	11.18
	5-6 Oct	6.91	37.53	15.55	66.72	16.57	25.88
	6-7 Oct	4.26	24.09	10.80	75.12	26.18	34.58
	7-8 Oct	7.59	19.26	19.69	50.09	17.31	27.39
	8-9 Oct	1.29	37.07	5.15	67.55	13.49	19.76
	9-10 Oct	7.51	6.54	6.68	39.93	11.44	18.44
	10-11 Oct	4.19	5.39	6.22	26.33	9.32	15.24
Target Value		20	-	-	-	25	50

Source: EIA Study Team

Table 4.2-29 Result of Air Quality Survey (Daily Average) at AQ2-5

Station ID	Duration	SO_2	NO_2	NO	CO	$PM_{2.5}$	PM_{10}
		μg/m³	μg/m³	μg/m³	μg/m³	μg/m³	μg/m³
AQ2	24 hours	16.81	35.65	1.49	190.06	20.39	35.46
AQ3	24 hours	16.82	42.00	1.36	209.17	16.70	35.59

AQ4	24 hours	18.71	39.22	6.15	262.67	19.00	36.11
AQ5	24 hours	15.13	38.64	10.35	147.07	19.08	31.86
Target Value		20	-	-	-	25	50

Source: EIA Study Team

4.3. Biological Environment

The Project site is adjacent to western Belin Sub-station and includes the former farm land area.

The ecological habitat of the area is generally homogenous and made up of modified habitat, while the AOI for biological environment is defined as about 500 m from the project site boundary. The area is largely comprised of agricultural land and associated irrigation channels, interspersed with villages, including existing sub-station. There is no critical habitat in and around the project site.

4.3.1. Literature Survey

4.3.1.1. Vegetation and Wildlife

The biodiversity report of Sintgaing Township is not available, and the status of flora and fauna is mentioned in Township Profile, 2017. The vegetation types in Sintgaing Township are mainly rain tree, tamarind, acacia tree, neem, cotton tree, gold mohur tree, mescal and tectona tree. The wildlife found in Sintgaing Township are rabbit, sparrow, crow and snake. Limited information is available on the terrestrial and aquatic systems within the project area and Myitnge River where river water intake and discharge points are.

4.3.1.2. Protected Area

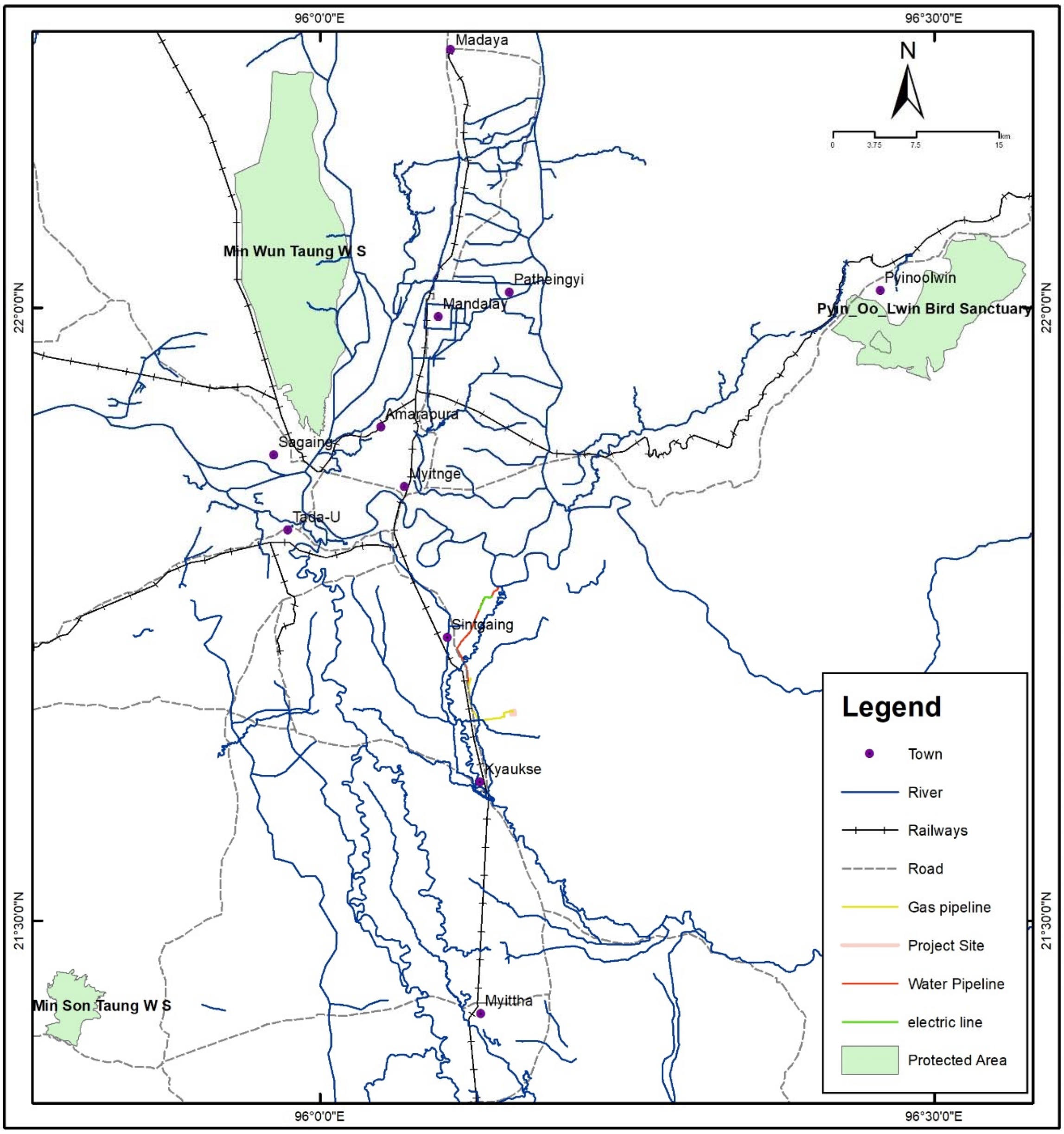
According to the World Database on Protected Areas (WDPA) the Country hosts a total of 57 Protected Areas including as shown in Table 4.3-1.

Table 4.3-1 World Database on Protected Areas – Myanmar.

Type	Number
National Park	4
Nature Reserve	3
Wildlife Sanctuary	23
National Park and ASEAN Heritage Park	3
Not Reported	4
Bird Sanctuary	4
Other Area	3
Protected Area	2
Reserved Forest	1
Game Sanctuary	1
Wildlife Park	1
Wildlife Sanctuary and ASEAN Heritage Park	2
Bird Sanctuary and ASEAN Heritage Park	1
Tiger Reserve	1
Mountain Park	1
Elephant Range	1
Botanical Garden	1
Ramsar Site, Wetland of International Importance	1
Total	57

Source: World Database on Protected Areas

The Project site is located at more than 50 km from the nearest protected area named "Pyin Oo Lwin Bird Sanctuary", "Minwuntaung Wildlife Sanctuary" and "Minsontaung Wildlife Sanctuary" as shown in Figure 4.3-1 .



Source: EIA Study Team based on Myanmar Protected Areas, 2011.

Figure 4.3-1 Protected Areas

4.3.2. Field Survey

4.3.2.1. Methodology

4.3.2.1.1. Survey Items

Detailed flora and fauna survey was conducted (i) in and around the Project site, (ii) at water intake station, and (iii) along water pipeline for both rainy and dry seasons. Habitat mapping and species identification were carried out.

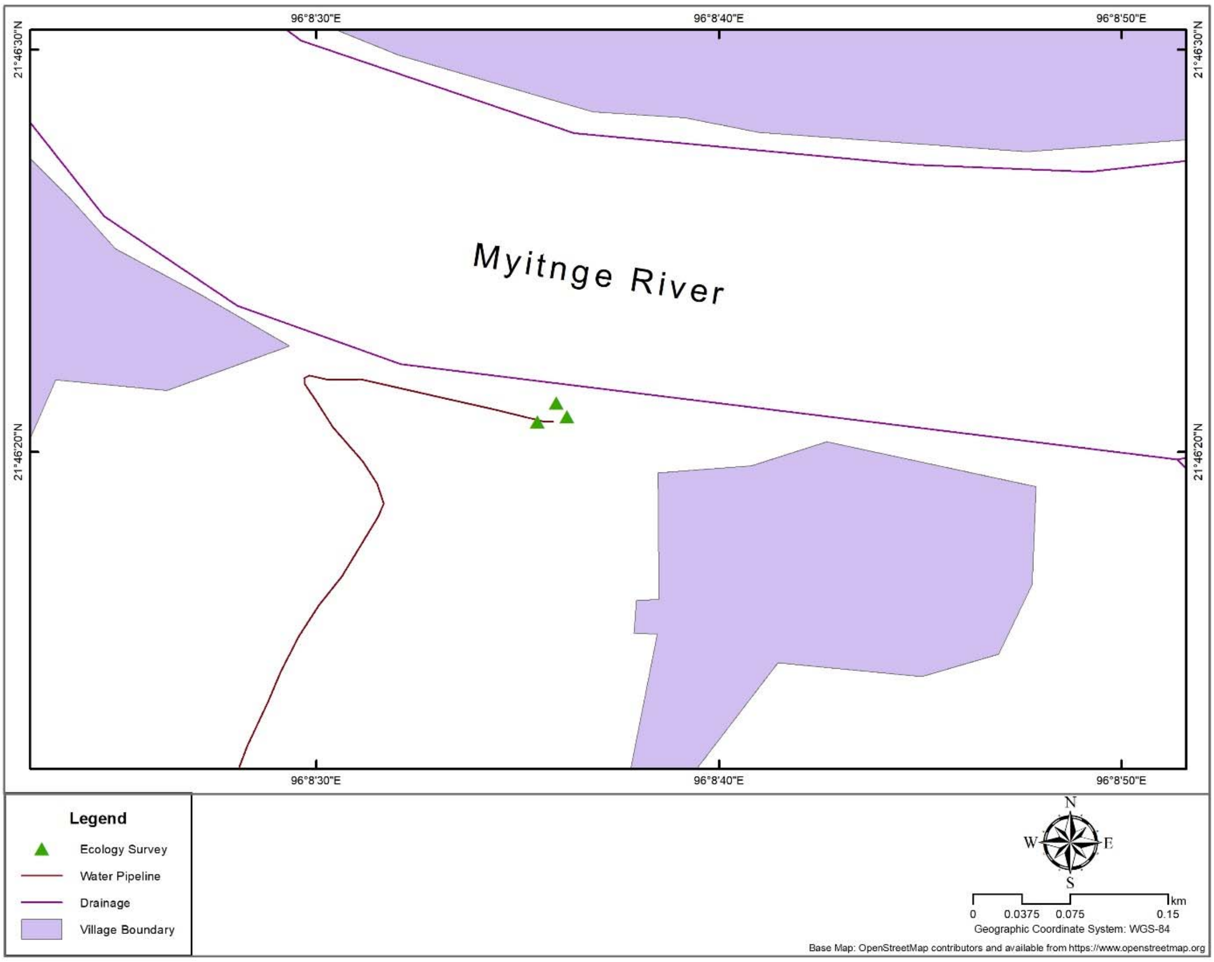
The flora and fauna survey items are as follows:

- i) Vegetation (Habitats)
- ii) Flora species

- iii) Fauna species
- iv) Important species

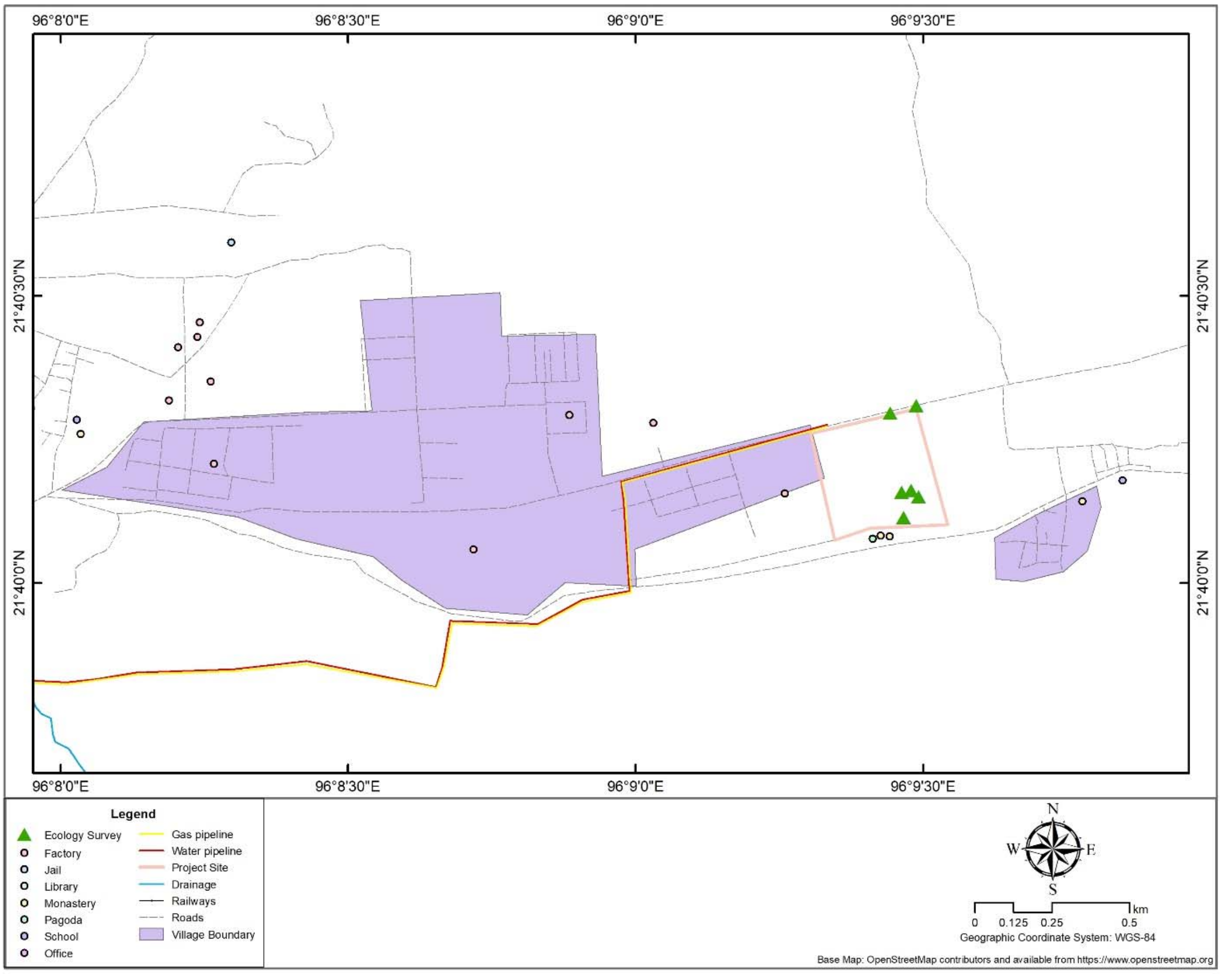
4.3.2.1.2. Survey Location

The location of survey areas (project site, water intake and pipeline) are shown in Figure 4.3-2 , Figure 4.3-3 and Figure 4.3-4.



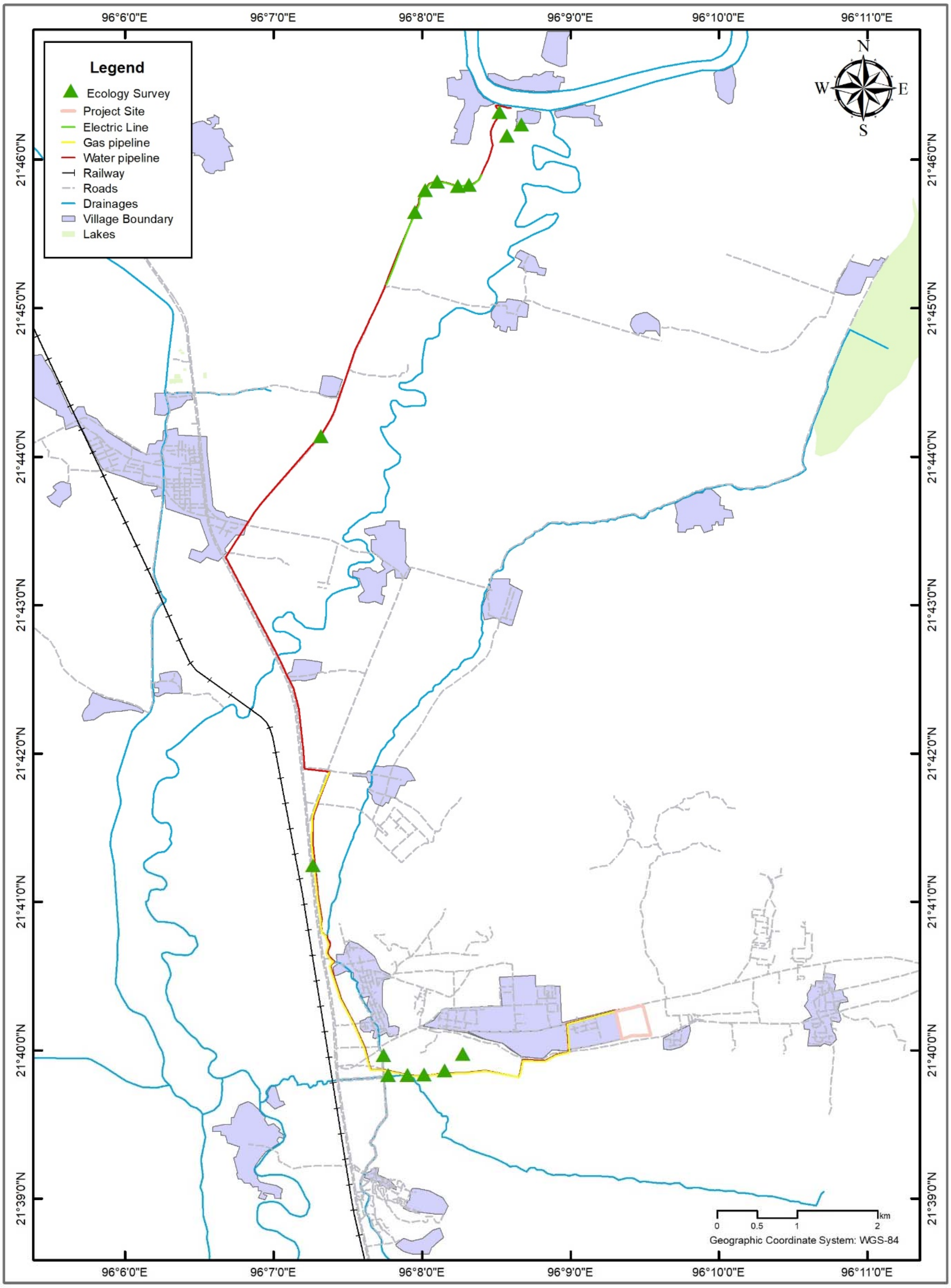
Source: EIA Study Team

Figure 4.3-2 Location of Survey Area (Intake Station)



Source: EIA Study Team

Figure 4.3-3 Location of Survey Area (Project Site)



Source: EIA Study Team

Figure 4.3-4 Location of Survey Area (Gas/Water Pipeline)

4.3.2.1.3. Survey Period

Flora and fauna surveys were conducted for both rainy season in August 2018 and dry season in October 2018. The survey duration is shown in Table 4.3-2.

Table 4.3-2 Survey Duration of Flora and Fauna Survey

Rainy Season	Dry Season
18 - 21 August 2018	4 - 7 October 2018

Source: EIA Study Team

4.3.2.1.4. Survey Method

4.3.2.1.4.1. Flora:

A Global Positioning System (GPS) was used to navigate and mark coordinates between sample plots around the study area. Field observation was conducted in and around the project area. During the field survey period, plotless sampling method was used. Plotless sampling methods are based on the random selection of points within a particular survey area. In addition, all trees, shrubs, herbs and cultivated crops were recorded and listed. Identification of plants and animal species was conducted with assistances of skilled local people. The identified species and families were translated to scientific name with assistance of a checklist of trees, shrubs, herbs and climbers of Myanmar.

4.3.2.1.4.2. Habitat Map

The result of field observation and secondary image from Google Earth were combined by GIS software to obtain a habitat map. At first, the field observations were conducted for habitat survey at site collecting the data with the Garmin GPS and upload it to Map Info Software. On the other hand, the Google Earth image was visually digitized based on the primary field survey. Finally, the habitat map was analyzed based on both of field survey and secondary image data using the Map Info software.

4.3.2.1.4.3. Fauna

The precise geographic coordinates for each location and parts of it we surveyed and were recorded by using GPS during survey period. The study of fauna takes substantial amount of time to understand the specific faunal characteristics of the area. The presence of wildlife was also confirmed from the local inhabitants depending on the animal sightings and the frequency of their visits in the project area. In addition, review of secondary data was another source of information for studying the fauna of the area. In addition, the following sources were also used.

4.3.2.1.4.4. Aquatic Fauna

Streams and wetland which include within the Study Area was surveyed for freshwater fish. Interviews with local fisherman from the study area were conducted during the collection of the specimen. Fishermen were interviewed with regard to fishery process including kinds of gear used, number of fishing time per day and target species. The fishing gears are trap, hook and line and gill nets. The water body of the irrigation canal was studied for aquatic fauna. The fishes were photographed soon after the collection and measurements were also taken for key characteristics. Indirect observation at a market and interview with fishermen about kind and quality of fishery product.

In addition to the field observation, secondary data was also surveyed by interviewing from local residents and literature reviewing. In the interview survey, the surveyor visited the residents in and around the survey area and interviewed the name of plants and animals existing in and around the area. Also, the past situation of flora and fauna, and the change on biodiversity and ecosystem in the area was interviewed for examination. Scene of interview survey is shown in Figure 4.3-5

Source: EIA Study Team

Figure 4.3-5 Interview Survey with Local People

4.3.2.2. Survey Result

4.3.2.2.1. Flora

In and around the area of intake station and project site, three major habitat types were observed namely (1) plantation, (2) bare land and (3) shrub land. There is no any intact forest within and around the project site area. Sceneries and habitat map of the project site are shown in Figure 4.3-6 and Figure 4.3-7.

There were 151 plant species identified in the survey areas, and they are presented in Table 4.3-3.

Source: EIA Study Team

Figure 4.3-6 Sceneries of Project Site

Source: EIA Study Team

Figure 4.3-7 Habitat Map of Project Site

Table 4.3-3 List of Recorded Plant Species

No.	Scientific Name	Common Name	Family Name	Habitat	Distribution	IUCN Status	Rainy Season			Dry Season		
							Project Site	Intake Station	Pipe line	Project Site	Water Intake	Pipe line
1	*Fluegga virosa*	Ye-chinya	Euphorbiaceae	Small Tree	Wide	NE	√	√		√	√	
2	*Terminalia catappa*	Banda	Combretaceae	Tree	Cultivated	NE		√	√		√	√
3	*Acacia auriculiformis*	Malaysia-padauk	Mimosaceae	Small Tree	Cultivated	LC		√	√		√	√
4	*Musa sapientum*	Nget-pyaw	Musaceae	Herb	Cultivated	NE		√	√		√	√
5	*Senna siamea*	Mezali	Caesalpiniaceae	Tree	Reported from Myanmar	NE		√	√		√	√
6	*Albizia lebbek*	Kokko	Mimosaceae	Tree	Reported from Myanmar	NE	√	√	√	√	√	√
7	*Tamarindus indica*	Magyi	Caesalpiniaceae	Tree	Cultiveted	NE	√	√	√	√	√	√
8	*Mangifera indica*	Thayet	Anacardiaceae	Tree	Wide	NE	√	√	√	√	√	√
9	*Borassus flabellifer*	Htan	Arecaceae	Tree	Bago, Mandalay, Sagaing, Taninthayi	LC	√	√	√	√	√	√
10	*Leucaena leucocephala*	Bawsagaing	Mimosaceae	Tree	Mandalay, Sagaing, Yangon	NE	√	√	√	√	√	√
11	*Azadirachta indica*	Tama	Meliaceae	Tree	Wide	NE	√	√	√	√	√	√
12	*Delonix rigia*	Sein-ban-gyi	Caesalpinaceae	Tree	Cultivated	NE		√	√		√	√
13	*Physalis minima*	Bauk-pin	Solanaceae	Herb	Bago, Taninthayi, Yangon	NE		√	√		√	√
14	*Psidium guajava*	Malaka	Myrtaceae	Small Tree	Cultivated	NE		√	√		√	√
15	*Carica papaya*	Thinbaw	Caricaceae	Small Tree	Cultivated	DD		√	√		√	√
16	*Hibiscus cannabinus*	Chin-baung	Malvaceae	Shrub	Cultivated	NE		√			√	
17	*Eugenia bracteolata*	Thabye	Myrtaceae	Tree	Ayeyarwady, Taninthayi	NE		√			√	
18	*Mimosa pudica*	Htikayon	Mimosaceae	Herb	Wide	NE	√	√	√		√	√
19	*Ficus glomerata*	Thapan	Moraceae	Tree	Bago, Kachin, Mandalay, Yangon	NE		√			√	
20	*Arundo donax*	Kyu	Poaceae	Grass	Reported from Myanmar	LC		√			√	
21	*Citrus aurantiifolia*	Thanbaya	Rutaceae	Shrub	Cultivated	NE		√			√	
22	*Tectona grandis*	Kyun	Verbenaceae	Tree	Wide	NE		√	√		√	√
23	*Chromolaena odorata*	Bizat	Asteraceae	Shrub	Wide	NE	√	√	√	√	√	√
24	*Acacia intsia*	Suboke	Mimosaceae	Climber/ Creeper	Wide	NE	√	√	√	√	√	√
25	*Calotropis procera*	Mayo	Asclepiadaceae	Shrub	Magway, Mandalay, Sagaing, Shan	NE		√	√		√	√

No.	Scientific Name	Common Name	Family Name	Habitat	Distribution	IUCN Status	Rainy Season			Dry Season		
							Project Site	Intake Station	Pipe line	Project Site	Water Intake	Pipe line
26	*Streblus asper*	Okhne	Moraceae	Small Tree	Bago, Sagaing, Taninthayi	NE		√	√		√	√
27	*Annona squamosa*	Awzar	Annonaceae	Small Tree	Cultivated	NE		√	√		√	√
28	*Acacia leucophloea*	Tanaung	Mimosaceae	Tree	Bago, Magway, Mandalay, Shan	NE	√	√	√	√	√	√
29	*Aegle marmelos*	Okshit	Rutaceae	Tree	Bago, Chin, Kachin, Kayin, Magway, Sagaing, Shan, Taninthayi, Yangon	NE		√	√		√	√
30	*Codiaeum variegatum*	Ywet-hla	Euphorbiaceae	Shrub	Cultivated	NE		√	√		√	√
31	*Momordica diocia*	Kyet-hin-ga	Cucurbitaceae	Climber/ Creeper	Cultivated	NE		√	√		√	√
32	*Citrus aurantiifolia*	Shauk-cho	Rutaceae	Shrub	Cultivated	NE		√	√		√	√
33	*Cassia glauca*	Pyiban-nyo	Caesalpinaceae	Small Tree	Cultivated	NE		√	√		√	√
34	*Citrullus colocynthis*	Kyi-ah	Cucurbitaceae	Climber/ Creeper	Wide	NE	√	√	√	√	√	√
35	*Capsicum annuum*	Ngayok	Solanaceae	Shrub	Cultivated	NE		√	√		√	√
36	*Pithecellobium dulce*	Kala-magyi	Mimosaceae	Tree	Magway, Mandalay	NE		√	√		√	√
37	*Chukrasia velutina*	Yinma	Meliaceae	Tree	Mandalay, Shan, Yangon	NE		√	√		√	√
38	*Gynandropsis gyandra*	Hingala	Capparaceae	Herb	Wide	NE	√	√	√	√	√	√
39	*Pterocarpus macrocarpus*	Padauk	Fabaceae	Tree	Bago, Mandalay, Sagaing, Taninthayi	NE		√	√		√	√
40	*Limonia acidissima*	Thi	Rutaceae	Tree	Magway, Mandalay	NE		√	√		√	√
41	*Spondias pinnata*	Gwe	Anacardiaceae	Tree	Reported from Myanmar	NE		√	√		√	√
42	*Clerodendrum villosum*	Ka-on	Vernbenaceae	Shrub	Wide	NE		√			√	
43	*Dysolobium grandis*	Khwe-labut-nwe	Fabaceae	Climber/ Creeper	Bago, Mandalay	NE		√	√		√	√
44	*Momordica dioica*	Hinga-baung	Cucurbitaceae	Climber/ Creeper	Cultivated	NE		√			√	
45	*Lawsonia alba*	Dan	Lythraceae	Shrub	Cultivated	NE		√	√		√	√
46	*Plumeria rubra*	Tayok-saga	Apocynaceae	Small Tree	Cultivated	NE		√	√		√	√
47	*Litchi chinensis*	Litch	Sapindaceae	Tree	Cultivated	NE		√	√		√	√
48	*Vallarisn solanacea*	Nabu-nwe	Apocyanaceae	Climber/ Creeper	Bago, Kachin, Mandalay, Yangon	NE		√			√	

No.	Scientific Name	Common Name	Family Name	Habitat	Distribution	IUCN Status	Rainy Season			Dry Season		
							Project Site	Intake Station	Pipe line	Project Site	Water Intake	Pipe line
49	*Citrus maxima*	Shauk-pan-thi	Rutacae	Small Tree	Cultivated	NE		√			√	
50	*Vigna catjang*	Pe-doung-she	Fabaceae	Shrub	Wide	NE		√	√		√	√
51	*Bombax ceiba*	Letpan	Bombacaceae	Tree	Wide	NE		√	√		√	√
52	*Cynodon dactylon*	Mye-sa-myet	Poaceae	Grass	Wide	NE	√	√	√	√	√	√
53	*Dregea volubilis*	Gwedauk-nwe	Asclepiadaceae	Climber/ Creeper	Wide	NE		√	√		√	√
54	*Operculina turpethum*	Kyahin-bin	Convolvulaceae	Climber/ Creeper	Wide	NE		√	√		√	√
55	*Ficus religiosa*	Bawdi-nyaung	Moraceae	Tree	Cultivated	NE		√	√		√	√
56	*Morinda angustifolia*	Yeyo	Rubiaceae	Small Tree	Wide	NE		√	√		√	√
57	*Leptadenia reticulata*	Gon-cho	Asclepiadaceae	Shrub/ Climber	Magway, Mandalay, Sagaing	NE	√	√	√	√	√	√
58	*Acrocarpus frixinifolius*	Ye- tama	Caesalpiniaceae	Tree	Wide	NE		√	√		√	√
59	*Duranta repens*	Bo-kadaw-myet-hkone	Vrebenaceae	Shrub	Cultivated	NE	√	√	√	√	√	√
60	*Phyllanthus urinaria*	Mye-ziphyu	Euphorbiaceae	Herb	Wide	NE	√	√		√	√	
61	*Cayratia trifolia*	Taw-sabyit	Vitaceae	Climber/ Creeper	Bago, Mandalay, Yangon, Unknown	NE		√	√		√	√
62	*Acalypha indica*	Kyaung-se-pin	Euphorbiaceae	Shrub	Mandalay, Taninthayi, Yangon	NE		√			√	
63	*Osyris weidhtiana*	Zaung-gyan	Santalaceae	Shrub	Chin, Mandalay, Sagaing	NE	√	√	√	√	√	√
64	*Boerhavia diffusa*	Pa-yan-na-war	Nyctaginaceae	Herb	Reported from Myanmar	NE		√	√		√	√
65	*Cephalandra indica*	Kinmon	Cucurbitaceae	Climber/ Creeper	Ayeyarwady, Kayin, Mandalay, Mon, Yangon	NE	√	√	√	√	√	√
66	*Abutilon indicum*	Bauk-khway	Malvaceae	Herb	Reported	NE	√	√	√	√	√	√
67	*Sesbania grandiflora*	Paukpan-byu	Fabaceae	Small Tree	Cultivated			√	√		√	√
68	*Pavonia rigida*	Wetchi-pane	Malvaceae	Herb	Bago, Kayin, Mandalay, Taninthayi, Yangon		√	√	√	√	√	√
69	*Commelina paludosa*	Wet-gyut	Commelinaceae	Herb	Kachin, Magway, Mandalay, Yangon			√			√	
70	*Achyranthes aspera*	Kyet-mauk-pyan	Amaranthaceae	Herb	Magway, Yangon			√	√		√	√
71	*Grewia humilis*	Khwe-tayaw	Tiliaceae	Shrub	Bago, Kachin, Mandalay, Unknown			√			√	

No.	Scientific Name	Common Name	Family Name	Habitat	Distribution	IUCN Status	Rainy Season			Dry Season		
							Project Site	Intake Station	Pipe line	Project Site	Water Intake	Pipe line
72	*Prosopis juliflora*	Gandasein	Mimosaceae	Tree	Cultivated	NE	√		√	√		√
73	*Ziziphus jujuba*	Zi	Rhamnaceae	Tree	Cultivated	NE	√	√	√	√		√
74	*Moringa oleifera*	Dan-da-lun	Moringaceae	Tree	Cultivated	NE	√		√	√		√
75	*Scaphium scaphigerum*	Mohbin	Steruliaceae	Tree	Mon, Taninthayi	NE			√			√
76	*Crateva magna*	Kadet	Capparaceae	Tree	Wide	NE	√		√	√		√
77	*Amaranthus spinosus*	Hin-nu-new-subak	Amaranthaceae	Herb	Cultivated	NE	√			√		
78	*Alternanthera nodiflora*	Kanaphaw	Amaranthaceae	Herb	Yangon, Mandalay, Taninthayi	LC	√			√		√
79	*Sida cordifolia*	Katsi-ne	Malvaceae	Herb	Bago, Magway, Mandalay, Sagaing, Shan, Yangon	NE	√			√		
80	*Acaccia catechu*	Sha	Mimosaceae	Tree	Magway, Mandalay	NE	√		√	√		√
81	*Leucas aspera*	Taw-pin-sein	Lamiaceae	Shrub	Bago, Mandalay, Shan, Yangon	NE	√		√	√		√
82	*Euphorbia nivulia*	Tazaung-myin-na	Euphorbiaceae	Small Tree	Wide	NE	√			√		
83	*Acilepis squarrosa*	Taw-kyet-mauk	Asteraceae	Herb	Wide	NE	√			√		
84	*Cajanus cajan*	Pe-sin-gon	Fabaceae	Shrub	Cultivated	NE	√			√		
85	*Jatropha gossypifolia*	Kyetsu-kanako	Euphorbiaceae	Shrub	Cultivated	NE	√		√	√		√
86	*Tribulus terrestris*	Tsule	Zygophyllaceae	Herb	Magway, Mandalay, Sagaing	NE	√			√		
87	*Ficus virens*	Nyaung-gyin	Moraceae	Tree	Bago, Kachin, Mandalay, Taninthayi, Yangon	NE	√			√		
88	*Eragrostis gangetica*	Gyo-gya-myet	Poaceae	Grass	Chin, Kachin, Shan	NE	√			√		
89	*Capparis zeylanica*	Mani-than-lyet	Capparaceae	Climber	Mandalay, Shan	NE	√					
90	*Striga lutea*	Pwin-byu	Scrophulariaceae	Herb	Kachin, Mandalay, Sagaing, Taninthayi, Unknown	NE	√			√		
91	*Eragrostis amabilis*	Yon-gale	Poaceae	Grass	Bago, Magway, Mandalay, Sagaing, Yangon	NE	√					
92	*Aglaia odoratissima*	Thanakha	Meliaceae	Tree	Bago, Taninthayi	NE	√			√		
93	*Cassia tora*	Dangywe	Caesalpinaceae	Shrub	Kachin, Mandalay, Sagaing, Yangon	NE	√		√	√		√
94	*Crotalaria orixensis*	Taw-pikesan	Fabaceae	Shrub	Magway, Mandalay, Sagaing	NE	√			√		
95	*Tinospora cordifolia*	Sin-don-ma-nwe	Menispermaceae	Climber	Wide	NE	√			√		

No.	Scientific Name	Common Name	Family Name	Habitat	Distribution	IUCN Status	Rainy Season			Dry Season		
							Project Site	Intake Station	Pipe line	Project Site	Water Intake	Pipe line
96	*Barleria prionitis*	Leik-su-ywe	Amaranthaceae	Shrub	Kachin, Magway, Mandalay, Yangon, Sagaing	NE	√			√		
97	*Clitoria ternatea*	Aung-me-nyo	*Fabaceae*	Climber/ Creeper	Kachin, Mandalay, Sagaing, Yangon	NE	√		√	√		√
98	*Boscia albitrunca*	Thamon	Capparaceae	Small Tree	Magway, Mandalay, Sagaing	NE	√			√		
99	*Ocimum americanum*	Pin-sein	Lamiaceae	Herb	Cultivated	NE	√			√		
100	*Lantana aculeata*	Seinnaabn	Verbenaceae	Shrub	Reported from Myanmar	NE	√			√		
101	*Millingtonia hortensis*	Egayit	Bignoniaceae	Tree	Wide	NE	√			√		
102	*Acacia concinna*	Kinmun-gyin	Mimosaceae	Climber/ Creeper	Cultivated	NE			√			√
103	*Andropogon fastigiatus*	Myauk-mya	Poaceae	Grass	Reported from Myanmar	NE			√			√
104	*Chloris barbata*	Sin-ngo-myet	Poaceae	Grass	Mandalay, Yangon	NE			√			√
105	*Cassia fistula*	Ngu	Caesalpiniaceae	Tree	Wide	NE			√			√
106	*Colocasia esculenta*	Pein	Araceae	Herb	Cultivated	LC			√			√
107	*Murraya koenigii*	Pyindaw-thein	Rutaceae	Small Tree	Cultivated	NE			√			√
108	*Cocas nucifera*	Ohn	Arecaceae	Tree	Cultivated	NE			√			√
109	*Cardiospermum corindum*	Kala-myetsi	Sapindaceae	Climber/ Creeper	Cultivated	NE			√			√
110	*Jatropha pungens*	Kyetsu	Euphorbiaceae	Shrub	Magway, Mandalay	NE			√			√
111	*Heliotropium indium*	Sin-hna-maung	Boraginaceae	Herb	Yangon	NE			√			√
112	*Solanum indicum*	Khayan-kazaw	Solanaceae	Shrub	Bago, Mandalay, Shan, Yangon	NE			√			√
113	*Mucuna pruriens*	Khwele-ya	Fabaceae	Climber	Bago, Chin, Kayin, Kayin, Mandalay, Mandalay, Sagaing, Sagaing, Shan, Yangon	NE			√			√
114	*Mnesithea striata*	Kaing	Poaceae	Grass	Reported from Myanmar	NE			√			√
115	*Manikara hexandra*	Khayay	Sapotaceae	Tree	Cultivated	NE			√			√
116	*Achras zapota*	Thagya	Sapotaceae	Tree	Cultivated	NE			√			√
117	*Ipomoea batatas*	Kazun	Convolvulaceae	Climber/ Creeper	Cultivated	NE			√			√
118	*Luffa acutangula*	Kha-we	Cucurbitaceae	Climber/ Creeper	Cultivated	NE			√			√

No.	Scientific Name	Common Name	Family Name	Habitat	Distribution	IUCN Status	Rainy Season			Dry Season		
							Project Site	Intake Station	Pipe line	Project Site	Water Intake	Pipe line
119	*Acacia mangium*	Man-gan-sha	Mimosaceae	Small Tree	Cultivated	NE			√			√
120	*Hedychium coronarium*	Ngwe-pan	Zingiberaceae	Herb	Cultivated	NE			√			√
121	*Cestrum nocturnum*	Nya-hmwe-pan	Solanaceae	Shrub	Cultivated	NE			√			√
122	*Morus alba*	Posa	Moraceae	Small Tree	Cultivated	NE			√			√
123	*Arundinella bengalensis*	Thaman-myet	Poaceae	Grass	Bago, Kachin, Mandalay, Shan, Yangon	NE			√			√
124	*Acacia farnesiana*	Nan-lon-kyaing	Mimosaceae	Small Tree	Cultivated	NE			√			√
125	*Calophyllum kunsteleri*	Tharapi	Hypericaceae	Tree	Mon, Taninthayi	NE			√			√
126	*Eucalyptus camaldulensis*	U-ca-lit	Myrtaceae	Tree	Cultivated	NE			√			√
127	*Jasminum arborescens*	Sabe	Oleaceae	Shrub/ Climber	Magway, Mandalay, Yangon	NE			√			√
128	*Caesalpinia pulcherrima*	Seinban-gale	Caesalpinaceae	Small Tree	Cultivated	NE			√			√
129	*Centella asiatica*	Myin-hkwa	Apiaceae	Herb	Wide	LC			√			√
130	*Madhuca longifolia*	Meze	Sapotaceae	Tree	Magway, Mandalay, Yangon, Unknown	NE			√			√
131	*Emblica officinalis*	Zipyu	Euphorbiaceae	Tree	Wide	NE			√			√
132	*Sterculia foetida*	Shaw-byu	Sterculiaceae	Tree	Chin, Kayin, Mandalay, Yangon	NE			√			√
133	*Butea frondosa*	Pauk	Fabaceae	Tree	Reported from Myanmar	NE			√			√
134	*Oroxylum indica*	Kyaung-sha	Bignoniaceae	Tree	Wide	NE			√			√
135	*Mesua ferrea*	Gangaw	Hypericaceae	Tree	Cultivated	NE			√			√
136	*Areca catechu*	Kunthi-pin	Araceae	Small Tree	Cultivated	NE			√			√
137	*Tabernaemontana divaricata*	Zalat	Apocynaceae	Shrub	Cultivated	NE			√			√
138	*Clerodendrum natans*	Ngayan-padu	Verbenaceae	Shrub	Reported from Myanmar	NE			√			√
139	*Markhamia stipulata*	Ma-hlwa	Bignonniaceae	Tree	Wide	NE			√			√
140	*Acacia nilotica*	Subyu	Mimosaceae	Small Tree	Mandalay, Magway	NE			√			√
141	*Ageratum conzyoides*	Kadu-hpo	Asteraceae	Shrub	Mandalay, Shan, Ysngon	NE			√			√

No.	Scientific Name	Common Name	Family Name	Habitat	Distribution	IUCN Status	Rainy Season			Dry Season		
							Project Site	Intake Station	Pipe line	Project Site	Water Intake	Pipe line
142	*Anisomeles candicans*	Taw-hnan	Lamiaceae	Herb	Bago, Magway, Mandalay	NE			√			√
143	*Anthocephalus morindaefolius*	Ma-U	Rubiaceae	Tree	Bago, Magway, Mandalay, Sagaing, Yangon	NE			√			√
144	*Cucumis trigonus*	Kasit	Cucurbitaceae	Climber/ Creeper	Mandalay, Yangon	NE			√			√
145	*Cassia sophera*	Kazaw-pok-nge	Caesalpinaceae	Shrub	Mandalay, Sagaing,	NE		√	√		√	√
146	*Datura metel*	Padauing	Solanaceae	Shrub	Cultivated	NE			√			√
147	*Canna indica*	Budatharana	Cannaceae	Herb	Cultivated	NE			√			√
148	*Cephalocroton discolor*	Pilaw-pinan-u-ywethla	Euphorbiaceae	Tree	Cultivated	NE			√			√
149	*Sphagneticola calendulacea*	Nay-kyar-gale	Asteraceae	Herb	Reported from Myanmar	NE			√			√
150	*Rhinacanthus communis*	Htaw-labat	Acanthaceae	Shrub	Bago, Magway, Mandalay, Yangon	NE			√			√
151	*Lagenaria siceraria*	Bu	Cucurbitaceae	Climber/ Creeper	Cultivated	NE			√			√

Note: NE = Not Evaluated, DD = Data Deficit and LC = Least Concerned
Source: EIA Study Team

4.3.2.2.2. Fauna

During the survey period, 50 bird species, 26 different butterfly species, 11 dragonfly species, 4 Beetle, 3 species of snail, 10 of mammal species, 18 species of reptiles and amphibian and 44 species of fish were recorded during the survey period. In this survey, two species of Bird and five Fish species were near threatened according the IUCN Red List (2018).

4.3.2.2.2.1. Birds

A total of 50 bird species were recorded during the survey period. The Grey-headed Parakeet (*Psittacula finschii*) of near-threatened was observed the project area in the rainy season. A part from the species family, Phasianidae, Chinese Francolin (*Francolinus pintadeanus*) and Coraciidae, Indian Roller (*Coracias benghalensis*) are found near the survey area and listed as forest birds. Member of the family Ardeidae, Eastern Cattle Egret (*Bubulcus coromandus*) and Little Egret (*Egretta grazetta*) was also noted as water bird. A part from the species family Alaudidae, Burmese bush lark (*Mirafra microptera*), Member of family of Leiothrichidae White-throated babbler (*Turdoides gularis*), the family of Columbidae, Burmese collared Dove (*Streptopelia xanthocycla*), the family of Corvidae, Hooded Treepie (*Crypsirina cucullata*) and the family of Pycnontidae, Ayeyarwady Bulbul (*Pyconotus blanfordi*)are found near the survey site and they are endemic species in Myanmar. Member of the family Cisticiolidae, Plain prinia (*Prinia flaxiventris*) are very common in study area. Family of Picidae, Motacillidae and Laniidae are Eurasian Wryneck (*Jynx torquilla*), White wagtail (*Motacilla alba*) and Brown Shrike (*Lanius cristatus*) were winter visitor and migrate birds of the country in Myanmar. A part from the species Family Turnitidae, Barred Button Quail (*Turnix suscitator*) are common species in upper dry zone in Myanmar. Confirmed species identified in the survey areas are presented in Table 4.3-4. Photo of some recorded bird species are shown in Figure 4.3-8.

Table 4.3-4 List of Recorded Bird Species

No	Scientific Name	Common Name(s)	Family	IUCN Status	Rainy Season			Dry Season		
					Project Site	Intake Station	Pipeline	Project Site	Intake Station	Pipeline
1	*Francolinus pintadeanus*	Chinese Francolin	Phasianidae	LC	√		√	√		√
2	*Turnix suscitator*	Barred Button Quail	Turnitidae	LC	√		√	√		√
3	*Coturnix coromandelica*	Rain Quail	Phasianidae	LC	√			√		
4	*Elanus axillaris*	Black-Shoulder kite	Accipitridae	LC		√	√	√	√	
5	*Bubulcus coromandus*	Eastern Cattle Egret	Ardeidae	LC	√		√	√		√
6	*Egretta grazetta*	Little Egret	Ardeidae	LC			√			√
7	*Megalaima haemacephala*	Coppersmith Barbet	Ramphastidae	LC	√	√	√	√	√	√
8	*Jynx torquilla*	Eurasian Wryneck	Picidae	LC				√		√
9	*Coracias benghalensis*	Indian Roller	Coraciidae	LC	√	√	√	√	√	√
10	*Merops orientalis*	Little green bee-eater	Meropidae	LC	√	√	√	√	√	√
11	*Centropus sinensis*	Greater Coucal	Cuculidae	LC	√	√	√	√	√	√
12	*Clamator jacobinus*	Pied cuckoo	Cuculidae	LC	√	√	√	√	√	√
13	*Cuculus canorus*	Eurasian Cuckoo	Cuculidae	LC				√		
14	*Athene brama*	Spotted owlet	Strigidae	LC	√		√	√	√	√
15	*Halcyon smyrnensis*	White-throated Kingfisher	Alcedinidae	LC	√	√	√	√	√	√
16	*Psittacula finschii*	Grey-headed Parakeet	Psittadae	NT		√	√			
17	*Psittacula Krameri*	Rose-ringed Parakeet	Psittadae	LC					√	√
18	*Cypsiurus balasiensis*	Asian Palm-Swift	Apodidae	LC	√	√	√	√	√	√
19	*Streptopelia chinensis*	Spotted Dove	Columbidae	LC	√	√	√	√	√	√
20	*Streptopelia tranquebarica*	Red collared Dove	Columbidae	LC	√	√	√	√	√	√
21	*Streptopelia xanthocycla*	Burmese collared Dove	Columbidae	LC/ Endemic	√	√	√	√	√	√
22	*Columba livia*	Rock Pigeon	Columbidae	LC	√	√	√	√	√	√
23	*Lanius collurioides*	Burmese Shrike	Laniidae	LC	√	√	√	√	√	√
24	*Lanius cristatus*	Brown Shrike	Laniidae	LC				√	√	√
25	*Crypsirina cucullata*	Hooded Treepie	Corvidae	NT/ Endemic	√		√	√		√
26	*Corvus splendens*	House Crow	Corvidae	LC	√	√	√	√	√	√
27	*Aegithina tiphia*	Common Iora	Aegithininae	LC	√	√	√	√	√	√
28	*Dicrurus leucophaeus*	Ashy Drongo	Dicruridae	LC	√	√	√	√	√	√
29	*Copsychus saularis*	Oriental Magpie-robin	Muscicapidae	LC	√	√	√	√	√	√
30	*Pyconotus cafer*	Red-vented Bulbul	Pycnontidae	LC	√	√	√	√	√	√
31	*Pycnonotus jocosus*	Red-whiskered Bulbul	Pycnontidae	LC	√	√	√	√	√	√

No	Scientific Name	Common Name(s)	Family	IUCN Status	Rainy Season			Dry Season		
					Project Site	Intake Station	Pipeline	Project Site	Intake Station	Pipeline
32	*Pyconotus blanfordi*	Ayeyarwady Bulbul	Pycnontidae	LC/ Endemic	√	√	√	√	√	√
33	*Upupa epops*	Common Hoopoe	Upupidae	LC	√	√	√	√	√	√
34	*Mirafra microptera*	Burmese bush lark	Alaudidae	LC/ Endemic	√	√	√	√	√	√
35	*Turdoides gularis*	White-throated babbler	Leiothrichidae	LC/ Endemic	√	√	√	√	√	√
36	*Chrysomma sinensis*	Yellow-eyed Babbler	Timaliidae	LC	√	√	√	√	√	√
37	*Acridotheres tristis*	Common Myna	Sturnidae	LC	√	√	√	√	√	√
38	*Acridotheres fuscus*	Jungle Myna	Sturnidae	LC	√	√	√	√	√	√
39	*Sturnus burmnnicus*	Venous –breasted Myna	Sturnidae	NE	√	√	√	√	√	√
40	*Saxicola caprata*	Pied Bushchat	Muscicapidae	LC	√	√	√	√	√	√
41	*Saxicola maurus*	Siberian stonechat	Muscicapidae	NE	√	√	√	√	√	√
42	*Prinia flaxiventris*	Plain prinia	Cisticiolidae	LC	√	√	√	√	√	√
43	*Orthotomus sutorius*	Common Tailorbird	Sylviidae	LC	√	√	√	√	√	√
44	*Lonchura punctulata*	Scaly-breasted Munia	Estrildidae	LC	√	√	√	√	√	√
45	*Passer domesticus*	House Sparrow	Passeridae	LC	√	√	√	√	√	√
46	*Passer montanus*	Eurasian Tree-sparrow	Passeridae	LC	√	√	√	√	√	√
47	*Passer Flaveolus*	Plain-backed sparrow	Passeridae	LC	√	√	√	√	√	√
48	*Anthus rufulus*	Paddyfield pipit	Motacillidae	LC	√	√	√			√
49	*Motacilla alba*	White wagtail	Motacillidae	LC				√	√	√
50	*Ploceus philippinus*	Baya weaver	Ploceidae	LC			√			√

Note: NE = Not Evaluated, DD = Data Deficit and LC = Least Concerned and NT = Near Threatened
Source: EIA Study Team

Ayeyarwady Bulbul (*Pyconotus blanfordi*)

Burmese collared Dove (*Streptopelia xanthocycla*)

Hooded Treepie (*Crypsirina cucullata*)

Venous–breasted Myna (*Sturnus burmnnicus*)

Burmese Shrike (*Lanius collurioides*)

White-throated babbler (*Turdoides gularis*)

Source: EIA Study Team

Figure 4.3-8 Photo of Some Recorded Bird Species

4.3.2.2.2.2. Mammals

During the survey period (rainy season and dry season), a total of 10 mammal species belonging to 7 genera were recorded through observation and interviewed in the project area. Amongst the recorded mammal species, Pallas's Squirrel, Burmese Hare and Phayre's Squirrel, Irrawaddy Squirrel and Variable Squirrel were considered to be common species, which were observed within the survey area. According to the villagers, the following mammal species were recognized as conservation interest that are found within the forest habitat of the survey area. These are Small Indian Civet, Small Asian Mongoose, Common Palm Civet, Jungle Cat, and Northern Tree Shrew.

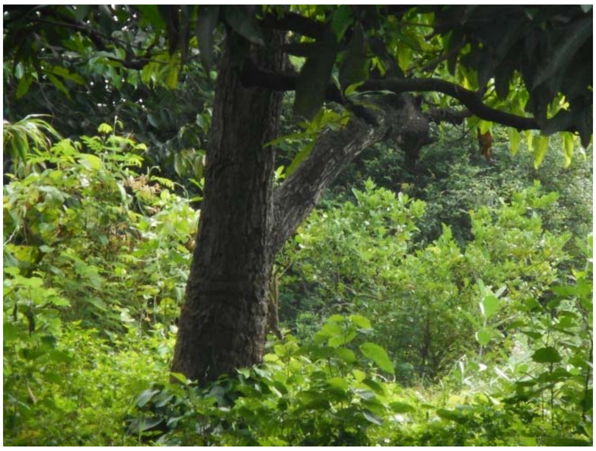
They were three species of civet and cat, one species of mongoose, four species of squirrel, one species of Burmese Hare and one species of Northern Tree Shrew based on interview information. According to the IUCN Red List (2018), there was no threatened species nor endemic species in the area. Confirmed species identified in the survey area are presented in Table 4.3-5, and photos of some recorded mammal species are shown in Figure 4.3-9.

Table 4.3-5 List of Recorded Mammal Species

No	Scientific Name	Common Name	Family Name	Observation Status	IUCN Status	Rainy Season			Dry Season		
						Project Site	Intake Station	Pipeline	Project Site	Intake Station	Pipeline
1	*Viverricula indica*	Small Indian Civet	Viverridae	Interviewed	LC	√	√	√	√	√	√
2	*Paradoxurus hermaphroditus*	Common Palm Civet	Viverridae	Interviewed	LC	√		√	√		√
3	*Felis chaus*	Jungle Cat	Felidae	Interviewed	LC		√			√	
4	*Herpestes javanicus*	Small Asian Mongoose	Herpestidae	Interviewed	LC	√		√	√		√
5	*Callosciurus erythraeus*	Pallas's Squirrel	Sciuridae	Observed	LC	√		√			√
6	*Callosciurus phayrei*	Phayre’s Squirrel	Sciuridae	Observed	LC		√	√	√	√	√
7	*Callosciurus pygerythrus*	Irrawaddy Squirrel	Sciuridae	Observed	LC		√			√	√
8	*Callosciurus finlaysonii*	Variable Squirrel	Sciuridae	Observed	LC		√	√			√
9	*Lepus peguensis*	Burmese Hare	Leporidae	Observed	LC	√		√	√		
10	*Tupaia belangeri*	Northern Tree Shrew	Tupaiidae	Interviewed	LC				√	√	√

Note: LC = Least Concerned
Source: EIA Study Team

Burmese Hare'scat (Rainy Season)



Phayrei's Squirrel (Rainy Season)

Irrawaddy Squirrel (Rainy Season)

Variable Squirrel (Dry Season)

Source: EIA Study Team

Figure 4.3-9 Photo of Some Recorded Mammal Species

4.3.2.2.2.3. Herpetology

During the herpetofauna survey, 18 amphibians and reptile species were recorded through interviewed and observation. 11 species were observed, and 7 species were interviewed from local people in survey area. These included 2 frogs, 2 skink, 2 gecko, 5 lizards and 7 snakes and 1 species of Asian Water Monitor. The families of frog are two species in families of Dicroglossidae. The families of lizard are five species in families Agamidae and the families of snake were three species in families Colubridae and three species in families Elapidae and one species in families Viperidae and the families of Skink are two species in families Scincidae. The families of Gecko are two species in families Gekkonidae and the families of Asian Water Monitor are one species in families Varanidae. According to the IUCN Red List of threatened species (2018), there was no threatened species nor endemic species in the survey area. The species identified in the survey area are presented in Table 4.3-6, and photos of some recorded herpect species are shown in Figure 4.3-10

Table 4.3-6 List of Recorded Herpeto Species

No	Scientific Name	Common Name	Family Name	Observation Status	IUCN Status	Rainy Season			Dry Season		
						Project Site	Intake Station	Pipeline	Project Site	Intake Station	Pipeline
1	*Calotes mystaceus*	Blue Forest Lizard	Agamidae	Observed	NE	√	√	√	√	√	√
2	*Leiolepis reevesii*	Reeves's Butterfly Lizard	Agamidae	Observed	NE	√	√	√	√	√	√
3	*Calotes chincollium*	Collared Forest Lizard	Agamidae	Observed	LC		√			√	
4	*Calotes emma*	Forest Crested Lizard	Agamidae	Observed	LC			√			√
5	*Calotes versicolor*	Garden Lizard	Agamidae	Observed	NE		√	√	√	√	√
6	*Dendrelaphis caudolineatus*	Stripe-tailed Bronzeback Tree Snake	Colubridae	Observed	NE	√		√			√
7	*Ptyas mucosa*	Indian Rat Snake	Colubridae	Interviewed	NE	√	√	√	√	√	√
8	*Daboia russelii*	Russell's Viper	Viperidae	Interviewed	LC	√	√	√	√	√	√
9	*Naja kaouthia*	Monocled Cobra	Elapidae	Interviewed	LC	√	√	√	√	√	
10	*Varanus salvator*	Asian Water Monitor	Varanidae	Interviewed	LC	√	√		√	√	
11	*Fejervarya limnocharis*	Field Frog	Dicroglossidae	Observed	LC	√		√			√
12	*Occidozyga laevis*	Common Puddle Frog	Dicroglossidae	Observed	LC	√		√			√
13	*Xenochrophis vittatus*	Striped Keelback Water Snake	Colubridae	Interviewed	NE			√	√	√	√
14	*Bungarus fasciatus*	Banded Krait	Elapidae	Interviewed	LC		√		√	√	√
15	*Sphenomorphus maculatus*	Spotted Forest Skink	Scincidae	Observed	NE		√			√	
16	*Eutropismultifasciat a*	Common Sun Skink	Scincidae	Observed	NE		√			√	
17	*Hemidactylus frenatus*	Asian House Gecko	Gekkonidae	Observed	LC					√	
18	*Gekko gecko*	Tokay Gecko	Gekkonidae	Observed	LC				√		

Note: NE = Not Evaluated
LC = Least Concerned
Source: EIA Study Team

Field Frog (Rainy Season)

Garden Lizard (Rainy Season)

Forest Crested Lizard(Rainy Season)

Spotted Forest Skink (Rainy Season)

Asian House Gecko(Dry Season)

Asian House Gecko(Dry Season)

Source: EIA Study Team

Figure 4.3-10 Photo of Some Recorded Herpect Species

4.3.2.2.2.4. Butterfly

A total of 26 species with 20 genera of butterflies under the order Lepidoptera belonging to 5 families were recorded. The family Nymphalidae and Pieridae were found dominant in the survey area. 10 species of Nymphalidae, 6 species of Pieridae and the 4 species of Papilionidae and 4 species of Lycaenidae, at least 2 species of Hesperiidae. According to the IUCN Red List (2018), there was no threatened and endemic species in this area. Confirmed species identified in the survey areas are presented in Table 4.3-7. Photo of some recorded Butterfly species are shown in Figure 4.3-11.

Table 4.3-7 List of Recorded Butterfly Species

No.	Species Name	Common Name	Family Name	IUCN Status	Rainy Season			Dry Season		
					Project Site	Intake Station	Pipeline	Project Site	Intake Station	Pipeline
1	*Troides aeacus*	Golden Butterfly	Papilionidae	NE			√			
2	*Papilio polytes*	Common Mormon	Papilionidae	NE	√	√	√		√	√
3	*Papilio demoleus*	Lime butterfly	Papilionidae	NE	√	√	√	√	√	√
4	*Chilasa clytia*	Common Mime	Papilionidae	NE			√			
5	*Catopsilia pyranthe*	Mottled Emigrant	Pieridae	NE	√	√	√		√	√
6	*Catopsilia pomona*	Lemon Emigrant	Pieridae	NE	√	√	√		√	√
7	*Appias olferna*	Eastern Striped Albatross	Pieridae	NE	√					
8	*Appias libythea*	Striped Albatrass	Pieridae	NE	√	√	√	√	√	√
9	*Ixias pyrene*	Yellow Orange-Tip	Pieridae	NE	√	√	√	√	√	√
10	*Eurema hecabe*	Common Grass Yellow	Pieridae	NE	√	√	√	√	√	√
11	*Danaus chrysippus*	Plain Tiger	Nymphalidae	NE	√	√	√	√	√	√
12	*Ideopsis vulgaris*	Blue Glassy Tiger	Nymphalidae	NE				√		
13	*Ariadne ariadne*	Angled Castor	Nymphalidae	NE						√
14	*Acraea violae*	Tawny Coster	Nymphalidae	NE	√	√	√	√		√
15	*Hypolimnas bolina*	Great Eggfly	Nymphalidae	NE	√		√			
16	*Mycalesis visala*	Long Brand Bushbrown	Nymphalidae	NE		√	√		√	√
17	*Mycalesis mineus*	Dark-branded Bushbrown	Nymphalidae	NE		√	√			√
18	*Junonia hierta*	Yellow Pansy	Nymphalidae	LC	√		√	√		
19	*Junonia almana*	Peacock Pansy	Nymphalidae	NE			√			√
20	*Junonia lemonias*	Lemon Pansy	Nymphalidae	NE	√	√		√	√	
21	*Tarucus callinara*	Spotted Pierrot	Lycaenidae	NE	√		√	√		√
22	*Chilades pandava*	Plain cupid	Lycaenidae	NE			√			√
23	*Castalius rosimon*	Common Pierrot	Lycaenidae	NE				√		
24	*Euchrysops cnejus*	Gram Blue	Lycaenidae	NE			√	√		
25	*Hasora chromus*	Common banded Awl	Hesperiidae	NE	√		√			
26	*Potanthus ganda*	Ganda dart	Hesperiidae	NE		√	√		√	√

Note: LC = Least Concern, NE = Not Evaluated
Source: EIA Study Team

Papilio demoleus (Lime Butterfly)

Chilasa clytia (Common Mime)

Troides aeacus (Golden Butterfly)

Ixais pyrene (Yellow Orange-Tip)

Eurema hecabe (Common Grass Yellow)

Catopsilia pyranthe (Mottled Emigrant)

Source: EIA Study Team

Figure 4.3-11 Photo of Some Recorded Butterfly Species

4.3.2.2.2.5. Dragonfly

A total of 11 species with 10 genera of 1 family were identified in the survey area. List of identified species are family Libellulidae. There was no threatened species and no endemic species around the survey area. The species identified in the survey areas are presented in Table 4.3-8, and photos of some recorded dragonfly species are shown in Figure 4.3-12.

Table 4.3-8 List of Recorded Dragonfly Species

No.	Species Name	Common Name	Family Name	IUCN Status	Rainy Season			Dry Season		
					Project Site	Intake Station	Pipeline	Project Site	Intake Station	Pipeline
1	*Tholymis tillarga*	Coral Tailed Cloudwing	Libellulidae	LC	√		√			
2	*Brachythemis contaminate*	Ditch Jewel	Libellulidae	LC			√			
3	*Trithemis aurora*	Marsh Glider	Libellulidae	LC			√	√		√
4	*Rhyothemis variegate*	Common Picture Wing	Libellulidae	LC			√			
5	*Crocothemis servilia*	Scarlet Skimmer	Libellulidae	LC	√			√		
6	*Orthetrum sabina*	Green Marsh Hawk	Libellulidae	LC	√	√	√	√	√	√
7	Pantala flavescens	Wandering Glider	Libellulidae	LC	√		√	√		√
8	*Bradinopyga geminate*	Granite Ghost	Libellulidae	LC	√					
9	*Potomarcha congener*	Yellow-tailed Ashy Skimmer	Libellulidae	NE	√			√		
10	*Macrodiplax cora*	Wandering Pennant	Libellulidae	LC		√			√	
11	*Diplacodes trivialis*	Ground Skimmer	Libellulidae	LC	√	√		√	√	√

Note: NE = Not Evaluated, LC = Least Concerned
Source: EIA Study Team

Crocothemis servilia (Scarlet Skimmer)

Orthetrum sabina (Green Marsh Hawk)

Pantala flavescens (Wandering Glider)

Bradinopyga geminate (Granite Ghost)

Potomarcha congener (Yellow-tailed Ashy Skimmer)

Tholymis tillarga (Coral Tailed Cloudwing)

Source: EIA Study Team

Figure 4.3-12 Some Photos of Recorded Dragonfly Species

4.3.2.2.2.6. Beetle

Four species of beetle were recorded in the study area. These families are Chrysomelidae (2 species), Scutelleridae (1 species) and Tenebrionidae (1 species) in this survey area. There are no threatened species in the study area according to the IUCN red list of (2018). Confirmed species identified in the survey areas are presented in Table 4.3-9. Photo of recorded beetle species are shown in Figure 4.3-13.

Table 4.3-9 List of Recorded Beetle Species

No.	Species Name	Common Name	Family Name	IUCN Status	Rainy Season			Dry Season		
					Project Site	Intake Station	Pipeline	Project Site	Intake Station	Pipeline
1	*Chrysochus cobaltinus*	Blue Mint Beetle	Chrysomelidae	NE	√			√		√
2	*Aulacophora foveicollis*	Pumpkin Beetle	Chrysomelidae	NE	√	√	√		√	√
3	*Chrysocoris stollii*	Jewel Bug	Scutelleridae	NE			√	√		√
4	*Tenebrio obscurus*	Mini Mealworns	Tenebrionidae	NE			√			√

Note: NE = Not Evaluated
Source: EIA Study Team

Tenebrio obscurus (Mini Mealworms)

Chrysocoris stollii (Jewel Bug)

Aulacophora foveicollis (Red Pumpkin Beetle)

Chrysochus cobaltinus (Blue Mint Beetle)

Source: EIA Study Team

Figure 4.3-13 Photo of Recorded Beetle Species

4.3.2.2.2.7. Snail

A total of 3 species distributed 3 family were identified and recorded and the most occurrence species are *Pila ampullacea* and *Asperitas nemorensis*. The dominant family is Ampulariidae. According to the IUCN Red List (2018), there was no threatened species. Confirmed species identified in the survey areas are presented in Table 4.3-10. Photos of recorded snail species are shown in Figure 4.3-14 .

Table 4.3-10 List of Recorded Snail Species

No	Scientific Name	Common Name	Family Name	Observation Status	IUCN Status	Rainy Season			Dry Season		
						Project site	Intake Station	Pipeline	Project site	Intake Station	Pipeline
1	*Pila ampullacea*	Nil	Ampullariidae	Observed	LC		√	√		√	√
2	*Asperitas nemorensis*	Nil	Dyakiidae	Observed	NE	√	√	√	√	√	√
3	*Camaena gabriellae*	Nil	Camaenidae	Observed	NE	√	√	√	√	√	√

Note: NE = Not Evaluated, LC = Least Concerned
Source: EIA Study Team

Pila ampullaceal

Asperitas nemorensis

Camaena gabriellae

Source: EIA Study Team

Figure 4.3-14 Photo of Recorded Snail Species

4.3.2.2.2.8. Fish

Field surveys and interviews with local fishermen who lived in the survey area were conducted during the collection of the specimens. Fishing activities are mostly traditional method. Fishermen were interviewed with regard to fishery process. A total of 44 species distributed 16 family were identified and recorded from the survey area and Myitnge River. The most commonly observed species are Puntius chola, Catla catla, Labeo rohita. The dominant Family is Cyprinidae. According to the IUCN Red List (2018), five species were near threatened species, and these were *Osteobrama belangeri*, *Ompok bimaculatus*, *Ompok pabo*, *Wallago attu* and *Bagarius bagarius*. Others were least concerned and not evaluated. Confirmed species identified in the survey area are presented in Table 4.3-11. Photo of some recorded fish species are shown in Figure 4.3-15.

Table 4.3-11 List of Recorded Fish Species

No	Scientific Name	Common Name	Family Name	Observation Status	IUCN Status	Rainy Season			Dry Season		
						Project site	Intake Station	Pipeline	Project site	Intake Station	Pipeline
1	*Notopterus notopterus*	Grey feather back	Notopteridae	Interview	LC		√	√		√	√
2	*Gudusia variegata*	Burmese River Shad	Clupeidae	Interview	LC		√	√		√	√
3	*Salmophasia sardinella*	Sardinella razorbelly minnow	Cyprinidae	Interview	LC		√	√			
4	*Raiamas guttatus*	Burmese trout	Cyprinidae	observed	LC		√	√		√	√
5	*Amblypharyngodon atkinsonii*	Burmese carplet	Cyprinidae	Interview	LC		√	√		√	√
6	*Osteobrama belangeri*	Manipur Osterobrama	Cyprinidae	observed	NT		√	√		√	√
7	*Osteobrama cunma*	Cunma osteobrma	Cyprinidae	observed	LC		√	√		√	√
8	*Puntius chola*	Swamp barb, chola barb	Cyprinidae	observed	LC	√	√	√	√	√	√
9	*Puntius gonionotus*	Silver barb	Cyprinidae	Interview	LC		√	√		√	√
10	*Puntius sarana*	Olive barb	Cyprinidae	Interview	LC		√	√			
11	*Cirrhinus mrigala*	Mrigal	Cyprinidae	Interview	LC		√	√			
12	*Catla catla*	Catla	Cyprinidae	Interview	LC		√	√			
13	*Labeo angra*	Carplet	Cyprinidae	observed	LC		√	√		√	√
14	*Labeo calabasu*	Carp	Cyprinidae	Interview	NE		√	√			
15	*Labeo rohita*	Rohu	Cyprinidae	observed	LC		√	√		√	√
16	*Labeo stoliczkae*	Minor Carp	Cyprinidae	Interview	NE		√	√			
17	*Lepidocephalichthys berdmorei*	Burmese loach	Cobitidae	Interview	LC		√	√			
18	*Mystus beekeri*	Day's mystus	Bagridae	Interview	LC		√	√			
19	*Mystus cavasius*	Genetic mystus	Bagridae	Interview	LC		√	√			
20	*Mystus leucophasis*	Sittang mystus	Bagridae	observed	LC		√	√		√	√
21	*Mystus pulcher*	Striped dwarf catfish	Bagridae	Interview	LC		√	√			
22	*Hemibagrus menoda*	Menoda catfish	Bagridae	Interview	LC		√	√			
23	*Hemibagrus microphthalmus*	Long whisker catfish	Bagridae	Interview	LC		√	√			
24	*Ompok bimaculatus*	Indian butter catfish	Siluridae	Interview	NT		√	√		√	√
25	*Ompok pabo*	Pabo catfish	Siluridae	Interview	NT		√	√			
26	*Wallago attu*	Boal	Siluridae	observed	NT		√	√		√	√
27	*Clupisoma prateri*	Brumese garua	Schilbeidae	Interview	LC		√	√			
28	*Eutropiichthys vacha*	Batchwa vacha	Schilbeidae	observed	LC		√	√		√	√
29	*Gagata cenia*	Indian gagata	Sisoridae	Interview	LC		√	√			

No	Scientific Name	Common Name	Family Name	Observation Status	IUCN Status	Rainy Season			Dry Season		
						Project site	Intake Station	Pipeline	Project site	Intake Station	Pipeline
30	*Bagarius bagarius*	Gangetic goonch	Sisoridae	Interview	NT		√	√			
31	*Bagarius yarrellii*	Goonch	Sisoridae	Interview	NE		√	√			
32	*Claris batrachus*	Walking Catfish	Clariidae	Interview	NE		√	√			
33	*Arius acutirostris*	Salweeen catfish	Ariidae	Interview	LC		√	√			
34	*Rhinomugil corsula*	Corsula mullet	Mugilidae	Interview	LC		√	√			
35	*Xenentodon cancila*	freshwater garfish	Belonidae	observed	LC		√	√		√	√
36	*Macrognathus aral*	One-stripe-spiny-Eel	Mastacembelidae	observed	LC		√	√		√	√
37	*Macrognathus zebrinus*	Spiny-eel	Mastacembelidae	Interview	LC	√	√	√	√		
38	*Mastacembelus armatus*	Tire-track-spiny-eel	Mastacembelidae	Interview	LC		√	√			
39	*Parambassis ranga*	Glass fish	Ambassidae	observed	LC		√	√		√	√
40	*Pangasius pangasius*	Nil	Pangasiidae	Interview	LC		√	√			
41	*Silonia silondia*	Silong Catfish	Schilbeidae	Interview	LC		√	√			
42	*Sperata aor*	Long-whiskered Catfish	Bagridae	Interview	LC	√	√	√			
43	*Oreochromis mossambica*	Talipa	Cichidae	observed	LC	√	√	√	√	√	√
44	*Aspidoparia morar*	Morar	Cyprinidae	observed	LC		√	√		√	√

Note: NE = Not Evaluated, LC = Least Concerned and NT = Near Threatened
Source: EIA Study Team

Cirrhinus mrigala (Rainy Season)

Oreochromis sp. (Rainy Season)

Oreochromis sp. (Dry Season)

Labeo calabasu(Dry Season)

Wallago attu (Dry Season)

Xenentodon cancila (Dry Season)

Parambassis ranga (Dry Season)

Macrognathus aral (Dry Season)

Source: EIA Study Team

Figure 4.3-15 Photo of Some Recorded Fish Species

4.4. Socio-economic Component

4.4.1. Survey Items

Socio-economic surveys were conducted by combining both literature and field survey on demography, ethics, religion, economic status, education, and health conditions. Literature and secondary data were collected at Sintgaing Township level, and additional field surveys were conducted at village level based on the comments for the scoping report by MONREC-ECD. The additional field surveys included the Kyaukse IPP plant, which is located in Na Be Bin Village.

4.4.1.1. Social Condition

4.4.1.1.1. Ethnic

4.4.1.1.1.1. Literature Survey

Ethnic groups of Sintgaing Township habitants are as shown in Table 4.4-1. The major ethnicity is the Burmese, about 95% of total population.

Table 4.4-1 Ethnic Group of Sintgaing Township

No.	Ethnicity	Residential Population	Township Population [a] (%)
1	Kachin	5	0.004
2	Kayar	-	-
3	Kayin	18	0.013
4	Chin	14	0.010
5	Mon	6	0.004
6	Burmese	127,857	94.788
7	Rakhine	8	0.006
8	Shan	26	0.019
9	Other	6,953	5.155
Total		134,887	-

Note: a) population ratios were calculated by EIA Study team
Source: Township Profile (2018), Sintgaing Township GAD

4.4.1.1.1.2. Preliminary Field Survey

The meeting for interview survey was conducted on 21 March 2019 at E Bya Village, to obtain the socio-economic condition of local people. There were 37 local people attended the meeting. According to the discussion and conversation between local people and EIA study team, the socio-economic conditions are summarized as follow;

- All the villagers are Burmese. The project area has no indigenous people nor minority group, so this should not be an issue in the project development. Buddhism is the only religion adopted by the villagers.
- Agriculture is the main occupation for most households in the project area. Other occupations are trading or small businesses, working with the government, and wage labor. The wage laborers are usually casual workers earning daily wages. Most of small traders open grocery shops in the villages, and some are engaged in buying-selling agricultural products. In line with their livelihood, most of the villagers are self-employed in their farms or small businesses. Most of the casual workers in the villages are not significantly difference between male and female adults, and between boys and girls. Boys and girls get fewer wages than adults which could be considered normal.
- The main crops are paddy, bean, wheat, corn, mangoes, banana, lemon, betel and vegetables. Cows are mainly used in agricultural works. Chicken, pig and duck are important livestock for home consumption and selling in the markets.

- Among 25 percent of villagers are farmers in E-Bya and Met Ka Ya Villages. Among 50 percent of villagers are farmers in Kyun Oo Village.
- The project area has no forest area. Therefore, the villages have no forest-based livelihood opportunities apart from firewood collection from vacant land. No industrial in the project area.
- No households in the project area engage in fisheries or aquaculture. Some villagers catch the fish in the Myitnge River for their home consumption.

Source: EIA Study Team

Figure 4.4-1 Photos of Public Hearing Survey

4.4.1.1.1.3. Field Survey

There was no concrete data about ethnic composition in Taung Yin, Na Be Bin and Shan Gan villages. According to the questionnaire survey to heads of villages, almost all residents in those villages are Burmese.

4.4.1.1.2. Household

4.4.1.1.2.1. Literature Survey

The total households in Sintgaing Township is over 28,000 and there are five wards in urban area and 163 villages in rural area as shown in Table 4.4-2.

Table 4.4-2 Household in Sintgaing Township

No.	Description	House	Household	Ward	Village tract	Village
1	Urban	1,677	1,703	5	-	-
2	Rural	26,701	27,231	-	48	163
Total		28,378	28,934	5	48	163

Source: Township Profile (2018), Sintgaing Township GAD

4.4.1.1.3. Population and Gender

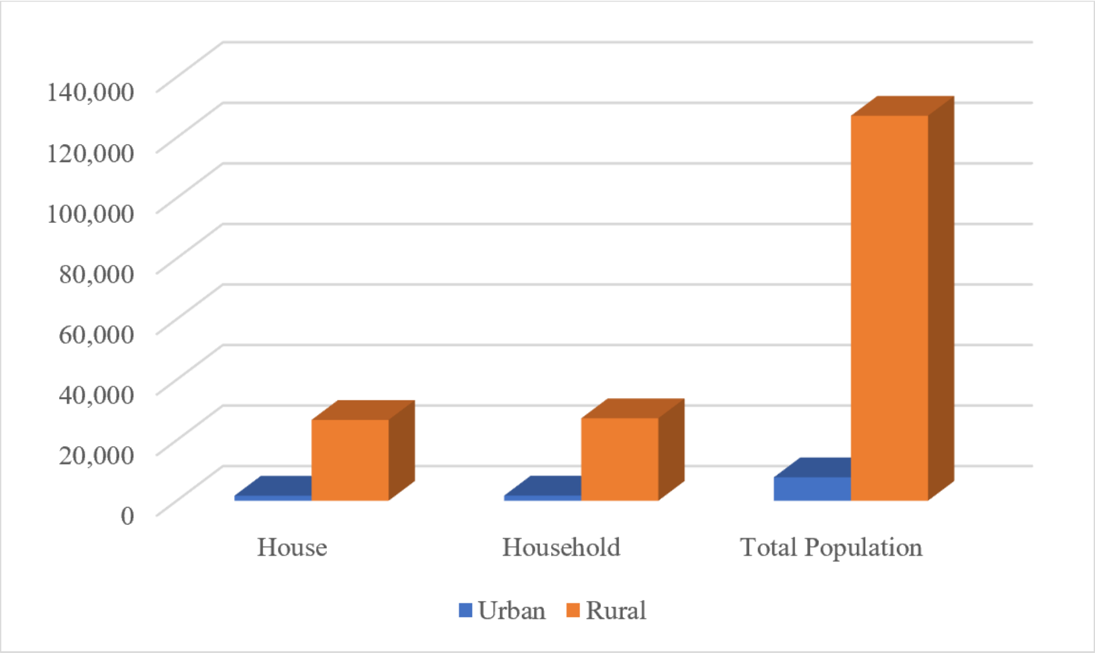
4.4.1.1.3.1. Literature Survey

Based on the Township Profile (2018) of Sintgaing Township, the total population is 134,904, mostly living in rural area as shown in Table 4.4-3 and Figure 4.4-2.

Table 4.4-3 Population in Sintgaing Township

No.	Description	Above 18			Below 18			Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
1	Urban	2,059	2,819	4,878	1,429	1,434	2,863	3,488	4,253	7,741
2	Rural	37,479	44,034	81,513	22,908	22,742	45,650	60,387	66,776	127,163
Total		39,538	6,853	86,391	24,337	24,176	48,513	63,875	71,029	134,904 [a]

Note: a) the total population differs from that in table 4.4-1, because of the different figures in the original reference
Source: Township Profile (2018), Sintgaing Township GAD



Source: Township Profile (2018), Sintgaing Township GAD

Figure 4.4-2 Urban and Rural of Sintgaing Township

4.4.1.1.3.2. Field Survey

Based on the questionnaire survey to village heads, the distribution of population by gender and age in Taung Yin, Na Be Bin and Shan Gan Villages is as shown in Table 4.4-4.

Table 4.4-4 Population in Taung Yin, Na Be Bin and Shan Gan Village, Sintgaing Township

No.	**Village**	**Above 18**			**Below 18**			**Total**		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
1	Taung Yin	257	333	590	92	72	164	349	405	754
2	Na Be Bin	519	541	1,060	253	246	499	772	787	1,559
3	Shan Gan	1,129	1,210	2,339	432	413	845	1,561	1623	3,184

Source: Village heads of Taung Yin, Na Be Bin and Shan Gan Village

4.4.1.1.4. Household and Gender

4.4.1.1.4.1. Literature Survey

There are 14 villages located in the project area. The literature referring to village level populations does not exist; therefore, population data on three villages were collected based on the field survey and presented in the following section.

4.4.1.1.4.2. Field Survey

Based on the field survey, the number of households, distribution of population by gender in Taung Yin, Na Be Bin and Shan Gan Villages are as shown in Table 4.4-5.

Table 4.4-5 House, Household and Population in Three Villages

No.	Village Name	House	Household	Male	Female	Total Population
1	Taung Yin	163	163	349	405	754
2	Na Be Bin	306	306	772	787	1,559
3	Shan Gan	706	706	1,561	1,623	3,184

Source: Village Heads of Taung Yin, Na Be Bin and Shan Gan Villages

4.4.1.1.5. Religion

4.4.1.1.5.1. Literature Survey

The different kinds of religion present in Sintgaing Township are shown in Table 4.4-5. More than 90% of the people living in the township are Buddhists as shown in Table 4.4-6.

Table 4.4-6 Religion in Sintgaing Township (2018)

Township	**Religion**	**Buddhist**	**Christian**	**Hindu**	**Muslim**	**Total**
Sintgaing	Number	127,914	328	-	6,662	134,904 [a]
	(%)	94.82	0.24	-	4.94	100.0

Note: a) the total population differs from that in table 4.4-1, because of the different figures in the original reference
Source: Township Profile (2018), Sintgaing Township GAD

4.4.1.1.5.2. Field Survey

Religions present in three villages are shown in Table 4.4-7. All the people living in the villages are Buddhists at the time of survey.

Table 4.4-7 Religion Taung Yin, Na Be Bin and Shan Gan Villages, Sintgaing Township

Township	**Unit**	**Buddhist**	**Christian**	**Hindu**	**Muslim**	**Total**
Taung Yin	Number	754	-	-	-	-
	(%)	100	-	-	-	-
Na Be Bin	Number	1,559	-	-	-	-
	(%)	100	-	-	-	-
Shan Gan	Number	3,184	-	-	-	-
	(%)	100	-	-	-	-

Source: Village heads of Taung Yin, Na Be Bin and Shan Gan Villages

4.4.1.1.6. Education

4.4.1.1.6.1. Literature Survey

According to the township profile, there are two universities in Sintgaing Township. Education status of Sintgaing Township are summarized in Table 4.4-8.

Table 4.4-8 Education Status in Sintgaing Township (2018)

No.	University/School	Teachers	Students	Ratio of Teachers to Students
1	University	372	23,877	1:64
2	High School	260	8,784	1:34
3	Affiliated High School	145	3,535	1:24
4	Middle School	165	4,925	1:30
5	Affiliated Middle School	57	1,353	1:24
6	Post-primary School	20	504	1:25
7	Primary School	394	6,121	1:16
8	Pre-school	17	301	1:18
9	Monastery Education School	66	1,153	1:17

Source: Township Profile (2018), Sintgaing Township GAD

4.4.1.1.6.2. Field survey

The educational infrastructures in Taung Yin, Na Be Bin and Shan Gan Villages, Sintgaing Township are shown in Table 4.4-9. There is one primary school in Taung Yin and Na Be Bin Villages, and one affiliated high school in Shan Gan Village.

Table 4.4-9 Educational Institution in Three Villages

No.	Educational institutions	Taung Yin (No.)	Na Be Bin (No.)	Shan Gan (No.)
1	Primary schools	1	1	0
2	Middle schools	0	0	0
3	Sub -Middle schools	0	0	0
4	High school	0	0	0
5	Sub-high schools	0	0	0
6	Affiliated High School	0	0	1
7	Pre-school	0	0	0
8	Monastery education schools	0	0	0
	Total	**1**	**1**	**1**

Source: Village heads of Taung Yin, Na Be Bin and Shan Gan Villages

4.4.1.2. Economic Profile

4.4.1.2.1. Literature Survey

In Sintgaing Township, agriculture is the major occupation of local people. Livestock is also a common practice in the area, especially of cows, buffaloes, pigs, goats and breed chicken, ducks and sheep. The households raise pigs and poultry such as chicken and ducks, for their own consumption and for occasional sale. In general, buffalo and cow are used as draught animals in rice paddies. Township's main products are rice and export to Mandalay. Production of main crops are described in Table 4.4-10.

Table 4.4-10 Production Rate of Main Crops (April-September 2018)

No.	Type of Crop	Production rate (Tin)
1	Rice	984,397
2	Groundnut	-
3	Sesame	177,688
4	Sunflower	33,861
5	Bean (Various types of bean)	116,305
6	Cotton	281,632
7	Sugar cane	-

Note: Tin is volume measured by a standard basket; 1 Tin equals to 38.5 Liters
Source: Township Profile (2018), Sintgaing Township GAD

4.4.1.2.2. Field Survey

Main occupations of villages are farmer, government staff, company staff and daily laborers. Livestock is a common practice in the area, especially of cows, buffaloes, pigs, goats and breed chicken, ducks and sheep. The households raise pigs and poultry such as chicken and ducks, for their own consumption and for occasional sale. In general, buffalo and cow are used as draught animals in rice paddies. Production of main crops are described in Table 4.4-11.

Table 4.4-11 Production Rate of Main Crops in Three Villages

No.	Type of Crop	Taung Yin	Na Be Bin	Shan Gan
1	Rice (Summer)	60 (Tin)[a]	60 (Tin)	60 (Tin)
2	Rice (Monsoon)	100 (Tin)	90 (Tin)	150 (Tin)
3	Onion	2,800 (Viss)[b]	3,000 (Viss)	3,000 (Viss)
4	Chilli	150 (Tin)	150 (Tin)	150 (Tin)
5	Sesame	0(Tin)	0(Tin)	10 (Tin)
6	Pigeion Pea	0(Tin)	0(Tin)	10 (Tin)
7	Chickpea	30 (Tin)	25 (Tin)	0 (Tin)

Note: a) Tin is volume measured by a standard basket, 1 Tin equals to 38.5 Liters
b) Viss is weight unit used in the area, 1Viss equals to 1.63 kg
Source: Village heads of Taung Yin, Na Be Bin and Shan Gan Village, Sintgaing Township

4.4.1.3. Industries

4.4.1.3.1. Literature Survey

There are 2 factories, 56 workshops and 7 cottage industries in Sintgaing Township. Most of business investments are of garment, forest products and value-added wood industry and food and consumer factories. About 6,104 people are employed in their respective work.

4.4.1.4. Occupational Status

4.4.1.4.1. Literature Survey

According to the township profile prepared by township GAD office, there are 81,547 workable people, which is over 60% of total population. Among them, employed persons are about 90% of total population, while unemployed are 10% and shown in Table 4.4-12.

Table 4.4-12 Occupational Status of Sintgaing Township

No.	Occupational Status	Person	% [a]
1	Workable person	81,547	100.00
2	Employed person	68,689	84.23
3	Unemployed person	12,858	15.77

Note: a) ratios were calculated by JICA Study team
Source: Township Profile (2018), Sintgaing Township GAD

4.4.1.4.2. Field Survey

It was difficult to obtain reliable data regarding employment situations in the villages, as all village heads had different definitions of such information. However, according to the village head's answers, the ratio of employed person versus workable person ranged between 81% to 93%.

4.4.1.5. Income Status

4.4.1.5.1. Literature Survey

Based on the secondary data received from related GAD offices, the average income per person of 2015 to 2018 are presented in Table 4.4-13.

Table 4.4-13 Income Level in Sintgaing Township

Unit - Kyat

No.	2015-16	2016-17	2017-18
1	794,794	829,881	953,286

Source: Township Profile (2018), Sintgaing Township GAD

4.4.1.5.2. Field Survey

Based on the interviews with village heads, average monthly income of household is as shown in Table 4.4-14.

Table 4.4-14 Income level of Taung Yin, Na Be Bin and Shan Gan Villages

Unit - Kyat

No.	**Name of Village**	**Per Month**	**Per Year**
1	Taung Yin	170,000	2,040,000
2	Na Be Bin	150,000	1,800,000
3	Shan Gan	150,000	1,800,000

Source: Village heads of Taung Yin, Na Be Bin and Shan Gan Villages

4.4.1.6. Health Profile

4.4.1.6.1. Literature Survey

The overall condition of the health including life expectancy (male/female), morbidity, major disease, and infant mortality rates are as shown in Table 4.4-15.

Table 4.4-15 Health Condition of Sintgaing Township

No.	Total Population	Mother Population	Children Population	Per 1000 Lives/Persons			Major Disease (person)		
				Birth rate	Mother Death	Infant mortality	Diarrhea	TB	ARI
1	134,904	1,397	1,402	9.74	2.49	7.1	614	30	58

Source: Township Profile (2018), Sintgaing Township GAD

Table 4.4-16 shows morbidity and mortality of diseases in Sintgaing Twonship in 2018. It shows high morbidity of diarrhea and Acute Respiratory Infections (ARI) disease in the township.

Table 4.4-16 Morbidity and Mortality of Diseases in Sintgaing Township

Diseases	Morbidity	Mortality
Diarrhea	614	1
ARI	58	0
TB	30	0
Malaria	0	0
Hepatitis	0	0

Source: Township Profile (2018), Sintgaing Township GAD

4.4.1.6.2. Field Survey

The overall condition of the maternal and child health, and major diseases are shown in Table 4.4-17.

Table 4.4-17 Health related Status of Three Villages

Name	Total Population	Mother Population	Population of Children	Major Disease (person)			
				Diarrhea	TB	Dysentery	ARI
Taung Yin	754	7	7	2	0	0	0
Na Be Bin	1559	18	18	2	0	0	0
Shan Gan	3184	35	35	1	1	0	0

Source: Village Head, Taung Yin, Na Be Bin and Shan Gan Village, Sintgaing Township

4.4.1.7. Land Use

4.4.1.7.1. Literature Survey

General Land use of Singaing Township includes cultivated land, vcacant land and non-cultivated land. In 2018, there were 69,309 acres of cultivated land and 288 acres of vacant land. Cultivated land includes farm land (40,822 acres), Ya (dry land: 26,191 acres) and garden (2,296 acres). Land use is mainly agriculture and cultivation, comprising more than 60% of total land use. The settlement land cover for town and village land is about 3%. Landuse pattern of Singaing Township is as shown on Table 4.4-18.

Table 4.4-18 Land Use in Sintgaing Township

No.	Type of Land	Area (Acre)
1	Cultivated Land	69,309
2	Vacant Land	288
3	Non-cultivated Land	41,239
	(a) Pasture Land (1,348)	
	(b) Industrial Land (1,324)	
	(c) Town Land (274)	
	(d) Village Land (3,270)	
	(e) Other (8,177)	
	(f) Forest and Protected Land (7,402)	
	(g) Area cannot be cultivated (19,444)	
	Total	110,836

Source: Township Profile (2018), Sintgaing Township GAD

4.4.1.8. Infrastructure Facilities

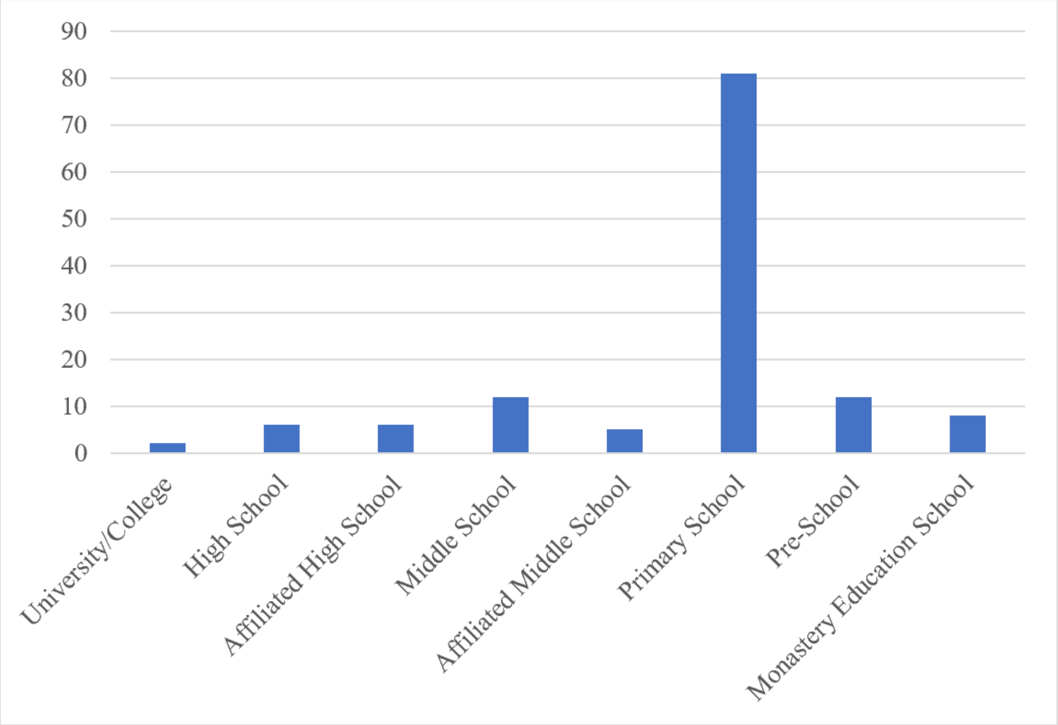
4.4.1.8.1. Literature Survey

The educational infrastructures in Sintgaing Township are shown in Table 4.4-19 and Figure 4.4-3 .

Table 4.4-19 Educational infrastructures in Sintgaing Township

No.	Educational institutions	Number
1	University/College	2
2	High School	6
3	Affiliated High School	6
4	Middle School	12
5	Affiliated Middle School	5
6	Primary School	81
7	Pre-School	12
8	Monastery Education School	8

Source: Township Profile (2018), Sintgaing Township GAD



Source: Township Profile (2018), Sintgaing Township GAD

Figure 4.4-3 Educational Infrastructures in Sintgaing Township

4.4.1.9. Health Related Facilities

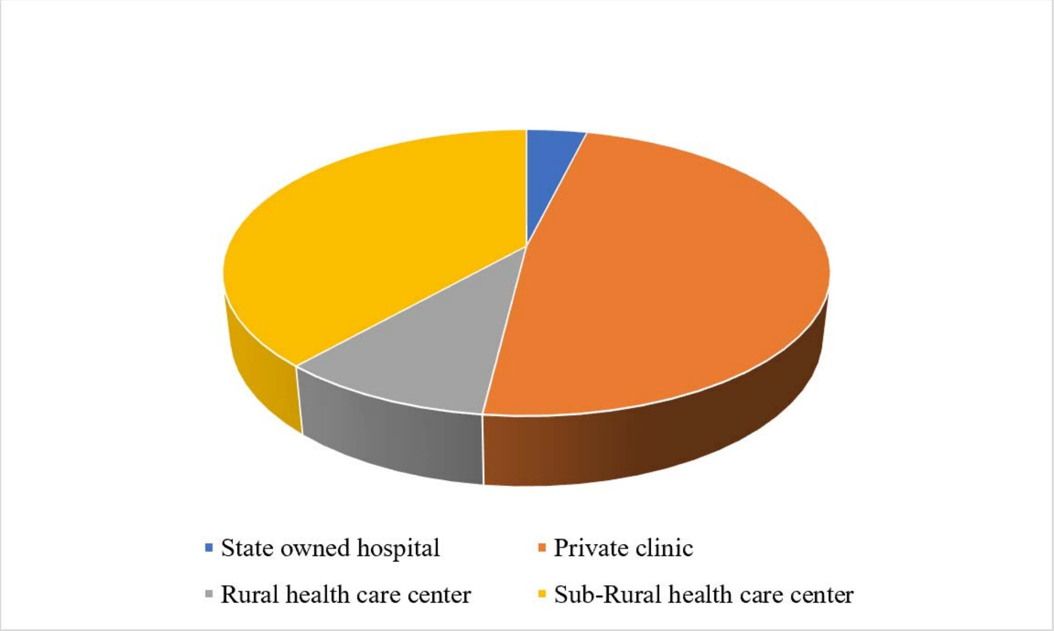
4.4.1.9.1. Literature Survey

Health facilities in Sintgaing Township are shown in Table 4.4-20 and Figure 4.4-4.

Table 4.4-20 Health Facilities in Sintgaing Township

No.	Health Facilities	Number
1	State owned hospitals	2
2	Private clinic	25
3	Rural health care centre	5
4	Sub-Rural health care centre	20

Source: Township Profile (2018), Sintgaing Township GAD



Source: Township Profile (2018), Sintgaing Township GAD

Figure 4.4-4 Health Facilities in Sintgaing Township

4.4.1.9.2. Field Survey

Health facilities in three village are shown in the following Table 4.4-21. There is no health facilities in Taung Yin, Na Be Bin and Shan Gan Villages.

Table 4.4-21 Health Facilities in Three Villages

No.	**Health Facilities**	Taung Yin	Na Be Bin	Shan Gan
1	State owned hospitals	0	0	0
2	Private clinic	0	0	0
3	Rural health care centers	0	0	0
4	Sub-Rural health care centers	0	0	0

Source: Village heads of Taung Yin, Na Be Bin and Shan Gan Villages

4.5. Cultural Components

4.5.1. Literature Survey

The number of religious buildings such as pagoda, monastery and convent school are shown in Table 4.5-1. There is no historical building in Sintgaing Township, while two traditional zones are situated in the township as shown in Table 4.5-2. Location of pagodas, which are found in the literature survey and located within the area are shown in Figure 4.5-1.

Table 4.5-1 Religious Buildings in Sintgaing Township

No.	Pagoda/Statue	Monastery	Convent School
1	3,608	249	24

Source: Township Profile (2018), Sintgaing Township GAD

Table 4.5-2 Historical Buildings in Sintgaing Township

No.	Traditional Zone
1	Pa Leik Traditional Zone (at Pa Leik village)
2	Matkhayar Traditional Zone (at Aepya village)

Source: Township Profile (2018), Sintgaing Township GAD

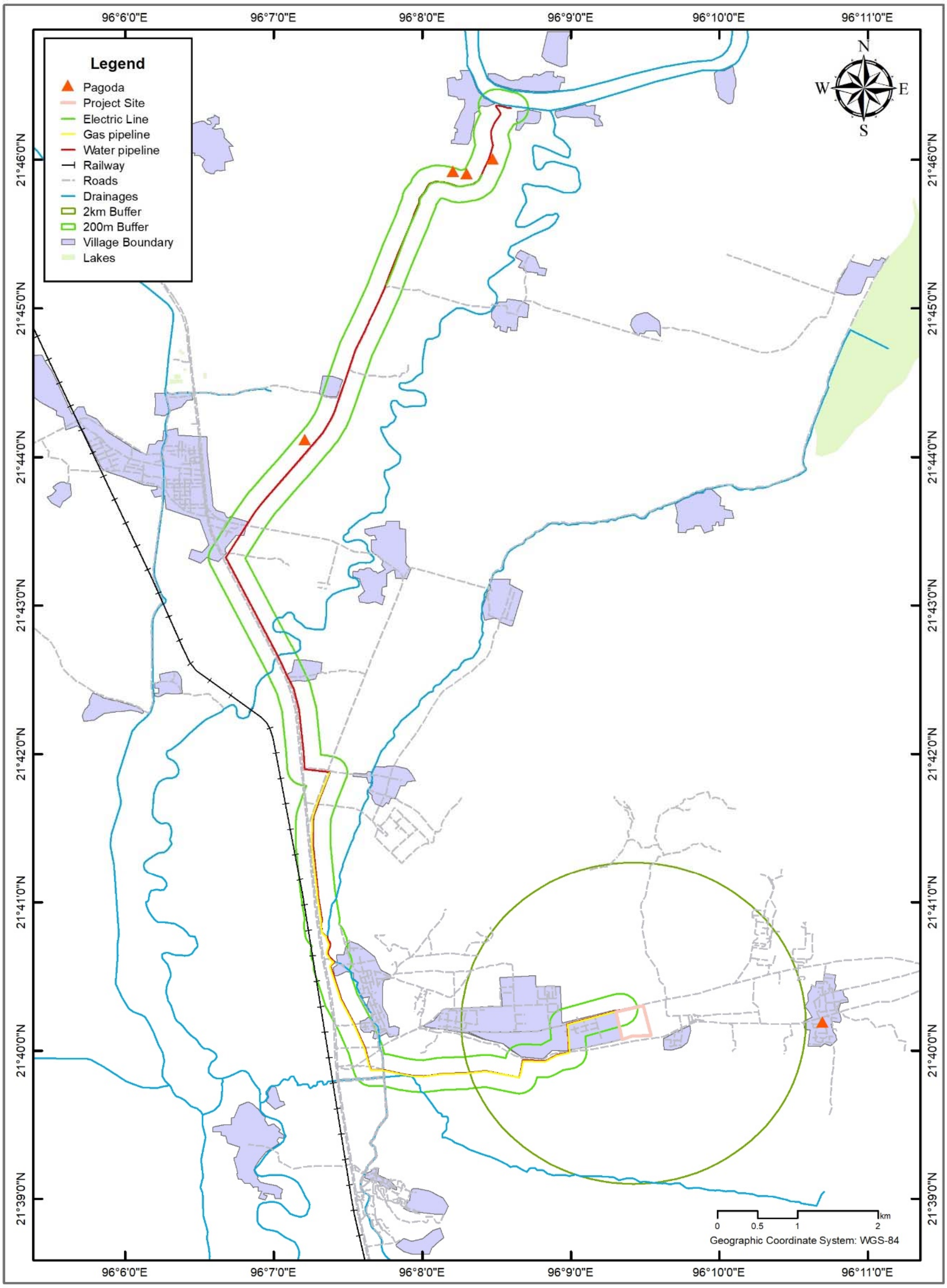


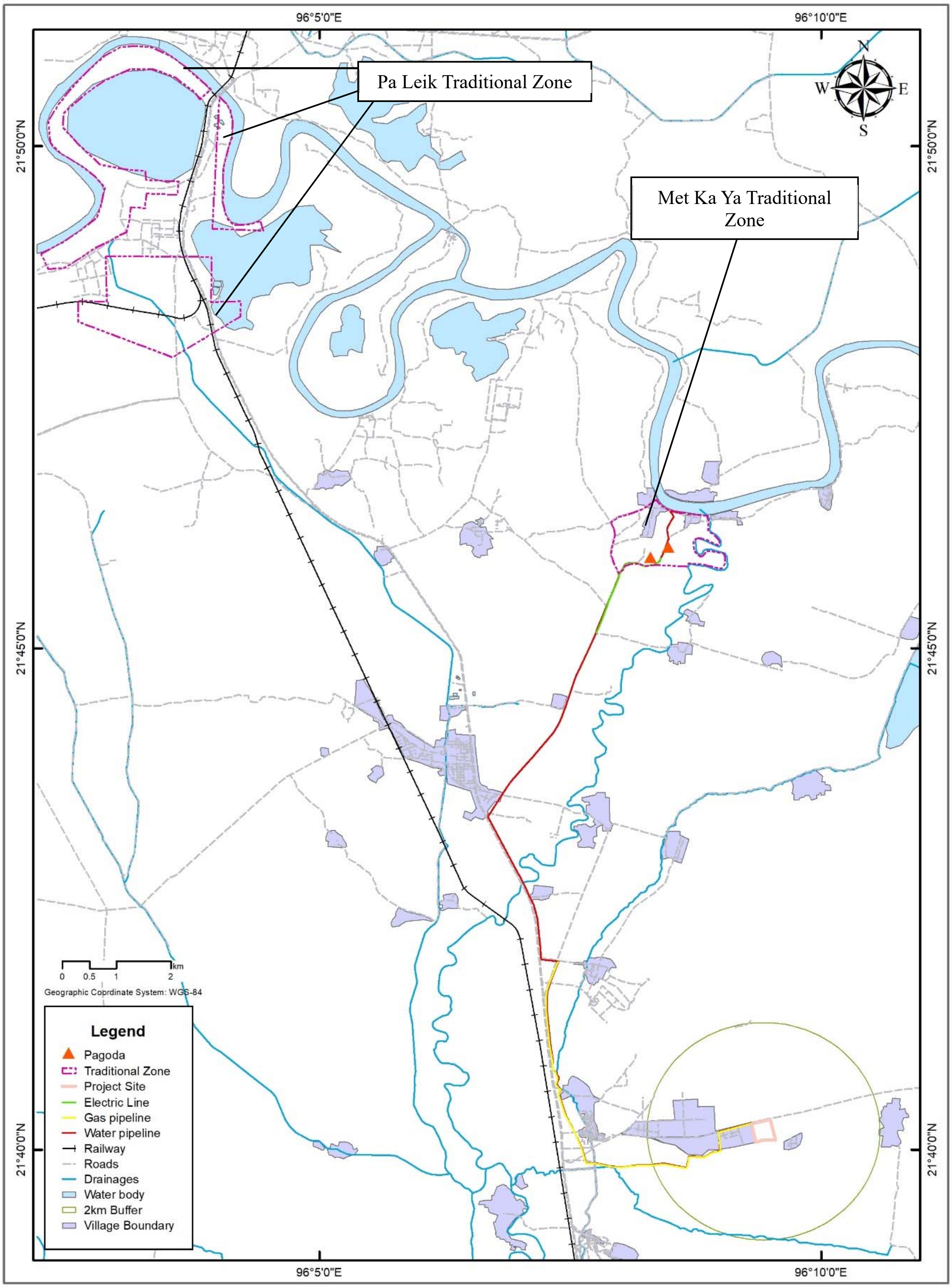
Figure 4.5-1 Location Map of Pagodas within AOI

4.5.2. Field Survey

Field survey of cultural components was conducted in AOI of the Project, namely the area of 2 km from the power plant site and 200 m from gas and water pipelines.

4.5.2.1. Traditional zone

Location of two traditional zones and valuable pagodas are as shown in Figure 4.5-2, and information of those zones are summarized in Table 4.5-3. In addition, there are two valuable pagodas within the Matkhayar traditional zone, which are closed to the planned water pipeline route. Information of two pagodas are summarized in Table 4.5-4.



Source: EIA Study Team

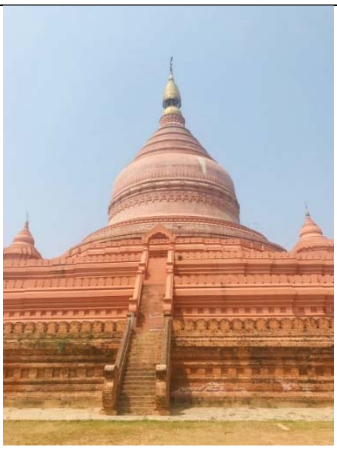
Figure 4.5-2 Location of Traditional Zones and Valuable Pagodas

Table 4.5-3 Traditional Zones in Sintgaing Township

No.	Village	Traditional Zone	Location	Photo
1	Pa Leik Village	Pa Leik	21°49'40.92"N 96° 3'4.57"E	
2	E-bya Village	Matkhayar	21°46'8.96"N 96° 8'38.85"E	

Source: EIA Study Team

Table 4.5-4 Two Pagodasa in Matkharyar Traditional Zone

No.	Pagoda Name	Traditional Zone	Location	Photo
1	Shwe Bone Pwint	Matkhayar	21°46'00.45"N 96° 8'28.48"E	
2	Shwe Se Khone	Matkhayar	21°4554.37"N 96° 8'18.64"E	

Source: EIA Study Team

4.5.2.2. Pagoda and Monastery

4.5.2.2.1. Survey Item

Cultural assets including pagoda and monastery located in the survey area were investigated and recorded.

4.5.2.2.2. Survey Period

Cultural assets observation was conducted on 24 and 25 October 2019.

4.5.2.2.3. Survey Method

Manual recording was applied for the survey area. Locations of pagodas and monasteries were recorded by hand-held GPS and photograph were taken accordingly.

4.5.2.2.4. Survey Result

There are about 25 pagodas and 13 monasteries, which are existing at 30 locations within the buffer of project site and pipeline. The detailed information of these cultural assets is shown in Table 4.5-5. Photos of some distinct pagodas are also shown in Figure 4.5-3, and locations of these pagodas are shown in Figure 4.5-4.

Table 4.5-5 Detailed Information of Cultural Assets in Buffer Zone

Sr. No.	GPS Location	Village Name	Cultural Type	Name
C1	21°46'22.71"N 96° 8'26.96"E	E Bya	Pagoda	-
C2	21°46'20.76"N 96° 8'28.71"E	E Bya	Pagoda & Monastery	Khone Myint Thar Pagoda & Monastery
C3	21°46'18.51"N 96° 8'28.89"E	E Bya	Pagoda	-
C4	21°46'4.54"N 96° 8'35.11"E	E Bya	Pagoda	-
C5	21°46'0.40"N 96° 8'28.57"E	E Bya	Pagoda	Shwe Bone Pwint Pagoda
C6	21°45'55.37"N 96° 8'12.59"E	E Bya	Pagoda	Shwezigon Pagoda
C7	21°45'54.26"N 96° 8'18.17"E	E Bya	Pagoda	Shwe Zayti Pagoda
C8	21°44'44.74"N 96° 7'32.87"E	Mont Paung	Monastery	-
C9	21°44'28.89"N 96° 7'25.34"E	Mont Paung	Pagoda	-
C10	21°44'6.92"N 96° 7'12.80"E	Ohn Pin Gyan	Pagoda & Monastery	Pain Gone Pagoda & Pain Gone Monastery
C11	21°43'31.71"N 96° 6'47.09"E	Ohn Pin Gyan	Monastery	Pyinnyardikaryone Monastery
C12	21°40'52.00"N 96° 7'25.00"E	Be Lin	Pagoda	-
C13	21°40'46.43"N 96° 7'23.44"E	Be Lin	Monastery	Bawdishwenyaung Nanpharlaung Monastery
C14	21°40'37.60"N 96° 7'25.77"E	Be Lin	Monastery	Ye-Lel Monastery

Sr. No.	GPS Location	Village Name	Cultural Type	Name
C15	21°40'36.46"N 96° 7'29.96"E	Bandar	Pagoda & Monastery	Nyaung Baw Monastery
C16	21°40'16.32"N 96° 7'37.95"E	Be Lin	Pagoda	-
C17	21°40'8.12"N 96° 7'38.60"E	Be Lin	Pagoda	Shwe Taung Thar Pagoda
C18	21°40'6.28"N 96° 7'42.18"E	Be Lin	Monastery	Tatar- U Monastery
C19	21°40'6.48"N 96° 7'42.99"E	Be Lin	Pagoda	-
C20	21°40'4.53"N 96° 9'24.75"E	Na Be Bin	Pagoda & Monastery	Na Be Bin Pagoda & Monastery (west)
C21	21°40'8.89"N 96° 9'45.93"E	Na Be Bin	Pagoda & Monastery	Na Be Bin Pagoda & Monastery (east)
C22	21°40'8.24"N 96°10'8.86"E	Shan Gan	Pagoda	Sein Koe Pwint Pagoda
C23	21°40'9.83"N 96°10'11.70"E	Shan Gan	Pagoda	Aungsupankoesu Pagoda
C24	21°40'3.49"N 96°10'17.25"E	Shan Gan	Pagoda	Kyatmakal Pagoda
C25	21°40'9.46"N 96°10'17.63"E	Shan Gan	Pagoda & Monastery	Kutiwikataryone Pagoda & Kutiwikataryone Monastery
C26	21°40'12.88"N 96°10'16.61"E	Shan Gan	Pagoda	-
C27	21°40'17.13"N 96°10'15.42"E	Shan Gan	Pagoda & Monastery	Shwegu Pagoda & Shwegu Monastery
C28	21°40'10.89"N 96°10'41.65"E	Shan Gan	Pagoda	Aung Chan Thar Pagoda
C29	21°40'2.05"N 96° 8'48.65"E	Na Be Bin	Pagoda	-
C30	21°40'32.78"N 96° 9'38.69"E	Na Be Bin	Pagoda & Monastery	-

Source: EIA Study Team

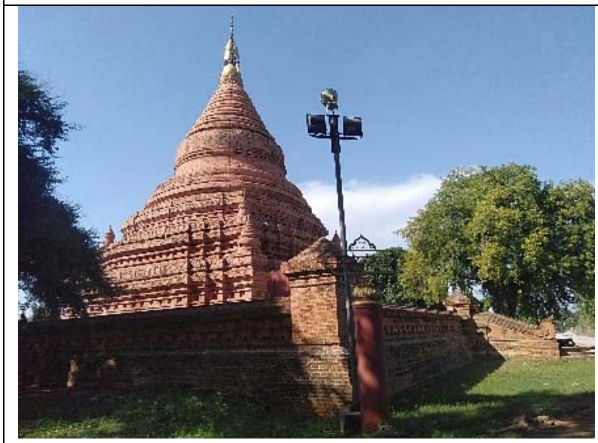
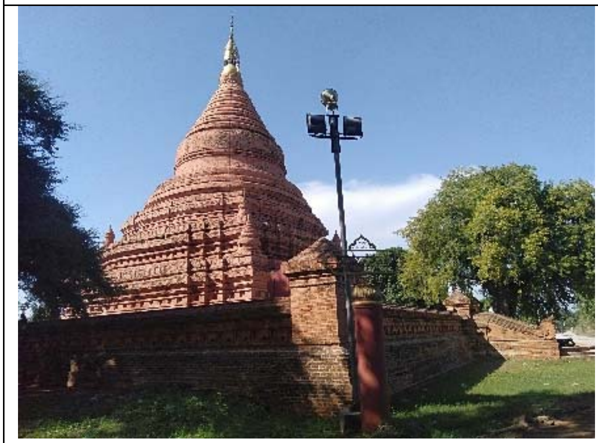
Shwe Bone Pwint Pagoda (C5)	Shwezigon Pagoda (C6)
	
Shwe Zayti Pagoda (C7)	Pain Gone Pagoda (C10)
Aung Chan Thar Pagoda (C22)	

Figure 4.5-3 Distinct Pagodas Located within Buffer Zone

Shwe Bone Pwint Pagoda (C5)	Shwezigon Pagoda (C6)
	
Shwe Zayti Pagoda (C7)	Pain Gone Pagoda (C10)
Aung Chan Thar Pagoda (C22)	

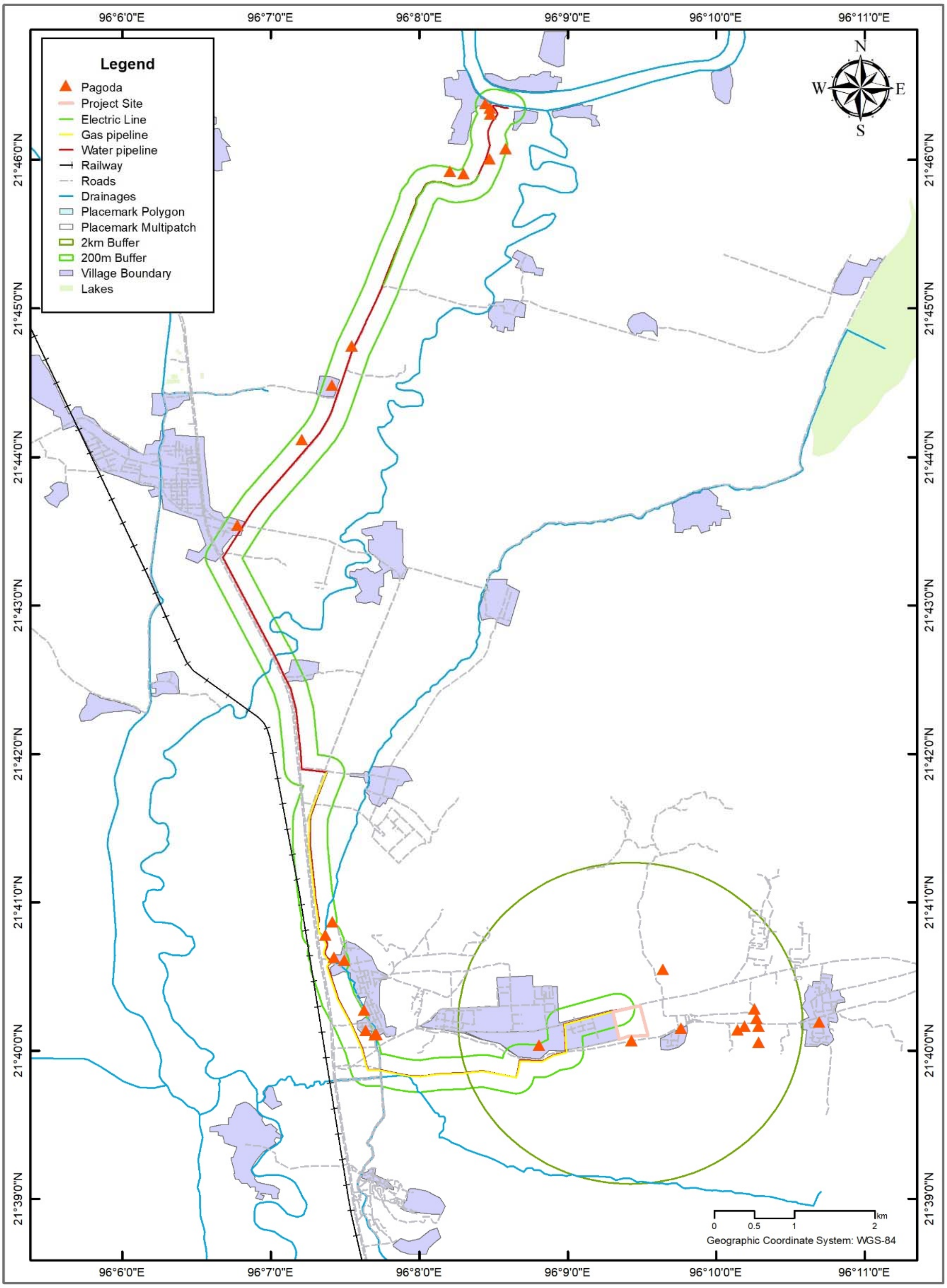


Figure 4.5-4 Location of Pagodas within Buffer Zone

4.5.2.2.5. Religious Buildings in Three Villages

Religious buildings in Taung Yin, Na Be Bin and Shan Gan Villages are as shown in Table 4.5-6. There are in total of 6 Pagodas/Statue, 12 Monasteries, 3 historical buildings in three villages. As historical buildings, the Na Be Bin villagers consider the King Pagoda, and Shan Gan villagers consider Aung Chan Thar Pagoda and Su Taung Pyae Pagoda as historical buildings.

Table 4.5-6 Religious Buildings in Taung Yin, Na Be Bin and Shan Gan Villages

No.	**Health Facilities**	Taung Yin	Na Be Bin	Shan Gan
1	Pagoda/Statue	1	3	2
2	Monastery	4	3	5
3	Church	0	0	0
4	Mosque	0	0	0
5	Historical Building	0	1	2

Source: Village heads of Taung Yin, Na Be Bin and Shan Gan Village

4.5.2.2.6. Ruins of the ancient city

There are two old-city walls in the heritage zone (Mekkhara Old City) near E Bya Village and Met Ka Ya Village. On 11th century, Anawrahta, King of Bagan Empire, designated Mekkhara region to develop a village for living and to manage lake, stream and dam in Lal Twin 11 districts. Mekkhara was known as not only a town name but also district name because it had a wall and authority to manage surrounding villages.

It was observed that Lal Twin 11 location called as Lal Twin 11 villages, Lal Twin 11 towns, Lal Twin 11 districts and Phit Thar 11 districts. It was named as Koe districts at the end of Inn Wa era and it is known as Kyaukse district at the present time.

The names of Lal Twin 11 districts are Pin Lal, Pyi Ma Nar, Myit Thar, Myin Kone Taing, Ya Mone, Pa Nan, Mekkhara, Ta Pyat Thar, Thin Taung, Ta Mote, Kan Luu and these are famous in the past period. These are the main rice production of Kyaukse Region. On 13th century of Myin Saing era, three shan brothers built new wall at Mekkhara old town second time.

4.6. Visual Component

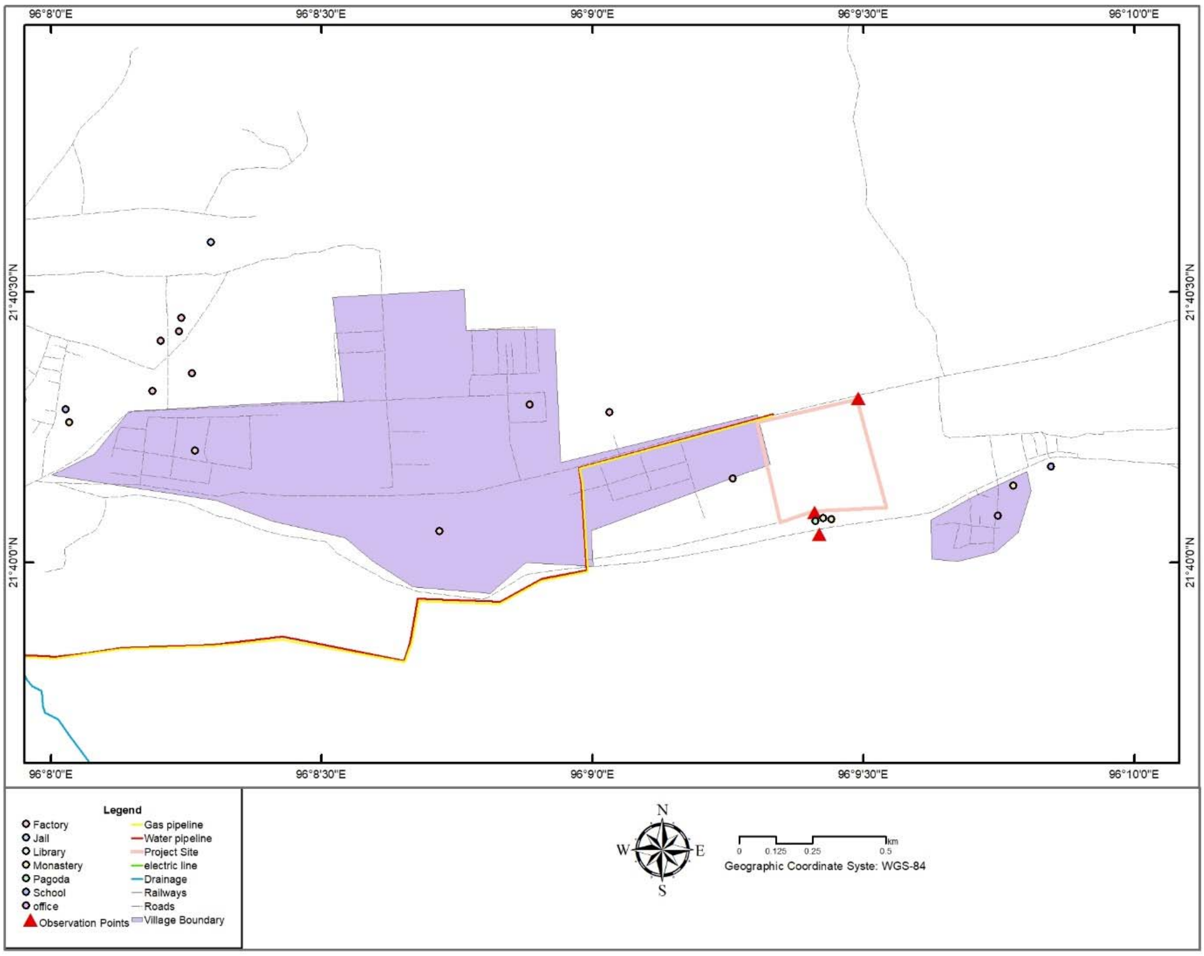
4.6.1. Literature Survey

Landscapes of aesthetic value such as topographic type, geomorphic expression and geologic significance, unique features of the scene, dimension and location of features are firstly examined by desk study (maps, images and documents). During field survey, locality of viewpoint and facing direction to the best field of view are observed.

The general elevation of the project site and surrounding area about 80 m above mean sea level. Overall, the area is flat and occupied by grass and some vegetation. Mountainous area is occupied in the north of project area and paddy field are in the south. In the north, the nearest mountain is the Nwa Le Taung, distanced about 500 m from project site and the highest point of this mountain is 289 m. In the east, Na Be Bin Village is the nearest village from project site and it occupied about 0.12 km^2 for residential area or village land. There is one pagoda compound (known as "Kin" Pagoda) which is closed about 20 m from southern fence of the project site.

4.6.2. Field Survey

The landscape condition of the project site was observed at three points, shown in Figure 4.6-1 . Land scape conditions are as shown in Figure 4.6-2 , Figure 4.6-3 and Figure 4.6-4.



Source: EIA Study Team

Figure 4.6-1 Survey Points of Landscape

Source: EIA Study Team

Figure 4.6-2 Landscape Condition of Pagoda Compound and the Project Site (view from south)

Source: EIA Study Team

Figure 4.6-3 Landscape Condition of the Project Site
(view from south, at southern boundary of the project site)

Source: EIA Study Team

Figure 4.6-4 Landscape Condition of the Project Site
(view from northeast, at northeast corner of the project site)

4.7. Valued Environmental Components

Among the physical, biological, socio-economic, cultural and visual environment that described above sections, following components are selected as Valued Environmental Components (VEC) for this project:

- air quality
- noise and vibration
- cultural components (such as ancient buildings, pagodas and monasteries)

These components are selected by considering characteristics of the Project and characteristics of surrounding environment elaborated in the Sections 4.2 to 4.6.

CHAPTER 5. IMPACT AND RISK ASSESSMENT AND MITIGATION MEASURES

5.1. Impact Assessment Methodology

5.1.1. Scope of Assessment

5.1.1.1. Introduction

The main objective of this section is to make a provisional identification of environmental and social impacts based on the project description and overall environmental and social conditions in and around the project area.

5.1.1.2. Identification of Environmental and Social Impacts

The potential impacts at the following aspects were preliminarily analyzed in this Section:

- Pollution control measures
- Natural environment
- Social-environment
- Others.

According to the EIA Procedure (2015), combined cycle power plant which has the capacity more than 50 MW is required to conduct EIA study.

The impacts were evaluated based on the following rating scale and criteria:

1) A-: Significant negative impact A+: Significant positive impact
2) B-: Some negative impact B+: Some positive impact
3) C: Impacts are not clear, need more investigation
4) D: No impacts or impacts are negligible, no further study required

The result of scoping for environmental and social impact assessment is shown in Table 5.1-1. Scoping was conducted at four stages: PC (Pre-construction) stage, CO (Construction) stage, OP (Operation) stage, and CL (Closure) stage. Based on the estimated ratings shown in Table 5.1-1, the items evaluated as negative impact (i.e. A- or B-) or unknown (i.e. C) were further examined in the EIA study.

Table 5.1-1 Scoping for Environmental and Social Impact Assessment

Category		Impacts	Estimated Ratings			Brief description (Reasons for scoping evaluation)
			PC/CO	OP	CL	
Pollution control measures	1	Air quality	B-	B-	B-	PC/CO, CL: Impact on air quality is expected due to dust from operation of construction machineries and traveling of the construction vehicles. OP: Impact on air quality is expected due to the emission of air pollutant from gas turbine. In general, gas turbine which use natural gas would emit nitrogen oxides. For sulphur oxides, it will not be emitted because natural gas doesn't contain sulphur. For carbon monoxide and soot, they will not be emitted under appropriate operation.
	2	Water quality	B-	B-	B-	PC/CO, CL: Impact on water quality due to muddy water from construction/

Category		Impacts	Estimated Ratings			Brief description (Reasons for scoping evaluation)
			PC/CO	OP	CL	
						demolition works at the intake station is expected. OP: Impact on river water quality due to discharge from the power plant is expected.
	3	Waste	B-	B-	B-	PC/CO, CL: Construction waste will be generated. OP: Waste from operation and maintenance work will be generated.
	4	Soil contamination	B-	D	D	PC/CO: Soil contamination would be occurred if soil improvement agent is used. OP, CL: Activities causing soil contamination are not planned.
	5	Noise & vibration	B-	B-	B-	PC/CO, CL: Noise and vibration levels may be temporally increased due to construction machineries and traveling of construction vehicle. OP: Noise and vibration levels may be increased due to operation of the power plant and pump station.
	6	Ground subsidence	B-	D	D	PC/CO: Subsidence may be assumed along the water and gas pipeline. OP, CL: Activities causing ground subsidence are not planned.
	7	Offensive odor	D	B-	D	PC/CO, CL: Activities causing offensive odor are not planned during construction. OP: Impact of odor from waste water treatment operation is expected.
	8	Bottom sediment	D	D	D	PC/CO, CL: Activities causing pollution to river sediment are not planned. OP: Impact on bottom sediment due to discharge water is not expected.
Natural environment	9	Protected Area	D	D	D	No protected area within and around the project area.
	10	Flora/Fauna & Biodiversity	B-	B-	B-	PC/CO, CL: Impact of the ecosystem due to construction/ demolition works of facilities is expected. OP: Impact of the aquatic biota due to water discharge is expected.
	11	Hydrology	D	B-	D	PC/CO, CL: Activities increasing rain water discharge are not planned. OP: Due to construction of the plant, the ground surface such as greenery area will be changed to impermeable area. Accordingly, amount of runoff of rain water might be increased.
	12	Topography and Geology	D	D	D	PC/CO, OP, CL: No activity that will adversely affect the topography and geographical features is expected.
Social environment	13	Involuntary resettlement	B-	D	D	PC/CO: Land acquisition around intake will be expected. OP, CL: Involuntary resettlement or other impact on livelihood will not be expected.
	14	Poverty	B+	B+	B+	PC/CO, OP, CL: Positive impacts such as creation of local employment are predicted.

Category		Impacts	Estimated Ratings			Brief description (Reasons for scoping evaluation)
			PC/CO	OP	CL	
	15	Ethnic minorities & indigenous peoples	C	C	C	PC/CO, OP, CL: In case there are ethnic minorities and indigenous peoples around the project site and they may be affected by the project, mitigation measures should be developed and executed with careful considerations of local context.
	16	Local economy (Employment)	B+	B+	B+	PC/CO, OP, CL: Positive impacts such as creation of local employment are predicted.
		Local economy (Livelihood)	B-	D	D	PC/CO: Impact on the livelihood (i.e. disturbance of agriculture works) due to installing pipelines in farm land is expected. OP: From the result of social survey which is shown in Chapter 4, it became clear that no villagers depend on fishery for their livelihood. CL: No activity that will adversely affect the livelihood is expected.
	17	Land use and utilization of local resources	B-	D	D	PC/CO: Impact on land use due to installing pipelines is expected. OP, CL: No impact on land use is expected.
	18	Water usage	B-	B-	B-	PC/CO, CL: Impact on water usage due to water-intake construction/ demolition is expected. OP: Impact on water usage due to discharge of the treated water is expected.
	19	Existing social infrastructure and service	B-	B-	D	PC/CO: Impact on the rural road service due to installation of pipeline is expected. OP: Impact on school activity around power plant is expected. CL: No impact on existing social infrastructure and service is expected.
	20	Social institutions such as social infrastructure and local decision-making institutions	D	D	D	PC/CO, OP, CL: No activity is planned that will affect to the social and local institutions.
	21	Maldistribution of damage and benefit	D	D	D	PC/CO, OP, CL: No activity is planned that will cause maldistribution of the damage or benefit.
	22	Local conflict of interest	D	D	D	PC/CO, OP, CL: No activity is planned that will cause local conflict.
	23	Cultural heritage	B-	B-	B-	PC/CO: Impact on heritage is expected due to installing pipelines, Impact on religious activity such as noise is expected OP, CL: Impact on religious activity such as noise is expected.
	24	Landscape	B-	B-	B-	PC/CO, CL: Impact on visibility due to construction/ demolition work is expected for short term. OP: Impact on visibility due to power plant is expected.
	25	Gender	C	C	C	PC/CO, OP: Information of gender is insufficient.

Category		Impacts	Estimated Ratings			Brief description (Reasons for scoping evaluation)
			PC/CO	OP	CL	
	26	Children's rights	C	C	C	PC/CO, CL: Information of children employment by contractor is insufficient. OP: No activity is planned that will violate the children's rights.
	27	Health (Community Health, Infectious disease and HIV/AIDS)	B-	B-	B-	PC/CO, CL: Influx of construction workers may increase the risks on communicable diseases. OP: Flue gas and effluent discharge may increase the risks on villager's health.
	28	Occupational health & safety	B-	B-	B-	PC/CO, CL: Impact on the working conditions of construction workers is expected. OP: Impact on the working conditions of workers of the power plant is expected.
Others	29	Accident	B-	C	B-	PC/CO, CL: Impact of construction vehicles to the local community is predicted. OP: Information of accident is insufficient.
	30	Cross-border impact, climate change	B-	B-	B-	PC/CO, CL: Emission of greenhouse gases (GHGs) due to construction is expected. OP: Emission of GHGs due to power plant is expected.

Note: PC (Pre-construction phase), CO (Construction phase), OP (Operation phase), CL (Closure phase)
Evaluation : A-: Significant negative impact A+: Significant positive impact
: B-: Some negative impact B+: Some positive impact
: C: Impacts are not clear, need more investigation
: D: No impacts or impacts are negligible, no further study is required
Source: EIA Study Team

5.1.2. Geographical Scope and Study Area Boundaries

Temporal Scope

On this EIA study, four temporal categories were set as shown in Table 5.1-2.

Table 5.1-2 Temporal Category

Temporal Category	Description
Pre-construction	Before the actual construction works (e.g. land acquisition, detailed design, tender of contractor)
Construction	After commencement of the construction work including preliminary work, land preparation, pipeline installation and test operation
Operation	After starting operation of the power plant
Decommissioning, closure, and post-closure	After decommissioning including closure of facility, demolition and land levelling

Source: EIA Study Team

5.1.3. Methodology

5.1.3.1. Assessment and Mitigation

Following process was applied for assessment of impact from the Project.

(1) Identification of the impact which is assumed to be caused by the project activity quantitatively/ analytically / qualitatively

(2) Proposal of mitigation measures which are feasible to implement technically/ economically/ legally

(3) Summarizing impacts, magnitude, mitigation measures to assess the impact comprehensively

5.1.4. Mapping

For forecasting and description of the impact, GIS mapping data was applied to this study with proper scale for each item.

5.1.5. Modeling Requirements

5.1.5.1. Air Quality

For forecasting of impact on ambient air quality, Gaussian plume dispersion model, which is the analytical solution of diffusion equation is applied. Formula for concentration of air pollutant is based on Gaussian plume equation and puff model’s equation.

5.1.5.2. Noise

Noise propagation model based on the geometric attenuation theorem was used for noise prediction from power facilities at the operational phase. If propagative obstacle is located on the pathway of the sound, attenuation by diffraction effect was considered.

5.2. Identification of Impacts, Mitigation Measures and Residual Impacts

5.2.1. Biophysical Impact

5.2.1.1. Air Quality

This subsection presents an identification of the potential impacts on air quality by construction and operation of the proposed combined cycle power plant. During construction phase, dust will be generated from construction activities. During the operational phase, air pollutant will be emitted from the combustion gas turbine. Under the condition that natural gas will be used as a fuel of gas turbine, only nitrogen dioxide will be produced as air pollutant. In general, emitted gas from the gas turbine which use the natural gas as fuel is cleaner than other combustion, in concrete, it contains nitrogen, oxygen, carbon dioxide, nitrogen dioxide and moisture, but does not contain sulfur dioxide nor particle matter.

5.2.1.1.1. Pre-construction and Construction Phases

5.2.1.1.1.1. Potential Impact on Air Quality

The following items are considered as potential impacts on air quality during the construction phase.

- Dust caused by the activities of the power plant construction including excavation, filling and materials handling.
- Dust emissions from transportation activities such as carrying soil by dump trucks.

Regarding the air pollutant from the exhaust of construction machinery, ambient air quality wouldn't be affected significantly from such a small-scale civil work which will be implemented in the Project, because the site preparation has been already done in the power plant site. In addition to that, it could be considered the pipeline installation is also small-scale civil work.

5.2.1.1.1.2. Area of Influence

Area of Influence (AOI) of dust from the construction activity is generally known as limited to the proximity of construction site.

- The AOI of air quality from construction machinery is generally set as 200 m from the boundary of the project site.
- The AOI of air quality from vehicles is set at 200 m from the access road of the national highway to the project site.

5.2.1.1.1.3. Methodology

The impact on air quality during the construction phase is identified qualitatively; because, in general, the impact is limited and temporally for normal civil works. The construction of the Project is not large-scaled civil works and facility construction, the degree of the impact is assumed relatively small.

5.2.1.1.1.4. Identified Impact and Mitigation Measures

The small soil particle will be generated through the earthworks (filling and excavation); because, activities of the earthworks will generally handle soil and rocks directly by construction machineries. The construction machineries which will be used earthworks are shown in Table 5.2-1.

Table 5.2-1 Construction Machinery of Earthwork

Type	Function
Excavator	Digging, soil handling, loading and unloading the soil from the lorry truck
Bulldozer	Pushing and moving soil, land clearing (land levelling)
Compaction roller	Compaction of the filling soil
Dump truck	Soil transportation

Source: EIA Study Team

Earthworks (excavation and filling) of the Project is anticipated to commence in the earlier part of the construction phase. In the same phase, dump trucks will be used for the transportation of the soil for the filling.

The dust from construction activities is important concern during the earthwork phase of the Project. However, there are mitigation measures of reducing the impact of dust as follows. These measures are easily applied by the contractor, thus need to be specified in the contract.

- Avoiding the concentrated use of construction machineries
- Avoiding earthworks during blowing strong wind
- Spraying the water to the road in the morning for reducing dust
- Covering the temporarily soil storage by cover sheet
- Applying car washing system for dump trucks

5.2.1.1.1.5. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-2.

Table 5.2-2 Assessment of Air Quality in Construction Phase

<table>
<tr><td rowspan="4">Characteristics</td><td>Affected area</td><td colspan="5">Surrounding area of project site,
Road from national highway to the project site</td></tr>
<tr><td>Duration/frequency</td><td colspan="5">Construction phase, especially during earthwork</td></tr>
<tr><td rowspan="2">Magnitude</td><td>A-</td><td>B-</td><td>D</td><td>B+</td><td>A+</td></tr>
<tr><td colspan="5">Impact of dust to be generated from the earthwork is expected. The impact is temporally and limited to the downwind area. Moreover, impact to the living environment and human health can be reduced by applying mitigation measures, thus significant impact will not be expected. The mitigation of the impact is possible.</td></tr>
<tr><td rowspan="2">Mitigation measures</td><td>Technical feasibility</td><td colspan="5">Feasible</td></tr>
<tr><td>Effectiveness</td><td colspan="5">Effective</td></tr>
<tr><td colspan="2">Residual impact</td><td colspan="5">There is no residual impact after construction.</td></tr>
</table>

Note: A-: Significant negative impact; A+: Significant positive impact
B-: Some negative impact; B+: Some positive impact
D: No impacts or impacts are negligible

Source: EIA Study Team

In conclusion, it is evaluated that the air pollution during the construction phase would be well controlled and managed and would not cause any significant impacts on air quality in and around the proposed project site.

5.2.1.1.2. Operation Phase

5.2.1.1.2.1. Potential Impact on Air Quality

The following items are considered as a potential impact on air quality during the operational phase.

- Air emissions from stacks during the operation of the Project.
- The key pollutant of concern from the gas turbine is nitrogen dioxide. In general, natural gas contains only a little amount of sulfur, thus, emission gas does not include sulfur dioxide. In addition, the concentration of the particle matter in emission gas is also few under the normal combustion condition.

5.2.1.1.2.2. Area of Influence

AOI of the emission from the stack is considered as wider than the AOI of dust, because emitted gas will be diffused from the outlet of the stack. Considering diffusion pattern of the emitted gas, AOI can be defined below.

- The AOI of air pollutant from the stack of the proposed gas turbine is defined as 2 km radius from the stack in the project site.

5.2.1.1.2.3. Methodology

Stack emission has been identified as a key source of air pollution at the operational phase. The ambient air quality in the AOI will be forecasted by using an air dispersion model. The dispersion model applied for this study is Gaussian plume model which is analytical solution of advection diffusion equation with referring to Total Volume Control Manual on Emission of Nitrogen Oxides in Japan. The meteorological data both of dry and rainy seasons observed in the project site (AQ1) is used as a condition of the modeling method.

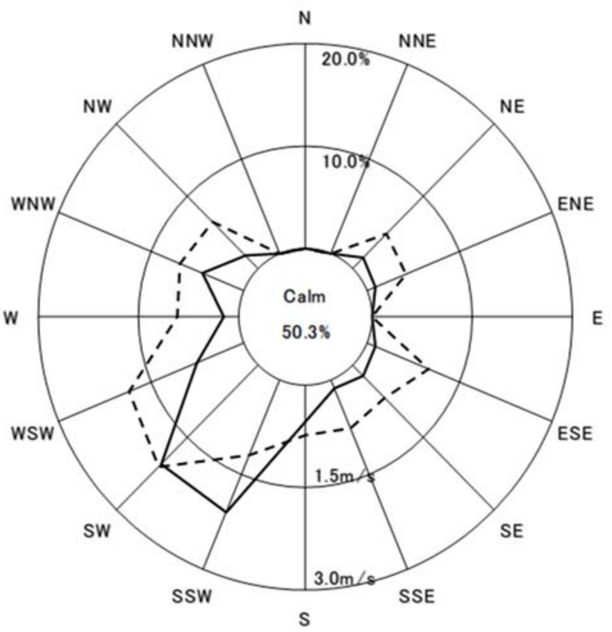
The summary of the conditions for dispersion model are presented in Table 5.2-3.

Table 5.2-3 Conditions of Flue Gas for Dispersion Model

Parameter		Value
Stack	Number	2
	Height(m)	30
	Diameter(m)	3.5
Flue gas	Flow rate (dry)(Nm^3/h)	692,860
	Flow rate (wet)(Nm^3/h)	767,930
	Exit temperature (ºC)	97
Concentration of pollutant	NOx (mg/m^3)	51

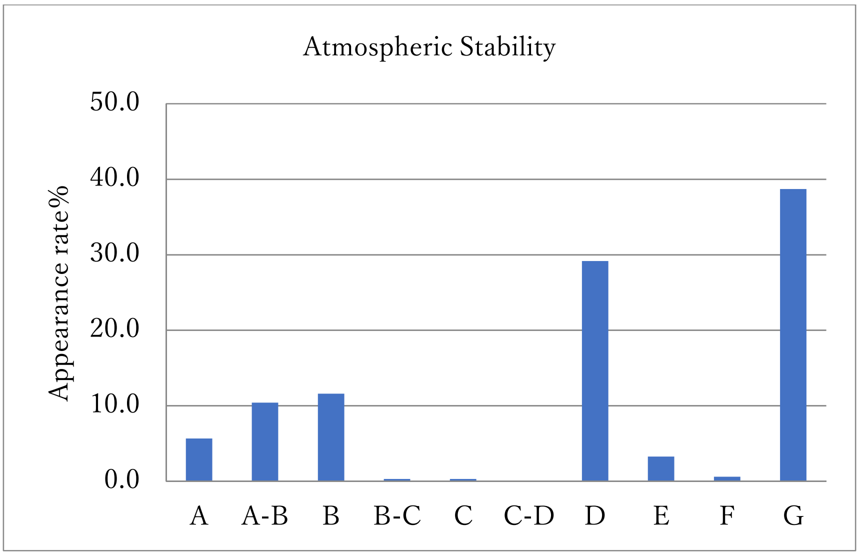
Source: EIA Study Team

The meteorological data which was used for modeling is shown in Figure 5.2-1 and Figure 5.2-2. Figure 5.2-1 shows the characteristics of the wind in the project site. In this figure, solid line shows the occurrence rate of wind direction and broken line shows the wind speed of each direction.



Note: Solid line shows the occurrence rate of wind direction and broken line shows the wind speed of each direction.
Source: EIA Study Team

Figure 5.2-1 Wind Rose in the Project Site



Atmospheric Stability	Stability Condition
A	Extremely unstable
B	Unstable
C	Slightly unstable
D	Neutral
E	Slightly stable
F	Stable
G	Extremely stable

Source: EIA Study Team

Figure 5.2-2 Appearance of Atmospheric Stability Condition

5.2.1.1.2.4. Identified Impact and Mitigation Measures

As mentioned above, key pollutants are nitrogen oxides. For the identification the impact of nitrogen dioxide, two types of forecasting method are applied.

(1) Forecast of annual ambient air quality

To forecast the average concentration of ambient air quality (concentration) from conditions of pollution and meteorological data in site, the dispersion model was used.

(2) Forecast in case of high-concentrated situation

To forecast the high concentration case, which may occur under particular meteorological conditions, stack downwash phenomenon was applied as a high-concentration situation.

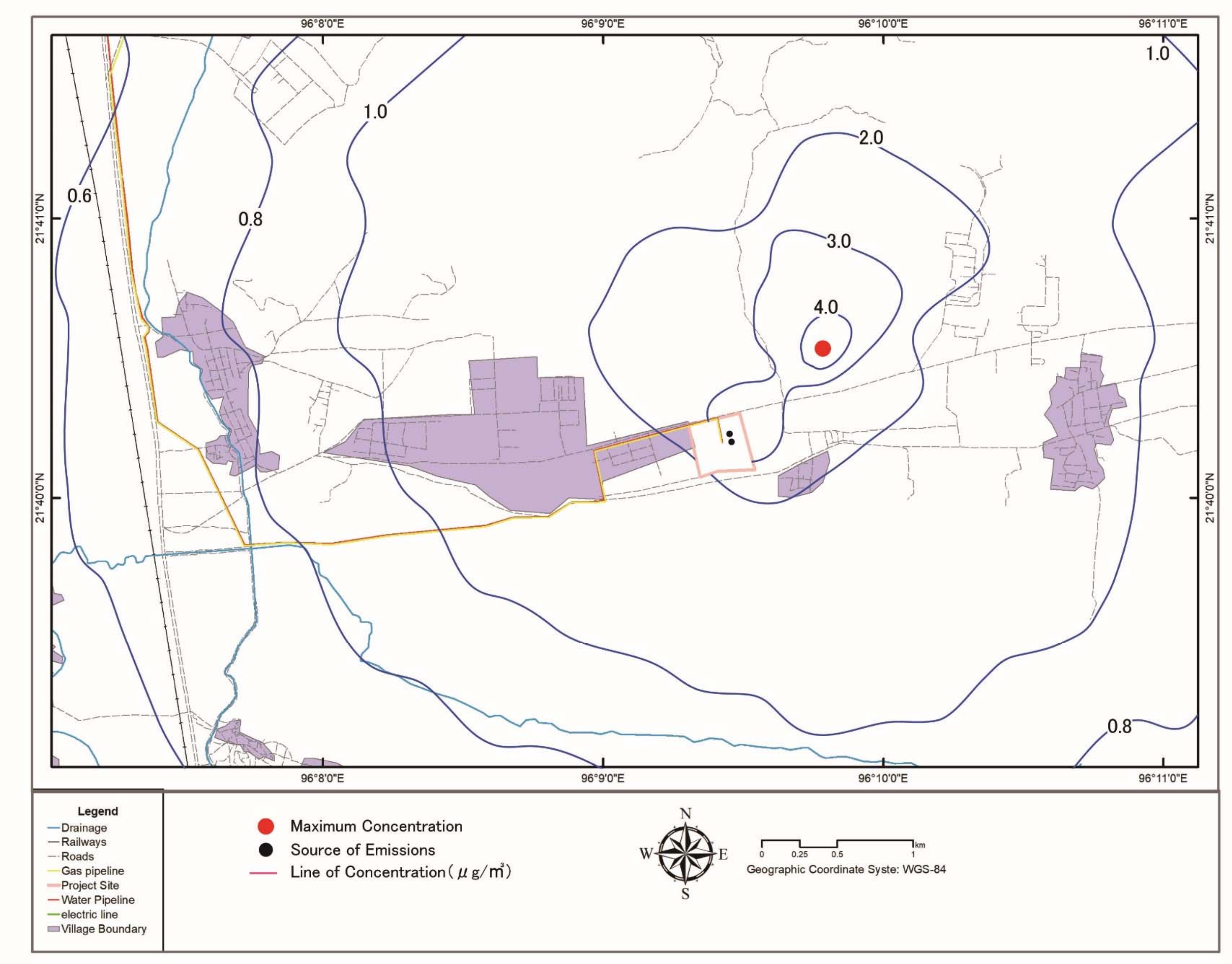
(3) Forecast of annual mean concentration of nitrogen dioxide

The result of forecasting annual mean concentration of nitrogen dioxide is shown in Table 5.2-4. The future concentration of nitrogen dioxide is less than the target value even if the concentration will be on the maximum point.

Table 5.2-4 Future Concentration of Nitrogen Oxides (long term)

Contributed concentration from this project	Point of maximum concentration appeared	Background concentration	Future annual concentration	Target value
4.4 μg/m^3	North-East from project site（845ｍ）	18.2 μg/m^3	22.6 μg/m^3	40μg/m^3

Source: EIA Study Team



Source: EIA Study Team

Figure 5.2-3 Contour Map of Annual NO_2 Concentration

(4) Forecast in case of high-concentrated situation

The result of forecasting in case of high-concentrated situation of nitrogen dioxide is shown in Table 5.2-5. The future concentration of nitrogen dioxide is less than the target value even if the concentration will be at the maximum point. For this study, 1-hour target value is applied as a target; because, this situation is assumed to happen in a short period of time.

Table 5.2-5 Future Concentration of Nitrogen Oxides (short term)

Contributed concentration from this project	Wind speed	Point of maximum concentration appeared	Background concentration	Future momentary concentration	Target value
147.5 μg/m^3	6.4 m/sec	Downwind (320 m)	18.2 μg/m^3	165.7 μg/m^3	200 μg/m^3

Source: EIA Study Team

The nitrogen dioxide from power plant is the key concern during operation. However, there are mitigation measures of reducing the impact of air pollutant as follows, which have been already reflected to forecast modeling. These measures are possible to be conducted by the project proponent.

- Using high height stack to induce dispersion of air pollutant
- Narrowing the outlet of the stack to avoid the appearance of stack downwash phenomenon
- Installation of low nitrogen dioxide type of gas turbine

5.2.1.1.2.5. Assessment of Impact

Assessment of the impact is conducted quantitatively using simple analytical method. The impact assessment is summarized in Table 5.2-6.

Table 5.2-6 Assessment of Air Quality in Operation Phase

Characteristics	Affected area	Surrounding area of surrounding area of project site, 2 km radius from the stack in the project site				
	Duration/frequency	Operation phase				
	Magnitude	A-	B-	D	B+	A+
		The impact of nitrogen oxides is expected; however, the forecasted results satisfies the target value. Thus, impact to the living environment and human health are estimated be limited. The mitigation of the impact is possible.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after demolition.				

Note: A-: Significant negative impact; A+: Significant positive impact
B-: Some negative impact; B+: Some positive impact
D: No impacts or impacts are negligible

Source: EIA Study Team

In conclusion, it is evaluated that the air quality during operation would be well controlled and managed and would not cause any significant impacts on air quality in and around the proposed project site.

5.2.1.1.3. Decommissioning, Closure, and Post-closure Phases

5.2.1.1.3.1. Potential Impact on Air Quality

The following items are considered as a potential impact on air quality on decommissioning phase.

- Dust caused from the activities of demolition of the power plant facilities and waste handling.
- Dust emissions from waste transportation activities.

The impact on air quality from the exhaust of demolition machinery is also considered limited as well as impact of construction phase by the same reason.

5.2.1.1.3.2. Area of Influence

AOI of dust from the demolition activity is generally known as limited to the surrounding area of project site. AOI is the same as the construction phase.

5.2.1.1.3.3. Methodology

The impact on air quality after decommissioning is identified qualitatively, because the impact is well known as limited and temporally for normal civil works. The demolition of the Project is normal sized civil works and facility construction.

5.2.1.1.3.4. Identified Impact and Mitigation Measures

The small soil particle will be raised up throughout the demolition activities. The construction machineries which will be used demolish are shown in Table 5.2-7.

Table 5.2-7 Construction Machinery of Demolition

Type	Function
Demolition spec excavator	Breaking concrete, asphalt, Loading and unloading the soil from the lorry truck
Dump truck	Waste transportation

Source: EIA Study Team

The dust from demolition activities is the key concern during demolition works. However, there are mitigation measures of reducing the impact of dust as follows. These measures are feasibly conducted by contractor.

- Avoiding the concentrated use of construction machineries
- Avoiding demolition during strong wind
- To spray the water to the road in the morning for reducing dust
- Sprinkling water to the demolition area
- Applying car washing system for dump trucks

5.2.1.1.3.5. Assessment of Impact

Assessment of the impact is conducted using the simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-8.

Table 5.2-8 Assessment of Air Quality in Decommissioning, Closure, and Post-closure Phases

Characteristics	Affected area	Surrounding area of the project site, Road from national highway to the project site				
	Duration/frequency	During demolition work				
	Magnitude	A-	B-	D	B+	A+
		Impact of dust to be generated from demolition works is expected. The impact is limited to the downwind area and temporally. Moreover, impact to the living environment and human health will be minimized by applying mitigation measures, thus significant impact will not be expected. The mitigation of the impact is possible.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after demolition.				

Note: A-: Significant negative impact A+: Significant positive impact
B-: Some negative impact B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

In conclusion, it is evaluated that the air quality during demolition would be well controlled and managed and would not cause any significant impacts on air quality in and around the proposed project site.

5.2.1.2. Water Quality

5.2.1.2.1. Pre-construction and Construction Phases

5.2.1.2.1.1. Potential Impact on Water Quality

The following item is considered as a potential impact on water quality on the construction phase.

- ➢ The water pollution (muddy water) caused by the construction of the intake facility in Myitnge River.

5.2.1.2.1.2. Area of Influence

AOI of muddy water from the construction activity is limited to the surrounding area of the construction site, because the sediment is consisted of relatively coarse particle, and the fine particle has been washed away due to the river flow. The sediment raised up by the construction work of the intake facility will be settled soon.

- The AOI of water quality from construction site is set as 100 m to the downstream from the intake.

5.2.1.2.1.3. Methodology

The impact on water quality on construction phase is identified qualitatively.

5.2.1.2.1.4. Identified Impact and Mitigation Measures

The cofferdam will be constructed prior to the intake construction to enclose the work area from the river. Steel sheet pile will be used for the construction of the cofferdam. The muddy water will be generated temporally during construction and demolition of the cofferdam.

The muddy water from construction activities is the key concern during intake construction. However, there are mitigation measures of reducing the impact of muddy water as follows. These measures are feasibly conducted by contractor.

- ➢ Installation of the steel structured cofferdam (Steel sheet pile)
- ➢ Using silt barrier around coffer dam
- ➢ Using temporary sedimentation tank for pumped up water in the working area

5.2.1.2.1.5. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-9.

Table 5.2-9 Assessment of Water Quality in Construction Phase

<table>
<tr><td rowspan="4">Characteristics</td><td>Affected area</td><td colspan="5">100 m to the downstream from the intake</td></tr>
<tr><td>Duration/frequency</td><td colspan="5">Piling and removing the steel sheet pipe for coffer dam</td></tr>
<tr><td rowspan="2">Magnitude</td><td>A-</td><td>B-</td><td>D</td><td>B+</td><td>A+</td></tr>
<tr><td colspan="5">Impact of turbid water to be generated from construction works of coffer dam during piling and removing steel sheets is expected. The impact is limited to downstream and temporally. The discharge amount of Myitnge River is abundant and the turbid water will be diluted immediately. Moreover, the generation amount of turbid water will be minimized by utilization of coffer dam, thus impacts on ecosystem and water use will be limited and not be significant. The mitigation of the impact is possible.</td></tr>
<tr><td rowspan="2">Mitigation measures</td><td>Technical feasibility</td><td colspan="5">Feasible</td></tr>
<tr><td>Effectiveness</td><td colspan="5">Effective</td></tr>
<tr><td colspan="2">Residual impact</td><td colspan="5">There is no residual impact after construction</td></tr>
</table>

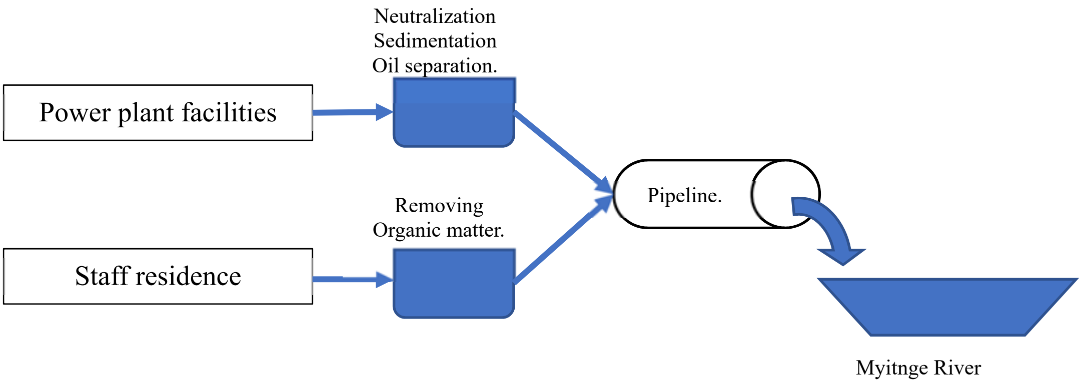
Note: A-: Significant negative impact; A+: Significant positive impact
B-: Some negative impact; B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

In conclusion, it is evaluated that the water pollution during construction would be well controlled and managed and would not cause any significant impacts on water quality around intake.

5.2.1.2.2. Operation Phase

5.2.1.2.2.1. Potential Impact on Water Quality

During the operational phase, wastewater treatment system will be used for Heat Recovery Steam Generator (HRSG) blowdown, floor drain from the gas turbine and steam turbine, contaminated yard drains and maintenance work. In addition, another wastewater treatment system will be used for sewerage from the staff residence. The main functions of the treatment system for power plant facilities are neutralization, sedimentation and oil separation. The main function of wastewater treatment for staff residence is removing organic matters. After treatment of both wastewater, treated water will be discharged to the Myitnge River through the water pipeline. The outlet of treated water will be installed downstream side of intake structure and protected by bank protection. Outlet will be covered by flap gate to avoid backward flow.



Source: EIA Study Team

Figure 5.2-4 Conceptual Wastewater Treatment Diagram

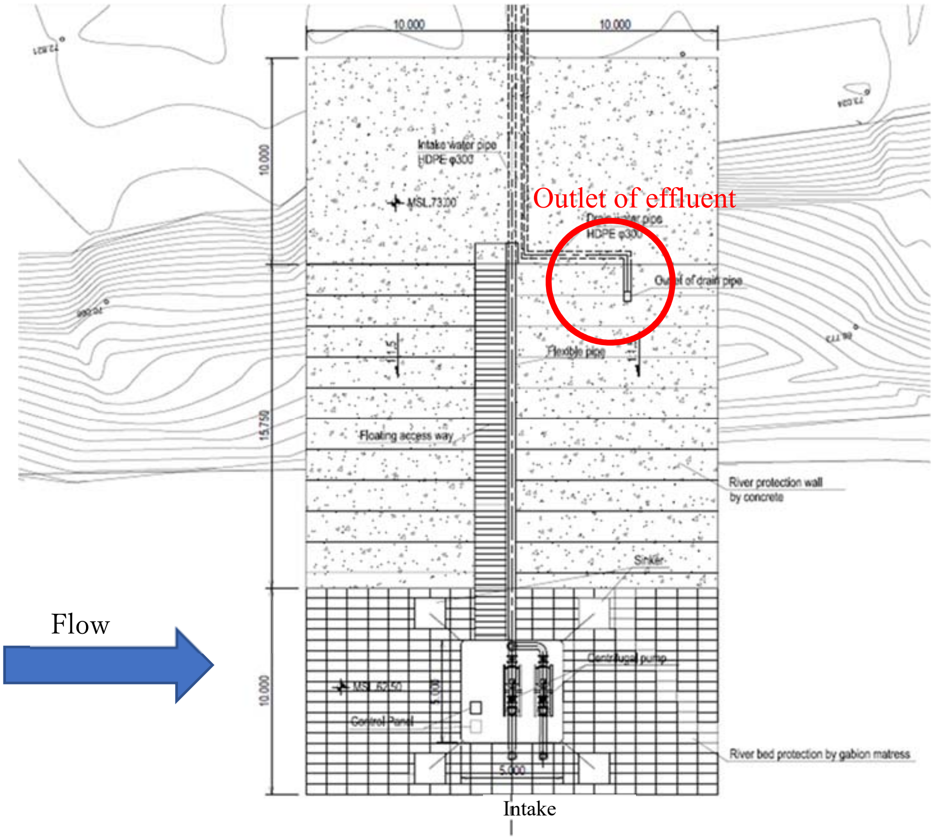
Both types of wastewater will be treated to comply with respective effluent standard. In addition, quantity of discharged water from the intake facility, which is equipped with outlet of effluent as in Figure 5.2-5 will be negligible quantity in comparison with flow rate of Myitnge River. On top of these, the following items are considered as a potential impact on water quality during the operational phase.

- Water pollution due to the effluent from the power plant facilities during the operation of the Project.
- Water pollution due to the domestic wastewater from the staff residence in the project site.

5.2.1.2.2.2. Area of Influence

The discharged water from the intake facility will be dispersed in a short time due to relatively rapid flow of the Myitnge River.

- The AOI of water quality is 100 m downstream of the intake facility.



Source: EIA Study Team

Figure 5.2-5 Draft Design of Intake Facility (Top View)

5.2.1.2.2.3. Methodology

The impact on water quality during the operational phase is identified analytically in comparison of water flow rate between effluent and Myitnge River.

5.2.1.2.2.4. Identified Impact and Mitigation Measures

Effluent from both treatment plants will be treated to comply with each of the target value, which is set to satisfy both Myanmar standard and World Bank Group (WBG) guidelines. Target value for effluent of treatment facility for the power plant facilities is shown in Table 5.2-10.

Table 5.2-10 Target Value for Effluent (Thermal Power)

Parameter	Unit	NEQG	WBG guideline	Target Value
Arsenic	mg/L	0.5	0.5	0.5
Cadmium	mg/L	0.1	0.1	0.1
Iron	mg/L	1	1.0	1
Lead	mg/L	0.5	0.5	0.5
Mercury	mg/L	0.005	0.005	0.005
Oil and grease	mg/L	10	10	10
pH	S.U[a]	6-9	6-9	6-9
Temperature increase	ºC	<3[b]	-	<3[b]
Total residual chlorine	mg/L	0.2	0.2	0.2
Total suspended solids	mg/L	50	50	50
Chromium (total)	mg/L	0.5	0.5	0.5
Copper	mg/L	0.5	0.5	0.5
Zinc	mg/L	1	1.0	1

Note: [a] Standard unit
[b] Temperature increase due to discharge of once-through cooling water
Source: National Environmental Quality (Emission) Guidelines, 2015
Table 5, WBG EHS Guidelines for Thermal Power Plants.

Target value of effluent of treatment facility for the staff residence is shown in Table 5.2-11.

Table 5.2-11 Target Value for Wastewater, Storm Water Runoff, Effluent and Sanitary Discharges

Parameter	Unit	NEQG	WBG guideline	Target value
5-day Biochemical oxygen demand	mg/L	50	30	30
Ammonia	mg/L	10	-	10
Arsenic	mg/L	0.1	-	0.1
Cadmium	mg/L	0.1	-	0.1
Chemical oxygen demand	mg/L	250	125	125
Chlorine (total residual)	mg/L	0.2	-	0.2
Chromium (hexavalent)	mg/L	0.1	-	0.1
Chromium (total)	mg/L	0.5	-	0.5
Copper	mg/L	0.5	-	0.5
Cyanide (free)	mg/L	0.1	-	0.1
Cyanide (total)	mg/L	1	-	1
Fluoride	mg/L	20	-	20
Heavy metals (total)	mg/L	10	-	10
Iron (total)	mg/L	3.5	-	3.5
Lead	mg/L	0.1	-	0.1
Mercury	mg/L	0.01	-	0.01
Nickel	mg/L	0.5	-	0.5
Oil and grease	mg/L	10	10	10
pH	S.U. [a]	6-9	6-9	6-9
Phenols	mg/L	0.5	-	0.5
Selenium	mg/L	0.1	-	0.1
Silver	mg/L	0.5	-	0.5
Sulphide	mg/L	1	-	1
Temperature increase	°C	<3[b]	-	<3[b]
Total coliform bacteria	MPN[d]/100 mL	400	400[c]	400
Total Nitrogen	mg/L	-	10	10
Total phosphorus	mg/L	2	2	2

Parameter	Unit	NEQG	WBG guideline	Target value
Total suspended solids	mg/L	50	50	50
Zinc	mg/L	2	-	2

Note: [a] Standard Unit
[b] At the edge of a scientifically established mixing zone which takes into account ambient water quality, receiving water use, potential receptors and assimilative capacity; when the zone is not defined, use 100 meters from point of discharge.
[c] Not applicable to centralized, municipal, wastewater treatment systems which are included in EHS Guidelines for Water and Sanitation.
[d] MPN = Most Probable Number

Source: National Environmental Quality (Emission) Guidelines, 2015
Table 1.3.1, WBG EHS Guidelines for Wastewater and Ambient Water Quality.

The comparison between discharge water and Myitnge River is presented in Table 5.2-12. Ratio of discharge to river flow is 0.0126% on 50th percentile of flow rate.

Table 5.2-12 Comparison Table of Flow Rate

Item	Flow value (m^3/sec)	Remark
Discharge water	0.0409	-
Myitnge River	325.0	50th percentile value
Raito of discharge to river flow	0.0126%	-

Source: EIA Study Team

Wastewater will be treated before discharging to the river, and the effluent water quality satisfies the target value. Besides, the remaining pollutant will be diluted by river water which is 7,950 times greater than the discharge amount of the effluent. As for the water temperature, treated water will go through the pipeline which is 17.6 km length from project site. It will take more than 8 hours from project site to Myitnge River. The temperature of the water will become almost the same as ambient temperature before discharge. Table 5.2-13 presents temperature of ground and river water which were measured on dry season. The ground temperature of 1 m depth in the grout was 29.0 ^{o}C and river water temperature was 28.0^{o}C. Therefore, the impact to the river water temperature is estimated be less than one degree.

Table 5.2-13 Temperature of Underground and River

Location	Date	Time	Temperature			Remark of ground temperature
			Air	Ground	Myitnge River Water	
Project Site	2018/10/8	9:15	34.0	32.5	N.A.	1 m Depth, Sunny
Discharge	2018/10/8	10:20	30.8	29.0	28.0	1 m Depth, Sunny

Source: EIA Study Team

The impact to the water quality in Myitnge River is considered to be negligible.

The mitigation measures of reducing the impact to the water quality is considered as follows.

- Installation of the wastewater treatment facilities and appropriate operation and maintenance

5.2.1.2.2.5. Assessment of Impact

Assessment of the impact is conducted using simple analytical methods that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-14.

Table 5.2-14 Assessment of Water Quality in Operation Phase

Characteristics	Affected area	100 m to the downstream from the intake				
	Duration/frequency	During operation				
	Magnitude	A-	B-	D	B+	A+
		Wastewater discharge will be unavoidable, but the wastewater will be treated to the target value prior to discharge to the Myitnge River. Moreover, the remaining pollutant will be diluted by river water which is 7,950 times greater than the discharge amount. Impact on the river water quality is negligible.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after operation				

Note: A-: Significant negative impact A+: Significant positive impact
B-: Some negative impact B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

In conclusion, it is evaluated that the water pollution during operation would be well controlled and managed and would not cause any significant impacts on water quality around and downstream of the outlet.

5.2.1.2.3. Decommissioning, Closure, and Post-closure Phases

5.2.1.2.3.1. Potential Impact on Water Quality

The following item is considered as a potential impact on water quality during the decommissioning phase.

- The water pollution (muddy water) caused by the demolition of the intake facility in Myitnge River.

5.2.1.2.3.2. Area of Influence

AOI of muddy water from the demolition activity is limited to the surrounding area of the demolition site, because the sediment is consisted of relatively coarse particle and the fine particle has been washed away due to the river flow. The sediment raised up by the demolition work of the intake facility will be settled soon.

- The AOI of water quality from demolition site is set as 100 m downstream from the intake.

5.2.1.2.3.3. Methodology

The impact on water quality on decommissioning phase is identified qualitatively.

5.2.1.2.3.4. Identified Impact and Mitigation Measures

The cofferdam will be installed prior to the intake demolition to enclose the work area from the river. Steel sheet pile will be used for the construction of the cofferdam. The muddy water will be generated temporally during construction and demolition of the cofferdam.

The muddy water from demolition is the key concern during intake demolition. However, there are mitigation measures of reducing the impact of muddy water as follows. These measures are feasibly conducted by contractor.

- Installation of the steel structured cofferdam (Steel sheet pile)
- Using silt barrier around coffer dam
- Using temporary sedimentation tank for pumped up water in the working area

5.2.1.2.3.5. Assessment of Impact

Assessment of the impact was conducted using simple analytical method that are descriptive and qualitative. The result of impact assessment is summarized in Table 5.2-15

Table 5.2-15 Assessment of Water Quality in Decommissioning, Closure, and Post-closure Phases

Characteristics	Affected area	100 m to the downstream from the intake				
	Duration/frequency	Intake demolition phase				
	Magnitude	A-	B-	D	B+	A+
		Impact of turbid water to be generated from construction work of the coffer dam during piling and removing steel sheets is expected. The impact is limited to downstream and temporally. The discharge amount of Myitnge River is abundant and the turbid water will be diluted immediately. Moreover, the generation amount of turbid water will be minimized by construction of coffer dam, thus impacts on ecosystem and water use will be limited and not be significant. The mitigation of the impact is possible.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after demolition				

Note: A-: Significant negative impact A+: Significant positive impact
B-: Some negative impact B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

In conclusion, it is evaluated that the water pollution during demolition would be well controlled and managed and would not cause any significant impacts on water quality around intake.

5.2.1.3. Waste

5.2.1.3.1. Pre-construction and Construction phases

5.2.1.3.1.1. Potential Impact on Waste

The following item is considered as a potential impact on waste during construction phase.

- The solid waste generation from the construction activity of this project.

5.2.1.3.1.2. Area of Influence

AOI of solid waste from construction activity is limited to the construction site.

5.2.1.3.1.3. Methodology

The impact on solid waste from construction activity is identified quantitatively.

5.2.1.3.1.4. Identified Impact and Mitigation Measures

The estimated amount of the waste during construction is presented in the Table 5.2-16.

Table 5.2-16 Solid Waste in Construction Phase

Item	Unit	Waste generation	Treatment method
Lumber (Cutting tree)	m^3	800	Selling, Recycling as a fuel
Construction waste from materials (Scrap of steel, pipe and cable)	ton	100	Selling, Dispose by the contractor
Domestic waste from site office and construction camp	ton/week	1.3	Dispose by the contractor
Sediment from the sanitary-fittings	kg/day	150	Dispose by the contractor

Note: Surplus soil would not be generated because of the soil balancing between cutting and filling.
Source: EIA Study Team

The solid waste from construction activity will be collected in the site. The generated solid waste from water pipeline and gas pipeline construction will be carried to the power plant site for segregation except for the soil. If there will be valuable materials for recycling use, such as valuable metals, contractor will sell those materials to third parties. The remains of the solid waste which cannot be recycled will be disposed properly. The Environmental Conservation Law 2012 stipulates that the project owner shall arrange to dispose the waste in accordance with environmentally sound methods. MONREC should cooperate with the relevant government departments, government organizations and experts to enable to promote the establishment of necessary facilities for treatment of solid and liquid waste based on the Environmental Conservation Rules, 2014. In Sintgaing Township, domestic waste is collected by the Sintgaing Municipal in accordance with Mandalay City Development Committee (MCDC) law 2014. At the same time, the Section 105 (A) of MCDC law mentions that industrial wastes and construction wastes have to be disposed into the designated site by Sintgaing municipality. No one can dispose the industrial waste to the domestic waste disposal site for now. In addition, there is no disposal site of industrial waste in Sintgaing Township. Thus, the contractor should make contract with third party company of industrial waste management and that third-party company will dispose the construction waste to the proper disposal site. If they will construct new disposal site of construction waste in Sintgaing Township, they should obtain a permission from Sintgaing municipality in accordance with the MCDC law. If it is difficult to assure the proper disposal site, proponent should prepare the disposal site in the power plant site, based on the consultation with Sintgaing Municipality.

The solid waste from construction activity is a key concern during construction. However, there are mitigation measures for reducing the impact of solid waste as follows. These measures are feasibly conducted by contractor.

- Keeping tidy in the construction site
- Installing separate waste stockyard to promote the recycling and reuse the solid waste
- Appropriate management of stockyard to prevent odor
- Regular inspection of waste storage yard to check the status of segregation
- Contractor should carry the generated solid waste except for the soil from water pipeline and gas pipeline construction site to the power plant site to segregate.
- Contractor should properly dispose the waste which cannot be recycled by themselves or by third party in accordance with the relevant laws. If it is difficult to secure the proper disposal site, the project proponent should prepare the disposal site in the power plant site.

5.2.1.3.1.5. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and quantitative. The impact assessment is summarized in the Table 5.2-17.

Table 5.2-17 Assessment of Solid Waste in Construction Phase

Characteristics	Affected area	Construction site				
	Duration/frequency	Construction phase				
	Magnitude	A-	B-	D	B+	A+
		Impact of solid waste is limited in the project site. The mitigation of the impact is possible.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after construction				

Note: A-: Significant negative impact; B-: Some negative impact; D: No impacts or impacts are negligible; A+: Significant positive impact; B+: Some positive impact

Source: EIA Study Team

In conclusion, it is evaluated that the solid waste during construction will be well controlled and managed and would not cause any significant impacts on waste.

5.2.1.3.2. Operation Phase

5.2.1.3.2.1. Potential Impact on Waste

The following items are considered as a potential impact on waste during operational phase.

- The solid waste (sludge) generation from the domestic water treatment activity of this project.
- The solid waste generation from the operation and maintenance activity of power plant facilities and office activity.

5.2.1.3.2.2. Area of Influence

AOI of solid waste from operational activity is limited to the project site.

5.2.1.3.2.3. Methodology

The impact on solid waste from operational activity is identified quantitatively.

5.2.1.3.2.4. Identified Impact and Mitigation Measures

The solid waste from the operational activity is assumed as shown in Table 5.2-18.

Table 5.2-18 Solid Waste in Operation Phase

Item	Unit	Waste generation	Treatment method
Sediment from the purification process (Sludge)	m^3/day	0.2	Dispose by EPGE
Used oil (From the flushing of lubricant every 4 to 6 years)	m^3	60	Selling, Recycling as a fuel
Domestic waste from site office and staff house	ton/week	0.2	Dispose by EPGE
Sediment from the sanitary-fittings (Sewage sludge)	kg/day	210	Dispose by EPGE

Source: EIA Study Team

The solid waste will be collected in the site. If there will be valuable materials for recycling use such as valuable metals, the project proponent will sell those materials to third parties. The sediment from the purifying process is consisted by particulate of soil or sand mainly. It could be used as a material of construction or reclamation. Sediment from the sanitary fittings (sewage sludge) could be used as a fertilizer or cultivation soil. The used oil will be generated from the power plant during operation. The used oil will be managed properly and will be sold to third-party. Thus, there is no possibility of used oil disposal during operational phase. The remains of the solid waste which can not to be recycled will be disposed properly. The domestic waste will be disposed to the waste disposal site nearby the project site. The project proponent should obtain permission to dispose the domestic waste from Sintgaing Township or Kyaukse Township before the operation.

The solid waste from the operational activity is the key concern. However, there are mitigation measures for reducing the impact of solid waste as follows. These measures are technically possible to conduct by the project proponent.

- Keeping tidy in the project site
- Installing separate waste stockyard to promote the recycling and reuse the solid waste
- Appropriate management of stockyard to prevent odor
- Making contract with licensed third party about proper solid waste treatment and disposal to the site which was approved by authority
- Regular inspection of waste storage yard to check the status of segregation
- Obtaining a permission for disposing domestic wastes from Sintgaing Township or Kyaukse Township through discussions with responsible authorities of both townships before commissioning.

5.2.1.3.2.5. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and quantitative. The impact assessment is summarized in Table 5.2-19.

Table 5.2-19 Assessment of Solid Waste in Operation Phase

Characteristics	Affected area	Project site				
	Duration/frequency	Operation phase				
	Magnitude	A-	B-	D	B+	A+
		Impact of solid waste is limited in the project site. The mitigation of the impact is possible.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after operation				

Note: A-: Significant negative impact A+: Significant positive impact
B-: Some negative impact B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

In conclusion, it is evaluated that the solid waste disposal during operation phase will be well controlled and managed and may not cause any significant impacts.

5.2.1.3.3. Decommissioning, Closure, and Post-closure Phases

The following item is considered as a potential impact on waste during demolition.

- Generation of the solid waste from the demolition activity of this project.

5.2.1.3.3.1. Area of Influence

AOI of solid waste from demolition activity is limited to the demolition site.

5.2.1.3.3.2. Methodology

The impact on solid waste from demolition activity is identified qualitatively. The total amount of waste generated from the demolition activity could not be estimated at this time because of the policy and method of closing has not been decided yet.

5.2.1.3.3.3. Identified Impact and Mitigation Measures

The solid waste from the demolition activity is assumed as Table 5.2-20.

Table 5.2-20 Solid Waste in Demolition Phase

Solid waste from demolition activity	Waste wood (wood chips, wood offcuts) Concrete waste Metallic waste E-waste

Source: EIA Study Team

Solid waste from the demolition activity will be collected in the site. If there will be valuable materials for recycling use such as valuable metals, E-waste contractor will sell those materials to third parties. The remains of the solid waste which can not to be recycled will be disposed properly.

The solid waste from demolition activity is the key concern. However, there are mitigation measures for reducing the impact of solid waste as follows. These measures are feasibly conducted by contractor.

- Keeping tidy in the project site
- Installing separate waste stockyard to promote the recycling and reuse the solid waste

- Contractor should carry the generated solid waste (except for the soil) from demolition sites of water pipeline and gas pipeline to the power plant site for segregation.
- Regular inspection of the waste storage yard to check the status of segregation
- Contractor should properly dispose the waste, which cannot be recycled by themselves or by third party in accordance with the relevant laws.

5.2.1.3.3.4. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-21.

Table 5.2-21 Assessment of Solid Waste in Decommissioning, Closure, and Post-closure Phases

Characteristics	Affected area	Project site				
	Duration/frequency	Demolition phase				
	Magnitude	A-	**B-**	D	B+	A+
		Impact of solid waste is limited in the project site. The mitigation of the impact is possible.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after demolition				

Note: A-: Significant negative impact; A+: Significant positive impact
B-: Some negative impact; B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

In conclusion, it is evaluated that the solid waste during demolition phase would be well controlled and managed and would not cause any significant impacts.

5.2.1.4. Soil Contamination

5.2.1.4.1. Pre-construction and Construction Phases

5.2.1.4.1.1. Potential Impact on Soil Contamination

The soil contamination is not assumed; because soil improvement will not be executed according to the construction plan of the project. For prevention of soil contamination by the fuel and lubricant, the fuel refilling facility in the construction site should be paved with the impermeable materials such as concrete or asphalt concrete.

5.2.1.5. Noise and Vibration

5.2.1.5.1. Pre-construction and Construction phases

5.2.1.5.1.1. Potential Impact on Noise and Vibration

The following items are considered as a potential impact on noise and vibration during the construction phase.

- Noise and vibration caused by the activities of the power plant construction and materials handling.
- Noise and vibration from transportation activities such as carrying soil by dump trucks.

5.2.1.5.1.2. Area of Influence

AOI of noise and vibration from the construction activity is generally known as limited to surrounding area of the construction site.

- The AOI of noise from construction machinery is generally set as 200 m from the boundary of the project site.
- The AOI of noise from vehicles is set along access road of national highway to project site.
- The AOI on vibration from construction machinery is generally set as 100 m from the boundary of the project site.

5.2.1.5.1.3. Methodology

The impact on noise during construction phase is identified quantitatively. The impact on vibration during construction is identified qualitatively; because, in general, vibration from the construction machineries will not propagate more than 100 m.

5.2.1.5.1.4. Identified Impact and Mitigation Measures

In general, there are two sources for noise and vibration in the construction machinery. The one is combustion engine of the machine, and the other is working point of the machine such as drilling points. Among the construction activities, civil work is particularly known as a source of large impact on noise and vibration; because, powerful engine is used. On the other hand, building and facility construction usually generate relatively low level of noise and vibration. Hence, civil work should be considered as index of impact study. The typical construction machineries causing loud noise and vibration shown in Table 5.2-22.

Table 5.2-22 Construction Machinery of Civil Works

Type	Function of the construction machineries
Excavator	Digging, Soil handling, Loading and unloading the soil from the lorry truck
Bulldozer	Pushing and moving soil, land clearing (land levelling)
Compaction roller	Compaction of the filling soil
Dump truck	Soil transportation

Source: EIA Study Team

Construction machinery will be used inside the construction site during construction phase. The key impact on noise is expected during the operation of the noisiest machinery close to the residential area.

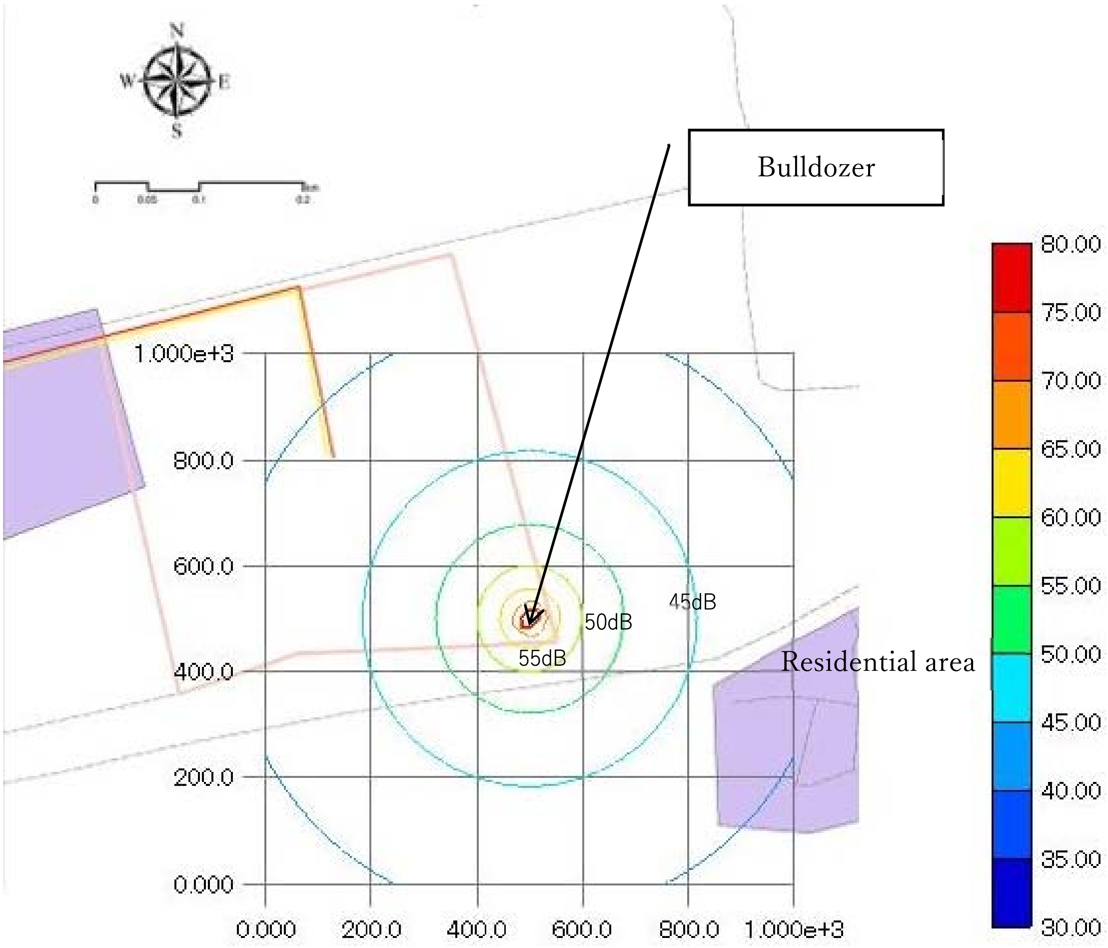
On this forecasting, Acoustical Society of Japan (ASJ) prediction model 2007 for construction noise is applicable for prediction. Table 5.2-23 shows the construction machineries for this project and the source-noise level of each machineries. Among these machineries, bulldozer is selected as the noisiest in the construction machineries for noise prediction.

Table 5.2-23 Sound Power Level of Noise Sources of Construction Machinery

Construction Machinery	L_{WAeff} (dB)	Specification
Excavator	101	Bucket capacity 0.7 m^3
Bulldozer	103	15 t type
Compaction roller	93	10 t type

Note L_{WAeff}: The effective value of the sound power level of source on A scale
Source: ASJ prediction model 2007 for construction noise

The forecasted noise level during construction from the project site is shown in Figure 5.2-6 and Table 5.2-24. The noise level in the nearest residential area is less than the target value (55 dB in daytime), even if the excavator will work at the nearest point to the residential zone. The forecasted value is just a noise from the construction machinery. The baseline of the noise is 51 dB at NV4 (daytime). Based on calculating the baseline and the forecasted noise from the machinery, combined noise level will be 52 dB.



Source: EIA Study Team

Figure 5.2-6 Result of Noise Forecasting

Table 5.2-24 Result of Noise Forecasting (L_{Aeq}[a])

forecast point	time	Forecast result	Target Value
Residential area	Daytime 07:00 - 22:00	< 45 dB	55 dB

Note: [a] Equivalent continuous sound level in decibels
Source: EIA Study Team

The impact on vibration from the construction machinery is considered to be small and negligible; because, vibration from construction machinery is attenuated during propagation in the ground. In general, the vibration wave from the construction machineries will not propagate more than 100 m.

The noise and vibration from civil works are important concern during construction phase of the Project. However, there are mitigation measures of reducing the impact of noise and vibration as follows. These measures are feasibly conducted by contractor.

- Avoiding the concentrated using of construction machineries
- Time limitation of the civil works (e.g. daytime: 7:00 to 22:00)
- Promoting awareness activity of gently operation to the operator
- Installing temporary enclosure wall to the southern and east boundaries during construction to reducing noise impact with diffraction effect

5.2.1.5.1.5. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-25.

Table 5.2-25 Assessment of Noise and Vibration in Construction Phase

Characteristics	Affected area	Surrounding area of project site, Road from national highway to the Pproject site				
	Duration/frequency	Construction phase, especially during civil work				
	Magnitude	A-	B-	D	B+	A+
		The impact is small because the noise level from the construction machinery in residential area will be under the target value and the construction term will be limited. In addition, the mitigation of the impact is possible.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after construction				

Note: A-: Significant negative impact A+: Significant positive impact
B-: Some negative impact B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

In conclusion, it is evaluated that noise and vibration during construction would be well controlled and managed and would not cause any significant impacts on noise and vibration in and around the proposed project site.

5.2.1.5.2. Operation Phase

5.2.1.5.2.1. Potential Impact on Noise and Vibration

The following item is considered as a potential impact on noise and vibration during the operational phase.

- Noise and vibration from power plant facilities

5.2.1.5.2.2. Area of Influence

AOI of noise and vibration from power plant facilities is generally known as limited to the surrounding area of project site.

- The AOI of noise from power plant facilities is generally set as 200 m from the boundary of the project site. The AOI of vibration from power plant facilities is set as 100 m.

5.2.1.5.2.3. Methodology

The impact on noise during operational phase is identified quantitatively as it is assumed to have significant effects. On the other hand, the vibration will not impact to the nearest residential because vibration from the facilities will not propagate more than 100 m generally. Therefore, qualitative method of impact identification is selected for vibration.

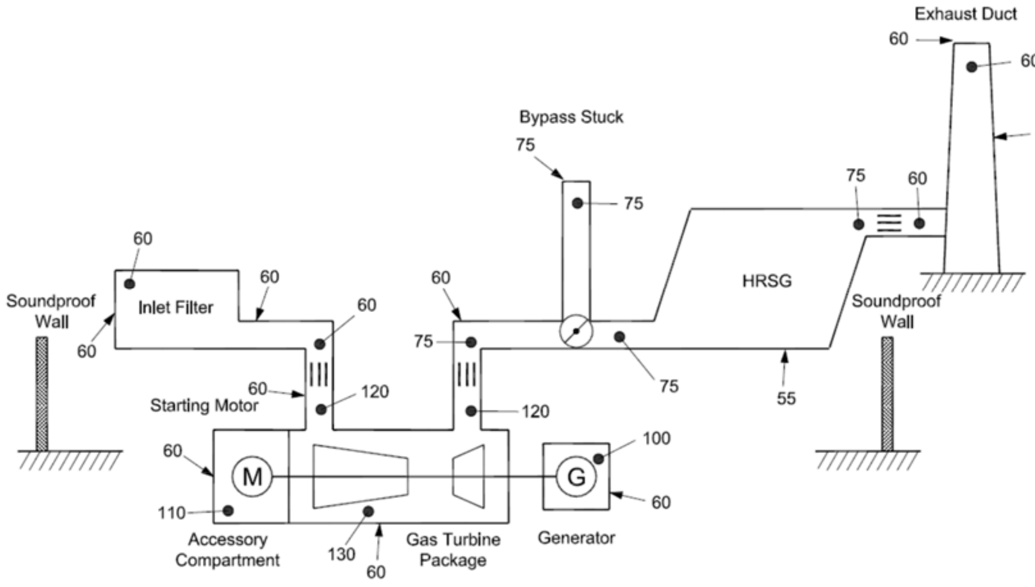
5.2.1.5.2.4. Identified Impact and Mitigation Measures

During operational phase, many types of noise and vibration sources will exist in the project site. Most of the noise sources will be operated 24 hours a day continuously. According to the project plan, the sound proof package will be applied to reduce noise impact. The major noise sources and noise values of them are presented in Table 5.2-26. For the identification of the noise impact, numerical model of noise attenuation is used. For this study, soundproof wall is omitted in the modeling to take safer side.

Table 5.2-26 Major Noise Sources and Noise Level

Facility	Major Noise source	Internal Noise (dB)	Noise value outside the sound proof package (dB)
Gas Turbine	Gas turbine package	130	60
	Intake air filter chamber	60	60
	Accessary component	110	60
	Generator	100	60
	Bypass Stack	75	75
	HRSG	75	55
	Stack	60	60
Steam Turbine	Steam Turbine	110	60
	Generator	100	60
	Feedwater Pump	75	60
	Air Cooled Condenser	75	75

Source: EIA Study Team



Source: EIA Study Team

Figure 5.2-7 Noise Countermeasure for Gas Turbine Intake and Exhaust System

Source: EIA Study Team

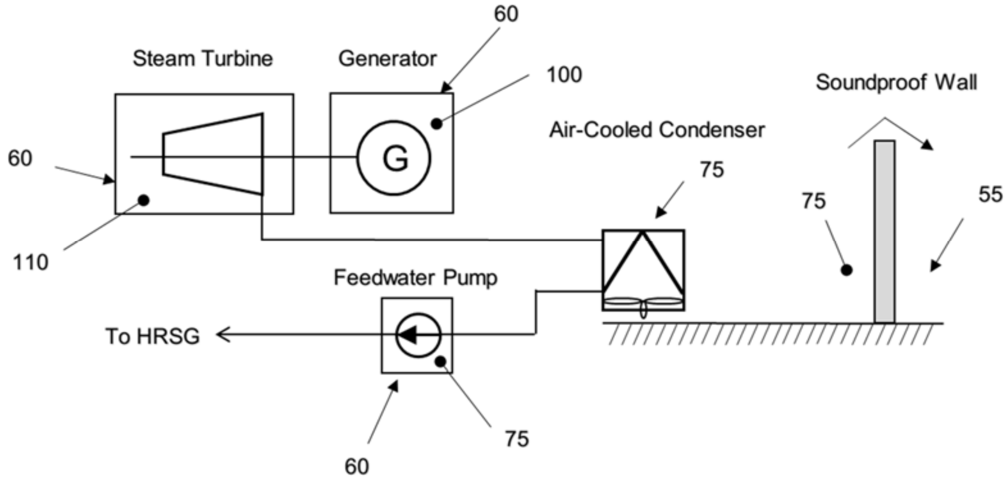
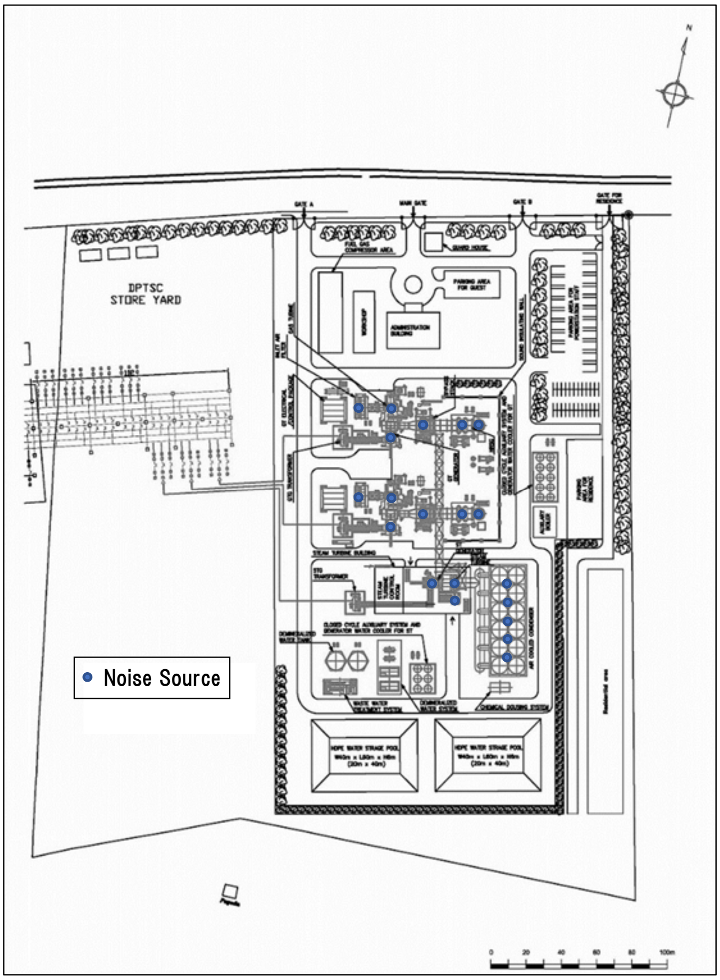


Figure 5.2-8 Noise Countermeasure for Steam Turbine Exhaust System and Cooler

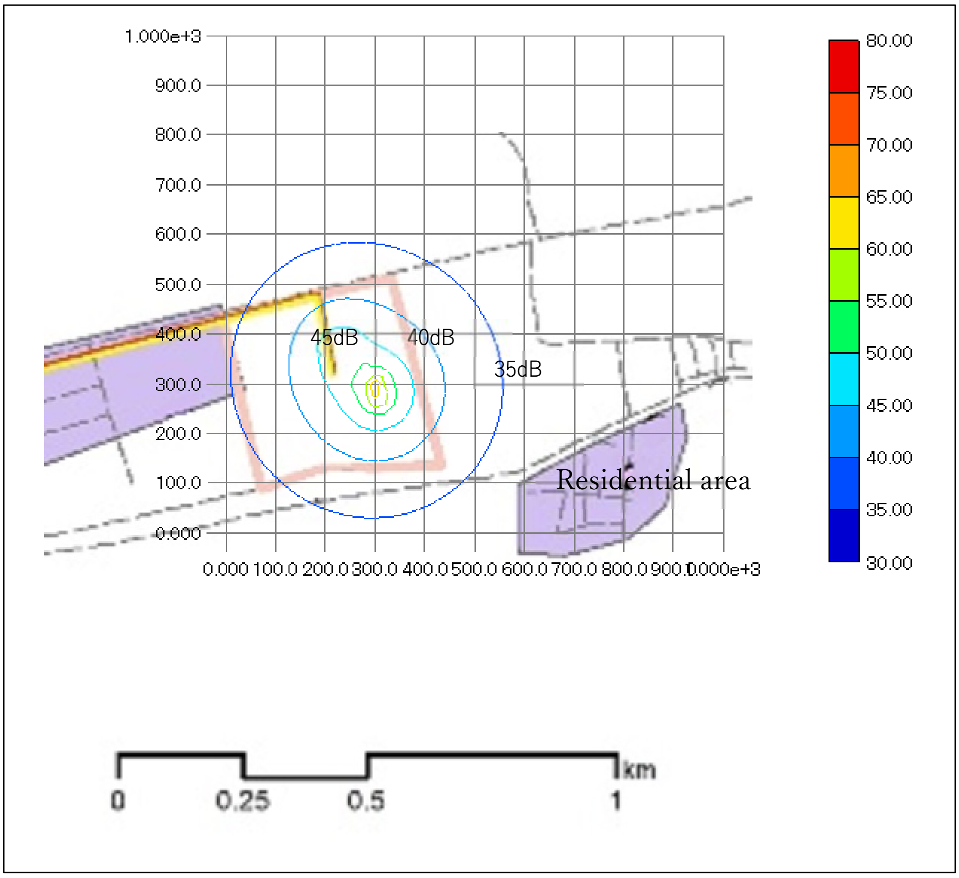


Source: EIA Study Team

Figure 5.2-9 Location of the Noise Source for Forecasting

The forecasted noise level from the project site is shown in Figure 5.2-10 and Table 5.2-27. The noise revel in the nearest residential area is less than the target value (45 dB in night time). The contour line of 45 dB is within the project site. The baseline of the noise is 51 dB (daytime) and 48 dB (night) at NV4. After composing baseline and noise from the facility, combined noise level will be 51 dB (daytime) and 48 dB (night).

The vibration will not impact to the nearest residential area; because, in general, vibration from the facilities will not propagate more than 100 m.



Source: EIA Study Team

Figure 5.2-10 Result of Noise Forecasting

Table 5.2-27 Result of Noise Forecasting (L_{Aeq}[a])

Forecast Point	Time	Forecast Result	Target Value
Residential, institutional, educational	Daytime 07:00 - 22:00	< 35 dB	55 dB
	Nighttime 22:00 - 07:00	< 35 dB	45 dB

Note: [a] Equivalent continuous sound level in decibels
Source: EIA Study Team

The noise and vibration from power plant facilities are important concern during operational phase of the Project. However, there are mitigation measures of reducing the impact of noise and vibration as follows.

- Implementation soundproof package for gas and steam turbine
- Strong foundation of the power plant facilities for reduction of the vibration

5.2.1.5.2.5. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-28.

Table 5.2-28 Assessment of Noise and Vibration in Operation Phase

Characteristics	Affected area	Surrounding area of surrounding area of project site
	Duration/frequency	Operation phase

	Magnitude	A-	B-	D	B+	A+
		The noise revel in the nearest residential area is less than the target value (45 dB in night time). The vibration will not impact to the nearest residential area because vibration from the facilities will not propagate to the area which is far from project site more than 100 m generally. Thus, the impact is small because impact to the living environment and human health will be small. The mitigation of the impact is possible.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after operation				

Note: A-: Significant negative impact; A+: Significant positive impact
B-: Some negative impact; B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

In conclusion, it is evaluated that noise and vibration during operation phase would be well controlled and managed and would not cause any significant impacts on noise and vibration in and around the proposed project site.

5.2.1.5.3. Decommissioning, Closure, and Post-closure Phases

5.2.1.5.3.1. Potential Impact on Noise and Vibration

The following items are considered as a potential impact on noise and vibration during demolition phase.

- Noise and vibration caused by the activities of the demolition and materials handling.
- Noise and vibration from transportation activities such as carrying solid waste by dump trucks.

5.2.1.5.3.2. Area of Influence

AOI of noise and vibration from the demolition activity is generally known as limited to the surrounding area of project site.

- The AOI of noise from machinery is generally set as 200 m from the boundary of the project site.
- The AOI of noise from vehicles is set along access road of national highway to project site. The AOI on vibration from machinery is generally set as 100 m from the boundary of the project site.

5.2.1.5.3.3. Methodology

The impact on noise and vibration during demolition is identified qualitatively.

5.2.1.5.3.4. Identified Impact and Mitigation Measures

In general, there are two sources for noise and vibration in the construction machinery. The one is combustion engine of the machine, the other is working point of the machine such as drilling point and compacting point. Among the demolition activities, civil work is particularly known as a significant cause of noise and vibration; because larger power of engine is necessary. The typical construction activities, which generate loud noise and vibration, are shown in Table 5.2-29.

Table 5.2-29 Construction Machinery of Demolition

Type	Function of the construction machineries
Excavator	Breaking concrete, asphalt, Loading and unloading the soil from the lorry truck
Dump truck	Waste transportation

Source: EIA Study Team

The noise and vibration from demolition works are important concern during decommission phase of the Project. However, there are mitigation measures of reducing the impact of noise and vibration as follows. These measures are feasibly conducted by contractor.

- Avoiding the concentrated use of construction machineries
- Time limitation of the demolition works (e.g. daytime)
- Promoting awareness activity of gently operation to the operator
- Installing temporary enclosure wall to the southern and east boundaries during demolition to reducing noise impact with diffraction effect

5.2.1.5.3.5. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-30.

Table 5.2-30 Assessment of Noise and Vibration in Demolition Phase

Characteristics	Affected area	Surrounding area of project site, Road from national highway to the project site				
	Duration/frequency	Demolition phase				
	Magnitude	A-	B-	D	B+	A+
		The impact of noise and vibration is expected due to demolition work, but mitigation measures will be applied, and the impact will be small. The mitigation of the impact is possible.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after demolition				

Note: A-: Significant negative impact; A+: Significant positive impact
B-: Some negative impact; B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

In conclusion, it is evaluated that noise and vibration during demolition would be well controlled and managed and would not cause any significant impacts on noise and vibration in and around the proposed project site.

5.2.1.6. Ground Subsidence

5.2.1.6.1. Pre-construction and Construction Phases

5.2.1.6.1.1. Potential Impact on Ground Subsidence

The following item is considered as a potential impact on ground subsidence during construction phase.

- Ground subsidence may occur after burying gas and water pipeline because of inadequate soil compaction for backfill.

5.2.1.6.1.2. Area of Influence

AOI of subsidence from construction activity is limited along the pipeline route.

5.2.1.6.1.3. Methodology

The impact on subsidence from construction activity is identified qualitatively.

5.2.1.6.1.4. Identified Impact and Mitigation Measures

Subsidence from the construction activity may be caused by inadequate soil compaction for backfill.

Subsidence from construction activity is the key concern during construction. However, there are mitigation measures for avoiding the subsidence as follows. These measures are feasibly conducted by contractor.

- Avoiding using waste and clay for backfilling of the pipeline
- Executing adequate soil compaction for back filling of the pipeline

5.2.1.6.1.5. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-31.

Table 5.2-31 Assessment of Subsidence in Construction Phase

<table>
<tr><td rowspan="4">Characteristics</td><td>Affected area</td><td colspan="5">Pipeline route</td></tr>
<tr><td>Duration/frequency</td><td colspan="5">Construction phase</td></tr>
<tr><td rowspan="2">Magnitude</td><td>A-</td><td>B-</td><td>D</td><td>B+</td><td>A+</td></tr>
<tr><td colspan="5">Impact of subsidence is small because affected area will be limited. The mitigation of the impact is possible.</td></tr>
<tr><td rowspan="2">Mitigation measures</td><td>Technical feasibility</td><td colspan="5">Feasible</td></tr>
<tr><td>Effectiveness</td><td colspan="5">Effective</td></tr>
<tr><td colspan="2">Residual impact</td><td colspan="5">There is no residual impact after construction</td></tr>
</table>

Note: A-: Significant negative impact; A+: Significant positive impact
B-: Some negative impact; B+: Some positive impact
D: No impacts or impacts are negligible

Source: EIA Study Team

In conclusion, it is evaluated that the subsidence during construction would be well controlled and managed and would not cause any significant impacts on waste.

5.2.1.7. Offensive Odor

5.2.1.7.1. Operation Phase

5.2.1.7.1.1. Potential Impact on Offensive Odor

The following item is considered as a potential impact on offensive odor during operation phase.

- The offensive odor generated from the wastewater treatment activity of this project.

5.2.1.7.1.2. Area of Influence

AOI of offensive odor from operational activity is in and around the project site.

5.2.1.7.1.3. Methodology

The impact on offensive odor from operational activity is identified qualitatively.

5.2.1.7.1.4. Identified Impact and Mitigation Measures

The source of the offensive odor from the operational activity is assumed as shown in Table 5.2-32.

Table 5.2-32 Offensive Odor in Operation Phase

Source of odor	Description
Wastewater treatment facility	Offensive odor may be generated in the reaction tank of biological treatment generally.
Waste stock facility	Offensive odor from the stocked waste is assumed, particularly from organic waste, sludge and chemical waste.

Source: EIA Study Team

The offensive odor from operational activity is the key concern. However, there are mitigation measures for reducing the impact of offensive odor as follows. These measures are technically possible to conduct by the project proponent.

- Periodical maintenance of wastewater treatment facility
- Feeding back to the monitoring result to the operation of treatment facility (In case of unusual situation, monitored results should be fed back to the operation immediately.)
- Installing separate and covered waste stockyard to reduce dispersion of the odor

5.2.1.7.1.5. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-33.

Table 5.2-33 Assessment of Offensive Odor in Operational Phase

Characteristics	Affected area	Project site				
	Duration/frequency	Operation phase				
	Magnitude	A-	B-	D	B+	A+
		Impact of offensive is limited in and around of the project site. The mitigation of the impact is possible.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after operation				

Note: A-: Significant negative impact A+: Significant positive impact
B-: Some negative impact B+: Some positive impact
D: No impacts or impacts are negligible

Source: EIA Study Team

In conclusion, it is evaluated that the offensive odor during operation phase would be well controlled and managed and would not cause any significant impacts on waste.

5.2.1.8. Flora, Fauna and Biodiversity

5.2.1.8.1. Pre-construction and Construction Phases

5.2.1.8.1.1. Potential Impact on Flora, Fauna and Biodiversity

The following items are considered as a potential impact on waste in construction phase.

- Change of vegetation due to the construction work in the project area.
- Loss of important species and/or their habitats caused by the project development.
- Impact on biodiversity and ecosystem by the project development.

5.2.1.8.1.2. Area of Influence

The area examined to forecast the impact was set in and around the project area.

5.2.1.8.1.3. Methodology

The impact on flora, fauna and biodiversity from construction activity is identified qualitatively.

The impact forecast for flora, fauna, and biodiversity was conducted as follows.

- The current status of vegetation in the project area was examined and then the impact on vegetation was evaluated by referring to the construction plan for the project development.
- The loss of important species and/or their habitats was determined by overlaying the project area on the habitats of important species.
- The impact on biodiversity and ecosystem in the project area was evaluated in consideration of biodiversity and ecosystem of the larger region.

5.2.1.8.1.4. Identified Impact and Mitigation Measures

1) Loss of vegetation

The project site is adjacent to existing Belin substation, and the project area is located within the brown field site. According to the result of the baseline survey, three major habitat types were observed: namely,

(1) plantation, (2) bare land and (3) shrub land. There is no intact forest within and around the project site area.

The project site area is mainly covered by shrub land and plantation. The vegetation of the area is low-rich natural environmental vegetation and the same types of vegetation are distributed in the surrounding area of the project site. The water pipeline also located within the row of road and some parts are occupied by the farm land.

Hence, it is evaluated that the change of vegetation due to the construction activities would not cause significant impact on the environment.

2) Loss of important species and their habitats

The summary of flora and fauna survey showed that 151 flora species, 26 butterflies, 11 dragonflies, 50 birds, 10 mammals, 18 reptiles and amphibians, 4 beetle, 3 snails and 44 fish species were recorded through observation and interview with the local people in the project site and the surrounding area. There were two near threatened bird species, five near threatened fish species were recorded according to the IUCN Global Threatened Status (2018). Reptiles and amphibian, butterfly, dragonfly and beetle, snail species were no globally threatened species according to the IUCN Red list threatened species (2018).

However, the loss of important species due to the project development would be evaluated carefully with the consideration of their habitats and specific living behavior.

Considering near threatened fish species, their habitats would remain unchanged as they can keep living in the Myitnge River. The water quality of the river would be adequately protected for conservation of aquatic life. Hence, fish species, in general, and near threatened fish species would be conserved in the Project area.

Meanwhile, habitats for bird species would be changed due to the project development. However, near threatened bird species, Grey-headed Parakeet (*Psittacula finschii*) and Hooded Treepie (*Crypsirina cucullata*), are relatively common and observed in a wide area in Myanmar, though classified as NT by IUCN list. These bird species can easily move to other places, because they can find similar habitats such as near water, grassland, and marshes in nearby areas. Therefore, loss of near threatened bird species would be avoided.

As a whole, the loss of seven near threatened species due to the project development would be minimized and limited, and therefore, would not cause significant impact on the environment and their existence in nature. In summary, it is evaluated that the project would not cause significant impact on important species and their habitats.

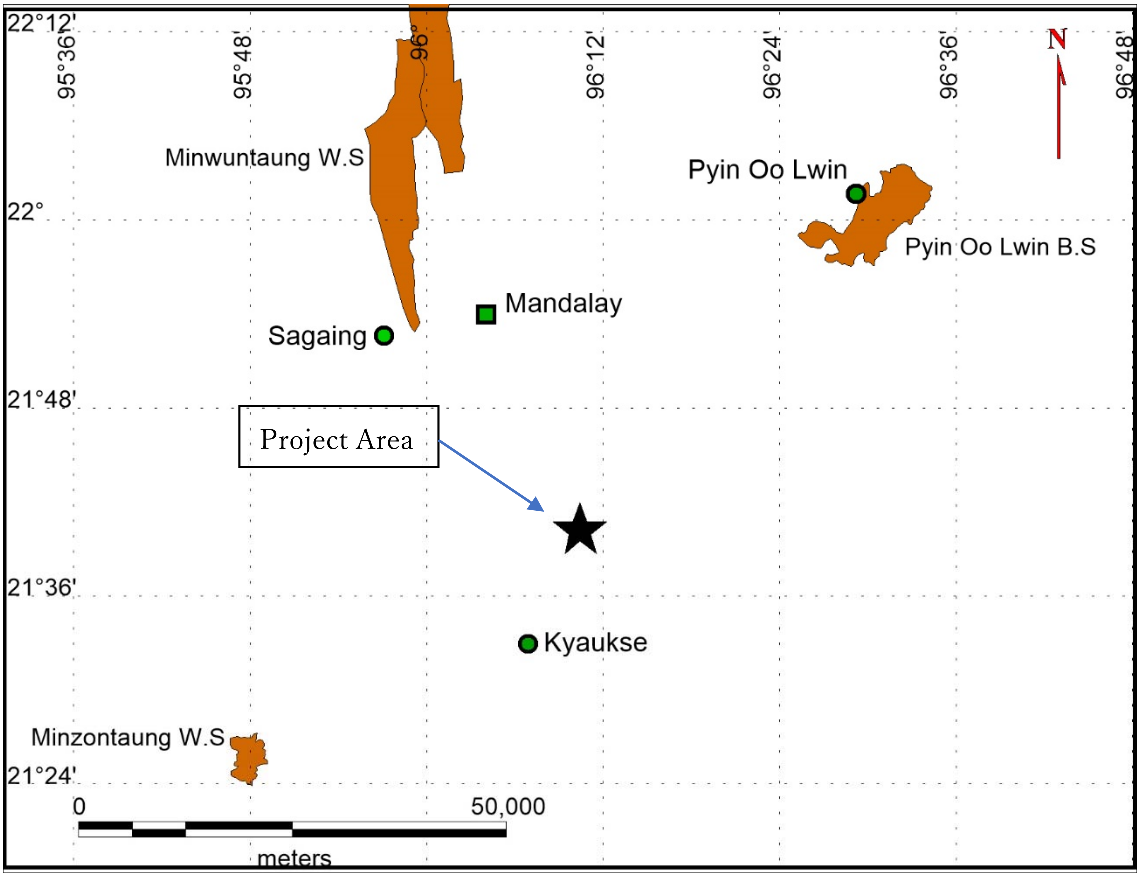
3) Impact on biodiversity and ecosystem by the project development.

The project site is located more than 20 km away from the protected areas (See in Figure 5.2-11).

Based on the field survey, the project site is mainly covered by shrub land and plantation. The vegetation of the area is low-rich natural environmental vegetation and the same types of vegetation are distributed in the surrounding area of the project site. Gas pipeline and water pipeline will also be located within the row of road and some parts were occupied by the farmland.

Through the field survey, it was observed that biodiversity in the project area was not rich because of the fact that the area has been inhabited and cultivated by local people for a long time. The project area is not a special area in terms of biodiversity and ecosystem, compared with nearby areas in the same region. Similar ecosystem and equivalent level of biodiversity would be found in nearby areas. Besides, the loss of some important species would not occur during the project development, as discussed above. Though the vegetation will be partially cleared due to the implementation of the Project, greening of the project area will help to mitigate the change of biodiversity and ecosystem.

Therefore, the development of the Project would not cause any significant impact on biodiversity and ecosystem of the region.



Source: EIA Study Team

Figure 5.2-11 Location of Project Site Related to the Protected Areas of Myanmar

The impact of flora, fauna and biodiversity from construction activity is the key concern. However, there are mitigation measures for reducing the impact of aquatic biota as follows (same as water quality). These measures are technically possible to conduct by contractor.

- Installation of the steel structured cofferdam (Steel sheet pile)
- Using silt barrier around coffer dam
- Using temporary sedimentation tank for pumped up water in the working area

Regarding terrestrial flora and fauna, the following measure is considered as technically possible to be conducted by contractor.

- Minimizing the land surface change such as plantation and shrub land for stockyard

5.2.1.8.1.5. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-34.

Table 5.2-34 Assessment of Flora, Fauna and Biodiversity in Construction Phase

Characteristics	Affected area	Project site				
	Duration/frequency	Long term to permanent/ Once-off				
	Magnitude	A-	B-	D	B+	A+
		1.The change of vegetation will not be significant. 2.The Project would not cause significant impact on important species and their habitats 3. The development of the Project would not cause any significant impact on biodiversity and ecosystem of the region				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after construction				

Note: A-: Significant negative impact A+: Significant positive impact
B-: Some negative impact B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

In conclusion, it is evaluated that flora, fauna and biodiversity during construction phase would be well controlled and managed, and the project activities may not cause any significant impacts on flora, fauna and biodiversity.

5.2.1.8.2. Operation Phase

5.2.1.8.2.1. Potential Impact on Flora, Fauna and Biodiversity

During the operational phase of the Project, smaller fauna such as many reptiles would be affected by noise from operation of power plant, but it is envisaged that this impact will be negligible given that majority of the species would have already migrated away from the area.

During operation phase of the Project, impacts on flora, fauna and biodiversity will be minimal except impact of the aquatic biota due to water discharge.

5.2.1.8.2.2. Area of Influence

The area examined to forecast the impact was set in and around the project area.

5.2.1.8.2.3. Methodology

The impact on flora, fauna and biodiversity from operation activity of the Project is identified qualitatively.

5.2.1.8.2.4. Identified Impact and Mitigation Measures

During operation phase, the wastewater from the project operation will be discharged to the Myitnge River after treated with wastewater treatment plant. Therefore, there would be potential impact on aquatic biota especially fish.

Considering near threatened fish species, their habitats would remain unchanged as they can keep living in the Myitnge River. The impact on water quality is negligible according to the result prediction of water quality. Hence, fish species, in general, and near threatened fish species would be conserved in the project area.

The impact of flora, fauna and biodiversity from operation activity is the key concern. However, there is mitigation measure for reducing the impact of biodiversity as follows (same as water quality). This measure is technically possible to conduct by the project proponent.

- Installation of the wastewater treatment and proper operation of treatment facility

5.2.1.8.2.5. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-35.

Table 5.2-35 Assessment of Flora, Fauna and Biodiversity in Operational Phase

Characteristics	Affected area	Project site				
	Duration/frequency	Long term to permanent/ongoing				
	Magnitude	A-	B-	D	B+	A+
		The impact on aquatic ecosystem is expected. The impact of discharged water is very small according to the water quality evaluation. Moreover, the impact of the treated water is negligible thus, impact on aquatic biota is limited.				
Mitigation measures	Technical feasibility	Treatment of effluent, waste and process water prior to discharge is feasible.				
	Effectiveness	Effective				
Residual impact		There is no residual impact after construction				

Note: A-: Significant negative impact; A+: Significant positive impact
B-: Some negative impact; B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

All wastewater from the project area, including wastewater from production area, domestic wastewater, storm water, floor washing water, etc. will be fully collected and treated to comply with applicable standards at wastewater treatment plant.

In conclusion, it is evaluated that flora, fauna and biodiversity during operation phase would be well controlled and managed and would not cause any significant impacts on flora, fauna and biodiversity.

5.2.1.8.3. Decommissioning, Closure, and Post-closure Phases

5.2.1.8.3.1. Potential Impact on Flora, Fauna and Biodiversity

Potential impact on flora, fauna and biodiversity would be the same as construction phase.

5.2.1.8.3.2. Area of Influence

The area examined to forecast the impact was set in and around the Project area.

5.2.1.8.3.3. Methodology

The impact on flora, fauna and biodiversity from operation activity of the Project is identified qualitatively.

5.2.1.8.3.4. Identified Impact and Mitigation Measures

Considering the impacts on flora, there is no further impacts are anticipated within the power plant site as a result of decommissioning activities. If the water intake was removed during the decommissioning phase, the impacts to the aquatic biota will be the same as construction phase.

The impact of flora, fauna and biodiversity from demolition activity is the key concern. However, there are mitigation measures for reducing the impact of biodiversity as follows (same as water quality). These measures are feasibly conducted by contractor.

- Installation of the steel structured cofferdam (Steel sheet pile)
- Using silt barrier around coffer dam
- Using temporary sedimentation tank for pumped up water in the working area

5.2.1.8.3.5. Assessment of Impact

The extent of the impact on the habitat is likely to be low as the footprint will be limited. Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-36.

Table 5.2-36 Assessment of Flora, Fauna and Biodiversity in Decommissioning, Closure, and Post-closure Phases

Characteristics	Affected area	Project site				
	Duration/frequency	Long term to permanent/once-off				
	Magnitude	A-	B-	D	B+	A+
		There is no further impact anticipated within the power plant site. The impact of the water quality is small; moreover, the impact on water quality is smaller after mitigation. Hence, fish species, in general, and near threatened fish species would be conserved.				
Mitigation measures	Technical feasibility	Feasible (Same as construction phase)				
	Effectiveness	Effective				
Residual impact		There is no residual impact after construction				

Note: A-: Significant negative impact A+: Significant positive impact
B-: Some negative impact B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

In conclusion, it is evaluated that flora, fauna and biodiversity on decommissioning, closure, and post-closure phase would be well controlled and managed and would not cause any significant impacts on flora, fauna and biodiversity.

5.2.1.9. Hydrology

5.2.1.9.1. Operation Phase

5.2.1.9.1.1. Potential Impact on Hydrology

During operational phase, an increase of the run-off water from the project site is assumed because of partial change of the land surface of the project site into impermeable surface such as paved ground, buildings and facilities.

- The increase of run-off water from the project site

5.2.1.9.1.2. Area of Influence

AOI of hydrology from operational activity is in and around the project site.

5.2.1.9.1.3. Methodology

The impact on hydrology during operational phase is identified analytically from a basic design of drainage system in the project site

5.2.1.9.1.4. Identified Impact and Mitigation Measures

Maximum daily rainfall at Kyaukse Township from 2011 to 2017 are shown in Table 5.2-37. Probable rainfall were calculated by using the maximum rainfall data, and the results are shown in Table 5.2-38.

Table 5.2-37 Maximum Daily Rainfall at Kyaukse Township from 2011 to 2017

Year	Maximum daily rainfall (mm)
2011	191
2012	44
2013	116
2014	87
2015	93
2016	81
2017	130

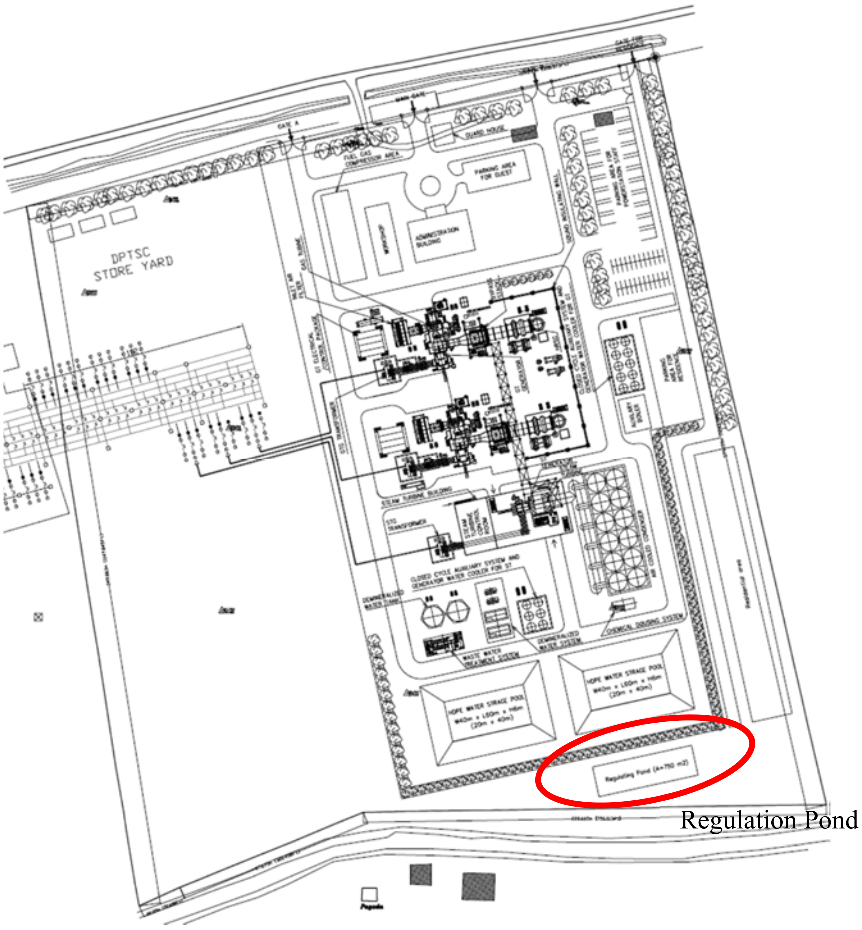
Source: Department of Meteorology and Hydrology, Yangon

Table 5.2-38 Probable Daily Rainfall at Kyaukse Township.

Probable year	Rainfall(mm/day)
10	180
5	150
2	100

Source: EIA Study Team by hydrological analysis utility

Those rainfall data were used for the basic design of drainage system and regulating pond in the project site. The run-off water will be collected to the regulation pond firstly and will be gradually discharged into adjacent canal which runs south side of the project site, thus the run-off water will be retarded, and the increase of the run-off water will be mitigated.



Source: EIA Study Team

Figure 5.2-12 Regulation Pond

The run-off water from project site is the key concern. However, there is mitigation measure for reducing the impact of run-off water as follows. The measure is feasibly conducted by the project proponent.

- ➢ Installation of the regulation pond with adequate capacity

5.2.1.9.1.5. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-39.

Table 5.2-39 Assessment of Hydrology in Operation Phase

Characteristics	Affected area	Project site				
	Duration/frequency	Operation phase				
	Magnitude	A-	B-	D	B+	A+
		Impact of runoff water is expected. The impact is limited because the regulation pond with adequate capacity will be installed.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after operation				

Note: A-: Significant negative impact; A+: Significant positive impact
B-: Some negative impact; B+: Some positive impact
D: No impacts or impacts are negligible

Source: EIA Study Team

In conclusion, it is evaluated that run-off water during operation would be well controlled and managed and would not cause any significant impacts on hydrology in and around the project site.

5.2.2. Social Impact Assessment

5.2.2.1. Involuntary Resettlement

The Project uses public land as much as possible to minimize acquisition of privately owned land. However, permanent acquisition of some areas is not avoidable for installing the intake facility and the electric poles for distribution line. In addition, agriculture land will be temporarily occupied during construction for installing gas and water pipelines. Although permanent land acquisition or temporary occupation are required, involuntary resettlement is not assumed, and therefore, impact of permanent land acquisition and temporary occupation is evaluated in this section.

5.2.2.1.1. Pre-construction and Construction Phases

5.2.2.1.1.1. Potential Impact on Land Acquisition

The following items are considered as a potential impact on land acquisition at pre-construction and construction phases.

- Permanent acquisition of agriculture and vacant land for installing water intake facility, pump station and electric poles for distribution line at the pre-construction phase
- Temporary occupation of agriculture land due to installing gas and water pipeline at the construction phase

5.2.2.1.1.2. Area of Influence

AOI of land acquisition from the construction activity is generally known as limited to surrounding area of the construction site.

- The AOI of land acquisition and temporary occupation is inside the Project site. (Gas and water pipeline, Intake facility, Electricity distribution line)

5.2.2.1.1.3. Methodology

The impact on permanent land acquisition in the pre-construction phase and temporary occupation in the construction phase is identified quantitatively.

5.2.2.1.1.4. Identified Impact and Mitigation Measures

Impact of permanent land acquisition and temporary occupation is summarized in Table 5.2-40.

Table 5.2-40 Possible Impact on Land Acquisition at Pre-construction and Construction Phases

No.	Facility	Acquisition Type	Area to be acquired at each land use
1	Water intake facility	Permanent acquisition (pre-construction phase)	Village land: 0.020 ha
2	Electric poles for 6.6 kV distribution line	Permanent acquisition (pre-construction phase)	Paddy: 0.0012 ha
3	Water pipeline (from water intake station to gas off-take station)	Temporary occupation (construction phase)	Paddy: 2.524 ha Village land: 0.234 ha Village land (school): 0.059 ha Land owned by Irrigation Department: 1.510 ha
4	Gas pipeline & water pipeline (from gas off-take station to the project site)	Temporary occupation (construction phase)	Paddy: 7.478 ha Village Land (School): 0.108 ha Industrial Grant Land: 0.160 ha Land owned by Irrigation Department: 0.046 ha Land owned by Ministry of Construction: 0.829 ha Land owned by EPGE: 0.393 ha
5	6.6 kV distribution line	Not acquired but just limitation of land use	Paddy: 1.364 ha

Source: EIA Study Team

Although land acquisition or temporary occupation will be necessary for installing the project facilities, resettlement is not assumed since houses were not located inside the land acquisition or temporary occupation area. Possible impact on land acquisition or temporary occupation will be compensated property by preparing an Abbreviated Resettlement Action Plan (A-RAP) in accordance with JICA Guidelines for Environmental and Social Considerations (April 2010) and relevant regulations in Myanmar. In the process of A-RAP preparation, participation of affected persons is secured by holding adequate consultation with them in timely manner for reflecting their comments into A-RAP. The measures to mitigate impact on permanent land acquisition and temporary occupation is listed below.

For permanent land acquisition:

- Compensation of the affected area in full replacement cost

For structures on affected land

- Compensation in full replacement cost to the entire structure if the affected portion is confirmed as not usable with all concerned parties, OR
- Compensation in full replacement cost to the affected portion if the structure is confirmed as usable with all concerned parties.

For crops and trees on affected land

- Crops: 3 times of the value calculated based on the average production of the grain and other crops currently sowed and current market price of that area
- Trees: 3 times of the value calculated based on the current price of the tree and current market price of the trees in that area

5.2.2.1.1.5. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-41.

Table 5.2-41 Assessment of Land Acquisition in Pre-construction and Construction Phases

Characteristics	Affected area	Project site (intake facility and electricity distribution line)				
	Duration/frequency	Pre-construction phase				
	Magnitude	A-	B-	D	B+	A+
		Identified impact related to land acquisition and temporary occupation will be properly compensated in accordance with the contents in A-RAP which will be prepared with due consultation with affected persons.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after pre-construction and construction				

Note: A-: Significant negative impact; A+: Significant positive impact
B-: Some negative impact; B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

In conclusion, it is evaluated that the land acquisition in pre-construction phase would be minimized by preparing proper A-RAP though impact on land acquisition is not avoidable.

5.2.2.2. Poverty

5.2.2.2.1. Pre-construction and Construction phases

5.2.2.2.1.1. Potential Impact on Poverty

The following items are considered as a potential impact on poverty at pre-construction and construction phases.

- ➢ Impact on the poverty groups of Project-affected Persons (PAPs) by permanent land acquisition and temporary occupation on the pre-construction phase
- ➢ Impact on the poverty groups of the surrounding community by construction works on the construction phase

5.2.2.2.1.2. Area of Influence

AOI of poverty is generally known as limited to the surrounding area of the project site.

- ➢ The AOI of poverty during pre-construction is in the project site (gas and water pipeline, intake facility, electricity distribution line).
- ➢ The AOI of poverty during construction is in and around the project site (power plant, gas and water pipeline, intake facility, electricity distribution line).

5.2.2.2.1.3. Methodology

The impact on poverty in pre-construction and construction phases is identified qualitatively.

5.2.2.2.1.4. Identified Impact and Mitigation Measures

5.2.2.2.1.4.1. Impact on the Poverty Groups of PAPs by Permanent Land Acquisition at the Pre-construction Phase and Temporary Occupation at the Construction Phase

Impact to poverty groups during the pre-construction and construction phases will be related to extent of impact to their income sources. As for pre-construction phase, land acquisition will be required for installing the water intake facility and electric poles for distribution line. The current land use of the candidate site for installing the water intake facility is vacant area and it is public land. Therefore, it is considered that impact to poverty groups due to installing the water intake facility is not assumed. As for installing electric pole, total of 11 areas will be necessary at a maximum. Approximately 1 m^2 per pole will be required and all necessary areas will be located in agricultural land. Although the necessary area will be located in agricultural land, possible impact to land-based income source is assumed as limited since the necessary area per plot is small and the remaining area in a plot can be usable.

During the construction phase, temporary occupation for installing water and gas pipelines in agricultural land will be required. The necessary duration for installing water and gas pipelines per plot is assumed as 1 week to 10 days or so. Thus, it is considered that impact to land-based income source would not be significant though some extent of impact to income would occur. Identified possible impact to poverty groups would be minimized by applying the following mitigation measures.

- ➢ Providing appropriate compensation for loss of crops and trees as per agreed contents in A-RAP
- ➢ Start construction after harvest as much as possible

5.2.2.2.1.4.2. Impact on the Poverty Groups at the Surrounding Community by Construction Works

During the construction phase, related job opportunities are expected. Accordingly, it is assumed that the Project would contribute for improvement of the regional economy, and the poverty groups at the surrounding of the project area could enjoy such opportunity to improve their economic condition. The measure to mitigate impact on is shown below.

- The contractor should prioritize the local people on hiring unskilled worker

5.2.2.2.1.5. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-42 and Table 5.2-43.

Table 5.2-42 Assessment of Poverty in Pre-construction Phase

Characteristics	Affected area	Project site (gas and water pipeline, intake facility, electricity distribution line)				
	Duration/frequency	Pre-construction phase				
	Magnitude	A-	B-	D	B+	A+
		There is a possibility that land-based income source for the poverty groups would be affected due to land acquisition for installing electric poles. However, such impact is considered as limited since the area to be acquired is small (i.e. 1 m^2 per plot) and the remaining area can be still usable.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after pre-construction				

Note: A-: Significant negative impact A+: Significant positive impact
B-: Some negative impact B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

Table 5.2-43 Assessment of Poverty in Construction Phase

Characteristics	Affected area	Project site (power plant, gas and water pipeline, intake facility, electricity distribution line) and the surrounding communities				
	Duration/frequency	Construction phase				
	Magnitude	A-	B-	D	B+	A+
		There is a possibility that a part of agriculture land where the poverty groups cultivate would be temporarily occupied to install water and gas pipes. It may affect their income source. On the other hand, the Project will bring a positive impact such as increasing job opportunities for the surrounding communities including project affected persons as the construction workers.				
Mitigation measures	Technical feasibility	Feasible for negative impact				
	Effectiveness	Effective for negative impact				
Residual impact		There is no residual impact after construction				

Note: A-: Significant negative impact A+: Significant positive impact
B-: Some negative impact B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

In conclusion, it is evaluated that the impact on poverty in pre-construction and construction phases would be minimized by proving appropriate compensation in timely manner in accordance with A-RAP.

5.2.2.2.2. Operation Phase

5.2.2.2.2.1. Potential Impact on Poverty

The following items are considered as a potential impact on poverty at operation phase.

- ➢ Impact on the poverty groups of the surrounding community by operation works

5.2.2.2.2.2. Area of Influence

AOI of poverty is generally known as limited to the surrounding area of the project site.

- ➢ The AOI of poverty is around the project site.

5.2.2.2.2.3. Methodology

The impact on poverty in the operation phase is identified qualitatively.

5.2.2.2.2.4. Identified Impact and Mitigation Measures

5.2.2.2.2.4.1. Impact on the Poverty Groups at the Surrounding Community by Operation Works

Same as the construction phase, operation of the Project would create job opportunities for the people living in the surrounding area. Therefore, it is assumed that the Project may cause positive impact, and the poverty group at the surrounding of the project area could enjoy such opportunity to improve their economic condition. The measures to mitigate impact on is shown below.

- ➢ EPGE would prioritize the local people on recruiting for new job in the new plant if he/she has adequate capability.

5.2.2.2.2.5. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-44.

Table 5.2-44 Assessment of Poverty in Operational Phase

Characteristics	Affected area	Surrounding area of the project site				
	Duration/frequency	Operational phase				
	Magnitude	A-	B-	D	B+	A+
		The Project will bring a positive impact such as increasing job opportunities related to the Project for the surrounding communities.				
Mitigation measures	Technical feasibility	(Positive impact)				
	Effectiveness	(Positive impact)				
Residual impact		There is no residual impact after operation				

Note: A-: Significant negative impact; A+: Significant positive impact; B-: Some negative impact; B+: Some positive impact; D: No impacts or impacts are negligible

Source: EIA Study Team

In conclusion, it is evaluated that the impacts on poverty in operation phase would be well controlled and managed and would not cause any significant impacts on poverty.

5.2.2.2.3. Decommissioning, Closure, and Post-closure Phases

5.2.2.2.3.1. Potential Impact on Poverty

The following items are considered as a potential impact on poverty at closure, and post-closure phases.

- Impact to the poverty groups of the surrounding community by being fired from the project-related works
- Impact on the poverty groups of the surrounding community by demolition works on decommissioning, closure, and post-closure phases

5.2.2.2.3.2. Area of Influence

AOI of poverty is generally known as limited to the surrounding area of the project site.

- The AOI of poverty during demolition is in and around the project site (power plant, gas and water pipeline, intake facility, electricity distribution line).

5.2.2.2.3.3. Methodology

The impact on poverty in decommissioning, closure, and post-closure phases is identified qualitatively.

5.2.2.2.3.4. Identified Impact and Mitigation Measures

5.2.2.2.3.4.1. Impact on the Poverty Groups at the Surrounding Community by Demolition Works

On the decommissioning, closure, and post-closure phases, related job opportunities are basically disappeared. However, the temporary job opportunity of demolition work is expected. Accordingly, it is assumed that the Project would contribute for improvement of the regional economy. In addition, the poverty groups at the surrounding of the project area are able to enjoy such opportunity to improve their economic condition. The measures to mitigate impact on is shown below.

- The contractor of demolition work should prioritize to hire local people employed as the unskilled workers for operating the power plant.

5.2.2.2.3.5. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-45 and Table 5.2-46.

Table 5.2-45 Assessment of Poverty in Decommissioning Phase

Characteristics	Affected area	Project site (power plant, gas and water pipeline, Intake facility, electricity distribution line)				
	Duration/frequency	Post closure phase				
	Magnitude	A-	B-	D	B+	A+
		Employment related to operation of the power plant will be terminated when the power plant is closed. The poverty groups employed for the power plant operation will lose their income source.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is residual impact of poverty after decommissioning				

Note: A-: Significant negative impact A+: Significant positive impact
B-: Some negative impact B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

Table 5.2-46 Assessment of Poverty in Demolition Phase

Characteristics	Affected area	Project site (Power plant, Gas and water pipeline, Intake facility, Electricity distribution line)				
	Duration/frequency	Demolition phase				
	Magnitude	A-	B-	D	B+	A+
		The Project will bring a positive impact such as increasing job opportunities for the surrounding communities as the workers for demolition works.				
Mitigation measures	Technical feasibility	(Positive impact)				
	Effectiveness	(Positive impact)				
Residual impact		There is no residual impact after demolition				

Note: A-: Significant negative impact A+: Significant positive impact
B-: Some negative impact B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

In conclusion, it is evaluated that the closing the power plant would bring both negative and positive impacts. While employment on operation of the power plant will be terminated once its operation is closed, demolition of the power plant will create job opportunities at the surrounding areas.

5.2.2.3. Ethnic minorities and indigenous peoples

In general, ethnic minorities and indigenous peoples are regarded as vulnerable to the impacts associated with development activities, and project proponent should pay special considerations to those peoples. EPGE has investigated the presence of those peoples through the following efforts:

- ✓ Public consultation meetings held at 4 places for the villagers of all the 14 villages located in the AOI (See 8.3. in chapter 8 and appendix C),
- ✓ Interview survey for village leaders and villagers of Met Ka Ya village and E Bya village, located near the intake facility (See 4.4.1.1.1.2. in chapter 4),
- ✓ RAP survey for compensation of installation of gas/ water pipelines and power poles (See appendix H), and
- ✓ Interview survey for village leaders in Na Be Bin village, Taung Yin village and Shan Gan village, located near the power facility (See 4.4.1.1.1.3 in chapter 4).

As a result of the above efforts, 3 households considered as belonging to the minority groups lived by same lifestyle as majority households in the survey area of RAP. It is possible to consider that they have already assimilated into Burmese society. Thus, adverse impact on ethnic minorities and indigenous peoples is not assumed.

5.2.2.4. Local Economy (Employment)

5.2.2.4.1. Pre-construction and Construction Phases

5.2.2.4.1.1. Potential Impact on Local Economy (Employment)

The following item is considered as a potential impact on local economy at the pre-construction and construction phases.

- Positive impact on local economy (employment) by creating job opportunities on construction works at the construction phase, number of workers for the construction is assumed to be about 800.

5.2.2.4.1.2. Area of Influence

AOI of local economy (employment) is generally known as limited to the surrounding area of the project site.

- The AOI of local economy (employment) is around the project site.

5.2.2.4.1.3. Methodology

The impact on local economy (employment) at the construction and operation phases is identified qualitatively.

5.2.2.4.1.4. Identified Impact and Mitigation Measures

5.2.2.4.1.4.1. Impact on Local Economy (Employment) at by Construction Works

Project-related job opportunities are expected to be increased during the construction phase for the construction-related works. In addition, job opportunities at the surrounding area such as restaurants or glossary stores for construction workers are expected. Accordingly, it is assumed that the Project would contribute for improvement of the regional economy and would contribute a positive impact.

5.2.2.4.1.5. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-47.

Table 5.2-47 Assessment of Local Economy (Employment) in Construction Phase

Characteristics	Affected area	Project site (power plant, gas and water pipeline, intake facility, electricity distribution line) and surrounding areas				
	Duration/frequency	Construction phase				
	Magnitude	A-	B-	D	B+	A+
		Positive impact such as creating job opportunities related to the construction works around the project area is assumed.				
Mitigation measures	Technical feasibility	(Positive impact)				
	Effectiveness	(Positive impact)				
Residual impact		There is no residual impact after construction				

Note: A-: Significant negative impact A+: Significant positive impact
B-: Some negative impact B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

In conclusion, it is evaluated that the Project would contribute positive impact to the local economy at the surrounding areas during the construction phase.

5.2.2.4.2. Operation Phase

5.2.2.4.2.1. Potential Impact on Local Economy (Employment)

The following item is considered as a potential impact on local economy (employment) at the operation phase.

- Positive impact on local economy (employment) by creating job opportunities on operation works

5.2.2.4.2.2. Area of Influence

AOI of local economy (employment) is generally known as limited to the surrounding area of the project site.

- The AOI of local economy (employment) is around the project site.

5.2.2.4.2.3. Methodology

The impact on local economy (employment) at the operation phase is identified qualitatively.

5.2.2.4.2.4. Identified Impact and Mitigation Measures

5.2.2.4.2.4.1. Impact on the Local Economy (Employment) by Operation Works

Same as the construction phase, the Kyaukse CCPP will create job opportunities in the area related to operation of the power plant. In addition, it is also expected that existing local economy such as restaurants or glossary stores in the area will be flourished.

5.2.2.4.2.5. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-48.

Table 5.2-48 Assessment of Local Economy (Employment) in Operational Phase

Characteristics	Affected area	Surrounding area of the project site				
	Duration/frequency	Operational phase				
	Magnitude	A-	B-	D	B+	A+
		Positive impact such as creating job opportunities related to the operation works around the project area				
Mitigation measures	Technical feasibility	(Positive impact)				
	Effectiveness	(Positive impact)				
Residual impact		There is no residual impact after operation				

Note: A-: Significant negative impact; A+: Significant positive impact
B-: Some negative impact; B+: Some positive impact
D: No impacts or impacts are negligible

Source: EIA Study Team

In conclusion, it is evaluated that the Project would bring positive impact to local economy (employment) at the surrounding area during operation phase.

5.2.2.4.3. Decommissioning, Closure, and Post-closure Phases

5.2.2.4.3.1. Potential Impact on Local Economy (Employment)

The following item is considered as a potential impact on local economy (employment) at the decommissioning and closure phases.

- Impact on local economy by decommissioning and closure

5.2.2.4.3.2. Area of Influence

AOI of local economy (employment) is generally known as limited to the surrounding area of the project site.

- The AOI of local economy is around the project site.

5.2.2.4.3.3. Methodology

The impact on local economy (employment) at the decommissioning and closure phases is identified qualitatively.

5.2.2.4.3.4. Identified Impact and Mitigation Measures

5.2.2.4.3.4.1. Impact on the Local Economy by Decommissioning and Closure Phases

On the decommissioning, closure, and post-closure phases, related job opportunities are basically disappeared, however, the temporary job opportunity of demolition work is expected the same as the construction phase. Accordingly, possible impact to local economy is assumed as the same as the construction phase (i.e. increasing job opportunities on demolition works, flourishing restaurants as well as other shops at the surrounding areas). The measures to mitigate negative impact (i.e. disappearing jobs related to operation of the power plant) is shown below.

- The contractor of demolition work should prioritize to hire local people worked as the unskilled workers for operating the power plant as unskilled worker for demolition works

5.2.2.4.3.5. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-49.

Table 5.2-49 Assessment of Local Economy (Employment) in Decommissioning and Closure Phases

Characteristics	Affected area	Project site (power plant, gas and water pipeline, intake facility, electricity distribution line)				
	Duration/frequency	Post closure phase				
	Magnitude	A-	B-	D	B+	A+
		Employment related to operation of the power plant will be terminated when the power plant is closed. Meanwhile, job opportunities of demolition works are assumed though such job opportunities are limited only at the demolition work.				
Mitigation measures	Technical feasibility	-				
	Effectiveness	-				
Residual impact		There is residual impact of poverty after decommissioning.				

Note: A-: Significant negative impact A+: Significant positive impact
B-: Some negative impact B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

In conclusion, it is evaluated that employment on operation of the power plant will be terminated once the operation is closed whereby causing negative impact to the local economy (employment). However, temporally job opportunities on demolition works are assured to temporary contribute to the local economy (employment).

5.2.2.5. Local Economy (Livelihood)

5.2.2.5.1. Pre-construction and Construction Phases

5.2.2.5.1.1. Potential Impact on Local Economy (Livelihood)

The following items are considered as a potential impact on livelihood at the pre-construction and construction phases.

- Impact on livelihood of PAPs by permanent land acquisition at the pre-construction phase
- Impact on livelihood of PAPs by temporary occupation of land at the construction phase

5.2.2.5.1.2. Area of Influence

AOI of livelihood is generally known as limited to the project site.

- The AOI of livelihood is around the project site. (gas and water pipeline, intake facility, electricity distribution line)

5.2.2.5.1.3. Methodology

The impact on livelihood at the pre-construction and construction phases is identified qualitatively.

5.2.2.5.1.4. Identified Impact and Mitigation Measures

5.2.2.5.1.4.1. Impact on Livelihood of PAPs by Permanent Land Acquisition at the Pre-construction Phase and Temporary Occupation at the Construction Phase

As for pre-construction phase, land acquisition will be required for installing the water intake facility and electric poles for distribution line. The current land use of the candidate site for installing the water intake

facility is vacant area and it is public land. Therefore, it is considered that impact to poverty groups due to installing the water intake facility is negligible. As for installing electric pole, total of 11 areas will be necessary at a maximum. Approximately 1 m^2 per pole will be required and all necessary areas will be located in agricultural land. Although the necessary area will be located in agricultural land, possible impact to land-based income source is assumed as limited since the necessary area per plot is small.

During the construction phase, temporary occupation for installing water and gas pipelines in agricultural land will be required. The necessary duration for installing water and gas pipelines per plot is assumed as 1 week to 10 days or so. Thus, it is considered that impact to land-based income source would not be significant, though some extent of impact to income would occur. In addition, a kiosk operating within the ROW may be required to be relocated temporarily during the construction works. In that case, commercial activity is temporally disturbed, and it may not affect income significantly since installation work is limited period.

In order to minimize the adverse impact, construction works should be done after harvest as much as possible. In addition, sufficient compensation for loss of crops should be provided as explained in the section of involuntary resettlement. As necessary, livelihood restoration program such as providing job opportunities and vocational training should be planned based on the extent of possible impact and the condition of temporary land occupation. The measures to mitigate impact are shown below.

For owners of crops and trees located in the affected area:

- Provide sufficient compensation for crops and trees
- Provide prioritized job opportunity related to the construction works

For those who live in the surrounding areas

- The contractor should prioritize the local people on hiring unskilled worker

For a kiosk operating within the ROW

- Temporary relocation of a kiosk to the nearest available land and necessary cost for moving should be provided by the project proponents, or
- Allowance for temporal relocation for duration of the construction work in case a shop is not operated

5.2.2.5.1.5. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in the Table 5.2-50 and Table 5.2-51.

Table 5.2-50 Assessment of Local Economy (Livelihood) in Pre-construction Phase

Characteristics	Affected area	Project site (gas and water pipeline, intake facility, electricity distribution line)				
	Duration/frequency	Pre-construction phase				
	Magnitude	A-	**B-**	D	B+	A+
		There is a possibility that land-based income source would be affected due to land acquisition for installing electric poles. However, such impact is considered as limited since the area to be acquired is small (i.e. 1 m^2 per plot) and the remaining area can be still usable.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after pre-construction				

Note: A-: Significant negative impact A+: Significant positive impact
B-: Some negative impact B+: Some positive impact

D: No impacts or impacts are negligible
Source: EIA Study Team

Table 5.2-51 Assessment of Local Economy (Livelihood) in Construction Phase

Characteristics	Affected area	Project site (power plant, gas and water pipeline, intake facility, electricity distribution line)				
	Duration/frequency	Construction phase				
	Magnitude	A-	B-	D	B+	A+
		There is a possibility that income source (kiosk, farmland) will be affected due to temporary occupation for installation of the pipeline. On the other hand, positive impact such as creating job opportunities related to the construction works around the project area is assumed.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after construction				

Note: A-: Significant negative impact A+: Significant positive impact
B-: Some negative impact B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

In conclusion, it is evaluated that the impact on local economy (livelihood) during pre-construction and construction would be minimized by applying compensation policies stipulated in A-RAP in timely manner.

5.2.2.6. Land Use and Utilization of Local Resources

5.2.2.6.1. Pre-construction and Construction Phases

5.2.2.6.1.1. Potential Impact on Land Use and Utilization of Local Resources

Land acquisition will be needed for intake / discharge facility. Land use of the intake / discharge facility will be changed. The following items are considered as a potential impact on land use and utilization of local resources at the pre-construction and construction phases.

- Impact on land use for land to be acquired at the pre-construction phase
- Temporally limitation on farm land use during the construction works

5.2.2.6.1.2. Area of Influence

AOI of land use and utilization of local resources is generally known as limited to the project site.

- The AOI of land use and utilization of local resources is around the project site. (gas and water pipeline, intake facility, electricity distribution line)

5.2.2.6.1.3. Methodology

The impact on land use and utilization of local resources of the Project is identified qualitatively.

5.2.2.6.1.4. Identified Impact and Mitigation Measures

At the pre-construction phase, acquiring land for installing water intake facility and electric poles is necessary. Since land to be permanently acquired is currently vacant land (not land for agricultural use), impact on land use is not significant.

At the construction phase, land occupation for the work of installing water pipeline (and partially gas pipeline) will cause temporal limitation of land use. However, the construction period of each agricultural plot is considered as short period (e.g. a few days to 1 week). Thus, impact to land use during the construction phase is also considered as not significant.

The power plant occupied area belongs to Ministry of Electricity and Energy, therefore, impacts connected with land occupation in terms of restrictions on the land use are considered negligible during the pre-construction and construction phases.

The measures to mitigate impact on land use are listed below.

For permanent land acquisition:

- Compensation of the affected area in full replacement cost

For temporary occupation:

- Compensation of trees and crops of 3 times the value calculated based on the current market price

5.2.2.6.1.5. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-52.

Table 5.2-52 Assessment of Land Use and Utilization of Local Resources during Pre-construction and Construction Phases

<table>
<tr><td rowspan="4">Characteristics</td><td>Affected area</td><td colspan="5">Project site and along the water and gas pipeline</td></tr>
<tr><td>Duration/frequency</td><td colspan="5">During pre-construction and construction phase/Constant</td></tr>
<tr><td rowspan="2">Magnitude</td><td>A-</td><td>B-</td><td>D</td><td>B+</td><td>A+</td></tr>
<tr><td colspan="5">Current land use for land to be acquired permanently is vacant land or agricultural land. As for permanent land acquisition in agricultural land, acquired land is very small (i.e. 1 m^2 per plot) and the remaining area can be usable. Although land acquisition is inevitable, its impact is considered as not adverse. As for temporary land occupation in the construction works, temporally disturbance of land use is assumed at some extent but very limited.</td></tr>
<tr><td rowspan="2">Mitigation measures</td><td>Technical feasibility</td><td colspan="5">Feasible</td></tr>
<tr><td>Effectiveness</td><td colspan="5">Effective</td></tr>
<tr><td colspan="2">Residual impact</td><td colspan="5">There is no residual impact after construction.</td></tr>
</table>

Note: A-: Significant negative impact; A+: Significant positive impact
B-: Some negative impact; B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

In conclusion, it is evaluated that land use and utilization of local resources during pre-construction and construction would be minimized by providing sufficient compensation stipulated in A-RAP in timely manner.

5.2.2.7. Water Usage

5.2.2.7.1. Pre-construction and Construction Phases

5.2.2.7.1.1. Potential Impact on Water Usage

The item examined to forecast the impacts were as follows.

- Impact on water usage caused by the project development during construction phase.
- Impact on water usage caused by water pollution (muddy water) derived from the construction of the intake facility in Myitnge River.

5.2.2.7.1.2. Area of Influence

AOI of water use was set in and around the project site.

- The AOI of water use is in and around the project site (i.e. communities located at the surround areas and near the intake facility in the Myitnge River).

5.2.2.7.1.3. Methodology

Qualitative method of impact analysis based on the result of water quality analysis.

5.2.2.7.1.4. Identified Impact and Mitigation Measures

During construction phase, water for construction would be secured adequately using transported water or underground water by contractor. Existing local water resources such as Myitnge River or Sun Ye Lake would not be used as water resource for construction work. Besides, volume of construction water usage is limited (e.g. washing construction machines or sprinkling water to construction site and road). Therefore, the potential impact on water usage in power plant site will be negligible. On the other hand, the muddy water due to intake construction will be generated temporally during construction and demolition of the cofferdam.

The muddy water from construction activities is the key concern during intake construction. However, there are mitigation measures of reducing the impact of muddy water as follows. These measures are feasibly conducted by contractor.

- Installation of the steel structured cofferdam (Steel sheet pile)
- Using silt barrier around coffer dam
- Using temporary sedimentation tank for pumped up water in the working area

5.2.2.7.1.5. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-53.

Table 5.2-53 Assessment of Water Usage in Construction Phase

Characteristics	Affected area	Project site				
	Duration/frequency	Construction phase				
	Magnitude	A-	B-	D	B+	A+
		Water for construction would be secured adequately from transported water and underground water inside the construction site, and necessary volume to be used for construction works is limited. Thus, impact to use of underground is not assumed. However, there is a possibility that muddy water from the work on water intake facility would impact water use at downstream. The impact to the water usage in Myitnge River is considered small according to the forecast result of water quality.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after construction				

Note: A-: Significant negative impact A+: Significant positive impact
B-: Some negative impact B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

In conclusion, it is evaluated that water usage during construction would be well controlled and managed and would not cause any significant impacts on water usage.

5.2.2.7.2. Operation Phase

5.2.2.7.2.1. Potential impact on water usage

The item examined to forecast the impact was as follows.

- Impact on water use caused by the project development in operation phase

5.2.2.7.2.2. Area of Influence

AOI of water use was set in and around the project site.

- The AOI of water use is in and around the project site. (i.e. communities located at the surrounding areas)

5.2.2.7.2.3. Methodology

Qualitative method of impact analysis based on the result of water quality analysis.

5.2.2.7.2.4. Identified Impact and Mitigation Measures

The Project requires the water mainly for steam turbine. Myitnge River, which flows 11 km north of the project site is planned as a water source. The river has enough flow discharge for water usage for the Project and the river water is available throughout the year stably. Other than this, there is no available water source near the site. The water transportation route is planned mainly along the existing irrigation canal and road, and water pipeline will be laid underground. Intake and discharge station will be installed at the river.

The water used for the Project will be taken from Myitnge River, the total amount of daily intake will be about 1,600 m^3/day. The waste water will be treated in the project site and discharged to Myitnge River.

The total amount of daily discharge will be about 1,200 m^3/day. Intake and discharge operation will be conducted around 8 hours in a day. Besides, amount of consumption will be controlled without causing impact on local water usage. In addition, the impact to the water quality in Myitnge River is negligible because of installation of waste water treatment facility.

The measure to mitigate impact on water use is listed below.

- Installing the waste water treatment facilities and appropriate operation and maintenance

5.2.2.7.2.5. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-54.

Table 5.2-54 Assessment of Water Usage in Operation Phase

Characteristics	Affected area	Project site				
	Duration/frequency	Operation phase				
	Magnitude	A-	B-	D	B+	A+
		Amount of water consumption will be controlled without causing impact on local water usage. The impact to the water quality in Myitnge River is negligible.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after operation				

Note: A-: Significant negative impact; A+: Significant positive impact; B-: Some negative impact; B+: Some positive impact; D: No impacts or impacts are negligible

Source: EIA Study Team

In conclusion, it is evaluated that water usage during operation would be well controlled and managed and would not cause any significant impacts on water usage.

5.2.2.7.3. Decommissioning, Closure, and Post-closure Phases

5.2.2.7.3.1. Potential Impact on Water Usage

The item examined to forecast the impact was as follows.

- Impact on water usage caused by the project development in decommissioning phase.
- Impact on water usage caused by water pollution (muddy water) derived from the demolition of the intake facility in Myitnge River.

5.2.2.7.3.2. Area of Influence

The area examined to forecast the impact was set in and around the project area.

- The AOI of water use is in and around the project site. (i.e. communities located at the surrounding area and near the intake facility in the Myitnge River)

5.2.2.7.3.3. Methodology

Qualitative method of impact analysis based on the result of water quality analysis.

5.2.2.7.3.4. Identified Impact and Mitigation Measures

During decommissioning phase, spraying water to reduce the dust would be secured adequately using transported water or underground water by contractor. Existing local water resources such as Myitnge River or Sun Ye Lake would not be used as water resource for demolition works. Besides, volume of demolition water usage is limited (e.g. washing construction machines or sprinkling water to demolition site and road). Therefore, the potential impact on water usage in power plant site will be quite small. On the other hand, the muddy water due to demolition of intake will be generated temporally during construction and demolition of the cofferdam.

The muddy water from construction activities is the key concern during intake demolition. However, there are mitigation measures of reducing the impact of muddy water as follows. These measures are feasibly conducted by contractor.

- Installation of the steel structured cofferdam (Steel sheet pile)
- Using silt barrier around coffer dam
- Using temporary sedimentation tank for pumped up water in the working area

5.2.2.7.3.5. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-55.

Table 5.2-55 Assessment of Water Usage in Decommissioning, Closure, and Post-closure Phases

Characteristics	Affected area	Project site				
	Duration/frequency	Demolition				
	Magnitude	A-	B-	D	B+	A+
		Water for demolition would be secured adequately from transported water and/or underground water inside the construction site, and necessary volume to be used for construction works is limited. Thus, impact to use of underground is not assumed. However, there is a possibility that muddy water from the work on water intake facility would impact water use at downstream. The impact to the water usage in Myitnge River is considered small according to the forecast result of water quality.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after construction.				

Note: A-: Significant negative impact; A+: Significant positive impact
B-: Some negative impact; B+: Some positive impact
D: No impacts or impacts are negligible

Source: EIA Study Team

In conclusion, it is evaluated that water usage in decommissioning, closure, and post-closure phases would be well controlled and managed and would not cause any significant impacts on water usage.

5.2.2.8. Existing Social Infrastructure and Service

5.2.2.8.1. Pre-construction and Construction Phases

5.2.2.8.1.1. Potential Impact on Existing Social Infrastructure and Service

The following items are considered as a potential impact on existing social infrastructure and service at the construction phase.

- Impact to transportation of local residents due to traffic congestion by construction vehicles
- Impact to access to social infrastructure such as pagoda during the construction works

5.2.2.8.1.2. Area of Influence

AOI of existing social infrastructure is generally known as limited to the project site.

- The AOI of existing social infrastructure and service is around the project site.

5.2.2.8.1.3. Methodology

The impact on existing social infrastructure and service at the construction phase is identified qualitatively.

5.2.2.8.1.4. Identified Impact and Mitigation Measures

Construction activities which may cause impact on existing social infrastructure and services at the construction phase will be transportation of goods and materials that may disturb local traffic and access to social infrastructure and services.

Due to the above limitation, temporally traffic congestion and limitation of access to social infrastructure (e.g. school and pagoda) in the project area are anticipated, though it is temporal only during the construction period.

Identified possible impacts are mitigated by applying the following measures during the construction phase. These measures are feasibly conducted by contractor.

- Applying steel sheet piles in order to narrow construction width in the rural road for pipe installation
- Arranging pedestrian way to secure accessibility to social infrastructure as necessary
- Informing contents of construction works and work schedule to the surrounding communities in advance
- Setting up sign board on the road to show the construction term and location

5.2.2.8.1.5. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-56.

Table 5.2-56 Assessment of Existing Social Infrastructure and Service in Construction Phase

Characteristics	Affected area	Project site				
	Duration/frequency	Construction phase				
	Magnitude	A-	B-	D	B+	A+
		Temporally access limitation to social infrastructure and temporally traffic congestion due to construction works and increase of construction vehicles.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after construction.				

Note: A-: Significant negative impact A+: Significant positive impact
B-: Some negative impact B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

In conclusion, it is evaluated that social infrastructure and service in construction phase would be well controlled and managed and would not cause any significant impacts on social infrastructure and service.

5.2.2.8.2. Operation Phase

The following item is considered as a potential impact on existing social infrastructure and service at the operation phase.

- Impact on school activity due to noise from the power plant

5.2.2.8.2.1. Area of Influence

AOI of social infrastructure and service is generally known as limited to the surrounding of the project site.

- The AOI of existing social infrastructure and service is around the project site.

5.2.2.8.2.2. Methodology

The impact on existing social infrastructure and service at the operation phase is identified qualitatively.

5.2.2.8.2.3. Identified Impact and Mitigation Measures

As explained in Section 5.2.1.5.2.4, level of noise to be generated from the power plant is estimated to be below the target value. The impact of noise is considered as small based on the forecast result.

Identified possible impacts will be mitigated by applying the following measure which should be initially taken at the time of project design and construction phases. The measure is possible to be conducted by the project proponent.

- Installation of soundproof package for gas and steam turbine

5.2.2.8.2.4. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-57.

Table 5.2-57 Assessment of Existing Social Infrastructure and Service in Operation Phase

Characteristics	Affected area	Project site				
	Duration/frequency	Operation phase				
	Magnitude	A-	B-	D	B+	A+
		The potential impact on school activity due to noise from power plant is expected. The actual impact is small because the noise level in primary school is below target value of noise according to the forecast result. In addition, the mitigation of the impact is possible.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after construction.				

Note: A-: Significant negative impact; A+: Significant positive impact; B-: Some negative impact; B+: Some positive impact; D: No impacts or impacts are negligible

Source: EIA Study Team

In conclusion, it is evaluated that social infrastructure and service in operation phase would be well controlled and managed and would not cause any significant impacts on social infrastructure and service.

For impact assessment on cultural heritage and landscape, these are described in Sections 5.2.2.14 and 5.2.4.

5.2.2.9. Gender

5.2.2.9.1. Pre-construction and construction phases

5.2.2.9.1.1. Potential impact on gender

The following item is considered as a potential impact on gender during construction phase.

- The discrimination of gender on job opportunity during construction phase

5.2.2.9.1.2. Area of Influence

The area examined to forecast the impact was set in and around the project area.

5.2.2.9.1.3. Methodology

The impact on gender during construction is identified qualitatively.

5.2.2.9.1.4. Identified Impact and Mitigation Measures

From the interview survey in E Bya Village located around the project area, most of the casual workers in the villages are not significantly difference between male and female adults. In terms of employment opportunities, it is assumed that there is no gender discrimination around the project site at the moment. However, there will be a possibility of discrimination on gender for new job opportunity of construction of the project facilities because the contractor will come from outside of the project area and the type of work will be different from existing job. The measure to mitigate impact on gender is presented below.

- The contractor should provide job opportunity to all local people without discrimination

of gender

5.2.2.9.1.5. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-58.

Table 5.2-58 Assessment of Gender in Construction Phase

Characteristics	Affected area	Project site (power plant, gas and water pipeline, intake facility, electricity distribution line)				
	Duration/frequency	Construction phase				
	Magnitude	A-	B-	D	B+	A+
		Current situation around the project area, the job opportunity is not discriminated. However, there is a possibility of discrimination for new job opportunity of construction for the project facilities. The contractor should provide new job opportunity without discrimination of gender. As a result of this, impact on gender discrimination for job opportunity will be mitigated.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after pre-construction				

Note: A-: Significant negative impact A+: Significant positive impact
B-: Some negative impact B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

In conclusion, it is assumed that there is a potential impact of gender discrimination in construction phase, and the mitigation measure can be executed by contractor. The impact would be managed and would not cause any significant impacts on gender discrimination of job opportunity.

5.2.2.9.2. Operation Phase

5.2.2.9.2.1. Potential impact on gender

The following item is considered as a potential impact on gender during operational phase.

- The discrimination of gender on job opportunity during operational phase

5.2.2.9.2.2. Area of Influence

The area examined to forecast the impact was set in and around the project area.

5.2.2.9.2.3. Methodology

The impact on gender during operational phase is identified qualitatively.

5.2.2.9.2.4. Identified Impact and Mitigation Measures

There is possibility of discrimination on gender for new job opportunity during operational phase in new plant because the kind of the work will be different from existing job. The measure to mitigate impact on gender is presented below.

- EPGE provides equal job opportunity according to the government policy.

5.2.2.9.2.5. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-59.

Table 5.2-59 Assessment of Gender in Operation Phase

Characteristics	Affected area	Project site				
	Duration/frequency	Operation phase				
	Magnitude	A-	B-	D	B+	A+
		There is a possibility of discrimination for job opportunity of new power plant. The project proponent provides equal job opportunity according to the government policy. Thus, impact on gender discrimination for job opportunity will be mitigated during operational phase.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after pre-construction				

Note: A-: Significant negative impact A+: Significant positive impact
B-: Some negative impact B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

In conclusion, it is assumed that there is a potential impact of gender discrimination in operation phase, however, the mitigation measure can be executed by the project proponent. The impact would be managed and would not cause any significant impacts on gender discrimination of job opportunity.

5.2.2.9.3. Decommissioning, Closure, and Post-closure Phases

5.2.2.9.3.1. Potential Impact on Gender

The following item is considered as a potential impact on gender in decommissioning phase.

- The discrimination of gender on job opportunity demolition

5.2.2.9.3.2. Area of Influence

The area examined to forecast the impact was set in and around the project area.

5.2.2.9.3.3. Methodology

The impact on gender during demolition is identified qualitatively.

5.2.2.9.3.4. Identified Impact and Mitigation Measures

From the interview survey in E Bya Village located around the project area, most of the casual workers in the villages are not significantly difference between male and female adults. In terms of employment opportunities, it is possible to consider there is no gender discrimination around the project site so far. However, there will be a possibility of discrimination on gender for new job opportunity of construction of the project facilities because the contractor will come from outside of the project area and the type of work will be different from existing job. The measure to mitigate impact on gender is presented below.

- The contractor should provide job opportunity to all local people without discrimination

of gender

5.2.2.9.3.5. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-60.

Table 5.2-60 Assessment of Gender in Decommissioning Phase

Characteristics	Affected area	Project site (power plant, gas and water pipeline, intake facility, electricity distribution line)				
	Duration/frequency	Demolition				
	Magnitude	A-	B-	D	B+	A+
		Current situation around the project area, the job opportunity is not discriminated. However, there is a possibility of discrimination for new job opportunity of demolition of the project facilities. The contractor should provide new job opportunity without discrimination of gender. As a result of this, impact on gender discrimination for job opportunity will be mitigated.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after pre-construction				

Note: A-: Significant negative impact A+: Significant positive impact
B-: Some negative impact B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

In conclusion, it is assumed that there is a potential impact of gender discrimination during decommissioning, however, the mitigation measure will be executed by contractor. The impact would be managed and would not cause any significant impacts on gender discrimination of job opportunity.

5.2.2.10. Children's Rights

5.2.2.10.1. Pre-construction and Construction Phases

The following item is considered as a potential impact on children's rights at the construction phase.

- Impact on increase of child labor.

5.2.2.10.1.1. Area of Influence

AOI of the children's rights are generally known as limited to in and around the project site.

- The AOI of children's rights are in and around the project site.

5.2.2.10.1.2. Methodology

The impact on the children's rights at the construction phase is identified qualitatively.

5.2.2.10.1.3. Identified Impact and Mitigation Measures

According to information from ILO[1], 9.3% of child population in Myanmar work as child labor. Under the situation that Myanmar currently faces, there is a possibility that the Project related construction works may cause child labor in the area.

Identified possible impact is mitigated by applying the following measure during the construction phase. The measure is feasibly conducted by contractor.

- Including prohibition of the child employment into the tender condition

5.2.2.10.1.4. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-61.

Table 5.2-61 Assessment of Children's Rights in Construction Phase

Characteristics	Affected area	Project site				
	Duration/frequency	Construction phase				
	Magnitude	A-	B-	D	B+	A+
		There is a possibility that children are hired as a work force since surrounding communities would expect the project-related job opportunities. The impact is mitigated by prohibition of the child employment in the tender condition.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after construction.				

Note: A-: Significant negative impact; A+: Significant positive impact
B-: Some negative impact; B+: Some positive impact
D: No impacts or impacts are negligible

Source: EIA Study Team

[1] https://www.ilo.org/yangon/areas/childlabour/lang--en/index.htm (as of 2 April 2019)

In conclusion, it is evaluated that a risk of the child labor would be minimized as long as EPGE applies the domestic regulations on child labor and conduct monitoring the situation periodically and would be controlled and managed.

5.2.2.10.2. Operation Phase

The following item is considered as a potential impact on children's rights at the operation phase.

- ➢ Impact on increase of child labor.

5.2.2.10.2.1. Area of Influence

AOI of the children's rights are generally known as limited to around the project site.

- ➢ The AOI of the children's rights are around the project site.

5.2.2.10.2.2. Methodology

The impact on the children's rights at the operation phase are identified qualitatively.

5.2.2.10.2.3. Identified Impact and Mitigation Measures

Once operation and maintenance of the power plant is started, job opportunities related to the power plant will be provided to the surrounding area, though types of jobs are limited. In this case, there is a possibility that children can access to those job opportunities.

There are several domestic regulations on child labor in Myanmar such as the Shops and Establishments Act 1951 or the Factory Act 1951. Both regulations prohibit child labor below 13 years old, though the Factories Act 1951 allows employment of child from the age of 13 years with the condition of granting a certificate of fitness.

In addition to apply the domestic regulations strictly, identified possible impact is mitigated by applying the following measure during the operation phase. The measure is feasibly conducted by EPGE though enhancing understanding of the child employment.

- ➢ Prohibiting the child employment regardless of the type of works

5.2.2.10.2.4. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-62.

Table 5.2-62 Assessment of Children's Rights in Operation Phase

Characteristics	Affected area	Project site				
	Duration/frequency	Operation phase				
	Magnitude	A-	B-	D	B+	A+
		There is a possibility that children are hired as a work force. However, such risk is able to be minimized as long as EPGE applies the domestic regulations on the child labor.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after construction.				

Note: A-: Significant negative impact A+: Significant positive impact
B-: Some negative impact B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

5.2.2.10.3. Decommissioning, Closure, and Post-closure Phases

The following item is considered as a potential impact on the children's rights at the decommissioning phase since demolishing the power plant facilities may be occurred in this phase.

- Impact on the Project on increase of child labor.

5.2.2.10.3.1. Area of Influence

AOI of children's rights are generally known as limited to in and around the project site.

- The AOI of children's rights are in and around the project site.

5.2.2.10.3.2. Methodology

The impact on the children's rights at the closure phase are identified qualitatively.

5.2.2.10.3.3. Identified Impact and Mitigation Measures

Same as the construction phase, there is a possibility of the child labor in this phase since demolition works related to demolishing the power plant facilities may be occurred.

Identified possible impact is mitigated by applying the following measure during the decommissioning phase. The measure is feasibly conducted by contractor of the demolishing works.

- Stipulating the term/condition to prohibit the child employment into the tender/contract documents

5.2.2.10.3.4. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-63.

Table 5.2-63 Assessment of Children's Rights on Decommissioning

Characteristics	Affected area	Project site				
	Duration/frequency	Demolishing phase				
	Magnitude	A-	B-	D	B+	A+
		There is a possibility that children are hired as a work force since surrounding communities would expect the Project to be hired as a worker. The impact is mitigated by prohibition of the child employment in the tender/contract condition.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after construction.				

Note: A-: Significant negative impact A+: Significant positive impact
B-: Some negative impact B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

In conclusion, it is evaluated that a risk of the child labor would be minimized as long as EPGE applies the domestic regulations on the child labor and conduct monitoring the situation periodically and would be controlled and managed.

5.2.2.11. Health (Community Health, Infectious Disease and HIV/AIDS)

5.2.2.11.1. Pre-construction and Construction phases

5.2.2.11.1.1. Potential Impact on Infectious Disease and HIV/AIDS

The following item was examined to forecast the impact:

- Impact on the risks for infectious diseases which might occur during the construction phases.

5.2.2.11.1.2. Area of Influence

AOI of infectious disease and HIV/AIDS generally is known as in and around the project site.

- The AOI of infectious disease and HIV/AIDS is around the project site.

5.2.2.11.1.3. Methodology

Qualitative method of impact analysis was used for infectious disease and HIV/AIDS during construction of power plant.

5.2.2.11.1.4. Identified Impact and Mitigation Measures

The Project will seek to maximize the employment of local people, thereby reducing the size of the external workforce in the construction site if accommodation will be arranged. However, an external workforce will be required.

From experience of large infrastructure in Myanmar, the Project has a possibility of increasing incidences from illegal activities or antisocial behaviors such as prostitution, casual sexual relations and increasing levels of substance abuse because of the increased disposable income within the local workforce. Abuse of alcohol (and drugs, should this occur) often correlates with increased levels of criminal behavior and violence (e.g. domestic violence). Such behavior increases the number of people indirectly affected by, or vulnerable to, alcohol and drug abuse; and casual sexual relations could lead to an increased incidence of HIV/AIDS.

According to the statistical data of Sintgaing Township (source: Township Profile, Sintgaing, 2018), the major diseases are common diseases (epidemic-prone) such as diarrhea, and only relatively small number of people has suffered from communicable diseases such as tuberculosis and malaria. There is an insufficient data about the HIV/AIDS in township profile.

However, the risk of infectious disease is expected to increase due to the influx of labors from outside for the construction and demolition phase. Since communicable and vector-borne disease such as HIV/AIDS and dengue is considered as one of the most concerned matter to be controlled, the appropriate mitigation measure and countermeasure, monitoring should be taken by the contractor during construction period. Especially, the mitigation measure stipulated in international guidelines such as EHS Guidelines by IFC should be taken.

In addition, it is expected that sanitation issues would become cause of prevalence of disease. Sanitation issues such as hygiene, health and environmental sanitation in and around labor camps and construction areas would be occurred in the case where sanitary facility is not adequately installed such as toilet and septic tank. Sanitation issues would cause infectious disease.

Identified possible impact is mitigated by applying the following measure during the construction phase. The measure is to be conducted by contractor.

- Appropriate mitigation measure and countermeasure, monitoring should be taken by the construction contractor (e.g. Educate workers and the surrounding communities on risks, prevention and available treatment on infectious disease)

5.2.2.11.1.5. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-64.

Table 5.2-64 Assessment of Infectious Disease and HIV/AIDS in Construction Phase

Characteristics	Affected area	Project site and surrounding communities				
	Duration/frequency	Construction phase				
	Magnitude	A-	B-	D	B+	A+
		Influx of outside construction workers in the project area at the construction phase will increase risk of infectious disease such as HIV/AIDS though such risk is able to be minimized by providing sufficient education and information to construction workers and the surrounding communities.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after construction.				

Note: A-: Significant negative impact; A+: Significant positive impact
B-: Some negative impact; B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

In conclusion, it is evaluated that a risk of infectious disease and HIV/AIDS during construction would be minimizing by providing sufficient awareness activities for the Project related workers and surrounding communities.

5.2.2.11.2. Operation Phase

5.2.2.11.2.1. Potential Impact on Community Health

The following item was examined to forecast the impact.

- Impact to the community health due to flue gas and effluent discharge which might occur during the operation phase.

5.2.2.11.2.2. Area of Influence

AOI of community health is same as the AOI of air quality and water quality as follows:

- The AOI of air pollutant from the stack of the proposed gas turbine can be defined as 2 km radius from the stack in the project site.
- The AOI of water quality is 100 m downstream of the intake facility.

5.2.2.11.2.3. Methodology

Qualitative method of impact analysis was applied for assessing impacts on community health.

5.2.2.11.2.4. Identified Impact and Mitigation Measures

5.2.2.11.2.4.1. Baseline of Health Status

Table 5.2-65 shows the health status of Sintgaing Township in 2018, and the Table 5.2-66 shows the health status of village groups, which are located around project area. The major disease in both township and village is infections. The most common disease around the project site is diarrhea. In general, the causes of diarrhea are follows.

- Internal factor

  Malabsorption syndrome

  Structural gastrointestinal disease

  Functional gastrointestinal disease

- External factor

  Food poisoning (food poisoning is usually caused by infectious bacteria or other organisms)

  Alcohol abuse

Table 5.2-65 Health Condition of Sintgaing Township

Total Population	Major Disease (person)			
	Diarrhea	TB(Tuberculosis)	Dysentery	ARI (Acute Respiratory Infections)
134,904	614	30	113	58

Source: Township Profile (2018), Sintgaing Township General Administration Department

Table 5.2-66 Health Condition of Village Groups (previous 6 months)

Village group	Major Disease (person)			
	Diarrhea	TB (Tuberculosis)	Dysentery	ARI (Acute Respiratory Infections)
E Bya, Met Ka Ya	15	0	1	0
Mont Paung, Ohn Pin Chan	0	0	0	0
Pin Char, Taw Ma	5	0	0	0
Be Lin, Ban Da, Taung U, Min Ye, Kyauk Mine, Taung Yin, Na Be Bin	2	13	0	0
Shan Gan	1	3	3	0

Source: Sintgaing Township General Administration Department (October 2019)

5.2.2.11.2.4.2. Impact on Community Health

It is assumed that the health impact will be caused by the emitted materials or substances from the Project. The major emitted materials are flue gas and effluent from the Project. The assumed health impacts are shown in the following table.

Table 5.2-67 Assumed Health Impact

Assumed Health impact	Remark
Respiratory disease (e.g. Bronchitis)	The flue gas contains nitrogen oxides, and the high concentrated nitrogen oxides may cause respiratory disease. However, considering those pollutants in ambient air levels are lower than the guideline values of WHO and IFC, and forecast result of air quality, the emitted gas is unlikely to cause adverse health impact in the AOI.
Digestive disease (Orally infected via a discharged water)	Even after the wastewater treatment, the effluent from the project facility may contain some amount of the biological infectious sources, therefore, there is a possibility to increase pathogenic bacteria and virus. For this issue, the disinfection process (e.g. chlorination) would be usually applied on waste water treatment.

Source: EIA Study Team

Identified possible impacts can be mitigated by applying the following measures during the operational phase. The measures are to be conducted by the project component.

- Applying high height stack to promote dispersion of air pollutant
- Narrowing the outlet of the stack to avoid the appearance of stack downwash
- Installation of low nitrogen dioxide type of gas turbine
- Installation of wastewater treatment and proper operation of treatment facility
- Installation of disinfection process (e.g. chlorination process) to the wastewater treatment facility

5.2.2.11.2.5. Assessment of Impact

Assessment of the impact was conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-68.

Table 5.2-68 Assessment of Infectious Community Health in Operation Phase

Characteristics	Affected area	Project site and surrounding communities				
	Duration/frequency	Operation phase				
	Magnitude	A-	B-	D	B+	A+
		Impacts to the community health are expected due to flue gas and effluent discharge, which might occur during the operation phases. These impacts are possibly be minimized by installing appropriate stack and water treatment facilities. As a result, the forecasted air and water quality will be below the target value, which is determined by international standard.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after operation.				

Note: A-: Significant negative impact A+: Significant positive impact
B-: Some negative impact B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

In conclusion, it is evaluated that a risk of community health would be minimizing by applying the appropriate mitigation measure during the operational phase. The measure is to be conducted by the project proponents.

5.2.2.11.3. Decommissioning, Closure, and Post-closure Phases

5.2.2.11.3.1. Potential Impact on Infectious Disease and HIV/AIDS

The following item was examined to forecast the impact.

- Impact on the risks for infectious diseases which might occur during the decommissioning phase..

5.2.2.11.3.2. Area of Influence

The area examined to forecast the impact was set in and around the project area.

5.2.2.11.3.3. Methodology

Qualitative method of impact analysis was used for infectious disease and HIV/AIDS during the decommission phase.

5.2.2.11.3.4. Identified Impact and Mitigation Measures

During the decommissioning phase, there will be limited employment opportunities and the external construction workforce will likely leave the area.

Identified possible impact is mitigated by applying the following measure during the decommissioning phase. The measure is to be conducted by contractor of decommissioning works.

- Appropriate mitigation measure and countermeasure, monitoring should be taken by the construction contractor (e.g. Educate workers and the surrounding communities on risks, prevention and available treatment on infectious disease)

5.2.2.11.3.5. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-69.

Table 5.2-69 Assessment of Infectious Disease and HIV/AIDS in Decommissioning, Closure, and Post-closure Phases

Characteristics	Affected area	Project Site				
	Duration/frequency	Decommissioning and post - closure				
	Magnitude	A-	B-	D	B+	A+
		Influx of non-native construction workers in the project area at the period of demolition work will increase risk of infectious disease such as HIV/AIDS, though such risk is able to be minimized by providing sufficient education and information to construction workers and the surrounding communities.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after construction.				

Note: A-: Significant negative impact A+: Significant positive impact
B-: Some negative impact B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

In conclusion, it is evaluated that infectious disease and HIV/AIDS on decommissioning, closure, and post-closure would be well controlled and managed and would not cause any significant impacts on water usage.

5.2.2.12. Occupational Health and Safety

5.2.2.12.1. Pre-construction and Construction Phases

5.2.2.12.1.1. Potential Impact on Occupational Health and Safety

The following item was examined to forecast the impact.

- Impact on the occupational health and safety which might occur during the construction of the Project.

5.2.2.12.1.2. Area of Influence

The area examined to forecast the impact was set in and around the project area.

5.2.2.12.1.3. Methodology

Qualitative method of impact analysis was used for occupational health and safety during the construction phase.

5.2.2.12.1.4. Identified Impact and Mitigation Measures

During construction, there would be possibilities of incident and accident caused by the following construction activities.

The construction activities will involve the following main activities (in order of occurrence):

- Site preparation including levelling
- Piling of the foundations
- Concrete works in scope of building construction
- Construction of fuel supply arrangements
- Construction of the water pipeline.

To prevent accidents and incidents, the project proponent regulates to install security and maintain safety prevention measures and personnel protective equipment suitable for workers. Therefore, the working condition during the construction should be managed by construction contractor based on the international guidelines such as EHS Guidelines by IFC. Especially when it is hot, countermeasures toward intense heat should be well conducted, by the construction contractor, while the project proponent will continuously give announcement to the contractor for the prevention of heat stroke.

The operation of heavy equipment and trucks, working at height, working in confined spaces, construction traffic, use of electric devices, handling of hazardous materials and other hazardous activities will be conducted during construction. Worker health and safety is a key risk with the potential for accidents that may result in injuries and fatalities as well as lost man-hours due to the nature of those activities. Potential accidents are falling from height, falling into water, entanglement with machinery, asphyxiation, explosion, eye damage during welding works and others.

The impact on worker health and safety from the Project will be a direct, negative impact. The duration will be short-term, for the duration of the construction phase.

In Myanmar, Occupational Safety and Health Law (2019) stipulates the employers' responsibilities to improve productivity and health of workers by providing necessary safety measures such as protective gears and medical facilities and by prescribing precautionary measure.

Although minor negative impacts on occupational health and safety are inevitable during construction, such impacts are to be minimized by applying the following measures:

- Providing OHS training program and information of safe work practice and emergency procedure

- Providing adequate health care facilities and first aid within the construction site

Comply with occupational health and safety guidelines presented in Section 2.0 of the General EHS Guideline published by IFC.

5.2.2.12.1.5. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-70.

Table 5.2-70 Assessment of Occupational Health and Safety in Construction Phase

Characteristics	Affected area	Project Site				
	Duration/frequency	Construction Phase				
	Magnitude	A-	B-	D	B+	A+
		Due to increase of transportation related to construction works and operation of heavy machine, there is a risk of occupational health and safety at some extent. However, such risk will be minimized by preparing sufficient management plan and providing education, protective equipment and necessary information on heat attack to workers.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after construction.				

Note: A-: Significant negative impact; A+: Significant positive impact
B-: Some negative impact; B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

In conclusion, it is evaluated that a risk of occupational health and safety during the construction phase would be minimized by preparing sufficient management plan and providing education to workers. With this mitigation measures, a risk of occupational health and safety during the operation phase will be controlled and managed, and would not cause any significant impacts.

5.2.2.12.2. Operation Phase

5.2.2.12.2.1. Potential Impact on Occupational Health and Safety

The following item was examined to forecast the impact.

- Impact on occupational health and safety which might occur during the operation phase of the Project.

5.2.2.12.2.2. Area of Influence

The area examined to forecast the impact was set in and around the project area.

5.2.2.12.2.3. Methodology

Qualitative method of impact analysis was used for occupational health and safety during operation of power plant.

5.2.2.12.2.4. Identified Impact and Mitigation Measures

During operation of the power plant, operation and regular maintenance activities will include but not be limited to; the operation of heavy equipment and trucks, use of electrical devices including high voltage, working at height, maintenance of high-pressure pipework and vessels and handling of hazardous materials. During these activities the workers will be at risk for accidents and injury. Therefore, there are possibility of accidents similar to the construction phase. In addition, accidents caused by non-ionizing radiation, high heat, combustion noise, electrical hazards, fire and explosion, and chemical hazards.

The impact on workers' health and safety as a result of the operation of the power plant will be negative impact. The implementation of mitigation measures, which is shown below should be executed throughout the operation phase with consideration in the health and safety management system of the specific risks associated with operation and maintenance activities.

- Providing OHS training program and information of safe work practice and emergency procedure
- Providing adequate health care facilities and first aid within the power plant site
- Comply with the occupational health and safety guidelines presented in relevant international guidelines, in particular, those refer to combined cycle power plants.

5.2.2.12.2.5. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-71.

Table 5.2-71 Assessment of Occupational Health and Safety in Operation Phase

Characteristics	Affected area	Project site				
	Duration/frequency	Operation phase				
	Magnitude	A-	B-	D	B+	A+
		There is a risk on worker's health and safety due to mis-handling, mis-operation of equipment or machine for operation of the power plant at some extent. These risks are possible to be mitigated by training for workers and other precautional measures following international guidelines.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after construction.				

Note: A-: Significant negative impact; A+: Significant positive impact
B-: Some negative impact; B+: Some positive impact
D: No impacts or impacts are negligible

Source: EIA Study Team

In conclusion, it is evaluated that the risk of occupational health and safety during the operation phase would be minimized by preparing sufficient management plan and providing education to workers. With this mitigation measures, the risk of occupational health and safety during the operation phase will be controlled and managed and would not cause any significant impacts.

5.2.2.12.3. Decommissioning, Closure, and Post-closure Phases

5.2.2.12.3.1. Potential Impact on Occupational Health & Safety

The following item was examined to forecast the impact.

- Impact on occupational health and safety which might occur during decommission phase.

5.2.2.12.3.2. Area of Influence

The area examined to forecast the impact was set in and around the project area.

5.2.2.12.3.3. Methodology

Qualitative method of impact analysis was used for occupational health and safety during the decommissioning phase.

5.2.2.12.3.4. Identified Impact and Mitigation Measures

Due to the nature of the activities being undertaken during decommissioning, workers' health and safety is a key risk with the potential for accidents that may result in injuries and fatalities as well as lost man-hours.

Although minor negative impacts on occupational health and safety are inevitable during the decommissioning phase, such impacts are to be minimized by applying the measures listed in the construction phase.

5.2.2.12.3.5. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-72.

Table 5.2-72 Assessment of Occupational Health and Safety in Decommissioning Phase

Characteristics	Affected area	Project site				
	Duration/frequency	Demolishing work phase				
	Magnitude	A-	B-	D	B+	A+
		Due to increase of transportation related to demolition works and operation of heavy machine, there is a risk of occupational health and safety at some extent.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after construction.				

Note: A-: Significant negative impact; A+: Significant positive impact; B-: Some negative impact; B+: Some positive impact; D: No impacts or impacts are negligible

Source: EIA Study Team

In conclusion, it is evaluated that the risk of occupational health and safety during the decommissioning phase would be minimized by preparing sufficient management plan and providing education to workers. With this mitigation measures, the risk of occupational health and safety during the operation phase will be controlled and managed and would not cause any significant impacts.

5.2.2.13. Accident

5.2.2.13.1. Pre-construction and Construction Phases

Accidents are defined to be the incidents that occur because of the activities related to the Project, and those involve workers under the project activities and surrounding community, such as traffic accidents caused by construction vehicles, gas explosion, fire, etc. EHS Guidelines by IFC define occupational health and safety as well as community environment and health. The following item is considered as a potential impact on accident during construction phase.

- Accidents might occur during the construction phase.

5.2.2.13.1.1. Area of Influence

The area examined to forecast the impact was set in and around the project area.

5.2.2.13.1.2. Methodology

Qualitative method of impact analysis was used for accident during the construction phase.

5.2.2.13.1.3. Identified Impact and Mitigation Measures

During the construction phase, traffic volume around the construction site will be increased due to frequent transportation of construction vehicles. In addition, construction activities using heavy machines are planned. Frequent transportation of construction vehicles or possibility of mis-handling of heavy machines will bring a risk of accidents at the surrounding communities as well as within the construction site.

Identified impact can be minimized by applying the following measures:

- Provide adequate health care facilitates and first aid within the construction site
- Provide training to construction workers about EHS
- Provide information and guidance on construction activities and safety to surrounding communities

5.2.2.13.1.4. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-73.

Table 5.2-73 Assessment of Accidents in Construction Phase

Characteristics	Affected area	Project site and surrounding areas				
	Duration/frequency	Construction phase				
	Magnitude	A-	B-	D	B+	A+
		Frequent transportation of construction vehicles or operation of heavy machine will increase a risk of accidents at the surrounding area and within the construction site at some extent. However, such risk would be minimized by providing training and sufficient information to construction workers and the surrounding communities.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after construction.				

Note: A-: Significant negative impact A+: Significant positive impact
B-: Some negative impact B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

In conclusion, it is evaluated that accident during construction phases would be well controlled and managed and would not cause any significant impacts on accident.

5.2.2.13.2. Operation Phase

The following items are considered as a potential impact on accident during operational phase:

- Impact on accidents by storing /treating hazardous or dangerous materials the inappropriate way during the operational phase.
- Impact on accidents related to explosion of gas pipeline

5.2.2.13.2.1. Area of Influence

The area examined to forecast the impact was set in the project area including communities nearby gas pipeline.

5.2.2.13.2.2. Methodology

Qualitative method of impact analysis was used for accident during operational phase.

5.2.2.13.2.3. Identified Impact and Mitigation Measures

During operation of power plant, dangerous/ hazardous material or fuel will be treated or stored in the project site.

Accidents caused from such kind of hazardous/ dangerous materials are the key concern during operation. However, there are mitigation measures for reducing the probability of accident as follows. These measures are possible to execute by the project proponent.

- Applying the safety standard established by EPGE internally for prevent accident caused by power plant operation
- Applying the design standard of MOGE for detailed design of gas pipeline to ensure the safety during operation
- Complying with the safety management plan of gas pipeline

5.2.2.13.2.4. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-74.

Table 5.2-74 Assessment of Accidents in Operational Phase

Characteristics	Affected area	Project site				
	Duration/frequency	Operational phase				
	Magnitude	A-	B-	D	B+	A+
		The incident/ accident due to storing/ treating /transporting (using pipeline) the hazardous or dangerous materials is assumed as a potential impact. However, it is possible to reduce a risk of accident by using proper safety standard or manuals.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after construction.				

Note: A-: Significant negative impact; A+: Significant positive impact
B-: Some negative impact; B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

In conclusion, it is evaluated that accident during operation would be well controlled and managed and would not cause any significant impacts on accident.

5.2.2.13.3. Decommissioning, Closure, and Post-closure Phases

The following item was examined to forecast the impact.

- Impact on accidents which might occur during the decommissioning phase.

5.2.2.13.3.1. Area of Influence

The area examined to forecast the impact was set in and around the project area.

5.2.2.13.3.2. Methodology

Qualitative method of impact analysis was used for accidents during demolishing of the power plant facilities.

5.2.2.13.3.3. Identified Impact and Mitigation Measures

During demolishing works, construction activities related to demolishing and transportation of construction vehicles bring a risk of accidents at the surrounding communities as well as within the construction area.

Identified impact can be minimized by applying the following measures:

- Providing adequate health care facilitates and first aid within the construction site
- Providing training to demolishing workers about GES
- Providing information and guidance on construction activities and safety to surrounding communities

5.2.2.13.3.4. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-75.

Table 5.2-75 Assessment of Accidents in Decommissioning Phase

Characteristics	Affected area	Project site				
	Duration/frequency	Demolishing work phase				
	Magnitude	A-	B-	D	B+	A+
		Transportation of construction vehicles or operation of heavy machine will increase a risk of accidents at the surrounding area and within the site of demolition work at some extent. However, such risks will be minimized by providing training and sufficient information to construction workers and the surrounding communities.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after construction.				

Note: A-: Significant negative impact; A+: Significant positive impact
B-: Some negative impact; B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

In conclusion, it is evaluated that accident on decommissioning would be minimized by applying the mitigation measures adequately.

5.2.2.14. Cross-border Impact and Climate Change

5.2.2.14.1. Pre-construction and Construction Phases

The following item was examined to forecast the impact.

- Impact on greenhouse gas (GHG) emission increase due to construction works of the Project during the construction phase.

5.2.2.14.1.1. Area of Influence

The area examined to forecast the impact was set in and around the project area.

5.2.2.14.1.2. Methodology

Qualitative method of impact analysis was used for cross-border impact and climate change during construction of power plant.

5.2.2.14.1.3. Identified Impact and Mitigation Measures

GHG will be emitted from the construction machines and vehicles to some extent during the construction phase. Regarding the emission amount of GHG, it wouldn't be significant because the site preparation has been already done in the power plant site and assumed scale of the construction and transportation activities will be small.

To minimize GHG emission during the construction phase, the following mitigation measure should be applied:

- The contractor should promote the efficient fuel use (e.g. educate construction workers/drivers about stopping unnecessary idling for construction machines and vehicles, avoid excessive loading operation).

5.2.2.14.1.4. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-76.

Table 5.2-76 Assessment of Cross-border Impact, Climate Change in Construction Phase

Characteristics	Affected area	Project site				
	Duration/frequency	Construction phase				
	Magnitude	A-	B-	D	B+	A+
		GHG emission from the construction works would not cause any significant impact, because the emission amount wouldn't be large since the assumed scale of the construction and transportation activities will be small.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after construction.				

Note: A-: Significant negative impact; A+: Significant Positive Impact; B-: Some negative impact; B+: Some positive impact; D: No impacts or impacts are negligible

Source: EIA Study Team

In conclusion, it is evaluated that GHG emission on construction phase would be well controlled and managed and would not cause any significant impacts on GHG emission.

5.2.2.14.2. Operation Phase

The following item was examined to forecast the impact:

- Impact on greenhouse gas (GHG) emission increase due to operation of the power plant during the operation phase.

5.2.2.14.2.1. Area of Influence

The area examined to forecast the impact was set in and around the project area.

5.2.2.14.2.2. Methodology

Qualitative method of impact analysis was used for cross-border impact and climate change during operation of power plant.

5.2.2.14.2.3. Identified Impact and Mitigation Measures

GHG will be emitted from the power plant to some extent during the operation phase. For the estimation of GHG emission reduction during operation, JICA Climate Finance Impact Tool / Mitigation (JICA Climate-FIT (Mitigation)) is used.

The combined cycle gas thermal power is categorized as the fuel efficiency improvement, thus "11. Thermal Power Generation/Fuel Efficiency Improvement" tool of the JICA Climate FIT is applied for estimation of the GHG reduction. The input value is presented in Table 5.2-77.

Table 5.2-77 Input Value to the JICA Climate FIT

Parameter	Description	Value	Unit
$EG_{PJ,y}$	Amount of electricity generated by the Project in a year	2,126,928	MWh/year
GE_{BL}	Specific fuel consumption of the baseline facilities	275	m^3/MWh
NCV_i	Net caloric value of the fuel i used for power generation	0.00003766	TJ/m^3
$EF_{fuel,i}$	CO_2 emission factor of the fuel i used for power generation	56.1	tCO_2/TJ
$FC_{PJ,i,y}$	Consumption of the fuel i used for power generation in the Project	347,728,200	m^3/year

Source: EIA Study Team

The annual emission reduction of GHG is shown in Table 5.2-78.

Table 5.2-78 Input Value to the JICA Climate FIT

Parameter	Description	Value	Unit
ERy	Emission reduction	499,565	tCO_2/year
BEy	Baseline emission	1,234,219	tCO_2/year
PEy	Project emission	734,654	tCO_2/year

Source: EIA Study Team

Along with the installation of proposed combined cycle thermal plant, the GHG emission will be 735,654 t per year, whereas the baseline emission will be 1,234,219 t per year, so the reduced amount is calculated as 499,565 t per year. To minimize GHG emission from the power plant, the following mitigation measure should be applied:

- Implementing an appropriate maintenance of the power facility to keep high efficiency with low GHG emission.
- Promoting saving on energy and electricity in the site

5.2.2.14.2.4. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-79.

Table 5.2-79 Assessment of Cross-border Impact, Climate Change in Operational Phase

Characteristics	Affected area	Project site				
	Duration/frequency	Operation phase				
	Magnitude	A-	B-	D	B+	A+
		Along with the installation of proposed combined cycle thermal plant, the GHG emission will be reduced 499,565 t per year. GHG emission is assumed, but the amount of the emission will be minimized because the combined cycle system will be applied, and appropriate maintenance work will be done to keep its high efficiency.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after construction.				

Note: A-: Significant negative impact A+: Significant positive impact
B-: Some negative impact B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

In conclusion, it is evaluated that GHG emission on operational phase would be well controlled and managed and would not cause any significant impacts on GHG emission.

5.2.2.14.3. Decommissioning, Closure, and Post-closure Phases

The following item was examined to forecast the impact.

- Impact on greenhouse gas (GHG) emission increase due to demolishing works of the Project during the decommissioning phase.

5.2.2.14.3.1. Area of Influence

The area examined to forecast the impact was set in and around the project area.

5.2.2.14.3.2. Methodology

Qualitative method of impact analysis was used for cross-border impact and climate change during the decommissioning phase.

5.2.2.14.3.3. Identified Impact and Mitigation Measures

GHG will be emitted from the construction machines and vehicles to some extent during the demolishing works at the decommissioning phase. Regarding the emission amount of GHG, it wouldn't be significant because large scaled civil work is not assumed.

To minimize GHG emission during the demolishing works, the following mitigation measures should be applied:

- Use the efficient fuel as much as possible
- Educate construction workers/drivers about stopping unnecessary idling for construction machines and vehicles
- Avoid excessive loading operation.

5.2.2.14.3.4. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-80.

Table 5.2-80 Assessment of Cross-border Impact, Climate Change in Decommissioning Phase

Characteristics	Affected area	Project site				
	Duration/frequency	Demolishing work phase				
	Magnitude	A-	B-	D	B+	A+
		GHG emission from the demolishing works would not cause significant impact, because the emission amount wouldn't be large since the assumed scale of the demolition and transportation activities will be small.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after construction.				

Note: A-: Significant negative impact; A+: Significant positive impact
B-: Some negative impact; B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

In conclusion, it is evaluated that GHG emission on decommissioning would be well controlled and managed and would not cause any significant impacts on GHG emission.

5.2.3. Cultural Impact Assessment

5.2.3.1. Cultural Heritage

5.2.3.1.1. Pre-construction and Construction Phases

On water pipeline installation, impact on ruins of ancient city was expected. The part of pipeline alignment is planned in the ancient city area in heritage zone (Mekkhara Old City) near E Bya Village and Met Ka Ya Village. Furthermore, the potential of indirect impact on religious activity in temple and pagoda during construction phase is assumed. The following items are considered as impact on cultural heritage:

- Impact on ruins of ancient city in heritage zone
- Indirect impact on religious activity in the cultural heritage (temple and pagoda) from noise of construction work

5.2.3.1.1.1. Area of Influence

The area examined to forecast the impact was set in and around the project area.

5.2.3.1.1.2. Methodology

Qualitative method of impact analysis was used for impact on cultural heritage during construction.

5.2.3.1.1.3. Identified Impact and Mitigation Measures

Regarding the impact on old ruin in heritage zone, MORAC already issued the approval for water pipeline route based on their Heritage Impact Assessment (HIA) in accordance with the Law on Preservation and Protection of Ancient Buildings (Pyidaungsu Hluttaw Law No. 51/2015) In this HIS report, MORAC said that the second proposed water pipeline route is considered as small direct impacted route because the route is less contact to the ancient wall. They also said if second proposed route will be used for pipeline, direct impacts to the ancient ruin will be fewer. The required process flow of approval and construction which is explained by Department of Archaeology and National Museum (DOANM) Mandalay under MORAC is shown as follows:

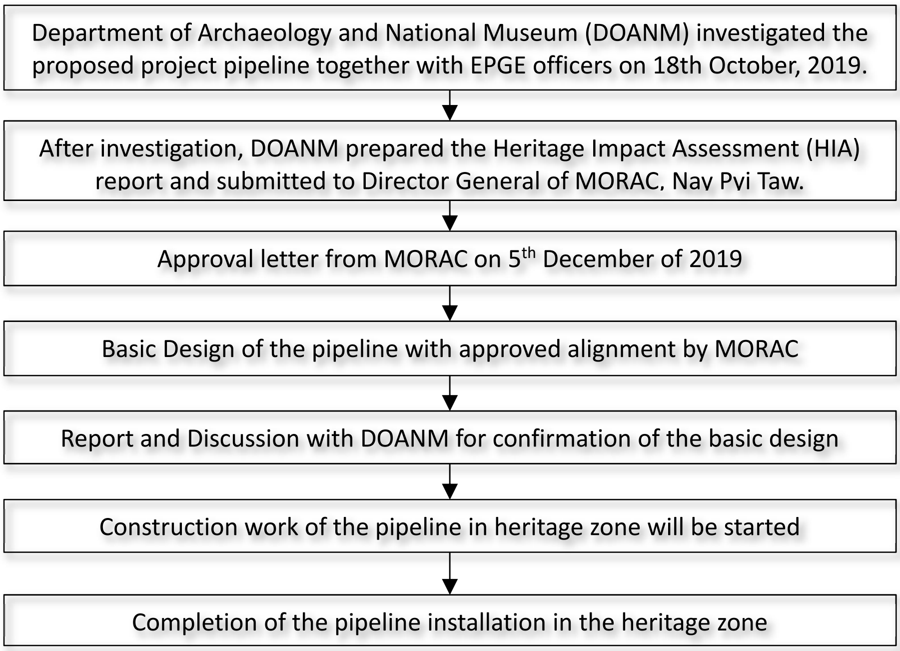


Figure 5.2-13 Process flow for Pipeline installation in the heritage zone

MORAC requested EPGE to execute the mitigation measure on installation of water pipeline as follows. EPGE should comply with those conditions.

1. EPGE should inform and submit request letter to Director (DOANM- Mandalay) to send expert for supervise before the installation of water pipeline in the ancient city area.

2. During the construction of the pipeline in the ancient city area, contractor should inform Department of Archeology and National Museum in advance to get help for preventing damage to the remained cultural heritage above and under the ground, and to get supervision of the DOANM.

3. The manual excavation (hand excavation) is required near the ancient wall for burying the pipelines without impact to the ruins. On the other section in the ancient city area, contractor can use low vibration machineries. (Contractor is prohibited to use machineries which would cause high vibration such as a vibratory hammer and concrete breaker in that section.)

4. Near the ancient city wall which will be passed the ancient city wall, contractor should keep 10 ft distance from the wall and to make detour route over the remained wall even if the wall structure is not remained. In this context, contractor can request advise from DOANM based on the actual situation.

5. Contractor should paint the pipelines which will across over the ancient city wall with the grey color or harmonious color with the environment. Regarding the color of the pipeline, contractor can discuss with DOANM about the color before installation. Contractor should consider the safety of transportation simultaneously. Contractor should secure the safety of transportation in the village road to avoid an accident.

6. In case of the finding of archaeological objects such as the row of bricks of ancient buildings, contractor should stop the operation of construction temporarily and should inform to the expert from Department of Archeology and National Museum (Mandalay Branch). If the expert of DOANM is not in the construction site, village leader can keep the found objects temporarily.

7. After the implementation of the pipeline in the ancient city area, contractor should submit the report including pipeline alignment layout map and the photo records on the implementation status to Department of Archeology and National Museum within one month.

In addition to above, EPGE will discuss with DOANM to get confirmation after basic design of the pipeline before the selection of contractor.

As for the indirect impact on religious activity, noise and vibration will be generated by construction works and will cause indirectly impact to the religious activities in the pagoda/ temple near the project site. The noise and vibration from construction works are important concern during construction phase of the Project. According to the result of noise forecasting (refer to 5.2.1.5.1) the impact on noise is estimated to be below the target value. In addition, there are mitigation measures of reducing the impact of noise and vibration as follows. These measures are feasibly conducted by contractor.

- Avoiding the concentrated use of construction machineries
- Time limitation of the civil works (e.g. daytime)
- Promoting awareness activity of gently operation to the operator
- Installing temporary enclosure wall to the southern and east boundaries during construction to reducing noise impact with diffraction effect

5.2.3.1.1.4. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-81 and Table 5.2-82.

Table 5.2-81 Assessment of Impact on Ruins in heritage zone during Construction Phase

Characteristics	Affected area	Water pipeline				
	Duration/frequency	Construction phase				
	Magnitude	A-	B-	D	B+	A+
		There is a possibility of impact to the ancient city wall due to water pipe installation. MORAC has already approved to install water pipeline with conditions which EPGE and contractor should be executed. By implementing those measures, impact on ancient city wall would be small.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after construction.				

Table 5.2-82 Assessment Cultural Heritage in Construction Phase

Characteristics	Affected area	Project site				
	Duration/frequency	Construction phase				
	Magnitude	A-	B-	D	B+	A+
		There is a possibility of indirect impact to the religious activity due to construction noise. According to the result of prediction on construction noise, noise level is small and mitigation measures are possible to execute.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after construction.				

Note: A-: Significant negative impact A+: Significant positive impact
B-: Some negative impact B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

In conclusion, it is assumed that there would be potential impact to the ancient city wall and potential indirect impact to religious activity in the temple/ pagoda on construction phase. However, direct impact to the ancient city wall will be minimized by proper installation manners and the noise level in the religious area is satisfied the target value according to the result of forecast. In addition, effective mitigation measures are applicable, thus the potential impact would be well controlled and managed and would not cause any significant impacts on heritage and religious activity.

5.2.3.1.2. Operation Phase

The following item is considered as a potential of indirect impact on religious activities in the cultural heritage (temple and pagoda) during operational phase:

- Indirect impact on religious activity in the cultural heritage (temple and pagoda) from noise of power plant operation

5.2.3.1.2.1. Area of Influence

The area examined to forecast the impact was set in and around the project area.

5.2.3.1.2.2. Methodology

Qualitative method of impact analysis was used for impact on cultural heritage during construction of power plant.

5.2.3.1.2.3. Identified Impact and Mitigation Measures

The noise and vibration will be generated by power plant facilities and will cause indirect impact to the religious activities in the pagoda/ temple near the project site. The noise and vibration from facilities are important concern during operation phase of the Project. According to the result of noise forecasting (refer to 5.2.1.5.2) the impact on noise will be below the target value. In addition, there are mitigation measures of reducing the impact of noise and vibration as follows. These measures are feasibly conducted by the project proponent:

- Installation of soundproof package for gas and steam turbine
- Strong foundation of the power plant facilities for reduction of the vibration

5.2.3.1.2.4. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-83.

Table 5.2-83 Assessment Cultural Heritage in Operational Phase

Characteristics	Affected area	Project site				
	Duration/frequency	Operational phase				
	Magnitude	A-	B-	D	B+	A+
		There is a possibility of indirect impact to the religious activity due to noise and vibration from power plant. According to the result of prediction, level of noise and vibration is small and mitigation measures are possible to execute.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after construction.				

Note: A-: Significant negative impact A+: Significant positive impact
B-: Some negative impact B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

In conclusion, it is assumed that potential indirect impact to the religious activity in the cultural heritage (temple and pagoda) during operational phase. However, the noise and vibration level are estimated to be below the target value according to the result of prediction. In addition, effective mitigation measures are applicable, thus the potential impact would be well controlled and managed and would not cause any significant impacts on religious activity in the cultural heritage

5.2.3.1.3. Decommissioning, Closure, and Post-closure Phases

The following item is considered as a potential impact on religious activities in the cultural heritage (temple and pagoda) on decommissioning phase:

- Impact on religious activity in the cultural heritage (temple and pagoda) from noise and vibration of decommissioning

5.2.3.1.3.1. Area of Influence

The area examined to forecast the impact was set in and around the project area.

5.2.3.1.3.2. Methodology

Qualitative method of impact analysis was used for impact to cultural heritage on decommissioning.

5.2.3.1.3.3. Identified Impact and Mitigation Measures

The noise and vibration will be generated by demolition works and will impact to the religious activities in the pagoda and temple near the project site. The noise and vibration from demolition are important concern during closure phase of the Project. However, there are mitigation measures of reducing the impact of noise and vibration as follows. These measures are feasibly conducted by contractor.:

- Avoiding the concentrated use of construction machineries
- Time limitation of the civil works (e.g. daytime)
- Promoting awareness activity of gently operation to the contractor
- Installing temporary enclosure wall to the southern and east boundaries during construction to reducing noise impact with diffraction effect

5.2.3.1.3.4. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-84.

Table 5.2-84 Assessment Cultural Heritage in Decommissioning Phase

Characteristics	Affected area	Project site				
	Duration/frequency	Decommissioning phase				
	Magnitude	A-	B-	D	B+	A+
		There is a possibility of indirect impact to the religious activity due to demolition work. According to the result of prediction, the impact of noise and vibration are small and mitigation measures are possible to execute. The impact is small because impact to the religious activity in the cultural heritage (temple and pagoda) will be limited period of time. The mitigation of the impact is possible.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after construction.				

Note: A-: Significant negative impact A+: Significant positive impact
B-: Some negative impact B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

In conclusion, it is assumed that potential indirect impact to the religious activity in the cultural heritage (temple and pagoda) in demolition phase. However, the impact of noise is not significant according to the result of prediction of demolition noise. In addition, effective mitigation measures are applicable, thus the potential impact would be well controlled and managed, and would not cause any significant impacts on religious activity in the cultural heritage.

5.2.4. Visual Impact Assessment

5.2.4.1. Landscape

5.2.4.1.1. Pre-construction and Construction phases

5.2.4.1.1.1. Potential Impact on Landscape

The following item is considered as a potential impact on landscape during construction phase:

- Disturbance of landscape at the project site due to construction works.

5.2.4.1.1.2. Area of Influence

The area examined to forecast the impact was set in and around the project area.

5.2.4.1.1.3. Methodology

Qualitative method of impact analysis was used for impact on landscape during the construction phase.

5.2.4.1.1.4. Identified Impact and Mitigation Measures

The general elevation of the project site and the surrounding area is about 80 m above mean sea level. Normally, the area is flat and occupied by grass and some vegetation. Mountainous area ray in the north of the project area and paddy field are in the south. In the north, the nearest mountain is the Nwa Le Taung, distanced about 500 m from the project site and the highest point of this mountain is 289 m. In the east, Na Be Bin Village is the nearest village from the project site and it occupied about 0.12 km^2 for residential area or village land. There is one pagoda compound (known as “Kin” Pagoda) which is located about 20 m from southern fence of the project site.

Constructions activities may change the visual landscape of the project area. Scenic beauty will be disturbed by site clearance activities, gathering of equipment and construction materials, machineries, etc. Duration of impact is short and only at the construction phase.

The construction activity is important concern on landscape during construction. However, there are mitigation measures of reducing the impact of landscape as follows. These measures are feasibly conducted by contractor.

- Installing temporary enclosure wall to the southern and east boundaries during construction to screen off the construction machinery and facilities from residential area

In addition, construction of power plant is important concern on landscape during and after construction. However, there are mitigation measures of reducing the impact of landscape as follows. These measures are possible to conduct by contractor.

- Greening and planting trees around the boundary of the project site to screen off the facilities of power plant from outside

5.2.4.1.1.5. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-85.

Table 5.2-85 Assessment of Landscape in Construction Phases

Characteristics	Affected area	Project site and surrounding area				
	Duration/frequency	Construction phase				
	Magnitude	A-	B-	D	B+	A+
		Possible impact is limited to the construction site, and it will be mitigated by installing temporary enclosure during the construction works. Therefore, possible impact is considered as minor.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after construction.				

Note: A-: Significant negative impact A+: Significant positive impact
B-: Some negative impact B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

In conclusion, it is evaluated that landscape in the project site will be changed to some extent the construction phase, but it will be minimized by installing temporary enclosure in the construction site.

5.2.4.1.2. Operation Phase

5.2.4.1.2.1. Potential Impact on Landscape

The items examined to forecast the impact were as follows:

- The visual impact on landscape caused by the project development.

5.2.4.1.2.2. Area of Influence

The area examined to forecast the impact was set in and around the project area.

5.2.4.1.2.3. Methodology

Qualitative method of impact analysis was used for impact on landscape during the operation phase.

5.2.4.1.2.4. Identified Impact and Mitigation Measures

In consideration of the presence of a new obstacle, the Project would have a negative impact on the visual environment; it will be visible from the surrounding villages due to the flat topography of the area.

The negative influence on the visual environment will have a long-term, continuous impact resulting in adverse change outside the range of natural variation.

The facility of power plant is important concern on landscape during construction. However, there is mitigation measure of reducing the impact on landscape as follows. These measures are feasibly conducted by the project proponent.

- Appropriate maintenance of planted/ existing trees around the boundary of project site to screen off the facilities of power plant from outside

5.2.4.1.2.5. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-86.

Table 5.2-86 Assessment of Landscape in Operational Phase

Characteristics	Affected area	Project site				
	Duration/frequency	Long term/constant				
	Magnitude	A-	B-	D	B+	A+
		The low sensitivity of the receiving landscape in surroundings, the absence of any landscape designations, it is considered that, both landscape and visual impacts would not have significant impact.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after construction.				

Note: A-: Significant negative impact A+: Significant positive impact
B-: Some negative impact B+: Some positive impact
D: No impacts or impacts are negligible
Source: EIA Study Team

In conclusion, it is evaluated that landscape on operational phases would be well controlled and managed and would not cause any significant impacts on landscape.

5.2.4.1.3. Decommissioning, Closure, and Post-closure Phases

5.2.4.1.3.1. Potential Impact on Landscape

The items examined to forecast the impact were as follows:

- The environmental impact on landscape caused by the project development.

5.2.4.1.3.2. Area of Influence

The area examined to forecast the impact was set in and around the project area.

5.2.4.1.3.3. Methodology

Qualitative method of impact analysis based on the field data.

5.2.4.1.3.4. Identified Impact and Mitigation Measures

During the decommissioning phase, construction activities related to demolishing the power plant facilities are assumed. The visual landscape of the project area may be affected due to demolishing works such as gathering of equipment and construction materials, machinery and camp establishment in and around the project area. The impact is for a short duration during the demolishing works, and possible impact may be mitigated by applying the same measure explained in the construction phase.

5.2.4.1.3.5. Assessment of Impact

Assessment of the impact is conducted using simple analytical method that are descriptive and qualitative. The impact assessment is summarized in Table 5.2-87.

Table 5.2-87 Assessment of Landscape in Decommissioning Phase

Characteristics	Affected area	Project site				
	Duration/frequency	Demolishing work phase				
	Magnitude	A-	B-	D	B+	A+
		The impacts to be caused by demolishing works are most likely to be of low negative significance with regard to both landscape and visual impacts.				
Mitigation measures	Technical feasibility	Feasible				
	Effectiveness	Effective				
Residual impact		There is no residual impact after construction.				

Note: A-: Significant negative impact A+: Significant positive impact
B-: Some negative impact B+: Some positive impact
D: No impacts or impacts are negligible

Source: EIA Study Team

In conclusion, it is evaluated that landscape on the decommissioning phases would be well controlled and managed and would not cause any significant impacts on landscape.

5.2.5. Summary of Impact Assessment

The summary of impact assessment is presented in Table 5.2-88.

Table 5.2-88 Summary of Impact Assessment

	Impacts	Scoping Result			Assessment Result			Reasons for Assessment Result	Related Components
		PC/CO	OP	CL	PC/CO	OP	CL		
I. Pollution control measures									
1	Air quality	B-	B-	B-	B-	B-	B-	PC/CO, CL: Impact of dust generated is expected. The impact is limited to downwind area and temporally.	Power facility, gas pipeline, water pipeline
								OP: The impact of nitrogen oxides is expected; however, the prediction result satisfies the target value.	Power facility
2	Water quality	B-	B-	B-	B-	D	B-	PC/CO, CL: Impact of turbid water on water quality due to construction/ demolition of the intake facility at the Myitnge River is expected. The generation amount of turbid water will be minimized by construction of coffer dam.	Water pipeline
								OP: The quality of treated wastewater that to be discharged to Myitnge River can be well managed by wastewater facilities and the adverse impact is considered to be negligible.	Power facility
3	Waste	B-	B-	B-	B-	B-	B-	PC/CO, CL: Impact of solid waste is limited in the project site. The mitigation of the impact is possible.	Power facility, gas pipeline, water pipeline
								OP: Impact of solid waste is limited in the project site. The mitigation of the impact is possible.	Power facility
4	Soil contamination	B-	D	D	D	D	D	No activity is planned that will cause soil contamination.	-
5	Noise & vibration	B-	B-	B-	B-	B-	B-	PC/CO, CL: The noise level from the construction machinery is predicted to be below the target value.	Power facility, gas pipeline, water pipeline
								OP: Impact on noise to the residents at the surrounding areas of the power plant is assumed; though the noise level from the power plant is predicted to be below the target value.	Power facility
6	Ground subsidence	B-	D	D	B-	D	D	PC/CO: Subsidence from construction activity is expected. The mitigation measure is capable of being enforced by contractor.	Gas pipeline, water pipeline

	Impacts	Scoping Result			Assessment Result			Reasons for Assessment Result	Related Components
		PC/CO	OP	CL	PC/CO	OP	CL		
								OP, CL: No activity is planned that will occur ground subsidence.	-
7	Offensive odor	D	B-	D	D	B-	D	PC/CO, CL: No activity is planned that will cause offensive odor during construction.	-
								OP: Offensive odor from operational activity is expected. The mitigation measure is capable of being enforced by the project proponent.	Power facility
8	Bottom sediment	D	D	D	D	D	D	PC/CO, CL: No activity is planned that will cause pollution to river bottom sediment. OP: Impact on bottom sediment due to discharge water is not expected.	-
II. Natural environment									
9	Protected Area	D	D	D	D	D	D	No protected area within and around the project area.	-
10	Flora/Fauna & Biodiversity	B-	B-	B-	B-	B-	B-	PC/CO: The impact on flora / fauna and biodiversity is expected. The change of vegetation is not significant. The impact to the aquatic biota is limited by proper mitigation measures.	Power facility, gas pipeline, water pipeline
								OP: The impact on aquatic ecosystem is expected. The impact on water quality is negligible, thus the impact on aquatic biota is limited.	Power facility
								CL: The impact on flora / fauna and biodiversity is expected. The change of vegetation is not significant. The impact to the aquatic biota is limited by proper mitigation measures.	Gas pipeline, water pipeline
11	Hydrology	D	B-	D	D	B-	D	PC/CO, CL: No activity is planned that will cause increase of rain water run-off.	-
								OP: Impact on the increase of runoff water is expected due to the modification of land use at the project site. The impact is limited because the regulation pond with adequate capacity will be installed.	Power facility
12	Topography and Geology	D	D	D	D	D	D	No activity that will adversely affect the topography and geographical features is expected.	-

III. Social environment									
13	Involuntary resettlement	B-	D	D	B-	D	D	PC/CO: Identified impact related to land acquisition and temporary occupation will be properly compensated in accordance with the contents in Abbreviated Resettlement Action Plan which will be prepared with due consultation with affected persons.	Gas pipeline, water pipeline
								OP, CL: Involuntary resettlement or other impact on livelihood will not be expected.	-
14	Poverty	B+	B+	B+	B- / B-, B+	B+	B-, B+	PC: The impact on poverty groups is expected. The impact is considered as limited since the area to be acquired is small.	Water pipeline
								CO: The impact on poverty group is expected from temporarily occupied land. On the other hand, positive impacts such as creation of local employment are predicted.	Gas pipeline, water pipeline
								OP: Positive impacts such as creation of local employment are predicted.	Power facility
								CL: Employment related to operation of the power plant will be terminated. On the other hand, the Project will bring a positive impact such as increasing job opportunities.	Power facility, gas pipeline, water pipeline
15	Ethnic minorities & indigenous peoples	C	C	C	D	D	D	PC/CO, OP, CL Adverse impact on ethnic minorities and indigenous peoples is not assumed, because confirmed 3 households are considered as assimilated people into Burmese society.	-
16	Local economy (Employment)	B+	B+	B+	B+	B+	B-, B+	PC/CO: Positive impacts such as creation of local employment are predicted.	Power facility, gas pipeline, water pipeline
								OP: Positive impacts such as creation of local employment are predicted.	Power facility
								CL: Employment related to operation of the power plant will be terminated Meanwhile, job opportunities of demolition works are assumed.	Power facility, gas pipeline, water pipeline

	Local economy (Livelihood)	B-	D	D	B- / B-, B+	D	D	PC: The impact on income source is expected.	Water pipeline
								CO: The impact on kiosks and farmers for temporary land occupation is expected. On the other hand, positive impacts such as creation of local employment are predicted	Gas pipeline, water pipeline
								OP: In Myitnge River, small-scaled fishery activity is carried out only for their home consumption and no villagers depend on fishery for their livelihood.	-
								CL: No activity that will adversely affect the livelihood is expected.	-
17	Land use and utilization of local resources	B-	D	D	B-	D	D	PC/CO: The impact on land use is expected. The acquired land / temporary land use is very small.	Gas pipeline, water pipeline
								OP, CL: No impact on land use is expected.	-
18	Water usage	B-	B-	B-	B-	D	B-	PC/CO, CL: The water demand during construction is small and impact to the water usage in Myitnge River is small according to the forecast result of water quality.	Water pipeline
								OP: Amount of water consumption will be controlled without causing impact on local water usage. The impact to the water quality in Myitnge River is negligible.	Power facility
19	Existing social infrastructure and service	B-	B-	D	B-	B-	D	PC/CO: Temporally access limitation and temporally traffic congestion due to construction works is expected. The mitigation measure is capable of being enforced by contractor.	Gas pipeline, water pipeline
								OP: The potential impact on school activity due to noise power plant is expected. The impact is small because the noise level in primary school is less than the target value.	Power facility
								CL: No impact on existing social infrastructure and service is expected.	-
20	Social institutions such as social infrastructure and local decision-making institutions	D	D	D	D	D	D	No activity is planned that will affect to the social and local institutions.	-
21	Maldistribution of damage and benefit	D	D	D	D	D	D	No activity is planned that will cause maldistribution of the damage or benefit.	-

22	Local conflict of interest	D	D	D	D	D	D	No activity is planned that will cause local conflict.	-
23	Cultural heritage	B-	B-	B-	B-	B-	B-	PC/CO: The impact on heritage (ancient city wall) is expected due to installing pipelines. MORAC has already approved to install water pipeline with conditions which EPGE and contractor should be executed. By implementing those measures, impact on ancient city wall would be small.	Water pipeline
								PC/CO, CL: The indirect impact on religious activity due to noise from construction/ demolition work is expected. According to the result of prediction on noise, noise level is small and mitigation measures are possible to execute.	Power facility, gas pipeline, water pipeline
								OP: The indirect impact on religious activity due to noise from power plant is expected. According to the result of prediction on noise, noise level is small and mitigation measures are possible to execute.	Power plant
24	Landscape	B-	B-	B-	B-	B-	B-	PC/CO, CL: The impact on landscape due to temporary storage of construction machines and equipment is expected. The proper mitigation measure is capable of being enforced. OP: The impact on landscape is expected. Greening and planting trees around the boundary of the project site to screen off the facilities of power plant from surrounding area can be applied.	Power facility
25	Gender	C	C	C	B-	B-	B-	PC/CO, CL: The gender discrimination of job opportunity in construction/ demolition work is expected. The proper mitigation measure should be enforced.	Power facility, gas pipeline, water pipeline
								OP: The gender discrimination of job opportunity in power facility is expected. The proper mitigation measure should be enforced.	Power facility
26	Children's rights	C	C	C	B-	B-	B-	PC/CO, CL: There is a possibility of child labour in construction/ demolition work. The proper mitigation measures should to be enforced.	Power facility, gas pipeline, water pipeline

								OP: There is a possibility of child labour in power plant. The proper mitigation measures should to be enforced.	Power facility
27	Health (Community Health, Infectious disease and HIV/AIDS)	B-	B-	B-	B-	B-	B-	PC/CO, CL: The risk of infectious disease and HIV/AIDS is expected. The risk can be minimized by providing educational training to workers and surrounding communities.	Power facility, gas pipeline, water pipeline
								OP: Impact to the community health due to flue gas and effluent discharge is expected. The risk can be minimized by countermeasures for air pollution and installation and proper operation of wastewater treatment facility.	Power facility
28	Occupational health & safety	B-	B-	B-	B-	B-	B-	PC/CO, CL: The impact on occupational health & safety in construction/ demolition work is expected. The proper mitigation measures can be executed.	Power facility, gas pipeline, water pipeline
								OP: The impact on occupational health & safety in power plant is expected. The proper mitigation measures can be executed.	Power facility
IV. Others									
29	Accident	B-	C	B-	B-	B-	B-	PC/CO, CL: The increase risk of traffic accident is assumed. The risk will be minimized by providing training and sufficient information to construction workers and the surrounding communities.	Power facility, gas pipeline, water pipeline
								OP: The accident due to storing/ treating /transporting (using pipeline) the dangerous material is assumed as a potential impact. It is possible to reduce the possibility of accident by applying proper safety standard or manuals.	Power facility, gas pipeline
30	Cross-border impact, climate change	B-	B-	B-	B-	B-	B-	PC/CO, CL: GHG will be emitted, but it would not cause significant impact, because the emission amount wouldn't be large since the assumed scale of the construction/ demolition works will be small.	Power facility, gas pipeline, water pipeline
								OP: GHG emission is assumed, but the amount of the emission will be minimized because the combined cycle system will be applied, and appropriate maintenance work will be done to keep its high efficiency.	Power facility

Note: PC (Pre-construction phase), CO (Construction phase), OP (Operation phase), CL (Closure phase)

Evaluation	: A-: Significant negative impact	A+: Significant positive impact
	: B-: Some negative impact	B+: Some positive impact
	: C: Impacts are not clear, need more investigation	
	: D: No impacts or impacts are negligible; no further study is required	

Source: EIA Study Team

CHAPTER 6. CUMULATIVE IMPACT ASSESSMENT

6.1. Methodology and Approach

This chapter presents the methodology and approach for cumulative impact assessment that contributes to better understanding of the extent of impacts and likelihood for major development activities to occur in and around the project area. For meaningful assessment, the timeframe of analysis is set to be until operation period of proposed project. In addition, scope of the analysis is limited to the projects, which are in either operation, planning, or closing phase.

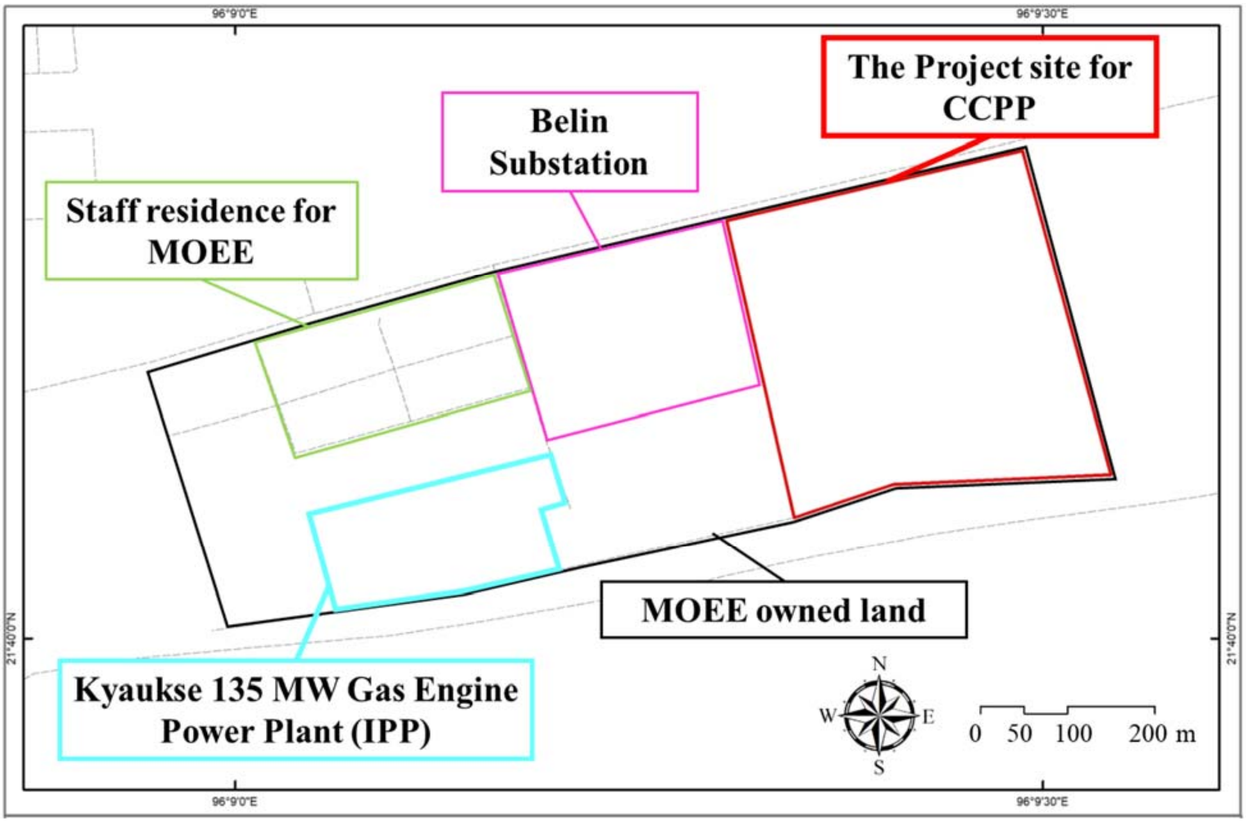
Within the above mentioned context, project to be considered has been identified as follows, and the result of analysis is presented in consecutive sections.

- Kyaukse 135MW Gas Engine Power Plant (IPP)

6.1.1. Emission from Power Plant

The IPP project has started to operate near the project site from March 2019. IPP project site is owned by MOEE and locates about 250 m west from the project site as shown in Figure 6.1-1.

If the period of operation of both projects overlaps, cumulative impact will occur and should be considered for some environmental aspects such as air pollution, noise and vibration.



Source: EIA Study Team

Figure 6.1-1 Location of the IPP Project

6.1.2. Effluent Discharge to Myitnge River

During operation phase, wastewater effluent from the Project will be discharged to Myitnge River via discharge water pipeline. Daily discharge amount will be 1,177.6 m^3 and discharge time will be 8 hours,

so the flow rate of effluent will be 0.0409 m^3/s. Currently, no other development plan is specified near the discharge point; in addition, the IPP project does not discharge any effluent.

Although the short term impact of effluent water is considered to be negligible, short-term and long-term impact will be assessed in the following section.

6.2. Determination of a Spatial and Temporal Framework

6.2.1. Emission from Power Plant

According to the tender document of the IPP project, the concession period for the power generation is set for 5 years from commercial operation date. Based on the information, the IPP project will terminate the operation in the year 2024, whereas the Project aims to commence operation in 2025. In addition, the EPGE is planning to allocate the fuel gas to the IPP to the Project after 2024. Therefore, as the operation period of these projects will not overlap, cumulative impact of simultaneous operation of the Project and the IPP is not expected.

6.2.2. Effluent Discharge to Myitnge River

The IPP project does not discharge effluent to Myitnge River. In addition, according to the result of impact assessment on water quality, the impact of the Project to water quality is evaluated as negligible because the flow rate ratio of effluent to Myitnge River is very small as 0.0126 % (at 50 percentile value of flow rate of Myitnge River), and the effluent will be treated by the treatment facilities.

For long-term, accumulation of trace metals to the sediment of Myitnge River is expected. However, such accumulative impacts are assessed as negligible since guidelines of Myanmar and international organizations for ambient water quality are set based on such long-term toxicity of each chemical and effluent from the Project comply such target values.

Consequently, although there will be effluent discharge, those are negligible and cumulative impact on water quality is expected to be at the level that does not affect aquatic environment in short and long term.

CHAPTER 7. ENVIRONMENTAL MANAGEMENT PLAN

7.1. Environmental Mitigation Measures

The Environmental Management Plan (EMP) consists of a set of mitigation and monitoring measures to be taken into consideration to minimize adverse environmental and social impacts identified by impact assessment at each project phase until they reach acceptable levels. The items which impacts were evaluated negative, regardless of the extent of impacts, were examined in this chapter. In this section, a separate EMP is developed according to the following hierarchy:

Mitigation Measures for Identified Potential Negative Impacts:

- Power facility in (a) construction, (b) operation, and (c) decommissioning, closure and post-closure phases
- Gas Pipeline in (a) pre- construction, (b) construction, (c) operation, and (d) decommissioning, closure and post-closure phases
- Water pipeline in (a) pre-construction, (b) construction, (c) operation, and (d) decommissioning, closure and post-closure phases

Environmental Monitoring:

- Power facility in (a) construction, (b) operation, and (c) decommissioning, closure and post-closure phases
- Gas Pipeline in (a) pre- construction, (b) construction, (c) operation, and (d) decommissioning, closure and post-closure phases
- Water pipeline in (a) pre- construction, (b) construction, and (c) decommissioning, closure and post-closure phases

In addition, the responsibility and organization structures to implement mitigation measures are clarified.

The implementing organization is requested to prepare the detailed EMP in accordance with this chapter.

7.1.1. Power Facility

Mitigation measures and the implementing organization at each project phase are shown from Table 7.1-1 to Table 7.1-3.

Table 7.1-1 Mitigation Measures for Identified Potential Negative Impacts at CONSTRUCTION PHASE (Power Facility)

Category	Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
Pollution	Air quality	- Temporary increase of dust from earthworks - Temporary increase of dust from transportation activities such as carrying soil by dump trucks	- Avoiding the concentrated use of construction machineries - Avoiding earthworks during strong wind - Covering the temporarily soil storage by cover sheets - Applying car washing system for dump trucks - Spray water to the road in the morning for dust control	Mainly earthwork	Contractor	EPGE	USD 500 / month for car washing system USD 3,500 / month for road sprinkler
	Waste	- Generation of solid waste from construction works	- Keeping tidy in the construction site - Set up a separate waste stock yard to promote recycling and reuse the soil waste - Appropriate management of stock yard to prevent odor - Contractor should properly dispose the waste, which cannot be recycled by themselves or by third party in compliance with the relevant laws. If it is difficult to assure the proper disposal site, proponent should prepare the disposal site in the power plant site.	All construction activities	Contractor	EPGE	Included in the construction costs
	Soil contamination	- Soil contamination by spilled fuel & oil	- Setting up paved refilling facility in the construction site	All construction activities	Contractor	EPGE	Included in the construction costs

Category	Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
	Noise & vibration	- Noise and vibration due to construction and material handling - Noise and vibration due to transportation activities such as carrying soil by dump trucks	- Avoiding the concentrated use of construction machineries - Time limitation of the civil works (e.g. daytime: 7:00 to 22:00) - Promoting awareness activity of gentle operation to the operators - Installation of temporary enclosure wall to the southern and east boundaries during construction	All construction activities	Contractor	EPGE	USD 77,000 for temporary enclosure wall
Natural environment	Flora, fauna and biodiversity	- Change vegetation due to the construction works - Loss of important species and/or their habitats caused by the project development - Impact on biodiversity and ecosystem by the project development	- Minimizing land surface change such as minimize clearing plantation and shrub land for stock yard	All construction activities	Contractor	EPGE	Included in the construction costs
Social Environment	Cultural heritage	- Impact on religious activity in the cultural heritage (Temple, Pagoda) from the noise of construction work	- Same as “Noise and Vibration”	All construction activities	Contractor	EPGE	-
	Landscape	- Possibility of temporary disturbance on surrounding landscape due to storing construction machines and materials	- Installation of temporary enclosure wall to the southern and east boundaries during the construction works - Greening and planting trees around the boundary of project site	Mainly storing construction machinery and stored materials	Contractor	EPGE	Temporary enclosure wall is installed for noise mitigation USD 142,000 for Greening
	Gender	- Possibility of discrimination of gender on job opportunity	- Providing job opportunity to all local people without discrimination of gender	All job offers	Contractor	EPGE	-

Category	Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
	Children's rights	- Possibility of child labor to the project related construction works	- Including prohibition of child employment into the tender condition	All job offers	Contractor	EPGE	-
	Health (Community health, infectious disease such as HIV/AIDS)	- Increasing risk of infectious disease due to influx of construction workers in the construction site	- Education for workers and the surrounding communities on risks, prevention and available treatment on infectious disease through the HIV/AIDS prevention program - Prevention illness among workers by undertaking health awareness and education initiatives	All construction activity	Contractor	EPGE	-
	Occupational health and safety	- Increase the risk of accidents related to the construction works	- Providing OHS training program and information of safe work practice and emergency procedure - Providing adequate health care facilities and first aid within the construction site	All construction activities	Contractor	EPGE	Included in the construction costs
Others	Accident	- Increase the risk of accidents related to the construction works within the construction site and at the surrounding communities	- Providing adequate health care facilities and first aid within the construction site - Providing training to construction workers about OHS - Providing information and guidance on construction activities and safety to the surrounding communities	All construction activities	Contractor	EPGE	Included in the construction costs
	Cross-border impact, climate change	- Possibility of increasing greenhouse gas (GHG) emission due to construction works	- Education for construction workers/drivers about stopping unnecessary idling for construction machines and vehicles - Avoiding excessive loading operation	All construction activities	Contractor	EPGE	Included in the construction costs

Source: EIA Study Team

Table 7.1-2 Mitigation Measures for Identified Potential Negative Impacts at the OPERATION PHASE (Power Facility)

Category	Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
Pollution	Air quality	- Air emission from stacks during the operation of power plant - The key pollutant of concern from the gas turbine is nitrogen dioxide. In general, natural gas contained only a little amount of sulfur, so that emission gas does not include sulfur dioxide. In addition to this, the concentration of the particle matter in emission gas is also few under the normal combustion condition.	- Applying high height stack to promote dispersion of air pollutant* - Narrowing the outlet of the stack to avoid the appearance of stack downwash phenomenon* - Installation of low nitrogen dioxide type of gas turbine*	Flue gas from gas turbine stacks	EPGE	MOEE	USD 550,000 for stack
	Water quality	- Water pollution due to the effluent from the power plant facilities during the operation of the power plant - Water pollution due to the domestic wastewater from the staff quarters in the project site	- Installation of wastewater treatment facility and proper operation of treatment facility - Installation of disinfection process (e.g. chlorination process) to the waste water treatment facility	Effluent from power facility and domestic used water	EPGE	MOEE	USD 1,400,000 for wastewater treatment facilities

Category	Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
	Waste	- Generation of soil waste (sludge) from the water treatment activity - Generation of solid waste from the operation and maintenance activity of power plant facilities and office activity	- Keeping tidy in the project site - Install separate waste stock yard to promote recycling and reuse the solid waste - Appropriate management of stockyard to prevent odor - Making contract with licensed third party about proper solid waste treatment and disposal to the site which was approved by authority - Regular inspection of waste storage yard to check the status of segregation - Obtaining a permission for disposing domestic wastes from Sintgaing Township or Kyaukse Township through discussions with responsible authority of both townships before commissioning.	Operation of the power facility	EPGE	MOEE	Included in the operation costs
	Noise and vibration	- Generation of noise and vibration from power plant operation.	- Installation of soundproof package for gas and steam turbine - Applying strong foundation of the power plant facilities for reduction of vibration*	Operation of the power facility	EPGE	MOEE	USD 370,000 for steam turbine sound proof enclosure.
	Offensive odor	- Offensive odor generated from the waste water treatment activity	- Periodically maintenance of the waste water treatment facility - Feedback to the monitoring result to the operation of the treatment facility - Install separate and covered waste stock yard to reduce dispersion of the odor	Effluent and wastes from the power facility operation	EPGE	MOEE	Included in the operation costs
Natural environment	Flora, fauna and biodiversity	- Possibility of impact to aquatic biota especially fish by waste water to be discharged to the Myitnge River	- Installation of the wastewater treatment facility and proper operation of the treatment facility	Effluent from power facility and domestic used water	EPGE	MOEE	same as the wastewater treatment facility under water quality measure

Category	Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
	Hydrology	- Increasing run-off water from the project site	- Installation of the regulation pond with adequate capacity	Run-off water from the project site	Contractor	EPGE	USD 150,000 for the regulation pond
Social environment	Water use	- Waste water generated from the power plant will be discharged to the Myitnge River	- Installation of the waste water treatment facility and proper operation of the treatment facility	Effluent from power facility and domestic used water	EPGE	MOEE	Same as the wastewater treatment facility under water quality measure
	Existing social infrastructure and service	- Possibility of the noise impact to school located at the surrounding area	- Installation of a soundproof package for gas and steam turbine	Noise from operation of the power facility	EPGE	MOEE	Sound proof package is installed for noise mitigation
	Cultural heritage	- Impact on the religious activity in the cultural heritage (Temple, Pagoda) from noise of the power facility	- Same as “Noise and Vibration”	Noise from operation of the power facility	EPGE	MOEE	Same as noise and vibration
	Landscape	- Possibility of disturbance on surrounding landscape due to the power plant facility	- Appropriate maintenance of planted/ existing trees around the boundary of the Project site	Mainly stacks of the power facility	EPGE	MOEE	Included in the operation costs
	Gender	- The discrimination of gender on job opportunity	- Provision of equal job opportunity in accordance with the government policy.	All job offers	EPGE	MOEE	-
	Children’s rights	- Possibility of child labor on the project related operation and maintenance works	- Prohibiting child employment even if it is a light work - Enhancing awareness on child employment among concerned parties	All job offers	EPGE	MOEE	-

Category	Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
	Health (Community health, infectious disease such as HIV/AIDS)	- Impact to the community health due to flue gas and effluent discharge	- Applying a high height stack to promote dispersion of air pollutant - Narrowing the outlet of the stack to avoid the appearance of stack downwash - Installation of low nitrogen dioxide type of gas turbine - Installation of the wastewater treatment facility and proper operation of the treatment facility - Installation of disinfection process (e.g. chlorination process) to the waste water treatment facility	Flue gas from the stack Effluent from power facility and domestic used water	EPGE	MOEE	-
	Occupational health and safety	- Possibility of increase in the risk of accidents related to operation and maintenance of the power plant	- Providing OHS training program and information of safe work practice and emergency procedure - Providing adequate health care facilities and first aid within the power plant site	All activity for workers	EPGE	MOEE	Included in the operation costs
4. Others							
	Accident	- Accident caused by storing /treating hazardous or dangerous materials	- Applying the internal safety standard to prevent accidents caused by power plant operation	All activity for workers	EPGE	MOEE	-
	Cross-border impact, climate change	- Possibility of increasing greenhouse gas (GHG) emission due to the operation of the power plant	- Planned combined cycle system has high efficiency - Promoting saving energy and electricity in the site	Mainly flue gas from the gas turbine stacks	EPGE	MOEE	-

Note: * These mitigation measures are actually incorporated into the project design at the time of project design, which will be implemented at the construction phase.
Source: EIA Study Team

Table 7.1-3 Mitigation Measures for Identified Potential Negative Impacts at the DECOMMISSIONING, CLOSURE, AND POST-CLOSURE PHASE (Power Facility)

Category	Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
Pollution	Air quality	- Temporary increase of dust from earthworks - Temporary increase of dust from waste transportation activities	- Avoiding the concentrated use of construction machines - Avoiding demolition works during strong wind - Sprinkling water to the demolition area - Applying car wash system for dump trucks	All demolition activities	Contractor of demolition works	EPGE	USD 500 / month for car washing system USD 3,500 / month for road sprinkler
	Waste	- Generation of solid waste from demolition works	- Keeping tidy in the demolition site - Setting up separate waste stock yard to promote the recycling and reuse the soil waste - Regular inspection of waste storage yard to check the status of segregation - Contractor should properly dispose the waste, which cannot be recycled by themselves or by third party in compliance with the relevant laws.	All demolition activities	Contractor of demolition works	EPGE	Included in the costs of contract
	Noise & vibration	- Noise and vibration due to demolition works and material handling - Noise and vibration due to transportation activities such as carrying soil by dump trucks	- Avoiding the concentrated use of construction machineries - Time limitation of the demolition work (e.g. daytime: 7:00 to 22:00) - Promoting awareness activity of gentle operation to the operators - Installation of temporary enclosure wall to the southern and east boundaries during construction	All demolition activities	Contractor of demolition works	EPGE	USD 77,000 for temporary enclosure wall

Category	Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
Social environment	Poverty	- Loss of job opportunities related to operation and maintenance of the power plant	- To prioritize the local people for hiring unskilled worker	All job offers	Contractor of demolition works	EPGE	-
	Local economy (employment)	- Loss of job opportunities related to operation and maintenance of the power plant	- To prioritize the local people for hiring unskilled worker	All job offers	Contractor of demolition works	EPGE	-
	Cultural heritage	- Impact on religious activity in the cultural heritage (Temple, Pagoda) from noise of demolition work	Same as "Noise and Vibration"	All demolition activities	Contractor of demolition works	EPGE	-
	Landscape	- Possibility of temporary disturbance on surrounding landscape due to storing construction machines and debris	- Installation of temporary enclosure wall to the southern and east boundaries during the demolition work	Mainly by construction machineries and stored debris	Contractor of demolition works	EPGE	Temporary enclosure wall is installed for noise mitigation
	Gender	- Possibility of discrimination of gender on job opportunity	- Providing job opportunity to all local people without discrimination of gender	All job offers	Contractor of demolition works	EPGE	-
	Children's rights	- Possibility of child labor on the project related demolition work	- Stipulating the term/condition to prohibit child employment into the tender/contract document	All job offers	Contractor of demolition works	EPGE	-
	Health (Community health, infectious disease such as HIV/AIDS)	- Increasing risk of infectious disease due to influx of construction workers in the construction site	- Educating workers and the surrounding communities on risks, prevention and available treatment on infectious disease through the HIV/AIDS prevention program - Preventing illness among workers by undertaking health awareness and education initiatives	All demolition activities	Contractor of demolition works	EPGE	-

Category	Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
	Occupational health and safety	- Increase the risk of accidents related to the demolition works	- Providing OHS training program and information of safe work practice and emergency procedure - Providing adequate health care facilities and first aid within the demolition site	All demolition activities	Contractor of demolition works	EPGE	Included in the costs of contract
Others	Accident	- Increase the risk of accidents related to the demolition works within the demolition site and at the surrounding communities	- Providing adequate health care facilities and first aid within the demolition site - Providing training to construction workers about OHS - Providing information and guidance on demolition activities and safety to the surrounding communities	All demolition activities	Contractor of demolition works	EPGE	Included in the costs of contract
	Cross-border impact, climate change	- Possibility of increasing greenhouse gas (GHG) emission due to demolition works	- Educating construction workers/drivers about stopping unnecessary idling for construction machines and vehicles - Avoiding excessive loading operation	All demolition activities	Contractor of demolition works	EPGE	Included in the costs of contract

Source: EIA Study Team

7.1.2. Gas Pipeline

Mitigation measures and the implementing organization at each project phase are shown from Table 7.1-4 to Table 7.1-7.

Table 7.1-4 Mitigation Measures for Identified Potential Negative Impacts at the PRE-CONSTRUCTION PHASE (Gas Pipeline)

Category	Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
Social environment	Involuntary resettlement	- Loss of income from crops and trees on the construction site	- Compensation of trees and crops in 3 times of the value calculated based on the current market price (compensation for trees will be paid only if it is needed to be cut. Trees naturally grown are not eligible for compensation).	Temporary land occupation	PMU, MRG, Township	EPGE	Covered in the ARAP
		- Loss of permanent structure by construction activities	- Compensation in full replacement cost to the entire structure if the affected portion is confirmed as not usable - Compensation in full replacement cost to the affected portion if the structure in the remaining portion is usable	Temporary land occupation	PMU, MRG, Township	EPGE	Covered in the ARAP

Source: EIA Study Team

Table 7.1-5 Mitigation Measures for Identified Potential Negative Impacts at CONSTRUCTION PHASE (Gas Pipeline)

Category	Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
Pollution	Air quality	- Temporary increase of dust from earthworks - Temporary increase of dust from transportation activities such as carrying soil by dump trucks	- Avoiding the concentrated use of construction machineries - Avoiding earthworks during strong wind - Covering the temporarily soil storage by cover sheets	Mainly earthwork	Contractor	EPGE	Included in the construction costs
	Waste	- Generation of solid waste from construction works	- Keeping tidy in the construction site - Contractor should carry the generated solid waste except excavated soil from gas pipeline construction site to the power plant site for segregation.	All construction activities	Contractor	EPGE	Included in the construction costs
	Noise & vibration	- Noise and vibration due to construction and material handling - Noise and vibration due to transportation activities such as carrying debris and soil by dump trucks	- Avoiding the concentrated use of construction machineries - Time limitation of the civil works (e.g. daytime: 7:00 to 22:00) - Promoting awareness activity of gentle operation to the operators	All construction activities	Contractor	EPGE	Included in the construction costs
	Ground subsidence	- Possibility of subsidence after burying gas pipeline due to inadequate soil compaction for backfill	- Avoid using waste and clay for backfilling of the pipeline - Execution of adequate soil compaction for back filling of the pipeline	Back filling	Contractor	EPGE	Included in the construction costs

Category	Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
Natural environment	Flora, fauna and biodiversity	- Change vegetation due to the construction works - Loss of important species and/or their habitats caused by the project development - Impact on biodiversity and ecosystem by the project development	- Minimizing land surface change such as minimize clearing shrub for stock yard	All construction activities	Contractor	EPGE	Included in the construction costs
Social environment	Poverty	- Impact to poverty groups due to temporary occupation	- Commencement of construction after harvest as much as possible - Prioritize the local people for hiring unskilled worker	All job offers	PMU, contractor	EPGE	-
	Local economy (Livelihood)	- Temporary disturbance of farm land	- Commencement of construction (i.e., installing the pipeline) after harvest as much as possible	All construction activities	PMU, contractor	EPGE	-
		- Temporary disturbance of kiosks	- Temporary relocation of kiosks to the nearest available land and necessary cost for moving should be provided by the project proponents, or - Allowance for temporal relocation for duration of the construction work in case a kiosk is not operated	All construction activities	PMU	EPGE	-
	Land use and utilization of local resources	- Temporary limitation of farmland use during the construction works	- Same as “Local economy (Livelihood)”	All construction activities	PMU, contractor	EPGE	-
	Existing social infrastructures and services	- Possibility of temporary traffic congestion due to temporary closure, and detour - Limited access to social infrastructure such as pagoda due to construction works	- Arranging a pedestrian way to secure access to social infrastructure as necessary - Informing contents of construction works and work schedule to the surrounding communities in advance - Setting up sign board on the road to show the construction term and location	All construction activities	Contractor	EPGE	Included in the construction costs

Category	Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
	Cultural heritage	- Impact on religious activities in the cultural heritage (Temple, Pagoda) from the noise of construction work	- Same as "Noise and Vibration"	All construction activities	Contractor	EPGE	Same as noise and vibration
	Gender	- Possibility of discrimination of gender on job opportunity	- Providing job opportunity to all local people without discrimination of gender	All job offers	Contractor	EPGE	-
	Children's rights	- Possibility of child labor to the project related construction works	- Including prohibition of child employment into the tender condition	All job offers	Contractor	EPGE	-
	Health (Community health, infectious disease such as HIV/AIDS)	- Increasing risk of infectious disease due to influx of construction workers in the construction site	- Education for workers and the surrounding communities on risks, prevention and available treatment on infectious disease through the HIIV/AIDS prevention program - Prevention illness among workers by undertaking health awareness and education initiatives	All construction activities	Contractor	EPGE	-
	Occupational health and safety	- Increase the risk of accidents related to the construction works	- Providing OHS training program and information of safe work practice and emergency procedure - Providing adequate health care facilities and first aid within the construction site	All construction activities	Contractor	EPGE	Included in the construction costs
Others	Accident	- Increase the risk of accidents related to the construction works within the construction site and at the surrounding communities	- Providing adequate health care facilities and first aid within the construction site - Providing training to construction workers about OHS - Providing information and guidance on construction activities and safety to the surrounding communities	All construction activities	Contractor	EPGE	Included in the construction costs

Category	Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
	Cross-border impact, climate change	- Possibility of increasing greenhouse gas (GHG) emission due to construction works	- Education for construction workers/drivers about stopping unnecessary idling for construction machines and vehicles - Avoiding excessive loading operation	All construction activities	Contractor	EPGE	Included in the construction costs

Source: EIA Study Team

Table 7.1-6 Mitigation Measures for Identified Potential Negative Impacts at the OPERATION PHASE (Gas Pipeline)

Category	Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
Others	Accident	- Accident caused by transporting gas by the pipeline	- Applying the design standard of MOGE for the detailed design of the gas pipeline to ensure safety during operation - Complying with the safety management plan of gas pipeline	Power facility	EPGE	MOEE	-

Source: EIA Study Team

Table 7.1-7 Mitigation Measures for Identified Potential Negative Impacts at the DECOMMISSIONING, CLOSURE, AND POST-CLOSURE PHASE (Gas Pipeline)

Category	Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
Pollution	Air quality	- Temporary increase of dust from earthworks - Temporary increase of dust from waste transportation activities	- Avoiding the concentrated use of construction machines - Avoiding demolition work during strong wind - Sprinkling water to the demolition area	All demolition activities	Contractor of demolition works	EPGE	Included in the costs of contract
	Waste	- Generation of solid waste from demolition works	- Keeping tidy in the demolition site - Contractor should carry the generated solid waste from gas pipeline site except for the soil to the power plant site to segregate.	All demolition activities	Contractor of demolition works	EPGE	Included in the costs of contract

Category	Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
	Noise & vibration	- Noise and vibration due to construction and material handling - Noise and vibration due to transportation activities such as carrying debris and soil by dump trucks	- Avoiding the concentrated use of construction machineries - Time limitation of the demolition works (e.g. daytime: 7:00 to 22:00) - Promoting awareness activity of gentle operation to the operators	All demolition activities	Contractor of demolition works	EPGE	Included in the costs of contract
Natural environment	Flora, fauna and biodiversity	- Change vegetation due to the construction works - Loss of important species and/or their habitats caused by the project development - Impact on biodiversity and ecosystem by the project development	- Minimizing land surface change such as clearing shrub for stock yard	All demolition activities	Contractor demolition works	EPGE	For aquatic biota, same as water quality
Social environment	Poverty	- Loss of job opportunities related to operation and maintenance of the power plant	- To prioritize the local people for hiring unskilled worker	All job offers	Contractor of demolition works	EPGE	-
	Local economy (employment)	- Loss of job opportunities related to operation and maintenance of the power plant	- To prioritize the local people for hiring unskilled worker	All job offers	Contractor of demolition works	EPGE	-
	Cultural heritage	- Impact on religious activities in the cultural heritage (Temple, Pagoda) from noise of demolition work	- Same as “Noise and Vibration”	All demolition activities	Contractor of demolition works	EPGE	Same as noise and vibration
	Gender	- Possibility of discrimination of gender on job opportunity	- Providing job opportunity to all local people without discrimination of gender	All job offers	Contractor of demolition works	EPGE	-
	Children’s rights	- Possibility of child labor on the project related demolition work	- Stipulating the term/condition to prohibit child employment into the tender/contract document	All job offers	Contractor of demolition works	EPGE	-

Category	Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
	Health (Community health, infectious disease such as HIV/AIDS)	- Increasing risk of infectious disease due to influx of construction workers in the demolition site	- Educating workers and the surrounding communities on risks, prevention and available treatment on infectious disease through the HIV/AIDS prevention program - Preventing illness among workers by undertaking health awareness and education initiatives	All demolition activities	Contractor of demolition works	EPGE	-
	Occupational health and safety	- Increase the risk of accidents related to the demolition works	- Providing OHS training program and information of safe work practice and emergency procedure - Providing adequate health care facilities and first aid within the demolition site	All demolition activities	Contractor of demolition works	EPGE	Included in the costs of contract
Others	Accident	- Increase the risk of accidents related to the demolition works within the construction site and at the surrounding communities	- Providing adequate health care facilities and first aid within the demolition site - Providing training to construction workers about OHS - Providing information and guidance on demolition activities and safety to the surrounding communities	All demolition activities	Contractor of demolition works	EPGE	Included in the costs of contract
	Cross-border impact, climate change	- Possibility of increasing greenhouse gas (GHG) emission due to demolition works	- Educating construction workers/drivers about stopping unnecessary idling for construction machines and vehicles - Avoiding excessive loading operation	All demolition activities	Contractor of demolition works	EPGE	Included in the costs of contract

Source: EIA Study Team

7.1.3. Water Pipeline

Mitigation measures and the implementing organization at each project phase are shown from Table 7.1-8 to Table 7.1-10

Table 7.1-8 Mitigation Measures for Identified Potential Negative Impacts at the PRE-CONSTRUCTION PHASE (Water Pipeline)

Category	Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
Social environment	Involuntary resettlement	- Land acquisition for electricity poles	- Compensation of the affected area in full replacement cost	Permanent/ temporary land occupation	PMU, MRG, Township	EPGE	Covered in the ARAP
		- Loss of income from crops and trees on the construction site	- Compensation of trees and crops in 3 times of the value calculated based on the current market price (compensation for trees will be paid only if it is needed to be cut. Trees naturally grown are not eligible for compensation).	Permanent/ temporary land occupation	PMU, MRG, Township	EPGE	Covered in the ARAP
		- Loss of permanent structure by construction activities	- Compensation in full replacement cost to the entire structure if the affected portion is confirmed as not usable - Compensation in full replacement cost to the affected portion if the structure in the remaining portion is usable	Permanent/ temporary land occupation	PMU, MRG, Township	EPGE	Covered in the ARAP
	Poverty	- Impact to poverty groups due to permanent land acquisition or temporary land occupation	- Same as “Involuntary resettlement”	Permanent/ temporary land occupation	PMU, MRG, Township	EPGE	-
	Local economy (Livelihood)	- Decrease of income due to permanent land acquisition or temporary occupation of farm land	- Same as “Involuntary resettlement”	Permanent/ temporary land occupation	PMU, MRG, Township	EPGE	-
	Land use and utilization of local resource	- Permanent and temporary limitation on farm land use due to land acquisition for electricity poles and construction work	- Same as “Involuntary resettlement”	Permanent/temporary land occupation	PMU, MRG, Township	EPGE	-

Source: EIA Study Team

Table 7.1-9 Mitigation Measures for Identified Potential Negative Impacts at CONSTRUCTION PHASE (Water Pipeline)

Category	Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
Pollution	Air quality	- Temporary increase of dust from earthworks - Temporary increase of dust from transportation activities such as carrying soil by dump trucks	- Avoiding the concentrated use of construction machineries - Avoiding earthworks during strong wind - Covering the temporarily soil storage by cover sheets	Mainly earthwork	Contractor	EPGE	Included in the construction costs
	Water quality	- Water pollution (muddy water) caused by the construction of the intake facility in the Myitnge river	- Installation of a steel structured cofferdam (steel sheet pile) - Use the silt barrier around the coffer dam - Use a temporary sedimentation tank for pumped up water in the working area	All construction activities	Contractor	EPGE	USD 166,000 for the cofferdam USD 36,000 for the silt barrier USD 3,000 for the sedimentation tank
	Waste	- Generation of solid waste from construction works	- Keeping tidy in the construction site - Contractor should carry the generated solid waste from water pipeline construction site except for the soil to the power plant site to segregate.	All construction activities	Contractor	EPGE	Included in the construction costs
	Noise & vibration	- Noise and vibration due to construction and material handling - Noise and vibration due to transportation activities such as carrying soil by dump trucks	- Avoiding the concentrated use of construction machineries - Time limitation of the civil works (e.g. daytime: 7:00 to 22:00) - Promoting awareness activities of gentle operation to the operators	All construction activities	Contractor	EPGE	Included in the construction costs

Category	Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
	Ground subsidence	- Possibility of subsidence after burying the water pipeline due to inadequate soil compaction for backfill	- Avoid using waste and clay for backfilling of the pipeline - Execution of adequate soil compaction for back filling of the pipeline	Back filling	Contractor	EPGE	Included in the construction costs
Natural environment	Flora, fauna and biodiversity	- Change vegetation due to the construction works - Loss of important species and/or their habitats caused by the project development - Impact on biodiversity and ecosystem by the project development	- Same as "water quality" for aquatic biota - Minimizing land surface change such as clearing shrub for the stock yard	All construction activities	Contractor	EPGE	For aquatic biota, same as water quality
Social environment	Poverty	- Impact to poverty groups due to permanent/ temporary occupation	- Commencement of construction after harvest as much as possible - Prioritize the local people for hiring unskilled worker	All job offers	PMU, contractor	EPGE	-
	Local economy (Livelihood)	- Permanent/ temporary disturbance of farm land	- Commencement of construction (i.e., installing water/gas pipeline) after harvest as much as possible	All construction activities	PMU, contractor	EPGE	-
		- Temporary disturbance of kiosks	- Temporary relocation of kiosks to the nearest available land and necessary cost for moving should be provided by the project proponents, or - Allowance for temporal relocation for duration of the construction work in case a kiosk is not operated	All construction activities	PMU	EPGE	-
	Land use and utilization of local resources	- Permanent/ temporary limitation of farmland use during the construction works	- Same as "Local economy (Livelihood)"	All construction activities	PMU, contractor	EPGE	-

Category	Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
	Water usage	- Water usage caused by the project development in construction phase	- Same as "Water quality"	Installation of the intake station	Contractor	EPGE	-
	Existing social infrastructures and services	- Possibility of temporary traffic congestion due to temporary closure, detour - Access limitation to social infrastructure such as pagoda due to construction works	- Applying steel sheet pile to narrow construction width in the rural road for water pipeline installation - Arranging pedestrian way to secure accessibly to social infrastructure as necessary - Informing contents of construction works and work schedule to the surrounding communities in advance - Setting up sign board on the road to show the construction term and location	All construction activities	Contractor	EPGE	Included in the construction costs
	Cultural heritage	- Impact on ruins of ancient city in heritage zone	- The manual excavation near the ancient wall for burying the pipelines - To comply with the conditions of approval from MORAC	Installation of the pipeline	Contractor	EPGE	-
		- Impact on religious activity in the cultural heritage (Temple, Pagoda) from the noise of construction work	- Same as "Noise and Vibration"	All construction activities	Contractor	EPGE	Same as noise and vibration
	Gender	- Possibility of discrimination of gender on job opportunity	- Providing job opportunity to all local people without discrimination of gender	All job offers	Contractor	EPGE	-
	Children's rights	- Possibility of child labor to the project related construction works	- Including prohibition of child employment into the tender condition	All job offers	Contractor	EPGE	-

Category	Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
	Health (Community health, infectious disease such as HIV/AIDS)	- Increasing risk of infectious disease due to influx of construction workers in the construction site	- Education workers and the surrounding communities on risks, prevention and available treatment on infectious disease through HIV/AIDS prevention program - Prevention illness among workers by undertaking health awareness and education initiatives	All construction activities	Contractor	EPGE	-
	Occupational health and safety	- Increase the risk of accidents related to the construction works	- Providing OHS training program and information of safe work practice and emergency procedure - Providing adequate health care facilities and first aid within the construction site	All construction activities	Contractor	EPGE	Included in the construction costs
Others	Accident	- Increase the risk of accidents related to the construction works within the construction site and at the surrounding communities	- Providing adequate health care facilities and first aid within the construction site - Providing training to construction workers about OHS - Providing information and guidance on construction activities and safety to the surrounding communities	All construction activities	Contractor	EPGE	Included in the construction costs
	Cross-border impact, climate change	- Possibility of increasing greenhouse gas (GHG) emission due to construction works	- Education for construction workers/drivers about stopping unnecessary idling for construction machines and vehicles - Avoiding excessive loading operation	All construction activities	Contractor	EPGE	Included in the construction costs

Source: EIA Study Team

Table 7.1-10 Mitigation Measures for Identified Potential Negative Impacts at the DECOMMISSIONING, CLOSURE, AND POST-CLOSURE PHASE (Water Pipeline)

Category	Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
Pollution	Air quality	- Temporary increase of dust from earthworks - Temporary increase of dust from waste transportation activities	- Avoiding the concentrated use of construction machines - Avoiding demolition works during blowing of strong wind - Sprinkling water to the demolition area	All demolition activities	Contractor of demolition works	EPGE	Included in the costs of contract
	Water quality	- Water pollution (muddy water) caused by the demolition of the intake facility in the Myitnge river	- Installation of the steel structure cofferdam (steel sheet pile) - Applying the silt barrier around the coffer dam - Applying temporary sediment tank for pumped up water in the working area	Demolition activities of the intake facility	Contractor of demolition works	EPGE	USD 166,000 for the cofferdam USD 36,000 for the silt barrier USD 3,000 for the sedimentation tank
	Waste	- Generation of solid waste from demolition works	- Keeping tidy in the demolition site - Contractor should carry the generated solid waste from water pipeline site except for the soil to the power plant site to segregate.	All demolition activities	Contractor of demolition works	EPGE	Included in the costs of contract
	Noise & vibration	- Noise and vibration due to demolition works and material handling - Noise and vibration due to transportation activities such as carrying debris and soil by dump trucks	- Avoiding the concentrated use of construction machineries - Time limitation of the demolition works (e.g. daytime: 7:00 to 22:00) - Promoting awareness activity of gentle operation to the operators	All demolition activities	Contractor of demolition works	EPGE	Included in the costs of contract

Category	Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
Natural environment	Flora, fauna and biodiversity	- Change vegetation due to the construction works - Loss of important species and/or their habitats caused by the project development - Impact on biodiversity and ecosystem by the project development	- Same as "water quality" for aquatic biota - Minimizing land surface change such as clearing shrub for stock yard	All demolition activities	Contractor of demolition works	EPGE	Included in the costs of contract
Social environment	Poverty	- Loss of job opportunities related to operation and maintenance of the power plant	- To prioritize the local people for hiring unskilled worker	All job offers	Contractor of demolition works	EPGE	-
	Local economy (employment)	- Loss of job opportunities related to operation and maintenance of the power plant	- To prioritize the local people for hiring unskilled worker	All job offers	Contractor of demolition works	EPGE	-
	Water usage	- Water usage caused by the project demolition of the water intake facility	- Same as "Water quality"	Demolition activities of the intake facility	Contractor of demolition works	EPGE	Same as water quality
	Cultural heritage	- Impact on religious activities in the cultural heritage (Temple, Pagoda) from noise of construction work	- Same as "Noise and Vibration"	All demolition activities	Contractor of demolition works	EPGE	Same as noise and vibration
	Gender	- Possibility of discrimination of gender on job opportunity	- Providing job opportunity to all local people without discrimination of gender	All job offers	Contractor of demolition works	EPGE	-
	Children's rights	- Possibility of child labor on the project related demolition works	- Stipulating the term/condition to prohibit child employment into the tender/contract document	All job offers	Contractor of demolition works	EPGE	-

Category	Items	Identified Potential Negative Impact	Mitigation Measures	Relevant Factor	Implementing Organization	Responsible Organization	Roughly estimated cost (USD)
	Health (Community health, infectious disease such as HIV/AIDS)	- Increasing the risk of infectious diseases due to influx of construction workers in the construction site	- Educating workers and the surrounding communities on risks, prevention and available treatment on infectious disease through the HIV/AIDS prevention program - Preventing illness among workers by undertaking health awareness and education initiatives	All demolition activities	Contractor of demolition works	EPGE	-
	Occupational health and safety	- Increase the risk of accidents related to the demolition works	- Providing OHS training program and information of safe work practice and emergency procedure - Providing adequate health care facilities and first aid within the demolition site	All demolition activities	Contractor of demolition works	EPGE	Included in the costs of contract
Others	Accident	- Increase the risk of accidents related to the demolition works within the demolition site and at the surrounding communities	- Providing adequate health care facilities and first aid within the construction site - Providing training to construction workers about OHS - Providing information and guidance on construction activities and safety to the surrounding communities	All demolition activities	Contractor of demolition works	EPGE	Included in the costs of contract
	Cross-border impact, climate change	Possibility of increasing greenhouse gas (GHG) emission due to demolition works	- Educating construction workers/drivers about stopping unnecessary idling for construction machines and vehicles - Avoiding excessive loading operation	All demolition activities	Contractor of demolition works	EPGE	Included in the costs of contract

Source: EIA Study Team

7.2. Environmental Monitoring Plan

The environmental monitoring plan including monitoring items, location, frequency and responsibility at each project phase is developed. The organization responsible for monitoring at each phase needs to review the monitoring results and takes necessary actions in case the monitoring results do not satisfy the standard values defined in Chapter 2. The monitoring results will be submitted to MONREC and JICA accordingly. The period for submission of monitoring report is quarterly during construction and demolition. On operation phase, the period is biannually.

7.2.1. Power Facility

7.2.1.1. The Environmental Monitoring Plan for the Power Facility at Construction Phase

The environmental monitoring plan during construction phase are shown in Table 7.2-1 and monitoring locations are presented in Figure 7.2-1 and Figure 7.2-2.

Table 7.2-1 Environmental Monitoring Plan at CONSTRUCTION PHASE (Power Facility)

Item	Monitoring Item	Monitoring Method	Monitoring Place	Frequency	Term	Responsibility	Roughly estimated cost (USD) [a]
1. Pollution							
Air quality	PM_{10}, Dust	[PM_{10}] Site Measurement	1 nearest village around the Project site	Quarterly (site measurement: for 1 week)	Entire construction phase	Contractor	USD 1,200 / survey
		[Dust] Check records of complaint					Included in the administration cost of contractor
Waste	Record of waste disposal and site condition	[Construction Yard] Check records of the amount and type of waste, and disposal method [Worker's Camp] Visual check for solid waste on the camp site and check records if collected by the licenced vendor.	Power facility site	Weekly	Entire construction phase	Contractor	Included in the construction costs
Soil contamination	Installation of paved refilling facility	Check the installation of paved refilling facility	Power facility site	Quarterly	Entire construction phase	Contractor	Included in the administration cost of contractor
Noise and vibration	Noise level (L_{Aeq}), Vibration level (L_{v10}) Traffic volume (for road side monitoring)	Check records of complaints (for noise and vibration) Site measurement	2 points (1 point near the project site, 1 point along the access road)	Quarterly for checking records. Once for measurement when construction work is at its peak (in daytime, 15hours)	Entire construction phase	Contractor	USD 1,400 / survey

Item	Monitoring Item	Monitoring Method	Monitoring Place	Frequency	Term	Responsibility	Roughly estimated cost (USD) [a]
2. Natural environment							
Flora, fauna and biodiversity	Condition of ecosystem	Field reconnaissance of ecosystem (e.g. vegetation, river water)	Around power facility site	2 times a year (rainy season and dry season)	Entire construction phase	Contractor	USD 900 / survey
3. Social environment							
Cultural heritage	Complaint from surrounding communities	Check complaint records	Power facility site	Weekly	Entire construction phase	Contractor	Included in the administration cost of contractor
Landscape	Installation of temporally enclosure wall	Check the site condition Check the installation of enclosure wall	Power facility site	Quarterly	Entire construction phase	Contractor	Included in the administration cost of contractor
Gender	Complaint from surrounding communities	Check complaint records	Power facility site	Weekly	Entire construction phase	Contractor	Included in the administration cost of contractor
Children's rights	Working record	Check working records of workers	Power facility site	Weekly	Entire construction phase	Contractor	Included in the administration cost of contractor
Health (Community health, infectious disease such as HIV/AIDS)	Awareness of infectious disease	Check records of awareness activities on infectious disease	Power facility site	Weekly	Entire construction phase	Contractor	Included in the administration cost of contractor
Occupational health and safety	Record of accidents in the construction site Usage of protective gears Record of safety education to workers	Check record of accidents in the construction site Observe usage of protective gears where applicable Check record of safety education	Power facility site	Weekly	Entire construction phase	Contractor	Included in the administration cost of contractor
4. Others							
Accident	Record of traffic accidents in the surrounding communities Record of information sharing of construction work for safety Record of awareness rising activities for safety	Check records of traffic accidents in the surrounding communities Check record of information sharing of construction work for safety	Along access road	Weekly	Entire construction phase	Contractor	Included in the administration cost of contractor

Item	Monitoring Item	Monitoring Method	Monitoring Place	Frequency	Term	Responsibility	Roughly estimated cost (USD) [a]
		Check record of awareness rising activities for safety					
Cross-border impact, climate change	Promote the efficient fuel use Amount of fuel use	Check records of fuel consumption Check record of awareness rising activities for efficient fuel use	Power facility site	Weekly	Entire construction phase	Contractor	Included in the administration cost of contractor

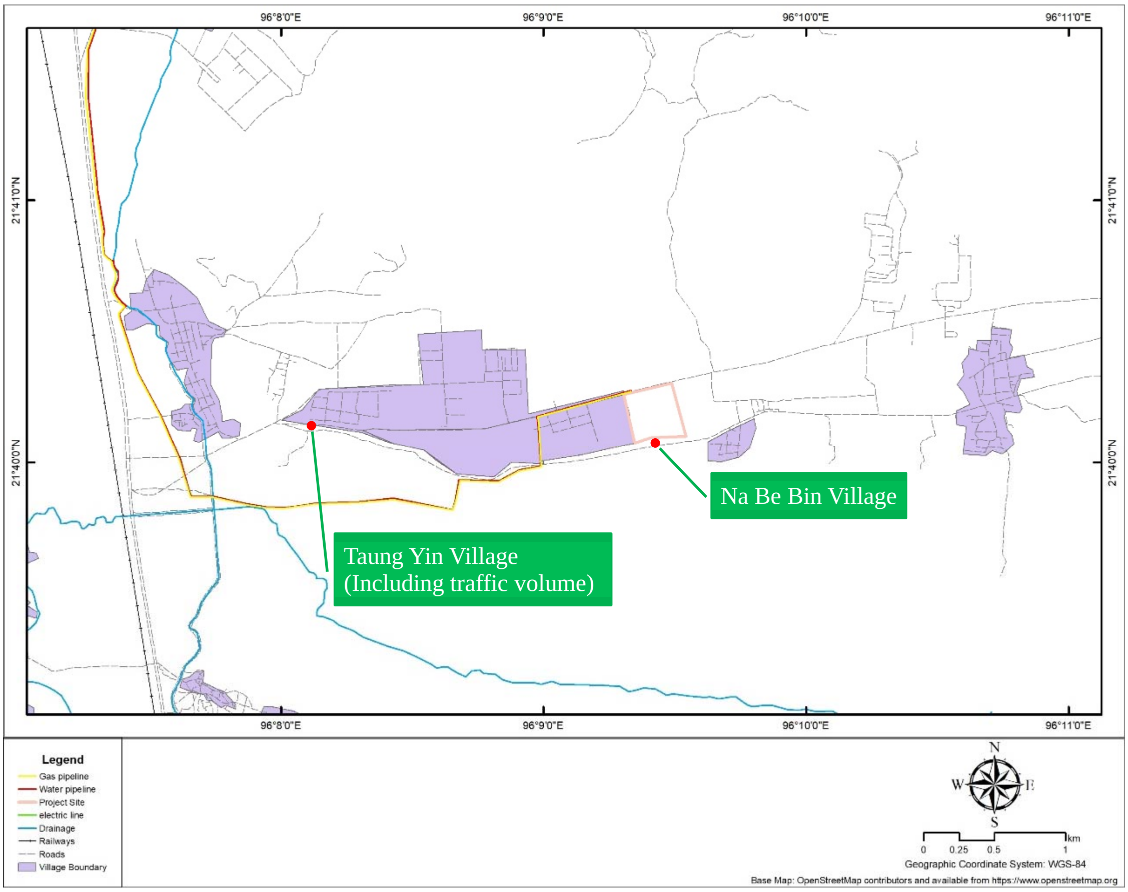
Note: a: Estimated cost per one survey. Traveling cost and allowances such as accommodation expenses are not included
Source: EIA Study Team

1) Air Quality

Source: EIA Study Team

Figure 7.2-1 Monitoring Point of Air Quality in CONSTRUCTION PHASE, DECOMMISSIONING, CLOSURE, AND POST-CLOSURE PHASE (Power Facility)

2) Noise & Vibration



Source: EIA Study Team

Figure 7.2-2 Monitoring Point of Noise & Vibration in CONSTRUCTION PHASE, DECOMMISSIONING, CLOSURE, AND POST-CLOSURE PHASE (Power Facility)

7.2.1.2. The Environmental Monitoring Plan for the Power Facility during Operation Phase

The environmental monitoring plan during operation phase are shown in Table 7.2-2 and monitoring locations are presented in Figure 7.2-3 to Figure 7.2-6.

Table 7.2-2 Environmental Monitoring Plan at OPERATION PHASE (Power Facility)

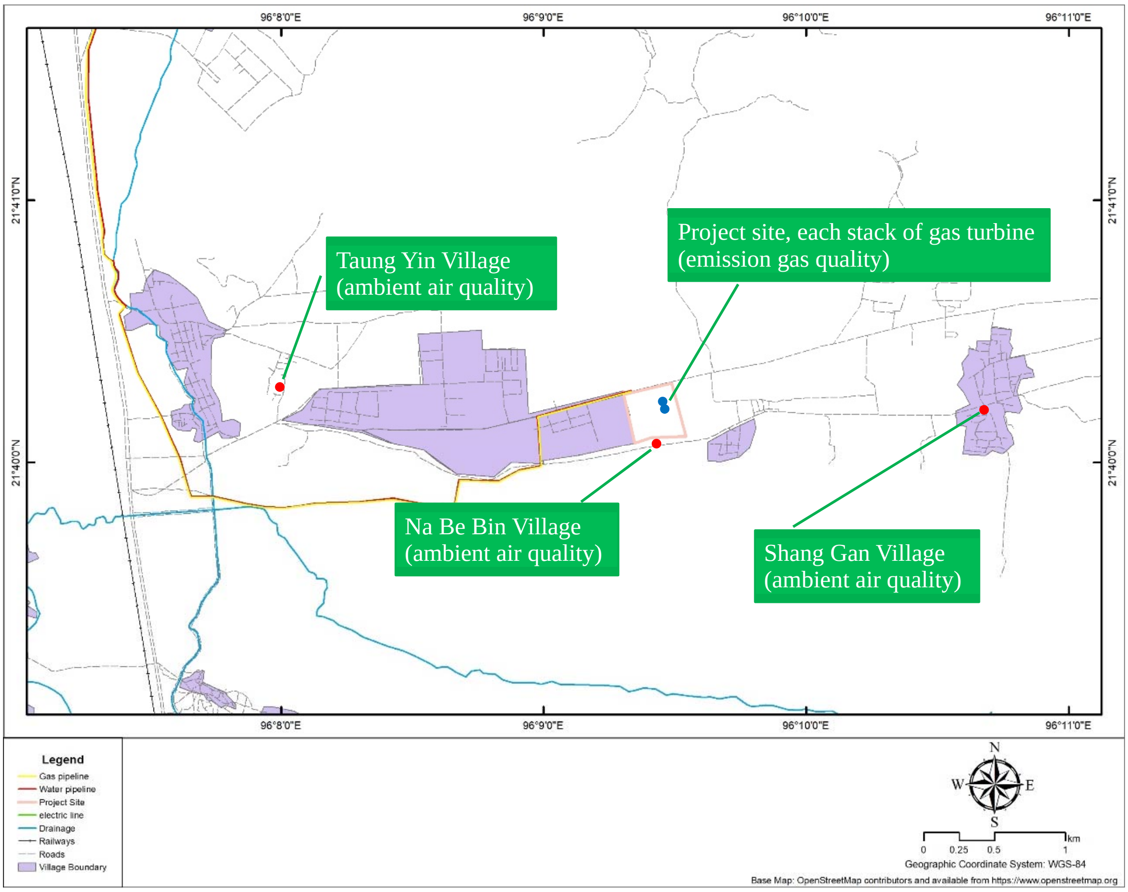
Item	Monitoring Item	Monitoring Method	Monitoring Place	Frequency	Term	Responsibility	Roughly estimated cost (USD) [a]
1. Pollution							
Air quality (Ambient)	NO_2	Site measurement	3 points around the Power facility site	Quarterly (each for 1 week)	2 years from starting operation	EPGE	USD 3,600 / survey
Air quality (Emission gas)	NO_2	Site measurement	2 points (each stack of gas turbine)	Quarterly	2 years from starting operation	EPGE	USD 2,400 / survey
Water quality (Treated effluent of power facility)	Arsenic, Cadmium, Iron, Lead, Mercury, Oil and grease, pH, Temperature increase, Total residual chlorine, Total suspended solids, Chromium (total), Copper, Zinc	Site measurement	1 point of outlet of effluent of power facility	Quarterly	2 years from starting operation	EPGE	USD 600 / survey
Water quality (Treated effluent of domestic usage)	BOD, Ammonia, Arsenic, Cadmium, Chemical oxygen demand, Chlorine (total residual), Chromium (hexavalent) Chromium (total) Copper, Cyanide (free), Cyanide (total), Fluoride, Heavy metals (total), Iron (total), Lead, Mercury, Nickel, Oil and grease, pH, Phenols, Selenium, Silver, Sulphide, Temperature increase, Total coliform bacteria, Total phosphorus, Total suspended solids, Zinc	Site measurement	1 point of outlet of effluent of domestic wastewater treatment facility	Quarterly	2 years from starting operation	EPGE	USD 900 / survey
Water quality (Myitnge River)	BOD, Ammonia, Arsenic, Cadmium, Chemical oxygen demand, Chlorine (total	Site measurement	3 points	Quarterly	2 years from starting operation	EPGE	USD 2,000 / survey

Item	Monitoring Item	Monitoring Method	Monitoring Place	Frequency	Term	Responsibility	Roughly estimated cost (USD) [a]
	residual), Chromium (hexavalent) Chromium (total) Copper, Cyanide (free), Cyanide (total), Fluoride, Heavy metals (total), Iron (total), Lead, Mercury, Nickel, Oil and grease, pH, Phenols, Selenium, Silver, Sulphide, Temperature increase, Total coliform bacteria, Total phosphorus, Total suspended solids, Zinc		- Effluent at the discharge point to Myitnge river - River water at upstream and 100m downstream of the discharge point				
Waste	Record of waste disposal and site condition	Check records of amount and type of waste, and disposal method	Power facility site	Monthly	2 years from starting operation	EPGE	Included in the operation costs
Noise and Vibration	Noise level (L_{Aeq}), Vibration level (L_{v10})	Site measurement	3 points around the Power facility site	Quarterly (daytime and nighttime, 24 hours)	2 years from starting operation	EPGE	USD 2,100 / survey
Offensive odor	Complaint from surrounding communities	Check complaint records (for offensive odor)	Power facility site	Quarterly	2 years from starting operation	EPGE	Included in the operation costs
2. Natural environment							
Flora, fauna and biodiversity	Condition of ecosystem	Field reconnaissance of ecosystem (e.g. vegetation, river water)	Around project site	2 times a year (rainy season and dry season)	2 years from starting operation	EPGE	USD 900 / survey
Hydrology	Complaint from villagers who live or cultivate along downstream of the channel Monitor for maintenance and capacity of the regulation pond	Check complaint records (for flooding) Check record of maintenance	Around downstream of the channel of the Power facility	Monthly during Rainy season	2 years from starting operation	EPGE	Included in the operation costs
3. Social environment							
Water use	Complaint from surrounding communities	Check complaint records	Myitnge River (from discharge point to 100 m downstream)	Every 2 weeks	2 years from starting operation	EPGE	Included in the operation costs

Item	Monitoring Item	Monitoring Method	Monitoring Place	Frequency	Term	Responsibility	Roughly estimated cost (USD) [a]
Existing social infrastructure and service	Complaint from surrounding communities	Check complaint records	Around the power facility site	Every 2 weeks	2 years from starting operation	EPGE	Included in the operation costs
Cultural heritage	Complaint from surrounding communities	Check complaint records	Around the Power facility site	Every 2 weeks	2 years from starting operation	EPGE	Included in the operation costs
Landscape	Condition of Planting and Greening	Check the site condition	Around the Power facility site	Quarterly	One time after starting operation	EPGE	Included in the operation costs
Gender	Complaint from surrounding communities	Check complaint records	Around the Power facility site	Every 2 weeks	2 years from starting operation	EPGE	Included in the operation costs
Children's rights	Complaints from surrounding communities	Check complaint records	Around the Power facility site	Every 2 weeks	2 years from starting operation	EPGE	Included in the operation costs
Health (Community health, infectious disease such as HIV/AIDS)	Health condition of surrounding village	Record of Health condition	In and around the Power facility site	Quarterly	2 years from starting operation	EPGE	Site measurement will be conducted in ambient air quality
Occupational health and safety	Records of accidents in the power facility Usage of protective gears	Check record of accidents in the construction site Observe usage of protective gears where applicable	Power facility site	Every 2 weeks	2 years from starting operation	EPGE	Included in the operation costs
4. Others							
Accident	Records of accidents Records of gas leakage monitoring activities	Check records of accidents Check records of gas leakage monitoring activities	Power facility site	Every 2 weeks	2 years from starting operation	EPGE	Included in the operation costs
Cross-border impact, climate change	Amount of fuel gas used, and electricity generated	Checking operation records	Around the Power facility site	Quarterly	2 years from starting operation	EPGE	Included in the operation costs

Note: a: Estimated cost per one survey. Traveling cost and allowances such as accommodation expenses, etc. are not included
Source: EIA Study Team

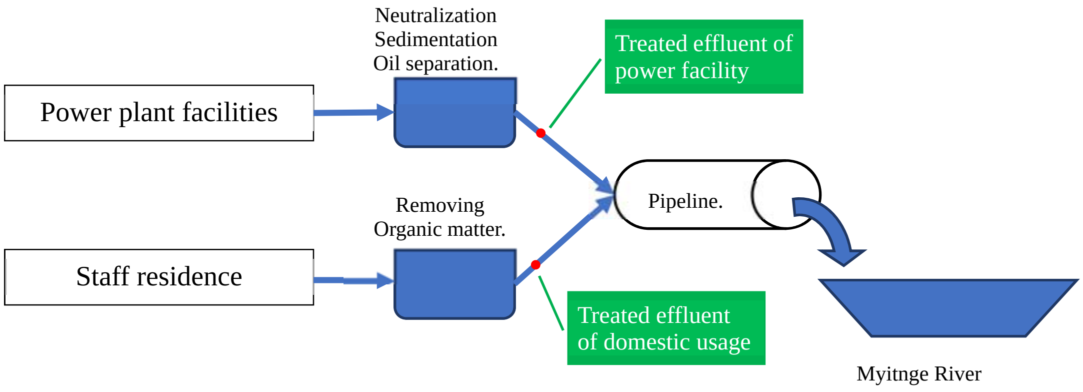
1) Air Quality



Source: EIA Study Team

Figure 7.2-3 Monitoring Point of Air Quality in OPERATION PHASE (Power Facility)

2) Water Quality



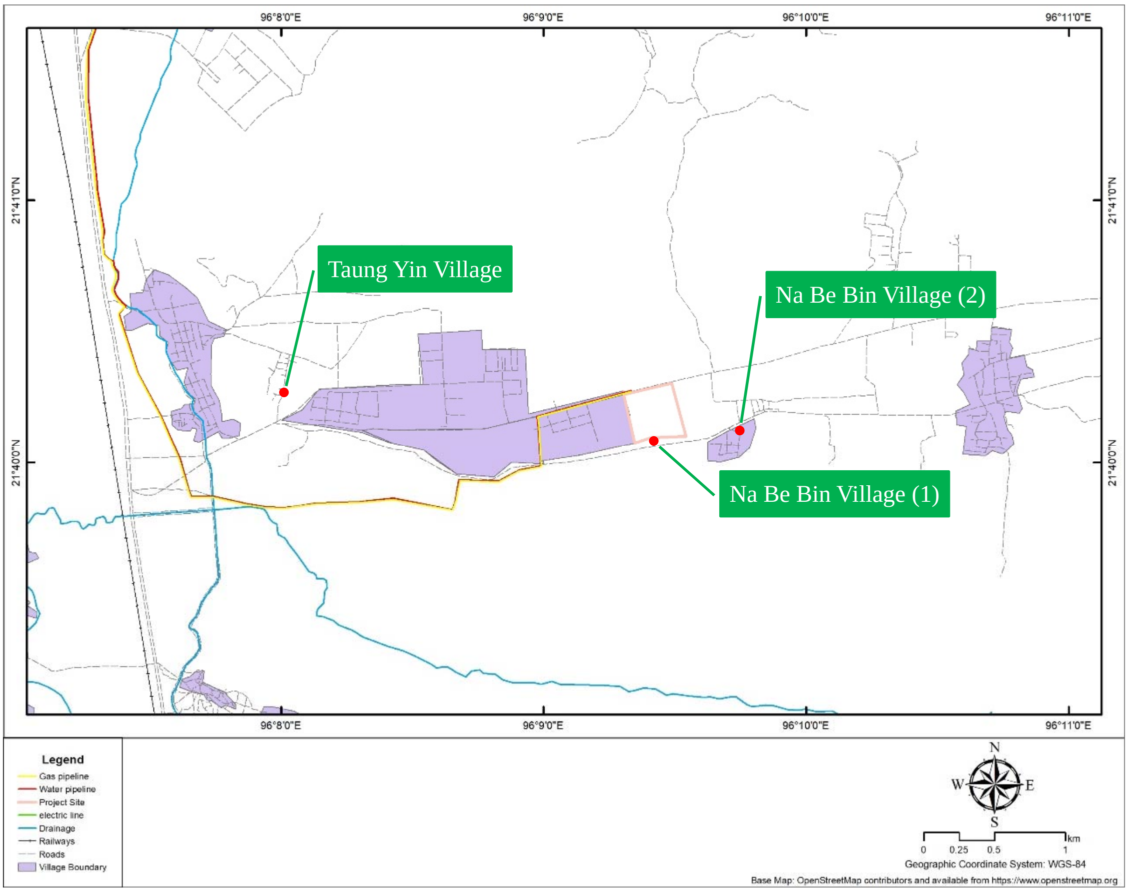
Source: EIA Study Team

Figure 7.2-4 Monitoring Point of Water Quality in the Project site in OPERATION PHASE (Power Facility)

Source: EIA Study Team based on the image by Google Earth Pro

Figure 7.2-5 Monitoring Point of Water Quality in Myitnge River in OPERATION PHASE (Power Facility)

3) Noise & Vibration



Source: EIA Study Team

Figure 7.2-6 Monitoring Point of Noise & Vibration in OPERATION PHASE (Power Facility)

7.2.1.3. The Environmental Monitoring Plan for the Power Facility at Decommissioning, Closure and Post-Closure Phase

The environmental monitoring plan during decommissioning, closure and post-closure phase are shown in Table 7.2-3 and monitoring locations are as presented in Figure 7.2-1 and Figure 7.2-2 in the section 7.2.1.1.

Table 7.2-3 Environmental Monitoring Plan at DECOMMISSIONING, CLOSURE, AND POST-CLOSURE PHASE (Power Facility)

Item	Monitoring Item	Monitoring Method	Monitoring Place	Frequency	Term	Responsibility	Roughly estimated cost (USD) [a]
1. Pollution							
Air quality	PM_{10}, Dust	[PM_{10}] Site Measurement [Dust] Check records of complaint	1 nearest village around the project site	Quarterly (site measurement: for 1 week)	Entire demolition phase	Contractor of demolition works	USD 1,200 / survey
Waste	Record of waste disposal and site condition	[Construction Yard] Check records of amount and type of waste, and disposal method [Worker's Camp] Visual check for solid waste on the camp site and check records if collected by the licenced vendor.	Demolition site	Weekly	Entire demolition phase	Contractor of demolition works	Included in the administration cost of contractor
Noise and vibration	Noise level (L_{Aeq}), Vibration level (L_{v10}) Traffic volume (for road side monitoring)	Check records of complaint (for noise and vibration) Site measurement	2 points (1 point near the project site, 1 point along the access road)	Quarterly for checking records, Once for measurement when construction work is at its peak (in daytime, 15 hours)	Entire demolition phase	Contractor of demolition works	USD 1,400 / survey
2. Social environment							
Poverty	Complaint from surrounding communities	Check complaint records	Power facility site	Weekly	Entire demolition phase	Contractor of demolition works	Included in the administration cost of contractor

Item	Monitoring Item	Monitoring Method	Monitoring Place	Frequency	Term	Responsibility	Roughly estimated cost (USD) [a]
Local economy (Employment)	Complaint from surrounding communities	Check complaint records	Power facility site	Weekly	Entire demolition phase	Contractor of demolition works	Included in the administration cost of contractor
Cultural Heritage	Complaint from surrounding communities	Check complaint records	Power facility site	Weekly	Entire demolition phase	Contractor of demolition works	Included in the administration cost of contractor
Landscape	Installation of temporally enclosure wall	Check the site condition Check the installation of enclosure wall	Power facility site	Quarterly	Entire demolition phase	Contractor of demolition works	Included in the administration cost of contractor
Gender	Complaint from surrounding communities	Check complaint records	Power facility site	Weekly	Entire demolition phase	Contractor of demolition works	Included in the administration cost of contractor
Children’s rights	Working record	Check working records of workers	Power facility site	Weekly	Entire demolition phase	Contractor of demolition works	Included in the administration cost of contractor
Health (Community health, infectious disease such as HIV/AIDS)	Awareness of infectious disease	Check records of awareness activities on infectious disease	Power facility site	Weekly	Entire demolition phase	Contractor of demolition works	Included in the administration cost of contractor
Occupational health and safety	Record of accidents in the construction site Usage of protective gears Record of safety education to workers	Check record of accidents in the construction site Observe usage of protective gears where applicable Check record of safety education	Power facility site	Weekly	Entire demolition phase	Contractor of demolition works	Included in the administration cost of contractor
3. Others							
Accident	Record of traffic accidents in the surrounding communities Record of information sharing of construction work for safety Record of awareness rising activities for safety	Check records of traffic accidents in the surrounding communities Check record of information sharing of construction work for safety Check record of awareness rising activities for safety	Along access road	Weekly	Entire demolition phase	Contractor of demolition works	Included in the administration cost of contractor
Cross-border impact, climate change	Promote the efficient fuel use Amount of fuel use	Check records of fuel consumption	Power facility site	Weekly	Entire demolition phase	Contractor of demolition works	Included in the administration cost of contractor

Item	Monitoring Item	Monitoring Method	Monitoring Place	Frequency	Term	Responsibility	Roughly estimated cost (USD) [a]
		Check record of awareness rising activities for efficient fuel use					

Note: a: Estimated cost per one survey. Traveling cost and allowances such as accommodation expenses, etc. are not included
Source: EIA Study Team

7.2.2. Gas Pipeline

7.2.2.1. The Environmental Monitoring Plan for the Gas Pipeline during Pre-Construction Phase

The environmental monitoring plan at each project phase are shown from Table 7.2-4.

Table 7.2-4 Environmental Monitoring Plan at Pre-CONSTRUCTION PHASE (Gas Pipeline)

Item	Monitoring Item	Monitoring Method	Monitoring Place	Frequency	Term	Responsibility	Roughly estimated cost (USD)
1. Social environment							
Involuntary resettlement	Progress of payment and site clearance for temporary land occupation	Check records of payment and site clearance	Along gas pipeline	Monthly	Up to completion of compensation payment and site clearance	PMU	Covered in the ARAP
	Grievance	Checking records of grievances (reception, contents and status of the process)	Along gas pipeline	Monthly	Until the livelihood is restored	PMU	Covered in the ARAP
	Restoration status of the PAPs	Checking implementation of restoration (if executed)	Along gas pipeline	Monthly	Until the livelihood is restored	PMU	Covered in the ARAP

Source: EIA Study Team

7.2.2.2. The Environmental Monitoring Plan for the Gas Pipeline during Construction Phase

The Environmental Monitoring Plan for the Gas Pipeline during Construction Phase The environmental monitoring plan at construction phase is shown in Table 7.2-5 and monitoring locations are presented in Figure 7.2-7.

Table 7.2-5 Environmental Monitoring Plan at CONSTRUCTION PHASE (Gas Pipeline)

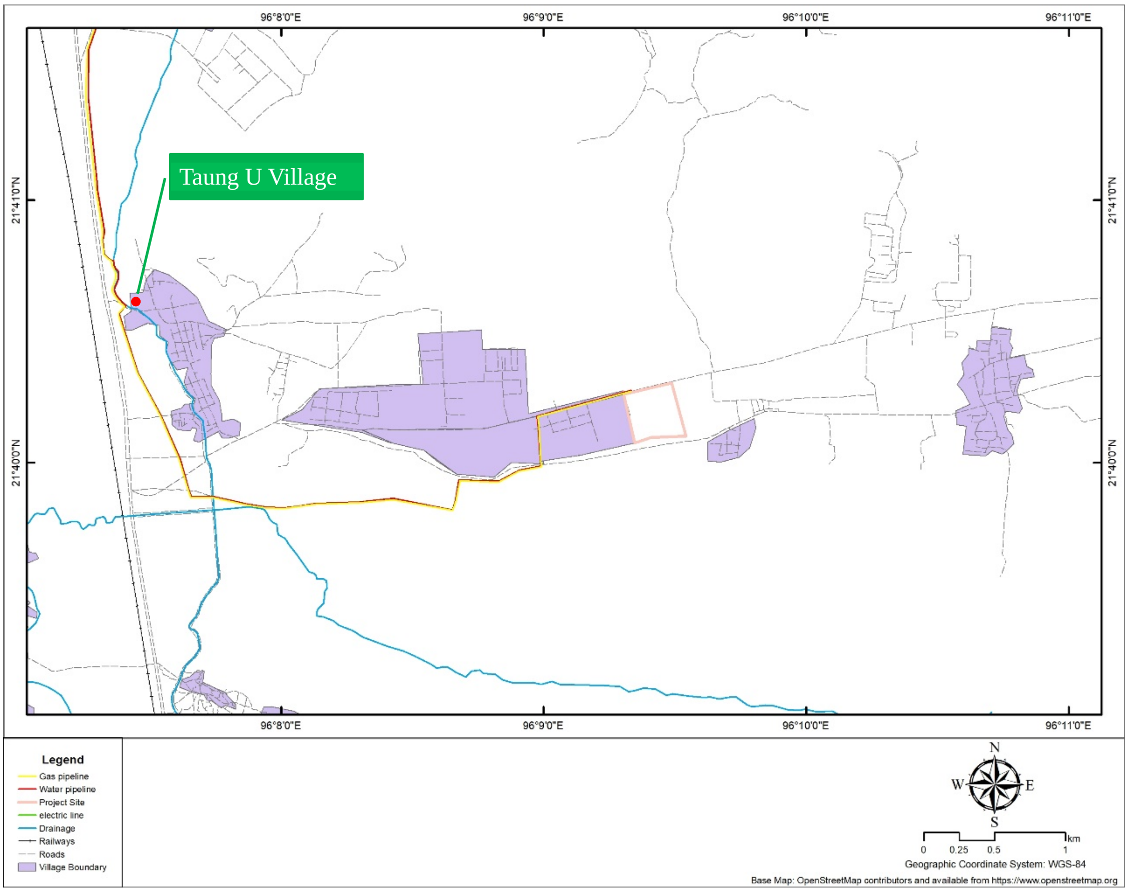
Item	Monitoring Item	Monitoring Method	Monitoring Place	Frequency	Term	Responsibility	Roughly estimated cost (USD) [a]
1. Pollution							
Air quality	Dust	Check records of complaint (for Dust)	1 nearest village around the construction site	Quarterly	Entire construction phase	Contractor	Included in the administration cost of contractor
Waste	Record of waste disposal	[Construction Yard] Check records of amount and type of waste, and disposal method [Worker's Camp] Visual check for solid waste on the camp site and check records if collected by the licenced vendor.	Along gas pipeline	Weekly	Entire construction phase	Contractor	Included in the administration cost of contractor
Noise and vibration	Noise level (L_{Aeq}), Vibration level (L_{v10})	Check records of complaint (for noise and vibration) Site measurement	For checking records: near the construction site For site measurement, 1 point near the gas pipeline	Quarterly for checking records Once for measurement when construction work is at its peak (daytime, 15hours)	Entire construction phase	Contractor	USD 700 / survey
Ground subsidence	Ground level condition	Check records of complaint (for ground subsidence)	Along gas pipeline	Quarterly	Entire construction phase	Contractor	Included in the administration cost of contractor
2. Natural environment							
Flora, fauna and biodiversity	Condition of ecosystem	Field reconnaissance of ecosystem (e.g. vegetation, river water)	Along gas pipeline	2 times a year (rainy season and dry season)	Entire construction phase	Contractor	USD 900 / survey

Item	Monitoring Item	Monitoring Method	Monitoring Place	Frequency	Term	Responsibility	Roughly estimated cost (USD) [a]
3. Social environment							
Poverty	Progress of compensation payment	Check payment records	Along gas pipeline	Weekly	Up to compensation payment	PMU	Covered in the ARAP
Local economy (Livelihood)	Complaint from surrounding communities	Check complaint records	Along gas pipeline	Quarterly	Up to completion of payment	PMU	
Land use and utilization of local resources	Complaint from surrounding communities	Check complaint records	Along gas pipeline	Quarterly	Entire construction phase	PMU	
Existing social infrastructure and service	Complaint from surrounding communities	Check complaint records	Along gas pipeline	Weekly	Entire construction phase	Contractor	Included in the administration cost of contractor
Cultural heritage	Complaint from surrounding communities	Check complaint records	Along gas pipeline	Weekly	Entire construction phase	Contractor	Included in the administration cost of contractor
Gender	Complaint from surrounding communities	Check complaint records	Along gas pipeline	Weekly	Entire construction phase	Contractor	Included in the administration cost of contractor
Children's rights	Working record	Check working records of workers	Along gas pipeline	Weekly	Entire construction phase	Contractor	Included in the administration cost of contractor
Health (Community health, infectious disease such as HIV/AIDS)	Awareness of infectious disease	Check records of awareness activities on infectious disease	Along gas pipeline	Weekly	Entire construction phase	Contractor	-
Occupational health and safety	Record of accidents in the construction site Usage of protective gears Record of safety education to workers	Check record of accidents in the construction site Observe usage of protective gears Check record of safety education	Along gas pipeline	Weekly	Entire construction phase	Contractor	Included in the administration cost of contractor
4. Others							
Accident	Record of traffic accidents in the surrounding communities Record of information sharing of construction work for safety	Check records of traffic accidents in the surrounding communities	Along gas pipeline	Weekly	Entire construction phase	Contractor	Included in the administration cost of contractor

Item	Monitoring Item	Monitoring Method	Monitoring Place	Frequency	Term	Responsibility	Roughly estimated cost (USD) [a]
	Record of awareness rising activities for safety	Check record of information sharing of construction work for safety Check record of awareness rising activities for safety					
Cross-border impact, climate change	Promote the efficient fuel use Amount of fuel use	Check records of fuel consumption Check record of awareness rising activities for efficient fuel use	Along gas pipeline	Weekly	Entire construction phase	Contractor	Included in the administration cost of contractor

Note: a: Estimated cost per one survey. Traveling cost and allowances such as accommodation expenses are not included
Source: EIA Study Team

1) Noise and Vibration



Source: EIA Study Team

Figure 7.2-7 Monitoring Point of Noise & Vibration in CONSTRUCTION PHASE, DECOMMISSIONING, CLOSURE, AND POST-CLOSURE PHASE (Gas Pipeline)

7.2.2.3. The Environmental Monitoring Plan for the Gas Pipeline during Operation Phase

The environmental monitoring plan at operation phase is shown in Table 7.2-6.

Table 7.2-6 Environmental Monitoring Plan at OPERATION PHASE (Gas Pipeline)

Item	Monitoring Item	Monitoring Method	Monitoring Place	Frequency	Term	Responsibility	Roughly estimated cost (USD) [a]
1. Others							
Accident	Records of accidents Records of gas leakage monitoring activities	Check records of accidents Check records of gas leakage monitoring activities	Along gas pipeline	Every 2 weeks	2 years from starting operation	EPGE	Included in the administration costs of EPGE

Source: EIA Study Team

7.2.2.4. The Environmental Monitoring Plan for the Gas Pipeline during Decommissioning, Closure and Post-closure Phase

The environmental monitoring plan at decommissioning, closure and post-closure phases is shown in Table 7.2-7 and monitoring locations are presented in Figure 7.2-7 in the section 7.2.2.2.

Table 7.2-7 Environmental Monitoring Plan at DECOMMISSIONING, CLOSURE, AND POST-CLOSURE PHASE (Gas Pipeline)

Item	Monitoring Item	Monitoring Method	Monitoring Place	Frequency	Term	Responsibility	Roughly estimated cost (USD) [a]
1. Pollution							
Air quality	Dust	Dust check records of complaint (for Dust)	1 nearest village around the construction site	Quarterly	Entire demolition phase	Contractor of demolition works	Included in the administration cost of contractor
Waste	Record of waste disposal	[Construction Yard] Check records of amount and type of waste, and disposal method [Worker's Camp] Visual check for solid waste on the camp site. If collected by the licenced vendor, check the collection records.	Along gas pipeline	Weekly	Entire demolition phase	Contractor of demolition works	Included in the administration cost of contractor
Noise and vibration	Noise level (L_{Aeq}), Vibration level (L_{v10})	Check records of complaint (for noise and vibration) Site measurement	For checking records: near the demolition site For site measurement, 1 point near the gas pipeline	Quarterly for checking records Once for measurement when demolition works are at its peak (daytime, 15hours)	Entire demolition phase	Contractor of demolition works	USD 700 / survey
2. Natural environment							
Flora, fauna and biodiversity	Condition of ecosystem	Field reconnaissance of ecosystem (e.g. vegetation, river water)	Along gas pipeline	2 times a year (rainy season and dry season)	Entire demolition phase	Contractor of demolition works	USD 900 / survey

3. Social environment							
Poverty	Complaint from surrounding communities	Check complaint records	Along gas pipeline	Weekly	Entire demolition phase	Contractor of demolition works	Included in the administration cost of contractor
Local economy (Employment)	Complaint from surrounding communities	Check complaint records	Along gas pipeline	Weekly	Entire demolition phase	Contractor of demolition works	Included in the administration cost of contractor
Cultural heritage	Complaint from surrounding communities	Check complaint records	Along gas pipeline	Weekly	Entire demolition phase	Contractor of demolition works	Included in the administration cost of contractor
Gender	Complaint from surrounding communities	Check complaint records	Along gas pipeline	Weekly	Entire demolition phase	Contractor of demolition works	Included in the administration cost of contractor
Children's rights	Working record	Check working records of workers	Along gas pipeline	Weekly	Entire demolition phase	Contractor of demolition works	Included in the administration cost of contractor
Health (Community health, infectious disease such as HIV/AIDS)	Awareness of infectious disease	Check records of awareness activities on infectious disease	Along gas pipeline	Weekly	Entire demolition phase	Contractor of demolition works	Included in the administration cost of contractor
Occupational health and safety	Record of accidents in the construction site Usage of protective gears Record of safety education to workers	Check record of accidents in the construction site Observe usage of protective gears Check record of safety education	Along gas pipeline	Weekly	Entire demolition phase	Contractor of demolition works	Included in the administration cost of contractor
4. Others							
Accident	Record of traffic accidents in the surrounding communities Record of information sharing of construction work for safety Record of awareness rising activities for safety	Check records of traffic accidents in the surrounding communities Check record of information sharing of construction work for safety Check record of awareness rising activities for safety	Along gas pipeline	Weekly	Entire demolition phase	Contractor of demolition works	Included in the administration cost of contractor
Cross-border impact, climate change	Promote the efficient fuel use Amount of fuel use	Check records of fuel consumption Check record of awareness rising activities for efficient fuel use	Along gas pipeline	Weekly	Entire demolition phase	Contractor of demolition works	Included in the administration cost of contractor

Note : a: Estimated cost per one survey. Traveling cost and allowances such as accommodation expenses, etc. are not included
Source: EIA Study Team

7.2.3. Water Pipeline

7.2.3.1. The Environmental Monitoring Plan for the Water Pipeline during Pre-Construction Phase

The environmental monitoring plan at pre-construction phase is shown in Table 7.2-8.

Table 7.2-8 Environmental Monitoring Plan at PRE-CONSTRUCTION PHASE (Water Pipeline)

Item	Monitoring Item	Monitoring Method	Monitoring Place	Frequency	Term	Responsibility	Roughly estimated cost (USD)
1. Social environment							
Involuntary resettlement	Progress of payment and land acquisition / site clearance	Check payment records and land acquisition / site clearance	Around the electricity pole and water pipeline	Monthly	Up to completion of compensation payment and land acquisition / site clearance	PMU	Covered in the ARAP
	Grievance	Checking record of grievance (reception, contents and status of the process)	Around the electricity pole and water pipeline	Monthly	Until the livelihood is restored	PMU	Covered in the ARAP
Poverty	Progress of compensation payment	Check payment records	Around the electricity pole and water pipeline	Monthly	Up to completion of compensation payment	PMU	Covered in the ARAP
Local economy (Livelihood)	Progress of compensation payment	Check payment records	Around the electricity pole and water pipeline	Monthly	Up to completion of compensation payment	PMU	Covered in the ARAP
	Progress of income restoration	Checking implementation of restoration (if executed)	Around the electricity pole and water pipeline	Monthly	Until the livelihood is restored	PMU	Covered in the ARAP
Land use and utilization	Progress of land acquisition / site clearance for temporary land occupation	Check land acquisition / site clearance records	Around the electricity pole and water pipeline	Monthly	Up to completion o site clearance	PMU	Covered in the ARAP

Source: EIA Study Team

7.2.3.2. The Environmental Monitoring Plan for the Water Pipeline during Construction Phase

The environmental monitoring plan at pre-construction phase is shown in Table 7.2-9 and monitoring locations are presented in Figure 7.2-8 and Figure 7.2-9.

Table 7.2-9 Environmental Monitoring Plan at CONSTRUCTION PHASE (Water Pipeline)

Item	Monitoring Item	Monitoring Method	Monitoring Place	Frequency	Term	Responsibility	Roughly estimated cost (USD) [a]
1. Pollution							
Air quality	Dust	Dust check records of complaint (for Dust)	Around the intake facility, electricity pole and water pipeline	Quarterly	Entire construction phase	Contractor	Included in the administration cost of contractor
Water quality	SS, BOD_5, COD, Oil and grease, pH, Total coliform bacteria	Site measurement	2 points upstream and downstream of water intake facility	Two times (during installation and removing coffer dam)	Construction/ demolition of the coffer dam	Contractor	USD 700 / survey
Waste	Record of waste disposal	[Construction Yard] Check records of amount and type of waste, and disposal method [Worker's Camp] Visual check for solid waste on the camp site. If collected by the licenced vendor, check collection records.	Around intake facility and water pipeline	Weekly	Entire construction phase	Contractor	Included in the administration cost of contractor
Noise and vibration	Noise level (L_{Aeq}), Vibration level (L_{v10})	Check records of complaint (for noise and vibration) Site measurement	For checking records: near the construction site For site measurement, 2 points (near the	Quarterly for checking records Once for measurement	Entire construction phase	Contractor	USD 1,000 / survey

Item	Monitoring Item	Monitoring Method	Monitoring Place	Frequency	Term	Responsibility	Roughly estimated cost (USD) [a]
			intake facility, and water pipeline)	when construction work is at its peak (daytime, 15hours)			
Ground subsidence	Ground level condition	Check records of complaint (for ground subsidence)	Around the water pipeline	Quarterly	Entire construction phase	Contractor	Included in the administration cost of contractor
2. Natural environment							
Flora, fauna and biodiversity	Condition of ecosystem	Field reconnaissance of ecosystem (e.g. vegetation, river water)	Around the intake facility, electricity pole and water pipeline (except the section of the gas pipeline)	2 times a year (rainy season and dry season)	Entire construction phase	Contractor	USD 1,200 / survey
3. Social environment							
Poverty	Progress of compensation payment	Check compensation payment records	Around the electricity pole and water pipeline	Weekly	Up to completion of compensation payment	PMU	Covered in the ARAP
Local economy (Livelihood)	Complaint from surrounding communities	Check complaint records	Around the electricity pole and water pipeline	Quarterly	Up to completion of compensation payment	PMU	-
Land use and utilization of local resources	Complaint from surrounding communities	Check complaint records	Around the electricity pole and water pipeline	Quarterly	Entire construction phase	PMU	-
Water usage	Complaint from surrounding communities	Check complaint records	Myitnge river (from discharge point to 100 m downstream)	Weekly	Entire construction phase	Contractor	Included in the administration cost of contractor
Existing social infrastructure and service	Complaint from surrounding communities	Check complaint records	Around the intake facility, electricity pole and water pipeline	Weekly	Entire construction phase	Contractor	Included in the administration cost of contractor
Cultural heritage	Record of findings of archaeological objects and actions which had been taken by contractor	Check record of findings	Around the water pipeline	Weekly	Entire construction phase	Contractor	Included in the administration cost of contractor

Item	Monitoring Item	Monitoring Method	Monitoring Place	Frequency	Term	Responsibility	Roughly estimated cost (USD) [a]
	Complaint from surrounding communities	Check complaint records	Around the intake facility, electricity pole and water pipeline	Weekly	Entire construction phase	Contractor	Included in the administration cost of contractor
Gender	Complaint from surrounding communities	Check complaint records	Around the intake facility, electricity pole and water pipeline	Weekly	Entire construction phase	Contractor	Included in the administration cost of contractor
Children's rights	Working record	Check working records of workers	Around the intake facility, electricity pole and water pipeline	Weekly	Entire construction phase	Contractor	Included in the administration cost of contractor
Health (Community health, infectious disease such as HIV/AIDS)	Awareness of infectious disease	Check records of awareness activities on infectious disease	Around the intake facility, electricity pole and water pipeline	Weekly	Entire construction phase	Contractor	Included in the administration cost of contractor
Occupational health and safety	Record of accidents in the construction site Usage of protective gears Record of safety education to workers	Check record of accidents in the construction site Observe usage of protective gears Check record of safety education	Around the intake facility, electricity pole and water pipeline	Weekly	Entire construction phase	Contractor	Included in the administration cost of contractor
4. Others							
Accident	Records of traffic accidents in the surrounding communities Records of information sharing of construction work for safety Records of awareness rising activities for safety	Check records of traffic accidents in the surrounding communities Check records of information sharing of construction work for safety Check records of awareness rising activities for safety	Around the intake facility, electricity pole and water pipeline	Weekly	Entire construction phase	Contractor	Included in the administration cost of contractor
Cross-border impact, climate change	Promote the efficient fuel use Amount of fuel use	Check records of fuel consumption Check records of awareness rising	Around the intake facility, electricity pole and water pipeline	Weekly	Entire construction phase	Contractor	Included in the administration cost of contractor

Item	Monitoring Item	Monitoring Method	Monitoring Place	Frequency	Term	Responsibility	Roughly estimated cost (USD) [a]
		activities for efficient fuel use					

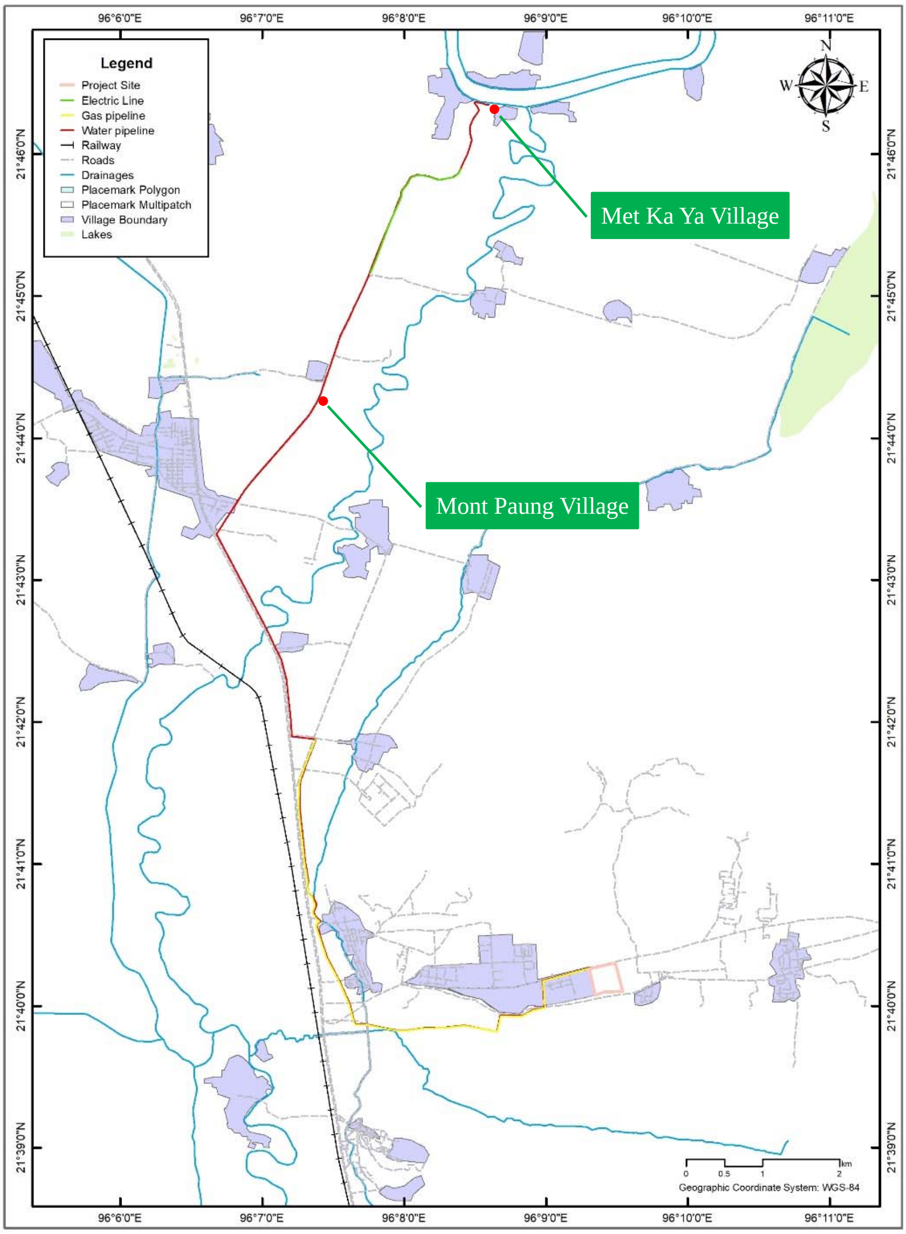
Note: a: Estimated cost per one survey. Traveling cost and allowances such as accommodation expenses, etc. are not included
Source: EIA Study Team

1) Water Quality

Source: EIA Study Team based on the image by Google Earth Pro

Figure 7.2-8 Monitoring Point of Water Quality in CONSTRUCTION PHASE, DECOMMISSIONING, CLOSURE, AND POST-CLOSURE PHASE (Water Pipeline)

2) Noise & Vibration



Source: EIA Study Team

Figure 7.2-9 Monitoring Point of Noise & Vibration in CONSTRUCTION PHASE, DECOMMISSIONING, CLOSURE, AND POST-CLOSURE PHASE (Water Pipeline)

7.2.3.3. The Environmental Monitoring Plan for the Water Pipeline at Decommissioning, Closure and Post-Closure Phase

The environmental monitoring plan at decommissioning, closure and post-closure phases is shown in Table 7.2-10 and monitoring locations are presented in Figure 7.2-8 Figure 7.2-9 in the section 7.2.3.2.

Table 7.2-10 Environmental Monitoring Plan at DECOMMISSIONING, CLOSURE, AND POST-CLOSURE PHASE (Water Pipeline)

Item	Monitoring Item	Monitoring Method	Monitoring Place	Frequency	Term	Responsibility	Roughly estimated cost (USD) [a]
1. Pollution							
Air quality	Dust	Dust check records of complaint (for Dust)	Around the intake facility and water pipeline	Quarterly	Entire demolition phase	Contractor of demolition works	Included in the administration cost of contractor
Water quality	SS, BOD_5, COD, Oil and grease, pH, Total coliform bacteria	Site measurement	2 points upstream and downstream of the water intake facility	Two times (during installation and removing the coffer dam)	Entire demolition phase	Contractor of demolition works	USD 700 / survey
Waste	Record of waste disposal	[Construction Yard] Check records of amount and type of waste, and disposal method [Worker's Camp] Check solid waste	Around intake facility and water pipeline	Weekly	Entire demolition phase	Contractor of demolition works	Included in the administration cost of contractor
Noise and vibration	Noise level (L_{Aeq}), Vibration level (L_{v10})	Check records of complaint (for noise and vibration) Site measurement	For checking records: near the construction site For site measurement, 2 points (near the intake facility, and water pipeline)	Quarterly for checking records Measurement construction work is at its peak (daytime, 15hours)	Entire demolition phase	Contractor of demolition works	USD 1,000 / survey
2. Natural environment							

Item	Monitoring Item	Monitoring Method	Monitoring Place	Frequency	Term	Responsibility	Roughly estimated cost (USD) [a]
Flora, fauna and biodiversity	Condition of ecosystem	Field reconnaissance of ecosystem (e.g. vegetation, river water)	Around the intake facility, electricity pole and water pipeline (except the section of the gas pipeline)	2 times a year (rainy season and dry season)	Entire demolition phase	Contractor of demolish works	USD 1,200 / survey
3. Social environment							
Poverty	Complaint from surrounding communities	Check complaint records	Around the intake facility, electricity pole and water pipeline	Weekly	Entire demolition phase	Contractor of demolition works	Included in the administration cost of contractor
Local economy (Employment)	Complaint from surrounding communities	Check complaint records	Around the intake facility, electricity pole and water pipeline	Weekly	Entire demolition phase	Contractor of demolition works	Included in the administration cost of contractor
Water usage	Complaint from surrounding communities	Check complaint records	Myitnge river (from discharge point to 100 m downstream)	Weekly	Entire demolition phase	Contractor of demolition works	Included in the administration cost of contractor
Cultural heritage	Complaint from surrounding communities	Check complaint records	Around the intake facility, electricity pole and water pipeline	Weekly	Entire demolition phase	Contractor of demolition works	Included in the administration cost of contractor
Gender	Complaint from surrounding communities	Check complaint records	Around the intake facility, electricity pole and water pipeline	Weekly	Entire demolition phase	Contractor of demolition works	Included in the administration cost of contractor
Children's rights	Working record	Check working records of workers	Around the intake facility, electricity pole and water pipeline	Weekly	Entire demolition phase	Contractor of demolition works	Included in the administration cost of contractor
Health (Community health, infectious disease such as HIV/AIDS)	Awareness of infectious disease	Check records of awareness activities on infectious disease	Around the intake facility, electricity pole and water pipeline	Weekly	Entire demolition phase	Contractor of demolition works	Included in the administration cost of contractor

Item	Monitoring Item	Monitoring Method	Monitoring Place	Frequency	Term	Responsibility	Roughly estimated cost (USD) [a]
Occupational health and safety	Record of accidents in the construction site Usage of protective gears Record of safety education to workers	Check record of accidents in the construction site Observe usage of protective gears Check record of safety education	Around the intake facility, electricity pole and water pipeline	Weekly	Entire demolition phase	Contractor of demolition works	Included in the administration cost of contractor
4. Others							
Accident	Record of traffic accidents in the surrounding communities Record of information sharing of construction work for safety Record of awareness rising activities for safety	Check records of traffic accidents in the surrounding communities Check record of information sharing of construction work for safety Check record of awareness rising activities for safety	Around the intake facility, electricity pole and water pipeline	Weekly	Entire demolition phase	Contractor of demolition works	Included in the administration cost of contractor
Cross-border impact, climate change	Promote the efficient fuel use Amount of fuel use	Check records of fuel consumption Check record of awareness rising activities for efficient fuel use	Around the intake facility, electricity pole and water pipeline	Weekly	Entire demolition phase	Contractor of demolition works	Included in the administration cost of contractor

Note: a) Estimated cost per one survey. Traveling cost and allowances such as accommodation expenses are not included
Source: EIA Study Team

CHAPTER 8. PUBLIC CONSULTATIONS AND DISCLOSURE

8.1. Introduction

Public consultation meetings for the Project were conducted to explain EIA study for scoping stage and preparation of EIA stage. A series of meetings were held around the Project site from Oct 2018 to January 2020, as shown in Table 8.1-1. For the PCM held in 25th January 2020, the purpose was explaining the change of the water pipeline alignment near in E Bya and Met Ka Ya villages.

Table 8.1-1 Public Consultation Meetings for Scoping and EIA Study

Stage	Date and time	Venue	Participants	Gender of villagers
Scoping	Saturday, 6 October 2018 9:30 - 11:00 a.m.	Kone Myint Tharyar Religious Hall	79 persons (villagers: 67)	Men: 57 Women: 10 Total: 67
	Saturday, 6 October 2018 1:30 - 3:00 p.m.	Ohn Pin Chan Village Religious Hall	86 persons (villagers: 78)	Men: 33 Women: 45 Total: 78
	Sunday, 7 October 2018 9:30 - 11:00 a.m.	Na Be Bin Village Religious Hall	63 persons (villagers: 52)	Men: 31 Women: 21 Total: 52
	Sunday, 7 October 2018 1:30 - 3:00 p.m.	Taung U Village Religious Hall	54 persons (villagers: 43)	Men: 34 Women: 9 Total: 43
EIA	Saturday, 20 April 2019 9:30 - 11:00 a.m.	Kone Myint Tharyar Religious Hall	68 persons (villagers:51)	Men:38 Women:13 Total:51
	Saturday, 20 April 2019 1:30 - 3:00 p.m.	Ohn Pin Chan Village Religious Hall	39 persons (villagers:26)	Men:23 Women:3 Total:26
	Sunday, 21 April 2019 9:30 - 11:00 a.m.	Na Be Bin Village Religious Hall	70 persons (villagers: 57)	Men:39 Women:18 Total:57
	Sunday, 21 April 2019 1:30 - 3:00 p.m.	Taung U Village Religious Hall	38 persons (villagers:25)	Men:24 Women:1 Total:25
	Saturday, 25 January 2020 1:00 – 2:00 p.m.	Kone Myint Tharyar Religious Hall	45 persons (villagers:18)	Men:14 Women:4 Total:18

Source: EIA Study Team

8.2. Methodology and Approach

8.2.1. Pre-Meeting with Village Tract Leaders and Other Stakeholders

Based on the recommendations from Sintgaing Township General Administration Department (GAD), specifications of methodology and approach such as notification, venue, date, time and participant of all the meetings were decided by consultation with all the relevant village tract leaders. There are 14 villages totally/ partially overlapped with AOI of the Project. The meetings with 14 village tract leaders were called by Sintgaing Township GAD and held as shown in Table 8.2-1. The invitees were not only village tract leaders but also other stakeholders from Sintgaing Township. The record of meetings with village tract leaders are shown in Table 8.2-2 to Table 8.2-4.

Table 8.2-1 Pre-meeting with Village Tract Leaders and other Stakeholders

Stage	Date and time	Venue
Scoping	Thursday, 24 August 2018, 10:00 - 11:30 a.m.	Sintgaing Township GAD
	Wednesday, 26 September 2018, 2:00 - 3:30 p.m.	Sintgaing Township GAD

EIA	Thursday, 11 April 2019, 10:30 -11:30 a.m.	Sintgaing Township GAD
	Friday, 17 January 2020, 10:00 – 11:00 a.m.	Sintgaing Township GAD

Source: EIA Study Team

Table 8.2-2 Record of 1st Meeting with Village Tract Leaders

Name of Meeting	Meeting with village tract leader along the gas pipeline and water pipeline
Date & Time	August 24 (Thursday), 2018, 10:00am- 11:30 am
Place & City	Meeting room of GAD, Sintgaing Township.
Participants	Village Tract Leader: 13 persons EPGE: 1 person JST: 5 persons
Handouts	Printed material (Myanmar language)
	Introduction ➢ Assistant Engineer from EPGE explained about the preliminary Environmental and Social Survey for Kyaukse Gas Combined-Cycle Power Plant Construction Project, requested the comment of village tract leader and asked cooperation for the study in Myanmar. ➢ In the presentation, assistant Engineer from EPGE explained - Outline of the Project - Objective - Project Proponent - Contents of the Project **Content and results of the discussion are as follows:** **<u>Outline</u>** ➢ Currently, electricity generation in Myanmar is 3,400 MW and usage of electricity is 3,300 MW. ➢ EPGE officer explained demand of electricity is increasing (15%) yearly in Myanmar. ➢ To meet the electricity demand forecast in near future, EPGE is planning to build new power plant owned by government. ➢ In order to build new power plant, EPGE and EIA Study Teams are conducting preliminary environmental and social considerations. ➢ The location of the power plant will be beside the Belin substation and the land is owned by DPTSC, MOEE. ➢ Three main contents in this project are construction of power plant (Gas turbine Combined- Cycle), gas pipeline and water pipeline. ➢ Then, he explained about the location of the project site (Power Plant), location and distance of underground water pipeline (17.5 km) and gas pipeline (7.5 km). The gas pipeline and water pipeline of power plant will be beside the existing gas pipeline. ➢ He mentioned that there are 14 related villages along the water pipeline and gas pipelines. ➢ He explained about schedule of public consultation meeting will be held on September or October for scoping and December for EIA report. ➢ He also gives the information of project construction will be starting 2 or 3 years later. **<u>Comment</u>** ➢ Village tract leaders asked about the water intake and size of the gas pipeline and water pipeline. ➢ Village tract leaders suggested about the compensation of land and crops will be important factor in this project. ➢ They also mentioned about they have faced similar problems related with compensation of land and crops in the previous project. ➢ They recommended to make efforts to reach an agreement with land owners for compensation. ➢ As for holding of public consultation meeting for both scoping stage and draft EIA stage, they suggested to separate three consultation meetings for 14 villages. ➢ There will be 4 or 5 villages to be included in one public consultation. The venue of the public consultation meeting will be chosen depending on the number of participants from each village. ➢ They suggested to invite mainly the affected land owner of each villages for this public consultation meeting.

	<u>Answer/feedback to the comment and result of the discussion</u> ➢ Regarding the intake and pipe size, EPGE answered that the water source is Myitnge River and diameter will be 300 mm for water pipe and 16 inch for gas pipe. ➢ Regarding compensation, EPGE answered that they are planning PCM focused on compensation. ➢ Regarding the similar problems related compensation occurred in previous project, the specific name of the project is not mentioned. ➢ Regarding the compensation, EPGE agreed to making efforts to reach agreement with affected people. ➢ Regarding the PCM venue, EPGE agreed that they will accept the recommendation of village tract leaders. ➢ Regarding the invitees, EPGE answered that they will try to identify affected land owner and invite to the PCM.

Source: EIA Study Team

Table 8.2-3 Record of 2nd Meeting with Village Tract Leaders

Name of Meeting	Meeting with village tract leaders
Date & Time	September 26 (Wednesday), 2018, 14:00pm- 15:30 pm
Place & City	Meeting room of General Administration Department (GAD), Sintgaing Township.
Participants	GAD (Sintgaing): 3 persons Village Tract Leader: 20 persons EPGE: persons JST 4 persons
Handouts	Printed material (Myanmar language)
Language used in explanation	Myanmar Language
	Introduction ➢ Superintendent Engineer from EPGE briefly explained about the background of Kyaukse Gas Combined-Cycle Power Plant Project and future plan of the Project. ➢ Assistant engineer from EPGE explain about the presentation file of village tract leader meeting. ➢ The following contents are included in the presentation file. - The Schedule of the Environmental and Social Survey - Future schedules - Public consultation (venue and time) **Content and results of the discussion are as follows:** **<u>Outline</u>** ➢ Explain about the current situation and future plan of environmental baseline survey. ➢ Environmental baseline survey (rainy season) was conducted in August and mention dry season survey will be conducted in October. ➢ Inform about the land owner ship survey will be conducted from 27th September together with officer from Agricultural land management and statistics. ➢ Announcement for the first public consultation meeting (EIA) will be held on 6th and 7th October. ➢ Explain about the difficulties of invitation of landowner in the first public consultation meeting (EIA) and will invite landowners from the second public consultation meeting. ➢ Discuss about the venue of public consultation meeting and time. ➢ Three villages (Met Ka Ya, Be Lin, Na Be Bin) were selected to held public consultation meeting for 14 affected villages of the Project. ➢ Request to village tract leaders to suggest the place for public consultation meeting and method of invitation. ➢ Request to give opinion from various kind of stakeholders such as local communities, authorities, organizations including socially vulnerable group. **<u>Comment</u>** ➢ Village tract leaders suggested to held public consultation meetings in four villages (Met Ka Ya, Ohn Pin Chan, Na Be Bin, Be Lin) for transportation convenience. ➢ Township officer (Sintgaing) recommended informing and giving the information to land

	and crops owners about period of land usage, area of land usage, the size of the pipe (water and gas). ➢ He also suggests village tract leaders to cooperate through invitation and joining the meeting. ➢ In the method of invitation, each village tract leaders will use the PA system and distribution of invitation letter to all villagers. ➢ In the collection of opinion from stakeholders, township officer (Sintgaing) recommends inviting all the people from 14 villages (not to select the people for PCM meeting). **<u>Answer/feedback to the comment and result of the discussion</u>** ➢ First public consultation meeting (EIA) will be held in four villages on 6th and 7th Oct. The four venues were suggested by village tract leaders. 1) Met Ka Ya- Kone Myint Tharyar Religious Hall, Ebya (9:00 am-10:00am on 6th Oct) 2) Ohn Pin Chan Religious Hall (13:00 pm-14:00 pm on 6th Oct) 3) Na Be Bin- Religious Hall (9:00 am- 10:00 am on 7th Oct) 4) Be Lin –Taung U Religious Hall (13:00 pm-14:00 pm on 7th^{t} Oct) ➢ EPGE will invite all villagers in 14 villages that was recommended by Township officer (Sintgaing). ➢ In the case of invitation, EPGE should announce PCM meeting in the public area of each village using banner or vinyl and also in front of meeting place (Religious Hall in four villages). ➢ Regarding the PCM focused on compensation, EPGE explained that they will invite all the affected land owners for another PCM for A-RAP.

Source: EIA Study Team

Table 8.2-4 Record of 3rd Meeting with Village Tract Leaders and other Stakeholders

Name of Meeting	Meeting with village tract leaders
Date & Time	April 11 (Thursday), 2019,10:30 am- 11:30am
Place & City	Meeting room of General Administration Department (GAD), Sintgaing Township.
Participants	GAD (Sintgaing): 3 persons Sintgaing Township: 13 persons Village Tract Leader:16 persons EPGE: 2 persons JST: 4 persons
Handouts	Printed material (Myanmar language)
Language used in explanation	Myanmar Language
	Introduction ➢ Executive Engineer from EPGE briefly explained about the background of Kyaukse Gas Combined-Cycle Power Plant Project and future plan of the Project. ➢ REM explained result of EIA study and invited two PCMs to Governmental staffs and participants (20th and 21st April for PCM of EIA result and 29th and 30th April for PCM of RAP) **Content and results of the discussion are as follows:** **<u>Outline</u>** ➢ Explain about the project description and EIA study **<u>Comment</u>** ➢ Union Parliamentarian advised that please inform and meet with representative of parliamentarian and township governmental departments before EIA study. We should give suggestions and comments to the project owner. ➢ Administrator, Singaing Township suggested that please explain the project detail information to villagers. ➢ E Bya Village head leader suggested E Bya villagers are ok. The villagers will attend the meeting on 20th and 21st April. But they worry whether the discharge water to Myitnge River, impact on river water or not? Please explain it in PCM. ➢ Ohn Pin Chan Village head leader suggested that only one villager is affected by the project.

	➢ Na Be Bin Village head leader suggested that we want to know how many affected land owners in my village? ➢ Mont Paung Village head leader said that land owner of pump station area does not agree to give his land. ➢ Police Officer told the participants that after the pipeline buried and installed, the farmers can grow their land and temporarily use only **<u>Q & A</u>** **Q; Head of Village, E Bya Village** We worry about the discharge water to Myitnge River. Is it impact on river water or not? **Ans: EPGE** Please do not worry about it. We have standards of water quality and we have to obey the standards. EIA has a monitoring plan. We will come to check and monitor the standard of discharge water. **Q; Head of Village, Taung U Village** More affected persons in Taung U Village. So, the famers worry about the land extension for pipe line. **Ans: EPGE** Pipeline depth is 5 feet and pipe line' width is 6 feet to 18 feet. After the pipe line installed, the land owners can grow their land. We can pay the compensation to the affected land owners according to the Farm land Law, 2014. **Q; Irrigation Department** Can you use only one line of water pipeline? or can you give discharge water to small drainage area near power plant? **Ans: EPGE** We cannot give the discharge water to other area because we use the water from Myitnge River and then discharge water to Myitnge River. **<u>Result of the discussion</u>** ➢ Meeting is satisfied. ➢ Received the suggestions and information from the participants. ➢ Second public consultation meeting (EIA) will be on 20th and 21st April for result of EIA study and on 29th and 30th April for RAP PCM.

Source: EIA Study Team

Table 8.2-5 Record of 4th Meeting with Village Tract Leaders

Name of Meeting	Meeting with village tract leaders along the route of newly proposed water pipeline
Date & Time	January 17 (Friday), 2020, 10:00am- 11:00 am
Place & City	Meeting room of GAD, Sintgaing Township.
Participants	GAD (Sintgaing): 2 persons
Handouts	Village Tract Leader: 2 persons (E Bya and Met Ka Ya)
Language used in explanation	Myanmar Language
	Introduction ➢ JST distributed presentation handouts in the meeting ➢ In the presentation handouts, JST explained - The reasons for modification of the pipeline route - The purpose of additional PCM for Environmental Impact Assessment (EIA) & Resettlement Action Plan (RAP) - Confirmation of the PCM venue, date and time - Confirmation of invitation process (including civil society organizations such as NGOs) **Content and results of the discussion are as follows:** **<u>Outline</u>** ➢ GAD asked the approval letter of Ministry of Religious Affairs and Culture (MORAC) concerning with the heritage areas. ➢ EPGE explained about MORAC approval letter with some comments and conditions that

	need to follow. ➢ JST requested whether the additional PCM for EIA-RAP can be held on 25 January 2020, because EPGE requested Mandalay Regional Government (MRG) to hold PCM on 25 January in the official letter. **Comment** ➢ Village leaders requested to hold PCM avoiding the Sabbath day. ➢ JST requested village leaders to choose the convenient time for PCM. ➢ GAD requested the village leaders to cooperate and support the project since it is a national project. ➢ GAD said they will support to invite governmental organizations. **Q&A** **Q**: JST asked if there are any appropriate civil society organizations such as NGOs around Sintgaing Township to be invited to PCM. **Ans**: GAD replied there is Women Affair around Sintgaing Township. Village leaders answered that they don't know such kind of groups around Sintgaing Township. **Answer/feedback to the comment and result of the discussion** ➢ JST answered that 25th Jan 2020 is Saturday and this day is not Sabbath day. ➢ Village leaders agreed to hold additional PCM on 25th Jan 2020 and selected their convenient time for PCM as 1:00 pm by considering the convenience for their villagers. ➢ Village leaders said they will support to invite villagers for PCM. ➢ GAD also approved to hold the PCM because the date and time were decided by the discussion. ➢ For invitation of the governmental organizations, EPGE will submit an official letter to GAD to request for inviting the relevant organizations

Source: EIA Study Team

8.2.2. Identification of PAPs and Other Stakeholders

PAPs were identified through the meeting with village tract leaders.

ECD of Mandalay Region, GAD of Sintgaing Township and organizations that had been consulted to study the alignment of water pipeline and gas pipeline were decided to be invited to the public consultation. Other relevant organizations to be invited were decided by the experiences of EIA Study Team and consultation with GAD of Kyaukse District and Sintgaing Township. The list of invitees is shown in Table 8.2-6.

Table 8.2-6 The List of Invitees for PCM

Invitees	Director, Environmental Conservation Department, Mandalay Region Officer, General Administration Department, Sintgain Township Officer, Department of Agriculture Land Management and Statistic, Sintgaing Township Officer, Irrigation and Water Utilization Management Department, Sintgaing Township Officer, Department of Rural Development, Sintgaing Township Officer, Department of Highways, Sintgaing Township Officer, Information and Public Relations Department, Sintgaing Township Members of Parliament (Pyithu Hluttaw, National Hluttaw and Regional Hluttaw) Myanmar Women's Affair Federation, Sintgaing Township Civil Society Organizations (CSO) (Sein Yaung So and Green Right Organization) Heads of villages and village tracts in and around the Project area Local residents in and around the Project area Media (Government sector) Other Organizations and individuals who are interested in the Project

Source: EIA Study Team

8.2.3. Method of the Public Consultation Meeting

Presentation and handouts were prepared and explained in Myanmar language. Opinions and questions from the participants were received in the question and answer session.

Additionally, feedback forms were provided to the participants so that those who are hesitant to speak out in public could share their views and comments. Moreover, assistant staff supported attendees to fill out the form in case the participant needs help in writing or reading.

8.2.4. Disclosure

The project proponent prepared the invitation letter together with the notice of the meeting in Myanmar language and announced to the invitees, who are villagers, and relevant governmental organizations, and anyone who are interested.

Basically, information on the PCM was announced to the invitees one week in advance before the meeting by sending invitation letters to the respective invitees. Especially for the villagers, the local consultant sent the invitation letter to each village-tract office one week in advance. The notice of the meeting was displayed together with the invitation letter on the public notice board of village-tract level and at venue as shown in Figure 8.2-1. Afterwards, the information on the PCM was requested to be disseminated by village tract leaders of the respective villages in accordance with local practice, such as public-address system.

Notice displayed in Mont Paung Village Tract Office	Notice displayed in Ohn Pin Chan Village Office
Notice displayed in Na Be Bin Village Office	Notice displayed in front of Taung U Village Office

Source: EIA Study Team

Figure 8.2-1 Photos of Notice Displayed in Village and Village Tract Offices

8.3. Results of Consultations during Project Scoping

8.3.1. Summary of Consultations Undertaken

The summary of consultations is shown in Table 8.3-1. Photos of the PCM are shown in Figure 8.3-1. Regarding the attendees, though the community-based organizations/ civil society were invited, it is not clear that whether they participated or not, because affiliation of each participant was not investigated in order not to cause hesitation to express his/ her opinion.

Table 8.3-1 Summary of Public Consultation Meeting at Scoping Stage

Time and Date	Saturday, 6 October 2018 1st session: 9:30 - 11:00 AM, 2nd session: 1:30 - 3:00 PM Sunday, 7 October 2018 3rd session: 9:30 - 11:00 AM, 4th session: 1:30 - 3:00 PM
Venue	1st session: Kone Myint Tharyar Religious Hall 2nd session: Ohn Pin Chan Village Religious Hall 3rd session: Na Be Bin Village Religious Hall 4th session: Taung U Village Religious Hall
Attendees	1st session: 79 persons (villagers: 67) 2nd session: 86 persons (villagers: 78) 3rd session: 63 persons (villagers: 52) 4th session: 54 persons (villagers: 43) Total: 282persons (villagers: 240)
Agenda	Explanation on the Project Description Major positive and negative findings on the draft scoping results Scope of EIA study Further schedule of EIA, etc.
Handout	Printed material (Myanmar language)
Language used	Myanmar language
Q & A Session	In total 7 questions were raised from the participants and discuss with the Project Proponent and coordination organization.
Feedback Sheet	In total 152 comments in four PCM sessions were submitted.

Source: EIA Study Team

Explanation (1)	Explanation (2)

Question and Answer session	Filling feedback form (EPGE staff assists to write)

Source: EIA Study Team

Figure 8.3-1 Photos of Public Consultation Meeting at Scoping Stage

8.3.2. Results of Consultations during Scoping Stage

Summarized questions and responses are shown in Table 8.3-2. As a whole, 7 questions were raised from the participants and discussed with the project proponent. Regarding the opinion No.7 in the Table 8.3-2, villager's concern about increasing number of gas pipeline was discussed between EPGE and MOGE.

Table 8.3-2 Main Question and Response at All Sessions of PCMs at the Scoping Stage

No.	Opinion/Question	Explanation and Response
1	How is the explosive distance if the gas pipeline exploded? How is the responsibility if there are impacts on villagers by the project?	Nowadays, technology of gas pipeline construction is higher than before. The main reason of gas pipeline explosion is that pipes become thin and explode because of using more pressure of gas which is applied in the pipe, transmitting more pressure into the pipe than it is needed and using many years with poor maintenance. Safety is prioritized for this project. This pipeline is planned to be safe, resist and repaired when it is needed. It won't be dangerous. Even if the pipeline is accidentally exploded, it would not affect much to the surroundings because it is constructed underground. Pipeline maintenance will always be carried out. Holding this kind of meeting is intended to explain the question and reduce the worries of public. Auto shut down system is included if there will be accidental damage. It cannot be dangerous because of the high-quality pipeline will be installed.
2	It is found that pipeline will be passed beside irrigation canal. Pipeline can disturb the water flow. If the pipeline is buried at 1.3 meter depth, it will be safe for irrigation canal. If the pipeline is passed over the tunnel, it can be damaged while maintenance service performed for canal using machinery. Those points should be considered.	This meeting is intended to meet with public and make presentation as preliminary for environmental impact assessment. After that, baseline data collection will be conducted. If there are impacts on land concerned with pipeline construction, it will be presented in next meeting. At the moment, surveying along the pipeline is being conducted to know the affected land and people. After the pipeline is buried, the farmers can replant on their land. When the affected lists have been prepared, another meeting will be hold.
3	Where will wastewater be discharged because water will be used in project operation phase? How is the pollution of air emission?	At the project, water will be used after treatment. Wastewater will be discharged to the Myitnge River after proper treatment. There would not be negative impacts. Even if there is

No.	Opinion/Question	Explanation and Response
		emission into air or water, these emissions will be satisfied with standards and guidelines.
4	On behalf of local farmers, I would like to explain about land acquisition for construction Belin Substation. Firstly in 2004, 45.34 acres of land were occupied by government as well as 28.77 acres were also occupied secondly. We lost the crops. Villagers are being altered from farmers to daily labors. It was presented as villagers' grievances. There are 25 farmers who were affected. If the project needs employees, those 25 farmers should be prioritized to hire. There are young educated persons in another village. The local people should be considered priority for works of the project.	We sympathize for land loss. I don't want to comment for past conditions. Past and present are not the same. If there is a project, it is carried out after public consultations before the project begins. If there have the impacts by the project, it will be performed not to have grievances. Local people are prioritized for work opportunity. It is already instructed to give the work opportunity to local people during plant construction phase and operation phase.
5	I would like to know the positive and negative impacts by the project because it is located near Na Be Bin Village. Because natural gas is used in operation, heat wave and ecosystem degradation are being worried. We heard that gas emission is happening in other cement plants. If such kind of problems occur, who will be responsible for this?	The villagers may have that kind of worries. That's why environmental impact assessment team is surveying to know baseline air and water quality. The results will be presented in next meeting. This project is state-owned and thus the responsibility belongs to government. There are 5 power plants in Yangon. Those are constructed at residential area. EPGE employees are also living in that compound. Your worries will not be happened. Gas is mainly methane and it is burnt when it is with oxygen. Toxic which is dangerous for people cannot be formed. Wastewater will be discharged after proper treatment.
6	We Attended the meeting at Sintgaing Town. It is necessary to know exactly the route of pipeline and whose farms will be passed. Environmental impacts are quite far way to know for villagers. Because of the government project, there is no way to object. Affected farmers should be consulted and negotiated transparently.	300 MW power plant owned by government will be constructed in the Belin Substation compound. The project will take about five years for construction. Construction phase and EIA implementation will also be taking time. Concerned with land, our team is now surveying. The results will be presented in next meeting.
7	One gas pipeline is already existed near your planned pipeline route. Meeting for new gas pipeline construction was carried out in last month. Are new gas pipeline and the planned pipeline of the project the same or not?	It is different. That new gas pipeline is for short term project operated by MOGE. EPGE will discuss with MOGE for pipeline route.

Source: EIA Study Team

On feedback form, 152 opinions or comments were submitted by the participants. Major opinions or comments are summarized in Table 8.3-3. The most common opinion was supporting for the Project, while there were some opinions which should be considered on ToR of EIA study during construction and operation phases. Those opinions were reflected in the EIA report and explained in the next (EIA stage) public consultation meeting.

Table 8.3-3 Major Comments in Feedback Form at Scoping Stage

No.	Opinion/Comment	Number
1	Project is good.	40
2	Job opportunity (Hoping to employment of villagers)	19
3	Concern about safety of the project	15
4	No objection (if no impact)	13
5	No comment	12

Note: This table only shows major comments, fewer comments are not shown in this table.
Source: EIA Study Team

8.4. Results of Consultations during Preparation of EIA Report

8.4.1. Summary of Consultations Undertaken

The summary of consultations is shown in Table 8.4-1. Photos of the PCM are shown in Figure 8.4-1. Regarding the attendees, one person from community-based organization (Township Women Association, Sintgaing), two persons from CSO and one person from parliament were found.

Table 8.4-1 Summary of Public Consultation Meeting at EIA Preparation Stage

Time and Date	Saturday, 20 April 2019 1st session: 9:30 - 11:00 AM, 2nd session: 1:30 - 3:00 PM Sunday, 21 April 2019 3rd session: 9:30 - 11:00 AM, 4th session: 1:30 - 3:00 PM Saturday, 25 January 2020 5th session: 1:00 – 2:00 PM
Venue	1st session: Kone Myint Tharyar Religious Hall 2nd session: Ohn Pin Chan village Religious Hall 3rd session: Na Be Bin Village Religious Hall 4th session: Taung U Village Religious Hall 5th session: Kone Myint Tharyar Religious Hall
Attendees	1st session: 68 persons (villagers: 51) 2nd session: 39 persons (villagers: 26) 3rd session: 70 persons (villagers: 57) 4th session: 38 persons (villagers: 25) 5th session: 45 persons (villagers: 18) Total: 260 persons (villagers: 177)
Agenda	Introduction and Outline of the Project Feedback of the Precious PCM Environmental and Social Impact Assessment Study Mitigation Measures, etc. Purpose of the Additional PCM (Only for 5th session)
Handout	Printed material (Myanmar language)
Language used	Myanmar Language
Q & A Session	In total 18 questions were raised from the participants and discussed with the Project Proponent and coordination organization.
Feedback Sheet	In total 102 comments in four PCM sessions were submitted.

Source: EIA Study Team

Explanation (1)

Explanation (2)

Question and Answer session	Filling feedback form (EPGE staff assists to write)

Source: EIA Study Team

Figure 8.4-1 Photos of Public Consultation Meeting at EIA Preparation Stage

8.4.2. Results of Consultations during EIA Preparation Stage

Summarized questions and responses are shown in Table 8.4-2. As a whole, 18 questions were raised from the participants and discussed with the Project Proponent. Based on the opinion No.8 in the Table 8.4-2: villager's concern about the alignment of pipelines, EPGE had discussed with relevant organizations and the alignment was changed to use public area as much as possible.

Table 8.4-2 Main Question and Response at All Sessions of PCMs at the EIA Preparation Stage

No.	Opinion/Question	Explanation and Response
1	I worry about the river bank erosion, is it impact on river bank?	Before construction of intake water station, we have to build the retaining wall around that area.
2	Why did you consider the water pipeline across Met Ka Ya Village? Can you draw a water pipeline near E Bya village road?	According to the feasibility study, the proposed line route is more feasible for other option. So, we considered and selected the proposed line route.
3	Is there IP 1 (Intermediate Pump station) station near Mont Paung Village? If IP1 will be build, land owner doesn't agree.	Actually, we planned Intermediate Pump station at scoping stage, but now we don't plan to install that.
4	Where is pipeline area near Pin Char Bridge? Please show it. How many years do you build the Power Plant? When do you want to start the construction? Please come to explain and inform us because we worried about the cultivation for seasonal crops.	Project period is about 5 years. Yes, we will inform and discuss the project schedule or timeline.
5	Where is the gas pipeline and will it be across the farmland? During construction, is there any possibility that excavated trench will be left for a long time to install the pipes? If the situation happens, that will be an obstacle for agricultural work.	Near the pointed area, only water pipelines will be installed along the irrigation cannel. We will choose the best contractor. We will set up the complaint center in Belin Substation. We would like to communicate with local villagers. If you have any problems, please come to inform the complaint center.
6	On behalf of local farmers, I would like to explain about land acquisition for construction Belin Substation. Firstly in 2004, 45.34 acres of land were occupied by government as well as 28.77 acres were also occupied secondly. We lost the crops. Villagers are being altered from farmers to daily labors. It was presented as villagers' grievances. There are 25 farmers who were affected. If the project needs employees, those 25 farmers should be prioritized to	We sympathize for land loss. I don't want to comment for past conditions. Past and present are not the same. If there is a project, it is carried out after public consultations before the project begins. If there have the impacts by the project, it will be performed not to have grievances. Local people are prioritized for job opportunity. It is already instructed to give job opportunity to local people during plant construction phase and operation phase.

No.	Opinion/Question	Explanation and Response
	hire. There are young educated persons in another village. The local people should be considered priority for works of the project.	
7	I would like to request to provide job opportunities to my villagers, Na Be Bin. Because my village has many graduated persons.	Yes, we can provide job opportunities to the educated villagers during construction and operation phases. We will send the labour announcement letter to head of village and then you can apply the jobs.
8	I don't agree with this project because I cannot change land use due to existing gas pipeline.	This meeting is intended to inform the result of environmental impact assessment. This project is owned by Government. I can note your opinion and reflect in EIA report.
9	If the pipeline is installed in the embankment, the pipeline might disturb the water distribution. The maintenance will also need to be considered.	The project is at Loan Proposal Stage of EIA. We will hire technical consultants after ECD approve EIA report and carry out Loan Contract with JICA. After loan was approved, we will discuss with related professionals and consultants to create appropriate design. Therefore, we cannot show detail design at present, but we will not disturb the water distribution. We will carry out detail field survey along the pipelines by discussing with technicians and consultants. We will use the water pipeline technology which do not leak water for this project.
10	The gas pipeline is more concerning than the water pipeline as there are some persons who are against the installation of gas pipeline in their land.	The project has already avoided passing through the land where landowners are against the gas pipeline as much as possible. During the process, gas pipeline route has been shifted to new route along the canal.
11	There is a land marked as (villager's name)'s land beside the river. I wish to clarify that this land is not (person's name)'s property and it is owned by the village charity group. Therefore, I suggest marking this land as Village Land in addition to (villager's name)'s land.	Acknowledged the point.
12	I suggest compensation to village for (villager's name)'s land is necessary.	Yes, the compensation will be decided based on the discussions with relevant organizations, if the land is acquired. The pointed area is planned to use public area.
13	My fence might be impacted by the project and I want to know how the project will take responsibility.	If the project affects the fence, appropriate compensation will be paid to repair it.
14	I want to know how this project will impact the water resource.	This project will apply air cooling system which can save water consumption. We will use Myitnge River water and save as much river water as possible by the project. This project will use at most thousands of gallons of water per day.
15	Is this government project?	Yes, this project is cooperation between government and JICA with loan. We will use Combine Cycle Gas Turbine to reduce environmental impacts as much as possible.
16	I suggest repairing of roads if the project will damage them.	Yes, this project will use 2 percent of profit as CSR. Therefore, your suggestion will be included in CSR program.
17	Are there any changes in electricity price due to the construction of gas turbine?	The government will bear the whole cost of the construction of gas turbine with the purpose of providing electricity to the public. The electricity bill will not be affected by the expense of the construction of the gas turbine and will be collected according to the defined rates by the government.
18	Are there any gas emissions from the project?	This project will use Japan Technology named Dry

No.	Opinion/Question	Explanation and Response
		Low NOx Combustor (DLN). Nitrogen Oxide comes out from this combustor with high temperature. NOx will be emitted below NEQG, it doesn't mean NOx can be 0%. Moreover, we will plan to conduct environmental monitoring. We will submit monitoring report periodically.

Source: EIA Study Team

On feedback form, 102 opinions or comments were submitted by the participants. Major opinions or comments are summarized in Table 8.4-3. The most common opinion was supporting the Project, while there were some opinions which concerns about environmental and social impact. It is important to fully comply with EMP proposed in this EIA by both contractor and project proponent throughout the whole process of the Project.

Table 8.4-3 Major Comments in Feedback Form at EIA Preparation Stage

No.	Opinion/Comment	Number
1	No objection	11
2	Recommended	9
3	Pipeline route (To use public land for pipelines is better for farmers.)	8
3	Concern about noise (& Vibration) from the facilities	8
5	Job opportunity (Hoping to employment of villagers)	7

Note: This table only shows major comments, fewer comments are not shown in this table.
Source: EIA Study Team

8.5. Conclusion

PCM for Scoping and EIA preparation stages were conducted including invitation and information disclosure with adequate period, based on the meeting results with village tract leaders and related organizations such as GAD of Sintgaing Township. Especially for collecting opinions of villagers, feedback form was utilized for the person who hesitates to state his / her opinion in front of villagers.

Most of the opinions of villagers supported the Project, but there were some opinions related to concern about environmental and social considerations. For such opinions, project proponent has had consultations with relevant organizations to solve and reflect to the project plan.

Regarding the alignment of gas pipelines, basic principle is installing along existing gas pipeline, but the existing gas pipeline is laid mostly in private land. To reduce the environmental / social impact and number of PAPs, project proponent decided to use public land as much as possible. Moreover, result of the discussion with relevant organizations, total number of new gas pipelines which will be installed are decreased from two to one, by utilizing the existing gas pipeline.

CHAPTER 9. SUMMARY OF DEVELOPMENT PLANS

For the safe and efficient implementation of the Project, it is recommended to prepare and implement several development plans in addition to management and monitoring plans presented in previous chapters. This chapter recommends key contents of those plans to be developed by institutions in charge. The draft of development plans that include items to be included, legislative frameworks and responsible institutions are elaborated in the appendix G.

9.1. Seismic Resistant Plan

The seismic resistant plan should present basic policy of seismic design and initial inspection in compliance with the Myanmar National Building Code (MNBC) for the seismic design of civil and architectural structure. The preliminary plan developed in the report presents main features including Peak Ground Acceleration (PGA) for seismic design that are calculated based on the result of preparatory survey. The result of liquefaction analysis conducted in the preparatory survey shows the liquefaction potential in the project site is “low”. Based on these results, the superstructure of the Project should be designed in accordance with the PGA. During the construction phase, the Engineer will check and approve the construction drawings submitted by the contractor and supervise construction works based on the methods mentioned in MNBC.

During operation phase, daily visual inspection should be conducted by the operator together with the emergency inspection in case of the huge earthquake to execute appropriate countermeasures and avoid fatal damage. See appendix G-2 for detail.

9.2. Emergency Response Plan

The emergency response plan needs to be developed for promptly respond to the emergency cases that may occur during operation phase. The plan should present related organizations and agencies to be involved, the provisional organization chart for emergency response team, principle responsibilities and tasks of incident commanders, coordinators, fire-fighting team and evacuation teams. Also, the plan should elaborate items to be developed under the plan such as classifications of emergency levels, reporting flow, scenario development for emergency preparation, training and monitoring plan on emergency response. See appendix G-5 for detail.

9.3. Water Intake Management Plan

The water intake management plan should be developed for proper management of water intake from Myitnge River. The water intake consists of centrifugal pumps, pontoon, control panel and river bank/bed protection, and designed to be operated safely with necessary protections. For operation phase, intake management plan should be developed for operation during normal condition as well as flood and drought cases. In addition, periodical activities such as sediment removal and cleaning should be developed and reflected to daily monitoring and recording activities. See appendix G-13 for detail.

9.4. Waste Management Plan

The waste management plan needs to be developed for proper management of waste produced through all phases of the Project in compliance with the Environmental Conservation Law (2012), the Environmental Conservation Rules (2014) and other related national and local laws, and regulations. During construction phase, the Contractor should install waste stockyard and regularly inspect the condition of waste storage, to prevent the adverse impact to surrounding areas such as dispersion of odor or solid waste.

The amount of waste should be recorded and monitored up to final destinations such as disposal site. See appendix G-17 for detail.

9.5. Community Health and Safety Plan

The community health and safety plan need to be developed to minimize adverse health and safety impacts to surrounding communities of the project site. The plan should be developed in compliance with the Public Health Law (1972), the National Health Policy (1993) and other related national and regional regulations related to public health and safety. The plan should cover structural safety of the project infrastructure, fire safety, traffic safety and prevention of diseases. See appendix G-22 for detail.

9.6. Industrial Risk Management Plan

The industrial risk management plan needs to be developed to manage industrial risk during operation phase that are caused by interruption of fuel supply, water intake, defect of turbine and other fundamental facilities of the power plant. The plan should be developed and implemented in accordance with ISO 31000 and ISO/IEC 31010. In development of the industrial risk management plan, specific risks under the Project need to be analysed and evaluated. Based on the preconditions mentioned above, EPGE should develop the plan, and monitor and record during entire project period. See appendix G-27 for detail.

9.7. Community Development Plan

The community development plan needs to be developed to elaborate a set of activities, which directly benefit to the community affected by the Project, and ultimately share the benefit of the Project to surrounding communities. As there is no specific regulation that stipulates requirements for such plan, operational guides provided by international organizations such as the World Bank may be referred. See appendix G-32 for detail.

9.8. Occupational Health and Safety Management Plan

The occupational health and safety management plan needs to be developed to promote occupational health and safety of project related activities, to ultimately contribute safe and efficient operation of the Project. The plan should comply with the Occupational Safety and Health Law (2019) that aims at prevention of occupational accidents and diseases. Environmental, Health, and Safety Guidelines provided by the IFC may be referred in development of the plan. It should present the measures to prevent occupational risks during construction and operation phases such as falling from height, explosion, electric shocks and other project specific risks such as electrical hazard. The plan should also present countermeasures and monitoring plans. See appendix G-35 for detail.

9.9. Grievance and Redress Mechanism

The grievance and redress mechanism need to be developed to deal with any grievances or complaints related to the Project. The mechanism should be developed in consideration of different types of grievances and complaints that may be raised in different phases of project implementation. The mechanism for pre-construction phase should comply with the Land Acquisition Act (1894) to deal with the issues raised related to land acquisition and resettlement procedures. See appendix G-41 for detail.

9.10.Safety Management Plan of Gas Pipeline

The plan needs to be developed for safe installation, operation and demolition of gas pipeline related to the Project. The safety management plan of gas pipeline should comply with MOGE’s internal guidelines,

which have been developed based on ISO 13623 and ASME B31.8. The plan should include mitigation measures for the risks related to gas pipeline, such as internal corrosion, material and construction defect, improper operations, external damages, weather conditions and natural disasters. See appendix G-45 for detail.

9.11.Planning Considerations for Pipeline Installation in Heritage Zone

On the stage of feasibility study of this project, heritage zone was identified on the route of planned water pipeline. Thus, the alignment of the water pipeline was changed to divert one ancient city though, the new pipeline route which is named as an Option-B is still through another ancient city. The purpose of this plan is to conserve old heritage during construction of water pipeline. Contractor should follow to this plan during construction of water pipeline of the project. See appendix G-52 for detail.

9.12.Corporate Social Responsibility (CSR) Plan

Through their activities and relationships, all organizations make positive and negative contributions toward the goal of sustainable development. Organizations therefore have a key role to play in achieving this goal.

Corporate Social Responsibility (CSR) activities and reporting are an organization’s practice publicly on its economic, environmental, and/or social impacts, and hence its contributions towards the goal of sustainable development. See appendix G-59 for detail.

Appendix A

Field Survey Data

- A: Meteorology Survey (Aug. 2018)
- B: Meteorology Survey (Oct. 2018)
- C: Air Quality Survey (Aug. 2018)
- D: Air Quality Survey (Oct. 2018)
- E: Air Quality Survey (Oct. 2019)
- F: Noise Survey (Oct. 2018)
- G: Noise Survey (Oct. 2019)
- H: Vibration Survey (Oct. 2018)
- I: Vibration Survey (Oct. 2019)
- J: Traffic Volume (Oct. 2018)

A: Result of Wind Speed Survey (AQ1)

Parameter: WS

Unit: km/h

Date / time	18 to 19 Aug 2018	19 to 20 Aug 2018	20 to 21 Aug 2018	21 to 22 Aug 2018	22 to 23 Aug 2018	23 to 24 Aug 2018	24 to 25 Aug 2018
11 to 12	0.7	2.4	7.9	6.5	10	9.6	9.1
12 to 13	0.9	2.1	7.6	6.3	9.1	8.9	7.9
13 to 14	1.2	3.4	7.9	5.8	7.8	8.3	7.4
14 to 15	0.9	3.9	8.8	2.4	7.5	7	7.3
15 to 16	2.3	2.9	7.7	2.5	8.4	5.6	4.9
16 to 17	3.8	0.9	6.5	2.8	7.9	3.1	4.8
17 to 18	0.9	1.3	7	2.2	4.7	1	2
18 to 19	1.1	0.4	8.8	0.3	3.7	1.8	2
19 to 20	0.8	0.6	12.4	0.1	3.5	0.5	6.1
20 to 21	2.9	2.9	11.9	0.3	4.3	0.1	3.4
21 to 22	2.3	8	11.8	0.3	3.9	0	2.3
22 to 23	6	3.6	10.6	0.4	4.1	0.1	2.5
23 to 0	8.9	2.9	4.6	0	8.9	3.5	4.9
0 to 1	7.3	0.1	5.5	3.6	7.4	5.7	7
1 to 2	0.4	0.1	5.4	4.5	8	5.5	8.4
2 to 3	0	0.2	4.7	4.7	9.8	7.4	11.4
3 to 4	0.1	0.5	3.7	5.2	10.4	8.4	6
4 to 5	0.1	4	3.8	4.3	8.4	3.1	1.9
5 to 6	0	1	2	0.2	8.7	0.4	2.4
6 to 7	0	0	0.3	0.3	6.5	0.8	0.7
7 to 8	0.1	0.9	1.9	2.4	4	1.3	1.7
8 to 9	1.7	3.8	5.9	2.6	7.9	2.5	2.6
9 to 10	4.4	4.4	3.5	5.6	9.4	4.2	3.2
10 to 11	4.2	6.1	8.2	10.2	10.8	8.4	5.9
average	2.1	2.4	6.6	3.1	7.3	4.1	4.8

A: Result of Wind Direction Survey (AQ1)

Parameter:	WD
Unit:	Degree (Azimuth)

Date / time	18 to 19 Aug 2018	19 to 20 Aug 2018	20 to 21 Aug 2018	21 to 22 Aug 2018	22 to 23 Aug 2018	23 to 24 Aug 2018	24 to 25 Aug 2018
11 to 12	89	204	221	204	236	239	231
12 to 13	203	296	227	212	228	221	241
13 to 14	185	262	228	236	236	232	216
14 to 15	265	240	200	203	239	212	225
15 to 16	200	210	200	183	236	208	210
16 to 17	240	152	198	171	206	205	120
17 to 18	149	178	205	184	202	173	121
18 to 19	151	133	216	165	207	187	322
19 to 20	194	145	217	212	211	204	266
20 to 21	195	182	222	171	209	205	252
21 to 22	203	217	244	140	210	158	189
22 to 23	202	204	237	157	222	151	186
23 to 0	219	212	202	176	242	223	195
0 to 1	238	199	220	194	256	220	220
1 to 2	180	117	228	231	228	209	247
2 to 3	78	123	201	222	233	220	235
3 to 4	151	193	207	220	234	233	211
4 to 5	191	215	206	205	223	195	207
5 to 6	160	158	173	146	228	185	206
6 to 7	133	154	155	200	219	178	171
7 to 8	276	162	209	210	209	176	186
8 to 9	285	195	243	194	222	185	208
9 to 10	236	184	217	216	228	207	202
10 to 11	242	206	243	234	234	228	224
average	-	-	-	-	-	-	-

A: Result of Solar Radiation Survey (AQ1)

Parameter: Solar Radiation

Unit: wat/m^2

Date / time	18 to 19 Aug 2018	19 to 20 Aug 2018	20 to 21 Aug 2018	21 to 22 Aug 2018	22 to 23 Aug 2018	23 to 24 Aug 2018	24 to 25 Aug 2018
11 to 12	568	750	356	383	1151	394	340
12 to 13	856	857	697	553	864	400	561
13 to 14	831	873	831	226	439	314	819
14 to 15	785	687	640	45	517	445	816
15 to 16	452	157	377	135	530	452	534
16 to 17	100	169	272	207	350	86	357
17 to 18	127	49	112	110	105	56	145
18 to 19	18	3	18	8	5	5	4
19 to 20	0	0	0	0	0	0	0
20 to 21	0	0	0	0	0	0	0
21 to 22	0	0	0	0	0	0	0
22 to 23	0	0	0	0	0	0	0
23 to 0	0	0	0	0	0	0	0
0 to 1	0	0	0	0	0	0	0
1 to 2	0	0	0	0	0	0	0
2 to 3	0	0	0	0	0	0	0
3 to 4	0	0	0	0	0	0	0
4 to 5	0	0	0	0	0	0	0
5 to 6	0	2	1	1	1	1	1
6 to 7	58	38	61	37	48	26	50
7 to 8	145	130	202	176	180	136	281
8 to 9	244	417	601	400	271	248	322
9 to 10	637	716	430	756	632	390	529
10 to 11	1022	331	545	918	430	496	560
average	243	216	214	165	230	144	222

B: Result of Wind Speed Survey (AQ1)

Parameter:	WS
Unit:	km/h

Date / time	4 to 5 Oct 2018	5 to 6 Oct 2018	6 to 7 Oct 2018	7 to 8 Oct 2018	8 to 9 Oct 2018	9 to 10 Oct 2018	10 to 11 Oct 2018
11 to 12	0.0	0.5	2.3	0.6	2.1	0.6	2.8
12 to 13	0.0	1.1	0.3	0.5	4.2	2.4	2.8
13 to 14	0.0	1.5	1.5	4.9	3.7	2.8	2.2
14 to 15	0.0	1.1	1.5	3.1	2.5	1.0	1.6
15 to 16	0.0	0.8	0.3	1.4	1.4	0.9	1.0
16 to 17	0.1	0.2	0.0	1.1	12.3	0.6	0.4
17 to 18	0.1	0.0	0.0	0.2	9.9	0.3	0.2
18 to 19	1.6	0.2	0.0	0.2	4.0	0.4	0.1
19 to 20	0.1	0.5	0.0	0.0	1.5	0.0	0.0
20 to 21	0.0	0.0	0.0	0.0	1.2	0.2	0.5
21 to 22	0.0	0.1	0.0	0.0	2.3	0.1	1.3
22 to 23	0.7	0.0	0.0	0.0	2.9	0.2	1.3
23 to 0	0.9	0.0	0.0	0.1	1.7	0.8	4.0
0 to 1	1.7	0.0	0.0	0.0	2.4	1.5	2.6
1 to 2	0.4	1.2	0.0	0.0	0.6	2.4	0.8
2 to 3	0.0	1.7	0.0	0.6	0.4	2.5	0.7
3 to 4	0.0	1.3	0.0	0.4	2.6	1.7	2.5
4 to 5	0.0	1.8	0.0	0.0	0.3	5.7	1.8
5 to 6	0.0	1.8	0.1	0.0	0.0	4.8	1.7
6 to 7	0.0	0.0	0.7	0.1	0.0	4.7	0.8
7 to 8	1.7	0.1	2.5	0.0	0.0	2.2	0.2
8 to 9	0.0	0.1	3.7	0.2	0.0	0.2	0.0
9 to 10	0.7	0.7	2.9	1.2	0.3	0.2	0.0
10 to 11	1.0	1.1	1.4	1.9	0.4	2.5	1.4
average	0.4	0.6	0.7	0.7	2.4	1.6	1.3

B: Result of Wind Direction Survey (AQ1)

Parameter:	WD
Unit:	Degree (Azimuth)

Date / time	4 to 5 Oct 2018	5 to 6 Oct 2018	6 to 7 Oct 2018	7 to 8 Oct 2018	8 to 9 Oct 2018	9 to 10 Oct 2018	10 to 11 Oct 2018
11 to 12	336	112	152	110	142	222	288
12 to 13	343	140	133	185	155	292	288
13 to 14	346	202	264	287	138	276	302
14 to 15	346	213	253	242	144	291	303
15 to 16	241	195	293	160	175	319	292
16 to 17	134	206	259	92	298	314	303
17 to 18	176	206	234	124	307	281	304
18 to 19	167	292	232	109	178	297	298
19 to 20	105	284	232	110	74	289	295
20 to 21	212	285	232	108	206	289	300
21 to 22	307	348	232	96	145	313	189
22 to 23	99	350	232	98	44	306	68
23 to 0	133	350	232	98	277	307	121
0 to 1	155	350	232	98	306	307	213
1 to 2	109	197	232	98	310	295	309
2 to 3	346	55	232	149	271	291	316
3 to 4	331	92	232	51	74	308	321
4 to 5	356	64	232	45	23	295	304
5 to 6	356	39	232	93	297	301	311
6 to 7	356	43	211	48	297	293	312
7 to 8	245	77	62	39	297	298	295
8 to 9	123	246	45	73	297	216	285
9 to 10	320	150	45	115	281	268	284
10 to 11	239	144	65	124	257	268	261
average	-	-	-	-	-	-	-

B: Result of Solar Radiation Survey (AQ1)

Parameter: Solar Radiation

Unit: wat/m^2

Date / time	4 to 5 Oct 2018	5 to 6 Oct 2018	6 to 7 Oct 2018	7 to 8 Oct 2018	8 to 9 Oct 2018	9 to 10 Oct 2018	10 to 11 Oct 2018
11 to 12	480	240	160	85	230	200	450
12 to 13	760	510	430	210	400	310	598
13 to 14	730	670	378	235	256	289	634
14 to 15	620	430	200	117	76	101	106
15 to 16	500	210	190	130	131	109	231
16 to 17	157	135	121	83	67	45	180
17 to 18	96	13	56	47	23	2	112
18 to 19	12	8	2	1	2	1	12
19 to 20	0	0	0	0	0	0	0
20 to 21	0	0	0	0	0	0	0
21 to 22	0	0	0	0	0	0	0
22 to 23	0	0	0	0	0	0	0
23 to 0	0	0	0	0	0	0	0
0 to 1	0	0	0	0	0	0	0
1 to 2	0	0	0	0	0	0	0
2 to 3	0	0	0	0	0	0	0
3 to 4	0	0	0	0	0	0	0
4 to 5	0	0	0	0	0	0	0
5 to 6	1	0	0	0	0	1	1
6 to 7	43	30	56	20	13	24	50
7 to 8	105	112	113	112	109	106	104
8 to 9	110	140	112	85	67	105	104
9 to 10	141	100	120	130	86	121	740
10 to 11	95	95	111	141	121	300	960
average	160	112	85	58	66	71	178

C: Result of SO_2 Survey (AQ1)

Parameter:	SO_2
Unit:	μg/m³

Date / time	18 to 19 Aug 2018	19 to 20 Aug 2018	20 to 21 Aug 2018	21 to 22 Aug 2018	22 to 23 Aug 2018	23 to 24 Aug 2018	24 to 25 Aug 2018
11 to 12	3.10	14.36	1.25	0.00	1.63	0.13	0.00
12 to 13	22.14	6.65	4.89	5.30	1.94	0.00	0.47
13 to 14	27.78	21.79	12.82	0.00	2.38	0.06	3.54
14 to 15	6.08	1.63	0.25	0.00	7.06	0.19	5.74
15 to 16	0.50	0.56	0.78	0.00	1.03	1.82	9.97
16 to 17	0.00	0.00	0.00	0.09	0.06	0.85	0.00
17 to 18	0.00	0.72	0.00	3.89	0.00	1.72	0.00
18 to 19	0.91	1.98	0.00	22.26	0.09	0.00	0.19
19 to 20	0.00	0.34	0.00	0.00	0.00	0.03	0.00
20 to 21	0.00	0.00	0.00	0.60	0.00	0.00	0.00
21 to 22	0.50	0.00	0.00	0.00	0.00	0.00	0.00
22 to 23	0.82	0.13	0.00	0.09	0.03	0.09	0.00
23 to 0	0.00	0.00	0.00	0.09	0.00	0.09	4.39
0 to 1	0.00	3.61	0.00	0.00	0.06	0.00	1.13
1 to 2	0.00	0.00	0.00	0.00	0.00	0.00	0.28
2 to 3	2.26	0.00	0.00	0.00	0.00	0.00	0.00
3 to 4	4.77	0.66	0.00	0.00	0.09	0.03	0.00
4 to 5	9.72	0.00	0.00	0.00	0.00	0.00	0.00
5 to 6	9.25	0.03	0.00	2.51	0.44	0.09	0.00
6 to 7	4.08	2.32	0.31	0.50	0.00	1.00	4.33
7 to 8	22.14	8.84	1.00	0.91	1.54	0.09	2.63
8 to 9	35.12	2.85	9.91	4.52	3.04	0.00	3.57
9 to 10	27.81	13.80	7.56	21.32	5.86	0.22	1.60
10 to 11	25.74	1.07	0.82	5.17	6.27	1.98	4.77
average	8.45	3.39	1.65	2.80	1.31	0.35	1.78

C: Result of NO_2 Survey (AQ1)

Parameter:	NO_2
Unit:	μg/m^3

Date / time	18 to 19 Aug 2018	19 to 20 Aug 2018	20 to 21 Aug 2018	21 to 22 Aug 2018	22 to 23 Aug 2018	23 to 24 Aug 2018	24 to 25 Aug 2018
11 to 12	39.98	3.76	9.81	25.30	3.92	4.95	13.77
12 to 13	11.57	3.95	4.20	6.21	4.70	5.49	8.91
13 to 14	6.71	3.76	3.79	29.13	8.25	12.10	3.76
14 to 15	13.23	3.76	7.40	154.18	5.17	8.84	3.86
15 to 16	34.77	23.17	10.76	77.07	3.79	3.76	3.98
16 to 17	103.73	90.31	9.16	28.41	5.30	15.77	12.07
17 to 18	56.63	7.34	6.52	3.89	21.92	38.79	32.61
18 to 19	29.79	8.78	6.27	4.14	28.22	8.62	35.75
19 to 20	18.72	12.04	27.66	16.78	15.46	12.73	82.00
20 to 21	15.84	4.61	15.11	5.68	7.24	7.12	144.15
21 to 22	7.68	4.23	24.14	5.14	6.21	11.23	41.99
22 to 23	3.79	5.64	16.93	3.76	8.50	11.19	15.62
23 to 0	9.12	17.15	19.00	4.11	15.15	14.83	4.39
0 to 1	101.41	9.25	23.99	4.01	22.61	11.70	4.04
1 to 2	16.93	6.90	17.18	4.17	12.32	17.84	5.90
2 to 3	4.26	10.32	11.92	4.86	10.16	17.28	8.62
3 to 4	4.33	10.41	19.03	4.86	15.33	10.47	8.40
4 to 5	3.76	6.27	22.20	4.73	3.95	17.43	7.96
5 to 6	3.76	5.05	16.65	5.77	4.30	11.82	14.05
6 to 7	3.76	4.61	5.80	3.76	6.58	9.72	13.77
7 to 8	3.76	3.86	3.92	3.98	4.52	8.59	3.83
8 to 9	3.76	3.83	3.76	3.76	3.79	3.76	3.79
9 to 10	3.76	3.76	3.76	3.76	3.76	4.11	3.76
10 to 11	3.76	8.43	25.49	3.89	3.79	4.04	3.76
average	21.03	10.88	13.10	17.14	9.37	11.34	20.03

C: Result of NO Survey (AQ1)

Parameter:	NO
Unit:	µg/m^3

Date / time	18 to 19 Aug 2018	19 to 20 Aug 2018	20 to 21 Aug 2018	21 to 22 Aug 2018	22 to 23 Aug 2018	23 to 24 Aug 2018	24 to 25 Aug 2018
11 to 12	5.61	31.52	2.45	0.67	19.37	1.49	4.81
12 to 13	9.92	17.75	21.18	18.25	11.27	1.96	9.56
13 to 14	27.87	35.84	45.24	2.54	6.30	2.13	31.07
14 to 15	9.44	11.45	15.48	0.61	21.44	4.78	32.80
15 to 16	2.08	4.24	1.73	0.99	18.92	24.58	25.35
16 to 17	1.34	0.61	1.73	4.59	7.45	12.23	0.97
17 to 18	0.61	1.90	0.81	21.36	0.61	0.62	0.61
18 to 19	0.61	0.73	0.78	12.56	0.85	0.69	1.20
19 to 20	0.69	0.83	0.65	0.88	0.84	0.73	0.61
20 to 21	0.69	2.20	0.63	1.38	0.73	1.28	0.65
21 to 22	1.64	4.00	0.63	1.15	0.96	1.37	0.61
22 to 23	4.89	0.74	0.61	1.53	0.64	0.94	3.09
23 to 0	1.25	1.11	0.72	1.35	0.76	0.94	7.74
0 to 1	0.61	0.96	0.72	1.62	0.63	0.61	6.60
1 to 2	1.66	1.91	2.32	1.17	0.78	0.66	6.68
2 to 3	3.93	0.65	2.08	0.97	0.73	1.13	3.00
3 to 4	6.00	1.07	0.88	1.04	0.93	2.64	4.25
4 to 5	7.22	0.86	0.72	1.56	1.24	1.93	3.54
5 to 6	2.07	1.00	0.90	2.83	2.34	2.41	1.66
6 to 7	5.47	7.25	6.54	1.63	2.40	1.25	1.92
7 to 8	27.70	14.95	13.76	6.72	9.34	7.21	18.17
8 to 9	46.86	16.17	23.04	22.11	16.15	14.71	29.28
9 to 10	56.09	36.27	44.44	35.26	28.51	16.89	25.03
10 to 11	46.01	24.96	11.71	35.96	29.86	23.43	42.65
average	11.26	9.12	8.32	7.45	7.63	5.28	10.91

C: Result of CO Survey (AQ1)

Parameter:	CO
Unit:	µg/m^3

Date / time	18 to 19 Aug 2018	19 to 20 Aug 2018	20 to 21 Aug 2018	21 to 22 Aug 2018	22 to 23 Aug 2018	23 to 24 Aug 2018	24 to 25 Aug 2018
11 to 12	5.92	9.16	32.73	15.46	17.94	46.67	20.23
12 to 13	1.34	8.49	13.65	25.58	25.58	12.41	42.09
13 to 14	5.82	1.05	23.67	26.15	67.66	30.63	18.04
14 to 15	1.24	4.29	16.89	54.21	63.08	31.30	4.77
15 to 16	16.32	23.57	31.59	52.11	48.58	20.52	12.31
16 to 17	45.52	61.36	32.16	37.89	18.13	28.25	28.63
17 to 18	74.63	44.28	35.50	13.17	34.45	85.03	37.03
18 to 19	51.72	56.69	33.97	60.79	43.42	54.40	58.98
19 to 20	32.73	37.60	31.97	13.65	38.36	40.18	37.22
20 to 21	14.60	10.21	33.12	48.96	35.31	55.73	48.96
21 to 22	18.70	20.14	32.07	20.80	18.51	45.33	35.12
22 to 23	7.73	22.81	31.40	9.07	33.02	35.69	19.95
23 to 0	10.97	15.08	26.43	25.00	37.89	3.44	5.92
0 to 1	20.42	80.35	27.39	5.34	30.06	25.19	2.19
1 to 2	28.73	23.95	23.38	10.21	16.61	16.03	5.34
2 to 3	19.47	21.38	20.90	17.56	16.13	21.19	14.31
3 to 4	15.17	54.40	20.42	16.03	17.56	26.63	14.98
4 to 5	25.77	37.22	21.85	16.22	17.18	11.07	16.03
5 to 6	60.31	30.16	42.56	52.30	37.60	28.06	15.08
6 to 7	32.54	26.05	42.47	9.35	24.34	40.18	71.67
7 to 8	23.09	42.47	28.06	18.99	36.55	37.89	12.02
8 to 9	48.00	14.79	31.68	20.52	25.00	20.04	26.34
9 to 10	4.29	11.93	3.34	3.72	15.46	15.46	6.97
10 to 11	7.16	37.41	19.95	6.20	18.13	13.27	4.01
average	23.84	28.95	27.38	24.14	30.69	31.02	23.26

C: Result of $PM_{2.5}$ Survey (AQ1)

Parameter:	$PM_{2.5}$
Unit:	μg/m^3

Date / time	18 to 19 Aug 2018	19 to 20 Aug 2018	20 to 21 Aug 2018	21 to 22 Aug 2018	22 to 23 Aug 2018	23 to 24 Aug 2018	24 to 25 Aug 2018
11 to 12	2.92	8.92	26.43	15.92	3.38	14.72	13.35
12 to 13	2.37	20.38	2.12	4.57	28.57	6.00	2.18
13 to 14	2.65	2.08	2.12	28.57	34.05	16.97	2.72
14 to 15	16.72	12.07	15.28	22.77	14.95	6.48	2.17
15 to 16	41.35	39.62	23.90	4.30	6.38	2.33	2.82
16 to 17	38.78	10.35	18.37	6.73	13.47	18.47	29.67
17 to 18	4.62	7.12	24.22	2.92	24.92	23.57	31.17
18 to 19	5.57	18.62	28.23	14.87	18.95	17.97	23.68
19 to 20	12.95	20.93	24.93	9.92	10.88	19.80	15.90
20 to 21	8.80	6.82	11.65	4.28	9.27	11.10	4.62
21 to 22	4.92	14.00	7.90	7.27	5.92	10.17	2.40
22 to 23	4.65	6.28	4.82	7.57	10.02	18.23	3.82
23 to 0	8.75	14.17	5.57	7.82	10.45	21.22	3.05
0 to 1	21.20	3.03	9.47	8.53	8.22	14.30	5.17
1 to 2	2.60	3.70	11.28	6.10	5.08	7.47	4.50
2 to 3	2.05	6.23	10.57	6.08	7.95	5.93	4.58
3 to 4	3.75	6.87	10.85	8.77	10.37	3.47	2.50
4 to 5	5.27	9.88	11.50	7.87	6.07	2.37	2.33
5 to 6	11.22	6.33	9.07	8.85	9.05	2.43	4.02
6 to 7	7.17	6.70	9.43	8.62	7.33	7.50	8.60
7 to 8	2.00	3.50	4.70	6.10	4.40	3.95	3.32
8 to 9	2.00	2.80	2.70	2.28	3.57	2.03	2.03
9 to 10	2.43	3.02	2.20	3.28	2.03	2.48	2.00
10 to 11	2.85	38.17	24.48	11.82	5.00	5.47	6.15
average	9.07	11.32	12.57	8.99	10.84	10.18	7.61

C: Result of PM_{10} Survey (AQ1)

Parameter:	PM_{10}
Unit:	μg/m^3

Date / time	18 to 19 Aug 2018	19 to 20 Aug 2018	20 to 21 Aug 2018	21 to 22 Aug 2018	22 to 23 Aug 2018	23 to 24 Aug 2018	24 to 25 Aug 2018
11 to 12	1.68	3.37	13.67	11.88	2.07	15.83	12.20
12 to 13	1.23	4.03	1.10	3.13	5.13	4.35	1.05
13 to 14	1.20	1.00	1.05	49.15	49.63	24.47	1.47
14 to 15	19.72	1.75	16.55	127.82	13.72	5.40	1.02
15 to 16	47.22	55.68	33.03	7.52	4.40	1.17	1.63
16 to 17	80.03	17.48	21.28	1.25	27.20	23.37	41.70
17 to 18	43.45	13.07	30.25	1.00	50.32	26.72	18.78
18 to 19	19.23	34.70	34.50	14.72	29.95	18.82	31.48
19 to 20	13.30	41.27	32.17	31.62	9.02	23.20	68.48
20 to 21	1.42	1.00	9.63	2.93	12.38	9.18	82.23
21 to 22	1.33	1.28	6.07	5.65	3.97	19.35	1.35
22 to 23	1.00	4.38	2.95	2.15	8.53	46.52	1.08
23 to 0	3.63	10.02	3.75	16.48	8.85	54.25	1.00
0 to 1	36.75	2.07	7.32	8.77	9.55	14.78	1.00
1 to 2	2.10	1.97	9.43	1.95	3.47	5.18	1.95
2 to 3	1.02	15.62	7.43	4.05	5.58	4.88	1.48
3 to 4	2.13	2.68	8.55	6.92	8.03	1.00	1.00
4 to 5	1.87	12.98	23.05	4.63	4.10	1.08	1.05
5 to 6	14.77	16.55	8.13	15.95	6.55	1.15	1.77
6 to 7	3.80	1.87	5.98	6.08	5.20	11.60	10.38
7 to 8	1.00	1.63	2.58	1.25	2.82	1.25	1.00
8 to 9	1.05	1.17	1.47	1.12	2.03	1.02	1.00
9 to 10	1.33	1.10	1.12	1.95	1.00	1.33	1.00
10 to 11	1.62	20.00	33.43	6.08	3.58	3.97	2.80
average	12.58	11.11	13.10	13.92	11.55	13.33	12.00

D: Result of SO_2 Survey (AQ1)

Parameter:	SO_2
Unit:	µg/m^3

Date / time	4 to 5 Oct 2018	5 to 6 Oct 2018	6 to 7 Oct 2018	7 to 8 Oct 2018	8 to 9 Oct 2018	9 to 10 Oct 2018	10 to 11 Oct 2018
11 to 12	0.13	33.96	9.69	24.96	5.24	1.00	0.72
12 to 13	0.00	20.76	10.28	5.11	2.63	4.42	7.71
13 to 14	0.00	0.41	7.40	0.38	4.17	3.45	0.78
14 to 15	0.00	0.00	0.00	0.00	1.57	0.34	0.00
15 to 16	0.00	0.00	0.53	0.97	1.88	2.48	0.85
16 to 17	0.97	0.00	0.00	1.91	0.25	0.03	1.41
17 to 18	0.00	0.82	0.13	0.00	0.82	0.82	0.03
18 to 19	0.00	0.00	0.00	0.00	0.00	0.47	1.25
19 to 20	0.00	0.00	0.22	3.39	0.00	4.86	0.69
20 to 21	0.00	0.00	0.00	0.00	0.00	14.99	0.82
21 to 22	0.00	0.00	0.88	0.03	0.00	3.32	1.07
22 to 23	0.34	0.00	1.25	0.00	0.00	14.36	0.06
23 to 0	0.69	0.00	0.38	0.00	0.00	15.68	0.00
0 to 1	1.29	0.00	0.13	0.03	0.19	1.13	0.00
1 to 2	0.00	0.06	0.82	0.03	2.19	3.92	1.22
2 to 3	0.06	0.00	0.85	0.16	0.34	10.16	0.00
3 to 4	3.10	0.00	2.98	0.00	0.00	1.07	0.00
4 to 5	1.29	57.04	5.42	0.78	0.00	1.51	0.00
5 to 6	5.27	0.00	20.48	15.99	0.00	0.88	0.00
6 to 7	21.98	0.09	1.60	10.50	0.00	2.88	0.00
7 to 8	5.90	2.10	2.32	24.87	2.16	6.80	3.45
8 to 9	20.91	16.68	0.00	39.16	2.54	16.65	14.77
9 to 10	22.73	16.96	4.11	39.57	5.86	21.26	23.39
10 to 11	36.28	17.03	32.70	14.36	1.16	47.69	42.24
average	5.04	6.91	4.26	7.59	1.29	7.51	4.19

D: Result of NO_2 Survey (AQ1)

Parameter:	NO_2
Unit:	μg/m^3

Date / time	4 to 5 Oct 2018	5 to 6 Oct 2018	6 to 7 Oct 2018	7 to 8 Oct 2018	8 to 9 Oct 2018	9 to 10 Oct 2018	10 to 11 Oct 2018
11 to 12	120.69	3.76	3.79	3.76	5.96	3.86	3.76
12 to 13	37.50	3.76	3.76	4.58	4.70	6.33	3.76
13 to 14	31.14	8.09	6.18	62.74	4.92	4.48	3.76
14 to 15	22.20	4.26	30.10	45.94	6.11	38.22	3.76
15 to 16	14.20	6.96	93.51	11.29	29.16	31.89	3.76
16 to 17	26.34	36.31	61.40	3.76	58.45	4.48	3.76
17 to 18	30.10	66.54	13.92	57.88	179.55	3.76	7.24
18 to 19	50.45	97.27	80.93	67.73	151.83	3.76	8.65
19 to 20	40.39	54.25	63.03	17.94	147.31	3.76	5.08
20 to 21	33.11	113.45	43.46	18.81	41.05	3.76	3.76
21 to 22	27.63	53.87	30.16	6.74	8.53	3.76	3.86
22 to 23	16.12	29.19	24.11	11.35	3.92	3.76	6.08
23 to 0	8.18	27.88	21.86	16.18	3.95	3.76	12.17
0 to 1	8.81	28.25	15.87	16.15	4.30	3.76	4.83
1 to 2	5.68	30.01	9.16	14.52	4.14	3.76	8.00
2 to 3	4.58	65.50	5.14	14.64	8.09	3.76	13.89
3 to 4	5.08	56.54	4.99	54.31	13.36	3.76	4.39
4 to 5	6.08	72.12	4.80	9.85	5.05	3.76	4.14
5 to 6	4.36	76.85	5.96	4.01	4.42	3.76	5.64
6 to 7	3.98	43.90	4.30	4.95	4.45	3.76	3.89
7 to 8	3.76	8.75	9.44	3.76	3.76	3.76	3.76
8 to 9	3.76	5.64	24.40	3.76	4.04	3.76	3.76
9 to 10	3.76	3.76	14.11	3.76	55.81	3.76	3.76
10 to 11	3.76	3.76	3.76	3.76	136.87	3.76	3.76
average	21.32	37.53	24.09	19.26	37.07	6.54	5.39

D: Result of NO Survey (AQ1)

Parameter:	NO
Unit:	µg/m^3

Date / time	4 to 5 Oct 2018	5 to 6 Oct 2018	6 to 7 Oct 2018	7 to 8 Oct 2018	8 to 9 Oct 2018	9 to 10 Oct 2018	10 to 11 Oct 2018
11 to 12	1.32	80.02	44.72	82.23	20.43	0.76	3.89
12 to 13	0.75	66.09	52.73	70.17	19.05	6.50	13.82
13 to 14	0.91	13.28	39.70	5.60	22.87	5.89	4.55
14 to 15	2.57	12.10	14.37	1.25	18.82	0.65	0.91
15 to 16	13.21	19.23	2.10	13.97	16.89	0.61	1.78
16 to 17	0.86	16.02	0.61	80.06	0.94	0.61	4.05
17 to 18	0.76	2.53	7.21	1.06	1.64	1.98	0.81
18 to 19	0.73	0.71	0.61	0.88	0.61	3.01	0.65
19 to 20	0.61	0.61	0.69	0.61	0.61	5.29	1.82
20 to 21	0.74	0.61	0.61	0.61	0.61	7.06	3.70
21 to 22	0.61	0.61	0.61	0.83	0.61	6.69	2.57
22 to 23	0.72	0.69	0.61	0.61	0.61	8.63	0.82
23 to 0	0.89	1.74	0.61	0.78	0.67	9.07	0.77
0 to 1	0.65	1.91	0.61	0.65	0.76	7.32	1.52
1 to 2	0.83	1.10	0.65	0.84	0.61	7.94	3.50
2 to 3	1.05	0.71	0.82	1.38	0.62	4.58	0.61
3 to 4	2.88	0.61	1.30	0.61	0.61	3.88	1.97
4 to 5	0.72	0.61	0.78	2.61	0.61	1.85	3.23
5 to 6	0.74	0.61	3.80	5.11	0.61	4.52	1.21
6 to 7	3.66	2.34	2.15	3.47	0.61	5.22	0.90
7 to 8	12.30	20.06	0.62	30.22	1.58	5.44	3.76
8 to 9	23.53	28.70	0.62	64.07	1.55	15.72	13.67
9 to 10	35.37	41.94	18.34	76.70	4.75	23.16	35.75
10 to 11	63.85	60.41	64.40	28.25	6.82	23.96	42.92
average	7.09	15.55	10.80	19.69	5.15	6.68	6.22

D: Result of CO Survey (AQ1)

Parameter:	CO
Unit:	µg/m^3

Date / time	4 to 5 Oct 2018	5 to 6 Oct 2018	6 to 7 Oct 2018	7 to 8 Oct 2018	8 to 9 Oct 2018	9 to 10 Oct 2018	10 to 11 Oct 2018
11 to 12	4.49	2.19	21.95	6.68	56.59	70.14	7.92
12 to 13	11.93	9.73	9.73	16.32	52.49	87.13	26.05
13 to 14	27.87	64.61	70.52	104.88	46.67	81.69	56.78
14 to 15	18.90	59.84	102.69	97.15	74.91	38.46	13.84
15 to 16	13.93	59.07	167.20	70.43	103.07	101.45	13.27
16 to 17	50.10	68.33	140.95	63.84	86.08	79.30	35.98
17 to 18	21.09	132.46	94.96	6.97	81.31	30.44	28.82
18 to 19	69.95	140.00	150.02	88.18	119.67	7.63	60.41
19 to 20	73.20	166.24	116.81	151.64	63.27	46.86	22.62
20 to 21	60.03	187.53	106.98	39.60	65.28	58.31	10.12
21 to 22	43.14	77.49	83.12	45.62	49.82	31.78	4.68
22 to 23	49.91	54.30	95.62	40.46	42.66	49.72	7.73
23 to 0	57.55	52.11	91.81	19.18	46.00	48.86	10.21
0 to 1	52.30	55.45	59.17	25.58	52.97	1.34	12.60
1 to 2	15.56	44.09	49.63	36.93	76.06	6.39	56.40
2 to 3	29.30	29.87	34.64	55.54	64.70	36.65	1.81
3 to 4	67.18	42.47	35.98	53.16	22.62	5.34	7.06
4 to 5	47.33	35.12	58.60	48.77	43.71	0.95	13.07
5 to 6	58.60	60.03	168.25	70.62	57.36	8.88	14.51
6 to 7	109.84	70.91	59.55	74.53	48.38	14.31	18.32
7 to 8	36.46	57.83	25.48	33.40	91.90	28.73	48.86
8 to 9	36.93	71.67	30.63	2.00	83.12	24.14	67.47
9 to 10	11.36	37.89	26.05	10.40	98.87	18.23	11.26
10 to 11	8.02	22.14	2.58	40.37	93.72	81.50	82.07
average	40.62	66.72	75.12	50.09	67.55	39.93	26.33

D: Result of $PM_{2.5}$ Survey (AQ1)

Parameter:	$PM_{2.5}$
Unit:	µg/m^3

Date / time	4 to 5 Oct 2018	5 to 6 Oct 2018	6 to 7 Oct 2018	7 to 8 Oct 2018	8 to 9 Oct 2018	9 to 10 Oct 2018	10 to 11 Oct 2018
11 to 12	25.57	2.00	5.45	2.03	13.32	25.13	5.80
12 to 13	2.70	2.32	2.07	2.55	7.45	6.70	8.98
13 to 14	5.68	19.10	4.67	66.62	13.33	28.28	22.40
14 to 15	5.73	12.33	38.63	39.65	19.28	19.33	15.45
15 to 16	3.62	34.32	55.05	9.72	42.42	8.95	7.00
16 to 17	21.88	72.30	34.63	3.02	48.70	5.68	6.68
17 to 18	19.62	28.23	22.43	36.20	23.95	9.40	21.53
18 to 19	9.17	23.33	37.68	38.87	10.95	10.82	25.13
19 to 20	5.07	13.32	36.23	26.08	15.90	6.10	16.18
20 to 21	7.25	35.70	28.82	15.60	6.80	12.93	12.45
21 to 22	7.68	27.45	31.92	10.70	7.60	19.43	11.03
22 to 23	5.65	12.27	41.35	11.03	5.82	21.88	8.62
23 to 0	7.40	15.57	48.72	11.88	7.57	15.25	7.07
0 to 1	8.58	17.90	29.37	11.58	10.98	8.37	3.15
1 to 2	10.83	19.00	19.37	12.30	8.23	7.98	5.32
2 to 3	3.03	24.22	20.52	12.18	13.10	19.23	8.88
3 to 4	12.50	4.93	16.67	33.57	17.77	7.80	6.92
4 to 5	10.25	3.05	20.32	15.42	4.10	7.08	3.02
5 to 6	14.17	2.72	37.00	17.77	3.05	4.93	4.00
6 to 7	29.33	6.45	41.55	24.92	5.38	4.12	3.52
7 to 8	13.58	7.75	36.10	5.45	13.92	6.18	3.23
8 to 9	5.27	7.50	15.38	3.33	8.63	3.68	5.35
9 to 10	2.00	2.80	2.43	2.45	7.57	3.57	2.03
10 to 11	2.03	3.05	2.00	2.48	8.03	11.65	9.93
average	9.94	16.57	26.18	17.31	13.49	11.44	9.32

D: Result of PM_{10} Survey (AQ1)

Parameter:	PM_{10}
Unit:	µg/m^3

Date / time	4 to 5 Oct 2018	5 to 6 Oct 2018	6 to 7 Oct 2018	7 to 8 Oct 2018	8 to 9 Oct 2018	9 to 10 Oct 2018	10 to 11 Oct 2018
11 to 12	56.38	1.00	3.70	1.03	17.47	51.43	6.45
12 to 13	1.22	1.02	1.05	2.90	8.03	5.27	7.37
13 to 14	3.80	5.87	3.30	77.07	11.35	45.50	21.82
14 to 15	1.75	9.25	30.07	78.70	17.92	64.80	38.12
15 to 16	2.22	16.08	55.90	39.70	38.30	17.08	22.63
16 to 17	24.47	30.53	50.07	2.07	57.78	2.83	6.08
17 to 18	22.43	40.22	27.87	30.38	53.77	20.87	70.97
18 to 19	34.43	38.02	48.22	54.95	88.15	21.93	53.65
19 to 20	23.07	23.72	52.03	83.47	46.30	4.18	12.68
20 to 21	7.72	216.93	41.97	26.80	4.80	18.00	1.65
21 to 22	5.30	34.27	30.68	11.97	5.68	41.15	19.03
22 to 23	2.25	19.32	57.88	18.20	1.57	25.05	25.53
23 to 0	2.52	10.27	88.25	15.82	20.48	5.93	21.53
0 to 1	6.12	34.32	41.30	10.38	37.72	5.15	1.00
1 to 2	4.18	25.75	34.92	14.37	2.73	5.53	34.72
2 to 3	1.00	24.32	18.25	12.33	20.12	59.70	5.68
3 to 4	15.48	4.32	9.47	93.17	21.15	15.38	1.60
4 to 5	18.12	73.52	17.15	25.93	2.30	5.33	1.03
5 to 6	10.07	1.35	68.23	19.95	1.68	1.00	2.27
6 to 7	21.23	5.27	65.25	32.50	2.53	2.00	1.63
7 to 8	1.33	1.60	65.75	1.60	4.02	4.27	1.62
8 to 9	1.07	1.10	16.65	1.62	1.03	1.12	1.15
9 to 10	1.00	1.20	1.05	1.35	1.22	1.45	1.02
10 to 11	1.07	1.83	1.00	1.00	8.23	17.53	6.62
average	11.18	25.88	34.58	27.39	19.76	18.44	15.24

E: Result of Air Quality Survey (AQ2)

parameter / time	SO_2 µg/m^3	NO_2 µg/m^3	NO µg/m^3	CO µg/m^3	$PM_{2.5}$ µg/m^3	PM_{10} µg/m^3
11 to 12	33.64	3.76	0.00	85.80	4.38	7.22
12 to 13	16.90	3.76	4.08	147.54	3.55	11.43
13 to 14	9.22	3.76	1.02	142.32	2.22	4.92
14 to 15	1.07	3.76	0.00	171.82	4.87	8.75
15 to 16	11.66	4.13	0.00	183.32	13.70	33.18
16 to 17	0.53	71.99	3.06	252.37	19.38	60.08
17 to 18	14.39	124.48	1.02	668.06	20.02	58.20
18 to 19	0.60	128.84	0.00	788.78	18.03	53.15
19 to 20	12.95	97.61	0.00	415.44	41.45	55.12
20 to 21	12.54	52.99	0.00	220.98	39.90	42.73
21 to 22	0.75	40.29	0.00	114.05	30.97	37.47
22 to 23	18.12	35.75	0.00	108.25	32.67	38.80
23 to 0	41.83	37.31	0.00	290.66	32.52	44.33
0 to 1	22.61	26.18	0.00	177.45	36.13	41.33
1 to 2	4.55	21.98	0.00	63.77	26.87	33.93
2 to 3	22.58	26.81	0.00	134.45	17.77	30.32
3 to 4	2.51	38.35	0.00	67.88	25.43	31.17
4 to 5	11.35	19.69	0.00	92.23	32.77	40.22
5 to 6	5.36	31.95	0.00	35.00	18.85	58.80
6 to 7	26.87	48.51	0.00	58.27	24.17	48.50
7 to 8	9.94	20.66	0.00	128.18	16.42	50.27
8 to 9	36.06	3.76	0.00	57.86	16.35	30.32
9 to 10	44.09	3.76	10.22	78.50	6.78	19.17
10 to 11	43.27	5.61	16.35	78.55	4.11	11.63
average	16.81	35.65	1.49	190.06	20.39	35.46

AQ2: 22(Tue.) - 23(Wed.) October 2019

E: Result of Air Quality Survey (AQ3)

parameter / time	SO_2 µg/m^3	NO_2 µg/m^3	NO µg/m^3	CO µg/m^3	$PM_{2.5}$ µg/m^3	PM_{10} µg/m^3
10 to 11	5.30	6.65	0.00	56.67	3.62	7.70
11 to 12	32.36	3.76	0.00	56.81	1.28	2.33
12 to 13	10.28	3.76	0.00	79.64	1.73	13.78
13 to 14	14.39	3.76	0.00	75.27	1.37	2.18
14 to 15	0.16	3.76	0.00	87.74	5.73	7.45
15 to 16	2.29	4.36	0.00	139.81	12.73	17.05
16 to 17	5.17	65.35	14.31	408.20	15.13	70.02
17 to 18	11.73	168.98	0.00	610.94	21.98	54.48
18 to 19	23.72	146.24	0.00	587.01	18.46	74.83
19 to 20	18.16	126.87	4.09	603.24	19.22	55.43
20 to 21	24.05	75.44	0.00	385.57	19.10	56.17
21 to 22	23.89	51.96	0.00	342.48	20.08	67.65
22 to 23	1.16	34.43	0.00	147.98	20.93	44.73
23 to 0	20.63	25.27	0.00	141.51	22.10	27.45
0 to 1	15.43	40.98	0.00	137.71	26.63	32.65
1 to 2	18.59	43.12	0.00	162.87	35.17	43.87
2 to 3	17.97	15.99	0.00	84.98	21.43	29.05
3 to 4	9.50	17.97	0.00	72.17	25.62	27.28
4 to 5	35.62	39.82	0.00	178.23	31.47	45.82
5 to 6	34.46	46.75	0.00	234.33	24.18	70.18
6 to 7	28.16	49.73	0.00	240.06	6.52	21.37
7 to 8	18.51	25.42	0.00	77.07	20.14	26.60
8 to 9	0.00	3.76	0.00	41.80	12.00	36.00
9 to 10	32.11	3.76	14.31	68.10	14.08	20.02
average	16.82	42.00	1.36	209.17	16.70	35.59

AQ3: 1(Mon.) - 22(Tue.) October 2019

E: Result of Air Quality Survey (AQ4)

time \ parameter	SO_2 µg/m^3	NO_2 µg/m^3	NO µg/m^3	CO µg/m^3	$PM_{2.5}$ µg/m^3	PM_{10} µg/m^3
12 to 13	0.00	3.76	46.48	11.12	2.21	3.82
13 to 14	8.72	3.76	2.04	83.73	4.70	8.58
14 to 15	5.96	3.76	2.04	171.40	3.52	7.08
15 to 16	1.10	3.76	11.25	187.74	15.70	21.30
16 to 17	11.57	36.31	8.18	302.28	24.23	51.22
17 to 18	24.65	124.80	3.07	1278.98	15.63	62.28
18 to 19	5.42	138.06	2.04	1037.78	10.57	30.68
19 to 20	1.98	102.16	1.02	416.58	25.15	25.28
20 to 21	30.70	87.83	1.02	298.76	21.43	40.50
21 to 22	49.26	64.72	0.00	396.97	5.98	19.42
22 to 23	23.96	52.74	0.00	271.08	7.57	49.22
23 to 0	18.22	32.52	0.00	196.70	36.53	50.32
0 to 1	14.11	32.11	0.00	176.88	20.92	42.20
1 to 2	20.22	40.23	0.00	176.07	2.95	44.53
2 to 3	9.47	37.50	0.00	104.50	8.32	35.78
3 to 4	5.86	37.91	0.00	94.01	31.82	44.03
4 to 5	27.06	42.11	0.00	148.88	14.60	34.78
5 to 6	4.80	31.36	0.00	74.84	29.63	43.35
6 to 7	26.40	29.19	0.00	273.70	37.90	52.48
7 to 8	28.03	21.29	4.09	163.84	30.35	43.80
8 to 9	32.36	3.95	11.25	72.22	27.82	42.13
9 to 10	66.29	3.76	2.04	103.60	32.15	44.07
10 to 11	18.69	3.79	44.99	127.90	29.02	42.37
11 to 12	14.33	3.76	8.18	134.40	17.25	27.43
average	18.71	39.22	6.15	262.67	19.00	36.11

AQ4: 24(Thu.) — 25(Fri.) October 2019

E: Result of Air Quality Survey (AQ5)

parameter / time	SO_2 µg/m^3	NO_2 µg/m^3	NO µg/m^3	CO µg/m^3	$PM_{2.5}$ µg/m^3	PM_{10} µg/m^3
12 to 13	8.09	3.76	1.02	124.01	4.60	11.30
13 to 14	9.06	3.76	14.31	107.43	2.50	31.00
14 to 15	8.81	3.89	8.18	126.63	5.00	23.57
15 to 16	1.38	3.83	2.04	140.48	3.65	54.40
16 to 17	1.41	41.64	18.40	194.64	10.37	10.82
17 to 18	5.39	105.30	9.20	243.41	17.90	53.45
18 to 19	1.66	116.80	2.04	263.39	19.62	38.05
19 to 20	2.57	97.39	6.13	210.18	37.42	28.48
20 to 21	14.30	97.58	24.54	238.32	21.03	30.17
21 to 22	11.26	68.98	0.00	224.32	30.38	39.38
22 to 23	14.55	55.97	0.00	215.40	41.83	45.55
23 to 0	30.32	65.54	0.00	222.09	36.40	44.33
0 to 1	12.39	36.78	0.00	160.46	5.25	50.03
1 to 2	8.72	30.89	0.00	123.56	5.40	42.45
2 to 3	21.01	34.52	0.00	120.94	31.95	42.03
3 to 4	15.11	42.96	0.00	103.21	47.62	49.10
4 to 5	1.88	31.45	0.00	92.30	41.37	46.02
5 to 6	5.05	22.92	0.00	77.20	37.30	43.30
6 to 7	10.97	36.94	0.00	86.61	30.27	38.20
7 to 8	32.01	11.51	33.74	93.67	9.95	12.78
8 to 9	61.30	3.76	127.81	58.71	5.85	7.70
9 to 10	6.46	3.76	1.02	91.21	5.57	12.82
10 to 11	2.16	3.76	0.00	95.09	2.38	3.85
11 to 12	77.14	3.76	0.00	116.53	4.34	5.90
average	15.13	38.64	10.35	147.07	19.08	31.86

AQ5: 23(Wed.) -– 24(Thu.) October 2019

F: Result of Noise Level Survey

Unit: L_{Aeq}

Time \ Location		NV1	NV2	NV3	NV4
7:00-8:00	Daytime	70.0	57.0	59.4	52.1
8:00-9:00		66.3	45.9	55.2	57.1
9:00-10:00		71.0	51.1	56.3	49.2
10:00-11:00		73.3	43.4	52.6	51.2
11:00-12:00		73.5	51.1	61.9	53.2
12:00-13:00		54.8	59.8	43.0	45.9
13:00-14:00		64.7	52.1	57.5	53.8
14:00-15:00		49.1	51.3	60.6	48.8
15:00-16:00		65.8	54.1	52.9	48.5
16:00-17:00		56.2	66.0	57.5	48.1
17:00-18:00		58.9	58.7	68.5	48.4
18:00-19:00		68.3	51.0	56.4	49.6
19:00-20:00		66.4	56.8	55.8	52.5
20:00-21:00		57.2	55.4	54.5	49.2
21:00-22:00		56.2	50.8	52.4	50.1
22:00-23:00	Nighttime	55.6	-	-	51.1
23:00-24:00		54.9	-	-	48.5
24:00-01:00		54.9	-	-	44.9
01:00-02:00		54.4	-	-	50.6
02:00-03:00		52.2	-	-	47.9
03:00-04:00		56.2	-	-	45.1
04:00-05:00		60.4	-	-	47.0
05:00-06:00		59.9	-	-	47.8
06:00-07:00		70.0	-	-	45.9
Average	Daytime	68	57	60	51
	Nighttime	62	-	-	48

NV1: Fri, 5th to 6th Oct 2018, NV2: Mon, 8th Oct 2018

NV3: Tue, 9th Oct 2018, NV4: Wed, 10th to 11th Oct 2018

G: Result of Noise Level Survey (NV5 to 7)

Unit: L_{Aeq}

Time \ Location		NV5	NV6	NV7
7:00-8:00	Daytime	-	-	-
8:00-9:00		46.0	58.4	69.2
9:00-10:00		-	-	-
10:00-11:00		-	-	-
11:00-12:00		-	-	-
12:00-13:00		46.9	55.8	69.8
13:00-14:00		-	-	-
14:00-15:00		-	-	-
15:00-16:00		-	-	-
16:00-17:00		48.0	48.5	68.4
17:00-18:00		-	-	-
18:00-19:00		-	-	-
19:00-20:00		-	-	-
20:00-21:00		-	-	-
21:00-22:00		-	-	-
Average	Daytime	47	56	69
	Nighttime	-	-	-

NV5 to 7: Wed, 23rd Oct 2019

H: Result of Vibration Level Survey

Unit: L_{V10}

Location / Time		NV1	NV2	NV3	NV4
7:00-8:00	Daytime	40	<25	30	<25
8:00-9:00		39	<25	31	<25
9:00-10:00		39	<25	29	<25
10:00-11:00		31	<25	44	<25
11:00-12:00		31	<25	30	<25
12:00-13:00		31	<25	29	<25
13:00-14:00		30	<25	27	<25
14:00-15:00		30	<25	25	<25
15:00-16:00		<25	25	28	<25
16:00-17:00		<25	<25	30	<25
17:00-18:00		<25	<25	<25	<25
18:00-19:00		29	<25	<25	<25
19:00-20:00		30	25	<25	<25
20:00-21:00		27	27	<25	<25
21:00-22:00		<25	27	<25	<25
22:00-23:00	Nighttime	<25	-	-	<25
23:00-24:00		<25	-	-	<25
24:00-01:00		<25	-	-	<25
01:00-02:00		<25	-	-	30
02:00-03:00		<25	-	-	<25
03:00-04:00		<25	-	-	<25
04:00-05:00		<25	-	-	<25
05:00-06:00		25	-	-	<25
06:00-07:00		<25	-	-	<25
Average	Daytime	30	25	29	<25
	Nighttime	25	-	-	26

The values under 25dB (<25dB) are recognized as 25dB when averaging

NV1: Fri, 5th to 6th Oct 2018, NV2: Mon, 8th Oct 2018

NV3: Tue, 9th Oct 2018, NV4: Wed, 10th to 11th Oct 2018

I: Result of Vibration Level Survey (NV 5 to 7)

Unit: L_{V10}

Time \ Location		NV5	NV6	NV7
7:00-8:00	Daytime	-	-	-
8:00-9:00		<25	<25	25
9:00-10:00		-	-	-
10:00-11:00		-	-	-
11:00-12:00		-	-	-
12:00-13:00		<25	<25	25
13:00-14:00		-	-	-
14:00-15:00		-	-	-
15:00-16:00		-	-	-
16:00-17:00		<25	<25	25
17:00-18:00		-	-	-
18:00-19:00		-	-	-
19:00-20:00		-	-	-
20:00-21:00		-	-	-
21:00-22:00		-	-	-
Average	Daytime	<25	<25	25
	Nighttime	-	-	-

NV5 to 7: Wed, 23rd Oct 2019

J: Traffic Volume (T1)

	From National Highway No.1			To National Highway No.1		
	Motorbike	Light Vehicle	Heavy Vehicle	Motorbike	Light Vehicle	Heavy Vehicle
7:00-8:00	263	12	3	195	8	3
8:00-9:00	232	33	10	269	31	3
9:00-10:00	187	29	6	167	24	7
10:00-11:00	136	26	9	176	25	9
11:00-12:00	132	36	1	179	20	14
12:00-13:00	174	23	4	132	17	7
13:00-14:00	145	13	19	106	16	10
14:00-15:00	113	16	12	118	20	6
15:00-16:00	180	28	16	155	30	7
16:00-17:00	117	22	10	433	39	15
17:00-18:00	264	27	9	300	27	8
18:00-19:00	144	20	4	145	14	8
19:00-20:00	156	10	9	45	19	9
20:00-21:00	40	18	2	14	5	15
21:00-22:00	4	3	3	3	4	0
22:00-23:00	13	1	3	6	1	3
23:00-24:00	3	0	2	0	1	0
24:00-01:00	2	0	3	0	0	0
01:00-02:00	6	2	0	5	0	0
02:00-03:00	1	1	0	4	1	0
03:00-04:00	3	0	1	6	0	0
04:00-05:00	5	0	0	90	0	1
05:00-06:00	12	3	1	30	3	3
06:00-07:00	57	1	5	80	7	5
Total	2389	324	132	2658	312	133
	2845			3103		

T1: Fri, 5th to 6th Oct 2018

Appendix B (1)
Environment Monitoring Form for Power Facility

Construction Phase

The latest results of the below monitoring items should be submitted to authorities every week at construction phase. The items, standards to be applied, measurement points, and frequency for each monitoring parameter are established based on the EIA Report for Kyaukse Gas Combined-Cycle Power Plant Construction Project. Should there be any changes to the original plan, such change should be reviewed and evaluated by environmental expert.

1. Pollution

(1) Air Quality

For Power Facility

Monitoring Place: 1 nearest village around the project site
Frequency: Quarterly

Complaints from Residents

- Are there any complaints from residents regarding air quality (Dust) in this monitoring period? □ Yes, □ No

If yes, please describe the contents of complains and its countermeasures to fill in the table below.

Item	Date received Complainants	Contents of Complainants	Responses / Countermeasures
Dust			

Monitoring Place: 1 station around the Project site Area
Frequency: Quarterly, 1 week continuous measurement

Air Quality Measurement Results at the station in or around the Project site

Item	Unit	Measured Value	Country's Standard	Target value to be applied	Method	Note (Reason of excess of the standard)
PM_{10}	$\mu g/m^3$/hour		1 year: 20 1 hour: 50	Apply hourly country's standard (average value of each survey should be compared to 1 year standard)		

(2) Waste

For Power Facility

Monitoring Place: Project site

Frequency: Weekly

Waste disposal

- Are there any wastes generated in this monitoring period? □ Yes, □ No

If yes, please report the amount of sludge and fill in the results of solid waste management Activities.

<Construction site>

Type	Generated from	Unit	Amount	Disposal Method

<Worker's camp>

Type	Generated from	Unit	Amount	Disposal Method

For Power Facility

Site condition

- Is there any odor generated in this monitoring period? □ Yes, □ No

If yes, please report the countermeasures undertaken.

<Construction site>

Generated from	Countermeasures undertaken

<Worker's camp>

Generated from	Countermeasures undertaken

(3) Soil Contamination

For Power Facility

Monitoring Place: Project site

Frequency: Weekly

Paved fuel refilling facility

- Is there paved fuel refilling facility in the site? □ Yes, □ No

If yes, please report the status of fuel refilling facility.

Serial	Types of pavement	Unit	Area	Observation
1				
2				
3				

(4) Noise and Vibration

For Power Facility

Monitoring Place: 2 points near the project site (No.1: Near project site, No.2: along access road from National highway to the project site)

Frequency: [Noise level measurement] One (1) time at peak of construction work

[Record of complaints from residents] Quarterly

Noise Level Measurement Results

Item	Unit	Location	Measured Value [a]	Country's Standard	Target value to be applied	Method	Note (Reason of excess of the standard)
L_{Aeq}	dB(A)	No.1		Daytime: 55	Apply country's standard		
		No.2		Daytime: 70			
Traffic volume	cars	No.2		-	-		-

a: necessary to attach hourly data

Note: Daytime is from 7:00 – 22:00 (10:00 – 22:00 in public holiday)

Vibration Level Measurement Results

Item	Unit	Location	Measured Value [a]	Country's Standard	Target value to be applied	Method	Note (Reason of excess of the standard)
L_{10}	dB	No.1		none	Daytime: 65 (Japanese regulatory standard)		

		No.2			Daytime: 70 (Japanese regulatory standard)		

a: necessary to attach hourly data
Note: Daytime is from 7:00 – 22:00

Complaints from Residents

- Are there any complaints from residents regarding Nose and Vibration in this monitoring period? □ Yes, □ No

If yes, please describe the contents of complains and its countermeasures to fill in the table below.

Item	Date received Complainants	Contents of Complainants	Responses / Countermeasures
Noise			
Vibration			

2. Natural Environment

(1) Flora, Fauna and Biodiversity
For Power Facility

Monitoring Place: Project Site and Intake Point
Frequency: 2 times a year (once in rainy season and once in dry season)

Field Reconnaissance Results

Item	Item	Findings	Required Countermeasures
Terrestrial Flora	General condition		
	Rare spices		
Terrestrial Fauna	General condition		
	Rare spices		

3. Social Environment

(1) --1 Cultural Heritage
For Power Facility
Monitoring Place: Whole project area
Frequency: Weekly

Complaints from Residents

- Are there any grievances submitted, solved and pending issues ? □ Yes, □ No

If yes, please describe the contents of grievances to fill in the table below.

Item	Date received Complaints	Contents of Complaints	Responses / Countermeasures
Cultural Heritage			

(1) -2 Gender

For Power Facility

Monitoring Place: Whole project area

Frequency: Weekly

Complaints from Residents

- Are there any grievances submitted, solved and pending issues ? □ Yes, □ No

If yes, please describe the contents of grievances to fill in the table below.

Item	Date received Complaints	Contents of Complaints	Responses / Countermeasures
Gender			

(2) Landscape

For Power Facility

Monitoring Place: Whole project area

Frequency: Quarterly

Checking Results of the Site Condition and Installation of Enclosure Wall

- Please describe the condition and remarkable issues (if any) to fill in the table below.

Date	Site Condition	Remarkable Issues

(3) Children's Rights

For Power Facility

Monitoring Place: Whole project area

Frequency: Weekly

Checking Results of Working Record

- Please describe the condition and remarkable issues (if any) to fill in the table below.

Date	Number of Workers	Lowest Age of Workers	Remarkable Issues

(4) Health (Community Health, Infectious Disease such as HIV/AIDS)

For Power Facility
Monitoring Place: Surrounding communities of project area
Frequency: Weekly

Education and training to workers and surrounding community
- Was there any education, training, awareness raising activities implemented in this monitoring period? □ Yes, □ No
If yes, describe the contents in the table below.

Date	Activities	Description (Location, Participant etc.)

(5) Occupational Health and Safety
For Power Facility
Monitoring Place: Whole project area
Frequency: Weekly

Checking Results of Record

- Protective gears, precautious signs and other safety measures have been taken during the monitoring period? □ Yes, □ No
If No, describe the issues in the table below.

Date	Contents of Infectious / Incidents	Actions to be taken, responsible party (if there are any)

Note: If emergency incidents are occurred, the information should be reported to the relevant organizations and authorities immediately.

- Are there any incidents regarding, Working Environment, Accident in this monitoring period? □ Yes, □ No
If yes, describe the contents of complains and its countermeasures to fill in the table below.

Date	Contents of Infectious / Incidents	Counter Measures

Note: If emergency incidents are occurred, the information should be reported to the relevant organizations and authorities immediately.

Education and Training to Workers

- Were there any education and training, awareness raising activities implemented in this monitoring period? □ Yes, □ No

If yes, please describe the contents below the table.

Date	Activities	Description (Location, Participant etc.)

4. Others

(1) Accidents

For Power Facility

Monitoring Place: Surrounding area

Frequency: Weekly

Record of activities

- Was there any information sharing on construction activities and safety measures to construction workers and/or communities during this monitoring period? □ Yes, □ No

If yes, describe the contents of activities in the table below.

Date	Contents of training	Type and number of participants, any remark

Checking Results of Record

- Are there any education and training, awareness raising activities regarding safe construction works implemented during this monitoring period? □ Yes, □ No

If yes, please describe the contents of complains and its countermeasures to fill in the table below.

Date	Contents of Incidents	Counter Measures

- Are there any (traffic) accidents involving construction workers and/or surrounding community during this monitoring period? □ Yes, □ No

If yes, please describe the detail of accident and preventive measures to fill in the table below.

Date	Contents of accidents (location, type, number of injuries etc.)	Counter Measures (responsible parties if there are any)

Note: If emergency incidents are occurred, the information should be reported to the relevant organizations and authorities immediately.

(2) Cross-border Impact, Climate Change
For Power Facility

Monitoring Place: Whole project area
Frequency: Weekly

Checking the Record
- Please describe the amount of fuel use.

Month/Week	Number of Vehicles Operated	Amount of Fuels used

- Were there any activity for promoting efficient fuel use, such as idling stop training for drivers? □ Yes, □ No
If yes, describe the detail of activities in the table below.

Date	Participants	Note, remarks

End of Document

Operation Phase

The latest results of the below monitoring items should be submitted to authorities at operation phase. The items, standards to be applied, measurement points, and frequency for each monitoring parameter are established based on the EIA Report for Kyaukse Gas Combined-Cycle Power Plant Construction Project. Should there be any changes to the original plan, such change should be reviewed and evaluated by environmental expert.

1. Pollution

(1) Air Quality

For Power Facility

Monitoring Place: 3 stations around the Project site Area

Frequency: Quarterly (monitoring period: 2 years since starting operation), 1 week continuous measurement

Air Quality Measurement Results at the station in or around the Project site

Item	Unit	Measured Value	Country's Standard	Target value to be applied	Method	Note (Reason of excess of the standard)
NO_2	μg/m³/hour		1 year: 40 1 hour: 200	Apply hourly country's standard (average value of each survey should be compared to 1 year standard)		

Air Quality Measurement Results at gas turbine

Monitoring Place: 2 points (each stack of gas turbine)

Frequency: Quarterly (monitoring period: 2 years since starting operation)

Item	Unit	Measured Value	Country's Standard	Target value to be applied	Method	Note (Reason of excess of the standard)
NO_2	μg/m³/hour		100	51 (WBG guideline)		

(2) Water Quality

For Power Facility

Target: Treated effluent of power facility

Measurement Point: 1 point of outlet of treatment facility for boiler blow water

Frequency: Quarterly (monitoring period: 2 years since starting operation)

Water Quality Measurement Results

Item	Unit	Measured Value	Country's Standard	Target value to be applied	Method	Note (Reason of excess of the standard)
pH	-		6 - 9	Apply country's standard		
Arsenic	mg/L		0.5			
Cadmium	mg/L		0.1			
Iron	mg/L		1			
Lead	mg/L		0.5			
Mercury	mg/L		0.005			
Chromium (total)	mg/L		0.5			
Copper	mg/L		0.5			
Zinc	mg/L		1			
Oil and grease	mg/L		10			
Temperature increase	ºC		<3			
Total residual chlorine	mg/L		0.2			
Total suspended solids	mg/L		50			

Target: Treated effluent of domestic wastewater
Measurement Point: 1point of outlet of treatment facility for domestic wastewater

Frequency: Quarterly (monitoring period: 2 years since starting operation)
Water Quality Measurement Results

Item	Unit	Measured Value	Country's Standard	Target value to be applied	Method	Note (Reason of excess of the standard)
pH	-		6 - 9	Apply country's standard except for below: - COD: 125 (WBG guideline) - Total nitrogen: 10 (WBG guideline)		
BOD_5	mg/L		50			
COD	mg/L		250			
Ammonia	mg/L		10			
Phenol	mg/L		0.5			
Arsenic	mg/L		0.1			
Cadmium	mg/L		0.1			
Iron	mg/L		3.5			
Lead	mg/L		0.1			
Mercury	mg/L		0.01			
Chromium (total)	mg/L		0.2			
Chromium	mg/L		0.1			

Item	Unit	Measured Value	Country's Standard	Target value to be applied	Method	Note (Reason of excess of the standard)
(hexavalent)						
Cyanide (free),	mg/L		0.1			
Cyanide (total)	mg/L		1			
Fluoride	mg/L		20			
Heavy metals (total)	mg/L		10			
Nickel	mg/L		0.5			
Selenium	mg/L		0.1			
Silver	mg/L		0.5			
Sulphide	mg/L		1			
Temperature increase	°C		<3			
Copper	mg/L		0.5			
Zinc	mg/L		2			
Oil and grease	mg/L		10			
Total coliform bacteria	MPN /100mL		400			
Total nitrogen	mg/L		10			
Total phosphorus	mg/L		2			
Total residual chlorine	mg/L		10			
Total suspended solids	mg/L		50			

Target: Myitnge River
Measurement Point: 3points (effluent at discharge point, upstream of discharge point in Myitnge River, and 100 m downstream of discharge point in Myitnge River)

Frequency: Quarterly (monitoring period: 2 years since starting operation)

Water Quality Measurement Results

Item	Unit	Measured Value	Country's Standard	Target value to be applied	Method	Note (Reason of excess of the standard)
pH	-		6 - 9	Apply country's standard except for below: - COD: 125 (WBG guideline) - Total nitrogen: 10 (WBG guideline)		
BOD_5	mg/L		50			
COD	mg/L		250			
Ammonia	mg/L		10			
Phenol	mg/L		0.5			
Arsenic	mg/L		0.1			
Cadmium	mg/L		0.1			

Item	Unit	Measured Value	Country's Standard	Target value to be applied	Method	Note (Reason of excess of the standard)
Iron	mg/L		3.5			
Lead	mg/L		0.1			
Mercury	mg/L		0.01			
Chromium (total)	mg/L		0.2			
Chromium (hexavalent)	mg/L		0.1			
Cyanide (free),	mg/L		0.1			
Cyanide (total)	mg/L		1			
Fluoride	mg/L		20			
Heavy metals (total)	mg/L		10			
Nickel	mg/L		0.5			
Selenium	mg/L		0.1			
Silver	mg/L		0.5			
Sulphide	mg/L		1			
Temperature increase	ºC		<3			
Copper	mg/L		0.5			
Zinc	mg/L		2			
Oil and grease	mg/L		10			
Total coliform bacteria	MPN /100mL		400			
Total nitrogen	mg/L		10			
Total phosphorus	mg/L		2			
Total residual chlorine	mg/L		10			
Total suspended solids	mg/L		50			

(3) Waste

For Power Facility

Monitoring Place: Project site

Frequency: Monthly (2 years since starting operation)

- Waste disposal

- Are there any wastes of sludge in this monitoring period? □ Yes, □ No

If yes, please report the amount of sludge and fill in the results of solid waste management Activities.

Type	Generated from	Unit	Amount	Disposal Method

(4) Noise and Vibration
For Power Facility

<u>Monitoring Place:</u> 3 points around the project site
<u>Frequency:</u> Quarterly (2 years since starting operation)

<u>Noise Level Measurement Results</u>

Item	Unit	Location	Measured Value [a]	Country's Standard	Target value to be applied	Method	Note (Reason of excess of the standard)
L_{Aeq}	dB(A)	No.1		Daytime: 55 Nighttime: 45	Apply country's standard		
		No.2					
		No.3					

a: necessary to attach hourly data
Note: Daytime is from 7:00 – 22:00 (10:00 – 22:00 in public holiday)
Night time is from 22:00 – 7:00 (22:00 – 10:00 in public holiday)

<u>Vibration Level Measurement Results</u>

Item	Unit	Location	Measured Value [a]	Country's Standard	Target value to be applied	Method	Note (Reason of excess of the standard)
L_{10}	dB	No.1		none	Daytime: 65 Nighttime: 60 (Japanese regulatory standard)		
		No.2					
		No.3					

a: necessary to attach hourly data
Note: Daytime is from 7:00 – 22:00
Night time is from 22:00 – 7:00

(5) Offensive Odor
For Power Facility
Monitoring Place: Project site
Frequency: Quarterly (2 years since starting operation)

Complaints from Residents
- Are there any complaints from residents regarding offensive odor in this monitoring period? □ Yes, □ No
If yes, please describe the contents of complains and its countermeasures to fill in the table below.

Contents of Complaints from Residents	Countermeasures

2. Natural Environment

(1) Flora, Fauna and Biodiversity
For Power Facility

Monitoring Place: Project site and intake point
Frequency: 2 times, once in rainy season and once in dry season, for 2 years since starting operation

Field Reconnaissance Results

Item	Item	Findings	Required Countermeasures
Terrestrial Flora	General condition		
	Rare spices		
Terrestrial Fauna	General condition		
	Rare spices		
Aquatic Flora	General condition		
	Rare spices		
Aquatic Fauna	General condition		
	Rare spices		

(2) Hydrology
For Power Facility
Monitoring Place: Project Site and Intake Point
Frequency: monthly during rainy season (2 years since starting operation)

Results observation

Item	Findings	Actions to be taken (if there are any)
Capacity of regulation pond is properly sustained to accommodate excessive run-off water		
If there are significant run-off water from project site caused by intensive rainfall or any other reason		

Complaints from Residents

- Are there any complaints from residents regarding excessive run-off water during the monitoring period? □ Yes, □ No

If yes, please describe the contents of complains and its countermeasures to fill in the table below.

Contents of Complaints from Residents	Countermeasures

3. Social Environment

For Power Facility

(1) Water Usage, Existing Social Infrastructure and Service, Cultural heritage, Gender and Children's Rights

Monitoring Place: Project site

Frequency: Every 2 weeks (for 2 years since starting operation)

Complaints from Residents

- Are there any grievances submitted, solved and pending regarding issues ? □ Yes, □ No

If yes, please describe the contents of grievances to fill in the table below.

Item	Date received complaints	Contents of Complaints	Responses / Countermeasures
Water Usage			
Existing Social Infrastructure and Service			
Cultural heritage (disruption by noise or vibration to cultural activities)			
Gender			
Children's Rights			

(2) Landscape

For Power Facility

<u>Monitoring Place:</u> Project site

<u>Frequency:</u> Quarterly (for 2 years since starting operation)

<u>Checking Results of the Site Condition</u>

- Please describe the condition of planted trees inside the plant, and fill in the table below if there are remarkable change from last monitoring.

Date	Site Condition	Remarkable Issues

(3) Health (Community Health, Infectious Diseases and HIV/AIDS)

For Power Facility

<u>Monitoring Place:</u> Surrounding communities of project area

<u>Frequency:</u> Quarterly (for 2 years since starting operation)

<u>Record of community health status</u>

<u>Fill in the table below based on the interviews to community health worker through Singaing Township General Administration department</u>

Village group	Major Disease (number of person)			
	Diarrhea	TB(Tuberculosis)	Dysentery	ARI (Acute Respiratory Infections)
E Bya, Met Ka Ya				
Mont Paung, Ohn Pin Chan				
Pin Char, Taw Ma				
Be Lin, Ban Da, Taung U, Min Ye, Kyauk Mine, Taung Yin, Na Be Bin				
Shan Gan				

(4) Occupational Health and Safety
For Power Facility
Monitoring Place: Project Site
Frequency: Every 2 weeks

Record of activities / measures taken

- Was there any training about safe working practice, such as usage of protective gears during this monitoring period? □ Yes, □ No
  If yes, describe the contents of activities and fill in the table below.

Date	Contents of training	Type and number of participants, any remark

- Were health care facilities and first aid provided in functional status during the monitoring period? □ Yes, □ No
  If NO, describe the situation and actions to be taken, and fill in the table below.

Date/period	Situation	Actions to be taken, responsible party (if there are any)

Note: If emergency incidents are occurred, the information should be reported to the relevant organizations and authorities immediately.

Checking Results of Record

- Are there any incidents regarding occupational health and safety in this monitoring period? □ Yes, □ No
  If yes, please describe the contents of complains and its countermeasures to fill in the table below.

Date	Contents of Infectious / Incidents	Counter Measures

Note: If emergency incidents are occurred, the information should be reported to the relevant organizations and authorities immediately.

4. Others

(1) Accident

For Power Facility

<u>Monitoring Place:</u> Project site and communities, the main roads

<u>Frequency:</u> Every 2 weeks (for 2 years from starting operation)

<u>Checking Results of Record</u>

- Are there any accidents involving operators and/or surrounding community during this monitoring period? □ Yes, □ No

If yes, please describe the detail of accident and preventive measures to fill in the table below.

Date	Contents of accidents (location, type, number of injuries etc.)	Counter Measures (responsible parties if there are any)

Note: If emergency incidents are occurred, the information should be reported to the relevant organizations and authorities immediately.

<u>Checking Results of Record</u>

- Are there any gas leakage during this monitoring period? ☐ Yes, ☐ No

If yes, please describe the detail of the leakage and counter measures to fill in the table below.

Date	Contents of leakage (location, type, cause, etc.)	Counter Measures (responsible parties if there are any)

Note: If leakages are occurred, the information should be reported to the relevant organizations and authorities immediately.

(2) Cross-border Impact, Climate Change

For Power Facility

<u>Monitoring Place:</u> Project site

<u>Frequency:</u> Quarterly (monitoring period: 2 years since starting operation)

<u>Checking Results of Record</u>

- Please describe the amount of fuel use for gas turbine.

Amount of Fuel gas used for gas turbine	Amount of Electricity generated

End of Document

Decommissioning, Closure, and Post-Closure Phase

The latest results of the below monitoring items should be submitted to Authorities at Decommissioning, Closure, and Post-Closure Phase. The items, standards to be applied, measurement points, and frequency for each monitoring parameter are established based on the EIA Report for Kyaukse Gas Combined-Cycle Power Plant Construction Project. Should there be any changes to the original plan, such change should be reviewed and evaluated by environmental expert.

1. Pollution

(1) Air Quality

For Power Facility

Monitoring Place: 1 nearest village around the Project site

Frequency: Quarterly

Complaints from Residents

- Are there any complaints from residents regarding air quality in this monitoring period? □ Yes, □ No

If yes, please describe the contents of complains and its countermeasures to fill in the table below.

Item	Date received Grievance	Contents of Grievance	Responses / Countermeasures
Dust			

Monitoring Place: 1 station around the Project site Area

Frequency: Quarterly, 1 week continuous measurement

Air Quality Measurement Results at the station in or around the Project site

Item	Unit	Measured Value	Country's Standard	Target value to be applied	Method	Note (Reason of excess of the standard)
PM_{10}	$\mu g/m^3$/hour		1 year: 20 1 hour: 50	Apply hourly country's standard (average value of each survey should be compared to 1 year standard)		

(2) Waste

For Power Facility

Monitoring Place: Project site

Frequency: Weekly

Waste disposal

- Are there any wastes generated in this monitoring period? □ Yes, □ No

If yes, please report the amount of sludge and fill in the results of solid waste management Activities.

<Construction site>

Type	Generated from	Unit	Amount	Disposal Method

<Worker's camp>

Type	Generated from	Unit	Amount	Disposal Method

For Power Facility

Site condition

- Is there any odor generated in this monitoring period? □ Yes, □ No

If yes, please report the countermeasures undertaken.

<Construction site>

Generated from	Countermeasures undertaken

<Worker's camp>

Generated from	Countermeasures undertaken

(3) Noise and Vibration

For Power Facility

<u>Monitoring Place:</u> 2 points near the project site (No.1: near project site, No.2: along access road from National highway to the project site)

<u>Frequency:</u> [Noise level measurement] One (1) time at peak of construction work

[Record of complaints from residents] Quarterly

<u>Noise Level Measurement Results</u>

Item	Unit	Location	Measured Value [a]	Country's Standard	Target value to be applied	Method	Note (Reason of excess of the standard)
L_{Aeq}	dB(A)	No.1		Daytime: 55	Apply country's standard		
		No.2		Daytime: 70			
Traffic volume	cars	No.2		-	-		-

a: necessary to attach hourly data

Note: Daytime is from 7:00 – 22:00 (10:00 – 22:00 in public holiday)

<u>Vibration Level Measurement Results</u>

Item	Unit	Location	Measured Value [a]	Country's Standard	Target value to be applied	Method	Note (Reason of excess of the standard)
L_{10}	dB	No.1		none	Daytime: 65 (Japanese regulatory standard)		
		No.2			Daytime: 70 (Japanese regulatory standard)		

a: necessary to attach hourly data

Note: Daytime is from 7:00 – 22:00

Complaints from Residents

- Are there any complaints from residents regarding Nose and Vibration in this monitoring period? □ Yes, □ No
  If yes, please describe the contents of complains and its countermeasures to fill in the table below.

Item	Date received Complainants	Contents of Complainants	Responses / Countermeasures
Noise			
Vibration			

2. Social Environment

(1) Poverty, Local economy (Employment), Cultural heritage and Gender
For Power Facility

Monitoring Place: Whole project area
Frequency: Weekly, during demolishing period

Complaints from Residents

- Are there any grievances submitted, solved and pending regarding demolition works? □ Yes, □ No
  If yes, please describe the contents of grievances to fill in the table below.

Item	Date received Complaints	Contents of Complaints	Responses / Countermeasures
Poverty			
Local economy (Employment)			
Cultural heritage (disruption by noise or vibration to cultural activities)			
Gender			

(2) Landscape
For Power Facility

Monitoring Place: Whole project area
Frequency: Quarterly during demolition period

Checking Results of the Site Condition and Installation of Enclosure Wall
- Please describe the condition and remarkable issues (if any) to fill in the table below.

Date	Site Condition	Remarkable Issues

(3) Children's Rights
For Power Facility

Monitoring Place: Whole project area
Frequency: Weekly during demolition period

Checking Results of Working Record
- Please describe the condition and remarkable issues (if any) to fill in the table below.

Date	Number of Workers	Lowest Age of Workers	Remarkable Issues

(4) Health (Community Health, Infectious Disease such as HIV/AIDS)

For Power Facility
Monitoring Place: Surrounding communities of project area
Frequency: Weekly during demolition period

Education and training to workers and surrounding community
- Was there any education, training, awareness raising activities regarding health and infectious disease such as HIV/AIDS implemented in this monitoring

period? □ Yes, □ No

If yes, describe the contents in the table below.

Date	Activities	Description (Location, Participant etc.)

(5) Occupational Health and Safety

For Power Facility

Monitoring Place: Whole project area

Frequency: Weekly during demolition period

Checking Results of Record

- Protective gears, precautious signs and other safety measures have been taken during the monitoring period? □ Yes, □ No

If No, describe the issues in the table below.

Date	Contents of Infectious / Incidents	Actions to be taken, responsible party (if there are any)

Note: If emergency incidents are occurred, the information should be reported to the relevant organizations and authorities immediately.

- Are there any incidents regarding, Working Environment, Accident in this monitoring period? □ Yes, □ No

If yes, describe the contents of complains and its countermeasures to fill in the table below.

Date	Contents of Infectious / Incidents	Counter Measures

Note: If emergency incidents are occurred, the information should be reported to the relevant organizations and authorities immediately.

Education and Training to Workers

- Were there any education and training, awareness raising activities implemented in this monitoring period? □ Yes, □ No

If yes, please describe the contents below the table.

Date	Activities	Description (Location, Participant etc.)

3. Others

(1) Accidents

For Power Facility

Monitoring Place: Surrounding area

Frequency: Weekly

Record of activities

- Was there any information sharing on demolishing activities and safety measures to construction workers and/or communities during this monitoring period? □ Yes, □ No

If yes, describe the contents of activities in the table below.

Date	Contents of training	Type and number of participants, any remark

Checking Results of Record

- Are there any education and training, awareness raising activities regarding safe construction works implemented during this monitoring period?

□ Yes, □ No

If yes, please describe the contents of complains and its countermeasures to fill in the table below.

Date	Contents of Incidents	Counter Measures

- Are there any (traffic) accidents involving construction workers and/or surrounding community during this monitoring period? □ Yes, □ No

If yes, please describe the detail of accident and preventive measures to fill in the table below.

Date	Contents of accidents (location, type, number of injuries etc.)	Counter Measures (responsible parties if there are any)

Note: If emergency incidents are occurred, the information should be reported to the relevant organizations and authorities immediately.

(2) Cross-border impact, climate change
For Power Facility

Monitoring Place: Whole project area
Frequency: Weekly

Checking the Record
- Please describe the amount of fuel use.

Month/Week	Number of Vehicles Operated	Amount of Fuels used

- Were there any activity for promoting efficient fuel use, such as idling stop training for drivers? □ Yes, □ No
If yes, describe the detail of activities in the table below.

date	Participants	Note, remarks

End of Document

Appendix B (2)

Environment Monitoring Form for Gas Pipeline

Pre-construction Phase

The latest results of the following monitoring items should be submitted to authorities every week at pre-construction phase. The items, standards to be applied, measurement points, and frequency for each monitoring parameter are established based on the EIA Report for Kyaukse Gas Combined-Cycle Power Plant Construction Project. Should there be any changes to the original plan, such change should be reviewed and evaluated by environmental expert.

1. Social Environment

(1) Involuntary Resettlement
For Gas Pipeline

Monitoring Place: Whole project area
Frequency: Monthly

Complaints from Residents
- Please describe the progress and remarkable issues (if any) to fill in the table below.

Resettlement Works		Progress in Narrative	Remarkable Issues
Project Affected Persons	Progress of compensation payment		
	Progress of site clearance		
	Income Restoration Program (if executed)		
Common Assets	Relocation		

- Are there any grievances submitted, solved and pending regarding resettlement works? □ Yes, □ No
If yes, please describe the contents of grievances to fill in the table below.

Item	Date received Grievance	Contents of Grievance	Responses / Countermeasures
Involuntary Resettlement			

End of Document

Construction Phase

The latest results of the below monitoring items should be submitted to authorities every week at construction phase. The items, standards to be applied, measurement points, and frequency for each monitoring parameter are established based on the EIA Report for Kyaukse Gas Combined-Cycle Power Plant Construction Project. Should there be any changes to the original plan, such change should be reviewed and evaluated by environmental expert.

1. Pollution

(1) Air Quality

For Gas Pipeline

Monitoring Place: 1 nearest village around the project site

Frequency: Quarterly

Complaints from Residents

- Are there any complaints from residents regarding air quality (Dust) in this monitoring period? □ Yes, □ No

If yes, please describe the contents of complains and its countermeasures to fill in the table below.

Item	Date received Complainants	Contents of Complainants	Responses / Countermeasures
Dust			

(2) Waste

For Gas Pipeline

Monitoring Place: Project site

Frequency: Weekly

Waste disposal

- Are there any wastes generated in this monitoring period? □ Yes, □ No

If yes, please report the amount of sludge and fill in the results of solid waste management Activities.

<Construction site>

Type	Generated from	Unit	Amount	Disposal Method

<Worker's camp>

Type	Generated from	Unit	Amount	Disposal Method

(3) Noise and Vibration

For Gas Pipeline

Monitoring Place: 1 point near the gas pipeline

Frequency: [Noise level measurement] One (1) time at peak of construction work
[Record of complaints from residents] Quarterly

Noise Level Measurement Results

Item	Unit	Location	Measured Value [a]	Country's Standard	Target value to be applied	Method	Note (Reason of excess of the standard)
L_{Aeq}	dB(A)	No.1		Daytime: 55	Apply country's standard		

a: necessary to attach hourly data

Note: Daytime is from 7:00 – 22:00 (10:00 – 22:00 in public holiday)

Vibration Level Measurement Results

Item	Unit	Location	Measured Value [a]	Country's Standard	Target value to be applied	Method	Note (Reason of excess of the standard)
L_{10}	dB	No.1		none	Daytime: 65 (Japanese regulatory standard)		

a: necessary to attach hourly data

Note: Daytime is from 7:00 – 22:00

Complaints from Residents

- Are there any complaints from residents regarding Nose and Vibration in this monitoring period? □ Yes, □ No

If yes, please describe the contents of complains and its countermeasures to fill in the table below.

Item	Date received Complainants	Contents of Complainants	Responses / Countermeasures
Noise			
Vibration			

(4) Ground Subsidence
For Gas Pipeline

Monitoring Place: Around gas pipeline
Frequency: Quarterly

Complaints from Residents

- Are there any complaints from residents regarding ground subsidence in this monitoring period? □ Yes, □ No
  If yes, please describe the contents of complains and its countermeasures to fill in the table below.

Item	Date received Complainants	Contents of Complainants	Responses / Countermeasures
Ground subsidence			

2. Natural Environment

(1) Flora, Fauna and Biodiversity
For Gas Pipeline

Monitoring Place: Project site and intake point
Frequency: 2 times a year (once in rainy season and once in dry season)

Field Reconnaissance Results

Item	Item	Findings	Required Countermeasures
Terrestrial Flora	General condition		
	Rare spices		
Terrestrial Fauna	General condition		
	Rare spices		

3. Social Environment

(1) Local Economy (Livelihood), Land use and utilization of local resources

For Gas Pipeline

Monitoring Place: Whole project area

Frequency: Quarterly

Complaints from Residents

- Are there any complaints from residents regarding livelihood, land use and utilization of local resources in this monitoring period?

□ Yes, □ No

If yes, please describe the contents of complains and its countermeasures to fill in the table below.

Item	Date received Complainants	Contents of Complainants	Responses / Countermeasures
Ground subsidence			

(2) -1 Poverty

For Gas Pipeline

Monitoring Place: Whole project area

Frequency: Weekly

Complaints from Residents

- Are there any grievances submitted, solved and pending issues ? □ Yes, □ No

If yes, please describe the contents of grievances to fill in the table below.

Item	Date received Complaints	Contents of Complaints	Responses / Countermeasures
Poverty			

(2) 2 Existing Social Infrastructure and Service

For Gas Pipeline

Monitoring Place: Whole project area

Frequency: Weekly

Complaints from Residents

- Are there any grievances submitted, solved and pending issues ? □ Yes, □ No

If yes, please describe the contents of grievances to fill in the table below.

Item	Date received Complaints	Contents of Complaints	Responses / Countermeasures
Existing Social Infrastructure and Service			

(2) -3 Cultural Heritage
For Gas Pipeline
Monitoring Place: Whole project area
Frequency: Weekly

Complaints from Residents

- Are there any grievances submitted, solved and pending issues ? □ Yes, □ No

If yes, please describe the contents of grievances to fill in the table below.

Item	Date received Complaints	Contents of Complaints	Responses / Countermeasures
Cultural Heritage			

(2) -4 Gender
For Gas Pipeline
Monitoring Place: Whole project area
Frequency: Weekly

Complaints from Residents

- Are there any grievances submitted, solved and pending issues ? □ Yes, □ No

If yes, please describe the contents of grievances to fill in the table below.

Item	Date received Complaints	Contents of Complaints	Responses / Countermeasures
Gender			

(3) Children's Rights
For Gas Pipeline
Monitoring Place: Whole project area
Frequency: Weekly

Checking Results of Working Record

- Please describe the condition and remarkable issues (if any) to fill in the table below.

Date	Number of Workers	Lowest Age of Workers	Remarkable Issues

(4) Health (Community Health, Infectious Disease such as HIV/AIDS)

For Gas Pipeline

Monitoring Place: Surrounding communities of project area

Frequency: Weekly

Education and training to workers and surrounding community

- Was there any education, training, awareness raising activities implemented in this monitoring period? □ Yes, □ No

If yes, describe the contents in the table below.

Date	Activities	Description (Location, Participant etc.)

(5) Occupational Health and Safety

For Gas Pipeline

Monitoring Place: Whole project area

Frequency: Weekly

Checking Results of Record

- Protective gears, precautious signs and other safety measures have been taken during the monitoring period? □ Yes, □ No

If No, describe the issues in the table below.

Date	Contents of Infectious / Incidents	Actions to be taken, responsible party (if there are any)

Note: If emergency incidents are occurred, the information should be reported to the relevant organizations and authorities immediately.

- Are there any incidents regarding, Working Environment, Accident in this monitoring period? □ Yes, □ No

If yes, describe the contents of complains and its countermeasures to fill in the table below.

Date	Contents of Infectious / Incidents	Counter Measures

Note: If emergency incidents are occurred, the information should be reported to the relevant organizations and authorities immediately.

Education and Training to Workers

- Were there any education and training, awareness raising activities implemented in this monitoring period? □ Yes, □ No

If yes, please describe the contents below the table.

Date	Activities	Description (Location, Participant etc.)

4. Others

(1) Accidents

For Gas Pipeline

Monitoring Place: Surrounding area

Frequency: Weekly

Record of activities

- Was there any information sharing on construction activities and safety measures to construction workers and/or communities during this monitoring period? □ Yes, □ No

If yes, describe the contents of activities in the table below.

Date	Contents of training	Type and number of participants, any remark

Checking Results of Record

- Are there any education and training, awareness raising activities regarding safe construction works implemented during this monitoring period? □ Yes, □ No

If yes, please describe the contents of complains and its countermeasures to fill in the table below.

Date	Contents of Incidents	Counter Measures

- Are there any (traffic) accidents involving construction workers and/or surrounding community during this monitoring period? □ Yes, □ No

If yes, please describe the detail of accident and preventive measures to fill in the table below.

Date	Contents of accidents (location, type, number of injuries etc.)	Counter Measures (responsible parties if there are any)

Note: If emergency incidents are occurred, the information should be reported to the relevant organizations and authorities immediately.

(2) Cross-border impact, climate change
For Gas Pipeline

Monitoring Place: Whole project area
Frequency: Weekly

Checking the Record

- Please describe the amount of fuel use.

Month/Week	Number of Vehicles Operated	Amount of Fuels used

- Were there any activity for promoting efficient fuel use, such as idling stop training for drivers? □ Yes, □ No

If yes, describe the detail of activities in the table below.

date	Participants	Note, remarks

End of Document

Operation Phase

The latest results of the following monitoring items should be submitted to authorities at operation phase. The items, standards to be applied, measurement points, and frequency for each monitoring parameter are established based on the EIA Report for Kyaukse Gas Combined-Cycle Power Plant Construction Project. Should there be any changes to the original plan, such change should be reviewed and evaluated by environmental expert.

4. Others

(1) Accident

For Gas Pipeline

Monitoring Place: Project site and communities along gas pipelines, the main roads

Frequency: Every 2 weeks (for 2 years from starting operation)

Checking Results of Record

- Are there any accidents involving operators and/or surrounding community during this monitoring period? □ Yes, □ No

If yes, please describe the detail of accident and preventive measures to fill in the table below.

Date	Contents of accidents (location, type, number of injuries etc.)	Counter Measures (responsible parties if there are any)

Note: If emergency incidents are occurred, the information should be reported to the relevant organizations and authorities immediately.

Checking Results of Record

- Are there any gas leakage during this monitoring period? □ Yes, □ No

If yes, please describe the detail of the leakage and counter measures to fill in the table below.

Date	Contents of leakage (location, type, cause, etc.)	Counter Measures (responsible parties if there are any)

Note: If leakages are occurred, the information should be reported to the relevant organizations and authorities immediately.

End of Document

Decommissioning, Closure, and Post-Closure Phases

The latest results of the below monitoring items should be submitted to authorities at decommissioning, closure, and post-closure phases. The items, standards to be applied, measurement points, and frequency for each monitoring parameter are established based on the EIA Report for Kyaukse Gas Combined-Cycle Power Plant Construction Project. Should there be any changes to the original plan, such change should be reviewed and evaluated by environmental expert.

1. Pollution

(1) Air Quality

For Gas Pipeline

Monitoring Place: 1 nearest village around the project site

Frequency: Quarterly

Complaints from Residents

- Are there any complaints from residents regarding air quality in this monitoring period? □ Yes, □ No

If yes, please describe the contents of complains and its countermeasures to fill in the table below.

Item	Date received Grievance	Contents of Grievance	Responses / Countermeasures
Dust			

(2) Waste

For Gas Pipeline

Monitoring Place: Project site

Frequency: Weekly

Waste disposal

- Are there any wastes generated in this monitoring period? □ Yes, □ No

If yes, please report the amount of sludge and fill in the results of solid waste management Activities.

<Construction site>

Type	Generated from	Unit	Amount	Disposal Method

<Worker's camp>

Type	Generated from	Unit	Amount	Disposal Method

(3) Noise and Vibration

For Gas Pipeline

Monitoring Place: 1 point near the gas pipeline

Frequency: [Noise level measurement] One (1) time at peak of construction work

[Record of complaints from residents] Quarterly

Noise Level Measurement Results

Item	Unit	Location	Measured Value [a]	Country's Standard	Target value to be applied	Method	Note (Reason of excess of the standard)
L_{Aeq}	dB(A)	No.1		Daytime: 55	Apply country's standard		

a: necessary to attach hourly data

Note: Daytime is from 7:00 – 22:00 (10:00 – 22:00 in public holiday)

Vibration Level Measurement Results

Item	Unit	Location	Measured Value [a]	Country's Standard	Target value to be applied	Method	Note (Reason of excess of the standard)
L_{10}	dB	No.1		none	Daytime: 65 (Japanese regulatory standard)		

a: necessary to attach hourly data

Note: Daytime is from 7:00 – 22:00

Complaints from Residents

- Are there any complaints from residents regarding Nose and Vibration in this monitoring period? □ Yes, □ No

If yes, please describe the contents of complains and its countermeasures to fill in the table below.

Item	Date received Complainants	Contents of Complainants	Responses / Countermeasures
Noise			
Vibration			

2. Natural Environment
For Gas Pipeline

(1) Flora, Fauna and Biodiversity

Monitoring Place: Project site and intake point
Frequency: Once in dry season and once in dry season, during demolishing period

Field Reconnaissance Results

Item	Item	Findings	Required Countermeasures
Terrestrial Flora	General condition		
	Rare spices		
Terrestrial Fauna	General condition		
	Rare spices		

3. Social Environment

(1) -Poverty, Local economy (Employment), Cultural heritage and Gender
For Gas Pipeline

Monitoring Place: Whole project area
Frequency: Weekly, during demolishing period

Complaints from Residents

- Are there any grievances submitted, solved and pending regarding demolition works? □ Yes, □ No
If yes, please describe the contents of grievances to fill in the table below.

Item	Date received Complaints	Contents of Complaints	Responses / Countermeasures
Poverty			
Local economy (Employment)			
Cultural heritage (disruption by noise or vibration to cultural activities)			
Gender			

(2) Children's Rights

For Gas Pipeline

Monitoring Place: Whole project area

Frequency: Weekly during demolition period

Checking Results of Working Record

- Please describe the condition and remarkable issues (if any) to fill in the table below.

Date	Number of Workers	Lowest Age of Workers	Remarkable Issues

(3) Health (Community Health, Infectious Disease such as HIV/AIDS)

For Gas Pipeline

Monitoring Place: Surrounding communities of project area

Frequency: Weekly during demolition period

Education and training to workers and surrounding community

- Was there any education, training, awareness raising activities regarding health and infectious disease such as HIV/AIDS implemented in this monitoring period? □ Yes, □ No

If yes, describe the contents in the table below.

Date	Activities	Description (Location, Participant etc.)

(4) Occupational Health and Safety
For Gas Pipeline
Monitoring Place: Whole project area
Frequency: Weekly during demolition period

Checking Results of Record

- Protective gears, precautious signs and other safety measures have been taken during the monitoring period? □ Yes, □ No
If No, describe the issues in the table below.

Date	Contents of Infectious / Incidents	Actions to be taken, responsible party (if there are any)

Note: If emergency incidents are occurred, the information should be reported to the relevant organizations and authorities immediately.

- Are there any incidents regarding, Working Environment, Accident in this monitoring period? □ Yes, □ No
If yes, describe the contents of complains and its countermeasures to fill in the table below.

Date	Contents of Infectious / Incidents	Counter Measures

Note: If emergency incidents are occurred, the information should be reported to the relevant organizations and authorities immediately.

Education and Training to Workers
- Were there any education and training, awareness raising activities implemented in this monitoring period? □ Yes, □ No
If yes, please describe the contents below the table.

Date	Activities	Description (Location, Participant etc.)

4. Others

(1) Accidents

For Gas Pipeline

Monitoring Place: Surrounding area

Frequency: Weekly

Record of activities

- Was there any information sharing on demolishing activities and safety measures to construction workers and/or communities during this monitoring period? □ Yes, □ No

If yes, describe the contents of activities in the table below.

Date	Contents of training	Type and number of participants, any remark

Checking Results of Record

- Are there any education and training, awareness raising activities regarding safe construction works implemented during this monitoring period? □ Yes, □ No

If yes, please describe the contents of complains and its countermeasures to fill in the table below.

Date	Contents of Incidents	Counter Measures

- Are there any (traffic) accidents involving construction workers and/or surrounding community during this monitoring period? □ Yes, □ No

If yes, please describe the detail of accident and preventive measures to fill in the table below.

Date	Contents of accidents (location, type, number of injuries etc.)	Counter Measures (responsible parties if there are any)

Note: If emergency incidents are occurred, the information should be reported to the relevant organizations and authorities immediately.

(2) Cross-border impact, climate change
For Gas Pipeline

Monitoring Place: Whole project area
Frequency: Weekly

Checking the Record

- Please describe the amount of fuel use.

Month/Week	Number of Vehicles Operated	Amount of Fuels used

- Were there any activity for promoting efficient fuel use, such as idling stop training for drivers? □ Yes, □ No
  If yes, describe the detail of activities in the table below.

date	Participants	Note, remarks

End of Document

Appendix B (3)

Environment Monitoring Form for Water Pipeline

Pre-construction Phase

The latest results of the following monitoring items should be submitted to authorities every week at pre-construction phase. The items, standards to be applied, measurement points, and frequency for each monitoring parameter are established based on the EIA Report for Kyaukse Gas Combined-Cycle Power Plant Construction Project. Should there be any changes to the original plan, such change should be reviewed and evaluated by environmental expert.

1. Social Environment

(1) Involuntary Resettlement, Poverty, Local Economy (Livelihood), Land Use and Utilization
For Water Pipeline

Monitoring Place: Whole project area
Frequency: Monthly

Complaints from Residents
- Please describe the progress and remarkable issues (if any) to fill in the table below.

Resettlement Works		Progress in Narrative	Remarkable Issues
Project Affected Persons	Progress of compensation payment		
	Progress of land acquisition		
	Progress of site clearance		
	Income Restoration Program (if executed)		
Common Assets	Relocation		

- Are there any grievances submitted, solved and pending regarding resettlement works? □ Yes, □ No
If yes, please describe the contents of grievances to fill in the table below.

Item	Date received Grievance	Contents of Grievance	Responses / Countermeasures
Involuntary Resettlement			
Poverty			
Local economy (Livelihood)			
Land use and utilization			

End of Document

Construction Phase

The latest results of the following monitoring items should be submitted to authorities every week at construction phase. The items, standards to be applied, measurement points, and frequency for each monitoring parameter are established based on the EIA Report for Kyaukse Gas Combined-Cycle Power Plant Construction Project. Should there be any changes to the original plan, such change should be reviewed and evaluated by environmental expert.

1. Pollution

(1) Air Quality

For Water Pipeline

Monitoring Place: 1 nearest village around the Project site

Frequency: Quarterly

Complaints from Residents

- Are there any complaints from residents regarding air quality (Dust) in this monitoring period? □ Yes, □ No

If yes, please describe the contents of complains and its countermeasures to fill in the table below.

Item	Date received Complainants	Contents of Complainants	Responses / Countermeasures
Dust			

(2) Water Quality

For Water Pipeline

Measurement Point: 1 station down stream of water intake facility

Frequency: Two (2) time at construction of coffer dam (during installation and removing)

Water Quality Measurement Results

Item	Unit	Measured Value	Country's Standard	Target value to be applied	Method	Note (Reason of excess of the standard)
SS	mg/L		none	To be set		
BOD_5	mg/L		30	Apply country's standard		
COD	mg/L		125			
Oil and grease	mg/L		10			
pH	-		6 - 9			
Total coliform bacteria	MPN/ 100mL		400			

(3) Waste

For Water Pipeline

<u>Monitoring Place:</u> Project site

<u>Frequency:</u> Weekly

<u>Waste disposal</u>

- Are there any wastes generated in this monitoring period? □ Yes, □ No

If yes, please report the amount of sludge and fill in the results of solid waste management Activities.

<Construction site>

Type	Generated from	Unit	Amount	Disposal Method

<Worker's camp>

Type	Generated from	Unit	Amount	Disposal Method

(4) Noise and Vibration

For Water Pipeline

<u>Monitoring Place:</u> 2 points near the water pipeline (intake facility and water pipeline)

<u>Frequency:</u> [Noise level measurement] One (1) time at peak of construction work
[Record of complaints from residents] Quarterly

<u>Noise Level Measurement Results</u>

Item	Unit	Location	Measured Value [a]	Country's Standard	Target value to be applied	Method	Note (Reason of excess of the standard)
L_{Aeq}	dB(A)	No.1		Daytime: 55	Apply country's standard		
		No.2					

a: necessary to attach hourly data

Note: Daytime is from 7:00 – 22:00 (10:00 – 22:00 in public holiday)

Vibration Level Measurement Results

Item	Unit	Location	Measured Value [a]	Country's Standard	Target value to be applied	Method	Note (Reason of excess of the standard)
L_{10}	dB	No.1		none	Daytime: 65 (Japanese regulatory standard)		
		No.2					

a: necessary to attach hourly data

Note: Daytime is from 7:00 – 22:00

Complaints from Residents

- Are there any complaints from residents regarding Nose and Vibration in this monitoring period? □ Yes, □ No

If yes, please describe the contents of complains and its countermeasures to fill in the table below.

Item	Date received Complainants	Contents of Complainants	Responses / Countermeasures
Noise			
Vibration			

(5) Ground Subsidence

For Water Pipeline

Monitoring Place: Around water pipeline

Frequency: Quarterly

Complaints from Residents

- Are there any complaints from residents regarding Ground subsidence in this monitoring period? □ Yes, □ No

If yes, please describe the contents of complains and its countermeasures to fill in the table below.

Item	Date received Complainants	Contents of Complainants	Responses / Countermeasures
Ground subsidence			

2. Natural Environment

(1) Flora, Fauna and Biodiversity
For Water Pipeline

<u>Monitoring Place:</u> Project site and intake point
<u>Frequency:</u> 2 times a year (once in rainy season and once in dry season)

<u>Field Reconnaissance Results</u>

Item	Item	Findings	Required Countermeasures
Terrestrial Flora	General condition		
	Rare spices		
Terrestrial Fauna	General condition		
	Rare spices		
Aquatic Flora	General condition		
	Rare spices		
Aquatic Fauna	General condition		
	Rare spices		

3. Social Environment

(1) Local Economy (Livelihood), Land Use and Utilization of Local Resources
For Water Pipeline
<u>Monitoring Place:</u> Whole project area
<u>Frequency:</u> Quarterly

<u>Complaints from Residents</u>

- Are there any complaints from residents regarding livelihood and land use and utilization of local resources in this monitoring period? □ Yes, □ No

If yes, please describe the contents of complains and its countermeasures to fill in the table below.

Item	Date received Complainants	Contents of Complainants	Responses / Countermeasures
Ground subsidence			

(2) -1 Poverty

For Water Pipeline

Monitoring Place: Whole project area

Frequency: Weekly

Complaints from Residents

- Are there any grievances submitted, solved and pending issues ? □ Yes, □ No

If yes, please describe the contents of grievances to fill in the table below.

Item	Date received Complaints	Contents of Complaints	Responses / Countermeasures
Poverty			

(2) -2 Water Usage

For Water Pipeline

Monitoring Place: Whole project area

Frequency: Weekly

Complaints from Residents

- Are there any grievances submitted, solved and pending issues ? □ Yes, □ No

If yes, please describe the contents of grievances to fill in the table below.

Item	Date received Complaints	Contents of Complaints	Responses / Countermeasures
Water Usage			

(2) -3 Existing Social Infrastructure and Service

For Water Pipeline

Monitoring Place: Whole project area

Frequency: Weekly

Complaints from Residents

- Are there any grievances submitted, solved and pending issues ? □ Yes, □ No

If yes, please describe the contents of grievances to fill in the table below.

Item	Date received Complaints	Contents of Complaints	Responses / Countermeasures
Existing Social Infrastructure and Service			

(2) -4 Cultural Heritage

For Water Pipeline

Monitoring Place: Around the water pipeline

Frequency: Weekly

Findings of archaeological objects

- Are there any archaeological findings, solved and pending issues? □ Yes, □ No

If yes, please describe the contents of grievances to fill in the table below.

Item	Date of finding	Contents	Responses / Countermeasures
Cultural Heritage			

Monitoring Place: Whole project area

Frequency: Weekly

Complaints from Residents

- Are there any grievances submitted, solved and pending regarding issues ? □ Yes, □ No

If yes, please describe the contents of grievances to fill in the table below.

Item	Date received Complaints	Contents of Complaints	Responses / Countermeasures
Cultural Heritage			

(2) -5 Gender

For Water Pipeline

Monitoring Place: Whole project area

Frequency: Weekly

Complaints from Residents

- Are there any grievances submitted, solved and pending issues ? □ Yes, □ No

If yes, please describe the contents of grievances to fill in the table below.

Item	Date received Complaints	Contents of Complaints	Responses / Countermeasures
Gender			

(3) Children's Rights

For Water Pipeline

Monitoring Place: Whole project area

Frequency: Weekly

Checking Results of Working Record

- Please describe the condition and remarkable issues (if any) to fill in the table below.

Date	Number of Workers	Lowest Age of Workers	Remarkable Issues

(4) Health (Community Health, Infectious Disease such as HIV/AIDS)
For Water Pipeline
Monitoring Place: Surrounding communities of project area
Frequency: Weekly

Education and training to workers and surrounding community

- Was there any education, training, awareness raising activities implemented in this monitoring period? □ Yes, □ No

If yes, describe the contents in the table below.

Date	Activities	Description (Location, Participant etc.)

(5) Occupational Health and Safety
For Water Pipeline
Monitoring Place: Whole project area
Frequency: Weekly

Checking Results of Record

- Protective gears, precautious signs and other safety measures have been taken during the monitoring period? □ Yes, □ No

If No, describe the issues in the table below.

Date	Contents of Infectious / Incidents	Actions to be taken, responsible party (if there are any)

Note: If emergency incidents are occurred, the information should be reported to the relevant organizations and authorities immediately.

- Are there any incidents regarding, Working Environment, Accident in this monitoring period? □ Yes, □ No

If yes, describe the contents of complains and its countermeasures to fill in the table below.

Date	Contents of Infectious / Incidents	Counter Measures

Note: If emergency incidents are occurred, the information should be reported to the relevant organizations and authorities immediately.

Education and Training to Workers

- Were there any education and training, awareness raising activities implemented in this monitoring period? □ Yes, □ No

If yes, please describe the contents below the table.

Date	Activities	Description (Location, Participant etc.)

4. Others

(1) Accidents

For Water Pipeline

Monitoring Place: Surrounding area

Frequency: Weekly

Record of activities

- Was there any information sharing on construction activities and safety measures to construction workers and/or communities during this monitoring period? □ Yes, □ No

If yes, describe the contents of activities in the table below.

Date	Contents of training	Type and number of participants, any remark

Checking Results of Record

- Are there any education and training, awareness raising activities regarding safe construction works implemented during this monitoring period?

□ Yes, □ No

If yes, please describe the contents of complains and its countermeasures to fill in the table below.

Date	Contents of Incidents	Counter Measures

- Are there any (traffic) accidents involving construction workers and/or surrounding community during this monitoring period? □ Yes, □ No

If yes, please describe the detail of accident and preventive measures to fill in the table below.

Date	Contents of accidents (location, type, number of injuries etc.)	Counter Measures (responsible parties if there are any)

Note: If emergency incidents are occurred, the information should be reported to the relevant organizations and authorities immediately.

(2) Cross-border Impact, Climate Change

For Water Pipeline

Monitoring Place: Whole project area

Frequency: Weekly

Checking the Record

- Please describe the amount of fuel use.

Month/Week	Number of Vehicles Operated	Amount of Fuels used

- Were there any activity for promoting efficient fuel use, such as idling stop training for drivers? □ Yes, □ No

If yes, describe the detail of activities in the table below.

date	Participants	Note, remarks

End of Document

Decommissioning, Closure, and Post-Closure Phases

The latest results of the below monitoring items should be submitted to authorities at decommissioning, closure, and post-closure phases. The items, standards to be applied, measurement points, and frequency for each monitoring parameter are established based on the EIA Report for Kyaukse Gas Combined-Cycle Power Plant Construction Project. Should there be any changes to the original plan, such change should be reviewed and evaluated by environmental expert.

1. Pollution

(1) Air Quality
For Water Pipeline

Monitoring Place: 1 nearest village around the project site
Frequency: Quarterly

Complaints from Residents

- Are there any complaints from residents regarding air quality in this monitoring period? □ Yes, □ No

If yes, please describe the contents of complains and its countermeasures to fill in the table below.

Item	Date received Grievance	Contents of Grievance	Responses / Countermeasures
Dust			

(2) Water Quality
For Water Pipeline

Measurement Point: 2 stations at upstream and downstream of water intake facility
Frequency: Two times at installation and demolition of cofferdam

Water Quality Measurement Results

Item	Unit	Measured Value	Country's Standard	Target value to be applied	Method	Note (Reason of excess of the standard)
SS	mg/L		none	To be set		
BOD_5	mg/L		30	Apply country's standard		
COD	mg/L		125			
Oil and grease	mg/L		10			
pH	-		6 - 9			
Total coliform bacteria	MPN/ 100mL		400			

(3) Waste

For Water Pipeline

Monitoring Place: Project site

Frequency: Weekly

Waste disposal

- Are there any wastes generated in this monitoring period? □ Yes, □ No

If yes, please report the amount of sludge and fill in the results of solid waste management Activities.

<Construction site>

Type	Generated from	Unit	Amount	Disposal Method

<Worker's camp>

Type	Generated from	Unit	Amount	Disposal Method

(4) Noise and Vibration

For Water Pipeline

Monitoring Place: 2 points near the water pipeline (intake facility and water pipeline)

Frequency: [Noise level measurement] One (1) time at peak of construction work
[Record of complaints from residents] Quarterly

Noise Level Measurement Results

Item	Unit	Location	Measured Value [a]	Country's Standard	Target value to be applied	Method	Note (Reason of excess of the standard)
L_{Aeq}	dB(A)	No.1		Daytime: 55	Apply country's standard		
		No.2					

a: necessary to attach hourly data

Note: Daytime is from 7:00 – 22:00 (10:00 – 22:00 in public holiday)

Vibration Level Measurement Results

Item	Unit	Location	Measured Value [a]	Country's Standard	Target value to be applied	Method	Note (Reason of excess of the standard)
L_{10}	dB	No.1		none	Daytime: 65 (Japanese regulatory standard)		
		No.2					

a: necessary to attach hourly data

Note: Daytime is from 7:00 – 22:00

Complaints from Residents

- Are there any complaints from residents regarding Nose and Vibration in this monitoring period? □ Yes, □ No

If yes, please describe the contents of complains and its countermeasures to fill in the table below.

Item	Date received Complainants	Contents of Complainants	Responses / Countermeasures
Noise			
Vibration			

2. Natural Environment

For Water Pipeline

(1) Flora, Fauna and Biodiversity

Monitoring Place: Project site and intake point

Frequency: Once in dry season and once in dry season, during demolishing period

Field Reconnaissance Results

Item	Item	Findings	Required Countermeasures
Terrestrial Flora	General condition		
	Rare spices		
Terrestrial Fauna	General condition		
	Rare spices		
Aquatic Flora	General condition		
	Rare spices		
Aquatic Fauna	General condition		
	Rare spices		

3. Social Environment

(1) -1 Poverty, Local Economy (Employment), Cultural Heritage and Gender
For Water Pipeline
Monitoring Place: Whole project area
Frequency: Weekly, during demolishing period

Complaints from Residents
- Are there any grievances submitted, solved and pending regarding demolition works? □ Yes, □ No
If yes, please describe the contents of grievances to fill in the table below.

Item	Date received Complaints	Contents of Complaints	Responses / Countermeasures
Poverty			
Local economy (Employment)			
Cultural heritage (disruption by noise or vibration to cultural activities)			
Gender			

(2) -2 Water Usage
For Water Pipeline
Monitoring Place: Whole project area
Frequency: Weekly, during demolishing period

Complaints from Residents
- Are there any grievances submitted, solved and pending regarding demolition works? □ Yes, □ No
If yes, please describe the contents of grievances to fill in the table below.

Item	Date received Complaints	Contents of Complaints	Responses / Countermeasures
Water Usage			

(3) Children's Rights
For Water Pipeline
Monitoring Place: Whole project area
Frequency: Weekly during demolition period

Checking Results of Working Record

- Please describe the condition and remarkable issues (if any) to fill in the table below.

Date	Number of Workers	Lowest Age of Workers	Remarkable Issues

(4) Health (Community Health, Infectious Disease such as HIV/AIDS)

For Water Pipeline
Monitoring Place: Surrounding communities of project area
Frequency: Weekly during demolition period

Education and training to workers and surrounding community

- Was there any education, training, awareness raising activities regarding health and infectious disease such as HIV/AIDS implemented in this monitoring period? □ Yes, □ No

If yes, describe the contents in the table below.

Date	Activities	Description (Location, Participant etc.)

(5) Occupational Health and Safety

For Water Pipeline
Monitoring Place: Whole project area
Frequency: Weekly during demolition period

Checking Results of Record

- Protective gears, precautious signs and other safety measures have been taken during the monitoring period? □ Yes, □ No

If No, describe the issues in the table below.

Date	Contents of Infectious / Incidents	Actions to be taken, responsible party (if there are any)

Note: If emergency incidents are occurred, the information should be reported to the relevant organizations and authorities immediately.

- Are there any incidents regarding, Working Environment, Accident in this monitoring period? □ Yes, □ No

If yes, describe the contents of complains and its countermeasures to fill in the table below.

Date	Contents of Infectious / Incidents	Counter Measures

Note: If emergency incidents are occurred, the information should be reported to the relevant organizations and authorities immediately.

Education and Training to Workers

- Were there any education and training, awareness raising activities implemented in this monitoring period? □ Yes, □ No

If yes, please describe the contents below the table.

Date	Activities	Description (Location, Participant etc.)

4. Others

(1) Accidents

For Water Pipeline

Monitoring Place: Surrounding area

Frequency: Weekly

Record of activities

- Was there any information sharing on demolishing activities and safety measures to construction workers and/or communities during this monitoring period? □ Yes, □ No

If yes, describe the contents of activities in the table below.

Date	Contents of training	Type and number of participants, any remark

Checking Results of Record

- Are there any education and training, awareness raising activities regarding safe construction works implemented during this monitoring period?

□ Yes, □ No

If yes, please describe the contents of complains and its countermeasures to fill in the table below.

Date	Contents of Incidents	Counter Measures

- Are there any (traffic) accidents involving construction workers and/or surrounding community during this monitoring period? □ Yes, □ No

If yes, please describe the detail of accident and preventive measures to fill in the table below.

Date	Contents of accidents (location, type, number of injuries etc.)	Counter Measures (responsible parties if there are any)

Note: If emergency incidents are occurred, the information should be reported to the relevant organizations and authorities immediately.

(2) Cross-border Impact, Climate Change

For Water Pipeline

Monitoring Place: Whole project area

Frequency: Weekly

Checking the Record

- Please describe the amount of fuel use.

Month/Week	Number of Vehicles Operated	Amount of Fuels used

- Were there any activity for promoting efficient fuel use, such as idling stop training for drivers? □ Yes, □ No

If yes, describe the detail of activities in the table below.

date	Participants	Note, remarks

End of Document

Appendix C

Public Consultation Materials for Scoping of EIA

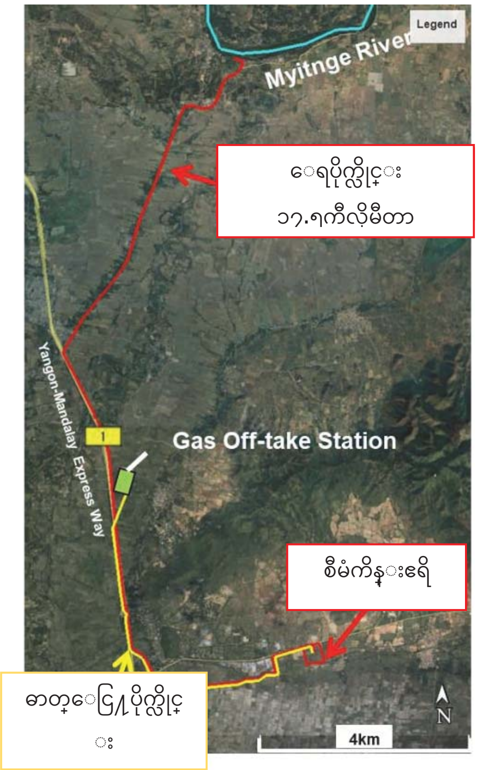
အများပြည်သူနှင့်တွေ့ဆုံဆွေးနွေးပွဲ
ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း(နယ်ပယ်အတိုင်းအတာသတ်မှတ်ခြင်းအဆင့်)
ကျောက်ဆည်သဘာဝဓာတ်ငွေ့နှင့်စွန့်ပစ်အပူသုံးဓာတ်အားပေးစက်ရုံစီမံကိန်း
၂၀၁၈ခုနှစ်၊ အောက်တိုဘာလ (၆)ရက်နှင့် (၇)ရက်

၁. စီမံကိန်းနောက်ခံ

မြန်မာနိုင်ငံ၏ လျှပ်စစ်ဓာတ်အား လိုအပ်မှုသည် ဖွံ့ဖြိုးတိုးတက်ရေးနှင့် ရင်းနှီးမြှုပ်နှံမှုလုပ်ငန်း စဉ်များအရ မကြာသေးမီနှစ်အတွင်း အရှိန်အဟုန်ပြင်းစွာ တိုးတက်လာသည်။ လက်ရှိတွင် နိုင်ငံ၏လျှပ်စစ်ဓာတ်အား ထုတ်လုပ်နိုင်မှုမှာ ၅၅၁၆.၈ မဂ္ဂါဝပ် ရှိပြီဖြစ်ပါသည်။

၂. စီမံကိန်းအချက်အလက်များ

လုပ်ငန်းရပ်များ	အသေးစိတ်အချက်အလက်များ
လျှပ်စစ်ဓာတ်အားပေး စက်ရုံ	၃၀၀ မဂ္ဂါဝပ် လျှပ်စစ်ဓာတ်အားပေးစက်ရုံ
ဓာတ်ငွေ့ပိုက်လိုင်း	၆ ကီလိုမီတာခန့်
ရေပိုက်လိုင်း	၁၇.၅ ကီလိုမီတာခန့်



၃. အများပြည်သူနှင့်တွေ့ဆုံဆွေးနွေးခြင်းရည်ရွယ်ချက်

စီမံကိန်းကြောင့် ဖြစ်ပေါ်လာနိုင်သော သဘာဝဝန်းကျင်နှင့် လူမှုဝန်းကျင်ဆိုင်ရာ သက်ရောက်မှုများ နှင့်အတူ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်လေ့လာခြင်းအတွက် ဆောင်ရွက်ရမည့်အရာများနှင့် စပ်လျဉ်း၍ ပြည်သူများ၏ သဘောထားအမြင်များကို ပေါင်းစပ်ဆောင်ရွက်နိုင်ရန် စီမံကိန်း ပြင်ဆင်ဆောင်ရွက်နေစဉ် ကာလ (ဉပမာ-နယ်ပယ်အတိုင်းအတာ သတ်မှတ်ခြင်းအဆင့်) အတွင်း အများပြည်သူများ နှင့်တွေ့ဆုံဆွေးနွေးပွဲ ဆောင်ရွက်ရခြင်းဖြစ်သည်။

၄. အဓိကသဘာဝနှင့်လူမှုထိခိုက်နိုင်မှု

စီမံကိန်းမှ မျှော်မှန်းထိခိုက်နိုင်ခြေများအား အောက်တွင်ဖော်ပြထားပါသည်။

စီမံကိန်းအဆင့်	သဘာဝနှင့်လူမှုထိခိုက်နိုင်မှု	
ဆောက်လုပ်ရေး မစတင်မီနှင့် တည်ဆောက်ရေး ကာလ	ကောင်းကျိုး	ဆင်းရဲမှု၊ ဒေသတွင်းစီးပွားရေး (အလုပ်အကိုင်အခွင့်အလမ်း)
	ဆိုးကျိုး	လေအရည်အသွေး၊ ရေအရည်အသွေး၊ စွန့်ပစ်ပစ္စည်း၊ မြေဆီလွှာညစ်ညမ်းမှု၊ ဆူညံသံနှင့်တုန်ခါမှု၊ မြေကျွံခြင်း၊ အပင်/သတ္တဝါနှင့်ဇီဝမျိုးစုံမျိုးကွဲ၊ ဆန္ဒမပါသောပြောင်းရွှေ့မှု၊ ဒေသတွင်းစီးပွားရေး (အသက်မွေးမှု)၊ မြေအသုံးချမှုနှင့် ဒေသတွင်းအရင်းမြစ်များအားအသုံးပြုမှု၊ ရေသုံးစွဲမှု၊ လက်ရှိလူမှုရေးဆိုင်ရာ အခြေခံအဆောက်အဦများနှင့်ဝန်ဆောင်မှုများ၊ ယဉ်ကျေးမှုအမွေအနှစ်၊ မြေယာရှုခင်း၊ ကူးစက်ရောဂါများ၊ လုပ်ငန်းခွင် ကျန်းမာရေးနှင့်လုံခြုံရေး၊ မတော်တဆမှု၊ နယ်ခြားဝင်ရောက်လာမှု၊ ရာသီဥတုပြောင်းလဲမှု
	ထပ်မံလေ့လာရန် လိုအပ်ချက်	တိုင်းရင်းသားလူနည်းစုနှင့် ဌာနေတိုင်းရင်းသား၊ ကျား/မ၊ ကလေးသူငယ်အခွင့်အရေး (ဤအချက်များသည် သဘာဝနှင့်လူမှုဝန်းကျင်သုံးသပ်ခြင်းအတွက် JICA

စီမံကိန်းအဆင့်	သဘာဝနှင့်လူမှုထိခိုက်နိုင်မှု	
		လမ်းညွှန်ချက်များသာဖြစ်သည်။)
စီမံကိန်းလည်ပတ်ကာလ	ကောင်းကျိုး	ဆင်းရဲမှု၊ ဒေသတွင်းစီးပွားရေး(အလုပ်အကိုင်အခွင့်အလမ်း)
	ဆိုးကျိုး	လေအရည်အသွေး၊ ရေအရည်အသွေး၊ စွန့်ပစ်ပစ္စည်း၊ ဆူညံသံနှင့်တုန်ခါမှု၊ အနံ့ဆိုး၊ အပင်/သတ္တဝါနှင့်ဇီဝမျိုးစုံမျိုးကွဲ၊ ဇလဗေဒ၊ ရေသုံးစွဲမှု၊ လက်ရှိလူမှုရေးဆိုင်ရာ အခြေခံအဆောက်အဦများနှင့်ဝန်ဆောင်မှုများ၊ ယဉ်ကျေးမှုအမွေအနှစ်၊ မြေယာရှုခင်း၊ လုပ်ငန်းခွင် ကျန်းမာရေးနှင့်လုံခြုံရေး၊ နယ်ခြားဝင်ရောက်လာမှု၊ ရာသီဥတုပြောင်းလဲမှု
	ထပ်မံလေ့လာရန်လိုအပ်ချက်	တိုင်းရင်းသားလူနည်းစုနှင့် ဌာနေတိုင်းရင်းသား၊ ဒေသတွင်းစီးပွားရေး(အသက်မွေးမှု)၊ ကျား/မ၊ မတော်တဆမှု (ဤအချက်များသည် သဘာဝနှင့်လူမှုဝန်းကျင်သုံးသပ်ခြင်းအတွက် JICA လမ်းညွှန်ချက်များသာဖြစ်သည်။)

၅. အခြေခံအချက်အလက်များကောက်ယူခြင်း

အမျိုးအစား	ဖော်ပြချက်
သဘာဝပတ်ဝန်းကျင်	➢ လေအရည်အသွေး (စက်ရုံတည်နေရာ) ➢ ရေအရည်အသွေး (မြစ်ငယ်မြစ်) ➢ ဆူညံသံနှင့်တုန်ခါမှု (စက်ရုံတည်နေရာပတ်ဝန်းကျင်၊ ရေစတင်ယူမည့်နေရာ၊ ကြားရေးတွန်းစက်နေရာ) ➢ မြေယာရှုခင်း (စက်ရုံတည်နေရာပတ်းဝန်းကျင်) ➢ ဂေဟစနစ် (စက်ရုံတည်နေရာပတ်ဝန်းကျင်၊ ရေစတင်ယူမည့်နေရာ၊ ရေသွယ်ပိုက်လိုင်း တလျှောက်)
လူမှုစီးပွား	➢ ရှိပြီးသားလူမှုစီးပွားအချက်အလက်များအားအသုံးပြုမည်ဖြစ်သည်။ (တည်ဆောက်ရေး အတွက် မြေနေရာရယူမှုနှင့်ဆိုင်သော လူမှုစီးပွားစစ်တမ်းများအား သီးခြားလေ့လာကောက်ယူပါမည်။) ➢ လူထုတွေ့ဆုံပွဲများအား နယ်ပယ်တိုင်းတာသတ်မှတ်ခြင်းအဆင့်နှင့် EIA အစီရင်ခံစာမူကြမ်းအဆင့်များတွင် ပြုလုပ်ပါမည်။

၆. ဆက်လက်လုပ်ဆောင်မည့် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း

ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းအား ဆက်လက်လုပ်ဆောင်မည်ဖြစ်ပြီး နောက်တစ်ကြိမ် လူထုတွေ့ဆုံပွဲအား လာမည့်နိုဝင်ဘာလတွင် ကျင်းပမည်ဖြစ်သည်။

ထပ်မံသိရှိလိုပါကဆက်သွယ်ရန်
ဖုန်း - ၀၆၇ ၈၁၀၄၂၈၂
အပူစွမ်းအင်သုံးစက်ရုံများဌာန၊ လျှပ်စစ်ဓာတ်အားထုတ်လုပ်ရေးလုပ်ငန်း

ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်းအတွက် အများပြည်သူနှင့်တွေ့ဆုံဆွေးနွေးခြင်း အခမ်းအနား (နယ်ပယ်အတိုင်းအတာသတ်မှတ်ခြင်းအဆင့်)

ကျောက်ဆည် သဘာဝဓာတ်ငွေ့နှင့် စွန့်ပစ်အပူသုံး ဓာတ်အားပေးစက်ရုံစီမံကိန်း

၂၀၁၈ ခုနှစ်၊ အောက်တိုဘာလ (၆)ရက် နှင့် (၇)ရက်

ELECTRIC POWER GENERATION ENTERPRISE

အစီအစဉ်

၁။ စီမံကိန်းနိဒါန်းနှင့် စီမံကိန်းအကြောင်းအရာ

၂။ ပတ်ဝန်းကျင်နှင့် လူမှုဝန်းကျင်ဆိုင်ရာ အဓိကသက်ရောက်မှုများ

၃။ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းတွင် လေ့လာမည့် အကြောင်းအရာများ

၄။ ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်းအတွက် နောင်ဆောင်ရွက်မည့် လုပ်ငန်းစဉ်များ

၅။ အမေး၊ အဖြေ ကဏ္ဍ

၁။ စီမံကိန်းနိဒါန်းနှင့် စီမံကိန်းအကြောင်းအရာ

စီမံကိန်း ဖြစ်ပေါ်လာပုံ

- မြန်မာနိုင်ငံ၏ လျှပ်စစ်ဓာတ်အား သုံးစွဲနိုင်မှုမှာ နှစ်စဉ်တိုးတက်လျက်ရှိရာ လျှပ်စစ်ဓါတ်အား လိုအပ်ချက်မှာ နှစ်စဉ် မြင့်မားလျက်ရှိပါသည်။

- လက်ရှိတွင် နိုင်ငံ၏ လျှပ်စစ်ဓါတ်အား ထုတ်လုပ်နိုင်မှုမှာ (၅၅၃၆.၈) MW (တပ်ဆင်အင်အား) သို့ရောက်ရှိနေပြီ ဖြစ်ပါသည်။

- လျှပ်စစ်ဓါတ်အားကို ပြည့်ဝစွာဖြည့်ဆည်းပေးနိုင်ရေးအတွက် နိုင်ငံပိုင်နှင့် ပုဂ္ဂလိကပိုင် ကဏ္ဍ (၂)ရပ်လုံးဖြင့် ဓါတ်အားပေးစက်ရုံများ တည်ဆောက်ဓါတ်အားထုတ်နိုင်ရေး စီစဉ်ဆောင်ရွက်လျက်ရှိပြီး ဂျပန်နိုင်ငံ JICA ၏ အကူအညီကို ရယူ၍လည်း လျှပ်စစ်ကဏ္ဍအတွက် မဟာဗျူဟာစီမံကိန်း (Master Plan)ကို ရေးဆွဲလျက်ရှိပါသည်။

- ယခုစီမံကိန်းမှာ နိုင်ငံ၏ ဓါတ်အားလိုအပ်ချက်ကို ဖြည့်ဆည်းပေးနိုင်ရေးအတွက် ဂျပန်နိုင်ငံ JICA ၏ ချေးငွေကို ရယူ၍ နိုင်ငံပိုင် ဓါတ်အားပေး စက်ရုံအဖြစ် တည်ဆောက်သွားမည့် စီမံကိန်းတစ်ခု ဖြစ်ပါသည်။

၁။ စီမံကိန်းနိဒါန်းနှင့် စီမံကိန်းအကြောင်းအရာ

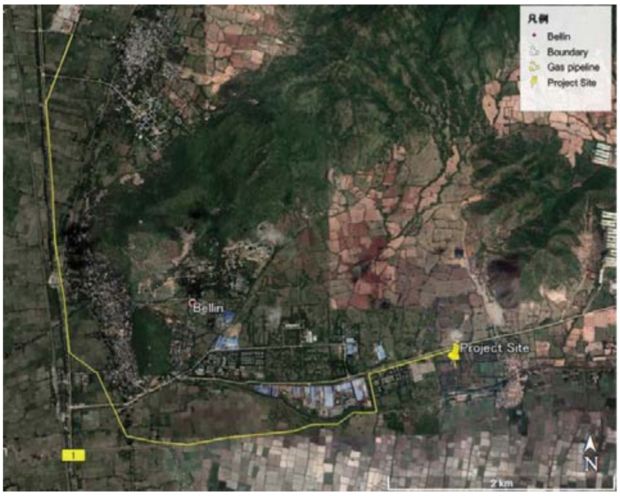
စီမံကိန်းဆိုင်ရာ အချက်အလက်များ

တည်နေရာ	- မန္တလေးတိုင်းဒေသကြီး၊ စဉ့်ကိုင်မြို့နယ် အတွင်းရှိ ဘယ်လင်းမြို့ အရှေ့ဘက် ၂.၂ ကီလိုမီတာ အကွာခန့်
ခန့်မှန်း ဧရိယာ	- ၁၂၀၀ ပေ x ၁၀၄၅ ပေ
အမျိုးအစား	- ၃၀၀ မဂ္ဂါဝပ် သဘာဝ ဓါတ်ငွေ့နှင့် စွန့်ပစ် အပူသုံးဓါတ်အားပေးစက်ရုံ (ဓါတ်ငွေ့တာဘိုင်စက် ၂၀၀ မဂ္ဂါဝပ် နှင့် ရေနွေးငွေ့တာဘိုင်စက် ၁၀၀ မဂ္ဂါဝပ်)

၁။ စီမံကိန်းနိဒါန်းနှင့် စီမံကိန်းအကြောင်းအရာ

စီမံကိန်းသို့ ဓါတ်ငွေ့ပိုက်လိုင်းသွယ်တန်းရယူပုံ

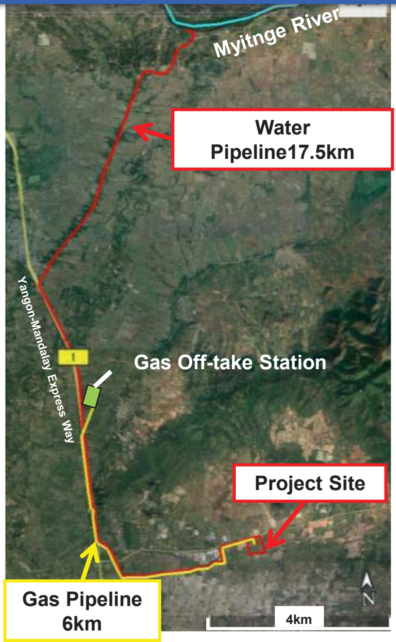
- ရွှေကမ်းလွန်သဘာဝဓါတ်ငွေ့ကို အသုံးပြုနိုင်ရန် ဓါတ်ငွေ့ပိုင်လိုင်း ၆ ကီလိုမီတာခန့် သွယ်တန်း တည်ဆောက်ရမည် ဖြစ်ပါသည်။
- ဓါတ်ငွေ့ပိုင်လိုင်းကို Shwe-China ဓါတ်ငွေ့ပိုက်လိုင်း၏ offtake station မှ project site အထိ လက်ရှိ တည်ဆောက်ပြီးသား ဓါတ်ငွေ့ပိုက်လိုင်းနှင့် အပြိုင်တည်ဆောက်သွားမည် ဖြစ်ပါသည်။
- ဓါတ်ငွေ့ပိုက်လိုင်းကို မြေအောက်တွင် မြှုပ်နှံတည်ဆောက်သွယ်တန်းခြင်း ဖြစ်ပါသည်။



၁။ စီမံကိန်းနိဒါန်းနှင့် စီမံကိန်းအကြောင်းအရာ

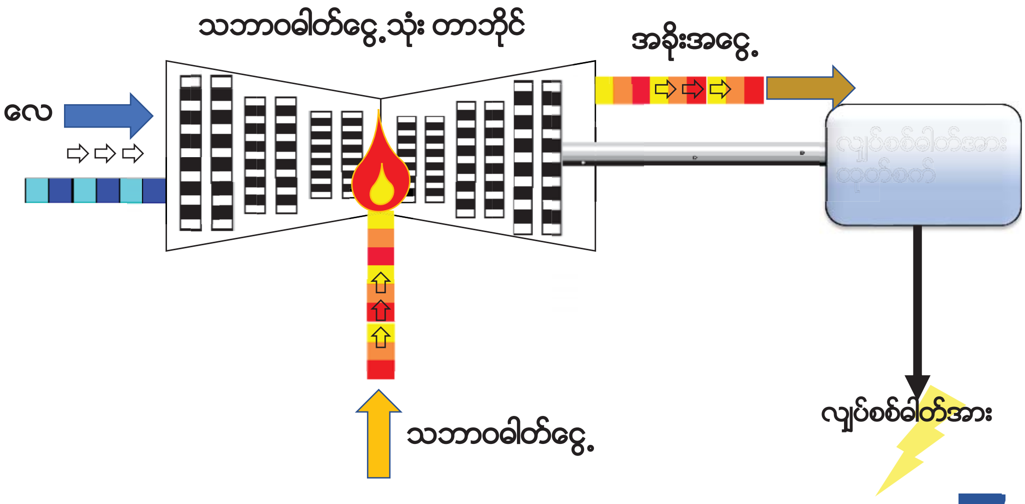
စီမံကိန်း သို့ ရေသွယ်တန်းရယူပုံ

- စီမံကိန်းသို့မြစ်ငယ်မြစ်မှ ရေကို ရေပိုက်လိုင်း ၁၇.၅ ကီလိုမီတာခန့် တည်ဆောက်သွယ်တန်းရယူ အသုံးပြုမည် ဖြစ်ပါသည်။
- ရေပိုက်လိုင်းသွယ်တန်းမည့် လမ်းအူကြောင်းမှာ လက်ရှိ ဆည်ရေပေးဝေသည့် မုန့်ပေါင်းမြောင်း နှင့် ရန်ကုန်-မန္တလေးအမှတ်(၁)လမ်းဘေး တလျှောက်ဖြစ်ပြီး ရေပိုက်လိုင်းကို မြေအောက်တွင် မြှုပ်နှံ သွယ်တန်းမည်ဖြစ်ပါသည်။
- မြစ်ရေကို စတင်ယူမည့် နေရာတွင် ရေပန့်ရုံတစ်ရုံနှင့် စီမံကိန်းသို့မရောက်မီ ကြားနေရာတွင် ရေပန့်ရုံ နှစ်ရုံကို တည်ဆောက်ရန် စီစဉ်ထားပါသည်။



၁။ စီမံကိန်းနိဒါန်းနှင့် စီမံကိန်းအကြောင်းအရာ

တည်ဆောက်မည့် စီမံကိန်း၏ လျှပ်စစ်ဓါတ်အားထုတ်လုပ်ပုံ



၁။ စီမံကိန်းနိဒါန်းနှင့် စီမံကိန်းအကြောင်းအရာ

အများပြည်သူနှင့်တွေ့ဆုံပွဲကျင်းပရခြင်း၏ ရည်ရွယ်ချက်

၁။ စီမံကိန်း အကောင်ထည်ဖော်ရသည့် ရည်ရွယ်ချက်နှင့် စီမံကိန်း အကောင်ထည်ဖော်ဆောင်ရွက်ရာတွင် သဘာဝပတ်ဝန်းကျင်နှင့် လူမှုပတ်ဝန်းကျင် ထိခိုက်မှုမရှိစေရန် စနစ်တကျဆောင်ရွက်ပုံ အဆင့်ဆင့်ကို အများပြည်သူ ပွင့်လင်းမြင်သာစွာ သိရှိနိုင်ရန်။

၂။ စီမံကိန်းနှင့် သက်ဆိုင်သူများထံမှ စီမံကိန်းအပေါ်၎င်းတို့၏ စိုးရိမ်ပူပန်မှုနှင့် အကြံပေးချက်များ ပြောကြားနိုင်မည့် အခွင့်အရေးရရှိနိုင်ရန်။

၃။ စီမံကိန်းအပေါ် အများပြည်သူ၏ အမြင်နှင့် တုန့်ပြန်မှုများကို ရယူနိုင်ရန်။

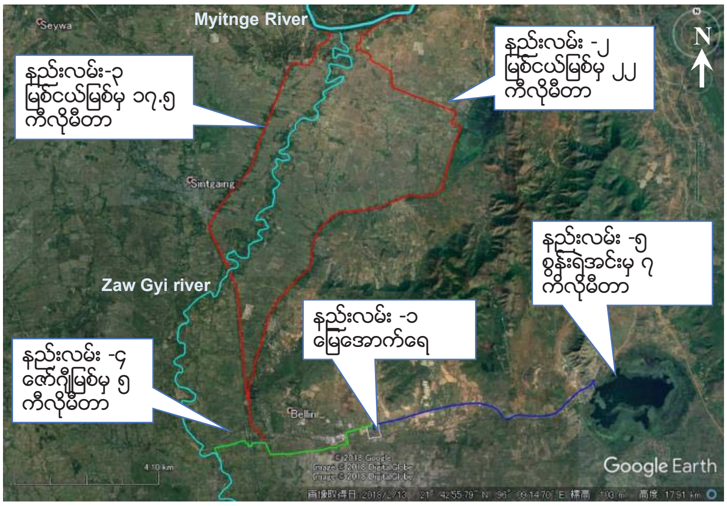
၄။ စီမံကိန်းနှင့်ပက်သက်၍ သဘာဝပတ်ဝန်းကျင်နှင့် လူမှုပတ်ဝန်းကျင် အပေါ်သက်ရောက်နိုင်မှုများကို အများပြည်သူသို့အသိပေးတင်ပြရန်။

၁။ စီမံကိန်းနိဒါန်းနှင့် စီမံကိန်းအကြောင်းအရာ

အခြားနည်းလမ်း သုံးသပ်ခြင်း

- စီမံကိန်းနေရာ ရွေးချယ်သတ်မှတ်ရာတွင် EPGE သည် ရည်မှန်းထားသည့် နေရာသုံးနေရာအနက် အခြားနေရာနှစ်နေရာ (ကျောက်ဖြူ နှင့် မြင်းခြံ) ထက် ပတ်ဝန်းကျင်နှင့် လူမှုဝန်းကျင်ဆိုင်ရာ သက်ရောက်မှု နည်းသည့် ကျောက်ဆည်မြို့ကို ရွေးချယ်ထားပါသည်။

- ရေအရင်းအမြစ်နှင့် ရေပိုက်လိုင်း လမ်းကြောင်း ရွေးချယ်ခြင်းကို အခြားလေ့လာချက် တစ်ရပ်အနေဖြင့် ဆောင်ရွက်ထားပါသည်။



၁။ စီမံကိန်းနိဒါန်းနှင့် စီမံကိန်းအကြောင်းအရာ

အခြား ဖြစ်နိုင်ခြေရှိသော နည်းလမ်းများ သုံးသပ်ခြင်း (ရေအရင်းအမြစ်နှင့် ရေပိုက်လိုင်း)

အမျိုးအစား	နည်းလမ်း-၁	နည်းလမ်း-၂	နည်းလမ်း-၃	နည်းလမ်း-၄	နည်းလမ်း-၅
ရေအရင်းအမြစ်	မြေအောက်ရေ	မြစ်ငယ်မြစ် (ပိုက်လိုင်းအရှည် ၂၂ ကီလိုမီတာ)	မြစ်ငယ်မြစ် (ပိုက်လိုင်းအရှည် ၁၇ ကီလိုမီတာ)	ဇော်ဂျီမြစ် (ပိုက်လိုင်းအရှည် ၅ ကီလိုမီတာ)	စွန်ရဲအင်း (ပိုက်လိုင်းအရှည် ၇ ကီလိုမီတာ)
မြေအသုံးချမှု	ပန့်ရုံနေရာမှ လွဲ၍ မြေနေရာ အသုံးချမှု ပြောင်းလဲခြင်းမရှိနိုင်ပါ။	နည်းလမ်း ၁ နှင့် နည်းတူဖြစ်ပါသည်။	နည်းလမ်း ၁ နှင့် နည်းတူဖြစ်ပါသည်။	နည်းလမ်း ၁ နှင့် နည်းတူဖြစ်ပါသည်။	နည်းလမ်း ၁ နှင့် နည်းတူဖြစ်ပါသည်။
နည်းပညာနှင့် စီးပွားရေး	မြေအောက်ရေတွင် ထုံးဓာတ်ပါဝင်မှုနှုန်းများ နေသောကြောင့် ရေသန့်စင်ရေးအတွက် ကုန်ကျစရိတ်နှင့် နည်းပညာများ လိုအပ်ပါသည်။	ရေအရည်အသွေး ကောင်းမွန်သော ကြောင့် ရေသန့်စင် ရေးအတွက် ကုန် ကျစရိတ် နည်းပါ လိမ့်မည်။	ရေအရည်အသွေး ကောင်းမွန်သော ကြောင့် ရေသန့်စင် ရေးအတွက် ကုန် ကျစရိတ် နည်းပါ လိမ့်မည်။	ရေတွင်အနည် ပါဝင်မှုနှုန်း များသောကြောင့် ရေသန့်စင်ရေးအတွက် ကုန်ကျစရိတ်နှင့် နည်းပညာများ လိုအပ်ပါသည်။	ရေအရည်အသွေး ကောင်းမွန်သော ကြောင့် ရေသန့်စင် ရေးအတွက် ကုန် ကျစရိတ် နည်းပါ လိမ့်မည်။
ရေအရင်းအမြစ် ပုံမှန်ရရှိနိုင်မှု	မရရှိနိုင်ပါ။	ပုံမှန်ရရှိနိုင်ပါသည်၊	ပုံမှန်ရရှိနိုင်ပါသည်။	ပုံမှန်မရရှိနိုင်ပါ။	ပုံမှန်မရရှိနိုင်ပါ။
သဘာဝပတ်ဝန်းကျင်နှင့်လူမှုရေးဆိုင်ရာ သက်ရောက်မှုများ	မြေအောက်ရေတွင် သိသာထင်ရှားသော သက်ရောက်မှုများ ဖြစ်ပေါ်နိုင်ပါသည်။	တည်ဆောက်ရေးကာ ကာလတွင်နည်းလမ်း-၃ထက် သက်ရောက်မှု ပိုများနိုင်ပါသည်။	နည်းလမ်း-၂ ထက်ရေပိုက်လိုင်းတို သောကြောင့် သက်ရောက်မှု လျော့နည်းပါမည်။	ဇော်ဂျီမြစ်၏ ရေအသုံးချမှုအပေါ် လူမှုရေးဆိုင်ရာ သက်ရောက်မှုများ ဖြစ်ပေါ်နိုင်ပါသည်။	စွန်ရဲကန်၏ ရေအသုံးချမှုအပေါ် သဘာဝပတ်ဝန်းကျင်နှင့် လူမှုရေးဆိုင်ရာ သက်ရောက်မှုများ ဖြစ်ပေါ်နိုင်ပါသည်။
နိဂုံးချုပ်	-	-	ရွေးချယ်ခဲ့ပါသည်။	-	-

၂.ပတ်ဝန်းကျင်နှင့် လူမှုဝန်းကျင်ဆိုင်ရာသက်ရောက်မှုများ (နယ်ပယ်အတိုင်းအတာသတ်မှတ်ခြင်း)

အဆိုပြုစီမံကိန်းမှ ဖြစ်နိုင်ခြေရှိသော သဘာဝပတ်ဝန်းကျင်နှင့် လူမှုပတ်ဝန်းကျင်ဆိုင်ရာ သက်ရောက်မှုများကို ကနဦးတွင် အောက်ဖော်ပြပါ လက္ခဏာရပ်များဖြင့် ဆန်းစစ်မည် ဖြစ်ပါသည်။

- သဘာဝပတ်ဝန်းကျင်
- ဇီဝဝန်းကျင်
- လူမှုစီးပွားရေးနှင့်
- ကျန်းမာရေး

ညစ်ညမ်းမှု၊ သဘာဝပတ်ဝန်းကျင်၊ လူမှုပတ်ဝန်းကျင် တို့၏ ထိခိုက်မှုများအား A မှ D ထိ အောက်ဖော်ပြပါ ညွှန်းကိန်းများအတိုင်း အမျိုးအစားခွဲခြားထားပါသည်။

A-: သိသာသောဆိုးကျိုးသက်ရောက်မှု A+: သိသာသောကောင်းကျိုးသက်ရောက်မှု
B-: ဆိုးကျိုးသက်ရောက်မှုအချို့ B+: ကောင်းကျိုးသက်ရောက်မှုအချို့
C: အကျိုးသက်ရောက်မှုမရှင်းလင်းသဖြင့်ထပ်မံလေ့လာရန်လိုအပ်သည်။
D: အကျိုးသက်ရောက်မှုမရှိသလောက်ဖြစ်၍ထပ်မံလေ့လာရန်မလိုအပ်။

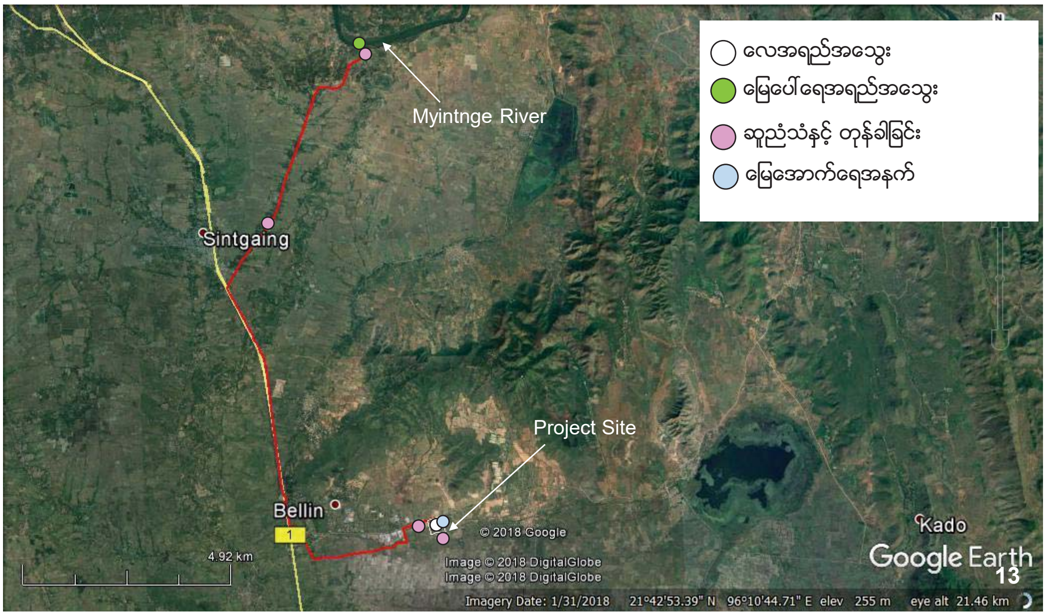
ပတ်ဝန်းကျင်နှင့် လူမှုဝန်းကျင်ဆိုင်ရာသက်ရောက်မှုများ (နယ်ပယ်အတိုင်းအတာသတ်မှတ်ခြင်း)

စီမံကိန်းမှမျှော်မှန်းနိုင်ချေများ

စီမံကိန်းအဆင့်	သဘာဝနှင့်လူမှုထိခိုက်မှု	
ဆောက်လုပ်ရေးမစတင်မီနှင့် တည်ဆောက် ရေးကာလ	ကောင်းကျိုး	ဆင်းရဲမှု၊ဒေသတွင်းစီးပွားရေး (အလုပ်အကိုင်အခွင့်အလမ်း)
	ဆိုးကျိုး	လေအရည်အသွေး၊ရေအရည်အသွေး၊စွန့်ပစ်ပစ္စည်း၊မြေဆီလွှာညစ်ညမ်းမှု၊ဆူညံသံနှင့် တုန်ခါမှု၊ မြေကျံခြင်း၊အပင်သတ္တဝါနှင့်ဇီဝမျိုးစုံမျိုးကွဲ၊ဆန္ဒမပါသောပြောင်းရွှေ့မှု၊ဒေသတွင်းစီးပွားရေး(အသက်မွေးမှု)၊မြေအသုံးချမှုနှင့်ဒေသအတွင်း အရင်းအမြစ်များအား အသုံးပြုမှု၊ရေသုံးစွဲမှု၊လက်ရှိလူမှုရေးဆိုင်ရာ အခြေခံအဆောက်အဦးများနှင့်ဝန်ဆောင်မှုများ၊ယဉ်ကျေးမှုအမွေအနှစ်၊မြေယာရှုခင်း၊ကူးစက်ရောဂါများ၊ လုပ်ငန်းခွင်ကျန်းမာရေးနှင့်လုံခြုံရေး၊မတော်တဆမှု၊နယ်ခြားဝင်ရောက်လာမှု၊ရာသီဥတုပြောင်းလဲမှု
	ထပ်မံလေ့လာရန် လိုအပ်ချက်	တိုင်းရင်းသားလူနည်းစုနှင့်ဌာနေတိုင်းရင်းသား၊ကျား/မ၊ကလေးသူငယ်အခွင့်အရေး၊ (ဤအချက်အလက်များသည် သဘာဝနှင့် လူမှုပတ်ဝန်းကျင်သုံးသပ်ခြင်းအတွက် JICA လမ်းညွှန်ချက်များသာဖြစ်သည်)
စီမံကိန်းလည်ပတ် ကာလ	ကောင်းကျိုး	ဆင်းရဲမှု၊ဒေသတွင်းစီးပွားရေး (အလုပ်အကိုင်အခွင့်အလမ်း)
	ဆိုးကျိုး	လေအရည်အသွေး၊ရေအရည်အသွေး၊စွန့်ပစ်ပစ္စည်း၊ဆူညံသံနှင့်တုန်ခါမှု၊အနံ့ဆိုး၊အပင်သတ္တဝါ နှင့်ဇီဝမျိုးစုံမျိုးကွဲ၊ဇလဗေဒ၊ရေသုံးစွဲမှု၊လက်ရှိလူမှုရေးဆိုင်ရာအခြေခံအဆောက်အဦး များနှင့်ဝန်ဆောင်မှုများ၊ယဉ်ကျေးမှုအမွေအနှစ်၊မြေယာရှုခင်း၊ကူးစက်ရောဂါများ၊ လုပ်ငန်းခွင်ကျန်းမာရေးနှင့်လုံခြုံရေး၊မတော်တဆမှု၊နယ်ခြားဝင်ရောက်လာမှု၊ရာသီဥတုပြောင်းလဲမှု
	ထပ်မံလေ့လာရန် လိုအပ်ချက်	တိုင်းရင်းသားလူနည်းစုနှင့်ဌာနေတိုင်းရင်းသား၊ကျား/မ၊ကလေးသူငယ်အခွင့်အရေး ၊(ဤအချက်အလက်များသည် သဘာဝနှင့် လူမှုပတ်ဝန်းကျင်သုံးသပ်ခြင်းအတွက် JICA လမ်းညွှန်ချက်များသာဖြစ်သည်)

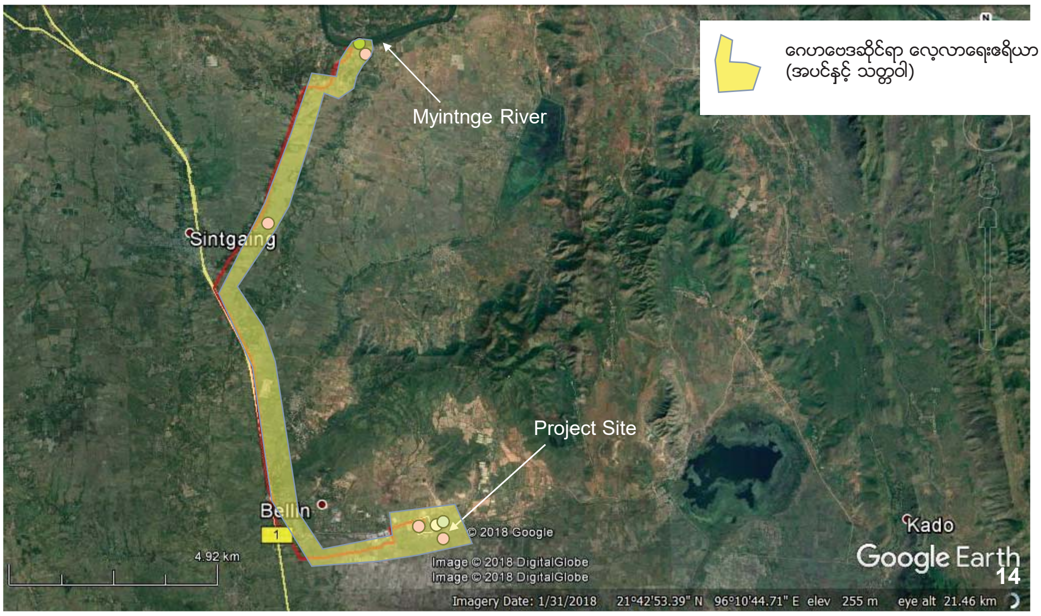
၃.ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းတွင် လေ့လာမည့် အကြောင်းအရာများ

အခြေခံအချက်အလက်များကွင်းဆင်းတိုင်းတာခြင်း အကျဉ်းချုပ်ဖော်ပြချက်



၃.ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းတွင် လေ့လာမည့် အကြောင်းအရာများ

အခြေခံအချက်အလက်များကွင်းဆင်းတိုင်းတာခြင်း အကျဉ်းချုပ်ဖော်ပြချက်



၃.ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းတွင် လေ့လာမည့် အကြောင်းအရာများ

အခြေခံအချက်အခက်များကွင်းဆင်းတိုင်းတာခြင်း အကျဉ်းချုပ်ဖော်ပြချက်

လေ့လာခြင်း/ လုပ်ငန်းအမျိုးအစား	မာတိကာ	မျှော်မှန်းကာလ
လူမှုစီးပွားကွင်းဆင်းတိုင်းတာခြင်း	က. တည်ရှိဆဲ လူမှုစီးပွား သတင်းအချက်အလက်များအား အသုံးပြုမည်ဖြစ်ပါသည်။ (တည်ဆောက်ရေးကာလအတွက် မြေယာသိမ်းဆည်းခြင်းနှင့်ပက်သက်သော လူမှုရေးကွင်းဆင်းလေ့လာခြင်းကို သီးခြား ဆောင်ရွက်မည်ဖြစ်ပါသည်။	မရှိပါ။
လူထုအကြံပြုတွေ့ဆုံဆွေးနွေးခြင်း	က. လူထုအကြံပြုတွေ့ဆုံဆွေးနွေးခြင်းအား အဆင့်နှစ်ဆင့်အတွက် (ဥပမာ- နယ်ပယ်အတိုင်းအတာသတ်မှတ်ခြင်းအဆင့်နှင့် ပတ်ဝန်းကျင်နှင့်လူမှုဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း ပြင်ဆင်ရေးအဆင့်) စီစဉ်မည်ဖြစ်ပါသည်။ ခ. စီမံကိန်းဧရိယာတွင်းရှိ ဒေသနေပြည်သူများ၊ စဉ့်ကိုင်မြို့နယ်ရှိ သက်ဆိုင်ရာ ကျေးရွာအုပ်စုရုံးများ၊ သက်ဆိုင်ရာအစိုးရ အဖွဲ့အစည်းများ၊ အခြားသက်ဆိုင်သူများနှင့် စိတ်ဝင်စားသူများအား ဖိတ်ကြားခြင်း	၂၀၁၈ခုနှစ် အောက်တိုဘာနှင့် နိုဝင်ဘာလ (စီစဉ်ထား)
စီမံကိန်းသတင်းအချက်အလက်ဖြန့်ချီခြင်း	က. နယ်ပယ်တိုင်းတာသတ်မှတ်ခြင်းအစီရင်ခံစာအကြမ်းနှင့် ပတ်ဝန်းကျင်နှင့်လူမှုဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းအစီရင်ခံအကြမ်းအား ပြည်သူများအား ဖြန့်ဝေခြင်း ခ. သက်ဆိုင်ရာ အစီရင်ခံစာအကြမ်းကို အထက်ဖော်ပြပါ နေရာများ (သို့) အစိုးရရုံးများတွင် ထားရှိခြင်း ဂ. ပြည်သူများထံမှ အကြံပြုချက်များအား နယ်ပယ်တိုင်းတာသတ်မှတ်ခြင်းအစီရင်ခံစာနှင့် ပတ်ဝန်းကျင်နှင့် လူမှုဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းအစီရင်ခံစာ နိဂုံးချုပ်ရေးသားသည့်အခါတွင် ထည့်သွင်းပါဝင်စေမည်ဖြစ်ပါသည်။	၂၀၁၈ခုနှစ် အောက်တိုဘာနှင့် နိုဝင်ဘာလ (စီစဉ်ထား)

၄.ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်းအတွက် နောင်ဆောင်ရွက်မည့် လုပ်ငန်းစဉ်များ

အမျိုးအစား	၂၀၁၈					
	ဇွန်	ဇူလိုင်	ဩဂုတ်	စက်တင်ဘာ	အောက်တိုဘာ	နိုဝင်ဘာ
၁. စီမံကိန်းအစီအစဉ်ဆန်းစစ်ခြင်း	■	■	■			
၂. နယ်ပယ်အတိုင်းအတာသတ်မှတ်ခြင်း						
နယ်ပယ်အတိုင်းအတာသတ်မှတ်ခြင်းအစီရင်ခံစာ ပြင်ဆင်ခြင်း		■	■	■		
လူထုအကြံပြုတွေ့ဆုံဆွေးနွေးခြင်း/စီမံကိန်းအကြောင်းပြည်သူများအားဖြန့်ဝေခြင်း					■ ▲	
၃. ကွင်းဆင်းတိုင်းတာခြင်း						
မိုးရာသီတွင် ကွင်းဆင်းတိုင်းတာခြင်း			■			
ခြောက်သွေ့ရာသီတွင်ကွင်းဆင်းတိုင်းတာခြင်း					■	
၄. ပတ်ဝန်းကျင်နှင့်လူမှုဝန်းကျင်သက်ရောက်မှုဆန်းစစ်ခြင်းစ်ခြင်း						
ပတ်ဝန်းကျင်နှင့်လူမှုဝန်းကျင်သက်ရောက်မှုဆန်းစစ်းစစ်ခြင်းအစီရင်ခံစာအကြမ်းပြင်ဆင်ခြင်း					■	■
လူထုအကြံပြုတွေ့ဆုံဆွေးနွေးခြင်း/စီမံကိန်းအကြောင်းပြည်သူများအားဖြန့်ဝေခြင်း						■ ▲

ယခုအဆင့်

၄.ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်းအတွက် နောင်ဆောင်ရွက်မည့် လုပ်ငန်းစဉ်များ

EIA လုပ်ငန်းစဉ်အဆင့်

စီမံကိန်းအစီအစဉ် ဆန်းစစ်ခြင်း

- အစီအစဉ်ချခြင်း
- အခြားနည်းလမ်းသုံးသပ်ခြင်း (ထိခိုက်မှု အနည်းဆုံး အစီအစဉ်ကို ရွေးချယ်ပါမည်။)

ယခုအဆင့်

နယ်ပယ်အတိုင်းအတာ သတ်မှတ်ခြင်း

- ထိခိုက်မှုများအားခန့်မှန်းခြင်း
- သဘာဝနှင့် လူမှုပတ်ဝန်းကျင် အချက်အလက်များရွေးချယ်ခြင်း
- လေ့လာမည့်အရာနှင့် နည်းလမ်းများ ချမှတ်ခြင်း

EIA လေ့လာမှု

- အခြေခံအချက်အလက်များလေ့လာကောက်ယူခြင်း
- စီမံကိန်းမှ သက်ရောက်မည့်ထိခိုက်မှုများအား ဆန်းစစ်ခန့်မှန်းခြင်း
- ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်နှင့် စောင့်ကြပ်မှုအစီအစဉ်များ ရေးဆွဲခြင်း

တက်ရောက်ခြင်းအတွက် အထူးကျေးဇူးတင်ပါသည်။

အမေးအဖြေကဏ္ဍ

Appendix D

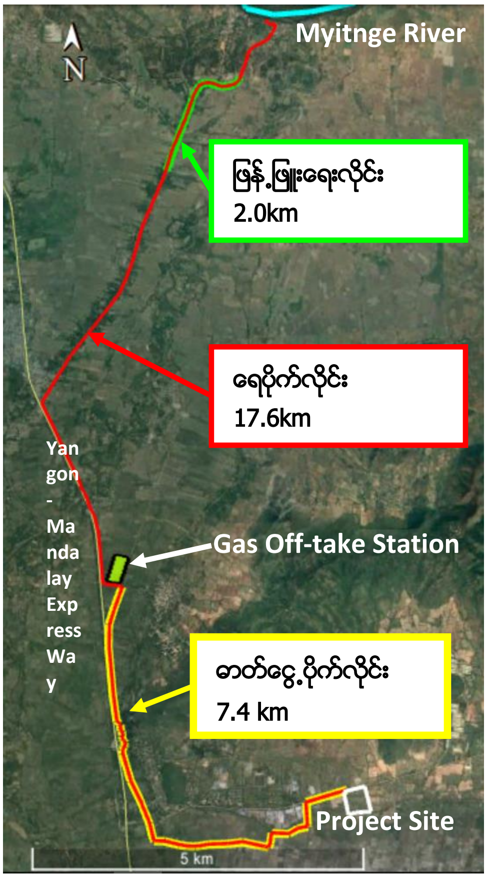
Public Consultation Materials for EIA

ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်းအတွက်
အများပြည်သူနှင့်တွေ့ဆုံဆွေးနွေးခြင်း (EIA လေ့လာမှုရလာဒ်)
၁၀၀ မဂ္ဂါဝပ်သဘာဝဓာတ်ငွေ့နှင့် စွန့်ပစ်အပူသုံးဓာတ်အားပေးစက်ရုံစီမံကိန်း(ကျောက်ဆည်)

၂၀၁၉ ခုနှစ်၊ ဧပြီလ (၂၀) ရက် နှင့် (၂၁) ရက်

၁။ စီမံကိန်းနောက်ခံ

မြန်မာနိုင်ငံ၏ လျှပ်စစ်ဓာတ်အား လိုအပ်မှုသည် ဖွံ့ဖြိုးတိုးတက်ရေးနှင့် ရင်းနှီးမြှုပ်နှံမှုလုပ်ငန်း စဉ်များအရ မကြာသေးမီနှစ်အတွင်း အရှိန်အဟုန်ပြင်းစွာ တိုးတက်လာသည်။ လက်ရှိတွင် ထောက်ပံ့ပေးနိုင်မှုမှာ ၂၀၁၉ တွင် ၃၈၀၀ မဂ္ဂါဝပ် ရှိပြီး ၂၀၂၂ခုနှစ်တွင် လျှပ်စစ်ဓာတ်အားလိုအပ်ချက်မှာ ၆၈၀၀ မဂ္ဂါဝပ်ထိဖြစ်လာမည်။



၂။စီမံကိန်းတွင်ပါဝင်သောအကြောင်းအရာများ

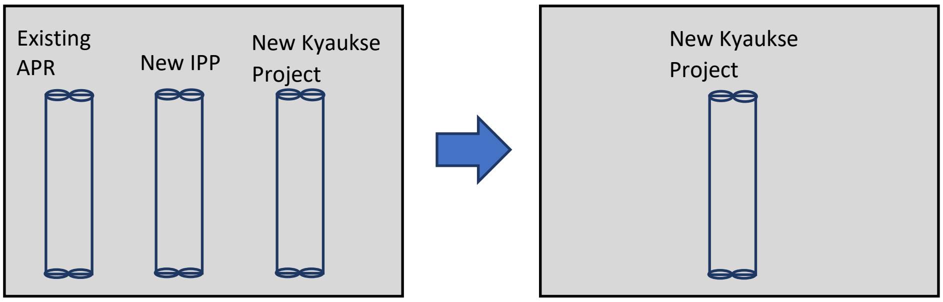
လုပ်ငန်းရပ်များ	အသေးစိတ် အချက်အလက်များ
သဘာဝဓာတ်ငွေ့နှင့်စွန့်ပစ်အပူသုံး ဓာတ်အားပေး စက်ရုံ တည်ဆောက်ခြင်း	တစ်လုံးလျှင် ၁၀၀ မဂ္ဂါဝပ်ထုတ်လုပ်နိုင်သည့် စွမ်းရည်မြင့် ဓာတ်ငွေ့သုံး တာဘိုင်စက်(၂)လုံး နှင့်ရေနွေးငွေ့တာဘိုင်စက်(၁)လုံးတို့ဖြင့် စုစုပေါင်း ထုတ်လုပ်မှု ၃၀၀မဂ္ဂါဝပ် ရှိသည့် လျှပ်စစ်ဓာတ်အား ပေးစက်ရုံကို တည်ဆောက်သွားမည်ဖြစ်ပါသည်။
ဓာတ်အားလိုင်း	မြေအောက်ကေဘယ်လ်ကြိုး
ဓာတ်ငွေ့ပိုက်လိုင်း	7.4 kmφ16inch x 1 ခန့်
ရေပိုက်လိုင်း	17.6 kmφ300 ㎜ x 2 ခန့် ဖြန့်ဖြူးရေးလိုင်း ၂ ကီလိုမီတာခန့်

၃။အများပြည်သူနှင့်တွေ့ဆုံ ဆွေးနွေးပွဲပြုလုပ်ရခြင်း၏ ရည်ရွယ်ချက် ။

။စီမံကိန်းကြောင့် ဖြစ်ပေါ်လာနိုင်သော သဘာဝ ဝန်းကျင်နှင့် လူမှုဝန်းကျင်ဆိုင်ရာ သက်ရောက်မှုများ နှင့်အတူ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်လေ့လာခြင်းအတွက် ဆောင်ရွက်ရမည့်အရာများနှင့် စပ်လျဉ်း၍ ပြည်သူများ၏ သဘောထားအမြင်များကို ပေါင်းစပ်ဆောင်ရွက်နိုင်ရန် စီမံကိန်း ပြင်ဆင်ဆောင်ရွက်နေစဉ် ကာလအတွင်း လူထုတွေ့ဆုံဆွေးနွေးပွဲ ဆောင်ရွက်ရခြင်းဖြစ်သည်။

၄။ ဒေသခံများ၏အကြံပြုချက်နှင့်အညီ ဆောင်ရွက်ခဲ့မှုများ

ပထမအကြိမ် ကျင်းပခဲ့သော လူထုတွေ့ဆုံဆွေးနွေးပွဲမှ ဒေသခံပြည်သူများ၏ ပြောကြားချက်များကို ထည့်သွင်းစဉ်းစား၍ စီမံကိန်းအတွက် ဓာတ်ငွေ့ပိုက်လိုင်း သွယ်တန်းခြင်းကို အသစ်ထပ်မံသွယ်တန်းခြင်း မပြုလုပ်ဘဲ တည်ဆောက်ပြီးသား ဓာတ်ငွေ့ပိုက်လိုင်းကို အသုံးပြုသွားနိုင်ရန် လေ့လာမှုများပြုလုပ်ခဲ့ပါသည်။



၅။ သဘာဝပတ်ဝန်းကျင်လေ့လာဆန်းစစ်မှုအနှစ်ချုပ်

သဘာဝပတ်ဝန်းကျင်လေ့လာဆန်းစစ်မှု အနှစ်ချုပ်ကိုအောက်ပါဇယားတွင်ဖော်ပြထားသည်။

အမျိုးအစား	သက်ရောက်မှု	အဆင့်သတ်မှတ်ချက			ကိုယ်စားပြု လျော့ပါးစေရေးနည်းလမ်း		
		PC/CO	OP	CL	PC/CO	OP	CL
ညစ်ညမ်းမှု ထိန်းချုပ်ရေးဆောင်ရွက်မှု	**လေအရည်အသွေး**	B-	B-	B-	· စက်ကိရိယာအဟောင်းများသုံးစွဲခြင်းမှရှောင်ရှားရန်	· NOx ထုတ်လွှတ်မှုနည်းသော တာဘိုင်	· တည်ဆောက်ရေးကာလကဲ့သို့
	ရေ အရည်အသွေး	B-	D	B-	· ထုထည်ကြီးမားသောစတီးကိုယ်ထည် (သံမဏိပြားပိုင်)	· ရေဆိုးသန့်စင်စနစ်	· တည်ဆောက်ရေးကာလကဲ့သို့
	စွန့်ပစ်ပစ္စည်း	B-	B-	B-	· သီးခြားအမှိုက်စွန့်ပစ်ရန်နေရာ	· အမှိုက်စွန့်ပစ်မှုနှင့်သန့်စင်မှုအတွက်သင့်လျော်သောတတိယအဖွဲ့အစည်း	· တည်ဆောက်ရေးကာလကဲ့သို့
	ဆူညံမှုနှင့် တုန်ခါမှု	B-	B-	B-	· စက်ကိရိယာအဟောင်းများသုံးစွဲခြင်းမှရှောင်ရှားရန်	· အသံလုံစနစ်	· တည်ဆောက်ရေးကာလကဲ့သို့
	မြေကျွံမှု	B-	D	D	· ပိုက်လိုင်းပြန်ဖို့ရာတွင်အမှိုက်နှင့်ရွှံ့သုံးခြင်းမှရှောင်ရှားရန်	·	·
	အနံ့ဆိုး	D	B-	D	·	· ရေဆိုးသန့်စင်စက်ကိုပြုပြင်ထိန်းသိမ်းရန်	·
သဘာဝပတ်ဝန်းကျင်	**အပင်/အကောင်နှင့်ဇီဝမျိုးစုံမျိုးကွဲ**	B-	B-	B-	· ရေအရည်အသွေးကဲ့သို့	· ရေအရည်အသွေးကဲ့သို့	· ရေအရည်သွေးကဲ့သို့
	ဇလဗေဒ	D	B-	D	·	· လုံလောက်သောခံနိုင်ဝန်ရှိသည့်အနည်စစ်ကန်	·
လူမှုပတ်ဝန်းကျင်	**သဘောမတူသောပြန်လည်နေရာချထားမှု**	B- / D	D	D	**ယာယီအလုပ်အကိုင်-** · အပင်နှင့်ကောက်ပဲသီးနှံများ၏လက်ရှိပေါက်ဈေးကိုအ ခြေခံတွက်ချက်ပြီးဒုဆပေးလျော်ခြင်း	·	·
	ဆင်းရဲမွဲတေမှု	B- / B+	B+	B- / B+	· ကန်ထရိုက်တာမှဦးစားပေးငှားရမ်းစေခြင်း	· EPGE မှစက်ရုံသစ်အတွက်အလုပ်အကိုင်သစ်များကိုလုံလောက်သောအရည်အချင်းရှိ သည့်ဒေသခံကျား/မ ဦးစားပေးခန့် ထား မည်။	· တည်ဆောက်ရေးကာလကဲ့သို့
	ဒေသတွင်းစီးပွားရေး (အလုပ်အကိုင်)	B+	B+	B- / B+	· အထက်ပါအတိုင်း	· အထက်ပါအတိုင်း	· တည်ဆောက်ရေးကာလကဲ့သို့
	(အသက်မွေးလမ်းကြောင်း)	B- / B-	D	D	· အထက်ပါအတိုင်း	·	·
	မြေအသုံးချမှုနှင့်ဒေသတွင်းရင်းမြစ်အသုံးပြုမှု	B-	D	D	**.သဘောမတူသောပြန်လည်နေရာချထားမှုကဲ့သို့**	·	·
	ရေအသုံးပြုမှု	B-	B-	B-	· ရေထုအရည်အသွေးကဲ့သို့	· ရေထုအရည်အသွေးကဲ့သို့	· ရေထုအရည်အသွေးကဲ့သို့
	လက်ရှိလူမှုရေးအခြေခံအဆောက်အဦနှင့်ဝန်ဆောင်မှု	B-	B-	D	· ကျေးလက်လမ်းများတွင်စတီးပြားပိုင်သုံးခြင်းဖြင့်တည်ဆောက်ရန်နေရာအနည်း ငယ်သာလို	· အသံလုံစနစ်	·
	ကျား၊ မ	B-	B-	B-	· ကန်ထရိုက်တာမှခွဲခြားဆက်ဆံမှုမရှိဘဲဒေသခံမျှားကိုအလုပ်အကိုင် အခွင့်အလန်းဖန်တီးပေးရန်	· EPGE မှတန်းတူအလုပ်အကိုင်ခွင့်အရေး ပေးမည်။	· တည်ဆောက်ရေးကာလကဲ့သို့
	ကလေးသူငယ်အခွင့်အရေး	B-	B-	B-	· ကလေးသူငယ်များအားအလုပ်စေခိုင်းမှုကိုတားမြစ်ရန်	· မည်သည့်အလုပ်အမျိုးအစားမဆိုကလေးသူငယ်များအားခိုင်စေးခြင်းမှတာမြစ်ခြင်း	· တည်ဆောက်ရေးကာလကဲ့သို့
	ကူးစက်ရောဂါနှင့်HIV/AIDS	B-	D	B-	· ကန်ထရိုက်တာမှသင့်လျော်သောလျော့ပါးစေရေးနည်းလမ်းအသုံးပြုရန်	·	· တည်ဆောက်ရေးကာလကဲ့သို့
	လုပ်ငန်းခွင်ကျန်းမာရေးနှင့်လုံခြုံရေး	B-	B-	B-	· အပြည်ပြည်ဆိုင်ရာစံချိန်စံညွှန်နှင့်အညီသတ်မှတ်ထားသော **လုပ်ငန်းခွင်ကျန်းမာရေးနှင့်လုံခြုံရေးသင်တန်းမျှားပေးခြင်း**	· အပြည်ပြည်ဆိုင်ရာစံချိန်စံညွှန်နှင့်အညီသတ်မှတ်ထားသော **လုပ်ငန်းခွင်ကျန်းမာရေးနှင့်လုံခြုံရေးသင်တန်းများပေးခြင်း**	· တည်ဆောက်ရေးကာလကဲ့သို့
	မတော်တဆမှု	B-	B-	B-	· သတင်းအချက်အလက်နှင့်လုံခြုံရေးစည်းမျဉ်းများထောက်ပံ့ခြင်း	· ဘေးကင်းလုံခြုံရေးစံချိန်စံညွှန်းများကို	· တည်ဆောက်ရေးကာလကဲ့သို့
	နယ်နမိတ်ဖြတ်ကျော်သက်ရောက်မှု၊ ရာသီဥတုဖောက်ပြန်ခြင်း	B-	B-	B-	· ကန်ထရိုက်တာမှာစွမ်းရည်ပြည့်လောင်စာဆီအသုံးပြု မှုမြှင့်တင်ခြင်း	· လုပ်ငန်းခွင်အတွင်းလျှပ်စစ်ချင့်စွမ်းအင်အသုံးပြုမှုချွေတာရန်	· တည်ဆောက်ရေးကာလကဲ့သို့
ယဉ်ကျေးမှု	**ယဉ်ကျေးမှုအမွေအနှစ်**	B-	B-	B-	· **ဆူညံမှုနှင့် တုန်ခါမှု ကဲ့သို့**	· **ဆူညံမှုနှင့် တုန်ခါမှု ကဲ့သို့**	· တည်ဆောက်ရေးကာလကဲ့သို့
ပသာဒမြင်ကွင်း	**မြေယာရှုခင်း**	B-	B-	B-	· ယာယီအကာအရံ ပြုလုပ်ခြင်း	· စိမ်းလန်းစိုပြေရေးနှင့် သစ်ပင်စိုက်ပျိုးခြင်း	· တည်ဆောက်ရေးကာလကဲ့သို့

ရှင်းလင်းချက်: PC (တည်ဆောက်ရေးအကြိုကာလ), CO (တည်ဆောက်ရေးကာလ) OP (လုပ်ငန်းလည်ပတ်ကာလ), CL (ပိတ်သိမ်းကာလ)

အကဲဖြတ်ခြင်း ၁) A-: သိသာထင်ရှားသောဆိုးကျိုး A+: သိသာထင်ရှားသောကောင်းကျိုး

၂) B-: ဆိုးကျိုးအနည်းငယ် B+: ကောင်းကျိုးအနည်းငယ်

၃) D: သက်ရောက်မှုမရှိ (သို) လစ်လျူရှုနိုင်သောသက်ရောက်မှု

သတင်းအချက်အလက်ပိုမိုသိရှိလိုပါက ဆက်သွယ်ရန်
လျှပ်စစ်ဓာတ်အားထုတ်လုပ်ရေးလုပ်ငန်း (EPGE) *****************

ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်းအတွက် အများပြည်သူနှင့်တွေ့ဆုံဆွေးနွေးခြင်း

(Result of EIA Study)

၃၀၀ မဂ္ဂါဝပ် သဘာဝဓာတ်ငွေ့နှင့် စွန့်ပစ်အပူသုံး ဓာတ်အားပေးစက်ရုံစီမံကိန်း(ကျောက်ဆည်)

၂၀၁၉ခုနှစ်၊ ဧပြီလ (၂၀)ရက် နှင့် (၂၁) ရက်

အစီအစဉ်

၁။ စီမံကိန်းမိတ်ဆက်နှင့် စီမံကိန်းအကြောင်းအရာ

၂။ ပထမအကြိမ် အများပြည်သူတွေ့ဆုံပွဲမှရရှိသောတုံ့ပြန်ချက်များ

၃။ ပြောင်းလဲပြင်ဆင်ထားသောစီမံကိန်းအစီအစဉ်

၄။ ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်း အနှစ်ချုပ်

၅။ ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်လေ့လာမည့်အချိန်ဇယား

၆။ အမေး၊ အဖြေ ကဏ္ဍ

၇။ နောက်လာမည့်အစည်းအဝေးအတွက်ကြေငြာခြင်း

၁။ စီမံကိန်းမိတ်ဆက်နှင့် စီမံကိန်းအကြောင်းအရာ

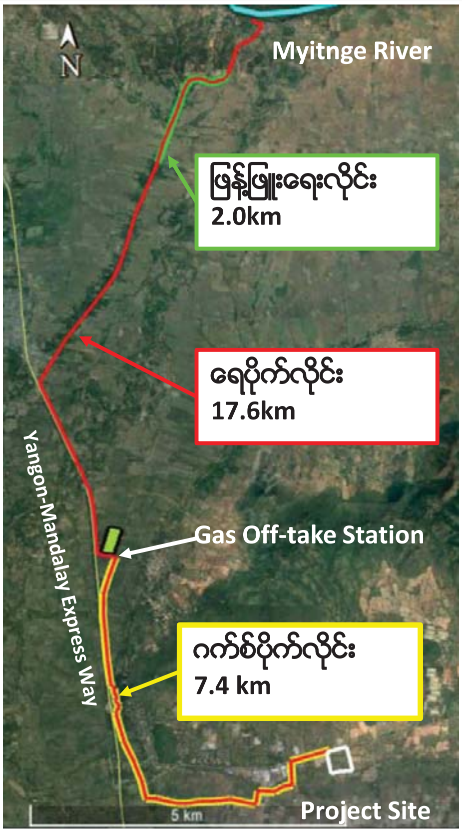
စီမံကိန်းတွင်ပါဝင်သောအကြောင်းအရာများ

လုပ်ငန်းရပ်များ	အသေးစိတ် အချက်အလက်များ
သဘာဝဓာတ်ငွေ့နှင့်စွန့်ပစ်အပူသုံး ဓာတ်အားပေး စက်ရုံ တည်ဆောက်ခြင်း	တစ်လုံးလျှင် ၁၀၀ မဂ္ဂါဝပ်ထုတ်လုပ်နိုင်သည့် စွမ်းရည်မြင့် ဓာတ်ငွေ့သုံး တာဘိုင်စက်(၂)လုံး နှင့်ရေနွေးငွေ့တာဘိုင်စက်(၁)လုံးတို့ဖြင့် စုစုပေါင်း ထုတ်လုပ်မှု ၃၀၀မဂ္ဂါဝပ် ရှိသည့် လျှပ်စစ်ဓာတ်အား ပေးစက်ရုံကို တည်ဆောက်သွားမည်ဖြစ်ပါသည်။
ဓာတ်အားလိုင်း	မြေအောက်ကေဘယ်ကြိုး
ဓာတ်ငွေ့ပိုက်လိုင်း	7.4 kmφ16inch x 1 ခန့်
ရေပိုက်လိုင်း	17.6 kmφ300mmx 2 ခန့် ဖြန့်ဖြူးရေးလိုင်း ၂ ကီလိုမီတာခန့်

၁။ စီမံကိန်းမိတ်ဆက်နှင့် စီမံကိန်းအကြောင်းအရာ

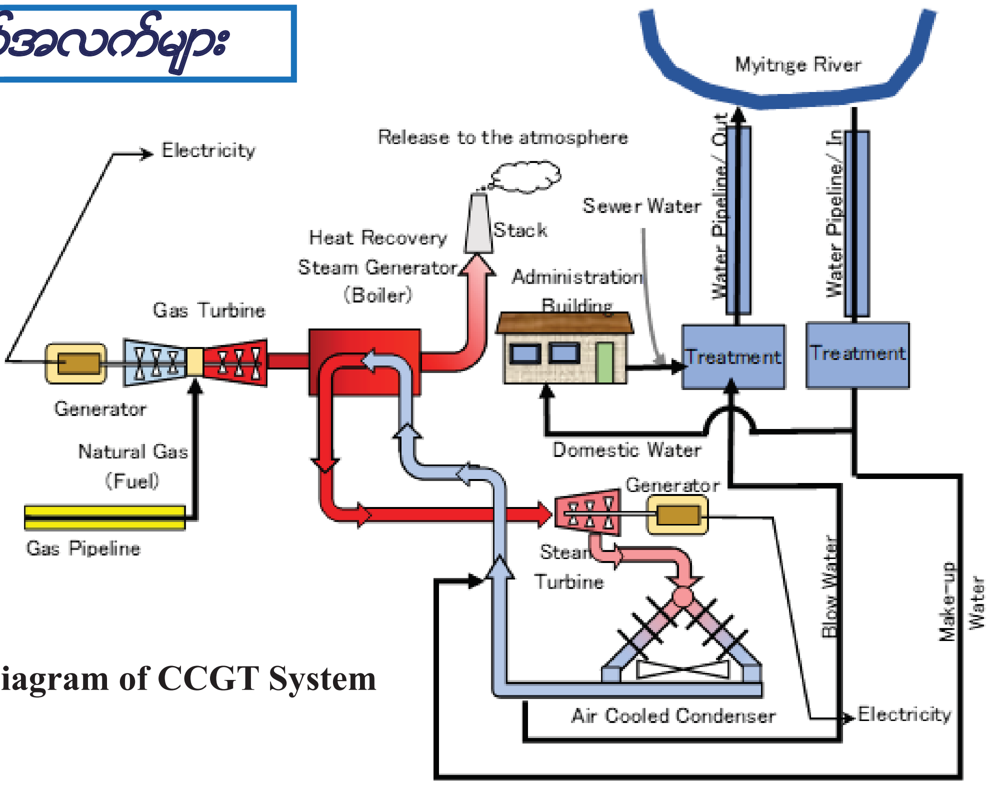
စီမံကိန်းတွင်ပါဝင်သောအကြောင်းအရာများ

- အဆိုပြုစီမံကိန်းသည် ရေကို လုပ်ငန်းခွင်အတွင်း သုံးစွဲမည့်ရေအနေဖြင့် သာမက အအေးခံမည့်ရေ အတွက်ပါ လိုအပ်ပါသည်။ ယခုစီမံကိန်းသည် လုပ်ငန်းခွင် အနီးတစ်ဝိုက်တွင် ရေမရရှိနိုင်သောကြောင့် မြစ်ငယ်မြစ်မှ ရေကိုရယူရန် စီစဉ်ထားပါသည်။ မြစ်ငယ်မြစ်သည် စီမံကိန်းနေရာမှ မြောက်ဘက် ၁၁ ကီလိုမီတာတွင် စီးဆင်းလျှက်ရှိပါသည်.
- ရေသယ်ယူရေး လမ်းကြောင်းကို လက်ရှိဆည်ရေပေးသည့် တူးမြောင်းတစ်လျောက် စီစဉ်ထားပြီး မြေအောက်မှ သယ်ယူမည် ဖြစ်သည်။



၁။ စီမံကိန်းနိဒါန်းနှင့် စီမံကိန်းအကြောင်းအရာ

စီမံကိန်းအချက်အလက်များ



Conceptual Diagram of CCGT System

၁။ စီမံကိန်းမိတ်ဆက်နှင့် စီမံကိန်းအကြောင်းအရာ

အများပြည်သူနှင့်တွေ့ဆုံ ဆွေးနွေးပွဲပြုလုပ် ရခြင်း၏ ရည်ရွယ်ချက်

စီမံကိန်းကြောင့် ဖြစ်ပေါ်လာနိုင်သော သဘာဝဝန်းကျင်နှင့် လူမှုဝန်းကျင်ဆိုင်ရာ သက်ရောက်မှုများနှင့်အတူ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်လေ့လာခြင်းအတွက် ဆောင်ရွက်ရမည့်အရာများနှင့် စပ်လျဉ်း၍ ပြည်သူများ၏ သဘောထားအမြင်များကို ပေါင်းစပ်ဆောင်ရွက်နိုင်ရန် စီမံကိန်း ပြင်ဆင်ဆောင်ရွက်နေစဉ် ကာလအတွင်း လူထုတွေ့ဆုံဆွေးနွေးပွဲ ဆောင်ရွက်ရခြင်းဖြစ်သည်။

၁။ စီမံကိန်း၏ ရည်ရွယ်ချက်၊ အစီအစဉ်၊ ခန့်မှန်းသက်ရောက်မှုများ၊ လျော့ပါးရေး နည်းလမ်းများနှင့် လုပ်ငန်းစဉ် စသည့် အချက်အလက်များအားဖြန့်ဝေခြင်း

၂။ စီမံကိန်း ပြင်ဆင်ဆောင်ရွက်နေစဉ်ကာလအတွင်း စီမံကိန်းနှင့် ပတ်သတက်သည့် စိုးရိမ်ပူပန်မှုများ၊ အကြံပေးချက်များကို စီမံကိန်းနှင့် သက်ဆိုင်သူများအား ပြောကြားနိုင်မည့် အခွင့်အရေးများ ပေးအပ်ခြင်း

၃။ လူထုတွေ့ဆုံဆွေးနွေးပွဲ ဆောင်ရွက်နေစဉ်အတွင်း အမြင်သဘောထားများ နှင့် စီမံကိန်းလုပ်ငန်းစဉ် ပြင်ဆင်ခြင်းနှင့် ပတ်သက်သည့် တုံ့ပြန်ချက်များ ရယူခြင်း

၄။ စီမံကိန်း၏ ပတ်ဝန်းကျင်နှင့် လူမှုဝန်းကျင်ဆိုင်ရာ သက်ရောက်မှုများနှင့် အကျိုးရလဒ်များနှင့် သက်ဆိုင်သည့် သတင်းအချက်အလက်များ ဖြည့်စွက်ပေးခြင်း

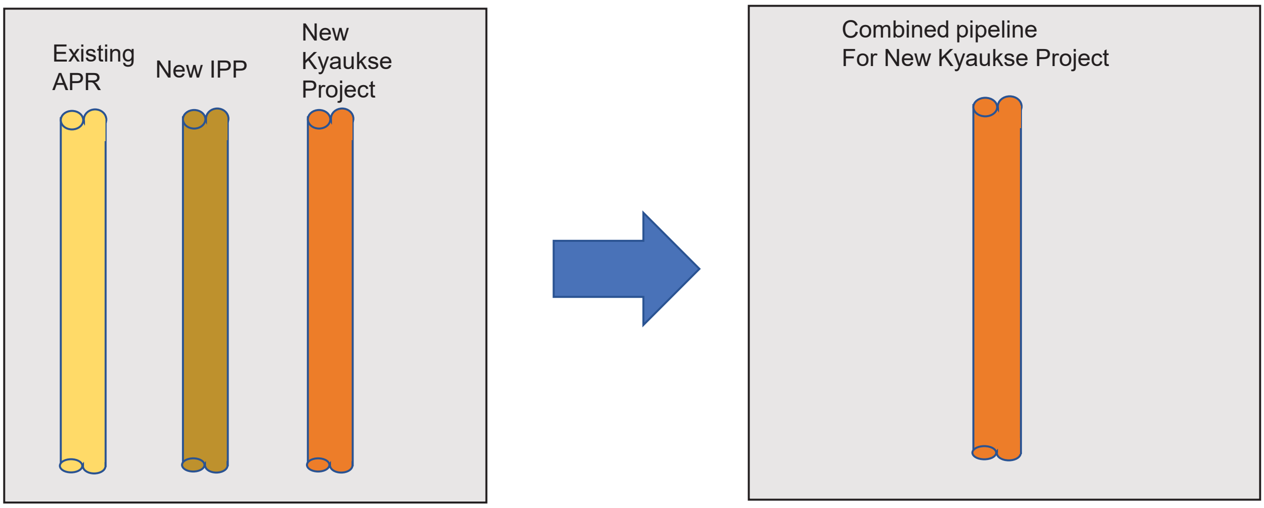
၂။ ပထမ အကြိမ်အများပြည်သူတွေ့ဆုံပွဲမှရရှိသောတုံ့ပြန်ချက်များ

ပထမအကြိမ်ပြည်သူလူထု တွေ့ဆုံပွဲ တက်ရောက်သူများထံမှသဘောထား၊ မှတ်ချက်၁၅၂ ခုရရှိခဲ့ပါသည်။ သဘောထားမှတ်ချက်အများစုမှာစီမံကိန်းအတွက်အထောက်အပံ့ဖြစ်ခဲ့ပါသည်။ အချို့သောသဘောထားမှတ်ချက်များသည် တည်ဆောက်ရေးကာလနှင့် လုပ်ငန်းလည်ပတ်သည့်ကာလများအတွင်းပတ်ဝန်းကျင်လေ့လာဆန်းစစ်မှု TOR အပေါ်ထည့်သွင်းစဉ်းစားသင့်သောအချက်များပါရှိသည်။

အဓိကသဘောထား၊ မှတ်ချက်များ
စီမံကိန်းကကောင်းပါတယ်။
တိုင်းပြည်အတွက်ကောင်းမွန်းသောစီမံကိန်းဖြစ်လို့ဝမ်းသာပါတယ်။
စီမံကိန်းကိုအကောင်အထည်ဖော်ရာတွင်ပိုက်လိုင်းတစ်လျှောက်မှာနေထိုင်သောပြည်သူလူထု၏ ဘေးကင်းလုံခြုံမှု၊ မြစ်ငယ်မြစ်၏ ရေစီးရေလာကောင်းမွန်ရေးနှင့်သယ်ယူပို့ဆောင်ရေး ကောင်းမွန် မှုရှိစေချင်ပါတယ်။
အမှိုက် နှင့် လေထုညစ်ညမ်းမှုမရှိဘဲ စီမံကိန်းကို အကောင်အထည်ဖော်သင့်ပါတယ်၊
ရိတ်သိမ်းပြီးချိန်မှာသာပိုင်းလိုင်းကို မြေအောက်အနက်တွင် တပ်ဆင်မြေမြှုပ်ခြင်းပြုလုပ်သင့်ပါသည့်။

၃။ ပြောင်းလဲပြင်ဆင်ထားသောစီမံကိန်းအစီအစဉ်

ပထမအကြိမ် ကျင်းပခဲ့သော လူထုတွေ့ဆုံဆွေးနွေးပွဲမှ ဒေသခံပြည်သူများ၏ ပြောကြားချက်များကို ထည့်သွင်းစဉ်းစား၍ စီမံကိန်းအတွက် ဓာတ်ငွေ့ပိုက်လိုင်း သွယ်တန်းခြင်းကို အသစ်ထပ်မံသွယ်တန်းခြင်း မပြုလုပ်ဘဲ တည်ဆောက်ပြီးသား ဓာတ်ငွေ့ပိုက်လိုင်းကို အသုံးပြုသွားနိုင်ရန် လေ့လာမှုများပြုလုပ်ခဲ့ပါသည်။

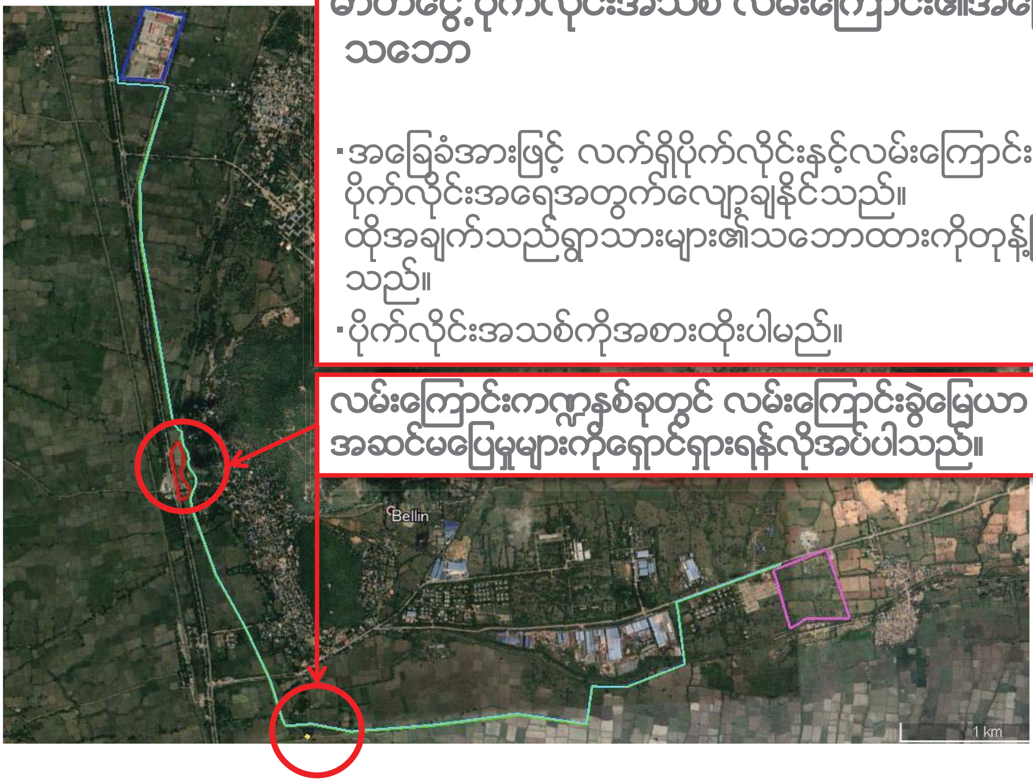


၃။ ပြုပြင်မွမ်းမံထားသောစီမံကိန်းအစီအစဉ်

ဓာတ်ငွေ့ပိုက်လိုင်းအသစ် လမ်းကြောင်း၏အခြေခံ သဘော

- အခြေခံအားဖြင့် လက်ရှိပိုက်လိုင်းနှင့်လမ်းကြောင်းတူလျှင် ပိုက်လိုင်းအရေအတွက်လျော့ချနိုင်သည်။ ထိုအချက်သည်ရွာသားများ၏သဘောထားကိုတုန့်ပြန်မှုလဲဖြစ်သည်။
- ပိုက်လိုင်းအသစ်ကိုအစားထိုးပါမည်။

လမ်းကြောင်းကဏ္ဍနှစ်ခုတွင် လမ်းကြောင်းခွဲမြေယာ အဆင်မပြေမှုများကိုရှောင်ရှားရန်လိုအပ်ပါသည်။



၄။ သဘာဝပတ်ဝန်းကျင်လေ့လာဆန်းစစ်ခြင်းအနှစ်ချုပ်

အဆိုပြုစီမံကိန်း၏ ဖြစ်နိုင်ချေရှိသောသဘာဝပတ်ဝန်းကျင်နှင့်လူမှုပတ်ဝန်းကျင်ဆိုင်ရာ သက်ရောက်မှုများကိုကြိုတင်လေ့လာမှုရလဒ်များကိုအောက်ပါရှု့ထောင့်အလိုက်ခွဲခြမ်းစိတ်ဖြာတင်ပြထားသည်။

- ရူပပတ်ဝန်းကျင်
- ဇီဝပတ်ဝန်းကျင်
- လူမှုစီးပွား နှင့်
- ကျန်းမာရေး
- ညစ်ညမ်းမှုများ၊ သဘာဝပတ်ဝန်းကျင်နှင့် လူမှုပတ်ဝန်းကျင် အပေါ်သက်ရောက်မှုများကို အောက်ပါစံများနှင့်အညီ A မှ D ထိခွဲခြားထားသည်။

၁) A-: သိသာထင်ရှားသောဆိုးကျိုး A+: သိသာထင်ရှားသောကောင်းကျိုး

၂) B-: ဆိုးကျိုးအနည်းငယ် B+: ကောင်းကျိုးအနည်းငယ်

၃) D: သက်ရောက်မှုမရှိ (သို့) လစ်လျူရှုနိုင်သောသက်ရောက်မှု

၄။ သဘာဝပတ်ဝန်းကျင်လေ့လာဆန်းစစ်ခြင်းအနှစ်ချုပ်

အမျိုးအစား	သက်ရောက်မှု	အဆင့်သတ်မှတ်ချက်			ကိုယ်စားပြု လျော့ပါးစေရေးနည်းလမ်း		
		PC/CO	OP	CL	PC/CO	OP	CL
ညစ်ညမ်းမှုထိန်းချုပ်ရေးဆောင်ရွက်မှု	လေအရည်အသွေး	B-	B-	B-	· စက်ကိရိယာအဟောင်းများသုံးစွဲခြင်းမှရှောင်ရှားရန်	· NOx ထုတ်လွှတ်မှုနည်းသောတာဘိုင်	ညစ်ညမ်းမှုထိန်းချုပ်ရေးဆောင်ရွက်မှု
	ရေအရည်အသွေး	B-	D	B-	· ထုထည်ကြီးမားသောစတီးကိုယ်ထည် (သံမဏိပြားပိုင်)	· ရေဆိုးသန့်စင်စနစ်	
	စွန့်ပစ်ပစ္စည်း	B-	B-	B-	· သီးခြားအမှိုက်စွန့်ပစ်ရန်နေရာ	· အမှိုက်စွန့်ပစ်မှုနှင့်သန့်စင်မှုအတွက်သင့်လျော်သောတတိယအဖွဲ့အစည်း	
	ဆူညံမှုနှင့်တုန်ခါမှု	B-	B-	B-	· စက်ကိရိယာအဟောင်းများသုံးစွဲခြင်းမှရှောင်ရှားရန်	· အသံလုံစနစ်	
	မြေကျွံမှု	B-	D	D	· ပိုက်လိုင်းပြုန်ဖို့ရာတွင်အမိုက်နင့် ရွှံ့သုံးခြင်းမှရှောင်ရှားရန်		
	အနံ့ဆိုး	D	B-	D		· ရေဆိုးသန့်စင်စက်ကိုပြုပြင်ထိန်းသိမ်းရန်	

၄။ သဘာဝပတ်ဝန်းကျင်လေ့လာဆန်းစစ်ခြင်းအနှစ်ချုပ်

အမျိုးအစား	သက်ရောက်မှု	အဆင့်သတ်မှတ်ချက်			ကိုယ်စားပြု လျော့ပါးစေရေးနည်းလမ်း		
		PC/CO	OP	CL	PC/CO	OP	CL
သဘာဝပတ်ဝန်းကျင်	အပင်/အကောင်နှင့်ဇီဝမျိုးစုံမျိုးကွဲ	B-	B-	B-	· ရေအရည်အသွေးကဲ့သို့	· ရေအရည်အသွေးကဲ့သို့	· ရေအရည်သွေးကဲ့သို့
	ဇလဗေဒ	D	B-	D		· လုံလောက်သောခံနိုင်ဝန်ရှိသည့်အနည်စစ်ကန်	
လူမှုပတ်ဝန်းကျင်	သဘောမတူဘဲသာပြန်လည်နေရာချထားမှု	B-/D	D	D	**ယာယီအလုပ်အကိုင်-** · အပင်နှင့်ကောက်ပဲသီးနှံများ၏လက်ရှိပေါက်ဈေးကိုအခြေခံတွက်ချက်ပြီး၃ ဆပေးလျော်ခြင်း		
	ဆင်းရဲမွဲတေမှု	B-/B+	B+	B-/B+	· ကန်ထရိုက်တာမှဦးစားပေးငှားရမ်းစေခြင်း	· EPGE မှစက်ရုံသစ်အတွက်အလုပ်အကိုင်သစ်များကိုလုံလောက်သောအရည်အချင်းရှိ သည့်ဒေသခံကျား/မ ဦးစားပေးခန့် ထား မည်။	
	ဒေသတွင်းစီးပွားရေး (အလုပ်အကိုင်)	B+	B+	B-/B+	· အထက်ပါအတိုင်း	· အထက်ပါအတိုင်း	
	(အသက်မွေးလမ်းကြောင်း)	B-/B-	D	D	· အထက်ပါအတိုင်း		

၄။ သဘာဝပတ်ဝန်းကျင်လေ့လာဆန်းစစ်ခြင်းအနှစ်ချုပ်

အမျိုးအစား	သက်ရောက်မှု	အဆင့်သတ်မှတ်ချက			ကိုယ်စားပြု လျှော့ပါးစေရေးနည်းလမ်း		
		PC/CO	OP	CL	PC/CO	OP	CL
လူမှုပတ်ဝန်းကျင်	မြေအသုံးချမှုနှင့်ဒေသတွင်းရင်းမြစ်အသုံးပြုမှု	B-	D	D	.သဘောမတူသောပြန်လည်နေရာချထားမှုကဲ့သို့		
	ရေအသုံးပြုမှု	B-	B-	B-	· ရေထုအရည်အသွေးကဲ့သို့	· ရေထုအရည်အသွေးကဲ့သို့	· ရေထုအရည်အသွေးကဲ့သို့
	လက်ရှိလူမှုရေးအခြေခံအဆောက်အဦးနှင့်ဝန်ဆောင်မှု	B-	B-	D	· ကျေးလက်လမ်းများတွင်စတီးပြားပိုင်သုံးခြင်းဖြင့်တည်ဆောက်ရန်နေရာအနည်း ငယ်သာလို	· အသံလုံစနစ်	
	ကျား ၊ မ	B-	B-	B-	· ကန်ထရိုက်တာမှခွဲခြားဆက်ဆံမှုမရှိဘဲဒေသခံများကိုအလုပ်အကိုင်အခွင့်အလန်းဖန်တီးပေးရန်	· EPGE မှတန်းတူအလုပ်အကိုင်ခွင့်အရေး ပေးမည်။	· တည်ဆောက်ရေးကာလကဲ့သို့
	ကလေးသူငယ်အခွင့်အရေး	B-	B-	B-	· ကလေးသူငယ်များအားအလုပ်စေခိုင်းမှုကိုတားမြစ်ရန်	· မည်သည့်အလုပ်အမျိုးအစားမဆိုကလေးသူငယ်များအားခိုင်စေခြင်းမှတားမြစ်ခြင်း	· တည်ဆောက်ရေးကာလကဲ့သို့
	ကူးစက်ရောဂါနှင့်HIV/AIDS	B-	D	B-	· ကန်ထရိုက်တာမှသင့်လျော်သောလျှော့ပါးစေရေးနည်းလမ်းအသုံးပြုရန်		· တည်ဆောက်ရေးကာလကဲ့သို့

၄။ သဘာဝပတ်ဝန်းကျင်လေ့လာဆန်းစစ်ခြင်းအနှစ်ချုပ်

အမျိုးအစား	သက်ရောက်မှု	အဆင့်သတ်မှတ်ချက			ကိုယ်စားပြု လျှော့ပါးစေရေးနည်းလမ်း		
		PC/CO	OP	CL	PC/CO	OP	CL
လူမှုပတ်ဝန်းကျင်	လုပ်ငန်းခွင်ကျန်းမာရေးနှင့်လုံခြုံရေး	B-	B-	B-	· အပြည်ပြည်ဆိုင်ရာစံချိန်စံညွှန်နှင့်အညီသတ်မှတ်ထားသော လုပ်ငန်းခွင်ကျန်းမာရေးနှင့်လုံခြုံရေးသင်တန်းများပေးခြင်း	· အပြည်ပြည်ဆိုင်ရာစံချိန်စံညွှန်နှင့်အညီသတ်မှတ်ထားသောလုပ်ငန်းခွင်ကျန်းမာရေးနှင့်လုံခြုံရေးသင်တန်းများပေးခြင်း	· တည်ဆောက်ရေးကာလကဲ့သို့
	မတော်တဆမှု	B-	B-	B-	· သတင်းအချက်အလက်နှင့်လုံခြုံရေးစည်းမျဉ်းများထောက်ပံ့ခြင်း	· ဘေးကင်းလုံခြုံရေးစံချိန်စံညွှန်းမျာကို	· တည်ဆောက်ရေးကာလကဲ့သို့
	နယ်နမိတ်ဖြတ်ကျော်သက်ရောက်မှု၊ ရာသီဥတုဖောက်ပြန်ခြင်း	B-	B-	B-	· ကန်ထရိုက်တာမှာစွမ်းရည်ပြည့်လောင်စာဆီအသုံးပြုမှုမြှင့်တင်ခြင်း	· လုပ်ငန်းခွင်အတွင်းလျှပ်စစ်နှင့်စွမ်းအင်အသုံးပြုမှုချွေတာရန်	· တည်ဆောက်ရေးကာလကဲ့သို့
ယဉ်ကျေးမှု	ယဉ်ကျေးမှုအမွေအနှစ်	B-	B-	B-	· ဆူညံမှုနှင့် တုန်ခါမှု ကဲ့သို့	· ဆူညံမှုနှင့် တုန်ခါမှု ကဲ့သို့	· တည်ဆောက်ရေးကာလကဲ့သို့
ပသာဒမြင်ကွင်း	မြေယာရှုခင်း	B-	B-	B-	· ယာယီအကာအရံပြုလုပ်ခြင်း	· စိမ်းလန်းစိုပြေရေးနှင့်သစ်ပင်စိုက်ပျိုးခြင်း	· တည်ဆောက်ရေးကာလကဲ့သို့

၅။ EIA လေ့လာမှုအစီအစဉ် အချိန်ဇယား

အမျိုးအစား	၂၀၁၈					
	ဇွန်	ဇူလိုင်	ဩဂုတ်	စက်တင်ဘာ	အောက်တိုဘာ	နိုဝင်ဘာ
၁. စီမံကိန်းအစီအစဉ်ဆန်းစစ်ခြင်း						
၂. နယ်ပယ်အတိုင်းအတာသတ်မှတ်ခြင်း						
နယ်ပယ်အတိုင်းအတာသတ်မှတ်ခြင်းအစီရင်ခံစာပြင်ဆင်ခြင်း						
လူထုအကြံပြုတွေ့ဆုံဆွေးနွေးခြင်း/စီမံကိန်းအကြောင်းပြည်သူများအားဖြန့်ဝေခြင်း					▲	
၃. ကွင်းဆင်းတိုင်းတာခြင်း						
မိုးရာသီတွင် ကွင်းဆင်းတိုင်းတာခြင်း						
ခြောက်သွေ့ရာသီတွင်ကွင်းဆင်းတိုင်းတာခြင်း						
၄. ပတ်ဝန်းကျင်နှင့်လူမှုဝန်းကျင်သက်ရောက်မှုဆန်းစစ်ခြင်း						
ပတ်ဝန်းကျင်နှင့်လူမှုဝန်းကျင်သက်ရောက်မှုဆန်းစစ်ခြင်းအစီရင်ခံစာအကြမ်းပြင်ဆင်ခြင်း						
လူထုအကြံပြုတွေ့ဆုံဆွေးနွေးခြင်း/စီမံကိန်းအကြောင်းပြည်သူများအားဖြန့်ဝေခြင်း						▲

ယခုအဆင့်

၅။ EIA လေ့လာမှုအစီအစဉ် အချိန်ဇယား

EIA လုပ်ငန်းစဉ်အဆင့်

စီမံကိန်းအစီအစဉ် ဆန်းစစ်ခြင်း

- အစီအစဉ်ချခြင်း
- အခြားနည်းလမ်းသုံးသပ်ခြင်း (ထိခိုက်မှုအနည်းဆုံး အစီအစဉ်ကို ရွေးချယ်ပါမည်။)

နယ်ပယ်အတိုင်းအတာ သတ်မှတ်ခြင်း

- ထိခိုက်မှုများအားခန့်မှန်းခြင်း
- သဘာဝနှင့် လူမှုပတ်ဝန်းကျင် အချက်အလက်များရွေးချယ်ခြင်း
- လေ့လာမည့်အရာနှင့် နည်းလမ်းများ ချမှတ်ခြင်း

ယခုအဆင့်

EIA လေ့လာမှု

- အခြေခံအချက်အလက်များလေ့လာကောက်ယူခြင်း
- စီမံကိန်းမှ သက်ရောက်မည့်ထိခိုက်မှုများအား ဆန်းစစ်ခန့်မှန်းခြင်း
- ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်နှင့် စောင့်ကြပ်မှုအစီအစဉ်များ ရေးဆွဲခြင်း

တက်ရောက်ခြင်းအတွက်
အထူးကျေးဇူးတင်ပါသည်။

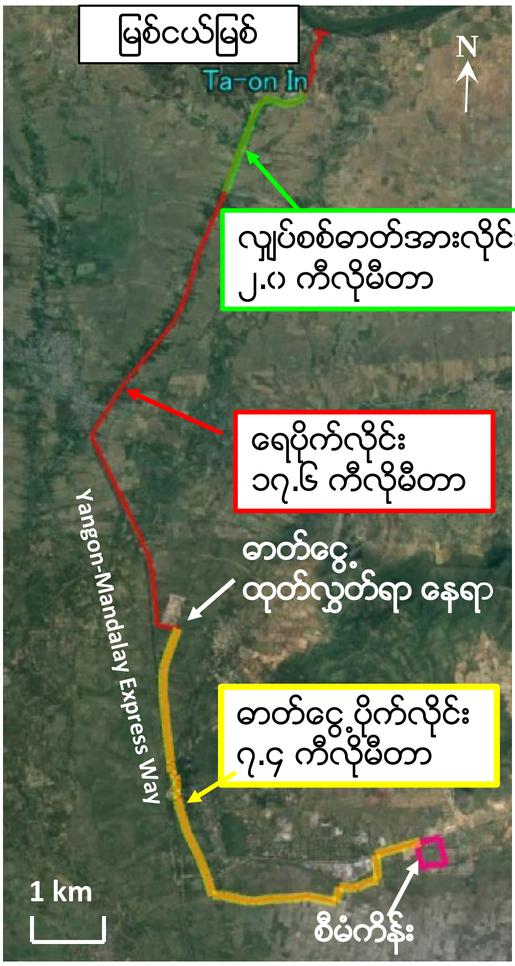
အမေးအဖြေကဏ္ဍ

ကျောက်ဆည် သဘာဝဓာတ်ငွေ့နှင့်စွန့်ပစ်အပူသုံးဓာတ်အားပေးစက်ရုံစီမံကိန်းနှင့် ပတ်သက်၍ သဘာဝပတ်ဝန်းကျင် နှင့် လူမှုဝန်းကျင်ဆိုင်ရာအများပြည်သူနှင့် တွေ့ဆုံဆွေးနွေးခြင်းအခမ်းအနား

၂၀၂၀ ခုနှစ်၊ ဇန်နဝါရီလ ၂၅ရက်

၁။ စီမံကိန်းနောက်ခံ

မြန်မာနိုင်ငံ၏ လျှပ်စစ်ဓာတ်အားလိုအပ်မှုသည် ဖွံ့ဖြိုးတိုးတက်ရေးနှင့် ရင်းနှီးမြှုပ်နှံမှုလုပ်ငန်းများကြောင့် မကြာသေးမီ နှစ်များအတွင်း အရှိန်အဟုန်ပြင်းစွာတိုးတက်လာသည်။ ၂၀၁၉ ခုနှစ်တွင် ပျမ်းမျှ လျှပ်စစ်ထောက်ပံ့မှုနှုန်းမှာ၄၆၀၀ မဂ္ဂါဝပ် ဖြစ်ပြီး၂၀၂၂ ခုနှစ်တွင် ၅၇၀၀ မဂ္ဂါဝပ် ရှိလာမည်ဟု ခန့်မှန်းရပါသည်။



၂။ စီမံကိန်းတွင် ပါဝင်သောအကြောင်းရာများ

လုပ်ငန်းစဉ်	ပါဝင်သည့် စက်ရုံများ
ဓာတ်အားပေးစက်ရုံ	၃၀၀ မဂ္ဂါဝပ် GTCC ဓာတ်အားပေးစက်ရုံ ၂၀၀ မဂ္ဂါဝပ် ဂတ်စ် တာဘိုင် ၁၀၀ မဂ္ဂါဝပ် ရေနွေးငွေ့သုံး တာဘိုင် Flue gas denitrification facility သဘာဝဓာတ်ငွေ့ထောက်ပံ့ရေးစနစ် ရေကိုလည်ပတ်ကာသန့်စင်သည့် စက်ရုံ ရေဆိုးသန့်စင်စက်ရုံ ဓာတ်အားပေးပို့ခြင်းနှင့် အသွင်ပြောင်းလဲပေးသည့် စက်ရုံ ၊ ဆက်သွယ်ရေးစက်ရုံ
ဓာတ်အားလိုင်း	မြေအောက်သွယ်တန်းကေဘယ် (စီမံကိန်းနေရာအတွင်း၌သာ)
ဓာတ်ငွေ့ပိုက်လိုင်း	ခန့်မှန်း ၇.၄ kmရှ ၁၆ လက်မ x ၁၊ မြေအောက်
ရေပိုက်လိုင်း	ခန့်မှန်း ၁၇.၆kmရှ ၃၀၀မီလီမီတာx၂၊ မြေအောက် ဖြန့်ဖြူးရေးလိုင်းခန့်မှန်း ၂ ကီလိုမီတာ၊ အထက်မှ

၃။ အများပြည်သူနှင့်ထပ်မံတွေ့ဆုံဆွေးနွေးပွဲပြုလုပ်ရသည့်ရည်ရွယ်ချက်

မူလကစီစဉ်ထားသောပိုက်လိုင်းသည်အမွေအနှစ်ဇုန်၏မြို့ရိုး ၂ခုပေါ်တွင်ပါဝင်နေသည်ကို တွေ့ရှိရသည်။မြို့ရိုးများပေါ် ကျရောက်သောသက်ရောက်မှုများကို ရှောင်ရှား ရန်အတွက် သာသနာရေးနှင့် ယဉ်ကျေးမှုဝန်ကြီးဌာန(MORAC) နှင့်ဆွေးနွေးကာ ပိုက်လိုင်းလမ်းကြောင်းအသစ်ကို ပြင်ဆင် ဆောင်ရွက်ခဲ့ပါသည်။

ပိုက်လိုင်းလမ်းကြောင်း အသစ်အတွက် လိုအပ်သော အများပြည်သူနှင့် တွေ့ ဆုံဆွေးနွေးပွဲကို ထပ်မံ ဆောင်ရွက်ရန် လျှပ်စစ်ဓာတ်အားထုတ်လုပ်ရေးလုပ်ငန်း (EPGE) မှအကြံပြုခဲ့ပါသည်။

၄။ ပိုက်လိုင်းလမ်းကြောင်းအသစ် ပြောင်းလဲသတ်မှတ်ခြင်း

လျှပ်စစ်ဓာတ်အားထုတ်လုပ်ရေးလုပ်ငန်း (EPGE) သည် ယခင်မှ ရွာသားများ၏ သဘောထား မှတ်ချက်များကို အခြေခံ၍ ပိုက်လိုင်းလမ်းကြောင်း များကို ပြင်ဆင်ခဲ့ပါသည်။ သဘောထားမှတ်ချက်များထဲမှ တခုမှာ စီမံကိန်းဧရိယာ တပိုက်ရှိ လက်ရှိပိုက်လိုင်းများ၏ အခြေအနေနှင့် သက်ဆိုင်နေပါသည်။ ထို့ကြောင့် လျှပ်စစ်ဓာတ်အားထုတ်လုပ်ရေးလုပ်ငန်း (EPGE)သည် ပိုက်လိုင်း အရေ အတွက်ကို လျှော့ချနိုင်ရန် ကွင်းဆင်းလေ့လာမှုများကို ထပ်မံဆောင်ရွက်ခဲ့ပါသည်။

၅။ အရင်တွေ့ဆုံပွဲများနှင့် မတူညီသည့်အချက်များ

သဘာဝဓာတ်ငွေ့ပိုက်လိုင်းများတိုးမြှင့်ရေးနှင့်ပတ်သတ်၍စိုးရိမ်ပူပန်နေကြသောရွာသားများ၏ သဘော ထားများကိုအခြေခံ၍ လျှပ်စစ်ဓာတ်အားထုတ်လုပ်ရေးလုပ်ငန်း (EPGE) သည် သက်ဆိုင်ရာ အဖွဲ့အစည်းများနှင့် ဆွေးနွေးခဲ့သည်။ ယခင်ကပိုက်လိုင်း ၃လိုင်း အစား ၂လိုင်းအထိ လျှော့ချခဲ့ပါသည်။ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန၏အကြံပြုချက်အရ လိုအပ်သော ကွင်းဆင်းလေ့လာမှုများကိုလည်း ထပ်မံဆောင်ရွက်ခဲ့ပါသည်။

၆။ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်လေ့လာခြင်း (EIA) လေ့လာမှု အကျဉ်းချုပ်

ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်လေ့လာမှုကို Myanmar EIA လုပ်ငန်းစဉ် (၂၀၁၅) နှင့် JICA၏ သဘာဝပတ်ဝန်းကျင် နှင့် လူမှုဝန်းကျင်ဆိုင်ရာ လမ်းညွှန်မှု (၂၀၁၀) တို့နှင့်အညီ ဆောင်ရွက်ခဲ့ပါသည်။. ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ် လေ့လာမှု၏ ရလာဒ် အကျဉ်းချုပ်ကို အောက်တွင် ဖော်ပြထားသည်။ ၎င်းတို့မှာ လေ့လာထားမှုများထဲမှ အချို့ကို ကောက်နုတ်ဖော်ပြထားခြင်း ဖြစ်ပါသည်။

အမျိုးအမည်	လေ့လာသည့် အမျိုးအစား	ဆန်းစစ်ချက် ရလဒ်			ဆိုးကျိုးသက်ရောက်မှုများကို လျှော့ချခြင်း နည်းလမ်းများ		
		PC / CO	OP	CL	PC/CO	OP	CL
ညစ်ညမ်းမှု လျှော့ချခြင်း နည်းလမ်းများ	လေထု အရည် အသွေး	ခ-	ခ-	ခ-	· ဆောက်လုပ်ရေးလုပ်ငန်းသုံး စက်များကို အပြင်းအထန် လည်ပတ်ခြင်းမှ ရှောင်ကျဉ်ရန်	· နိုက်ထရိုဂျင်အောက်ဆိုဒ် ထွက်ရှိမှုနည်းသော ဂတ်စ်တာဘိုင် အမျိုးအစားများကို အသုံးပြုရန်	· ဆောက်လုပ်ရေး ကာလအတိုင်း ဆောင်ရွက်ရန်
	ရေအရည် အသွေး	ခ-	ဃ	ခ-	· သမဏိကိုယ်ထည်သုံး cofferdam ကို တပ်ဆင်အသုံးပြုခြင်း (Steel sheet pile)	· စွန့်ပစ်ရေသန့်စင်စက်ရုံတည်ဆောက်ခြင်းနှင့် သင့်လျော်စွာ လည်ပတ်ခြင်း	· ဆောက်လုပ်ရေး ကာလအတိုင်း ဆောင်ရွက်ရန်
	အသံဆူညံမှု နှင့် တုန်ခါမှု	ခ-	ခ-	ခ-	· ဆောက်လုပ်ရေးလုပ်ငန်းသုံး စက်များကို အပြင်းအထန် လည်ပတ်ခြင်းမှ ရှောင်ကျဉ်ရန်	· အသံလုံစနစ်များတပ်ဆင် အသုံးပြုခြင်း	· ဆောက်လုပ်ရေး ကာလအတိုင်း · ဆောင်ရွက်ရန်
သဘာဝ ပတ်ဝန်းကျင်	အပင်၊ တိရစ္ဆာန် ဂေဟဗေဒစနစ်	ခ-	ခ-	ခ-	· ကုန်းနေ အပင်၊ တိရစ္ဆာန် Terrestrial biota အတွက်၊ မြေမျက်နှာသွင်ပြင် ပြောင်းလဲမှုကို အနည်းဆုံးဖြစ်စေရန်	· ရေအရည်အသွေး အတိုင်း ဆောင်ရွက်ရန်	· ဆောက်လုပ်ရေး ကာလအတိုင်း · ဆောင်ရွက်ရန်

					· ရေနေ အပင်၊ တိရစ္ဆာန် Aquatic biota အတွက် ရေအရည်အသွေး အတိုင်း ဆောင်ရွက်ရန်		
လူမှု ပတ်ဝန်း ကျင်	နေရာအသစ်သို့ ပြန်လည်နေရာ ချထားခြင်း	ခ-	ဃ	ဃ	˚လုံလောက်သော လျော်ကြေးပေးချေ မှုများကို အကောင်အထည်ဖော်ရန် (အသေးစိပ် အ ချက်အလက်များကို ပြန်လည်နေရာချထားရေးအစီအမံ RAP အစီရင်ခံစာတွင် ဖော်ပြထားပါသည်)		
	ဆင်းရဲနွမ်းပါးမှု	ခ- / ခ+	ခ+	ခ+-	· ဆောက်လုပ်ရေးလုပ်ငန်း များကို ရိတ်သိမ်းပြီးသည် နှင့် အမြန်ဆုံး စတင်နိုင်ရန် · ကျွမ်းကျင်မှုမလိုအပ်သော လုပ်သားများအတွက် ဒေသခံများကို ဦးစားပေးငှားရမ်းရန်	· ဒေသခံများတွင် စက်ရုံတွင်း ခန့်ထားရန် အရည်အချင်းပြည့်မီပါက EPGE သည် ဒေသခံများကို ဦးစားပေး ခန့်အပ်မည်ဖြစ်ပါသည်။	· ဆောက်လုပ်ရေး ကာလအတိုင်း ဆောင်ရွက်ရန်
	ဒေသတွင်း စီးပွါးရေး (အလုပ်ရရှိမှု)	ခ+	ခ+	ခ+-	· ကျွမ်းကျင်မှုမလိုအပ်သော လုပ်သားများအတွက် ဒေသခံများကို ဦးစားပေးငှားရမ်းရန်	· ဆင်းရဲနွမ်းပါးမှု အတိုင်း ဆောင်ရွက်ရန်	· ဆောက်လုပ်ရေး ကာလအတိုင်း ဆောင်ရွက်ရန်
	(အသက်မွေး ဝမ်းကြောင်းမှု)	ခ- / ခ+-	ဃ	ဃ	· ဆောက်လုပ်ရေးလုပ်ငန်း များကို ရိတ်သိမ်းပြီးသည် နှင့် အမြန်ဆုံး စတင်နိုင်ရန်	·	·
	လက်ရှိအများ ပြည်သူ အဆောက် အအုံများ နှင့် ဝန်ဆောင်မှုများ	ခ-	ခ-	ဃ	· ပိုက်လိုင်း၏အကျယ်ကို ကျဉ်းမြောင်းစေရန် သမဂ္ဂကိုယ်ထည်သုံး Steel sheet pile ကို တပ်ဆင်အသုံးပြုရန် · တပ်ဆင်ရာတွင် လုံခြုံမှုရှိစေရန် စကြ်နှင့်လမ်း တပ်ဆင်အသုံးပြုခြင်း	· စီမံကိန်းဧရိယာတဝိုက်၏ ကျောင်းများအတွက် အသံဆူညံမှု ကာကွယ်ရေး စည်းကမ်းများအတိုင်း ဆောင်ရွက်ရန်	·
	မတော်တဆ မှုများ	ခ-	ခ-	ခ-	· ဆောက်လုပ်ရေးလုပ်ငန်းများတွင် ဒေသခံများ၏လုံခြုံရေးအတွက် သတင်းအချက်အလက်များ နှင့် လမ်းညွှန်မှုများပေးခြင်း	· လုပ်ငန်းခွင်အတွင်းချမှတ်ထားသော လုံခြုံမှုစံနှုန်းများကို လိုက်နာခြင်း	· ဆောက်လုပ်ရေး ကာလအတိုင်း ဆောင်ရွက်ရန်
ယဉ်ကျေးမှု	ယဉ်ကျေးမှု အမွေ အနှစ်များ (ရှေးဟောင်း ယဉ်ကျေးမှု နယ်မြေ)	ခ-	ဃ	ဃ	· ရှေးဟောင်းယဉ်ကျေးမှု နယ်မြေ၏ မြို့နံရံနားတွင် လက်ဖြင့်သာ တူးဖော်ရန် · ရှေးဟောင်းယဉ်ကျေးမှု နယ်မြေ၏ မြို့နံရံနားတွင် ရှောင်၍ တူးဖော်ရန် · ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်လေ့လာမှုပြီးလျှင်လည်း ရှေးဟောင်းယဉ်ကျေးမှုဦးစီးဌာနနှင့် အမြဲမပြတ် ဆွေးနွေး ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။	·	·

ဆောက်လုပ်ရေးမလုပ်မီကာလ (PC)၊ ဆောက်လုပ်ရေးကာလ (CO)၊ လုပ်ငန်းလည်ပတ်သည့်ကာလ (OP) နှင့် လုပ်ငန်းရပ်စဲသည့်ကာလ (CL)

အကဲဖြတ်ခြင်းရလဒ်များ

1) က-: သိသာသော ဆိုးကျိုးသက်ရောက်မှု   က+: သိသာသော ကောင်းကျိုးသက်ရောက်မှု
2) ခ-: ဆိုးကျိုးသက်ရောက်မှု အချို့   ခ+: ကောင်းကျိုးသက်ရောက်မှု အချို့
3) ဃ: အကျိုးသက်ရောက်မှု မရှိသလောက်ဖြစ်

၇။ ပြန်လည်နေရာချထားရေး လေ့လာမှု အကျဉ်းချုပ်

<စီမံကိန်း ဧရိယာအတွင်းရှိ ဒေသခံများ၏ နေထိုင်မှုပုံစံများနှင့် ကိုက်ညီအောင် ဆောင်ရွက်ထားသော ခံစားခွင့်များကို စီမံကိန်းအတွက် နောက်ဆုံးရက်သတ်မှတ်ခြင်း

	စီမံကိန်းအတွက် နောက်ဆုံးရက်သတ်မှတ်ခြင်း
၂၀ရက် ဒီဇင်ဘာ၊ ၂၀၁၉	အမွေအနှစ်ဇုန်အနီး ပြန်လည်သတ်မှတ်ထားသော ပိုက်လိုင်းအတွက်
၃၀ရက် ဧပြီ၊၂၀၁၉	အခြား ဧရိယာများအတွက်

စီမံကိန်းအတွက် နောက်ဆုံးရက်သတ်မှတ်ခြင်းနေ့ နောက်ပိုင်း ဧရိယာအတွင်း ကျူးကျော်ဝင်ရောက်လာသူများသည်လျော်ကြေး သို့မဟုတ် အခြားသော ပြန်လည်နေရာချထားရေး အကူအညီများကို ခံစားခွင့်မရှိပါ။

လုပ်ငန်းခွင်အခြေအနေပေါ်မူတည်၍ နောက်ထပ်လေ့လာသည့်အဆင့်တွင် နောက်ဆုံးရက်သတ်မှတ်သည့် နေ့စွဲကို ပြန်လည် သုံးသပ်မည် (သို့) အသစ်ပြောင်းလဲသွားမည်ဖြစ်ပါသည်။

<လျော်ကြေးတွင် ထည့်သွင်းစဉ်းစားသည့် အချက်များ >

	အမျိုးအစား	ကူညီထောက်ပံ့မှု
၁။	မြေ	
၁)	ရေရယူရန် စက်ပစ္စည်းများနှင့် လျှပ်စစ်တိုင်များ တပ်ဆင်သည့်မြေနေရာများ (အမြဲတမ်းအတွက် ရယူခြင်း)	က) ထိခိုက်သည့် မြေနေရာအတွက် အစားထိုးလျော်ကြေးငွေ အပြည့် ပေးချေမှု
၂)	ရေပိုက်နှင့် ဂတ်စ်ပိုက်များ တပ်ဆင်ထားသည့် မြေနေရာများ (ယာယီ အသုံးပြုခြင်း)	က) ထိခိုက်နစ်နာသော အပိုင်းရှိ သီးနှံများ/ သစ်ပင်များ အတွက် ငွေသား လျော်ကြေး (နံပါတ်-၃ ကို လေ့လာပါ)
၂	အဆောက်အအုံ	
၁)	စပါးကျီ သို့ သီးနှံများသိမ်းသည့် ဂိုဒေါင်	က) အသုံးမပြုသည့် အဆောက်အအုံပင် ဖြစ်လင့်ကစား ထိခိုက်သည့် အဆောက်အအုံ တခုလုံးအတွက် အစားထိုး လျော်ကြေးငွေ အပြည့်ပေးချေမှု
၂)	ဆိုင်	က) တတ်နိုင်သမျှ အနီးဆုံးနေရာတွင် ဆိုင်နေရာ ပြန်လည်စီစဉ်ပေးမှု နှင့် ခ) ဆိုင်နေရာ ယာယီပြောင်းလဲပေးရသောကြောင့် ဆိုင်မဖွင့်ရသည့် အချိန်အတွက် ငွေပေးချေခြင်း
၃	သီးနှံများနှင့် သစ်ပင်များ	
၁)	သီးနှံများ	[သီးနှံပိုင်ရှင်များအတွက်] က) လက်ရှိ ပျမ်းမျှ အထွက်နှုန်းနှင့် ဈေးကွက်ကာလ ပေါက်ဈေး တို့အပေါ်တွက်ချက်၍ တန်ဖိုး၏ ၃ဆရှိ ငွေသားလျော်ကြေး ပေးချေမှု
၂)	သစ်ပင်များ	[သစ်ပင်ပိုင်ရှင်များအတွက်] က) ဈေးကွက်ကာလ ပေါက်ဈေး အပေါ်တွက်ချက်၍ တန်ဖိုး၏ ၃ဆရှိ ငွေသားလျော်ကြေး ပေးချေမှု

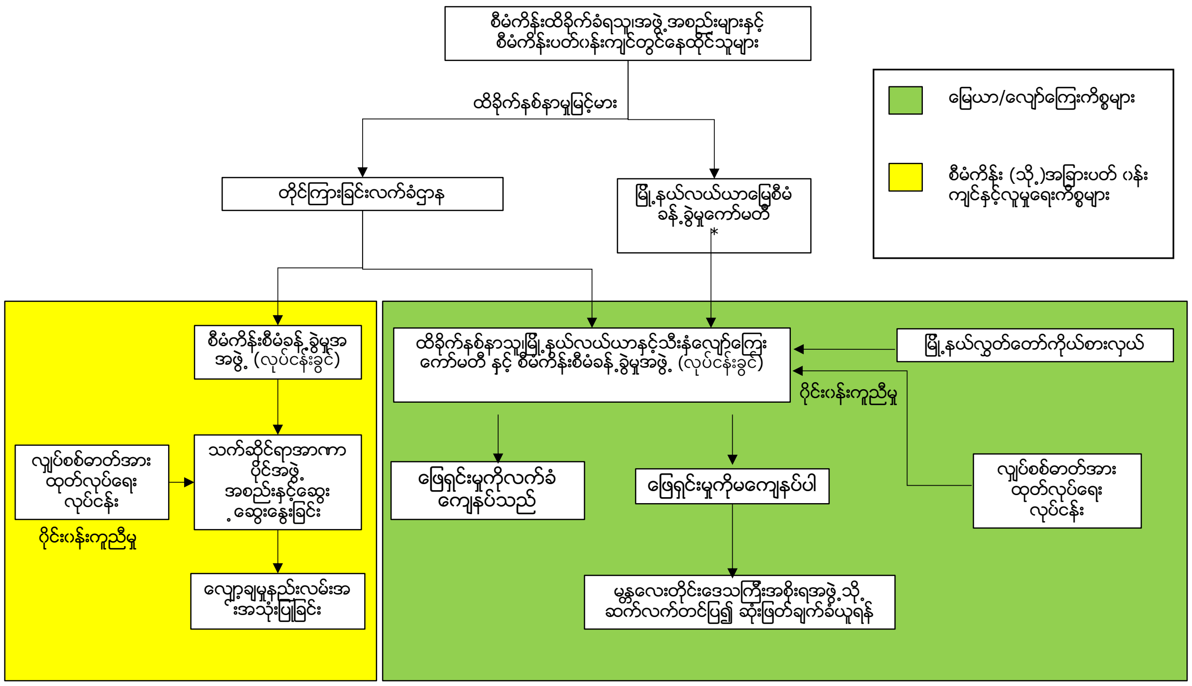
<ဝင်ငွေပြန်လည် ထူထောင်ရေး အစီအစဉ် >

အမျိုးအစား	စံနှုန်း	ပါဝင်သည့် အကြောင်းအရာ	မှတ်ချက်
စိုက်ပျိုးမြေ ပိုင်ရှင်များ၊ မြေငှားများ ၊ အလုပ်သမားများနှင့် ဆိုင်ပိုင်ရှင်များ၊ ဆိုင်အလုပ်သမားများ	အမြဲတမ်း (သို့) ကာလကြာရှည်စွာ ဝင်ငွေ ထိခိုက်ခြင်း ရေပိုက်နှင့် ဂတ်စ်ပိုက်လိုင်းတပ်ဆင်သည့်လုပ်ငန်းများ အတွင်း ယာယီဝင်ငွေ ထိခိုက်ခြင်း	ဝင်ငွေလမ်းကြောင်း ပြောင်းလဲရာတွင် ကူညီထောက်ပံ့ပေးခြင်း အုပ်ချုပ်ရေးဆိုင်ရာ ကူညီထောက်ပံ့ပေးခြင်း အကယ်၍ စီမံကိန်း၏လိုအပ်ချက်နှင့် ထိခိုက်နစ်နာသောသူ၏ အရည်အချင်းတို့ ကိုက်ညီပါက စီမံကိန်းတွင် အမြဲတမ်းဝန်ထမ်း အဖြစ် ဦးစားပေးခန့်အပ်ခြင်း	က) နှင့် ခ) ဝင်ငွေရင်းမြစ် အခြေအနေ ဆန်းစစ်ခြင်းကို သက်ဆိုင်ရာပါတီများ အားလုံးက စစ်ဆေးပါမည်
အားနည်းသည့် အုပ်စုများ	အားနည်းသော (နွမ်းပါးသော) အုပ်စုအဖြစ် သတ်မှတ်ထားသော အိမ်ထောင်စုများ	အကယ်၍ စီမံကိန်း၏လိုအပ်ချက်နှင့် ထိခိုက်နစ်နာသောသူ၏ အရည်အချင်းတို့ ကိုက်ညီပါက စီမံကိန်းတွင် အမြဲတမ်းဝန်ထမ်း အဖြစ် ဦးစားပေးခန့်အပ်ခြင်း ထိခိုက်နစ်နာသောသူ၏ စိတ်ဝင်စားမှုနှင့် လူမှုဖူလုံရေး ဝန်ဆောင်မှုများ ကိုက်ညီမှုရှိပါက ကူညီဆောင်ရွက်ပေးရန်	နွမ်းပါးသော အိမ်ထောင်စုအဖြစ် သတ်မှတ်ခြင်းကို သက်ဆိုင်ရာ ပါတီများ၏ အတည်ပြုချက်ဖြင့် ဆောင်ရွက်ပါမည်

အထက်ဖော်ပြပါလူများအပြင်၊ ၂၀၁၅ ခုနှစ် ဘီးလင်း ဓါတ်အားပေးစက်ရုံတွင် မြေယာပါ ထား သော သူများကိုပါ စီမံကိန်း၏လိုအပ်ချက်နှင့် ကိုက်ညီပါက စီမံကိန်းတွင် အမြဲတမ်းဝန်ထမ်း အဖြစ် ခန့်အပ်သွားမည် ဖြစ်ပါသည်။

<နစ်နာမှုများကို ဖြေရှင်းသည့် စနစ် (GRM) >

စီမံကိန်းနှင့် ပတ်သက်သော မကျေနပ်ချက်များကို ကိုင်တွယ်ဖြေရှင်းရန် အောက်ပါ နည်းလမ်းအတိုင်း ဆောင်ရွက် သွားမည်ဖြစ်ပါသည်။ EPGE သည် တိုင်ကြားလာသော မကျေနပ်ချက်များကို လက်ခံရန်အတွက် တိုင်ကြားခြင်းလက်ခံဌာနကို တည်ထောင်သွားမည်ဖြစ်ပါသည်။ မြေယာရယူခြင်း၊ လျော်ကြေးပေးခြင်း စသည့်ကိစ္စများကို ဖြေရှင်းနိုင်ရန်အတွက် စဥ့်ကိုင်မြို့နယ်ရှိ လယ်ယာမြေစီမံ ခန့်ခွဲမှုကော်မတီ (LCCC) ကို တည်ထောင်သွားမည်ဖြစ်ပါသည်။



* LCCC = မြို့နယ်လယ်ယာမြေစီမံ ခန့်ခွဲမှုကော်မတီ

သတင်းအချက်အလက်များအတွက်ဆက်သွယ်ရန်
လျှပ်စစ်ဓာတ်အား ထုတ်လုပ်ရေးလုပ်ငန်း(EPGE):
စဉ့်ကိုင်မြို့နယ်အထွေထွေအုပ်ချုပ်ရေးဦးစီးဌာန:
သက်ဆိုင်ရာကျေးရွာအုပ်ချုပ်ရေးမှူးများ:

သဘာဝပတ်ဝန်းကျင် နှင့် လူမှုဝန်းကျင်ဆိုင်ရာ အများပြည်သူနှင့် ထပ်မံတွေ့ဆုံဆွေးနွေးခြင်း အခမ်းအနား

ကျောက်ဆည် သဘာဝဓာတ်ငွေ့နှင့် စွန့်ပစ်အပူသုံး ဓာတ်အားပေးစက်ရုံစီမံကိန်း

၂၀၂၀ ခုနှစ်၊ ဇန်နဝါရီလ ၂၅ရက်

အစီအစဉ်

၁။ စီမံကိန်းနိဒါန်းနှင့် စီမံကိန်းအကြောင်းအရာ

၂။ အများပြည်သူနှင့် ထပ်မံတွေ့ဆုံဆွေးနွေးပွဲပြုလုပ်ရသည့် ရည်ရွယ်ချက်

၃။ ယခင်တွေ့ဆုံပွဲများနှင့် မတူညီသည့်အချက်များ

၄။ ပတ်ဝန်းကျင်ထိခိုက်ဆန်းစစ်လေ့လာမှု အကျဉ်းချုပ်

၅။ ပြန်လည်နေရာချထားရေး လေ့လာမှု အကျဉ်းချုပ်

၆။ အမေး အဖြေ ကဏ္ဍ

၁။ စီမံကိန်းနိဒါန်းနှင့် စီမံကိန်းအကြောင်းအရာ

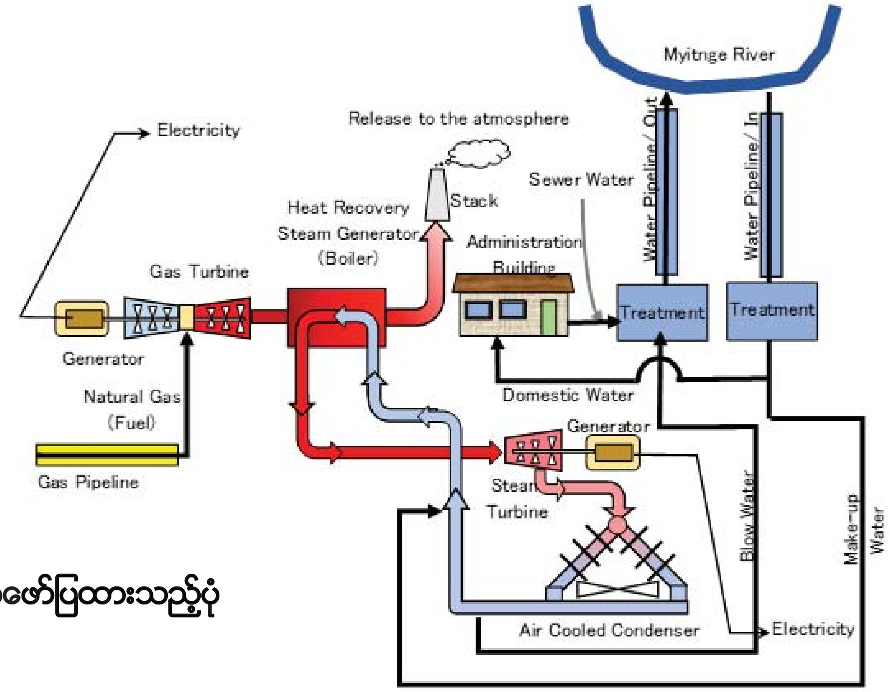
စီမံကိန်းတွင် ပါဝင်သော အကြောင်းအရာများ

လုပ်ငန်းစဉ်	ပါဝင်သည့် စက်ရုံများ
ဓာတ်အားပေးစက်ရုံ	၃၀၀ MW သဘာဝဓာတ်ငွေ့နှင့် စွန့်ပစ်အပူသုံးဓာတ်အားပေး စက်ရုံ ၂၀၀ MW ဓာတ်ငွေ့ တာဘိုင် ၁၀၀ MW ရေနွေးငွေ့သုံး တာဘိုင် Flue gas denitrification facility သဘာဝဓာတ်ငွေ့ထောက်ပံ့ရေးစနစ် ရေကိုလည်ပတ်ကာ သန့်စင်သည့် စက်ရုံ ရေဆိုးသန့်စင်စက်ရုံ ဓာတ်အားပေးပို့ခြင်းနှင့် အသွင်ပြောင်းလဲပေးသည့် စက်ရုံ ဆက်သွယ်ရေး စက်ရုံ
ဓာတ်အားလိုင်း	မြေအောက်သွယ်တန်းကေဘယ် (စီမံကိန်းနေရာအတွင်း၌သာ)
ဓာတ်ငွေ့ပိုက်လိုင်း	ခန့်မှန်း ၇.၄ kmφ ၁၆ လက်မ x ၁၊ မြေအောက်
ရေပိုက်လိုင်း	ခန့်မှန်း ၁၇.၆kmφ ၃၀၀မီလီမီတာx၂၊ မြေအောက် လျှပ်စစ်လိုင်း ခန့်မှန်း ၂ ကီလိုမီတာ၊ အထက်မှ

၁။ စီမံကိန်းနိဒါန်းနှင့် စီမံကိန်းအကြောင်းအရာ

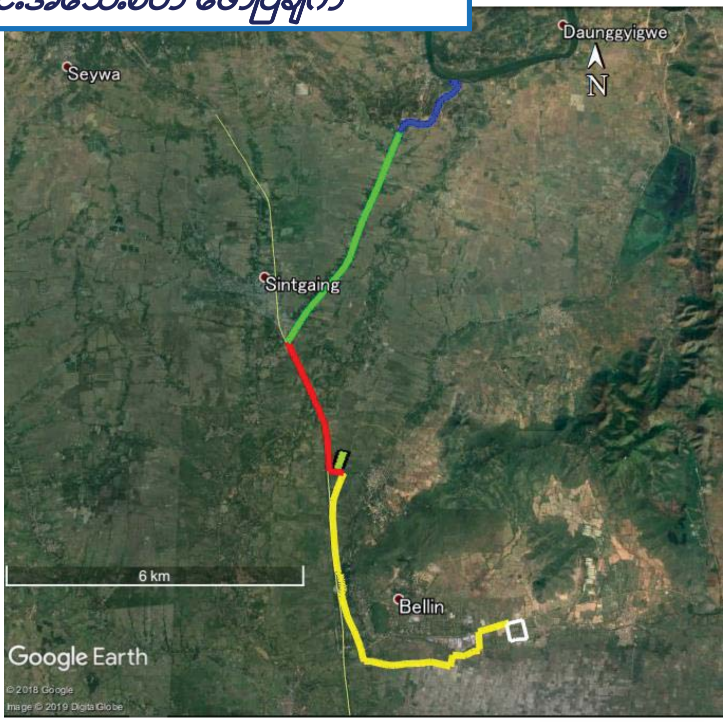
- ရေနွေးငွေ့သုံး တာဘိုင်နှင့် စက်ရုံတွင်းသုံးရန် အတွက် မြစ်ငယ်မြစ်မှရေကို အသုံးပြုသွားမည် ဖြစ်ပါသည်။ စက်ရုံအနီးတဝိုက်တွင် ရေအရင်းမြစ် အဖြစ် မြစ်ငယ်မြစ်သာ ရှိသောကြောင့် ဖြစ်ပါသည်။ မြစ်ငယ်မြစ်မှ စီမံကိန်း မြောက်ဘက်သို့ ရေကို ၁၁ ကီလိုမီတာခန့်ရှိ ရေပိုက်လိုင်း တည်ဆောက်ကာ သွယ်တန်းရယူ အသုံးပြုမည် ဖြစ်ပါသည်။
- စီမံကိန်းသည် ဓာတ်ငွေ့တာဘိုင်များ၏ လောင်စာအတွက် သဘာဝဓာတ်ငွေ့ကို အသုံးပြုရန် လိုအပ်ပါသည်။ လိုအပ်သော သဘာဝ ဓာတ်ငွေ့ကို စီမံကိန်း၏ အနောက်မြောက် ၅ ကီလိုမီတာခန့်အကွာတွင် တည်ရှိသော ဓာတ်ငွေ့ ထုတ်လွှတ်ရာ နေရာမှ ရယူသွားမည် ဖြစ်ပါသည်။
- လျှပ်စစ်ဓာတ်အား ဖြန့်ဖြူးရေးလိုင်းကို ရှိပြီးသား လျှပ်စစ်ဓာတ်အားလိုင်းသို့ ဆက်သွယ်၍ တပ်ဆင်ကာ စီမံကိန်းမှ ရေယူသောနေရာသို့ လျှပ်စစ်ဓာတ်အား ဖြန့်ဖြူးပေးမည် ဖြစ်ပါသည်။

၁။ စီမံကိန်းနိဒါန်းနှင့် စီမံကိန်းအကြောင်းအရာ



CCPP စနစ်ကိုဖော်ပြထားသည့်ပုံ

ပိုက်လိုင်းအသေးစိတ် ဖော်ပြချက်

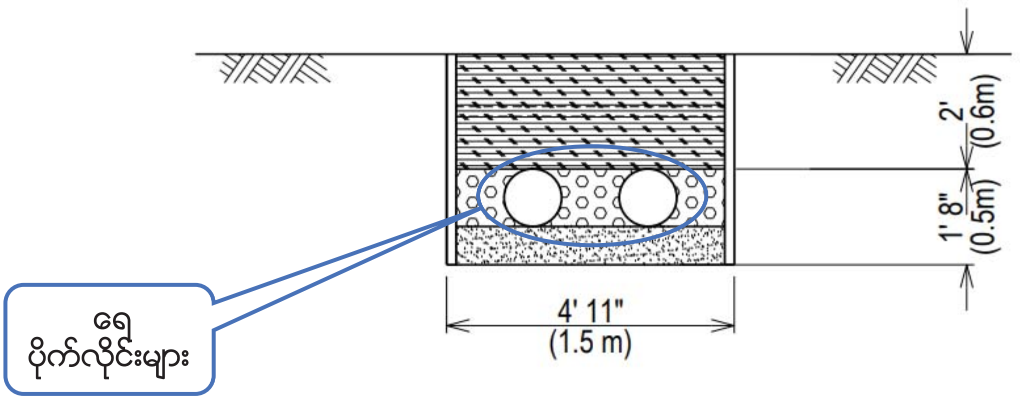


Legend

- Section-A
- Section-B
- Section-C
- Section-D

၁။ စီမံကိန်းနိဒါန်းနှင့် စီမံကိန်းအကြောင်းအရာ

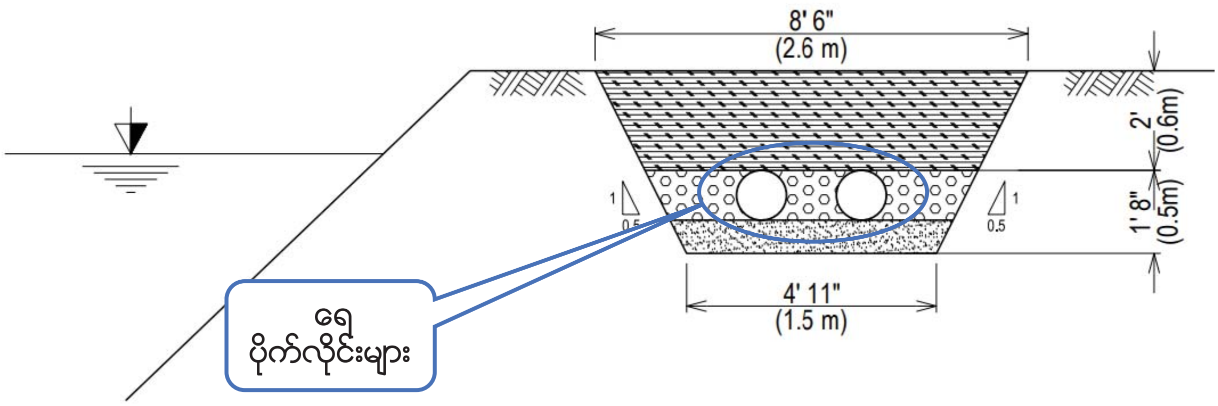
ပိုက်လိုင်းအသေးစိတ် ဖော်ပြချက် (အပိုင်း- အေ)



WATER PIPE TYPICAL SECTION INSIDE VILLAGE

၁။ စီမံကိန်းနိဒါန်းနှင့် စီမံကိန်းအကြောင်းအရာ

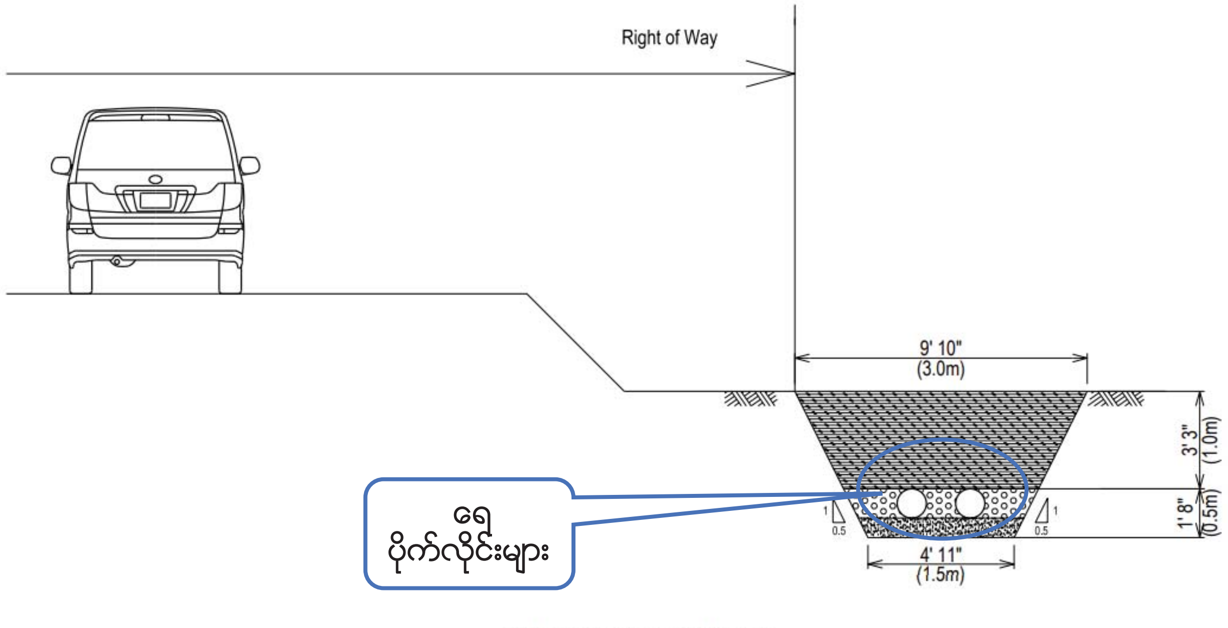
ပိုက်လိုင်းအသေးစိတ် ဖော်ပြချက် (အပိုင်း- ဘီ)



WATER PIPE TYPICAL SECTION

၁။ စီမံကိန်းနိဒါန်းနှင့် စီမံကိန်းအကြောင်းအရာ

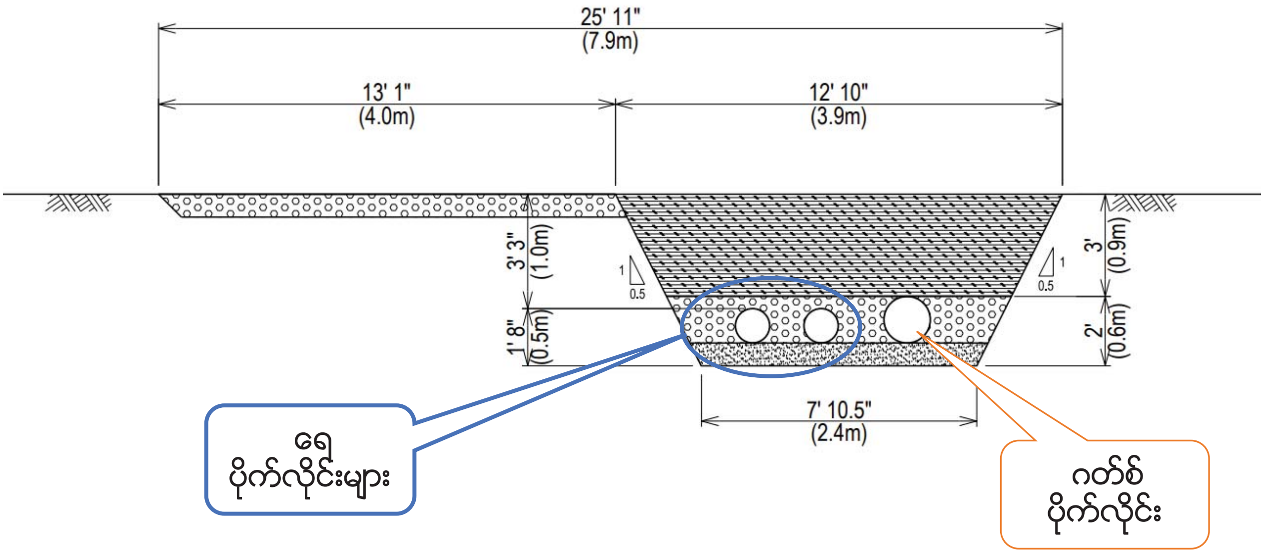
ပိုက်လိုင်းအသေးစိတ် ဖော်ပြချက် (အပိုင်း- စီ)



WATER PIPE TYPICAL SECTION

၁။ စီမံကိန်းနိဒါန်းနှင့် စီမံကိန်းအကြောင်းအရာ

ပိုက်လိုင်းအသေးစိတ် ဖော်ပြချက် (အပိုင်း- ဒီ)



WATER PIPE AND GAS PIPE TYPICAL SECTION (VIEW FROM NORTH SIDE)

၁။ စီမံကိန်းနိဒါန်းနှင့် စီမံကိန်းအကြောင်းအရာ

ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်လေ့လာခြင်း(EIA)အတွက် ယခင် တွေ့ဆုံဆွေးနွေးပွဲများမှ အဓိက အမြင်များ

- စီမံကိန်းကို ထောက်ခံပံ့ပိုးပေးသည့် မှတ်ချက်များ အများဆုံးတွေ့ရသည်။
- သဘာဝပတ်ဝန်းကျင်၊ လူမှုဝန်းကျင်ဆိုင်ရာ သက်ရောက်မှုများ (ပိုက်လိုင်းလမ်းကြောင်း၊ ဓာတ်အားပေးစက်ရုံမှ အသံဆူညံမှု၊ ရွာသားများအတွက် အလုပ်အကိုင်အခွင့်အလမ်းများ) နှင့် ပတ်သက်၍ စိုးရိမ်ပူပန်မှုရှိသည့် မှတ်ချက်အချို့ကို တွေ့ရသည်။)

ပြန်လည်နေရာချထားရေးအစီအမံ (RAP)အတွက် ယခင် တွေ့ဆုံဆွေးနွေးပွဲများမှ အဓိက အမြင်များ

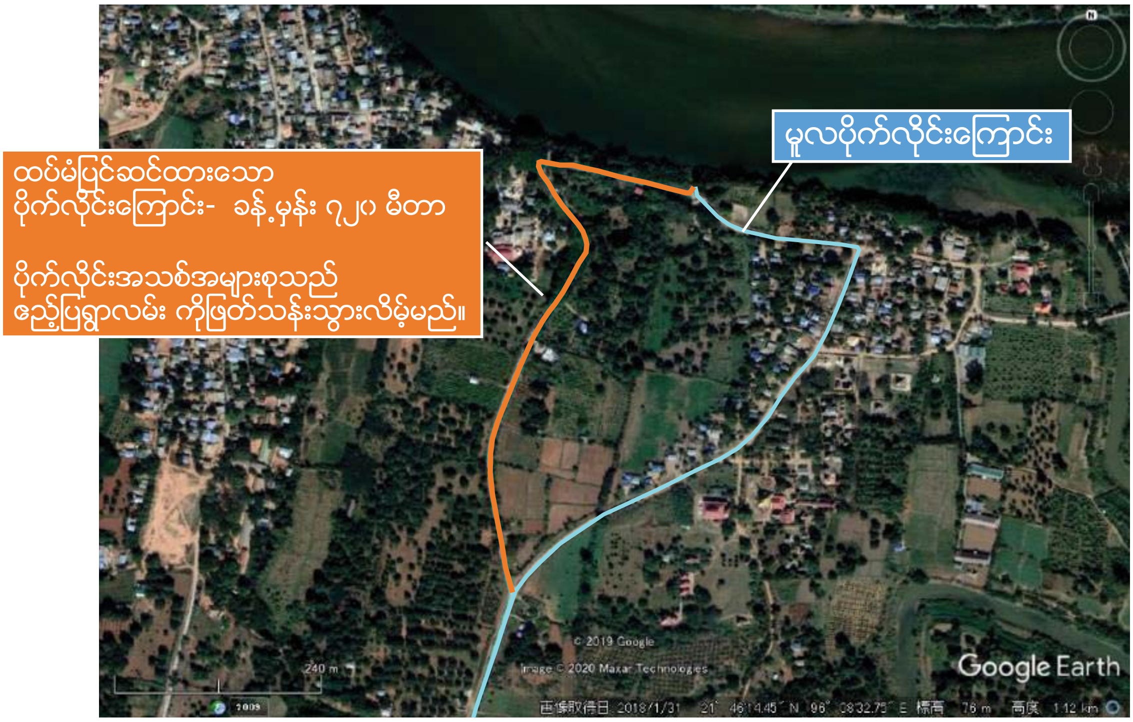
- ထိခိုက်နစ်နာသော ကောက်ပဲသီးနှံများအတွက် သင့်လျော်သော လျော်ကြေးများ ပေးသင့်သည်။
- လျော်ကြေးငွေ ပမာဏကို မည်သို့တွက်ချက်ထားသည်ကို ရှင်းပြပေးသင့်သည်။
- ဆောက်လုပ်ရေးလုပ်ဆောင်နေချိန်တွင် ဒေသခံများကို မထိခိုက်အောင် ဆောင်ရွက်သင့်သည်။

- ၎င်းထင်မြင်ချက်များအပေါ် အခြေခံ၍ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်လေ့လာခြင်း (EIA) နှင့် ပြန်လည်နေရာချထားရေးအစီအမံ (RAP) အစီရင်ခံစာများကို ပြင်ဆင်ခဲ့သည်။

၂။ အများပြည်သူနှင့် ထပ်မံတွေ့ဆုံဆွေးနွေးပွဲ ပြုလုပ်ရသည့်ရည်ရွယ်ချက်

- မူလကစီစဉ်ထားသောပိုက်လိုင်းသည် အမွေအနှစ်ဇုန်၏ မြို့ရိုး၂ခုပေါ်တွင် ရှိနေသည်ကို တွေ့ရှိရသည်။
- မြို့ရိုးများပေါ်ကျရောက်သော သက်ရောက်မှုများကို ရှောင်ရှားရန်အတွက် သာသနာရေးနှင့် ယဉ်ကျေးမှုဝန်ကြီးဌာန (MORAC) လက်အောက်ရှိ ရှေးဟောင်းသုတေသနနှင့် အမျိုးသားပြတိုက်ဦးစီး ဌာန(DoANM) နှင့် ဆွေးနွေးကာ ပိုက်လိုင်းလမ်းကြောင်း အသစ်ကို ပြင်ဆင်ဆောင်ရွက်ခဲ့ပါသည်။
- ၂၀၁၉ခုနှစ်ဇွန်လအထိအရ ပိုက်လိုင်းလမ်းကြောင်း အသစ်အတွက် လိုအပ်သော ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်လေ့လာခြင်း (EIA) နှင့် ပြန်လည်နေရာချထားရေးအစီအမံ (RAP) ကို ထပ်မံဆောင်ရွက်ရန် လျှပ်စစ်ဓာတ်အားထုတ်လုပ်ရေးလုပ်ငန်း EPGE မှအကြံပြုခဲ့ပါသည်။

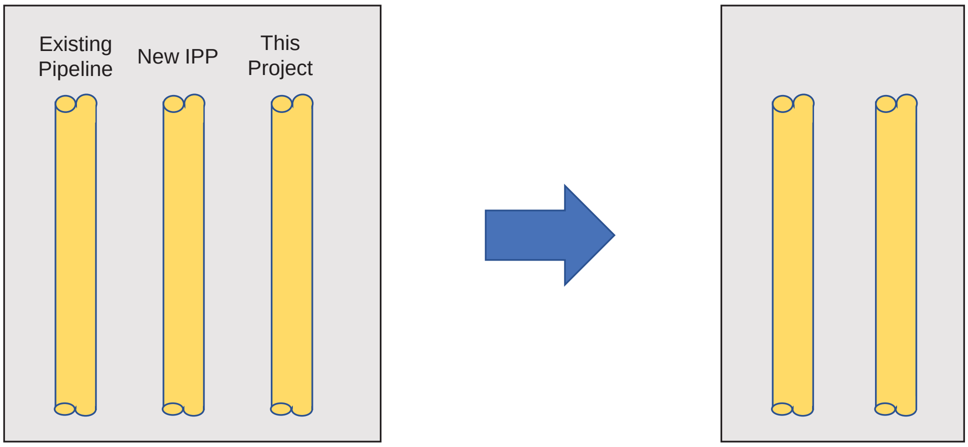
၂။ အများပြည်သူနှင့် ထပ်မံတွေ့ဆုံဆွေးနွေးပွဲ ပြုလုပ်ရသည့်ရည်ရွယ်ချက်



၃။ ယခင်တွေ့ဆုံပွဲများနှင့် မတူညီသည့်အချက်များ

ဂတ်စ်ပိုက်လိုင်း

- သဘာဝဓာတ်ငွေ့ပိုက်လိုင်းများ တိုးမြှင့်ရေးနှင့်ပတ်သတ်၍ စိုးရိမ်ပူပန်နေကြသော ရွာသားများ၏ သဘောထားများကို အခြေခံ၍ လျှပ်စစ်ဓာတ်အားထုတ်လုပ်ရေးလုပ်ငန်း (EPGE) သည် သက်ဆိုင်ရာ အဖွဲ့အစည်းများနှင့် ဆွေးနွေးခဲ့သည်။ ယခင်က ပိုက်လိုင်း ၃လိုင်း အစား ၂လိုင်းအထိ လျှော့ချခဲ့ပါသည်။



၃။ ယခင်တွေ့ဆုံပွဲများနှင့် မတူညီသည့်အချက်များ

ထပ်မံဖြည့်စွက်ရန်အခြေခံအချက်အလက်များကွင်းဆင်းလေ့လာခြင်း

- ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်လေ့လာခြင်း (EIA) လေ့လာဆန်းစစ်မှု၏ နယ်ပယ်တိုင်းတာသတ်မှတ်ခြင်းအစီရင်ခံစာ (Scoping Report) မှတ်ချက်များအပေါ်အခြေခံ၍ လျှပ်စစ်ဓာတ်အားထုတ်လုပ်ရေးလုပ်ငန်း (EPGE) သည် ၂၀၁၉ခုနှစ် အောက်တိုဘာလတွင် သဘာဝပတ်ဝန်းကျင်နှင့် လူမှုဝန်းကျင် ကွင်းဆင်း လေ့လာမှုများကို ဆောင်ရွက်ခဲ့သည်။

အကြောင်းအရာ	ထပ်မံကွင်းဆင်းလေ့လာမှုများ
သဘာဝ ပတ်ဝန်းကျင်	➢ လေထုအရည်အသွေးလေ့လာမှု: နောက်ထပ် ၄နေရာ ထပ်မံဆောင်ရွက်ခဲ့ (နဘဲပင်၊ တောင်ရင်း၊ ရှမ်းကန်ရွာ နှင့် IPP site) ➢ အသံနှင့် တုန်ခါမှု: နောက်ထပ် ၃နေရာ ထပ်မံဆောင်ရွက်ခဲ့ (နဘဲပင်၊ တောင်ရင်းနှင့် IPP site)
လူမှုဝန်းကျင်	ကျေးရွာအဆင့် ကွင်းဆင်းလေ့လာမှုများကို တောင်ရင်း၊ နဘဲပင် နှင့် ရှမ်းကန်ရွာ တို့တွင်ဆောင်ရွက်ခဲ့ပါသည်။
ကျန်းမာရေး	ကျေးရွာအဆင့် ကွင်းဆင်းလေ့လာမှုများကို သက်ရောက်မှုရှိသော ရွာအားလုံးတွင် ဆောင်ရွက်ခဲ့ပါသည်။

၄။ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်လေ့လာခြင်း (EIA) လေ့လာမှု အကျဉ်းချုပ်

သက်ရောက်မှု တို့ကိုလေ့လာအကဲဖြတ်ခြင်းနှင့် သဘာဝပတ်ဝန်းကျင် စီမံခန့်ခွဲမှု (EMP) ကို ရေးဆွဲခြင်း

ဆောက်လုပ်ရေးမလုပ်မီကာလ (PC)၊ ဆောက်လုပ်ရေးကာလ (CO)၊ လုပ်ငန်းလည်ပတ်သည့်ကာလ (OP) နှင့် လုပ်ငန်းရပ်စဲသည့်ကာလ (CL) တို့၏ သဘာဝပတ်ဝန်းကျင်နှင့် လူမှုပတ်ဝန်းကျင်ဆိုင်ရာ သက်ရောက်မှု တို့ကိုလေ့လာ၍ အကဲဖြတ်ခြင်းရလဒ်များကို (က) မှ (ဃ) အဆင့်ထိ အောက်ဖော်ပြပါ အမှတ်လက္ခဏာများနှင့်အညီ အမျိုးအစားသတ်မှတ်ပါသည်။

1) က-: သိသာသော ဆိုးကျိုးသက်ရောက်မှု   က+: သိသာသော ကောင်းကျိုးသက်ရောက်မှု
2) ခ-: ဆိုးကျိုးသက်ရောက်မှု အချို့   ခ+: ကောင်းကျိုးသက်ရောက်မှု အချို့
3) ဃ: အကျိုးသက်ရောက်မှု မရှိသလောက်ဖြစ်၍ ထပ်မံလေ့လာရန်မလို

သက်ရောက်မှုအကဲဖြတ်ခြင်း ရလဒ်များကို အခြေခံ၍ ဆိုးကျိုးသက်ရောက်မှုများကို လျှော့ချရန်နှင့် ၎င်းတို့ကို လက်ခံနိုင်သောအနေအထားထိ ရောက်စေရန် ရည်ရွယ်၍ သဘာဝပတ်ဝန်းကျင် စီမံခန့်ခွဲမှု အစီအစဉ် (EMP) ကို ရေးဆွဲခဲ့ပါသည်။

၄။ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်လေ့လာခြင်း (EIA) လေ့လာမှု အကျဉ်းချုပ်

အမျိုးအမည်	လေ့လာသည့် အမျိုးအစား	ဆန်းစစ်ချက် ရလဒ်			ဆိုးကျိုးသက်ရောက်မှုများကို လျှော့ချခြင်း နည်းလမ်းများ		
		PC/CO	OP	CL	ဆောက်လုပ်ရေးမလုပ်မီကာလ (PC)/ ဆောက်လုပ်ရေးကာလ (CO)	လုပ်ငန်းလည်ပတ်သည့်ကာလ (OP)	လုပ်ငန်းရပ်စဲသည့်ကာကာလ (CL)
ညစ်ညမ်းမှု လျော့ချခြင်း နည်းလမ်းများ	လေထု အရည် အသွေး	ခ-	ခ-	ခ-	· ဆောက်လုပ်ရေးလုပ်ငန်းသုံး စက်များကို အပြင်းအထန် လည်ပတ်ခြင်းမှ ရှောင်ကျဉ်ရန်	· နိုက်ထရိုဂျင်အောက်ဆိုဒ် ထွက်ရှိမှုနည်းသော ဂတ်စ်တာဘိုင် အမျိုးအစားများကို အသုံးပြုရန်	· ဆောက်လုပ်ရေး ကာလအတိုင်း ဆောင်ရွက်ရန်
	ရေအရည် အသွေး	ခ-	ဃ	ခ-	· သမဏ်ကိုယ်ထည်သုံး cofferdam ကို တပ်ဆင်အသုံးပြုခြင်း (Steel sheet pile)	· စွန့်ပစ်ရေသန့်စင် စက်ရုံတည်ဆောက်ခြင်းနှင့် သင့်လျော်စွာ လည်ပတ်ခြင်း	· ဆောက်လုပ်ရေး ကာလအတိုင်း ဆောင်ရွက်ရန်
	စွန့်ပစ်ပစ္စည်း	ခ-	ခ-	ခ-	· အစိုင်အခဲစွန့်ပစ်ပစ္စည်းများကို Recycle လုပ်ရန် နှင့် ပြန်လည်အသုံးပြုနိုင်ရန် အစိုင်အခဲစွန့်ပစ်ပစ္စည်းသိုလှောင်ရုံကို သီးခြားတည်ဆောက်ရန်	· သင့်လျော်သော အစိုင်အခဲစွန့်ပစ်ပစ္စည်း သန့်စင်ခြင်းနှင့် စွန့်ပစ်ခြင်းဆိုင်ရာ တတိယ အဖွဲ့အစည်းနှင့် စာချုပ်ချုပ်ဆိုခြင်း	· ဆောက်လုပ်ရေး ကာလအတိုင်း ဆောင်ရွက်ရန်
	အသံဆူညံမှု နှင့် တုန်ခါမှု	ခ-	ခ-	ခ-	· ဆောက်လုပ်ရေးလုပ်ငန်းသုံး စက်များကို အပြင်းအထန် လည်ပတ်ခြင်းမှ ရှောင်ကျဉ်ရန်	· ဂတ်စ်နှင့် ရေနွေးငွေ့တာဘိုင်များအတွက် အသံလုံစနစ်များတပ်ဆင် အသုံးပြုခြင်း	· ဆောက်လုပ်ရေး ကာလအတိုင်း ဆောင်ရွက်ရန်
	မြေကျွံခြင်း	ခ-	ဃ	ဃ	· ပိုက်လိုင်းနေရာကိုပြန်လည် မြေဖို့ရာတွင် စွန့်ပစ်ပစ္စည်းများနှင့် ရွှံ့စေးများ အသုံးမပြုရန်		
	ဆိုးရွားသော အနံ့	ဃ	ခ-	ဃ		· စွန့်ပစ်ရေသန့်စင် စက်ရုံအား ပုံမှန် ထိန်းသိမ်းခြင်း	

၄။ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်လေ့လာခြင်း (EIA) လေ့လာမှု အကျဉ်းချုပ်

အမျိုးအမည်	လေ့လာသည့် အမျိုးအစား	ဆန်းစစ်ချက် ရလဒ်			ဆိုးကျိုးသက်ရောက်မှုများကို လျှော့ချခြင်း နည်းလမ်းများ		
		PC/CO	OP	CL	PC/CO	OP	CL
သဘာဝ ပတ်ဝန်းကျင်	အပင်၊ တိရစ္ဆာန် ဂေဟာဗေဒစနစ်	ခ-	ခ-	ခ-	· ရေအရည်အသွေလေ့လာမှု အတိုင်း ဆောင်ရွက်ရန် · မြေမျက်နှာသွင်ပြင်ပြောင်းလဲမှုကို အနည်းဆုံးဖြစ်စေရန်	· ရေအရည်အသွေးလေ့လာမှု အတိုင်း ဆောင်ရွက်ရန်	· ရေအရည်အသွေးလေ့လာမှု အတိုင်း ဆောင်ရွက်ရန် · မြေမျက်နှာသွင်ပြင် ပြောင်းလဲမှုကို အနည်းဆုံးဖြစ်စေရန်
	ဇလဗေဒ	ဃ	ခ-	ဃ	·	· Regulation Pond တပ်ဆင် အသုံးပြုခြင်း	·
လူမှု ပတ်ဝန်း ကျင်	နေရာအသစ်သို့ ပြန်လည်နေရာ ချထားခြင်း	ခ-	ဃ	ဃ	လုံလောက်သော လျော်ကြေးပေးချေမှုများကို အကောင်အထည်ဖော်ရန် (အသေးစိပ် အချက်အလက်များကို RAP အစီရင်ခံစာတွင် ဖော်ပြထားပါသည်)		
	ဆင်းရဲနွမ်းပါးမှု	ခ- / ခ+ -	ခ+:	ခ+ ခ-:	· ဆောက်လုပ်ရေးလုပ်ငန်းများကိုသီးနံ ရိတ်သိမ်းပြီးသည် နှင့် အမြန်ဆုံး စတင်နိုင်ရန် ကျွမ်းကျင်မှုမရှိသောလုပ်သားများအ းအတွက် ဒေသခံများကိုဦးစားပေး ငှားရမ်းရန်	· ဒေသခံများတွင် စက်ရုံတွင်း ခန့်ထားရန် အရည်အချင်းပြည့်မီပါက EPGE သည် ဒေသခံများကို ဦးစားပေး ခန့်အပ်မည်ဖြစ်ပါသည်။	· ဆောက်လုပ်ရေး ကာလအတိုင်း ဆောင်ရွက်ရန်
	တိုင်းရင်းသား လူနည်းစုများနှင့် ဌာနေတိုင်းရင်	ဃ	ဃ	ဃ	စီမံကိန်းဧရိယာတဝိုက်တွင် တိုင်းရင်းသားလူနည်းစုများနှင့် ဌာနေတိုင်းရင်းသားများကို မတွေ့ရှိရသောကြောင့် ထိုသူတို့အပေါ် ဆိုးကျိုးသက်ရောက်နိုင်ခြေ မရှိဟု ယူဆပါသည်။		

၄။ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်လေ့လာခြင်း (EIA) လေ့လာမှု အကျဉ်းချုပ်

အမျိုး အမည်	လေ့လာသည့် အမျိုးအစား	ဆန်းစစ်ချက် ရလဒ်			ဆိုးကျိုးသက်ရောက်မှုများကို လျှော့ချခြင်း နည်းလမ်းများ		
		PC/ CO	OP	CL	PC/CO	OP	CL
လူမှု ပတ်ဝန်း ကျင်	ဒေသတွင်း စီးပွါးရေး (အလုပ်ရရှိမှု)	ခ+	ခ+	ခ+ -	· ကျွမ်းကျင်မှုမရှိသောလုပ်သားများအတွက် ဒေသခံများကိုဦးစားပေးငှားရမ်းရန်	· ဆင်းရဲနွမ်းပါးမှုနှင့် တူညီပါသည်။	· ဆောက်လုပ်ရေး ကာလအတိုင်း ဆောင်ရွက်ရန်
	(အသက်မွေး ဝမ်းကြောင်းမှု)	ခ- / ခ+-	ဃ	ဃ	· ဆောက်လုပ်ရေးလုပ်ငန်း များကို ရိတ်သိမ်းပြီးသည် နှင့် အမြန်ဆုံး စတင်နိုင်ရန်		
	မြေယာနှင့် ဒေသ၏ ရင်းမြစ်များ အသုံးပြုခြင်း	ခ-	ဃ	ဃ	· ဆောက်လုပ်ရေးလုပ်ငန်း များကို ရိတ်သိမ်းပြီးသည် နှင့် အမြန်ဆုံး စတင်နိုင်ရန်		
	ရေ အသုံးပြုမှု	ခ-	ခ-	ခ-	· ရေအရည်အသွေးအတွက် ဆောင်ရွက်မှုများအတိုင်း ဆောင်ရွက်ရန်	· ရေအရည်အသွေးအတွက် ဆောင်ရွက်မှုများအတိုင်း ဆောင်ရွက်ရန်	· ရေအရည်အသွေး ဆောင်ရွက်မှုများ အတိုင်း ဆောင်ရွက်ရန်
	လက်ရှိအများ ပြည်သူ အဆောက် အအုံများ နှင့် ဝန်ဆောင်မှုများ	ခ-	ခ-	ဃ	· ပိုက်လိုင်း၏အကျယ်ကို ကျဉ်းမြောင်းစေရန် သမဏ်ကိုယ်ထည်သုံး Steel sheet pile ကို တပ်ဆင်အသုံးပြုရန် · တပ်ဆင်ရာတွင် လုံခြုံမှုရှိစေရန် စကြံ့နည်းလမ်း တပ်ဆင်အသုံးပြုခြင်း	· စီမံကိန်းဧရိယာတဝိုက်၏ ကျောင်းများအတွက် အသံဆူညံမှု ကာကွယ်ရေး စည်းကမ်းများအတိုင်း ဆောင်ရွက်ရန်	
	ကျား/ မ တန်းတူညီမှု	ခ-	ခ-	ခ-	· ဒေသခံများကို အလုပ်အကိုင်ပေးရာတွင် ကျား၊မ ခွဲခြားခြင်း မရှိစေရန်	· အလုပ်အကိုင် အခွင့်အလမ်းများကို အစိုးရမှချမှတ်ထားသော မူဝါဒများ အတိုင်း သို့မှသာ ဆောင်ရွက်ရန်	· ဆောက်လုပ်ရေး ကာလအတိုင်း ဆောင်ရွက်ရန်

၄။ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်လေ့လာခြင်း (EIA) လေ့လာမှု အကျဉ်းချုပ်

အမျိုး အမည်	လေ့လာသည့် အမျိုးအစား	ဆန်းစစ်ချက် ရလဒ်			ဆိုးကျိုးသက်ရောက်မှုများကို လျှော့ချခြင်း နည်းလမ်းများ		
		PC/ CO	OP	CL	PC/CO	OP	CL
လူမှု ပတ်ဝန်း ကျင်	ကလေးသူငယ်များ၏ အခွင့်အရေး	ခ-	ခ-	ခ-	· တင်ဒါတွင် ကလေးသူငယ်လုပ်သား ခေါ်ယူမှု တားမြစ်ချက်များပါရှိသည်။	· ကလေးသူငယ်လုပ်သား ခေါ်ယူမှုအား တားမြစ်ပါသည်။	· ဆောက်လုပ်ရေး ကာလအတိုင်း ဆောင်ရွက်ရန်
	ကူးစက် ရောဂါများ၏ အန္တရာယ် (AIDS/HIV)	ခ-	ခ-	ခ-	· ကျွမ်းကျင်လုပ်သားများ ခေါ်ယူမှုနှင့် ဒေသအပေါ် သက်ရောက်လာနိုင်သော စိန်ခေါ်မှုများ၊ ကူးစက်ရောဂါကာကွယ်မှု နှင့် ကုသရေးနည်းလမ်းများ ဆောင်ရွက်ထားရှိရန်	· နိုက်ထရိုဂျင်အောက်ဆိုဒ် ထွက်ရှိမှုနည်းသော ဂတ်စ်တာဘိုင် အမျိုးအစားများကို အသုံးပြုရန်စွန့်ပစ်ရေသန့်စင် စက်ရုံတည်ဆောက်ခြင်းနှင့် သင့်လျော်စွာ လည်ပတ်ခြင်း	· ဆောက်လုပ်ရေး ကာလအတိုင်း ဆောင်ရွက်ရန်
	လုပ်ငန်းခွင ကျန်းမာရေး နှင့် ဘေးကင်းရေး	ခ-	ခ-	ခ-	· လုပ်ငန်းခွင်ကျန်းမာရေးနှင့်ဘေးကင်း လုံခြုံရေး အတွက် လုံခြုံသော လုပ်ငန်း ခွင်နှင့်အရေးပေါ် လုပ်ထုံးလုပ်နည်း ဆိုင်ရာ သတင်းအချက်အလက်များ ပေးခြင်း	· လုပ်ငန်းခွင်ကျန်းမာရေးနှင့်ဘေးကင်း လုံခြုံရေး အတွက်ဓါတ်အားပေးစက်ရုံ လုပ်ငန်းခွင်တွင် လုံလောက်သော ကျန်းမာရေး စောင့် ရှောက်မှုများ ထားရှိရန်	· ဆောက်လုပ်ရေး ကာလအတိုင်း ဆောင်ရွက်ရန်
	မတော်တဆ ဆမှုများ	ခ-	ခ-	ခ-	· ဆောက်လုပ်ရေးလုပ်ငန်းများတွင် ဒေသခံများ၏လုံခြုံရေးအတွက် သတင်းအချက်အလက်များ နှင့် လမ်းညွှန်မှုများပေးခြင်း	· ဓါတ်အားပေးစက်ရုံလည်ပတ်မှုကြောင့် ဖြစ်ပေါ်လာနိုင်သော မတော်တဆမှုများကို ကာကွယ်ရန်အတွက် လုပ်ငန်းခွင်အတွင်းချမှတ်ထားသော လုံခြုံမှုစံနှုန်းများကို လိုက်နာခြင်း	· ဆောက်လုပ်ရေး ကာလအတိုင်း ဆောင်ရွက်ရန်
	ရာသီဥတု	ခ-	ခ-	ခ-	· ဆောက်လုပ်ရေးလုပ်သားများအတွက်	· Combined cycle စနစ်သည်	· ဆောက်လုပ်ရေး

၄။ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်လေ့လာခြင်း (EIA) လေ့လာမှု အကျဉ်းချုပ်

အမျိုးအမည်	လေ့လာသည့် အမျိုးအစား	ဆန်းစစ်ချက်ရလဒ်			ဆိုးကျိုးသက်ရောက်မှုများကို လျှော့ချခြင်း နည်းလမ်းများ		
		PC/CO	OP	CL	PC/CO	OP	CL
ယဉ်ကျေးမှု	ယဉ်ကျေးမှုအမွေအနှစ်များ (ဘုရားများ)	ခ-	ခ-	ခ-	· အသံဆူညံမှု နှင့် တုန်ခါမှုအတိုင်း ဆောင်ရွက်ရန်	· အသံဆူညံမှု နှင့် တုန်ခါမှုအတိုင်း ဆောင်ရွက်ရန်	· အသံဆူညံမှု နှင့် တုန်ခါမှုအတိုင်း ဆောင်ရွက်ရန်
	ယဉ်ကျေးမှုအမွေအနှစ်များ (ရှေးဟောင်းယဉ်ကျေးမှုနယ်မြေ)	ခ-	ဃ	ဃ	· ရှေးဟောင်းယဉ်ကျေးမှု နယ်မြေ၏ မြို့နံ့ရံနားတွင် လက်ဖြင့်သာ တူးဖော်ရန် · ရှေးဟောင်းယဉ်ကျေးမှု နယ်မြေ၏ မြို့နံ့ရံနားတွင် ရှောင်၍ တူးဖော်ရန် · EIA လေ့လာမှုပြီးလျှင်လည်း ရှေးဟောင်းသုတသနနှင့်အမျိုးသားပြသားပြတိုက်ဦးစီးဌာန(DoANM) နှင့် အမြဲမပြတ် ဆွေးနွေး ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။ (အသေးစိပ် ဒီဇိုင်း၊ ဆောက်လုပ်ရေးလုပ်ငန်းများစသည်)		
မြင်ကွင်းအနေအထား	ရှုခင်း	ခ-	ခ-	ခ-	· ဆောက်လုပ်ရေးကာလ အတွင်း တောင်ဘက်နှင့် အရှေ့ဘက်ခြမ်းတို့တွင် ယာယီအကာအကွယ်နံရံများ တပ်ဆင်သွားမည် ဖြစ်ပါသည်။	· စီမံကိန်းဧရိယာတဝိုက်တွင် သစ်ပင်များ စိုက်ပျိုးခြင်းနှင့် စိမ်းလန်းစိုပြေစေရန် ဆောင်ရွက်ခြင်း	· ဆောက်လုပ်ရေး ကာလအတိုင်း ဆောင်ရွက်ရန်

၅။ ပြန်လည်နေရာချထားရေးအစီအမံ လေ့လာမှု အကျဉ်းချုပ်

စီမံကိန်းအတွက်နောက်ဆုံးရက်သတ်မှတ်ခြင်း

စီမံကိန်း ဧရိယာအတွင်းရှိ ဒေသခံများ၏ အနေအထားအတည်အကျဖြစ်အောင်ပြုလုပ်ရန် လိုအပ်ပါသည်။

↓

စီမံကိန်းအတွက် နောက်ဆုံးရက်သတ်မှတ်ခြင်း

၂၀ ဒီဇင်ဘာ၊ ၂၀၁၉	အမွေအနှစ်ဖုန်အနီး ပြန်လည်သတ်မှတ်ထားသော ပိုက်လိုင်းအတွက်
၃၀ ဧပြီ၊ ၂၀၁၉	အခြား ဧရိယာများအတွက်

↓

- ဖြတ်တောက်သည့်နေ့နောက်ပိုင်း ဧရိယာအတွင်း ကျူးကျော်ဝင်ရောက်လာသူများသည် လျော်ကြေး သို့မဟုတ် အခြားပြန်လည်နေရာချထားရေး အကူအညီများကို ခံစားခွင့်မရှိပါ။
- လုပ်ငန်းခွင်အခြေအနေပေါ်မူတည်၍ နောက်ထပ်လေ့လာသည့်အဆင့်တွင် စီမံကိန်းအတွက် နောက်ဆုံးရက်သတ်မှတ်သည့်နေ့စွဲကို ပြန်လည်သုံးသပ်ရန် သို့ အသစ်ပြောင်းလဲရန်

၅။ ပြန်လည်နေရာချထားရေး လေ့လာမှု အကျဉ်းချုပ်

ပြန်လည်နေရာချထားရေးအစီအစဉ်ပြင်ဆင်မှုများအတွက်သက်ဆိုင်သောစည်းမျဉ်းများနှင့် စံချိန်စံညွှန်းများ

[အလှူရှင်မူဝါဒများ]

- JICA ၏သဘာဝပတ်ဝန်းကျင် နှင့် လူမှုရေးထည့်သွင်းစဉ်းစားခြင်းဆိုင်ရာလမ်းညွှန်ချက်များ (ဧပြီ၂၀၁၀)
- ကမ္ဘာ့ဘဏ် OP 4.12

[မြန်မာနိုင်ငံ၏ လုပ်ထုံးလုပ်နည်းများ]

- မြေယာသိမ်းဆည်းခြင်းဥပဒေ ၁၈၉၄
- လယ်ယာမြေ ဥပဒေ ၂၀၁၂
- လယ်ယာမြေ နည်းဥပဒေများ ၂၀၁၂
- အမျိုးသား မြေအသုံးချမှု မူဝါဒ (ဇန်နဝါရီ၊ ၂၀၁၆)

၅။ ပြန်လည်နေရာချထားရေး လေ့လာမှု အကျဉ်းချုပ်

	မကွန်ရာ	ဘယ်လင်း	တောင်ရင်း	ညှော့ပြ	ပင်းချား
သက်ရောက်ခံ မြေကွက် အရေအတွက် စုစုပေါင်း	၁	၄၉	၂၅	၁၇	၁၃
ပြည်သူပိုင်မြေ မြေကွက် အရေအတွက်	၁	၃	၀	၁	၁
လယ်ယာကွက်များ အရေအတွက်	၀	၄၆	၂၅	၁၆	၁၂
စုစုပေါင်း အဆောက်အဦးအရေအတွက်	၀	၁	၀	၆	၆
- တဲ	၀	၀	၀	၀	၁
- ခြံစည်းရိုး	၀	၁	၀	၆	၅
ဆိုင်အရေအတွက်	၀	၀	၀	၀	၀

၅။ ပြန်လည်နေရာချထားရေး လေ့လာမှု အကျဉ်းချုပ်

	မုန့်ပေါင်း	တောမ	အုန်းပင်ခြံ	စုစုပေါင်း
သက်ရောက်ခံ မြေကွက် အရေအတွက် စုစုပေါင်း	၀	၂၂	၂၁	၁၄၈
ပြည်သူပိုင်မြေ မြေကွက် အရေအတွက်	၀	၀	၀	၆
လယ်ယာကွက်များ အရေအတွက်	၀	၂၂	၂၁	၁၄၂
စုစုပေါင်း အဆောက်အဦးအရေအတွက်	၀	၀	၄	၁၇
တဲ	၀	၀	၀	၁
ခြံစည်းရိုး	၀	၀	၄	၁၆
ဆိုင်အရေအတွက်	၂	၀	၀	၂

၅။ ပြန်လည်နေရာချထားရေး လေ့လာမှု အကျဉ်းချုပ်

လျော်ကြေးတွင် ထည့်သွင်းစဉ်းစားသည့် အချက်များ

	အမျိုးအစား	ကူညီထောက်ပံ့မှု
၁။	မြေ	
၁)	ရေရယူရန် စက်ပစ္စည်းများနှင့် လျှပ်စစ်တိုင်များ တပ်ဆင်သည့်မြေနေရာများ (အမြဲတမ်းအတွက် ရယူခြင်း)	က) ထိခိုက်သည့်မြေနေရာအတွက် အစားထိုးလျော်ကြေးငွေ အပြည့်ပေးချေမှု
၂)	ရေပိုက်နှင့် ဂတ်စ်ပိုက်များ တပ်ဆင်ထားသည့် မြေနေရာများ (ယာယီ အသုံးပြုခြင်း)	က) ထိခိုက်နစ်နာသော အပိုင်းရှိ သီးနှံများ/ သစ်ပင်များအတွက် ငွေသားလျော်ကြေး (နံပါတ်-၃ ကို လေ့လာပါ)

၅။ ပြန်လည်နေရာချထားရေး လေ့လာမှု အကျဉ်းချုပ်

လျော်ကြေးတွင် ထည့်သွင်းစဉ်းစားသည့် အချက်များ

	အမျိုးအစား	ကူညီထောက်ပံ့မှု
၂	အဆောက်အအုံ	
၁)	စပါးကျီ သို့ သီးနှံများသိမ်းသည့် ဂိုဒေါင်	က) အသုံးမပြုသည့် အဆောက်အအုံပင် ဖြစ်လင့်ကစား ထိခိုက်သည့်အဆောက်အအုံ တခုလုံးအတွက် အစားထိုးလျော်ကြေးငွေ အပြည့်ပေးချေမှု
၂)	ဆိုင်	က) တတ်နိုင်သမျှ အနီးဆုံးနေရာတွင် ဆိုင်နေရာ ပြန်လည်စီစဉ်ပေးမှု ခ) ဆိုင်နေရာ ယာယီပြောင်းလဲပေးရသောကြောင့် ဆိုင်မဖွင့်ရသည့် အချိန်အတွက် ငွေပေးချေခြင်း

၅။ ပြန်လည်နေရာချထားရေး လေ့လာမှု အကျဉ်းချုပ်

လျော်ကြေးတွင် ထည့်သွင်းစဉ်းစားသည့် အချက်များ

	အမျိုးအစား	ကူညီထောက်ပံ့မှု
၃	သီးနှံများနှင့် သစ်ပင်များ	
၁)	သီးနှံများ	[သီးနှံပိုင်ရှင်များအတွက်] က) လက်ရှိ ပျမ်းမျှ အထွက်နှုန်း နှင့် ဈေးကွက်ကာလ ပေါက်ဈေး တို့အပေါ်တွက်ချက်၍ တန်ဖိုး၏ ၃ဆရှိ ငွေသားလျော်ကြေး ပေးချေမှု
၂)	သစ်ပင်များ	[သစ်ပင်ပိုင်ရှင်များအတွက်] က) ဈေးကွက်ကာလ ပေါက်ဈေး အပေါ်တွက်ချက်၍ တန်ဖိုး၏ ၃ဆရှိ ငွေသားလျော်ကြေး ပေးချေမှု

၅။ ပြန်လည်နေရာချထားရေး လေ့လာမှု အကျဉ်းချုပ်

ဝင်ငွေ ပြန်လည်ထူထောင်ရေး အစီအစဉ် (IRP)

အမျိုးအစား	စံနှုန်း	ပါဝင်သည့် အကြောင်းအရာ	မှတ်ချက်
စိုက်ပျိုးမြေ ပိုင်ရှင်များ၊ မြေငှားများ၊ အလုပ်သမားများနှင့် ဆိုင်ပိုင်ရှင်များ၊ ဆိုင် အလုပ်သမားများ	➢ အမြဲတမ်း (သို့) ကာလကြာရှည်စွာ ဝင်ငွေ ထိခိုက်ခြင်း ➢ ရေပိုက်နှင့် ဂတ်စ်ပိုက်လိုင်း တပ်ဆင့်သည့်လုပ်ငန်းများ အတွင်း ယာယီဝင်ငွေ ထိခိုက်ခြင်း	က) ဝင်ငွေလမ်းကြောင်းပြောင်းလဲရာတွင် ကူညီထောက်ပံ့ပေးခြင်း ခ) အုပ်ချုပ်ရေးဆိုင်ရာ ကူညီထောက်ပံ့ပေးခြင်း ဂ) အကယ်၍ စီမံကိန်း၏လိုအပ်ချက်နှင့် ထိခိုက်နစ်နာသောသူ၏ အရည်အချင်းတို့ ကိုက်ညီပါက စီမံကိန်းတွင် အမြဲတမ်းဝန်ထမ်း အဖြစ် ဦးစားပေးခန့်အပ်ခြင်း	က)နှင့် (ခ) ဝင်ငွေရင်းမြစ် အခြေအနေ ဆန်းစစ်ခြင်းကို သက်ဆိုင်ရာပါတီများ အားလုံးက စစ်ဆေးပါမည်
အားနည်းသည့် အုပ်စုများ	➢ အားနည်းသော (နွမ်းပါးသော) အုပ်စုအဖြစ် သတ်မှတ်ထားသော အိမ်ထောင်စုများ	➢ အကယ်၍ စီမံကိန်း၏လိုအပ်ချက်နှင့် ထိခိုက်နစ်နာသောသူ၏ အရည်အချင်းတို့ ကိုက်ညီပါက စီမံကိန်းတွင် အမြဲတမ်းဝန်ထမ်း အဖြစ် ဦးစားပေးခန့်အပ်ခြင်း ➢ ထိခိုက်နစ်နာသောသူ၏ စိတ်ဝင်စားမှုနှင့် လူမှုဖူလုံရေး ဝန်ဆောင်မှုများ ကိုက်ညီမှုရှိပါက ကူညီဆောင်ရွက်ပေးရန်	➢ နွမ်းပါးသော အိမ်ထောင်စုအဖြစ် သတ်မှတ်ခြင်းကို သက်ဆိုင်ရာ ပါတီများ၏ အတည်ပြုချက်ဖြင့် ဆောင်ရွက်ပါမည်

အထက်ဖော်ပြပါလူများအပြင်၊ ၂၀၀၅ ခုနှစ် ဘီးလင်း ဓါတ်အားပေးစက်ရုံတွင် မြေယာပါထားသောသူများကိုပါ စီမံကိန်း၏လိုအပ်ချက်နှင့် ကိုက်ညီပါက စီမံကိန်းတွင် အမြဲတမ်းဝန်ထမ်း အဖြစ်ခန့်အပ်သွားမည် ဖြစ်ပါသည်။

၅။ ပြန်လည်နေရာချထားရေး လေ့လာမှု အကျဉ်းချုပ်

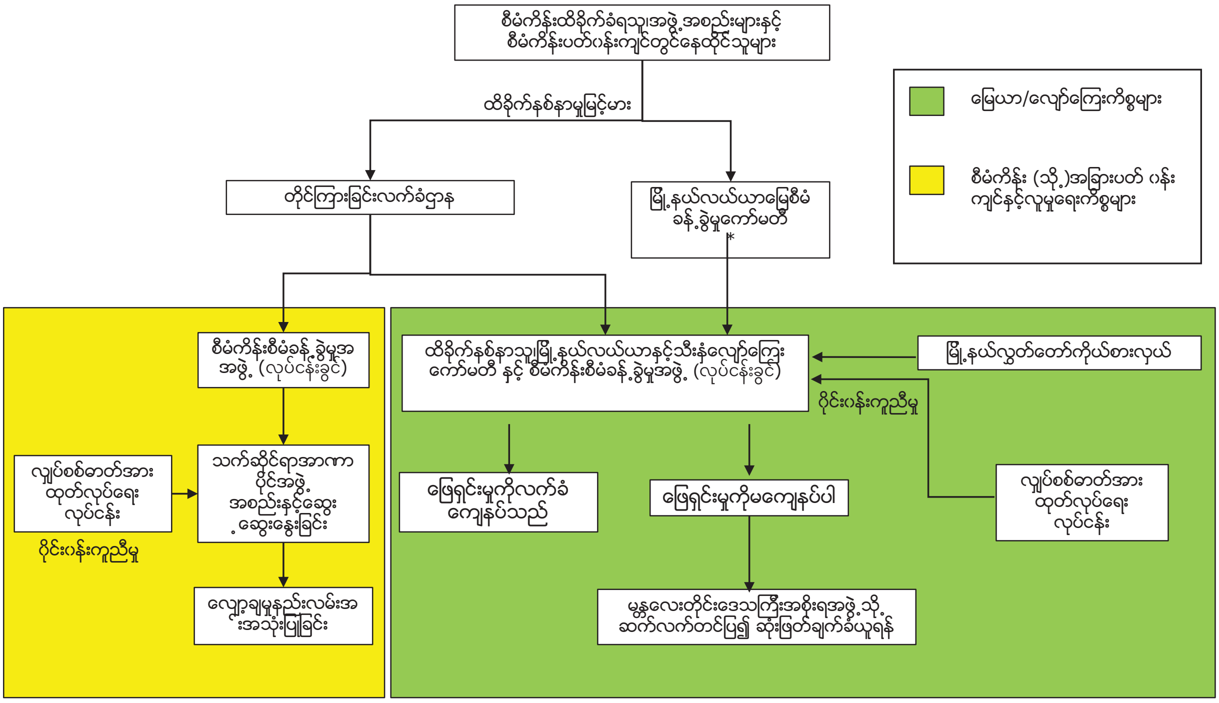
နစ်နာမှုများကို ဖြေရှင်းသည့် စနစ် (GRM)

နစ်နာမှုများကို ဖြေရှင်းသည့် စနစ် (GRM) ၏ ရည်ရွယ်ချက်များ

(1) စီမံကိန်းနှင့် ပတ်သတ်သည့် တိုင်ကြားချက်များကို ကိုင်တွယ်ဖြေရှင်းခြင်း

(2) တိုင်ကြားသည့် လူပုဂ္ဂိုလ်နှင့် တိုင်ပင်ဆွေးနွေး၍ ပေါ်ပေါက်လာသော ပြဿနာပေါ် ဆန်းစစ်ခြင်းနှင့် သင့်လျော်သော နည်းလမ်းများဖြင့် ဖြေရှင်းခြင်း

၅။ ပြန်လည်နေရာချထားရေး လေ့လာမှု အကျဉ်းချုပ်



* LCCC = မြို့နယ်လယ်ယာမြေစီမံ ခန့်ခွဲမှုကော်မတီ

၆။ အမေး အဖြေ ကဏ္ဍ

လူကြီးမင်း၏ စိတ်ဝင်စားမှုအတွက် ကျေးဇူးအထူးတင်ရှိပါသည်။

Appendix E

Record of PCM for Scoping of EIA

Record of PCM for Scoping of EIA

Summary of the results of four sessions of PCM at scoping stage are presented in Tables 1 to 4. The comments of the participants from feedback forms are also described in Tables 5 to 8.

Table 1 Summarized results at the first session of PCM at scoping stage

<table>
<tr><td colspan="2">Date: 6/10/ 2018 (Saturday)</td><td colspan="2">Time: 9:30 to 11:00 am</td><td>Venue: Kone Myint TharYar Monastery</td></tr>
<tr><td rowspan="10">1. Participants</td><td>Organization</td><td colspan="2">Participants</td><td>Total</td></tr>
<tr><td>General Administration Department (GAD) (Sintgaing Township)</td><td colspan="2">➢ Deputy Township Administrator</td><td>1</td></tr>
<tr><td>Electric Power Generation Enterprise (EPGE)</td><td colspan="2">➢ Superintendent Engineer
➢ Assistant Engineer</td><td>3</td></tr>
<tr><td>Mandalay Regional Environmental Conservation Department (ECD- Mandalay)</td><td colspan="2">➢ Assistant Director</td><td>1</td></tr>
<tr><td>Irrigation and Water Utilization Management Department</td><td colspan="2">➢ Staff Officer
➢ Assistant staff officer</td><td>2</td></tr>
<tr><td>EIA Study Team</td><td colspan="2"></td><td>5</td></tr>
<tr><td>E Bya Village</td><td colspan="2"></td><td>Men: 35
Women: 9
Total: 44</td></tr>
<tr><td>Met Ka Ya Village</td><td colspan="2"></td><td>Men: 12
Women: 0
Total: 12</td></tr>
<tr><td>Mont Paung Village</td><td colspan="2"></td><td>Men: 9
Women: 1
Total: 10</td></tr>
<tr><td>Kyun U Village</td><td colspan="2"></td><td>Men: 1
Women: 0
Total: 1</td></tr>
<tr><td></td><td colspan="3">Total</td><td>79</td></tr>
<tr><td rowspan="2">2. Main Discussion Points</td><td colspan="2">Opinion/Question</td><td colspan="2">Explanation and Response</td></tr>
<tr><td colspan="2">(Mont Paung Village)
How is the explosive distance if the gas pipeline exploded? How is the responsibility if there are impacts on villagers by the project?</td><td colspan="2">EPGE
Nowadays, technology of gas pipeline construction is higher than before. The main reason of gas pipeline explosion is that pipe become thin and explode because of using more pressure of gas which is applied in the pipe, transmitting more pressure into the pipe than it is needed and using the pipe for many years with poor maintenance. Safety is prioritized on this project. This pipeline is planned to be safe, resist and repaired when it is needed. It won’t be dangerous. Even if the pipeline is accidentally exploded, it would not affect much on the surroundings because it is constructed underground. Pipeline maintenance will always be carried out. Holding this kind of meeting is intended to explain the question and reduce the worries of public. Auto shut down system is included if there will be</td></tr>
</table>

		accidental damage. It cannot be dangerous because the high-quality pipeline will be installed.
	Irrigation and Water Utilization Management Department It is found that pipeline will be passed beside irrigation canal. **Pipeline can disturb the water** flow. If the pipeline is buried at 1.3 meter depth, it will be safe for irrigation canal. If the pipeline is passed over the tunnel, it can be damaged while maintenance service performed for canal using machinery. Those points should be considered.	EIA **Study Team** This meeting is intended to meet with public and make presentation as preliminary for environmental impact assessment. After that, baseline data collection will be conducted. If there are impacts on land concerned with pipeline construction, it will be presented in next meeting. At the moment, surveying along the pipeline is being conducted to know the affected land and people. After the pipeline is buried, the farmers can replant on their land. When the affected lists have been prepared, another meeting will be hold. If there will be affected land, land management committee will be constituted and cooperated with Ministry of Electricity and Energy. We, Local consultant are studying the natural environment and social environment in order to mitigate the potential impacts.
3. Photograph		

Source: EIA Study Team

Table 2 Summarized results at the second session of PCM at scoping stage

Date: 6/10/ 2018 (Saturday)		Time: 1:30 to 3:00 pm	Venue: Ohn Pin Chan Village Religious Hall
1. Participants	Organization	Participants	Total
	Electric Power Generation Enterprise (EPGE)	➢ Superintendent Engineer ➢ Assistant Engineer	3
	EIA Study Team		5
	Pin Char Village		Men: 6 Women: 0 Total: 6
	Ohn Pin Chan Village		Men: 18 Women: 45 Total: 63
	Kyi Village		Men: 1 Women: 0 Total: 1
	Sint Gaing Gyi Village		Men: 2 Women: 0 Total: 2
	Myo Ma Village		Men: 1 Women: 0 Total: 1
	Ka The Zu Village		Men: 3 Women: 0 Total: 3
	Taw Ma Village		Men: 1 Women: 0 Total: 1
	Mont Paung Village		Men: 1 Women: 0 Total: 1
	Total		86

2. Main Discussion Points	Opinion/Question	Explanation and Response
	(Pin Char Village) - Where will waste water be discharged because water will be used in project operation phase? - How is the pollution of air emission?	**EIA Study Team** The water from Myitnge River will be used. Now survey team is monitoring air conditions. The results and baseline conditions will be presented at second meeting. **EPGE** There would not be negative impacts. Even if there is emission into air or water, these emissions will be satisfied with standards and guidelines. **EPGE** At the project, water will be used after treatment. Waste water will be discharged to the Myitnge River after proper treatment. This kind of explanation, getting opinions and making discussions are conducted for public awareness. At the present, there are about ten power plants operating with gas,

		mostly in Yangon. There has no danger at the moment.
3. Photograph		

Source: EIA Study Team

Note: Though total attendees were 86, registered or signed attendees were 79, because of 3 persons from EPGE and 4 persons from EIA Study Team did not sign.

Table 3 Summarized results at the third session of PCM at scoping stage

<table>
<tr><td colspan="2">Date: 7/10/2018 (Sunday)</td><td colspan="2">Time: 9:30 to 11:00 am</td><td>Venue: Taung Yin Village Religious Hall</td></tr>
<tr><td rowspan="10">1. Participants</td><td>Organization</td><td colspan="2">Participants</td><td>Total</td></tr>
<tr><td>Electric Power Generation Enterprise (EPGE)</td><td colspan="2">➢ Superintendent Engineer
➢ Assistant Engineer</td><td>3</td></tr>
<tr><td>EIA Study Team</td><td colspan="2"></td><td>5</td></tr>
<tr><td>Mandalay Regional Environmental Conservation Department
(ECD- Mandalay)</td><td colspan="2">➢ Assistant Director</td><td>1</td></tr>
<tr><td>General Administration Department (GAD)
(Sintgaing Township)</td><td colspan="2">➢ GAD staff, Clerk</td><td>1</td></tr>
<tr><td>Irrigation and Water Utilization Management Department</td><td colspan="2">➢ Irrigation Staff, controller</td><td>1</td></tr>
<tr><td>Na Be Bin Village</td><td colspan="2"></td><td>Men: 22
Women: 20
Total: 42</td></tr>
<tr><td>Taung Yin Village</td><td colspan="2"></td><td>Men: 3
Women: 1
Total: 4</td></tr>
<tr><td>Shan Kan Village</td><td colspan="2"></td><td>Men: 6
Women: 0
Total: 6</td></tr>
<tr><td colspan="3">Total</td><td>63</td></tr>
<tr><td rowspan="3">2. Main Discussion Points</td><td colspan="2">Opinion/Question</td><td colspan="2">Explanation and Response</td></tr>
<tr><td colspan="2">Taung Yin Village
On behalf of local farmers, I would like to explain about land acquisition for construction Belin Sub-Station. Firstly in 2004, 45.34 acres of land were occupied by government as well as 28.77 acres were also occupied secondly. We lost the crops.
Villagers are being altered from farmers to daily labors. It was presented on villagers' grievances. There are 25 farmers who were affected. If the project needs employees, those 25 farmers should be prioritized. There are young educated persons in another village. The local people should be considered priority for works of the project.</td><td colspan="2">EPGE
We sympathize for land loss. I don't want to comment for past conditions. Past and present are not the same. If there is a project, it is carried out after public consultations before the project begins. If there are impacts by the project, it will be performed not to have grievances. Local people are prioritized for work opportunity. It is already instructed to give the work opportunity to local people during plant construction phase and operation phase.</td></tr>
<tr><td colspan="2">Na Be Bin Village
I would like to know the positive and negative impacts by the project because it is located near Na Be Bin village. Because natural gas is used in operation, heat wave and ecosystem degradation are being worried. We heard that gas emission is happening in other cement plants. If such kind of problems occur, who will be responsible for this?</td><td colspan="2">EIA Study Team
The villagers may have that kind of worries. That's why environmental impact assessment team is surveying to know baseline air and water quality. The results will be presented in next meeting. This project is a state-owned and thus the responsibility belongs to government.</td></tr>
</table>

<table>
<tr><td></td><td></td><td>EPGE
There are 5 power plants in Yangon. Those are constructed at residential area. EPGE employees are also living in that compound. Your worries will not be happened. Gas is mainly methane and it is burnt when it is with oxygen. Toxic which is dangerous for people cannot be formed. Wastewater will be discharged after proper treatment.

EPGE
Contact addresses will be provided to inform EPGE directly if there are impacts and problems concerned with the project.</td></tr>
<tr><td rowspan="3">3. Photograph</td><td>
</td><td>
</td></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td>
</td><td>
</td></tr>
</table>

Source: EIA Study Team

Note: Though total attendees were 63, registered or signed attendees were 55, because of 3 persons from EPGE, 4 persons from EIA Study Team and 1 person from local consultant did not sign.

Table 4 Summarized results at the fourth session of PCM at scoping stage

<table>
<tr><td colspan="2">Date: 7/10/ 2018 (Sunday)</td><td colspan="2">Time: 1:30 to 3:00 pm</td><td>Venue: Taung U Village Religious Hall</td></tr>
<tr><td rowspan="11">1. Participants</td><td>Organization</td><td colspan="2">Participants</td><td>Total</td></tr>
<tr><td>Electric Power Generation Enterprise (EPGE)</td><td colspan="2">➢ Superintendent Engineer
➢ Assistant Engineer</td><td>3</td></tr>
<tr><td>Myanma Oil and Gas Enterprise (MOGE)</td><td colspan="2">➢ Assistant Engineer</td><td>1</td></tr>
<tr><td>EIA Study Team</td><td colspan="2"></td><td>7</td></tr>
<tr><td>Taung U Village</td><td colspan="2"></td><td>Men: 16
Women: 2
Total: 18</td></tr>
<tr><td>Be Lin Village</td><td colspan="2"></td><td>Men: 6
Women: 2
Total: 8</td></tr>
<tr><td>Kyauk Mine Village</td><td colspan="2"></td><td>Men: 4
Women: 0
Total: 4</td></tr>
<tr><td>Ah Le Kyauk Mine Village</td><td colspan="2"></td><td>Men: 1
Women: 0
Total: 1</td></tr>
<tr><td>Ban da Village</td><td colspan="2"></td><td>Men: 6
Women: 5
Total: 11</td></tr>
<tr><td>Other</td><td colspan="2"></td><td>Men: 1
Women: 0
Total: 1</td></tr>
<tr><td colspan="3">Total</td><td>54</td></tr>
<tr><td rowspan="3">2. Main Discussion Points</td><td colspan="2">Opinion/Question</td><td colspan="2">Explanation and Response</td></tr>
<tr><td colspan="2">Taung U Village
Environmental impacts are quite far way to know for villagers. Because of the government project, there is no way to object. Affected farmers should be consulted and negotiated transparently.</td><td colspan="2">EPGE
300 MW power plant owned by government will be constructed in the Belin substation compound. The project will take about five years for construction. Construction phase and EIA implementation will also be taking time.

EIA Study Team
This meeting is intended to inform that environmental impact assessment is started to investigate. Concerned with land, our team is now surveying. The results will be presented in next meeting.</td></tr>
<tr><td colspan="2">Be Lin Village
One gas pipeline is already existed near your planned pipeline route. Meeting for new gas pipeline construction was carried out in last month. Are new gas pipeline and the planned pipeline of the project the same or not?</td><td colspan="2">EPGE
It is different. That new gas pipeline is for short term project operated by MOGE. EPGE will discuss with MOGE for pipeline route.</td></tr>
</table>

3. Photograph

Source: EIA Study Team

Table 5 Feedback from participants at first session of PCM at scoping stage

No.	Name	Village	Contact No.	Comment/Suggestion
1		Met Ka Ya		I advocate the project. It sounds good.
2		E Bya		I advocate all the things.
3		E Bya		I Agree.
4				I satisfy.
5		E Bya		I satisfy that the government does good things.
6		Mont Paung		I have no objection.
7				I satisfy.
8		E Bya		I agree.
9		E Bya		It is the best if public will not be impacted.
10		E Bya		I would like the project to implement the safety for local communities during construction phase.
11		E Bya		The project sounds good. It is good for country development. I would like the project to implement without impacting the public.
12		E Bya		On behalf of local farmers I would like the project to implement without impacting the public.
13		E Bya		I think that the project is good for village.
14		E Bya		I satisfy that the government does good things.
15		E Bya		It will be good if there are no grievances by the project.
16		E Bya		It will be good if there are no grievances by the project.
17		E Bya		It will be good if there are no grievances by the project.
18		E Bya		I think that the project is good because it is assumed that there is no grievance by the project.
19		E Bya		I would like the project to implement the safety for local people along pipe line, the good transportation and water flow of rivers.
20		Mont Paung		Roads can be destroyed because of traffic during construction of gas pipeline. We would like the project to repair the roads as well as create the job opportunities for local workers.
21		Met Ka Ya		Job opportunities are desired during project construction. We want the project to be successful.
22		E Bya		Local people should be prioritized if labors are needed during pipeline construction.
23		Mont Paung		The project should be implemented according to the wishes of local people. I would like the project to implement without impacting the public by natural disaster.
24		E Bya		I would like the project to implement without impacting the public and to help the necessity of villages.
25		E Bya		I advocate the project implementation. I would like the project to implement with less impact and to avoid the impact to road users such as local people and students by machines and vehicles during project implementation.
26		E Bya		The project should be implemented because of providing electricity to public by the government.
27		Mont Paung		I would like the project to implement without impacting the public by natural disaster as well as without damaging the road beside Mont Paung Canal and to repair as original conditions if damaged.
28		Mont Paung		I would like the project to support conveniently because I'm living beside Mont Paung Canal. The project should be implemented without impacting the public by natural disaster as well as without damaging the road by traffic during construction and needed to repair as original conditions if damaged.
29		E Bya		I would like the project to make convenient the channel for water intake and to repair the road if damaged.

No.	Name	Village	Contact No.	Comment/Suggestion
30		E Bya		Explanation is good. The project should be implemented without impact anyone. The power plant should be constructed without impacting the environment. Air and water are also needed to clean.
31		Mont Paung		Beside farmland compensation, life insurances for local people whose living beside pipeline should be considered. Job opportunities should be focused for farmers and villagers.
32		E Bya		Layout map for construction is needed. It is necessary to present detailed line route and affected farm land, garden land.
33		Mont Paung		The project should be implemented according to the wishes of local people. I would like the project to implement without impacting the public by natural disaster.
34		Mont Paung		It is difficult to pass the road beside Mont Paung canal by trucks. Villagers are repairing the road by themselves and it is hoped to repair the road to be good. Beside farmland compensation, life insurances for local people living beside pipeline should be considered. Job opportunities should be focused for farmers and villagers along pipeline.
35		Kyun U		Drivers should drive safely without harming local people during construction phase. Roads should be repaired to be good. The project should be performed safely for public.
36		E Bya		Drivers should drive safely without harming local people during construction phase. Roads should be repaired to be good. The project should be performed safely for public.
37		E Bya		Kyaukse Natural gas and waste heat power plant project (Combined Cycle Power Plant) by national government is very good.
38		E Bya		Implementing the public consultation is very good.

Source: EIA Study Team

Table 6 Feedback from participants at second session of PCM at scoping stage

No.	Name	Village	Contact No.	Comment/Suggestion
1		Ohn Pin Chan		It will be good if no danger for my village. I would like the project to implement safely during construction and operation phase.
2		Ohn Pin Chan		The project will be good if local people are not impacted by project implementation.
3		Ohn Pin Chan		The project is hoped to success.
4		Ka The Zu		If the project is started, the time should be after harvesting crops in dry season.
5		Ohn Pin Chan		The project will be good if the benefits of local people are not impacted by project implementation.
6		Ohn Pin Chan		Can health be impacted at present project construction site? Can the project affect local people?
7		Ohn Pin Chan		Can the project construction affect health? Can earthquakes occur? Can humans be dangerous?
8		Pin Char		I would like the project to implement avoiding the damage to roads around the village and waste water channel. Job opportunities for villagers should be considered.
9		Ohn Pin Chan		I advocate that the power plant construction is good because Ohn Pin Chan village will be passed by pipeline and natural environment are not impacted by the project. Excavated soil for burring pipeline should be refilled.
10				Which organization is responsible for possible negative impacts and how it will be carried out?
11		Ohn Pin Chan		Social environment should be safe.

No.	Name	Village	Contact No.	Comment/Suggestion
12				Can using old pipeline be safe? Can waste heat gas have side effects for babies and pregnant? It is better no impacts on environment rather than less impact on environment. How is the responsibility of company for diseases from labors who come from other places? Present environment should not be worse than before because of plant construction.
13		Ohn Pin Chan		I worry to affect Ohn Pin Chan Village by the project.
14		Ohn Pin Chan		I like the construction of the plant.
15		Ohn Pin Chan		I think the project is good.
16		Ohn Pin Chan		I think that project construction is good.
17		Ohn Pin Chan		I think that the project is good.
18		Pin Char		The project is good.
19		Ohn Pin Chan		Noting to say about the project right now.
20		Ohn Pin Chan		I think that project implementation is good.
21		Ohn Pin Chan		I think that project implementation is good.
22		Ohn Pin Chan		I think that project implementation is good.
23		Ohn Pin Chan		I think that project implementation is good.
24		Ohn Pin Chan		I think that project implementation is good.
25		Ohn Pin Chan		I like construction of the plant.
26		Ohn Pin Chan		I think that project implementation is good.
27		Ohn Pin Chan		I think that project implementation is good.
28		Ohn Pin Chan		I think that project implementation is good.
29		Pin Char		Ambient air, water and odor should be clean and safe for local peoples and workers.
30		Myo Ma		I delight that the project is for electricity supply to the country and loan is prepared with the help of JICA under rules and regulations. Job opportunities should be considered.
31		Pin Char		I advocate fully because the project will benefit the country.
32		Ka The Zu		Job opportunities should be prioritized for local people. Labors who come from other places should not be staying for long time in the village.
33		Ohn Pin Chan		I would like the project to implement without impacting on natural and social environment.
34		Sint Gaing Gyi		I would like the project to implement without impacting on local people and natural environment.
35		Sint Gaing Gyi		I would like the project to implement without impacting on local people and farmers.
36				I would like the project to implement without impacting on natural and social environment.
37		Ohn Pin Chan		I would like the project to implement without impacting on local people and natural environment.
38		Ohn Pin Chan		The project is good.
39		Ohn Pin Chan		I worry to affect Ohn Pin Chan Village by the project.
40		Ohn Pin Chan		I worry to affect Ohn Pin Chan Village by the project.
41		Ohn Pin Chan		The project is good.
42		Ohn Pin Chan		I worry to affect Ohn Pin Chan Village by the project.
43		Ohn Pin Chan		I worry to affect Ohn Pin Chan Village by the project.
44		Ohn Pin Chan		I agree the project.
45		Ohn Pin Chan		I worry to affect Ohn Pin Chan Village by the project.

Source: EIA Study Team

Table 7 Feedback from participants at third session of PCM at scoping stage

No.	Name	Village	Contact No.	Comment/Suggestion
1		Na Be Bin		I would like the project to implemented without impacting the health of villagers. Job opportunities should be prioritized for local people.
2		Na Be Bin		I want to know the positive and negative impact by gas pipeline because it is very close to the village. Job opportunities should be considered.

No.	Name	Village	Contact No.	Comment/Suggestion
3		Na Be Bin		I agree the project. The project should be implemented without air pollution and waste impacts. Job opportunity is necessary.
4		Na Be Bin		Generations of farmers who lost lands during sub-station construction should be employed in this project. During project construction, job opportunities should be considered for local people.
5		Na Be Bin		Can agriculturalists, animals and crops production rate be impacted by this project? Can disease occur on old people by the project? Can the water be impacted?
6		Taung Yin		Consultations should be carried out with framers of the land passing by water pipeline and gas pipeline. Job opportunities should be prioritized for local people.
7		Na Be Bin		Pipelines should be buried deeply and installed after harvesting.
8		Shan Gan		I would like to thank the proponents of Kyaukse Natural gas and waste heat power plant project. It is delighted for electricity supply for country by the project. Welcome to construct the plant. Consultations should be carried out with farmers to be convenient before pipeline construction. Project activities should be started after harvesting. I want to know positive and negative impacts by passing of pipeline.
9		Na Be Bin		Complains about grievances during construction and operation phase should be assessed at once.
10		Na Be Bin		Nothing to suggest.
11		Na Be Bin		Nothing to suggest.
12		Na Be Bin		Nothing to suggest.
13		Na Be Bin		If it is not dangerous, it will be good. It is the project which benefits the public. Job opportunities should be prioritized for local people of Na Be Bin Village.
14		Na Be Bin		Generations of 25 farmers who lost lands in 2004 should be employed in this project.
15		Na Be Bin		During project construction, it should be performed without being dangerous on natural environment and local people in the village.
16		Na Be Bin		Natural gas and waste heat power plant project is good. Are there any side effects of plant, odor changes, diseases occurrences on crops, animals and old people?
17		Taung Yin		Project is good. Fair opportunities should be carried out for farmers.
18		Na Be Bin		Project is good.
19		Na Be Bin		Project is good.
20		Na Be Bin		Project is good.
21		Na Be Bin		Project is good.
22		Na Be Bin		Project is good.
23		Na Be Bin		Project is good.
24		Na Be Bin		Project is good.
25		Na Be Bin		Project is good.
26		Na Be Bin		I would like the project to implement after harvesting.
27		Na Be Bin		I would like the project to implement without side effects on local people of Na Be Bin Village. Job opportunities should be considered for local people.
28		Na Be Bin		I would like the project to implement after harvesting.
29		Na Be Bin		I would like the project to implement without side effects on local people of Na Be Bin Village. Job opportunities should be considered for local people.
30		Shan Kan		I would like the project to implement without impacting the crops by passing of pipeline on the farm land.
31		Na Be Bin		I would like the project to implement without impacting on natural environment.
32		Na Be Bin		I would like the project to implement after harvesting.
33		Na Be Bin		I would like the project to implement without impacting on natural environment.
34		Na Be Bin		Project is good. It will be better if no danger. I worry about crops being impacted by the project.

No.	Name	Village	Contact No.	Comment/Suggestion
35		Na Be Bin		Project is good. It will be better if no danger. I worry about crops being impacted by the project.
36		Na Be Bin		I would like the project to be safe during construction.
37		Na Be Bin		Project is good. It will be better if no danger. I worry about crops being impacted by the project.
38		Na Be Bin		Is there any compensation for farmers by pipeline installation or not?
39		Na Be Bin		Project is good.
40		Na Be Bin		Project is good.

Source: EIA Study Team

Table 8 Feedback from participants at fourth session of PCM at scoping stage

No.	Name	Village	Contact No.	Comment/Suggestion
1		Be Lin		It should be compensated worthily if the farmlands are destroyed. The project should be responsible if there are negative impacts by pipelines. When the project is implemented successfully, development activities should be carried out in surrounding villages. Project should be implemented after harvesting.
2		Be Lin		I advocate the project because I believe that public can get benefits by project implementation.
3		Be Lin		Crops production rate decreased at my farmlands because of burying old pipeline. Compensations were not received. When this project is implemented, worth compensation should be offered if there is impact.
4		Taung U		This project is hoped to make benefits for country and public. The project should offer work opportunities to the farmers around the project. Would like the project to implement without impacting the health?
5		Bandar		My farmlands were impacted during construction of Yangon-Mandalay 6-lanes road. The farmlands were also impacted by installation of old pipeline and construction of transmission poles. That's why, I would like to request that not to pass again my farmland by this project.
6		Taung U		My farmlands were impacted during construction of Yangon-Mandalay 6-lanes road. The farmlands were also passed by installation of gas pipeline in 2004. Farmlands cannot be sold because of buried gas pipeline. That's why, I would like to request that not to pass again my farmland by this project.
7		Ban da		My farmlands were impacted during construction of Yangon-Mandalay 6-lanes road. The farmlands were also passed by installation of gas pipeline in 2004. Farmlands cannot be sold because of buried gas pipeline. That's why, I would like to request that not to pass again my farmland by this project.
8		Taung U		My farmlands were impacted during construction of Yangon-Mandalay 6-lanes road. The farmlands were also passed by installation of gas pipeline in 2004. Farmlands cannot be sold because of buried gas pipeline. That's why, I would like to request that not to pass again my farmland by this project.
9		Taung U		Project is good to be delightful. It is better that the project is state-owned.
10		Taung U		It is delighted that the project is for the country. Project is good.
11		Taung U		Project is good.
12		Be Lin		Nothing to suggest.
13		Ah Le Taung		Nothing to suggest.
14		Ban da		Nothing to suggest.
15		Be Lin		Plantation cannot be carried out because farmlands were destroyed by burying of old pipelines. Worth compensation should be offered if the pipeline is passing through.

No.	Name	Village	Contact No.	Comment/Suggestion
16		Taung U		I would like to thank because the project is implemented for the benefits of public. I agree the project.
17		Ban da		Nothing to suggest.
18		Kyauk Mine		Nothing to suggest.
19		Taung U		Nothing to suggest.
20		Taung U		Nothing to suggest.
21		Ban da		Nothing to suggest.
22		Ban da		Nothing to suggest.
23		Taung U		Thanks for the project. Job opportunities should be prioritized the graduated young people in the villages.
24		Taung U		I would like to thank because the project is implemented for the benefits of public.
25		Ban da		I would like to suggest that the project should be implemented conveniently with local people and land owners.
26		Be Lin		It is suggested that the project will be successful by consultation with farmers in the area passing by pipeline.
27		MOGE		There is no way to decline the project because combined cycle power plant project will be carried out with least impacts in natural environment. I agree the project. Instead of installing a new natural gas pipeline, present pipeline should be used for 300 MW.
28		Yangon		I would like the project to be successful. The project should be carried out with least impacts on public.
29		Ban da		I satisfy the project.

Source: EIA Study Team

Appendix F

Record of PCM for EIA

Record of PCM for Scoping of EIA

Summary of the results of four sessions of PCM at EIA stage are presented in Table 1 to 5. The comments of the participants from feedback forms are also described in Table 6 to 9.

Table 1 Summarized results at the first session of PCM at EIA stage

<table>
<tr><td colspan="2">Date: 20/4/2019 (Saturday)</td><td colspan="2">Time: 9:30 to 11:00 am</td><td>Venue: Kone Myint TharYar Religious Hall</td></tr>
<tr><td rowspan="11">1. Participants</td><td>Organization</td><td colspan="2">Participants</td><td>Total</td></tr>
<tr><td>General Administration Department (GAD) (Sintgaing Township)</td><td colspan="2">➢ Deputy Township Administrator</td><td>1</td></tr>
<tr><td>Electric Power Generation Enterprise (EPGE)</td><td colspan="2">➢ Deputy Chief Engineer
➢ Superintendent Engineer
➢ Assistant Engineer</td><td>6</td></tr>
<tr><td>Mandalay Regional Environmental Conservation Department (ECD- Mandalay)</td><td colspan="2">➢ Assistant Director
➢ Officer</td><td>3</td></tr>
<tr><td>Township Education Department</td><td colspan="2">➢ Officer</td><td>1</td></tr>
<tr><td>EIA Study Team</td><td colspan="2"></td><td>6</td></tr>
<tr><td>E Bya Village</td><td colspan="2"></td><td>Men: 27
Women: 13
Total: 40</td></tr>
<tr><td>Met Ka Ya Village</td><td colspan="2"></td><td>Men: 3
Women: 0
Total: 3</td></tr>
<tr><td>Mont Paung Village</td><td colspan="2"></td><td>Men: 3
Women: 0
Total: 3</td></tr>
<tr><td>Kyun U Village</td><td colspan="2"></td><td>Men: 5
Women: 0
Total: 5</td></tr>
<tr><td colspan="3">Total</td><td>51</td></tr>
<tr><td rowspan="4">2. Main Discussion Points</td><td colspan="2">Opinion/Question</td><td colspan="2">Explanation and Response</td></tr>
<tr><td colspan="2">(E ByaVillage)
I worry about the river bank erosion, is it impact on river bank?</td><td colspan="2">EPGE
Before construction of intake water station, we have to build the retaining wall around that area.</td></tr>
<tr><td colspan="2">(E ByaVillage)
Why did you consider the water pipeline across Met Ka Ya Village?
Can you draw a water pipeline near El Pya village road?</td><td colspan="2">EPGE
According to the feasibility study, the proposed line route is more feasible for other option. So, we considered and selected the proposed line route.</td></tr>
<tr><td colspan="2">(Mont Pound Village)
Is there IP 1 (Intermediate Pump station) station near Mont Pound Village? If IP1 will be build, land owner doesn't agree.</td><td colspan="2">EPGE
Actually, we planned IP 1 at scoping stage, but now we don't plan to install that.</td></tr>
</table>

3. Photograph		

Source: EIA Study Team

Table 2 Summarized results at the second session of PCM at EIA stage

<table>
<tr><td colspan="2">Date: 20/4/2019 (Saturday)</td><td colspan="2">Time: 1:30 pm to 3:00 pm</td><td>Venue: Ohn Pin Chan Religious Hall</td></tr>
<tr><td rowspan="10">1. Participants</td><td>Organization</td><td colspan="2">Participants</td><td>Total</td></tr>
<tr><td>General Administration Department (GAD) (Sintgaing Township)</td><td colspan="2">➢ Deputy Township Administrator</td><td>1</td></tr>
<tr><td>Electric Power Generation Enterprise (EPGE)</td><td colspan="2">➢ Deputy Chief Engineer
➢ Superintendent Engineer
➢ Assistant Engineer</td><td>6</td></tr>
<tr><td>EIA Study Team</td><td colspan="2"></td><td>6</td></tr>
<tr><td>Ohn Pin Chan Village</td><td colspan="2"></td><td>Men: 8
Women: 2
Total: 10</td></tr>
<tr><td>Pin Char Village</td><td colspan="2"></td><td>Men: 7
Women: 0
Total: 7</td></tr>
<tr><td>Ta Yout Su Village</td><td colspan="2"></td><td>Men:2
Women: 1
Total: 3</td></tr>
<tr><td>Ka The Su Village</td><td colspan="2"></td><td>Men: 2
Women: 0
Total: 2</td></tr>
<tr><td>Sint Gaing Gyi Village</td><td colspan="2"></td><td>Men: 4
Women: 0
Total: 4</td></tr>
<tr><td colspan="3">Total</td><td>26</td></tr>
<tr><td rowspan="3">2. Main Discussion Points</td><td colspan="2">Opinion/Question</td><td colspan="2">Explanation and Response</td></tr>
<tr><td colspan="2">(Pin Char Village)
Where is pipeline area near Pin Char Bridge? Please show it.
How many years do you build the Power Plant? When do you want to start the construction? Please come to explain and inform us because we worried about the cultivation for seasonal crops.</td><td colspan="2">EPGE
Project period is about 5 years. Yes, we will inform and discuss the project schedule or timeline.</td></tr>
<tr><td colspan="2">(Mont Paung Village)
Where is the gas pipeline and will it be across the farmland? During construction, is there any possibility that excavated trench will be left for a long time to install the pipes? If the situation happens, that will be an obstacle for agricultural work.</td><td colspan="2">EPGE
Near the pointed area, only water pipelines will be installed along the irrigation cannel. We will choose the best contractor.
We will set up the complaint center in Belin substation. We would like to communicate with local villagers.
If you have any problems, please come to inform the complaint center.</td></tr>
</table>

<table>
<tr><td rowspan="4">3. Photograph</td><td> </td><td> </td></tr>
<tr><td> </td><td> </td></tr>
<tr><td> </td><td> </td></tr>
<tr><td> </td><td> </td></tr>
</table>

Source: EIA Study Team

Table 3 Summarized results at the third session of PCM at EIA stage

Date: 21/4/2019(Sunday)		Time: 9:30 to 11:00 am	Venue: Taung Yin Village Religious Hall
1. Participants	Organization	Participants	Total
	General Administration Department (GAD) (Sintgaing Township)	➢ Deputy Township Administrator	1
	Electric Power Generation Enterprise (EPGE)	➢ Deputy Chief Engineer ➢ Superintendent Engineer ➢ Assistant Engineer	6
	EIA Study Team		6
	Na Be Bin Village		Men:35 Women: 18 Total: 53
	Taung Yin Village		Men: 1 Women: 0 Total: 1
	Shan Gan Village		Men: 3 Women: 0 Total: 3
	Total		57

2. Main Discussion Points	**Opinion/Question**	**Explanation and Response**
	(Taung Yin Village) On behalf of local farmers, I would like to explain about land acquisition for construction Belin Sub-Station. Firstly in 2004, 45.34 acres of land were occupied by government as well as 28.77 acres were also occupied secondly. We lost the crops. Villagers are being altered from farmers to daily labors. It was presented at villagers' grievances. There are 25 farmers who were affected. If the project needs employees, those 25 farmers should be prioritized. There are young educated persons in another village. The local people should be considered priority for works of the project.	**EPGE** We sympathize for land loss. I don't want to comment for past conditions. Past and present are not the same. If there is a project, it is carried out after public consultations before the project begins. If there are impacts by the project, it will be performed not to have grievances. Local people are prioritized for job opportunity. It is already instructed to give the job opportunity to local people during plant construction phase and operation phase.
	(Na Be Bin Village) I would like to request to provide the job opportunities to my villagers, Na Be Bin. Because my village has many graduated persons.	**EPGE** Yes, we can provide the job opportunities to the educated villagers during construction and operation phase. We will send the labour announcement letter to Head of village and then you can apply the jobs.
3. Photograph		

Source: EIA Study Team

Table4 Summarized results at the fourth session of PCM at EIA stage

Date: 21/4/2019 (Sunday)		Time: 1:30 to 3:00 pm	Venue: Taung U Village Religious Hall
1. Participants	Organization	Participants	Total
	Electric Power Generation Enterprise (EPGE)	➢ Deputy Chief Engineer ➢ Superintendent Engineer ➢ Assistant Engineer	7
	EIA Study Team		6
	Taung U Village		Men: 4 Women: 1 Total: 5
	Be Lin Village		Men: 4 Women: 0 Total: 4
	Kyauk Mine Village		Men: 4 Women: 0 Total: 4
	Ban da Village		Men:10 Women: 0 Total: 10
	Other		Men:2 Women: 0 Total: 2
	Total		25
2. Main Discussion Points	**Opinion/Question**	**Explanation and Response**	
	(Be Lin Village) I don't agree with this project because I cannot change land use due to existing gas pipeline.	**EIA Study Team** This meeting is intended to inform the result of environmental impact assessment. This project is owned by Government. I can note your opinion and reflect in EIA report.	
3. Photograph			

Source: EIA Study Team

Table5 Summarized results at the fifth session of PCM at EIA stage

Date: 25/01/ 2020 (Saturday)	Time: 1:00 pm to 2:00 pm	Venue: Kone Myint Thar Yar Religious Hall

	Organization	Name/ Title	Total
1. Participants	General Administration Department (GAD) (Sintgaing Township)	➢ Deputy officer ➢ Senior Clerk	2
	Electric Power Generation Enterprise (EPGE)	➢ Superintendent Engineer ➢ Executive Engineer ➢ Assistant Engineer	6
	Education Department, Sintgaing Township	➢ Assistant township Education Officer	1
	Irrigation and Water Utilization Management Department, Sintgaing Township	➢ Staff Officer ➢ Staff	2
	Information and communication Department, Sintgaing Township	➢ Township Officer	1
	Immigration Department, Sintgaing Township	➢ Deputy Officer	1
	Electricity Department, Sintgaing Township	➢ (Electrical) Pa Leik Village Manager Office	1
	Health Department, Sintgaing Township	➢ Special Nurse ➢ Midwife ➢ Clerk	3
	Police Department, Sintgaing Township	➢ Village tract chief, Information Police Force, Sintgaing township	1
	EIA Study Team		7
	Sein Yaung So, CSO, Mandalay		2
	E Bya Village		Men: 10 for : 4 Total: 14
	Met Ka Ya Village		Men: 2 Women: 0 Total: 2
	Kyun U Village		Men: 1 Women: 0 Total: 1
	Kin Bat Village		Men: 1 Women: 0 Total: 1
	Total		45

	Opinion/Question	Explanation and Response
2. Main Discussion Points	**(Electricity Department)** If the pipeline is installed in the embankment, the pipeline might disturb the water distribution. The maintenance will also need to be considered.	**EPGE** The project is at Loan Proposal Stage of EIA. We will hire technical consultants after ECD approve EIA report and carry out Loan Contract with JICA. After loan was approved, we will discuss with related professionals and consultants to create appropriate design. Therefore, we cannot show detail design at present, but we will not disturb the water distribution.

		We will carry out detail field survey along the pipelines by discussing with technicians and consultants. We will use the water pipeline technology which do not leak water for this project.
	(Electricity Department) The gas pipeline is more concerning than the water pipeline as there are some persons who are against the installation of gas pipeline in their land.	**EIA Study Team** The project has already avoided passing through the land where landowners are against the gas pipeline as much as possible. During the process, gas pipeline route has been shifted to new route along the canal.
	(Met Ka Ya Village) There is a land marked as (villager's name)'s land beside the river. I wish to clarify that this land is not (person's name)'s property and it is owned by the village charity group. Therefore, I suggest marking this land as Village Land in addition to (villager's name)'s land.	**EIA Study Team** Acknowledged the point.
	(E Bya Village) I suggest compensation to village for (villager's name)'s land is necessary.	**EPGE** Yes, the compensation will be decided based on the discussions with relevant organizations, if the land is acquired. The pointed area is planned to use public area.
	(E Bya Village) My fence might be impacted by the project and I want to know how the project will take responsibility.	**EPGE** If the project affects the fence, appropriate compensation will be paid to repair it.
	(CSO) I want to know how this project will impact the water resource.	**EPGE** This project will apply air cooling system which can save water consumption. We will use Myitnge River water and save as much river water as possible by the project. This project will use at most thousands of gallons of water per day.
	(CSO) Is this government project?	**EPGE** Yes, this project is cooperation between government and JICA with loan. We will use Combine Cycle Gas Turbine to reduce environmental impacts as much as possible.
	(CSO) I suggest repairing of roads if the project will damage them.	**EPGE** Yes, this project will use 2 percent of profit as CSR. Therefore, your suggestion will be included in CSR program.
	(CSO) Are there any changes in electricity price due to the construction of gas turbine?	**EPGE** The government will bear the whole cost of the construction of gas turbine with the purpose of providing electricity to the public. The electricity bill will not be affected by the expense of the construction of the gas turbine and will be collected according to the defined rates by the government.
	(CSO) Are there any gas emissions from the project?	**EPGE** This project will use Japan Technology named Dry Low NOx Combustor (DLN). Nitrogen Oxide comes out from this combustor with high temperature. NOx will be emitted below NEQG, it doesn't mean NOx can be 0%. Moreover, we will plan to conduct environmental monitoring. We will submit monitoring report periodically.

3. Photos

Source: EIA Study Team

Table 6 Feedback from participants at first session of PCM at EIA stage

No.	Name	Village	Contact No.	Comment/Suggestion
1		E Bya		I have no objection.
2		E Bya		I satisfy. I have no comment
3		E Bya		Do the project conveniently. If the line is straight and pass in my orchard, I accept the project.
4		E Bya		Do the project. I accept.
5		E Bya		I agree it.
6		E Bya		I have no objection. If the project is convenient I accept.
7		E Bya		I have no objection. Do the project appropriately
8		E Bya		I agree the water pipe line.
9		E Bya		I have no objection. I accept the water pipe line.
10		Kyun U		If the road from Ohn Pin Chan will take two lanes better for public transportation and less impact on civilians travel.
11		E Bya		To conduct the water pipe line, do no harm. I would like to advise if the impact will appear please resolving with village organization
12		E Bya		I accept.
13		E Bya		I accept.
14		E Bya		I agree.
15		E Bya		I accept.
16		E Bya		Water intake area is upper side of the E Bya village and villagers use the water for drinking and agriculture so, dispose the waste water after treatment. The project will be implemented to provide jobs for local people.
17		E Bya		Thank you so much, give the crop compensation to who will be affected by the water pipe line.
18		E Bya		I would like to advice, do not excavate the Met Ka Ya Cemetery when the project implement.
19		E Bya		I have no objection.
20		Sintgaing Township		We have no objection for the power plant project, that will be implementing at Met Ka Ya village, E Bya Village tract, Sintgaing Township. Public Consultation Meeting has been 3 times including this time. Local people know about the power plant project that's why I would like to advice to reduce the public consultation meeting.
21		E Bya		Instead of the first proposed line for other ways have no house is to reduce the cost and impact. Note: If the pipe line passes the Met Ka Ya ancient city, heritage may be lost.
22		Kyun U		We want good transportation during the construction phase. We want discipline for vehicle and machinery driving during the construction phase.
23				The project is good. To implement the project successful without difficulty, corporation with local people, parliament member and government departmental should be done.
24				During the project prevent the damage on the public access road by the project's vehicles and machines.
25		E Bya		No objection.
26		E Bya		I think that project has no impact. I accept.
27		E Bya		No comments.

28		E Bya		Any impact should not be on local people by the construction of thermal power plant. Air, water, waste, noise, vibration, landslide, odor, flora and fauna each injury may occur so need to be monitored by the responsible department.
29		Met Ka Ya		1. In extend the pipeline, avoid the agricultural land as much as possible. 2. If not possible to avoid the agricultural land, give appropriate compensation. 3. Exempt from village land as much as possible. 4. Not effect on natural environment of Myitnge River by the waste water. 5. Not damage the aquatic in the river.
30		E Bya		The project is fine.

Source: EIA Study Team

Table 7 Feedback from participants at second session of PCM at EIA stage

No.	Name	Village	Contact No.	Comment/Suggestion
1		Ohn Pin Chan		I would like to know, how to do the compensation and crops compensation for land owner.
2		Ohn Pin Chan		Want to know the compensation rate for land and crop.
3		Ohn Pin Chan		The project is fine. It would be better if there is no electricity shortage.
4		Ohn Pin Chan		If you bury on the Mont Paung ditch pound, should not affect the irrigation tube. Want to do for safety.
5		Ohn Pin Chan		Want to extend the water pipe line between Mont Paung canal and road.
6		Ohn Pin Chan		Safety should be done when implementing the landfill of gas pipe line. Prevention of fire risks and explosions should be implemented.
7		Ohn Pin Chan		I want you to consult about occupational safety with farmer. I don't want the difficulty for water usage and communication.
8		Ohn Pin Chan		No more suggestion.
9		Ohn Pin Chan		I would like to suggest that there may be no impact on crop and land. I advocate the discussion.
10		Sint Kaing Gyi village		Do not damage crops and farmland as much as possible. I recommend the discussion.
11		Ohn Pin Chan		Recommended.
12		Ohn Pin Chan		Recommended.
13		Ohn Pin Chan		Please follow the public attitude.
14		Sint Kaing Gyi Village		I have no more comments about the project. Project will be convenient if you support the farmers' wish. This is the government project and our farmers' livelihood depend on land so if you do not affect will be better.
15		Pin Char		I got the knowledge. I attend this meeting because I want to know about the project.
16		Ohn Pin Chan		I have no objection. I attend this meeting because I want to get the knowledge.
17		Ohn Pin Chan		Water pipe line will not impact the farmer. More electricity will be got. Success the Project!
18		Ta Yoke Su		I support the explanation and discussion about Kyaukse combine power plant project.
19		Ohn Pin Chan		Myanmar have insufficient electricity. This project is benefit for the country and fulfills the electricity demand. Recommend the project.
20		Ohn Pin Chan		Less impact will be occurred if the water pipeline avoids the two roads. Farmers who living beside

				of the roads will be affect if the water pipeline pass through the eastern side of the road.
21		Pin Char		I suggest for public safety.
22		Ohn Pin Chan		No more comments. It is more convenient that water pipeline will be installed beside canal.

Source: EIA Study Team

Table 8 Feedback from participants at third session of PCM at EIA stage

No.	Name	Village	Contact No.	Comment/Suggestion
1		Na Be Bin		Priority of job opportunity.
2		Na Be Bin		Recommended
3		Na Be Bin		Recommended
4		Na Be Bin		Recommended
5		Na Be Bin		Recommended
6		Taung Yin		I have no objection
7		Na Be Bin		I have no objection
8		Shan Gan		I have no objection
9		Na Be Bin		I have no objection because the project is benefit for the public.
10		Na Be Bin		I agreed
11		Na Be Bin		Recommended
12		Na Be Bin		Want it to be benefit and convenient. Recommended.
13		Na Be Bin		Good
14		Na Be Bin		Agreed
15		Na Be Bin		Benefit for both side
16		Na Be Bin		Agreed
17		Taung Yin		Agreed all and thank you.
18		Na Be Bin		Noise heard because my place is closer to the plant.
19		Na Be Bin		In order to avoid the electric pole, 50 palm trees, 10 mango trees and some banana trees were cut by previous project. So, the farmers had losses. Electric pole is big, and our places is quiet closed to the project area, and thus we worried about the noise impact.
20		Na Be Bin		I would like to know about some negative impacts. What are those negative impacts?
21		Na Be Bin		Local people should be first priority for job assignment.
22		Na Be Bin		We cannot sleep well because of the noise from the former gas turbine. Please implement the mitigation measure for noise in the proposed Project.
23		Na Be Bin		I want you to corporate with village administration office for project implementation. I wish you provide the opportunity to the farmer who lost their properties.
24		Na Be Bin		The plant can be built. I would like the project to implement without impact.
25		Na Be Bin		Need to take the responsibility for noise pollution and any other effect on village.
26		Na Be Bin		Project is fine, if no effect on village.
27		Na Be Bin		I accept the project if no effect on village. We cannot sleep well by the noise from 145 MGW power plants. So, I suggest you implement this project without noise impact.
28		Na Be Bin		I have no objection about the project. We cannot sleep well by the noise from current plant.

29		Na Be Bin		Should be informed village leader once the project is implemented. I suggest that explosion and noise should not be occurred.
30		Shan Gan		To control the vibration from power plant as much as possible. To construct the 300 MW gas turbine without impact to the villager. To employ the Na Be Bin villagers in suitable job position in the power plant.
31		Na Be Bin		Need to inform the village leader, when temporary or permeant workers are employed during construction phase.
32		Na Be Bin		I know about that gas pipe line will not affect on air and water. Need to consult with village leader for employment of technician and general workers.

Source: EIA Study Team

Table 9 Feedback from participants at fourth session of PCM at EIA stage

No.	Name	Village	Contact No.	Comment/Suggestion
1		Be Lin		People may be lost if the pipe line is passed. 1.Land acquisition for road expansion. 2.We did not get the compensation for previous gas pipeline. The best is to install along Min Ye Canal.
2		Be Lin		Project is good if it will not have the impact on the environment.
3		Kyauk Mine		Project is good if it will not have the impact on the environment.
4		Kyauk Mine		In your presentation, the old pipe line will be used. If the old pipeline is not strong, it would affect on environment?
5		Ban da		Need to implement without any impact on village.
6		Ban da		Thank you for your consultation. Our villagers agree the project without any impact on environment. Mainly, we don’t want to impact the farm land and health of local people.
7		Taung U		1. I am not a farmer. 2. Want to know pipeline route which will pass through whose farm land. 3. I understand about that project is good for our country and people. 4. As an ordinary citizen, I don’t know and how can I do it. 5. Anyway, I want the implementation of the project. You may think that because I am not a farmer that’s why I do not sympathy. 6. 100 may be impacted to get 1000. So, the main thing is to support for satisfaction of those affected persons.
8		Ban da		Agreed. Want to get the job opportunity.
9		Ban da		If it is not dangerous, it will be good. It is the project which benefits to public. Job opportunities should be prioritized for local people.
10		Be Lin		We do not agree that gas pipeline pass through our farm land. Along the canal and Yangon- Mandalay road is better for public.
11		Taung U		It is better for all. Need to implement without environmental impact.
12		Ban da		Need to reduce the impact for farm land. Need to implement without effect to the farmers’ benefit.

13		Ban de		Need to install along the canal and other places where there is no farm land.
14		Be Lin		Project is good for our country and public. No impact on environment is better.
15		Be Lin		It is said that B- is some negative impact. Loss of farmers due to the Gas pipeline installation in their farm land are: 1-Land lost 2-Cannot clean the waste 3-Cannot build the building 4-Development committee and department of electricity objected by Farm Land Law 30(A) 5-Cannot get the best price while buying and selling. 6-You must pay the compensation rate is 3 times of current price Reading those facts, is our farm impacted as B-? Or if the presenter's farm loss, is it AAA-? Please consider and implement fundamentally.
16		Taung U		I do not agree the installation of gas pipeline.
17		Ban da		It is better to pass along the Min Ye canal.
18		Taung U		We cannot accept that the pipe line pass through our farmland.

Source: EIA Study Team

Appendix G

Development Plans

(1) Seismic Resistant Plan G-2

(2) Emergency Response Plan G-5

(3) Water Intake Management Plan G-13

(4) Waste Management Plan G-17

(5) Community Health & Safety Plan G-22

(6) Industrial Risk Management Plan G-27

(7) Community Development Plan G-32

(8) Occupational Health and Safety Management Plan G-35

(9) Grievance and Redress Mechanism G-41

(10) Safety Management Plan of Gas Pipeline G-45

(11) Planning Considerations for Pipeline Installation in Heritage Zone G-52

(12) Corporate Social Responsibility Plan G-59

Appendix G-1

Seismic-Resistant Plan

The seismic resistant plan is the basic designing concept to prevent a collapse of the facilities and to preserve life. The objective of the seismic resistant plan is to protect buildings to some extent from earthquakes. The Project is in an early stage at this time, thus the plan presents just a basic policy of the seismic design and initial inspection plan of the structures. The detailed seismic design and inspection plan of structures will be decided before the operational stage according to the detailed design and detailed operating plan.

1. Objective of the Seismic-Resistant Plan

   To carry out the seismic design for structures in the design phase and construction phase.

   To carry out inspections for the structures.

2. Application Stage

   Design, construction, and operational phases

3. Executing Institute

   Design phase: Design consultant

   Construction phase : Contractor

   Operational phase : EPGE

4. Target Area of This Plan

   Design phase : Construction site including the intake and pipeline route

   Construction phase: Construction site including the intake and pipeline route

   Operational phase: Within the power plant site and intake site

5. Related Organization/ Agency

   EPGE

6. Contents of the Plan

6.1. Regulatory Requirement

Civil and architectural structures will be designed based on Myanmar National Building Code (MNBC) for the seismic design of civil and architectural structures.

6.2. Design Phase

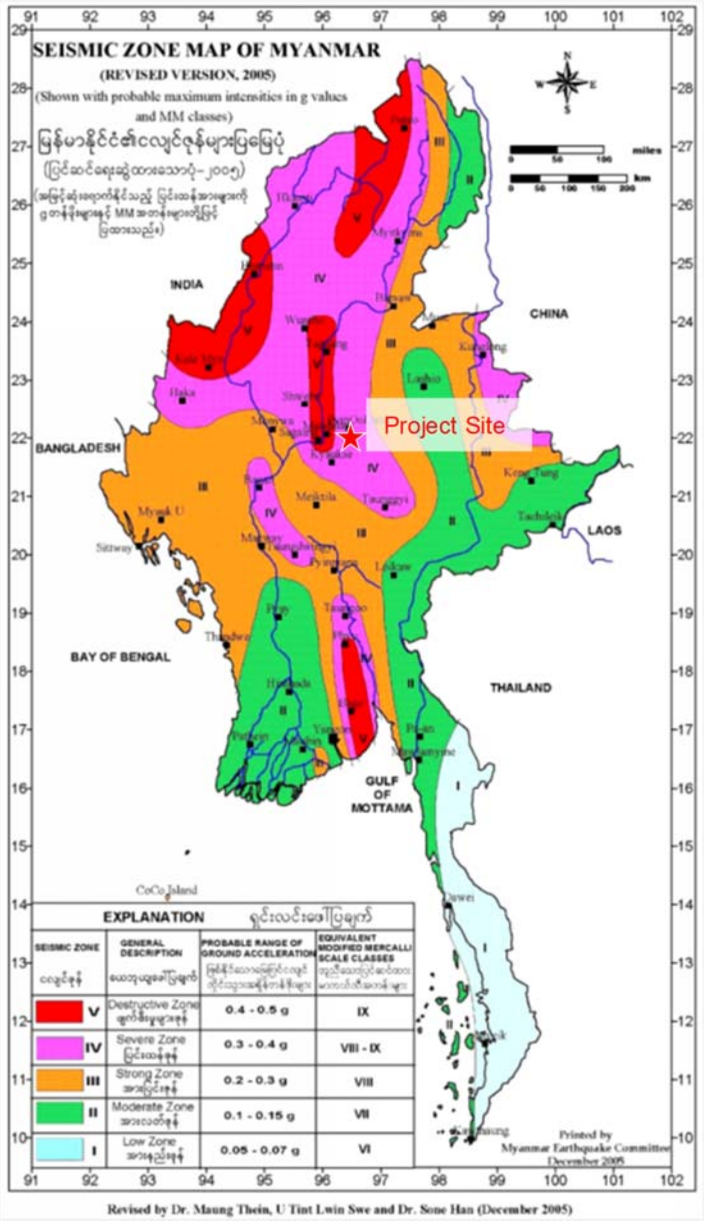
In the preparatory survey by JICA Survey Team, the site class in MNBC was determined as class D. And Peak Ground Acceleration (PGA) for the seismic design was calculated as 0.33 g. Structural calculation will be

carried out based on following results of PGA in the detailed design stage.

Table 1 PGA Calculation Results on the Preparatory Survey

Description	Value
Site Class	D
Shear Wave Velocity (V30)	265 m/s
Magnitude	7.0
Depth of Hypocenter	20 km
Distance to Epicenter	25 km
PGA	0.33 g

Source: EIA Study Team



Source: Myanmar National Building Code 2016

Figure 1 Seismic Zone Map in MNBC

On the other hand, liquefaction analysis was carried out in the preparatory survey. Based on the liquefaction analysis, liquefaction potential was judged as "low". Therefore, liquefaction of the ground below civil and architectural structures is not concerned at the power plant site. In the design phase, civil and architectural

structures will be designed using above PGA for seismic design only.

6.3. Construction Phase

In the construction phase, the contractor will construct civil and architectural structures based on the engineer's drawings which was designed based on the structural calculation method in MNBC. The Engineer will check and approve the contractor's construction drawings, and supervise construction works.

6.4. Operational Phase

The general damage risk by huge earthquakes and countermeasures are shown below. The earthquake risk will be considered, and countermeasure is taken in the detailed design. However, the inspection for the structures is required during the operation phase. In addition to the daily visual inspection, in the case a huge earthquake happens at the power plant site and intake site, the emergency inspection will be carried out to check any fatal damage on each structure.

Table 2 Damage Risk by Huge Earthquake and Countermeasures

Structures	Damage Type (Risk)	General Countermeasures	Countermeasure in the Project.
Concrete/Steel structure	Crack, deformation	Design with appropriate PGA	PGA was determined based on MNBC.
	Subsidence	Check liquefaction potential and carry out countermeasures, if any.	Liquefaction potential was judged as "low" by liquefaction analysis.
Pipe	Crack and leakage	Choose pipe materials with earthquake resistance	HDPE pipe which has high earthquake resistance was applied.
	Separation at joint	Welded joint	HDPE pipe is connected by welding.

Source: EIA Study Team

(End)

Appendix G-2

Emergency Response Plan

The basic function of the emergency response plan is to prepare for potential incidents or accidents. The Project will handle hazardous materials (e.g. natural gas, oil), thus the emergency response plan is required to secure a life of staff and safety of the power plant. However, the Project is in an early stage at this time, thus plan presents just a basic policy and initial plan of the emergency response. The detailed plan of the emergency response will be fixed before the operational phase according to the detailed design and detailed operating plan.

1. Objective of the Emergency Response

   To take the prompt action if emergency cases occur during operation of the Combined Cycle Power Plant (CCPP), and

   To be able to be minimizing panic and confusion for operator and staff of CCPP when an emergency occurs.

2. Application Stage

   Operational phase

3. Executing Institute

   Operational phase: EPGE, MOGE

4. Target Area of This Plan

   The Kyaukse CCPP site including the water intake station and pipeline from the intake station to the Kyaukse CCPP, and fuel gas pipeline from Kyaukse gas off take station to the Kyaukse CCPP

5. Related Organization/ Agency

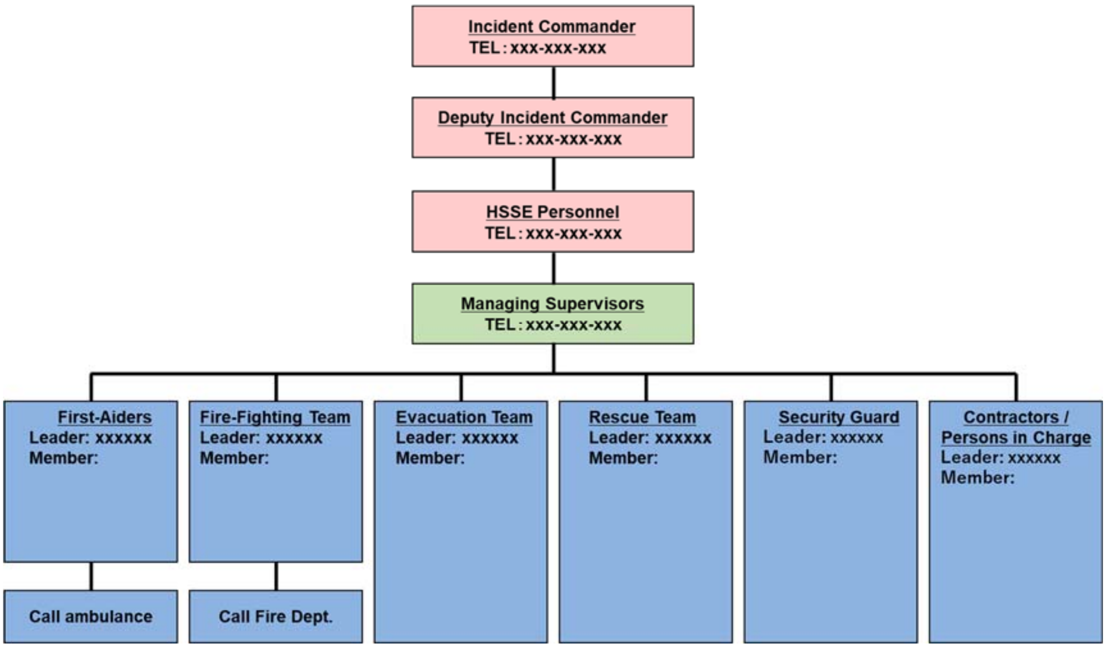
   DPTSC, Irrigation Department under MOALI, Forest Department under MONREC, Department of Rural Road Development under MOC, Police Department, Fire Fighting Department, Mandalay Region, Sintgaing Township GAD

6. Contents of the Plan

6.1. Emergency Response Framework

6.1.1. Organization of the Emergency Response Team (ERT)

The Emergency Response Team (ERT) will implement to respond to any major incident in a safe, rapid, effective, and efficient manner. This organization will be organized in the power plant. The typical organization chart is shown below as an example. Therefore, ERT should be organized before operational phase, and also this organization chart should be updated.



Source: EIA Study Team

Figure 1 Typical Organization Chart of ERT

(1) Incident Commander

The responsibilities of the Incident Commander are:

1. Forming the site ERT
2. Overall person in charge in the event of an emergency situation.
3. Provision of adequate resources for the ERT (i.e. manpower, equipment, etc.).
4. In charge of liaising with the related agencies and other stakeholders.
5. Assess the situation of the incident, accident and activate the ERT members for counter measures.
6. Classifying / determining the emergency level.
7. Direct all counter measures and emergency procedures to control and suppress the situation, and decide on the evacuation of the site.

The site manager usually also holds a position of the Incident Commander.

(2) Deputy Incident Commander

The responsibilities of the Deputy Incident Commander are:

1. Assist the Incident Commander on the coordination and execution of the site emergency response procedures.
2. To cover the duties of the Incident Commander when he is not at site.
3. Person in charge of coordination and directing of the ERT.
4. Collating and reporting the headcounts of the emergency evacuation to the Incident Commander.
5. Directing the search and rescue of missing personnel.

The deputy site manager usually also holds a position of the Deputy Incident Commander.

(3) Health, Safety, Security and Environment Personnel (HSSE Officer / HSSE Coordinator)

The responsibilities of the HSSE Personnel are:

1. To assist the Incident & Deputy Incident Commander on execution and directing of site emergency response procedures.
2. Assist in assembling and coordination with the ERT.
3. Assist in coordinating work at the emergency evacuation assembly area.

The site administration manager usually also holds a position of the site HSSE personnel.

(4) Managing Supervisors

The responsibilities of the Site Supervisors are:

1. Inform all personnel of the emergency situation.
2. Lock all office documents and shut down all electrical equipment, if possible.
3. Evacuate from their respective work areas calmly upon activation of emergency evacuation.
4. Remove all sensitive documents with them during evacuation, if possible.
5. Assist any personnel who requires any help.
6. Conduct headcount and report to the site HSSE personnel / Deputy Incident Commander.

The shift supervisors / leaders usually also hold a position of the managing supervisor.

(5) Qualified First-Aiders

The responsibilities of the Qualified First-Aiders are:

1. Setting up of the first-aid treatment area at the site emergency evacuation work area.
2. Rendering first-aid to the injured.
3. Coordination, directing and reporting to the external professional medical personnel.
4. Reporting the status of injured personnel to the Incident Commander / Deputy Incident Commander.

(6) Fire-Fighting Team

The responsibilities of the Fire-Fighting Team are:

1. Conducting fire-fighting in the event of a fire emergency.
2. Directing personnel to evacuate from the scene of fire.
3. Coordinating the rescue of personnel with the Rescue Team members from the scene of fire.
4. Remove any flammable materials.

(7) Evacuation Team

The responsibilities of the Evacuation Team are:

1. Set up the site emergency evacuation assembly area upon activation.
2. Liaise with the respective persons in charge from the different companies and work groups and collate the headcounts.
3. Reporting the headcounts to the Deputy to check the number of people present and missing and report

the status to the Incident Commander.

(8) Rescue Team

The responsibilities of the Rescue Team are:

1. Coordinating the evacuation and rescue of personnel.
2. Cooperating with the fire-fighting team on the rescue of personnel.
3. Cooperating with the respective persons in charge of the personnel on the rescue of missing personnel from their working areas.
4. Reporting to the Deputy Incident Commander on the status of their rescue.

(9) Site Security Guards

The responsibilities of the Site Security Guards are:

1. Inform the Site HSSE Personnel on the workers and contractors manpower on site.
2. Control the site personnel and vehicle traffic movement.
3. Stop all personnel / vehicles from entering the worksite in the event of an emergency.

(10) Contractors / Persons in Charge

The responsibilities of the Contractors / Persons in charge are:

1. Inform all their personnel of the emergency situation and carry out evacuation when instructed.
2. Ensure all personnel are evacuated from their work areas.
3. Ensure all machineries, equipment, etc. are shut down before leaving the work area.
4. Conduct headcount of their work personnel and report the headcount to the site HSSE personnel / Deputy Incident Commander.
5. In the event of missing personnel, inform the rescue teams on the last know working area of the missing personnel.
6. Ensure their personnel assemble neatly at their respective positions and wait for further instructions from the site HSSE personnel / Incident or Deputy Incident Commander.

6.1.2. Emergency Level Determination

The executing institute operates within the above-mentioned hierarchical response framework. The emergency level is determined by the complexity of the incident, the risk to personnel and the public, and the impact on the environment, and is further determined by the need for mobilization of resources. After a no-failure or emergency condition is detected or and/or reported to Incident Commander, he / she is responsible for classifying the event into one of the following three emergency levels.

- Level 1 (Green)

  Incident that is short term and can be effectively managed locally utilizing site facility resources.

- Level 2 (Yellow)

  Incident that is middle term, has the potential for off-site impacts and requires assistance from headquarter office / regional /township resources.

- Level 3 (Red)

  Incident that is long term, may have wide spread impacts and requires assistance from government office / global resources.

6.1.3. Communication and Reporting

All personnel first observing or verifying any emergency situation at the CCPP are responsible for notifying the managing supervisor. Quick notification allows time to provide early warning to ERT and agencies.

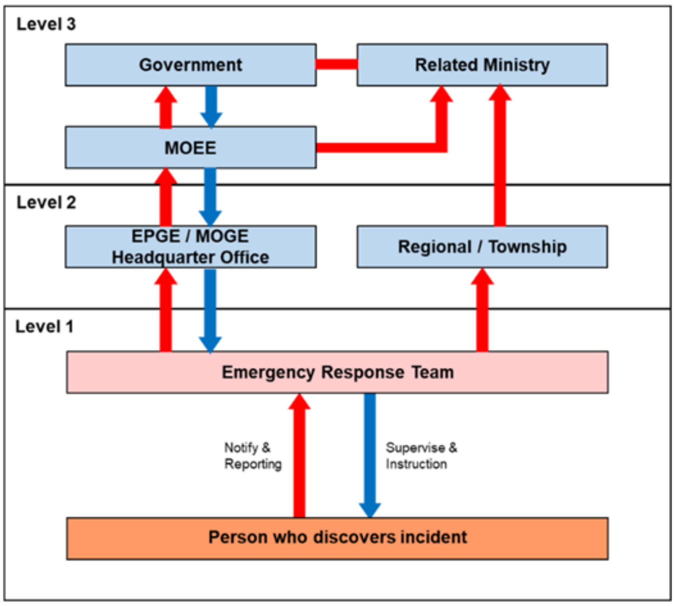
(1) Fire and/or Gas Alarms

Fire and gas alarms are activated manually and immediately after personnel discover fire and/or gas incident. Vocal alarms as per emergency response are given immediately after discovery of an incident to alert personnel.

(2) Accident and Major Incident Reporting Procedure

When an incident occurs, the person who discovers the incident will notify ERT, and then he/she will notify Incident Commander in accordance with organization chart. The Incident Commander will then determine according to emergency level if the headquarter office needs to be notified / activated. If it needs, the Incident Commander will communicate to notify / report the headquarter office and then need to be supported by the headquarter office.

The accident and major incident reporting flow is described below. This is typical procedure. Therefore, this procedure should be updated before the operational phase.



Source: EIA Study Team

Figure 2 Typical Incident Reporting Flow

(3) Injury and Near-Misses

All incidents resulting in injuries or near-misses to personnel, contractor or any visitor must be reported immediately to the Managing Supervisors.

The relevant engineer with the support of the Site HSE Manager/Officer shall investigate all injuries and near-misses immediately, and the details recorded on the Accident/Incident Report. When causative factors have been established, remedial actions shall be implemented without delay.

The analysis of Accident Reports will assist in the identification of trend processes and activities occasioning physical injuries and enable the preventive procedures to be made or revised, if necessary. An investigation process and analysis of the accident process should be developed before the operational phase.

(4) Related Agencies Notifications

Incident Commander is responsible for assuring that all required notifications/reports are completed in a timely manner for all incidents. All contacts with regulatory agencies should be properly documented. Typical information to report would be the incident location, type and size of a spill, date & time of the incident, and other relevant information. The reporting protocol, items and detailed contents should be fixed after discussion with regulatory agencies before the operational phase.

6.1.4. Emergency Actions

After the Incident Commander determines the emergency condition and emergency level, the emergency response procedures may be taken. The emergency response procedures are organized according to incident scenarios.

The Incident Commander instructs managing supervisors to record the available information, observations, and actions taken on the record for previous section (communication and reporting). The time of changing conditions should be noted on the form and the situation documented with photographs and video, if possible. These actions may be performed directly by personnel or contractor by managing supervisors.

6.1.5. Scenario Emergency Response Procedures

The purpose of scenario emergency response procedures is to quickly identify the sensitivities that could potentially be affected during an incident and quickly emergency responses to them.

In general, scenario emergency response procedure is made by the following steps.

- Step 1. Identifying hazards and those at risk

  Looking for those things during plant operation that have the potential to cause harm and identifying things and people who may be exposed to the hazards.
- Step 2. Evaluating and prioritizing risks

  Estimating the existing risks (the severity and probability of possible harm) and prioritizing them in order of importance.
- Step 3. Deciding on emergency responses

  Identifying the appropriate emergency response to eliminate or control the risks.
- Step 4. Making the emergency response plan

Making emergency response scenario including classifying the emergency level based on identifying the appropriate emergency response and through a prioritization of risk.

Scenario emergency response procedures will be made before the operational phase according to the detailed design. This document introduces a scenario emergency response procedure in the following section.

6.1.6. Scenario Emergency Response Procedure (Example)

Water / gas pipe leak response procedure

1. The person(s) discovering the water / gas leak shall raise the alarm by informing the parties responsible / involved in the source of the gas leak.
2. If the water / gas leak is controllable, the responsible party shall shut off the source of water / gas leak immediately (e.g. turn off the valves / mains of the water / gas supply, etc.).
3. If the water / gas leak is uncontrollable, such as due to the damaged / failure of its containment, damage or rupture of piping / valves, etc. the party responsible shall inform the key personnel, any members of the ERT.
4. The ERT shall response within ½ hour (2 hours after office hour) and assess the situation while work together with the facilities management representative for the external help. And at the meantime, the plumber on standby at the site shall be activated.
5. If it is safe to do so, the responsible party shall assist in cordoning off the affected area to prevent further unauthorized entry until the ERT arrives and take over control of the emergency area.
6. For gas leak, the ERT shall:
   a. Raise the emergency evacuation alarm / siren to alert all personnel to start evacuation to the emergency assembly area & ensure the smooth evacuation of all personnel in the immediate vicinity.
   b. Ensure all users of the gas source is informed of the emergency situation and to shut off all gas supply
   c. The responsible party shall inform the provider of the gas supply immediately
   d. Ensure all sources of ignition are removed or extinguished & try to isolate the source of the gas leak
   e. Ensure that the area is ventilated as much as possible
7. If there is an outbreak of fire, the fire-fighting team shall commence to put out the fire.
8. The rescue team shall check for any casualty in the location and conduct rescue.
9. The first-aid team shall administer first-aid treatment if there is any injured.
10. The ERT shall contact the Incident / Deputy Incident Commander and report the status of the emergency.
11. Based on the information given, the Incident / Deputy Incident Commander shall assess the seriousness of the emergency incident and, decide on emergency level and then the next course of action.
12. In the event of the activation of emergency evacuation, the respective person(s) in charge shall commence headcount of their personnel and ensure all their personnel are accounted for. The person(s) in charge shall report their headcount and any missing personnel and their last known location to the site HSSE personnel / Deputy Incident Commander immediately.
13. The Incident / Deputy Incident Commander shall liaise with all relevant external parties (i.e. authorities,

emergency services, etc.) involved.

14. The Incident / Deputy Incident Commander shall inform the headquarter office and related agencies of the incident / situation and keep him/her informed of the status of the emergency, and an emergency incident report and submit the report to the headquarter office and related agencies according to the reporting protocol.
15. The Incident / Deputy Incident Commander shall ensure that all other official documentation required are submitted to the related agencies.

6.2. Training and Drill

On an annual basis, personnel will exercise this ERP by responding to an unscheduled, simulated emergency at the project site. The purpose of this exercise is to check the readiness of personnel and the effectiveness of the ERP, including to find any corrections that need to be made to the ERP. The headquarter office and/or site administration section will conduct the simulated emergency drill of the ERP. At the end of the drill should be given feedback any deficiencies identified during the simulation.

An annual ERP drill report will be prepared and kept on file that includes the executed scenario, actions and field observations taken during the drill, evaluator recommendations, training and follow-up items.

6.3. Monitoring Plan

The monitoring plan on the emergency response plan is necessary to reduce and prevent the person injured and environmental impact to the project site and around the project site. The following table shows the responsible organization and method of monitoring.

Table 1 Monitoring Plan on Emergency Response Plan

Project Phase	Monitoring method	Place	Frequency	Project components	Responsible organization
Operation	Checking record of training and drill	Project site	annually	Power plant Gas pipeline Water pipeline	EPGE/MOGE

Source: EIA Study Team

7. Reference

1. Environmental and Social Impact Assessment Report for Myingyan IPP Project, August 2016

(End)

Appendix G-3

Water Intake Management Plan

The water intake is one of the important facilities of the Project, and it will provide the water to the steam turbine which requires water to generate electricity. For the continuous operation, the management plan of the intake is necessary. This water intake management plan is prepared to aim sustainable electric power generation. However, the Project is in an early stage at this time, thus, the plan presents just a basic policy and initial plan of the water intake management. The detailed plan of the water intake management will be fixed before the operational phase according to the detailed design and detailed operating plan.

1. Objective of the Water Intake Management Plan
   To manage the water intake during whole project phases

2. Application Stage
   Design, construction, and operational phases

3. Executing Institute
   Design phase: Design consultant
   Construction phase: The Engineer, and the Contractor
   Operation phase: EPGE

4. Target Area of This Plan
   Design phase: Intake site
   Construction phase: Intake site
   Operational phase: Intake site

5. Related Organization/ Agency
   EPGE, IWUMD

6. Contents of the Plan

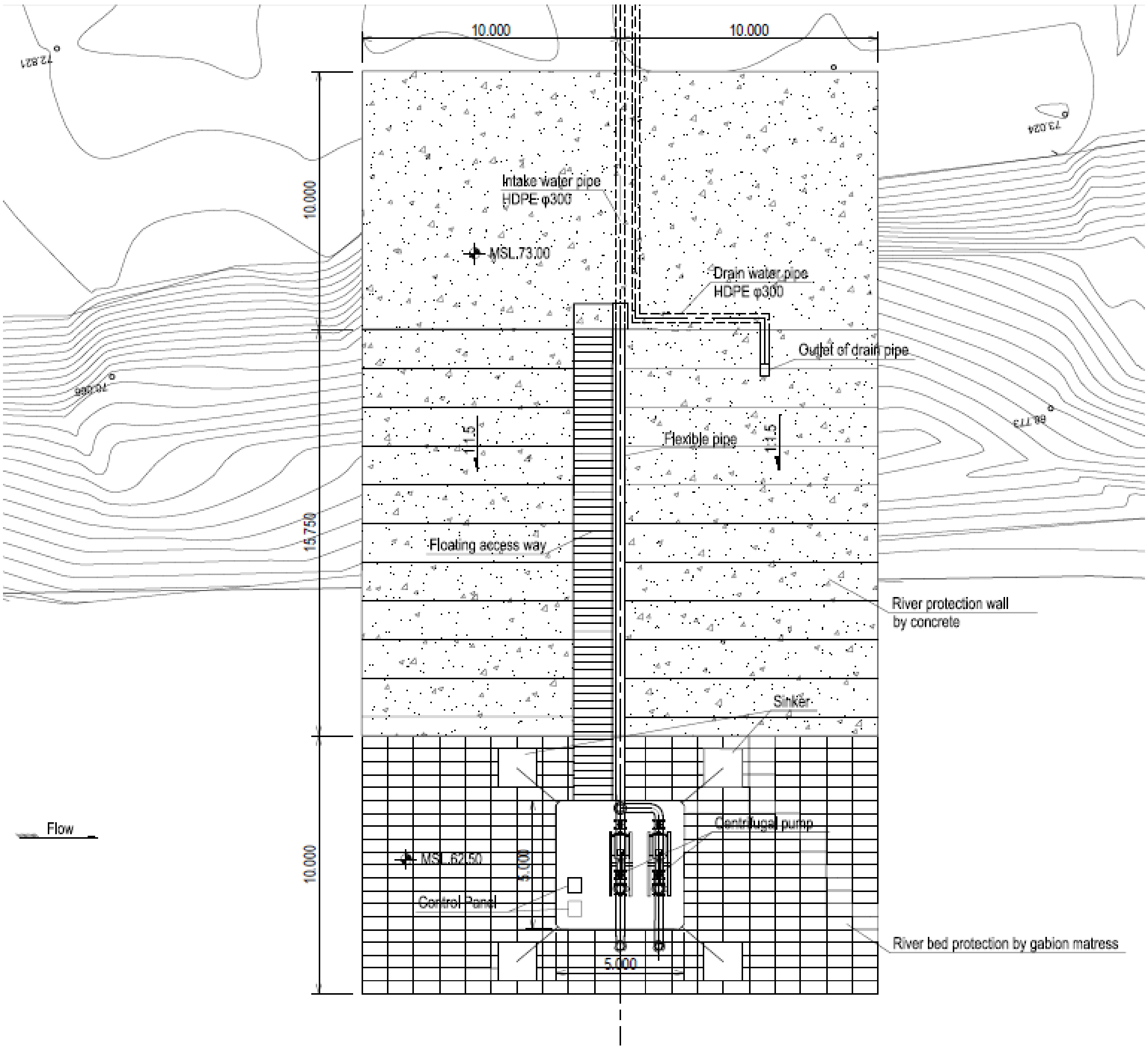
6.1. Design Phase

In the preparatory survey by JICA, a floating type was chosen as intake structure. The floating type intake consists of following facilities.

Table 1 Main Facilities at the Intake Site

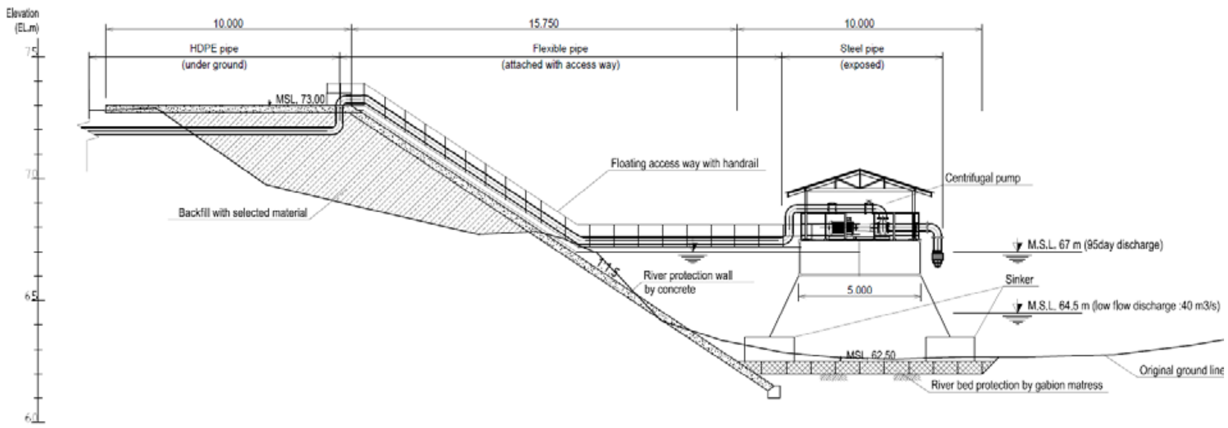
Facilities	Purpose
Centrifugal pump (2 nos)	To pump up water from Myitnge River to the power plant site.
Pontoon	Pump basement which follows water level variation in Myitnge River.
Sinker	To fix the location of pontoon.
Access way	To access to pumps and the control panel on pontoon from the river bank.
Control panel	To control the pump on pontoon.
Intake Pipe	To send pumped up water to the power plant.
Drain Pipe	To discharge water from the power plant to Myitnge River.
River bank/bed protection	To protect scouring and erosion of the river bank and river bed.
Trash boom	To avoid floating garbage from blocking the water suction at the water surface.

Source: EIA Study Team



Source: EIA Study Team

Figure 1 Preliminary Design of Intake Structure (Plan)



Source: EIA Study Team

Figure 2 Preliminary Design of Intake Structure (Section)

Current descriptions of each facility in the preparatory survey are shown in Table 2. Also, the general concept of mitigation measures for the risk at intake site is shown in Table 3. In the detailed design, specifications of each facilities will be finalized by the design consultant.

Table 2 General Descriptions of Intake Design in the Preparatory Survey

Facility	Item	Description
Intake Pump	Operation Hour	8 hours
	Number of Pump	100% x 2 nos. (One is a stock pump for an emergency case or maintenance case)
	Discharge	3.3 m^3/min
	Total Head for each Pump	64.5 m
	Type	Horizontal Single Suction Single Stage Centrifugal Pump (200 mm x 70 kW)
Drain Pump (at Power Plant)	Number of Pump	100% x 2 Nos. (One is a stock pump for an emergency case or maintenance case)
	Discharge	4.20 m^3/min
	Total Head for each Pump	61.6 m
	Type	Horizontal Single Suction Single Stage Centrifugal Pump (200 mm x 80 kW)
Pipe	Intake Pipe	HDPE pipe φ300 mm x 1 nos.
	Drain Pipe	HDPE pipe φ300 mm x.1 nos.

Source: EIA Study Team

Table 3 General Concept of Mitigation Measures for the Risk at Intake Site

Risk	Mitigation Measure	Details
Security	Placement of the security guard	Security will stay beside the intake site.
Clogged by floating garbage	Trash boom installation	Float garbage will be blocked not to disturb pumping up.
Abrasion of the pump	Installation of the automatic control system	When the water level of Myitnge River is lower than the minimum required water level for pump up, pumping up will terminate by the automatic control system.

Source: EIA Study Team

6.2. Construction Phase

In the construction phase, the engineer will prepare construction drawings based on the concept finalized in the detailed design. The contractor will construct the intake structure based on the construction drawings submitted by the engineer.

Intake construction will be carried out in dry season to avoid flood risks during construction. Also, coffering will be made for the construction with dry condition.

6.3. Operational Phase

During the operation phase, the following operation and monitoring will be carried out. In the case of cleaning or emergency cases, a spare pump on pontoon will be used.

Table 4 Intake Management Plan in Operation Phase

Item	Description/purpose	Frequency	Responsible organizations
Pump operation (usual case)	Start and stop pumping up based on the requirement of the power plant.	Daily.	EPGE
Pump operation (flood case)	Pumping up is postponed if requirement of water from the power plant can be satisfied by water at pool in the power plant site	Flood situation	EPGE
Pump operation (drought case)	Pumping up will be terminated by the automatic system for the prevention of abrasion by riverbed sediment. Requirement of water from the power plant can be satisfied by water at pool in the power plant site	Drought situation	EPGE
Removal of sediment	Removal of sediment is not required. When the level of river water is lower than the minimum required water level for pump up, pumping up will terminate by the automatic control system.	Not required	EPGE
Cleaning	Cleaning of the trash boom, intake pipe, etc.	After flood and yearly	EPGE
Monitoring	Intake is usually monitored visually to check problems in the pumping system	Daily. And detail check after the case of natural disaster	EPGE
Record	River water level, pump up operation, and discharge will be recorded.	Daily	EPGE

Source: EIA Study Team

Appendix G-4

Waste Management Plan

The coexistence of economic growth and environmental protection is fundamental in today's world for sustainable development. On the electric power sector, the power facility has to accommodate the power supply with environmental conservation around the power facility. This waste management plan is prepared to aim environmentally sustainable electric power development in Kyaukse District. However, the Project is in an early stage at this time, thus the plan presents just a basic policy and initial plan of the waste management. The detailed plan of the waste management will be fixed before the construction and operational phase, according to the detailed design and detailed operating plan.

1. Objective of the waste management
   To manage the waste from the Project during whole project duration

2. Application Stage
   Construction, operational and closing phases

3. Executing Institute
   Construction and closing phases: Contractor
   Operation phase: EPGE

4. Target Area of This Plan
   Construction and closing phase: Construction site including the intake and pipeline route
   Operational phase: Within the powerplant site

5. Related Organization/ Agency
   Sintgaing Township
   Kyaukse Township

6. Contents of the Management Plan

6.1. Regulatory Requirement

The Environmental Conservation Law, 2012 stipulates the project owner shall arrange to dispose the waste in accordance with environmentally sound methods. MONREC shall cooperate with the relevant government department, government organizations and experts to enable to promote the establishment of necessary facilities for treatment of solid and liquid wastes based on the Environmental Conservation Rules, 2014. In Sintgaing Township, domestic waste is collected by Sintgaing Municipal in accordance with Mandalay City Development Committee (MCDC) Law 2014. On the other hand, Section 105 (A) of MCDC law mentions

that industrial wastes and construction wastes have to be disposed into the designated site by Sintgaing Municipal. No one can dispose the industrial waste to the domestic waste disposal site for now. In addition, there is no disposal site of industrial waste in Sintgaing Township.

6.2. Construction Phase

The contractor should discuss with the local authority in charge of the waste treatment and would dispose generated wastes in accordance with the law (MCDC law 2014). EPGE must monitor the disposal method and quantity. The estimated amount of the waste during construction is presented in the table below.

Table 1 Estimation of Construction Waste

Item	Unit	Waste generation	Treatment method
Lumber (Cutting tree)	m^3	800	Selling, Recycling as a fuel
Construction waste from materials (Scrap of steel, pipe and cable)	t	100	Selling, Dispose by the contractor
Domestic waste from the site office and construction camp	ton/week	1.3	Dispose by the contractor
Sediment from the sanitary-fittings	kg/day	150	Dispose by the contractor

Note: Surplus soil would not be generated because of the soil balancing between cutting and filling.
Source: EIA Study Team

The solid waste from construction activity will be collected in the site as an obligation of the contractor. If there will be valuable materials for recycling use such as valuable metals, the contractor will sell those materials to third parties. The remains of the solid waste which cannot be recycled will be disposed properly by the contractor in compliance with the relevant laws. In Sintgaing Township, domestic waste is collected by the Sintgaing Municipal in accordance with Mandalay City Development Committee (MCDC) Law 2014. At the same time, Section 105 (A) of MCDC Law mentions that industrial wastes and construction wastes have to be disposed into the designated site by Sintgaing Municipal. No one can dispose the industrial waste to the domestic waste disposal site for now. In addition, there is no disposal site of industrial waste in Sintgaing Township. Thus, the contractor should make contract with third party company of industrial waste management and that third-party company will dispose the construction waste to the proper disposal site. If they will construct a new disposal site of construction wastes in Sintgaing Township, they have to obtain a permission from Sintgaing Municipal according to the MCDC law. If it is difficult to assure the proper disposal site, the project proponent should prepare the disposal site in the power plant site, based on the consultation with Sintgaing Municipal.

6.3. Construction Phase (During Commissioning) and Operation Phase

After commissioning and starting the operation, wastes from the Project should be disposed by the project proponent. EPGE should prepare the disposal site through the discussion with local authority. The estimated amount of the waste during commissioning and operation is shown in the table below.

Table 2 Estimation of Waste from Commissioning

Item	Unit	Waste generation	Treatment method
Sediment from the purification process (Sludge)	m^3/day	0.2	Dispose by EPGE
Used oil (from flushing of lubricant)	m^3	60	Selling, Recycling as a fuel
Domestic waste from the site office and construction camp	ton/week	1.3	Dispose by EPGE
Sediment from the sanitary-fittings (Sewage sludge)	kg/day	150	Dispose by EPGE

Source: EIA Study Team

Table 3 Estimation of Waste from power facility

Item	Unit	Waste generation	Treatment method
Sediment from the purification process (Sludge)	m^3/day	0.2	Dispose by EPGE
Used oil (from flushing of lubricant every 4 to 6 years)	m^3	60	Selling, Recycling as a fuel
Domestic waste from the site office	ton/week	0.2	Dispose by EPGE
Sediment from the sanitary-fittings (Sewage sludge)	kg/day	210	Dispose by EPGE

Source: EIA Study Team

The solid waste will be collected in the site. If there will be valuable materials for recycling use such as valuable metals, the project proponent will sell those materials to third parties. The sediment from the purifying process is consisted by particulates of soil or sand mainly. It could be used as a material of construction or reclamation. The sediment from the sanitary fittings (sewage sludge) could be used as a fertilizer or cultivation soil. The used oil will be generated from the power plant during operation. The used oil will be managed properly and will be sold to third-parties. Thus, there is no possibility of used oil disposal during the operational phase. The remains of the solid waste which can not to be recycled will dispose properly.

The domestic waste will be disposed to the disposal site nearby the project site. The project proponent should discuss with relevant authority of Sintgaing and Kyaukse Townships to secure a disposal site for domestic waste and should get an approval to dispose the domestic waste from township or before operation.

6.4. Closure Phase

On the closing phase, the total amount of the waste generated from demolition works could not estimate at this time because of the policy and method of closing has not decided yet.

6.5. Waste Management Plan

6.5.1. Construction and Closure Phase

During construction of the new facility, mitigation measures will be executed to reduce the impact.

Table 4 Waste Management Plan on Construction and Closure Phase

Mitigation Measure	Remarks
Keeping tidy in the construction site	To prevent spreading wastes around the construction site To be easier management and recycling of construction wastes
Installing a separate waste stockyard to promote the recycling and reuse the solid waste	It can be easier management and recycling of construction wastes.
Appropriate management of a stockyard to prevent odor	e.g. Store an organic waste in closed containers
Regular inspection of waste storage yard to check the status of segregation	To instruct the workers for proper waste collection

Source: EIA Study Team

6.5.2. Construction Phase (During Commissioning) and Operation Phase

After the commissioning and start of the operation, the following mitigation measures about the solid waste will be executed to reduce the environmental impact.

Table 5 Waste Management Plan on Commissioning and Operation

Mitigation Measure	Remarks
Keeping tidy in the construction site	To prevent spreading waste around the construction site To be easier management and recycling of construction waste
Installing a separate waste stock yard to promote recycling and reuse the solid waste	To be easier management and recycling of construction waste
Appropriate management of stock yard to prevent odor	e.g. Store an organic waste in closed containers
Getting an approval of disposal site from Sintgaing Township after discussion with authority of township before the commissioning	To ensure the proper disposal site based on the relevant law
Making a contract with licensed third parties for proper solid waste treatment and disposal	For execution of proper waste management
Regular inspection of waste storage yard to check the status of segregation	To instruct the staff and personnel for proper waste collection
The contractor should carry the generated solid waste from the water pipeline and gas pipeline construction site except for the soil to the power plant site to segregate.	To collect construction debris which are generated out of the power facility site

Source: EIA Study Team

6.6. Monitoring Plan

The monitoring plan on waste management is necessary to prevent the environmental impact to around the project site and local community. The following table shows the responsible organization and method of monitoring.

Table 6 Monitoring Plan on Waste Management

Project Phase	Monitoring method	Place	Frequency	Project components	Responsible organization
Construction	Checking records of amount, types of waste and disposal methods (including transportation, the name of disposal site)	Project site	Weekly	Power plant, Gas pipeline, Water pipeline	Contractor
Operation (Including commissioning)	Checking records of amount, types of waste and disposal methods (including transportation, the name of disposal site)	Project site	Monthly	Power plant, Gas pipeline, Water pipeline	Contractor
Closure	Checking records of amount, types of waste and disposal methods (including Transportation, the name of disposal site)	Project site	Weekly	Power plant, Gas pipeline, Water pipeline	Contractor

Source: EIA Study Team

(End)

Appendix G-5

Community Health and Safety Plan

Health and safety are the most concerned impact for the local community. Project proponents must make assurance of safety to the local community by their consideration to the project plan. On this study, the assumed health and safety impact from the Project and the mitigation measures in these respects are considered at the moment. The detailed community health and safety plan will be fixed before the construction phase according to the detailed design and detailed operating plan.

1. Objective of the health and safety plan
   To assure the community health and safety around project site

2. Application Stage
   Construction, operational, and closing phases

3. Executing Institute
   Construction and closing phases: Contractor
   Operation phase: EPGE

4. Target Area of This Plan
   All project phases: around the project site (including gas and water pipeline)

5. Related Organization/ Agency
   Ministry of Health and Sports
   Sintgaing Township GAD

6. Contents of the Management Plan

6.1. Regulatory Requirement

6.1.1. Public Health Law (1972)

It is concerned with protection of people's health by controlling the quality and cleanliness of food, drugs, environmental sanitation, epidemic diseases and regulation of private clinics.

6.1.2. National Health Policy (1993)

The National Health Policy (NHP) was developed with the initiation and guidance of the National Health Committee in 1993. The National Health Policy has placed the health for all goal as a prime objective using the primary health care approach.

As a related policy to the Project, there is a statement that is to intensify and expand environmental health activities including prevention and control of air and water pollution (Number 9 of NHP).

6.2. Health, Safety Impact and the Management Plan

Major impact items which are assumed from the proposed project are shown below.

6.2.1. Water Quality and Availability

The water source of this Project is Myitnge River. And treated waste water will be discharged to the Myitnge River. Besides, the flow rate of Myitnge River is big enough in comparison to the water consumption of the Project. That is why the negative impact is considered negligible.

6.2.2. Structural Safety of Project Infrastructure

On this Project, water and gas pipelines will be buried under the ground. Ground subsidence will be assumed after burying gas and water pipeline in case of inadequate soil compaction for backfill. The following mitigation measures are planned during pipeline construction

Table 1 Mitigation Measures for Structural Safety

Mitigation Measure	Remarks
To avoid using waste and clay for backfilling of the pipeline	-
Executing adequate soil compaction for back filling of the pipeline	-

Source: EIA Study Team

During pipeline construction, the contractor will check the complaint regularly as a monitoring of ground subsidence.

6.2.3. Fire Safety

A fire safety plan is required to secure the life and properties around the project site in case of fire. In the operational phase of this Project, the self-brigade for firefighting will be organized. In addition to this, the fire detection system and fire-fighting system should be installed obligatory. The detailed equipment of the fire detection and fire-fighting is shown in the following table.

Table 2 Fire-Prevention Equipment

Mitigation Measure	Remarks
Fire Detection System	
Fire detector	Smoke and heat detector
Push button alarm device and warning system	-
Fire Fighting System	
Water fire-fighting system	Such as water deluge system, sprinkler system and fire hydrant system
Foam fire-fighting system	-
Carbon dioxide fire extinguishing system	For natural gas used facilities
Portable extinguisher	-
Fire engine (pump car)	To draw water from the water pool in the site

Source: EIA Study Team

6.2.4. Traffic Safety

During the construction and closure phase, the traffic volume around the construction site (e.g. the power plant and pipeline route) will be increased due to frequent transportation of the construction materials. In addition, construction activities using heavy machines are planned. Frequent transportation of construction vehicles or possibility of mis-handling of heavy machines will bring a risk of accidents at the surrounding communities as well as within the construction site. The following mitigation plan will be applied to mitigate the assumed impact.

Table 3 Mitigation Measures for Traffic Safety

Mitigation Measure	Remarks
Provide adequate health care facilitates and first aid within the construction site	-
Provide training to construction workers about OHS	-
Provide information and guidance on construction activities and safety to surrounding communities	-

Source: EIA Study Team

During the construction phase, the contractor will check the record of traffic accidents regularly as a monitoring of traffic safety. This monitoring will be conducted under the monitoring for Occupational Health and Safety Management Plan as shown in Appendix G-8.

6.2.5. Disease Prevention

6.2.5.1. Health Data (Baseline of the Current Health Status)

Table 4 shows the health status of Sintgaing Township in 2018 and Table 5 shows the health status of village groups which are located around project area. The major disease in both township and village is infections. The most common disease around the project site is diarrhea. In general, the causes of diarrhea are the followings.

- ✓ Internal factor

  Malabsorption syndrome

  Structural Gastrointestinal disease

  Functional Gastrointestinal disease

- ✓ External factor

  Food poisoning (food poisoning is usually caused by infectious bacteria or other organisms)

  Alcohol abuse

Table 4 Health Condition of Sintgaing Township

Total Population	Major Disease (person)			
	Diarrhea	TB(Tuberculosis)	Dysentery	ARI (Acute Respiratory Infections)
134,904	1,418	82	113	58

Source: Township Profile (2018), Sintgaing Township General Administration Department

Table 5 Health Condition of Village Groups (Previous 6 Months)

Village group	Major Disease (person)			
	Diarrhea	TB(Tuberculosis)	Dysentery	ARI (Acute Respiratory Infections)
E Bya, Met Ka Ya	15	0	1	0
Mont Paung, Ohn Pin Chan	0	0	0	0
Pin Char, Taw Ma	5	0	0	0
Be Lin, Ban Da, Taung U, Min Ye, Kyauk Mine, Taung Yin, Na Be Bin	2	13	0	0
Shan Gan	1	3	3	0

Source: This data was provided from Sintgaing Township General Administration Department (October 2019)

6.2.5.2. Assumed Health Impact

It could be considered that the health impact during the operation phase will be caused by the emitted materials or substances from the Project. The major emitted materials are flue gas and effluent on this Project. The assumed health impacts are shown in Table 6.

As for a major health impact during the construction, the contractor will provide the educational program on prevention of HIV/AIDS and Sexually Transmitted Diseases (STDs) to workers and if necessary, to the nearby communities as outlined in the EIA and monitor the number of the education program provided and participants during the construction stage. This will be monitored separately under the Environmental Management Plan and Environmental Monitoring.

Table 6 Assumed Health Impact

Assumed Health impact	Remark
Respiratory disease (e.g. Bronchitis)	The flue gas contains nitrogen oxides. In general, the high concentrated nitrogen oxides will cause a respiratory disease. However, for this Project, ambient air levels will be lower than the guideline values of WHO and IFC according to the forecast result of air quality, and the health impact is considered negligible.
Digestive disease (Orally infected via a discharged water)	Even though after the wastewater treatment, the effluent from the project facility will contain the biological materials to some extent. There is a possibility to increase pathogenic bacteria and virus. For this issue, the disinfection process (e.g. Chlorination) would be usually applied on wastewater treatment.

Source: EIA Study Team

The following mitigation plan will be applied to mitigate the assumed impact.

Table 7 Mitigation Measures for Health Impact

Mitigation Measure	Remarks
Applying a high height stack to promote dispersion of air pollutant	For respiratory disease
Narrowing the outlet of the stack to avoid the appearance of stack downwash	
Installation of a low nitrogen dioxide emission type of the gas turbine	
Installation of the wastewater treatment and proper operation of treatment facility	For digestive disease
Installation of the disinfection process (e.g. chlorination process) to the	

waste water treatment facility	

Source: EIA Study Team

6.2.5.3. Monitoring Plan

The monitoring plan of air and water quality is necessary to prevent the health impact to around the project site and local community. The following table shows the responsible organization and method of monitoring.

Table 8 Monitoring Plan of Air and Water Quality

Project Phase	Monitoring Item	Monitoring Method	Place	Frequency	Project Components	Responsible Organization
Operation	Air quality NO_2 (Ambient)	Site measurement	Project site	Quarterly	Power plant	EPGE
	Air quality NO_2 (Flue gas)	Site measurement	Project site	Quarterly	Power plant	EPGE
	Water quality (effluent of domestic usage) BOD, Ammonia, Arsenic, Cadmium, Chemical oxygen demand, Chlorine (total residual), Chromium (hexavalent) Chromium (total) Copper, Cyanide (free), Cyanide (total), Fluoride, Heavy metals (total), Iron (total), Lead, Mercury, Nickel, Oil and grease, pH, Phenols, Selenium, Silver, Sulphide, Temperature increase, Total coliform bacteria, Total phosphorus, Total suspended solids, Zinc	Site measurement	Project site	Quarterly	Power plant	EPGE

Source: EIA Study Team

(End)

Appendix G-6

Industrial Risk Management Plan

The coexistence of economic growth and environmental protection is fundamental in today's world for sustainable development. In the electric power sector, the power facility has to accommodate the power supply with environmental conservation around the power facility. This industrial risk management plan is prepared to aim environmentally sustainable electric power development in Kyaukse District. However, the Project is in an early stage at this time, thus the plan presents just a basic policy and initial plan of the industrial risk management. The detailed industrial risk management plan will be fixed before the operational phase according to the detailed design and detailed operating plan.

1. Objective of the Industrial Risk Management

   To manage the industrial risk which could happen during commercial operation of the power plant and cause impacts on continuous operation.

2. Application Stage

   Operational phase

3. Executing Institute

   Operation phase: EPGE

4. Target Area of This Plan

   Operational phase: the power plant site including the intake and pipeline route

5. Related Organization/ Agency

   MOGE, DPTSC, Irrigation Department under MOALI, Forest Department under MONREC, Department of Rural Road Development under MOC, Police Department, Fire Fighting Department, Mandalay Region, and Sintgaing Township GAD

6. Contents of the Plan

6.1. Regulatory Requirement

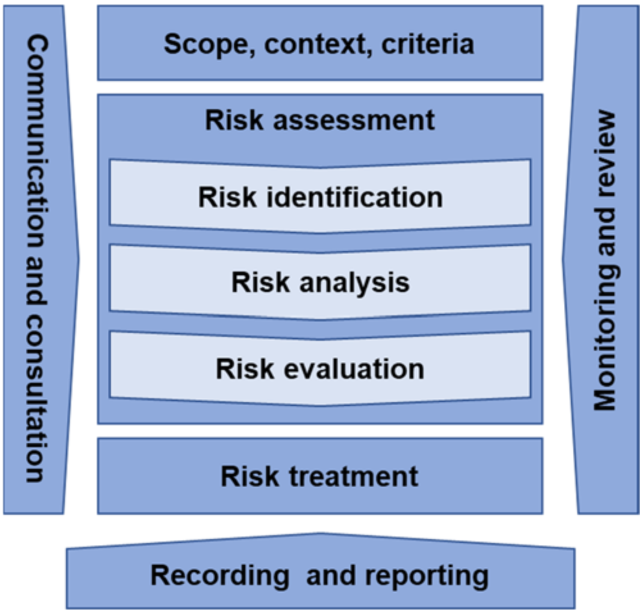
The power plant operation is exposed to the risk of the asset damage and power supply interruption due to system failures, accidents, incidents and natural disasters. It is necessary that measures should be taken to reduce and prevent such risks, and to limit their impacts on persons and the environment. In order to manage the risks, risk management is planned and implemented in accordiance with ISO 31000 and ISO/IEC 31010.

6.2. Industrial Risk Management

Industrial risk management is identification, evaluation, and prioritization of risks followed by coordinated and economical applications of resources to minimize, monitor, and control the probability or impact of unfortunate events or to maximize the realization of opportunities. This industrial risk management is planned and implemented based to ISO 31000 basically.

6.3. Risk Management Process

According to ISO 31000, a risk management process systematically applies management policies, procedures, and practices to a set of activities intended to establish the context, communicate and consult with stakeholders, and identify, analyze, evaluate, treat, monitor, record, report, and review risk. The risk management process is given below.



Source: EIA Study Team

Figure 1 Risk Management Process

(1) Scope, Context and Criteria

This is a process to establish the context, which means to define the external and internal parameters that organizations must consider when risks are managed.

An organization's external context includes its external stakeholders, its local, national, and international environment, as well as any external factors that influence its objectives.

An organization's internal context includes its internal stakeholders, its approach to governance, its contractual relationships, and its capabilities, culture, and standards.

(2) Risk identification

Risk identification is a process that involves finding, recognizing, and describing the risks that could affect the achievement of objectives. It is used to identify possible sources of risks in addition to the events and circumstances that could affect the achievement of objectives. It also includes the identification of possible

causes and potential consequences. It can be used historical data, theoretical analysis, informed opinions, expert advice, and stakeholder inputs to identify organization's risks.

(3) Risk Analysis

Risk analysis is a process that is used to understand the nature, sources, and causes of the identified risks. It is also used to study impacts and consequences and to examine the controls that currently exist, and then to identify the level of residual risks.

(4) Risk Evaluation

Risk evaluation is a process that is used to compare risk analysis results with established risk criteria in order to determine whether or not a specified level of risks is acceptable or tolerable.

(5) Risk Treatment

Risk treatment is a risk modification process. It involves selecting and implementing one or more treatment option(s). Once a treatment has been implemented, it becomes a control or modifies existing controls.

There are many treatment options. These options can avoid the risk, reduce the risk, remove the source of the risk, modify the consequences, change the probabilities, share the risk with others, simply retain the risk, or even increase the risk in order to pursue an opportunity.

(6) Recording and Reporting

Recording means recording information in a risk register (a list and/or document of results of risk assessment) so that this information can then be reported to decision-makers

(7) Communication and Consultation

Communication and consultation are a dialogue between an organization and its stakeholders. This dialogue is both continual and iterative.

(8) Monitoring and Review

Monitoring means to supervise, continually check and critically observe. A review is an activity which is carried out in order to determine whether something is a suitable, adequate, and effective way of achieving established objectives.

Personnel involved in power plant operations carry out "Scope, Context and Criteria", "Risk assessment (Risk identification, Risk analysis, Risk evaluation)", "Risk Treatment" processes before the operation phase, and if organization's external context and internal context is changed. Also, these processes will be carried out, if necessary, due to the results of "Communication and Consultation" and "Monitoring and Review" processes. "Communication and Consultation" and "Monitoring and Review" processes are carried out, if necessary.

6.4. Industrial Risk Management Plan

The following table shows industrial risks which could cause impacts on continuous operation of the power plant. Possible causes and mitigation measures are also shown in this table. In general, EPGE should monitor and record the plant operation condition and long-term trend during O&M period so that they can grasp the early signs of the industrial risks. EPGE also need to learn in detail on plant operation philosophy, O&M

manual, to be prepared by the Contractor in EPC stage, so that they can judge and take prompt actions for measures in case of the events.

It needs more detailed and quantitative assessment. However, the Project is in an early stage at this time, risk assessment should be carried out during the construction phase according to the detailed design and detailed operating plan.

Table 1 Industrial Risk

Risk	Possible cause	Mitigation measure
Intermittence of gas supply	Technical problem of the existing gas pipeline facility owned by MOGE	- To communicate with MOGE for obtaining any information about their gas pipeline operation
	Technical problem of the newly constructed gas pipeline facility for Kyaukse CCPP.	- Refer to Safety Management Plan of the gas pipeline for the newly constructed gas pipeline facility for Kyaukse CCPP.
Intermittence of water supply	Failure of the water intake pump	- To secure redundancy for the water intake pump (100% x 2 units)
	Low river water level for pump up	- To have a water storage pool in the power plant area to afford water supply for a few days operation
Defect of gas turbine	Technical problem of the gas turbine and/or its auxiliary equipment	- To have spare parts at site - To keep partial load operation with 1 gas turbine and steam turbine
Defect of steam turbine	Technical problem of the steam turbine and/or its auxiliary equipment	- To have spare parts at site - To keep partial load operation without a steam turbine (simple cycle operation)
Defect of main equipment such as feed water pump	Technical problem	- To have spare parts at site - To secure redundancy for main equipment
Fire	Electrical short circuit	- To perform the periodical inspection. - To have a fire fight system and equipment such as alarm, CO_2, a pump car - To have a fire fight team - To prepare the emergency response plan for fire (refer to Emergency Response Plan)
	Welding	- To have a work area /space - To prepare a welding procedure - To have the fire fight system and equipment such as alarm, CO_2, a pump car - To have a fire fight team - To prepare the emergency response plan for fire (refer to Emergency Response Plan)
	Tabaco	- To have a smoking area - To have a fire fight system and equipment such as alarm, CO2, a pump car - To have a fire fight team - To prepare the emergency response plan for fire (refer to Emergency Response Plan)

Risk	Possible cause	Mitigation measure
Natural disaster (Flood)	N/A	- To design based on inundation measures - To have flood control equipment - To prepare the emergency response plan for flood (refer to Emergency Response Plan)
Natural disaster (Earthquake)	N/A	- Seismic design in accordance with seismic records - To prepare the emergency response plan for earthquakes (refer to Emergency Response Plan)

Source: EIA Study Team

6.5. Monitoring Plan

The monitoring plan on industrial risk management is necessary to reduce and prevent continuous operation impacts by the industrial risk. The following table show the responsible organization and method of monitoring.

Table 2 Monitoring Plan on Emergency Response Plan

Project Phase	Monitoring method	Place	Frequency	Project components	Responsible organization
Operation	Checking records of risk assessment	Project site	Annually and when events occur	Power plant, Gas pipeline, Water pipeline	EPGE

Source: EIA Study Team

7. Reference

1. ISO 31000: 2018, Risk management – Guidelines
2. ISO/IEC 31010:2009, Risk management – Risk assessment techniques

(End)

Appendix G-7

Community Development Plan

The Community Development Plan is a set of activities undertaken by the project owner/contractor to directly benefit to the community affected by the Project. The overall objective of the plan is to fully engage affected communities into planning, construction and O&M phases, and share the benefit of the project development in culturally and socially appropriate manner. The plan should be developed during the preparation of the EIA. The plan is subject to revision in accordance with the process of planning and approval of the Project.

1. Objective of the Community Development Plan
   To engage the community into the planning process of the Project, to assess possible adverse and positive impacts of the Project to the communities, and to prepare the framework to share the benefit of the project implementation with the affected communities.

2. Application Stage
   Construction and operational phases

3. Executing Institute
   Construction phase: Contractor
   Operation phase: EPGE

4. Target Area of This Plan
   Throughout the Project: affected communities

5. Related Organization/ Agency
   Sintgaing Township, heads of affected communities

6. Contents of the Plan

6.1. Regulatory Requirement

There is no specific regulation that stipulates requirement for the Community Development Plan. The World Bank provides guidelines for benefit sharing with communities in monetary and non-monetary forms. Considering the Project does not generate any fund for community development activities, and there is no legal framework that specifies requirement for the plan, the following plan is developed by selecting items which are applicable to the Project and do not involve substantial financial resource based on existing guidelines and practical documents. Types of activities are categorized as follows:

(i) support for education; (ii) infrastructure improvement; (iii) support health care; (iv) social welfare support; (v) promotion of economic development; and (vi) local employment and local procurement programs.

6.2. Proposed Activities/Actions during Planning-Construction Phases

Item	Timing	Responsible Parties
(ii)-1 Improvement of community roads, where pipelines will be installed, or many dump trucks will travel	Throughout construction	Contractor
(ii)-2 Installation of street lamps to the power pole along the rural road	Early-mid construction	Contractor
(iii) Involve affected communities in awareness and educational initiatives for prevention of communicable diseases (especially sexually transmitted diseases)	Throughout construction	Contractor
(iii) Provide first aid treatment to community in case of emergency	Throughout construction	Contractor
(vi) Prioritized employment for (non-)skilled labor/ women/ marginalized groups	Early construction	Contractor

Source: EIA Study Team

6.3. Proposed Activities/Actions during O&M Phase

Item	Timing	Responsible Parties
(i) Accommodate the plant visit by students to develop awareness of energy and environmental issues	Operation	Operator
(iv) Provide a space for meeting, community gathering inside the workspace or compound of the power plant	Operation	Operator
(iv) Workers participate in the community events and/or make in-kind contributions to such an event	Operation	Operator
(iv) Provide the shelter and disaster supply (such as water, food and others) to local communities in case of a disaster	Operation	Operator
(v) -1 Provide a space for sale of farming products	Operation	Operator
(v) -2 Provide domestic water treatment sludge as a fertilizer	Operation	Operator
(vi) Prioritized employment for (non-)skilled labor/ women/ marginalized groups	Operation	Operator

Source: EIA Study Team

6.4. Monitoring Plan

Provisional parameters and timing of monitoring are as followings:

<Construction Phase>

Item	Parameter	Timing
(ii)-1 Improvement of community roads, where pipelines will be installed, or many dump trucks will travel	Length(m) of improved roads	Quarterly
(ii)-2 Installation of street lamps to the power pole along the rural road	Number (No.) of lamps installed	Quarterly
(iii) Involve affected communities in awareness and educational initiatives for prevention of communicable diseases (especially sexually transmitted diseases)	Number (No.) of participants to the initiatives	Quarterly
(iii) Provide first aid treatment to communities in case of emergency	Number (No.) of people treated	Quarterly
(vi) Prioritized employment for (non-)skilled labor/ women/ marginalized groups	Number (No.) of employment from local communities	Quarterly

Source: EIA Study Team

<Operation Phase>

Item	Parameter	Timing
(i) Accommodate the plant visit by students to develop awareness of energy and environmental issues	No. of students	Quarterly/biannually
(iv) Provide a space for meeting, community gathering inside the workspace or compound of the power plant	No. of gatherings held	Quarterly/biannually

Item	Parameter	Timing
(iv) Workers participate in the community events and/or in-kind contributions to such an event	No. of participants/ quantity of contributions	Quarterly/biannually
(iv) Provide the shelter and disaster supply (such as water, food and others) to local communities in case of a disaster	Quantity of such supplies	Quarterly/biannually
(v) -1 Provide a space for sale of farming products	No. of sellers	Quarterly/biannually
(v) -2 Provide domestic water treatment sludge as a fertilizer	Quantity of sludge provided	Quarterly/biannually
(vi) Prioritized employment for (non-)skilled labor/ women/ marginalized group	Number (No.) of employment from local communities	Quarterly/biannually

Source: EIA Study Team

(End)

Appendix G-8

Occupational Health and Safety Management Plan

This occupational health and safety management plan is prepared to ensure health and safety for workers/staff for this Project during each project phase. However, the Project is in an early stage at this time, thus the plan presents just a basic policy and initial plan of the occupational health and safety management. The detailed plan of the occupational health and safety management will be fixed before the operational phase according to the detailed design and detailed operating plan.

1. Objective of the Occupational Health and Safety Management Plan
   To manage the occupational health and safety during the construction, operation and closure phases of Kyaukse CCPP.

2. Application Stage
   Construction phase,
   Operational phase, and
   Closure phase

3. Executing Institute
   Construction phase: Contractor
   Operation phase: EPGE, MOGE
   Closure phase: EPGE, MOGE

4. Target Area of This Plan
   Construction phase: the power plant site including the intake and pipeline route
   Operational phase: the power plant site including the intake and pipeline route
   Closure phase: the power plant site including the intake and pipeline route

5. Related Organization/ Agency
   DPTSC, Irrigation Department under MOALI, Forest Department under MONREC, Department of Rural Road Development under MOC, Police Department, Fire Fighting Department, Mandalay Region, and Sintgaing Township GAD

6. Contents of the Plan

6.1. Regulatory Requirement
   Occupational Safety and Health Law (2019)
   It stipulates that the employers or entrepreneurs shall be responsible to improve the productivity and health of

workers by preventing the occurrence of occupational accidents and diseases by

- providing the sufficient number of personal protective clothing, materials and facilities prescribed and approved by the department on free of charge basis and cause workers to wear them while working.
- providing a clinic, appointing the registered doctors and nurses, and providing medicines and supporting equipment.
- prescribing the precautionary plans for emergency and occupational safety and health instructions, danger signs, notices, posters and signage for directions in accordance with stipulations.
- arranging to prevent any persons in the Workplace from occupational safety and health risks occurred due to materials and machines used and wastes generated in the workplace or process.

6.2. Construction Phase

The following table shows occupational health and safety risks during the construction phase of the power plant.

Table 1 Occupational Health and Safety Risks during the Construction Phase

Risk	Description
Accidents related to the construction works	Potential accidents related to the construction works include, but not limited to, the followings: - Falling from height, - Falling into water, - Entanglement with machinery, - Tripping over permanent obstacles or temporary obstructions, - Slipping on greasy walkways, - Falling objects, - Asphyxiation, - Explosion, - Contact with dangerous substances, - Electric shock, - Variable weather conditions, - Lifting excessive weights, and - Eye damage during welding work

Source: EIA Study Team

6.3. Construction Phase (During Commissioning) and Operation and Maintenance Phase

The following table shows occupational health and safety risks during the construction phase (during commissioning) and operation and maintenance phase of the power plant.

Table 2 Occupational Health and Safety Risk during Commissioning and Operation & Maintenance Phases

Risk	Description
Accidents related to operation and maintenance of the power plant	Potential accidents related to operation and maintenance include, but not limited to, the followings: - Falling from height, - Falling into water, - Entanglement with machinery, - Tripping over permanent obstacles or temporary obstructions, - Slipping on greasy walkways, - Falling objects, - Asphyxiation,

Risk	Description
	- Explosion, - Contact with dangerous substances, - Electric shock, - Variable weather conditions, - Lifting excessive weights, and - Eye damage during welding work
Non-ionizing radiation	Combustion facility workers may have a higher exposure to electric and magnetic fields (EMF) than the general public due to working in proximity to electric power generators, equipment, and connecting high-voltage transmission lines.
Heat	Occupational exposure to heat occurs during operation and maintenance of combustion units, pipes, and related hot equipment.
Noise	Noise sources in combustion facilities include the turbine generators and auxiliaries; boilers and auxiliaries, such as pulverizers; diesel engines; fans and ductwork; pumps; compressors; condensers; precipitators, including rappers and plate vibrators; piping and valves; motors; transformers; circuit breakers; and cooling towers.
Confined spaces	Specific areas for confined space entry may include coal ash containers, turbines, condensers, and cooling water towers (during maintenance activities).
Electrical hazards	Energized equipment and power lines can pose electrical hazards for workers at thermal power plants.
Fire and explosion hazards	Thermal power plants store, transfer, and use large quantities of fuels; therefore, careful handling is necessary to mitigate fire and explosion risks. In particular, fire and explosion hazards increase as the particle size of coal is reduced. Particle sizes of coal that can fuel a propagating explosion occur within thermal dryers, cyclones, baghouses, pulverized-fuel systems, grinding mills, and other process or conveyance equipment.
Chemical hazards	Thermal power plants utilize hazardous materials, including ammonia for NOx control systems, and chlorine gas for treatment of cooling tower and boiler water.
Dust	Dust is generated in handing solid fuels, additives, and solid wastes (e.g. ash). Dust may contain silica (associated with silicosis), arsenic (skin and lung cancer), coal dust (black lung), and other potentially harmful substances.

Source: EIA Study Team

6.4. Closure Phase

The following table shows occupational health and safety risks during the closure phase of the power plant.

Table 3 Occupational Health and Safety Risk during the Closure Phase

Risk	Description
Accidents related to the demolition works	Potential accidents related to the construction works include, but not limited to, the followings: - Falling from height, - Falling into water, - Entanglement with machinery, - Tripping over permanent obstacles or temporary obstructions, - Slipping on greasy walkways, - Falling objects, - Asphyxiation, - Explosion, - Contact with dangerous substances, - Electric shock, - Variable weather conditions, - Lifting excessive weights, and - Eye damage during welding work

Source: EIA Study Team

6.5. Occupational Health and Safety Management Plan

To secure the safety of workers, environmental, persons in charge of occupational health and safety should be assigned for each phase by the responsible organization.

6.5.1. Construction Phase

During the construction phase, the following mitigation measures will be executed to reduce the risk.

Table 4 Occupational Health and Safety Management during the Construction Phase

Risk	Mitigation Measure
Accidents related to the construction works	➢ Providing OHS training program and information of safe work practices and the emergency procedure ➢ Provide the respective personal protective equipment to workers ➢ Providing adequate health care facilities and first aid within the construction site ➢ Comply with occupational health and safety guidelines presented in Section 2.0 of the General EHS Guideline published by IFC.

Source: EIA Study Team

6.5.2. Construction Phase (During Commissioning) and Operation Phase

During the construction phase (during commissioning) and operation & maintenance phase, the following mitigation measures will be executed to reduce the risk.

Table 5 Occupational Health and Safety Management during the Construction Phase (during Commissioning) and Operation & Maintenance Phase

Risk	Mitigation Measure
Accidents related to operation and maintenance of the power plant	➢ Providing OHS training program and information of safe work practices and the emergency procedure ➢ Provide the respective personal protective equipment to workers ➢ Providing adequate health care facilities and first aid within the power plant site ➢ Comply with occupational health and safety guidelines presented in Section 2.0 of the General EHS Guideline published by IFC.
Non-ionizing radiation	➢ Comply with occupational health and safety guidelines presented in Section 2.0 of the General EHS Guideline published by IFC. ➢ Comply with occupational health and safety guidelines presented in Section 1.2 of the EHS Guidelines for Thermal Power Plants published by IFC for the health and safety impacts particular to operation of combined cycle power plants. (e.g. identification of potential exposure level, establishment of safety zones to differentiate radiation-free and exposed zones)
Heat	➢ Comply with occupational health and safety guidelines presented in Section 2.0 of the General EHS Guideline published by IFC. ➢ Comply with occupational health and safety guidelines presented in Section 1.2 of the EHS Guidelines for Thermal Power Plants published by IFC for the health and safety impacts particular to operation of combined cycle power plants. (e.g. regular inspection and maintenance of pressure vessels and piping)
Noise	➢ Comply with occupational health and safety guidelines presented in Section 2.0 of the General EHS Guideline published by IFC. ➢ Comply with occupational health and safety guidelines presented in Section 1.2 of the EHS Guidelines for Thermal Power Plants published by IFC for the health and safety impacts particular to operation of combined

Risk	Mitigation Measure
	cycle power plants. (e.g. design of generators to meet applicable occupational noise levels)
Confined spaces	➢ Comply with occupational health and safety guidelines presented in Section 2.0 of the General EHS Guideline published by IFC. ➢ Comply with occupational health and safety guidelines presented in Section 1.2 of the EHS Guidelines for Thermal Power Plants published by IFC for the health and safety impacts particular to operation of combined cycle power plants. (e.g. control entry to confined space such as turbines, and electrical panel to minimize unnecessary contact with specific hazard environments)
Electrical hazards	➢ Comply with occupational health and safety guidelines presented in Section 2.0 of the General EHS Guideline published by IFC. ➢ Comply with occupational health and safety guidelines presented in Section 1.2 of the EHS Guidelines for Thermal Power Plants published by IFC for the health and safety impacts particular to operation of combined cycle power plants. (e.g. consider installation of hazard warning lights inside electrical equipment enclosures to warn of inadvertent energization)
Fire and explosion hazards	➢ Comply with occupational health and safety guidelines presented in Section 2.0 of the General EHS Guideline published by IFC. ➢ Comply with occupational health and safety guidelines presented in Section 1.2 of the EHS Guidelines for Thermal Power Plants published by IFC for the health and safety impacts particular to operation of combined cycle power plants. (e.g. use of automated combustion and safety controls)
Chemical hazards	➢ Comply with occupational health and safety guidelines presented in Section 2.0 of the General EHS Guideline published by IFC. ➢ Comply with occupational health and safety guidelines presented in Section 1.2 of the EHS Guidelines for Thermal Power Plants published by IFC for the health and safety impacts particular to operation of combined cycle power plants. (e.g. consider generation of ammonia on site from urea or use of aqueous ammonia in place of pure liquefied ammonia)
Dust	➢ Comply with occupational health and safety guidelines presented in Section 2.0 of the General EHS Guideline published by IFC. ➢ Comply with occupational health and safety guidelines presented in Section 1.2 of the EHS Guidelines for Thermal Power Plants published by IFC for the health and safety impacts particular to operation of combined cycle power plants. (e.g. use of dust controls to keep dust below applicable guidelines or wherever free silica levels in airborne dust exceed 1 percent)

Source: EIA Study Team

6.5.3. Closure Phase

During the closure phase, the following mitigation measures will be executed to reduce the risk.

Table 6 Occupational Health and Safety Management during the Closure Phase

Risk	Mitigation Measure
Accidents related to the demolition works	➢ Providing OHS training program and information of safe work practices and the emergency procedure ➢ Provide the respective personal protective equipment to workers ➢ Providing adequate health care facilities and first aid within the construction site ➢ Comply with occupational health and safety guidelines presented in Section 2.0 of the General EHS Guideline published by IFC.

Source: EIA Study Team

6.6. Monitoring Plan

The monitoring plan on occupational health and safety management is necessary to prevent the accidents related to the construction, operation and closure of the power plant. The following table shows the responsible organizations and method of monitoring.

Table 7 Monitoring Plan on Occupational Health and Safety Management

Project Phase	Monitoring Method	Place	Frequency	Project components	Responsible organization
Construction	Check records of accidents in the construction site	Project site	Weekly	Power plant, Gas pipeline, Water pipeline	Contractor
Commissioning	Check records of accidents in the construction site	Project site	Weekly	Power plant, Gas pipeline, Water pipeline	Contractor
Operation	Check records of accidents in the project site	Project site	Monthly	Power plant, Gas pipeline, Water pipeline	EPGE, MOGE
Closure	Check records of accidents in the closure site	Project site	Weekly	Power plant, Gas pipeline, Water pipeline	EPGE, MOGE

Source: EIA Study Team

7. Reference

- IFC Environmental, Health, and Safety Guidelines for Thermal Power Plants, December 2008
- Environmental and Social Impact Assessment Report for Myingyan IPP Project, August 2016

(End)

Appendix G-9

Grievance Redress Mechanism

The Grievance Redress Mechanism (GRM) is a system to deal with any grievance or complain related to the Project comprehensively. Types of grievances may be changed as the project stage is changed. At the pre-construction phase, for example, grievances or inquires related to land acquisition and compensation are assumed as major concerns. Meanwhile at the construction phase, pollutants from civil works or contents of civil works may be raised though it may not be an issue at the pre-construction phase. Same as types of grievances, relevant agencies may be changed as the project stage is progressed. Accordingly, establishing an appropriate GRM is necessary considering the project stage. This document describes GRM at each project stage to initiate the Project to solve environmental and social related grievances during pre-construction, construction, operation and closing phases.

1. Objective of the GRM
   To deal with the grievance caused by the Project appropriately

2. Application Stage
   Pre-construction, construction, operation and closing phases.

3. Executing Institute
   Pre-construction phase: EPGE
   Construction and closing phases: EPGE and Contractor
   Operational phase: EPGE

4. Target Area of This Plan
   Pre-construction phase: Construction site for the water and gas pipeline, electric poles
   Construction and operation phases: Around construction site for all components
   Operational phase: Around power facility site and intake/ discharge facility

5. Related Organization/ Agency
   Pre-construction phase: Land and Crop Compensation Committee (LCCC) at township level, Parliament representative from the township and Mandalay Region Government (MRG)
   Construction phase: township government and others to be identified by the nature of grievances by the EPGE and Contractor
   Operational Phase: township government and others to be identified by the nature of grievances by EPGE

6. Contents of the Plan

6.1. Regulatory Requirement

Pre-construction phase:

<Land Acquisition Act>

Land Acquisition Act enacted in 1894 is the legal basis for land acquisition in Myanmar. The Act is still the legal basis for land acquisition which is consideration in calculating a suitable amount of compensation. The compensation is to be made as quick as possible for affected person when the land is acquired by the government. Government has authority to acquire the land under this Act not only for public purpose but also for business reasons for the companies.

There are other laws and regulations which govern land issues, land administration and land ownership respectively, though no law or regulation stipulates land acquisition and resettlement including rehabilitation of livelihood comprehensively after land acquisition.

Construction, operation and closing phase:

There is no specific law and regulation that stipulates requirements for developing the GRM.

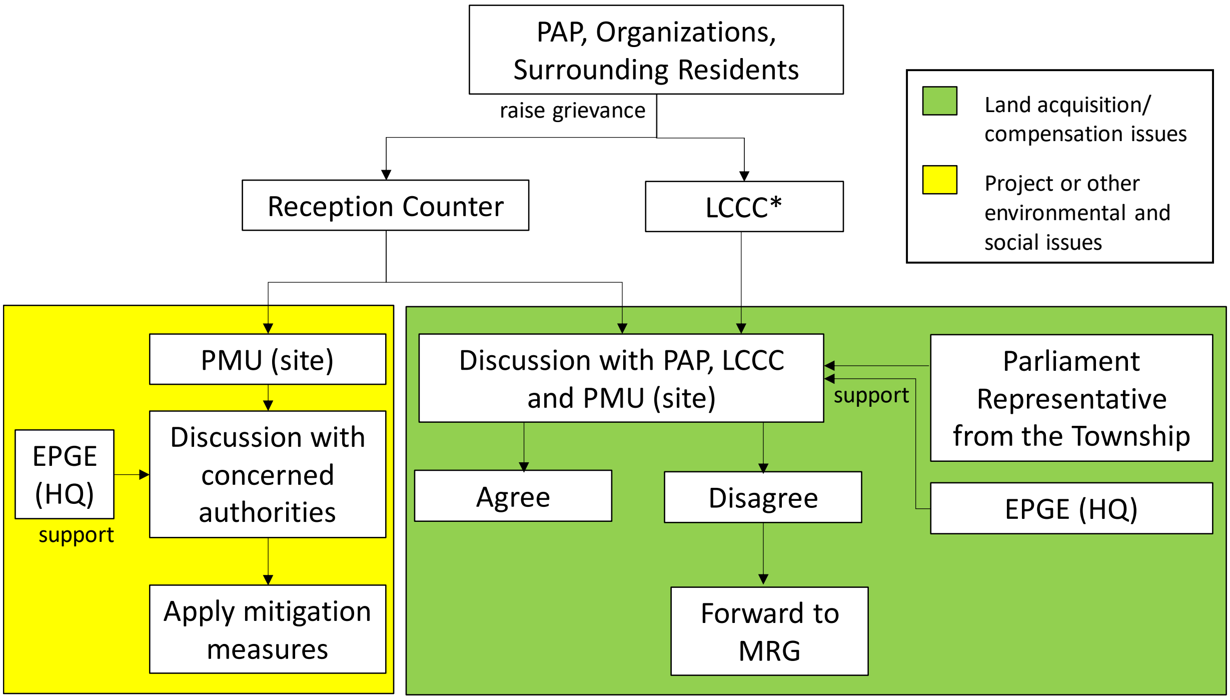
6.2. Pre-construction Phase

If there are Project Affected Persons (PAPs) or parties who are involved into the land acquisition/ temporal land occupation activities of the Project have an issue on those activities, they are able to raises it to LCCC or EPGE (in Belin Substation, a reception counter for complaints will be established) directly or through respective Village Administrators. LCCC and EPGE confirm the status together by conducting a field visit and holding an interview with a person who raises an issue and hold a meeting to discuss the issue. A parliament representative from the township will support discussions between the PAP, LCCC and EPGE. If all parties agree at the discussion, compensation will be paid. If not agreed, it will be forwarded to Mandalay Region Government for further examination and decision.

Other grievances and inquires related to the Project will be also received at the same reception counter in the Belin Substation. Project Management Unit (PMU, to be established in EPGE, see 2.3.4.1 of EIA report) will receive any villager's concern. According to the contents of grievance or inquires, the reception counter will categorize into land acquisition/compensation issues, the other project-related issues, or environmental issues. If a grievance is related to land acquisition/compensation issues, it will be handled at the aforementioned approach. In case a grievance is related to the Project or other environmental issues, it will be examined by the PMU and other concerned authorities to apply appropriate measures. The figure below shows the overall flow of grievance handling at the pre-construction phase.

The flow of grievances related to land acquisition and compensation was explained at the public consultation meeting held in the process of preparing the Resettlement Action Plan (RAP) while the contact window on grievances related to the Project or other environmental issues was explained at the stakeholder meeting on EIA. There is no strict timeline at each step of the GRM, and moving to the next step will be decided as per

discussion among concerned parties. However, 6 months are considered as the indicative maximum duration at each step. The eligible period of the GRM related to land acquisition and compensation is up to two years after physical displacement is done while the eligible period for the Project or other environmental issues will be applicable up to the closing phase.



* LCCC stands for Land and Crop Compensation Committee to be established at the Township

Notes:

1. Green part is the flow related to land acquisition/compensation grievance, Yellow part is the flow related to the Project or other environmental grievance.
2. PMU in the flow related to the Project or other environmental grievance will be worked at the construction and closing phases. EPGE will be the same function as PMU at the operation phase.

Source: EIA Study Team

Figure 1 Overall Flow on GRM at the Pre-Construction Phase

6.3. Construction Phase and Closing Phase

The reception counter for grievances established in Belin Substation at the pre-construction phase will be utilized, and the PMU will receive any villager's concern during the construction phase. Then, the PMU with technical support from the supervision consultant will discuss the mitigation measures and the solutions with the concerned authorities including villagers or village representatives.

In the closing phase, a reception counter will be established in Belin Substation again, and any villager's concern will be received there, details of the GRM will be decided before commencement of closing work.

6.4. Operation Phase

During the operation phase, a reception counter for grievances will be established in the Project site, and EPGE will discuss the mitigation measures and the solutions with the concerned authorities including villagers or village representatives.

6.5. Monitoring Plan

Provisional parameters and timing of monitoring are as follows:

Table 1 Parameters and Timing of Monitoring

Project Phase	Monitoring Method	Related Facilities	Frequency	Project Components	Responsible Organization
Pre-construction	Checking records of grievances (date of reception, contents of the grievance/ complaint, status/ responses/ countermeasures)	Intake/ discharge facility, water and gas pipeline, electric poles	weekly	Gas pipeline, Water pipeline	PMU
Construction/ Closing	Ditto	All	Ditto	Power facility, Gas pipeline, Water pipeline	PMU/ Contractor
Operation	Ditto	Ditto	Ditto	Ditto	EPGE

Source: EIA Study Team

(End)

Appendix G-10

Safety Management Plan of the Gas Pipeline

This safety management plan of the gas pipeline is prepared to ensure safety for the workers, surrounding communities and the facilities. However, the Project is in an early stage at this time, thus the plan presents just a basic policy and initial plan of the safety management. The detailed plan of the safety management will be fixed before the operational stage according to the detailed design and detailed operating plan.

1. Objective of the Safety Management of the Gas Pipeline

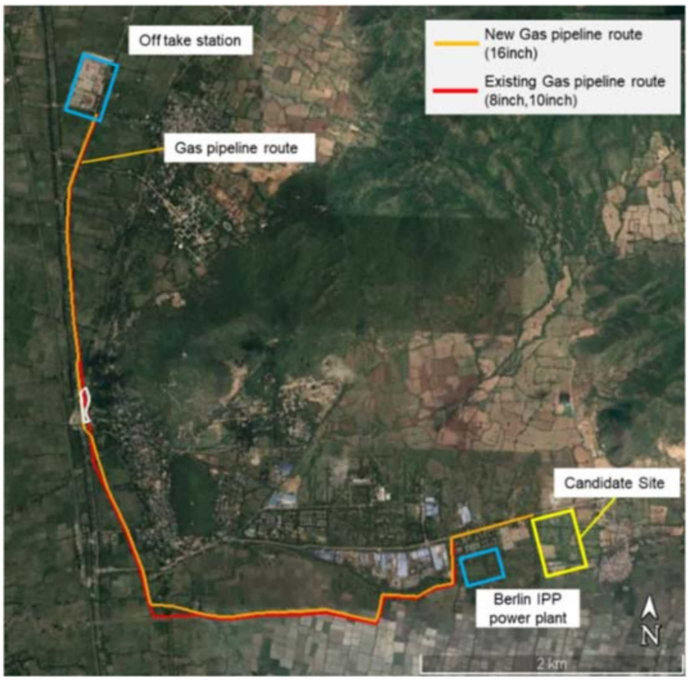
   To manage safety of the gas pipeline which will be installed from existing gas off-take station to Kyaukse CCPP

   The scope of gas pipeline for this plan is as follows;

   - Area: 7 km gas pipeline and its auxiliary equipment from the existing gas off-take station to Kyaukse CCPP, and the gas pipeline inside Kyaukse CCPP (see figure below)
   - Design pressure: 3.1 MPa
   - Pipeline Nominal Diameter:

     (1) from existing Kyaukse gas off-take station to Kyaukse CCPP: 16 inch (400 mm), and

     (2) inside Kyaukse CCPP: detail specifications of the gas pipelines to be fixed by the Contractor at the detail design stage



Source: EIA Study Team based on Google Earth

Figure 1 Gas Pipeline Route

The gas facilities may suffer a spontaneous failure or damage to gas pipework or equipment that results in a loss of containment of the fuel gas. Whenever there is a loss of containment of fuel gas, there is a danger of a fire or

an explosion occurring if a source of ignition is present, because the fuel gas consists of light hydrocarbon with methane (>99.5 mol%) as the major component which have flammability. To a certain extent, a leaking gas will disperse naturally or can be dispersed by mechanical ventilation, but even a moderate leakage rate may generate a flammable gas cloud that can ignite. The downwind distance that the flammable gas might reach depends on the volume of the fuel gas leaked, the rate of the leak, the prevailing weather conditions and source of ignition. Depending on these factors, the ignition of the gas may result in:

- *A flash fire (a short duration fire of an isolated gas cloud);*
- *A jet fire (a fire that burns back to its source and continues burning); or*
- *An explosion*

A fire or an explosion could cause significant damages to workers, equipment and public. For the actions to be taken in case of incident occurrence due to gas leakage, please refer to the Emergency Response Plan as shown in Appendix G-2.

2. Application Stage

Construction phase,
Operational phase,
Closure phase

3. Executing Institute

Construction phase: Contractor
Operation phase: EPGE, MOGE
Closure phase: EPGE, MOGE

4. Target area of This Plan

Construction phase: the powerplant site including the pipeline route
Operational phase: the powerplant site including the pipeline route
Closure phase: the powerplant site including the pipeline route

5. Related Organization/ Agency

MOGE, DRRD, MOALI and Sintgaing Township GAD

6. Contents of the Plan

6.1. Regulatory Requirement

Safety management regulations for the petroleum sector in Myanmar is under drafting as of November 2019. MOGE, an organization in charge of investigation, development, production and transportation of oil and gas, has its own internal guideline based on ISO 13623 and ASME B31.8.

6.2. Mitigation Measures for Risk of the Gas Pipeline

The following table shows principal causes of gas leakage applicable to each phase.

Table 1 Principal Causes of Gas Leakage

Cause	Phase			Area	
	Construction	Operation	Closure	From existing gas off-take station to Kyaukse CCPP	Kyaukse CCPP
Internal					
- Corrosion		✔		✔	✔
- Material defect	✔	✔		✔	✔
- Construction defect	✔			✔	✔
- Improper operations		✔		✔	✔
- Defect caused by pressure cycling		✔		✔	✔
External					
- Third party damage to gas supply pipeline	✔	✔	✔	✔	
- Aircraft crash	✔	✔	✔	✔	✔
- Severe weather conditions	✔	✔	✔	✔	✔
- Subsidence	✔	✔	✔	✔	✔
- Earthquake	✔	✔	✔	✔	✔
- Flooding	✔	✔	✔	✔	✔
- Vehicle impact	✔	✔	✔	✔	✔

Source: EIA Study Team

The following table shows mitigation measures to the principal causes of gas leakage, and they should be taken into consideration in the power plant. As the Project is in an early stage at this time, detail measures should be established according to the detail design and the result of hazard assessment.

Table 2 Mitigation Measure for Principal Causes of Gas Leakage

Cause	Mitigation Measure
Internal	
- Corrosion	➢ All pipelines and equipment should be suitably coated against external corrosion. Also, lagging should be provided with a removable panel to facilitate routine inspections of the condition of the pipework surface. ➢ To detect gas leakage by corrosion, necessary instruments such as flow meters and pressure gauges should be installed at appropriate points on the gas pipeline. ➢ Above measures should be considered in the detail design phase.
- Material defect	➢ Safety and reliability of the power plant should be reviewed regularly during the design, construction, and operational phases.
- Construction defect	➢ Safety and reliability of the power plant should be reviewed regularly during the design and construction phases. ➢ Installation and commissioning work should be carried out in accordance with design documents and manuals.
- Improper operations	➢ Safety and reliability of the power plant should be reviewed regularly during the operational phase. ➢ Operation staffs need to be well trained for O&M.
- Defect caused by pressure cycling	➢ Pressure gauges should be installed at appropriate points on the gas pipeline, and the pressure condition should be monitored regularly.
External	
- Third party damage to the gas supply pipeline	➢ Area around the gas supply pipeline and valve stations should be zone-classified and access-controlled to eliminate any source of ignition.
- Aircraft crash	➢ Most aircraft crashes occur during take-off or landing, within a limited 3 km zone at either end of airport runways. Kyaukse CCPP is outside this zone, and thus risk of aircraft crash on Kyaukse CCPP is considered negligible.
- Severe weather conditions	➢ Lightning strike is believed to have caused to major incidents at oil and gas facilities in a number of locations worldwide. Relevant equipment should be protected with lightning conductors.
- Subsidence	➢ A comprehensive soil investigation survey is recommended to investigate ground settlement / subsidence risks.
- Earthquake	➢ The design of the power plant should minimize the impacts due to severe earthquakes.
- Flooding	➢ Flooding is likely to occur in Kyaukse CCPP as it is situated 12 km south to the Myitnge River, and it may cause equipment failure resulting to gas leak if fuel gas equipment is damaged. ➢ Flooding in Kyaukse CCPP shall also be taken into account in the plant detail design stage.
- Vehicle impact	➢ Consider implementing crash barriers and control of vehicle access, onsite speed limits and driver training programme to reduce risks of gas leakage incidents arising from vehicle striking piping or equipment.

Source: EIA Study Team

To identify, analyze and evaluate the specific hazards and generating scenarios due to gas leakage from the newly constructed gas pipelines for Kyaukse CCPP, it is necessary to carry out hazard assessment. However,

as the Project is in an early stage at this time, it should be carried out in the detail design stage according to the detailed design and detailed operating plan.

Selection of a method for a process hazard analysis depends on many factors such as the size of equipment, complexity of the process and existing knowledge on the process. A hazard assessment study should comprise of the following elements:

- Identification of all hazardous scenarios associated with on-site transport (including piping), storage and handling of dangerous substances at the hazardous facility

  Hazard and Operability Analysis (HAZOP) is a well-defined, systematic technique for hazard identification. It can be applied to processes for which design information is available. This information commonly includes a piping and instrument diagram (P&ID), which is examined in small sections, such as individual items of equipment or pipes between them. For each of equipment or process, the possible significant 'deviations' (such as 'less flow') from each design intention, feasible 'causes' for those deviations, and potential 'consequences' are determined. It can then be decided whether existing, designed safeguards are sufficient, or whether additional actions are necessary to reduce risks to the acceptable level.
- Execution of a Quantitative Risk Assessment (QRA) expressing population risks in both individual and societal terms

  QRA is a well-defined, detailed numerical analysis of risks. It requires calculations of two components of risks: the magnitude of the potential harm L, and the probability p that the harm will occur. Previous similar incidents or a model, which can be generated with modelling software, can be used to estimate the values of these two components. Results can be expressed in terms of the likelihood of harm to a single individual, in the form of a probability contour plot. In addition, the risk to an offsite population can be calculated, and expressed as a plot of number of fatalities vs. frequency of incident. Because of the complexity of QRA and the need to obtain failure rates of specific items of equipment, it is carried out when required by the Authority under normal circumstances.
- Comparison of individual and societal risks with the Criteria for Evaluating Hazard to Life in accordance with international guidelines/standards such as UK HSE Risk Guidelines and BS PD 8010 Code of practice for pipelines Part 3
- Identification and assessment of practicable and cost-effective risk mitigation measures

6.3. Safety Management Plan

The safety management of the gas pipeline is necessary to prevent the accidents related to the construction, operation and closure of the gas pipelines. The following table shows the responsible organizations and methods of monitoring for safety management of the gas pipeline.

Table 3 Overall Monitoring Plan on Safety Management of the Gas Pipeline

Project Phase	Monitoring Method	Place	Frequency	Project Components	Responsible Organization
Construction	Check the detail design plan	N/A	Timing to be determined in the detail design stage	Power plant, Gas pipeline	Contractor
	Check the installation procedure	N/A	Timing to be determined in the detail design stage	Power plant, Gas pipeline	Contractor
	Check records of accidents in the construction site	Project site	Weekly	Power plant, Gas pipeline	Contractor
Commissioning	Check the detail design plan	N/A	Timing to be determined in the detail design stage	Power plant, Gas pipeline	Contractor
	Check the commissioning procedure	N/A	Timing to be determined in the detail design stage	Power plant, Gas pipeline	Contractor
	Check records of accidents in the construction site	Project site	Weekly	Power plant, Gas pipeline	Contractor
Operation	Check records of O&M training in the construction site	Project site	Monthly	Power plant, Gas pipeline	EPGE, MOGE
	Carry out O&M activities to mitigate the risk of gas leakage (see 6.4 below)	Project site	See 6.4 below	Power plant, Gas pipeline	EPGE, MOGE
	Check records of accidents in the gas facilities	Project site	Monthly	Power plant, Gas pipeline	EPGE, MOGE
Closure	Check the demolition procedure	Project site	Timing to be determined later	Power plant, Gas pipeline	EPGE, MOGE
	Check records of accidents in the construction site	Project site	Weekly	Power plant, Gas pipeline	EPGE, MOGE

Source: EIA Study Team

6.4. Monitoring Plan Specifically for the Risk of Gas Leakage

To mitigate the risk of gas leakage which could result in a fire or an explosion, it is important to monitor the gas pipeline condition regularly. Therefore, EPGE/MOGE shall carry out at least followings as basic monitoring activities especially for operation and maintenance of gas pipelines, which are the requirements of ASME B31.8. The detail plan and procedure for each activity should be established by EPGE/MOGE in the detail design stage considering its experience and knowledge of the existing power plant.

Table 4 Basic Monitoring Activities for Gas Leakage during Operation and Maintenance of Gas Pipelines

Activity	Description	Frequency
Periodic Surveillance of Pipelines	As a means of maintaining the integrity of its pipeline system, EPGE/MOGE shall establish and implement procedures for periodic surveillance of its facilities. Studies shall be initiated, and appropriate actions shall be taken where unusual operating and maintenance conditions occur, such as failures, leakage history, drop in flow efficiency due to internal corrosion, or substantial changes in cathodic protection requirements.	Every day as part of daily monitoring of operating and maintenance conditions
Pipeline Patrolling	EPGE/MOGE shall maintain a periodic pipeline patrol program to observe surface conditions on and adjacent to each pipeline right-of-way, indications of leaks, construction activity other than that performed by the company, natural hazards, and any other factors affecting the safety and operation of the pipeline. Patrols shall be performed at least once every year. Weather, terrain, size of line, operating pressures, and other conditions will be factors in determining the need for more frequent patrol. <Example of inspection item> ➢ Visual inspection of gas pipelines and accessories installed above the ground ➢ Visual inspection of ground conditions around buried gas pipeline	At least once per year
Leakage Surveys	EPGE/MOGE shall provide for periodic leakage surveys of the line in its operating and maintenance plan. The types of surveys selected shall be effective for determining if potentially hazardous leakage exists. The extent and frequency of the leakage surveys shall be determined by the operating pressure, piping age, etc. <Example of inspection item> ➢ Gas leakage check by gas detector and/or smelling at holes temporarily made by boring work or at existing manholes	At least once per year
Repair	If at any time a defect is evident on a pipeline, temporary measures shall be employed immediately to protect the property and the public. If it is not feasible to make repairs at the time of discovery, permanent repairs shall be made. If the pipeline is not taken out of service, the operating pressure shall be at a level that will provide safety during the repair operations.	When necessary
Pipeline Leak Records	Records shall be made covering all leaks discovered and repairs made. All pipeline breaks shall be reported in detail. These records along with leakage survey records, line patrol records, and other records relating to routine or unusual inspections shall be kept in the file of EPGE/MOGE, as long as the section of line remains in service.	When necessary

Source: EIA Study Team

7. Reference

1. Environmental and Social Impact Assessment Report for Myingyan IPP Project, August 2016
2. ISO 13623, 2017 Petroleum and natural gas industries - Pipeline transportation systems
3. ASME B31.8, 2018 Gas Transmission and Distribution Piping System

Appendix G-11

Planning Considerations for Pipeline Installation in Heritage Zone

1. Outline

EPGE plans to construct new power facility in Sintgaing township, Kyaukse district to supply electricity according to the increasing electricity demand in Myanmar. On the stage of feasibility study of this project, heritage zone (Mekkhara Old City) was identified on the route of planned water pipeline. Mekkhara Old city has two city walls. (Anawrahta city wall and Athinkhara city wall) The alignment of the water pipeline was changed to divert Athinkhara city wall though, the new pipeline route which is named as an Option-B is still through Anawrahta city wall. The purpose of this plan is to conserve old heritage during construction of water pipeline. The contractor should follow to this plan during construction of water pipeline of the project.

2. Overview of the heritage zone

On 11th century, Anawrahta, King of Bagan Empire, designated Mekkhara region to develop a village for living and to manage lake, stream and dam in Lal Twin 11 districts. Mekkhara was known as not only a town name but also district name because it had a wall and authority to manage surrounding villages. It was observed that Lal Twin 11 location called as Lal Twin 11 villages, Lal Twin 11 towns, Lal Twin 11 districts and Phit Thar 11 districts. It was named as Koe districts at the end of Inn Wa era and it is known as Kyaukse district at the present time. The names of Lal Twin 11 districts are Pin Lal, Pyi Ma Nar, Myit Thar, Myin Kone Taing, Ya Mone, Pa Nan, Mekkhara, Ta Pyat Thar, Thin Taung, Ta Mote, Kan Luu and these are famous in the past period. These are the main rice production of Kyaukse Region. On 13th century of Myin Saing era, three shan brothers built new wall at Mekkhara old town second time.

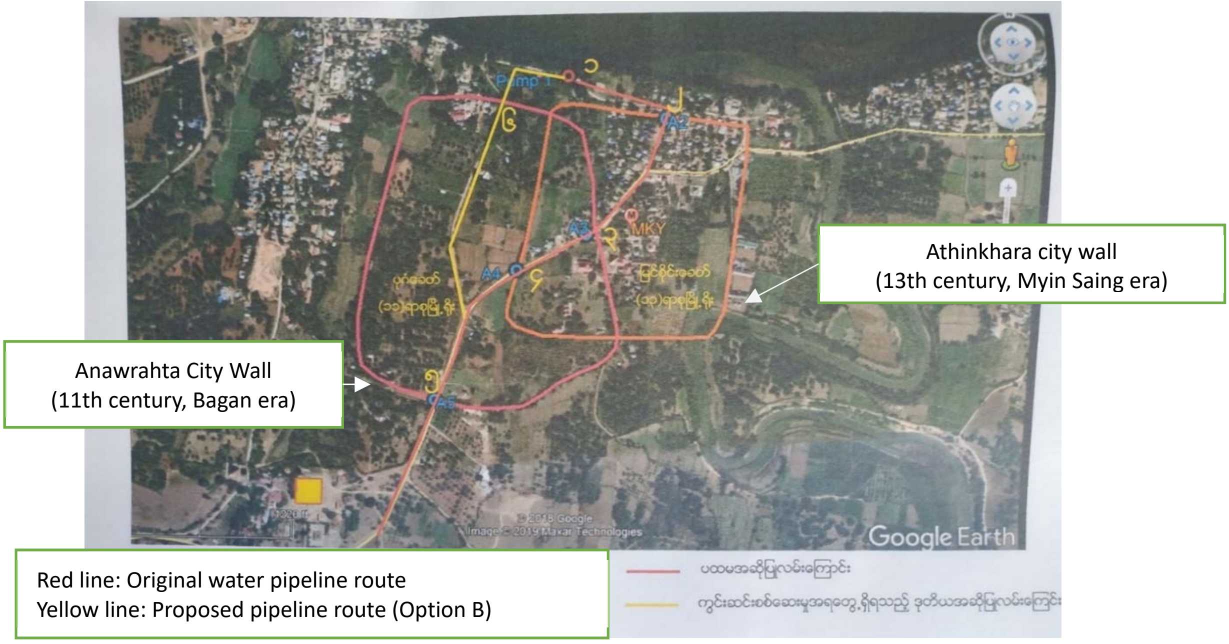


Figure1 Location map of the heritage zone

2.1. Anawrahta city wall (Old wall)

- Name of the old ruin – Anawrahta's City wall

- Estimated age of the old ruin /Name of Dynasty – 11th century of Bagan era

2.2. Athinkhara city wall (New wall)

- Name of the new ruin- Athinkhayar's City wall.

- Estimated age of the new ruin /Name of Dynasty-13th century of Myin Saing era

3. Process for approval of pipeline construction in heritage zone

3.1. Rationale law of heritage conservation

- The Preservation and Protection of Ancient Buildings (Pyidaungsu Hluttaw Law No. 51/2015)

3.2. Process flow

The required process flow of approval and construction which is explained by Department of Archaeology and National Museum (DOANM) Mandalay under MORAC (Ministry of Religious Affairs and Culture) is shown as follows:

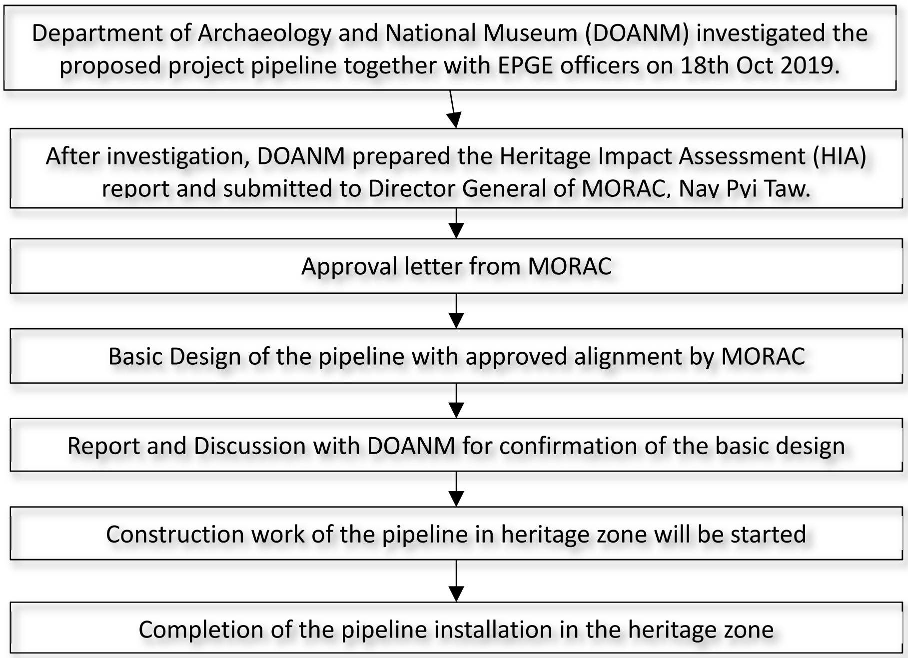


Figure2 Process flow for Pipeline installation in the heritage zone

3.3. Necessary approvals for pipeline construction

According to the Law on Preservation and Protection of Ancient Buildings (Pyidaungsu Hluttaw Law No. 51/2015),

Chapter VII Application for Request, Checking and Permission

No. 15. The one who want to conduct the following thing within the designated area of ancient building require to apply permission from responsible department.

- Expansion of town, quarter, village
- Expansion or Construction or Repairing or Fencing of hotels, factories and residence etc.
- **Excavation of petroleum, natural gas and metal, installation of natural gas pipelines and main electricity pipeline, construction or expansion of factory, communication tower, new road, bridge, airport, irrigation canal and dam**
- Installation of underground electricity and communication cable and other underground construction
- Excavation or expansion of well, lake, canal and breeding lake for animal husbandry
- Excavation, soil and gold digging, mountain collapse, bulldozing, landmine, sanding and stone-cold extraction etc.
- Fencing of ancient building area in the private location.
- Construction of new building that not harmonize with the surrounding environment near ancient building

Chapter VIII Prohibitions

No.20. Not allowing anyone to do following thing that impact on ancient building or ancient area without permission letter.

- **(b) Not allowing to use heavy machineries and vehicles passing that can happen vibration within ancient area.**

4. Considerations for construction work of water pipeline

4.1. Conditions of the approval letter from MORAC

1. EPGE should inform and submit request letter to Director (DOANM- Mandalay) to send expert for supervise before the installation of water pipeline in the ancient city area.

2. During the construction of the pipeline in the ancient city area, contractor should inform Department of Archeology and National Museum in advance to get help for preventing damage to the remained cultural heritage above and under the ground, and to get supervision of the Department of Archeology and National Museum (Mandalay Branch).

3. The manual excavation (hand excavation) is required near the ancient wall (Point No.5 and No.6) for burying the pipelines without impact to the ruins. On the other section in the ancient city area (Interval section between No.5 and No.6), contractor can use low vibration machineries. (Contractor is prohibited to use machineries which would cause high vibration such as a vibratory hammer and concrete breaker in that section.)

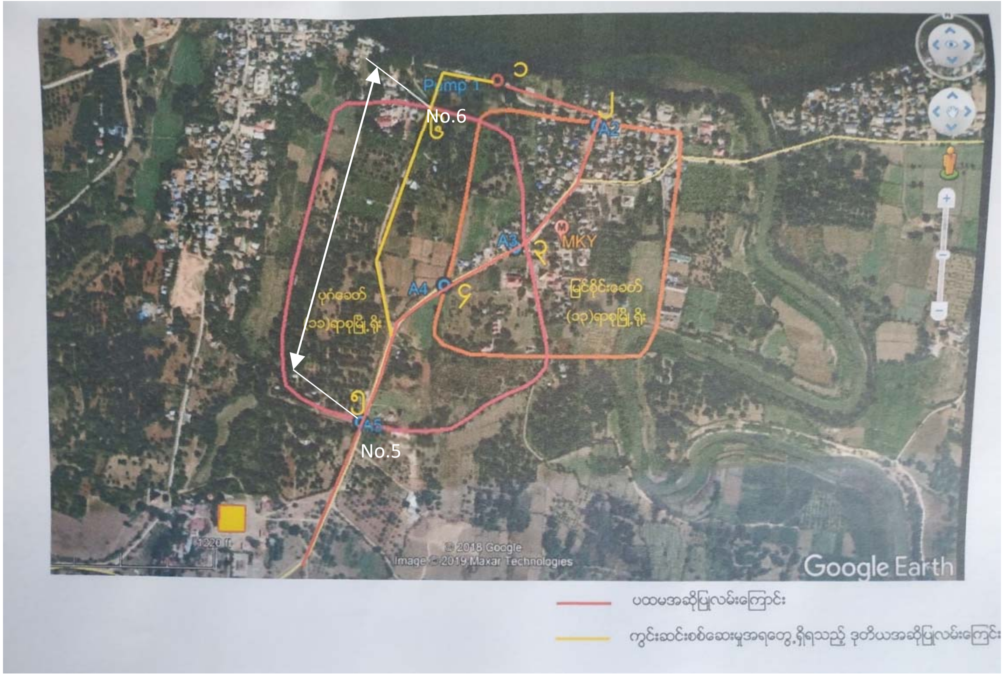


Figure3 alignment of the option-B (Yellow line)

4. Near the ancient city wall (point No.5 and No6) which will be passed the ancient city wall, contractor should keep 10 ft distance from the wall and to make detour route over the remained wall even if the wall structure is not remained. In this context, contractor can request advise from DOANM based on the actual situation.

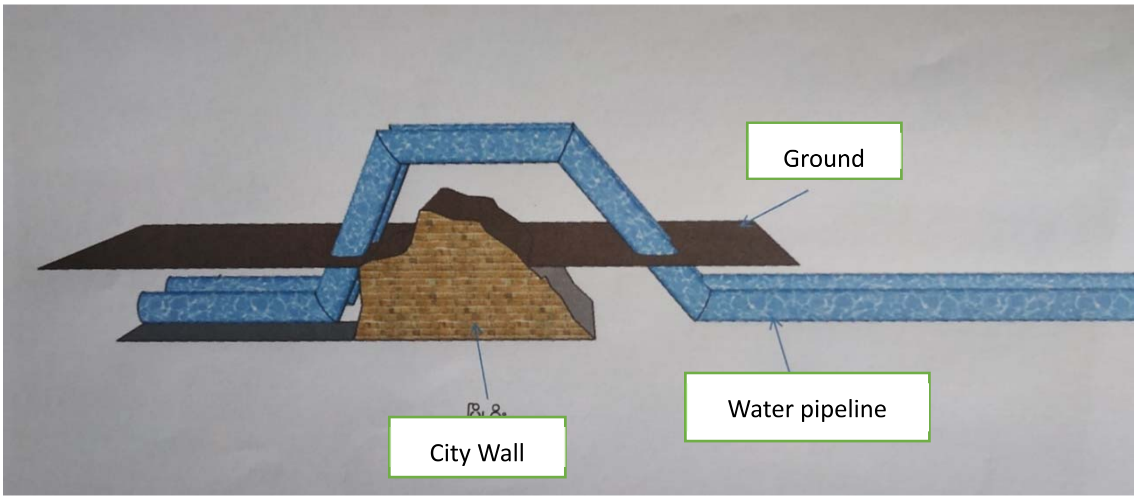


Figure4 Detour route over the ancient wall

5. Contractor should paint the pipelines which will across over the ancient city wall with the grey color or harmonious color with the environment. Regarding the color of the pipeline, contractor can discuss with DOANM about the color before installation. Contractor should consider the safety of transportation simultaneously. Contractor should secure the safety of transportation in the village road to avoid an accident.

6. In case of the finding of archaeological objects such as the row of bricks of ancient buildings, contractor should stop the operation of construction temporarily and should inform to the expert from Department of Archeology and National Museum (Mandalay Branch). If the expert of DOANM is not in the construction site, village leader can keep the found objects temporarily.

7. After the implementation of the pipeline in the ancient city area, contractor should submit the report including pipeline alignment layout map and the photo records on the implementation status to Department of Archeology and National Museum within one month.

4.2. Additional considerations in the heritage zone

After Basic Design of the pipeline before the selection of contractor, EPGE should discuss with DoANM to get confirmation.

5. Contact number of authorities

Authorities of heritage conservation near Kyaukse township is under DOANM (Mandalay).

- U Hla Shwe – Assistant Director from DOANM (Mandalay)
- Contact no: 09-43012917

<Attachment: Approval letter from MORAC >

ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော်အစိုးရ
သာသနာရေးနှင့်ယဉ်ကျေးမှုဝန်ကြီးဌာန
ရှေးဟောင်းသုတေသနနှင့်အမျိုးသားပြတိုက်ဦးစီးဌာန
ရုံးအမှတ် – ၃၅၊ နေပြည်တော်

စာအမှတ်၊ ၃၄၈၆ /၃/၄-င
ရက်စွဲ ၊၂၀၁၉ ခုနှစ်၊ ဒီဇင်ဘာလ ၅ ရက်

သို့

ဦးဆောင်ညွှန်ကြားရေးမှူး
လျှပ်စစ်ဓာတ်အားထုတ်လုပ်ရေးလုပ်ငန်း
ရုံးအမှတ်(၂၇)၊ နေပြည်တော်

GT/ 16/12

အကြောင်းအရာ။ **ဓာတ်အားပေးစက်ရုံအတွက် ရေပိုက်လိုင်းသွယ်တန်းခွင့်ပြုပါရန်ကိစ္စ**

ရည် ညွှန်း ချက်။ လျှပ်စစ်နှင့်စွမ်းအင်ဝန်ကြီးဌာန၊ ရုံးအမှတ်(၂၇)၊ နေပြည်တော်၏ (၂၇.၁၁.၂၀၁၉)ရက်စွဲပါစာအမှတ်၊ ၄၁၂/ဥမရ-ပစအ(ဘဲလင်း– 300mw)/ ၂၀၁၉

၁။ မန္တလေးတိုင်းဒေသကြီး၊ ကျောက်ဆည်ခရိုင်၊ စဉ့်ကိုင်မြို့နယ်၊ မကွန်ရာမြို့ဟောင်းအနီးရှိ ဘဲလင်း(၂၃၀)ကေဗွီဓာတ်အားခွဲရုံဝင်းအတွင်း၌ တည်ဆောက်မည့် ၃၀၀ မဂ္ဂါဝပ် ဓာတ်အားပေးစက်ရုံအတွက် လိုအပ်သောရေကို ဂျပန်နိုင်ငံ JACA မှ ချေးငွေရယူပြီး မြစ်ငယ်မြစ်မှ (၁ပေ)ရေပိုက်လိုင်း (၂)လိုင်းဖြင့် သွယ်တန်းဆောင်ရွက်သွားမည့် စီမံကိန်းအကောင်အထည်ဖော် ဆောင်ရွက်နိုင်ရန် လျှပ်စစ်ဓာတ်အားထုတ်လုပ်ရေးလုပ်ငန်းနှင့် ရှေးဟောင်းသုတေသနနှင့်အမျိုးသားပြတိုက်ဦးစီးဌာန၊ မန္တလေးဌာနခွဲမှ တာဝန်ရှိသူများ ကွင်းဆင်းစစ်ဆေးခဲ့သည့် (HIA)အစီရင်ခံစာအရ ရှေးဟောင်းအမွေအနှစ်များအား ထိခိုက်မှုအနည်းဆုံးဖြစ်သည့် Option–B လမ်းကြောင်းအတိုင်း သွယ်တန်းခွင့်ပြုနိုင်ပါရန်နှင့် ရေပိုက်လိုင်းအား တည်ဆောက်ချိန်တွင် ရှေးဟောင်းသုတေသနနှင့်အမျိုးသားပြတိုက်ဦးစီးဌာနမှ ပညာရှင်များ စေလွှတ်ပေးပါရန် လျှပ်စစ်ဓာတ်အားထုတ်လုပ်ရေးလုပ်ငန်းက ရည်ညွှန်းပါစာဖြင့် ညှိနှိုင်းခဲ့ပါသည်။

၂။ ဤကိစ္စနှင့်စပ်လျဉ်း၍ **Option–B လမ်းကြောင်းအတိုင်း သွယ်တန်းခွင့်ပြုပါကြောင်းနှင့် လုပ်ငန်းဆောင်ရွက်ရာတွင် အောက်ပါအချက်များနှင့်အညီ ဆောင်ရွက်ပေးပါရန် ညှိနှိုင်းအကြောင်းကြားအပ်ပါသည်–**

(က) မြို့ဟောင်းဧရိယာတွင် ရေပိုက်လိုင်းမြှုပ်နှံရန် မြေတူးဖော်ခြင်းအတွက် စက်ယန္တရားများအသုံးမပြုစေဘဲ လူအင်အားဖြင့်သာ ဆောင်ရွက်ရန်၊

3-Arch/ D /2019 / Mar/ December

(ခ) မြို့ရိုးအား ဖြတ်သန်းမည့်အမှတ်(၅)နေရာတွင် မြို့ရိုးအတွင်းအပြင် အနည်းဆုံး (၁ဂ)ပေခန့်ခွာ၍ မြေတူးရန်နှင့် မြို့ရိုးအကြွင်းအကျန်များပေါ်မှသာ ပိုက်လိုင်းသွယ်တန်းရန်၊

(ဂ) မြို့ရိုးဟောင်းပေါ် ဖြတ်သန်းသွားမည့် ၎င်းရေပိုက်လိုင်းအား မီးခိုးရောင်သို့မဟုတ် ပတ်ဝန်းကျင်နှင့် ရောထွေးနိုင်မည့် ဆေးရောင်သုတ်ပေးရန်၊

(ဃ) မြို့ဟောင်းအတွင်း လုပ်ငန်းဆောင်ရွက်ရာတွင် မြေပေါ်မြေအောက်ရှိ ယဉ်ကျေးမှုအမွေအနှစ်များ ထိခိုက်ပျက်စီးမှုမရှိစေရေးအတွက် အကူအညီများပေးနိုင်ရန် ရှေးဟောင်းသုတေသနနှင့်အမျိုးသားပြတိုက်ဦးစီးဌာန၊ မန္တလေးဌာနခွဲသို့ ကြိုတင်ဆက်သွယ် အကြောင်းကြားပေးရန်နှင့် မန္တလေးဌာနခွဲ၏ အနီးကပ်ကြီးကြပ်မှုဖြင့် ဆောင်ရွက်ရန်၊

(င) မြေတူးဖော်သည့်အချိန်တွင် ရှေးဟောင်းဝတ္ထုပစ္စည်း၊ ရှေးဟောင်းအဆောက်အအုံ၏ အုတ်ရိုးတန်း စသည့် ထူးခြားသည့်အခြေအနေ တစ်စုံတစ်ရာတွေ့ရှိပါက လုပ်ငန်းဆောင်ရွက်မှုအားခေတ္တရပ်ဆိုင်း၍ ရှေးဟောင်းသုတေသနနှင့်အမျိုးသားပြတိုက်ဦးစီးဌာန၊ မန္တလေးဌာနခွဲသို့ အချိန်နှင့်တပြေးညီသတင်းပေးပို့အကြောင်းကြားရန်၊

(စ) လုပ်ငန်းဆောင်ရွက်ပြီးစီးပါက အမှန်တကယ် ပိုက်လိုင်းသွယ်တန်းမှုလမ်းကြောင်းပြမြေပုံ၊ ဆောင်ရွက်ခဲ့မှုအခြေအနေ ဓာတ်ပုံမှတ်တမ်းတို့ပါဝင်သော အစီရင်ခံစာအား ရှေးဟောင်းသုတေသနနှင့် အမျိုးသားပြတိုက်ဦးစီးဌာနသို့ တစ်လအတွင်း ပြန်လည်တင်ပြပေးရန်။

ညွှန်ကြားရေးမှူးချုပ်(ကိုယ်စား)

(ကိုကိုနိုင် ၊ ဒုတိယညွှန်ကြားရေးမှူးချုပ်)

မိတ္တူကို-

- ညွှန်ကြားရေးမှူး၊ ရှေးဟောင်းသုတေသနနှင့် အမျိုးသားပြတိုက်ဦးစီးဌာန၊ မန္တလေးဌာနခွဲ
- ရုံးလက်ခံ/ မျှော

3-Arch/ D /2019 / Mar/ December

(End)

Appendix G-12

Corporate Social Responsibility Plan

In 1987, the World Commission on Environment and Development set out an aspirational goal of sustainable development – describing it as 'development which meets the needs of the present without compromising the ability of future generations to meet their own needs.

Through their activities and relationships, all organizations make positive and negative contributions toward the goal of sustainable development. Organizations therefore have a key role to play in achieving this goal.

Corporate Social Responsibility (CSR) activities and reporting are an organization's practice publicly on its economic, environmental, and/or social impacts, and hence its contributions towards the goal of sustainable development.

However, the Project is in an early stage currently, thus the plan presents just a basic policy and initial plan of the Corporate Social Responsibility (CSR). The detailed plan of the CSR will be fixed before the construction and operational phase, according to the detailed design and detailed operating plan.

On this CSR plan, the required information for CSR report is described based on Global Reporting Initiative (GRI) standards. EPGE will follow the GRI's universal standards which every organization should apply to prepare a sustainability report.

1. Basic policy of the CSR report

   The Reporting Principles are fundamental to achieving high quality sustainability reporting. The Reporting Principles are described in following table.

Table Reporting principles of CSR report

･Stakeholder Inclusiveness	The reporting organization shall identify its stakeholders and explain how it has responded to their reasonable expectations and interests.
･Sustainability Context	The report shall present the reporting organization's performance in the wider context of sustainability.
･Materiality	The report shall cover topics that: 1. reflect the reporting organization's significant economic, environmental, and social impacts; or 2. substantively influence the assessments and decisions of stakeholders.
･Completeness	The report shall include coverage of material topics and their Boundaries, sufficient to reflect significant economic, environmental, and social impacts, and to enable stakeholders to assess the reporting organization's performance in the reporting period.

2. General Disclosures

General Disclosure standard is used to report contextual information about an organization and its sustainability reporting practices. This includes information about an organization's profile, strategy, ethics and integrity, governance, stakeholder engagement practices, and reporting process.

1. Organizational profile
2. Strategy Disclosure
3. Ethics and integrity Disclosure
4. Governance Disclosure
5. Stakeholder engagement
6. Reporting practice

3. Management Approach

Material topics are those that reflect an organization's significant economic, environmental and social impacts; or that substantively influence the assessments and decisions of stakeholders. Organizations might be involved with impacts either through their own activities or as a result of their business relationships with other entities.

The Boundary for the material topic which includes a description of:

i. where the impacts occur;
ii. the organization's involvement with the impacts.

For example, whether the organization has caused or contributed to the impacts or is directly linked to the impacts through its business relationships.

For each material topic, the reporting organization shall report the following information:

a. An explanation of how the organization manages the topic.
b. A statement of the purpose of the management approach.
c. A description of the following, if the management approach includes that component:
    i. Policies
    ii. Commitments
    iii. Goals and targets
    iv. Responsibilities
    v. Resources
    vi. Grievance mechanisms
    vii. Specific actions, such as processes, projects, programs and initiatives

4. Specified topics on CSR

EPGE can select specific topics of each impact from the project based on the detailed plan and design. EPGE will use the information of GRI standards on an organization's impacts related to economic, environmental, and social topics. The 200, 300, and 400 series of GRI standards include numerous topic-specific Standards. The following items should be included at least as the impacts will be assessed in CSR report.

Table the Items for Reporting in CSR report

Category	Items
Economic	✓ Direct economic value generated and distributed ✓ Risks and opportunities posed by climate change that have the potential to generate substantive changes in operations
Environment	✓ Total weight or volume of materials ✓ Percentage of recycled input materials used to manufacture the organization's primary products and services. ✓ Total fuel consumption ✓ Water consumption and Discharge volume ✓ The method of water treatment and discharged water quality
Social	✓ Total number and rate of new employee ✓ Management approach for occupational health and safety ✓ Average hours of training that the organization's employees have undertaken

5. Budget planning for the CSR activities and reporting

   Necessary budget for actions and preparation of CSR report will be made by EPGE basically. However, the total budget is based on the scope and contents of the CSR reporting of this project. EPGE have a plan to allocate two percent of the benefit as a budget for CSR activity. On the first stage of the project after two years of starting operation, EPGE can use monitoring data of EIA study for preparation of CSR report. After the monitoring period of EIA study, EPGE should draw up a budget of preparation of CSR report every year.

Kyaukse Gas Combined-Cycle Power Plant Construction Project

Abbreviated Resettlement Action Plan

(A-RAP)
[DRAFT]

FEBRUARY 2020

Electric Power Generation Enterprise (EPGE)

Ministry of Electricity and Energy (MOEE)

TABLE OF CONTENTS

CHAPTER 1: INTRODUCTION 1-1
1.1 Background 1-1
1.2 Project Location 1-1
1.3 Project Description 1-3
1.4 Measures to Minimize Involuntary Resettlement 1-12
1.5 Scope of Abbreviated Resettlement Action Plan 1-12

CHAPTER 2: SOCIO-ECONOMIC PROFILE 2-1
2.1 Method of Social Environemntal Survey 2-1
2.2 Results of Social Environmental Survey 2-2
2.2.1 Profile of Project Affected Households 2-2
2.2.2 Socio-Economic Information of Project Affected Households 2-3
2.2.3 Socio-Economic Information of Affected Shops 2-5

CHAPTER 3: LEGAL FRAMEWORK 3-1
3.1 Legislation Related to Land and Land Tenure in Myanmar 3-1
3.1.1 Laws and Regulations related to Land Acquisition and Land Use 3-1
3.1.2 Procedure of Land Acquisition under Myanmar Regulations 3-1
3.2 JICA Guidelines for Environemntal and Social Considerations (April 2010) 3-2
3.3 Comparison between the JICA Guidelines and Myanmar Legislation 3-4
3.4 Key Principles on Relocation for the Project 3-6

CHAPTER 4: ENTITLEMENT AND ASSISTANCE 4-1
4.1 Eligibility 4-1
4.2 Entitlement 4-1
4.3 Livelihood Restoration Program 4-4

CHAPTER 5: INSTITUTIONAL FRAMEWORK 5-1
5.1 Institutional Framework 5-1

CHAPTER 6: GRIEVANCE REDRESS MECHANISM 6-1
6.1 Principles 6-1
6.2 Procedure 6-1

CHAPTER 7: IMPLEMENTATION SCHEDULE 7-1
7.1 Provisional Schedule 7-1

CHAPTER 8: MONITORING 8-1
8.1 Principal 8-1
8.2 Method 8-1
8.3 Internal Monitoring 8-1

CHAPTER 9: CONSULTATION MEETING 9-1
9.1 First Public Consultation Meeting 9-1
9.2 Second Public Consultation Meeting 9-2

CHAPTER 10: BUDGET 10-1
10.1 Budget 10-1

LIST OF TABLES

Table 1.3-1 Physical Components of the Project 1-3
Table 1.3-2 Shwe Gas Composition 1-11
Table 1.5-1 Area and Size of Land to be used by the Project 1-16
Table 1.5-2 Land to be used by the Project 1-16
Table 1.5-3 Summary of Land to be used for the Project* 1-17
Table 2.1-1 Outline of Social Environmental Survey 2-1
Table 2.1-2 No. of Survey Targets (Project Affected Households) 2-1
Table 2.2-1 Household Size 2-3
Table 2.2-2 Types of Household-Heads 2-3
Table 2.2-3 Income Source of Household Head 2-3
Table 2.2-4 Expenditure of Households 2-4
Table 2.2-5 Drinking Water of Households 2-4
Table 2.2-6 Households classified as Vulnerable Groups 2-4
Table 3.1-1 Major Law for Land Acquisition and Land Use 3-1
Table 3.3-1 Comparison between JICA Guidelines and Myanmar Legislation 3-4
Table 4.2-1 Provisional Entitlement Matrix 4-2
Table 4.3-1 Eligibility and Contents of Livelihood Restoration Program 4-4
Table 5.1-1 Responsibilities of Relevant Organization for Implementing A-RAP 5-1
Table 7.1-1 Provisional Implementation Schedule 7-1
Table 9.1-1 Summary of the 1st PCM 9-1
Table 9.2-1 Summary of the 2nd PCM 9-2
Table 9.2-2 Summary of the Additional PCM 9-3
Table 10.1-1 Summary of Provisional Compensation Amount as of June 2019 10-1

LIST OF FIGURES

Figure 1.2-1 Location of the Project Area 1-2
Figure 1.2-2 Location of the Project Area 1-2
Figure 1.3-1 Location of the Project Facilities 1-4
Figure 1.3-2 Location of the Gas Pipeline 1-5
Figure 1.3-3 Current Status of Pipeline Route 1-6
Figure 1.3-4 Location of the Water Pipeline 1-7
Figure 1.3-5 Location of the Water Pipeline 1-7
Figure 1.3-6 Location of the Water Pipeline 1-8
Figure 1.3-7 Candidate Site of Water Intake Station 1-8
Figure 1.3-8 Current Status of Water Pipeline Route 1-8
Figure 1.3-9 Location of the Electric Line 1-9
Figure 1.3-10 Conceptual Process 1-9
Figure 1.3-11 Facility Layout Plan 1-10
Figure 1.5-1 Flow for Preparing A-RAP 1-13
Figure 1.5-2 Location of Necessary Land 1-15
Figure 3.1-1 Procedure of Land Acquisition under Law in Myanmar 3-2
Figure 6.2-1 Provisional Grievance Redress Mechanism 6-2
Figure 8.3-1 Reporting of Internal Monitoring Result 8-1

APPENDIXES

Appnedix-1 Questionnaire Form for Social Environmental Survey
Appendix-2 Internal Monitoring Form
Appnedix-3 Minutes of 1st Public Consultation Meeting
Appnedix-4 Minutes of 2nd Public Consultation Meeting
Appendix-5 Minutes of Additional Public Consultation Meeting

ACRONYMS

A-RAP	Abbreviated Resettlement Action Plan
CBD	Central Business District
COD	Cut-off Date
GAD	General Administration Department
JICA	Japan International Cooperation Agency
MMK	Myanmar Kyat
NGOs	Non-Governmental Organizations
OP	Operational Policies
ODA	Official Development Assistance
PAHs	Project Affected Households
PAPs	Project Affected Persons
ROW	Right of Way
SHM	Stakeholder Meeting
WB	World Bank

Definitions of Terms for This A-RAP

Project Affected Persons (or Households)	Persons (or households) affected by construction of the Kyaukse Gas Combined-Cycle Power Plant Project (the Project).
Cut-Off Date	The cut-off date is the date when the project is formally declared by the relevant authorities to stakeholders. Generally, the cut-off date is the date when census begins. Persons who occupy the project area after the cut-off date will not be eligible for any assistance on land acquisition by the Project.
Detailed Measurement Survey (DMS)	Census, socio-economic survey and inventory of asset for examining impact to be caused due to project implementation
Entitlement	Range of assistance measures including: i) compensation for loss of assets and loss of income sources, and ii) assistance for vulnerable groups
Land Acquisition	Permanently used by the Project. Therefore, land ownership will be transferred from the original land owners to the project executing agency.
Land Occupation	Temporarily used during the construction works only. Therefore, land ownership will not be transferred, and land will be returned to the landowners when the construction works are completed.
Relocation	Physical displacement from the original location
Shop	A store fixed its structure on the ground and difficult to move or re-assemble
Stoll	A vendor with movable or easily re-assembled structure
Vulnerable Groups	Distinct groups of people who might suffer disproportionately from land acquisition and occupation activities and specifically include: i) households headed by a single parent, disabled person or elderly (over 61 years old), ii) households falling under the generally accepted indicator for poverty or iii) ethnic minorities is regarded as the vulnerable groups.

CHAPTER 1: INTRODUCTION

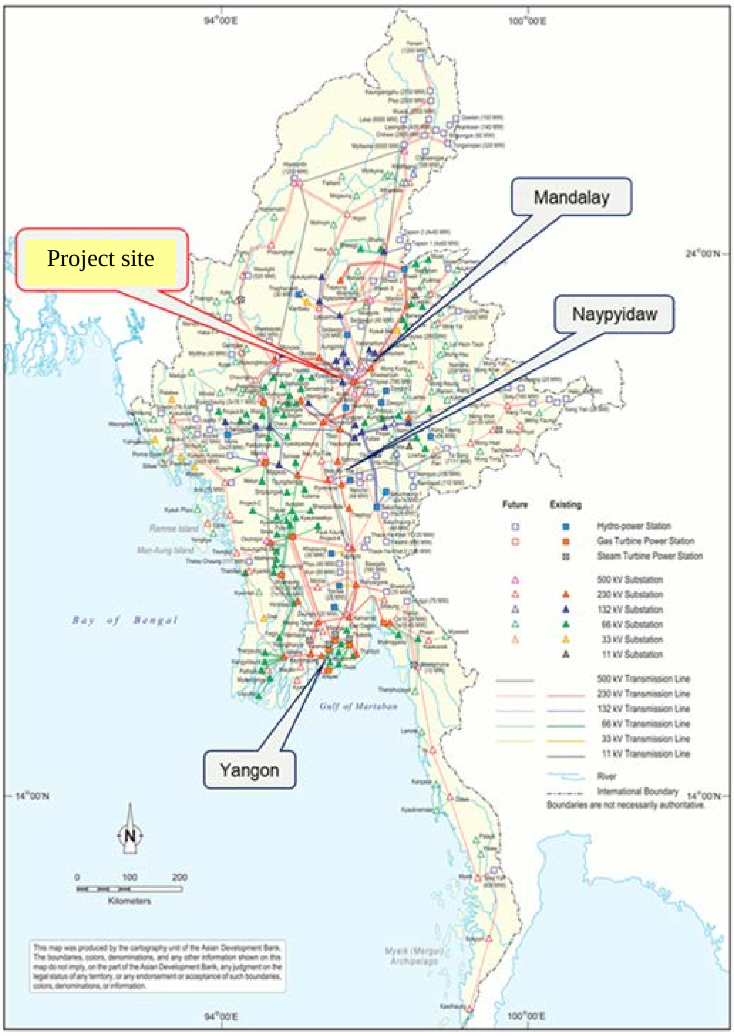
1.1 Background

The electricity demand of Myanmar has been growing rapidly in recent years because of the concentration of development and investment. To meet the growing demand for power supply, the Electric Power Generation Enterprise (EPGE), Ministry of Electricity and Energy aims at increasing generation capacity up to 5,700 MW by 2022, whereas the current capacity is 4,600 MW (2019). Furthermore, from the energy security point of view, it is ideal to utilize various energy sources, such as hydro, gas thermal, coal thermal and renewable energy. Since the gas thermal can start generating electricity with shorter development period compared to other methods, it is expected to be a preferable generation method for Myanmar, as to respond increasing demand.

In this context, JICA conducted a Feasibility Study for Kyaukse Gas Combined-Cycle Power Plant Construction Project (the Project) as a Japanese loan project. The Project consists of 300 MW gas combined cycle thermal power plant, modification of Belin Substation, development of related transmission equipment, water intake and discharge pipelines, natural gas pipelines and electricity cable installation. Proposed site for the power plant is next to Belin substation, Kyaukse City, Mandalay Region, Myanmar, which is currently owned by MOEE.

1.2 Project Location

The Project is located at Be Lin Village Tract in Sintgaing Township of Kyaukse District at Mandalay Region. It is approximately 30km away from Mandalay to south-east as shown in Figure 1.2-1. It is also located adjacent to the Bellin Sub-Station as shown in Figure 1.2-2.



Source: JICA Study Team based on Myanmar Energy Sector Initial Assessment, ADB, October 2012

Figure 1.2-1 Location of the Project Area

Source: JICA Study Team based on Google Earth Pro

Figure 1.2-2 Location of the Project Area

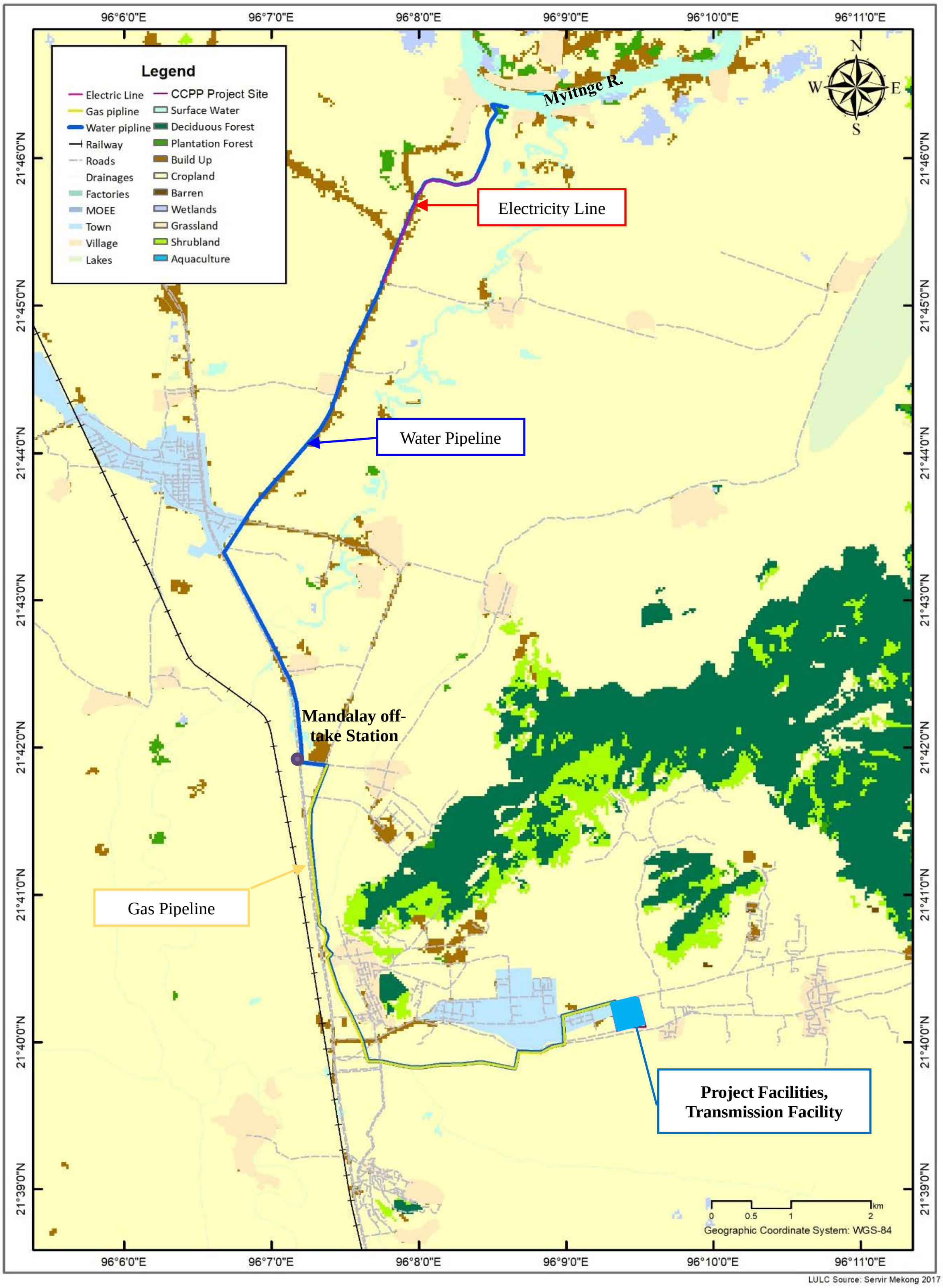
1.3 Project Description

Generation capacity of the Project is approximate 300MW. Electricity will be produced by Combined Cycle of Gas Turbine (CCGT). Table 1.3-1 shows the physical components of the Project, which are the target of environmental and social considerations. The locations of these components are shown in Figure 1.3-1.

Table 1.3-1 Physical Components of the Project

Facilities	Detail of the Facility
Power facilities	300MW CCGT Power Plant - 200MW Gas Turbine - 100MW Steam Turbine Flue gas denitrification facility Natural fuel gas supply system Circulating water treatment facility Waste water treatment facility Transmission and transformation facility Communication facility
Transmission facility	Underground Cable, within the Power facility site, relocation of existing transmission line within the Project site
Gas Pipeline	Underground, Approx. 7.4 km φ16inch x 1
Water Pipelines	Underground, Approx. 17.6 km φ300 ㎜ x 2
Electricity line	Overhead line, Approx. 2.0 km

Source: JICA Study Team



Source: JICA Study Team

Figure 1.3-1 Location of the Project Facilities

(1) Power facilities

- The power generation method is CCGT which uses gas turbine and steam turbine. The capacity of generation is approximate 300MW, which is derived from 200MW gas turbine and 100MW steam turbine.

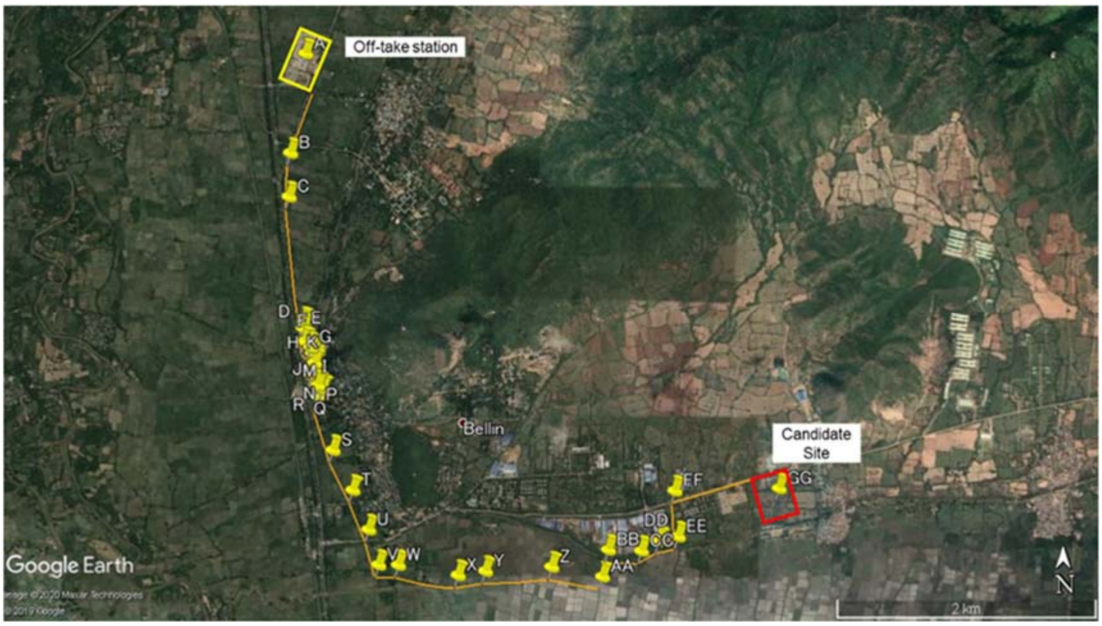
- Generated electricity in the Project will be sent to the Belin substation which will be expanded by utilizing the Project site. After that, electricity will supply to the transmission network in Myanmar.

(2) Transmission facility

- There are existing over-head 33kV transmission line in the Project site for power facilities. Before the construction of power plant, it is necessary to be relocated. The relocation will be implemented within the project site for power facilities.

(3) Gas pipeline

- The fuel gas will be supplied from Mandalay off-take station of Shwe-China gas pipeline. In the Project, new gas pipeline will be installed underground along an existing pipeline which is used for another project. Regarding the installation of gas pipeline of this project, site clearance and/or permission from other authorities will not be necessary at the feasibility study stage but will be required at the basic/detailed design stage.



Source: JICA Study Team based on the image by Google Earth Pro

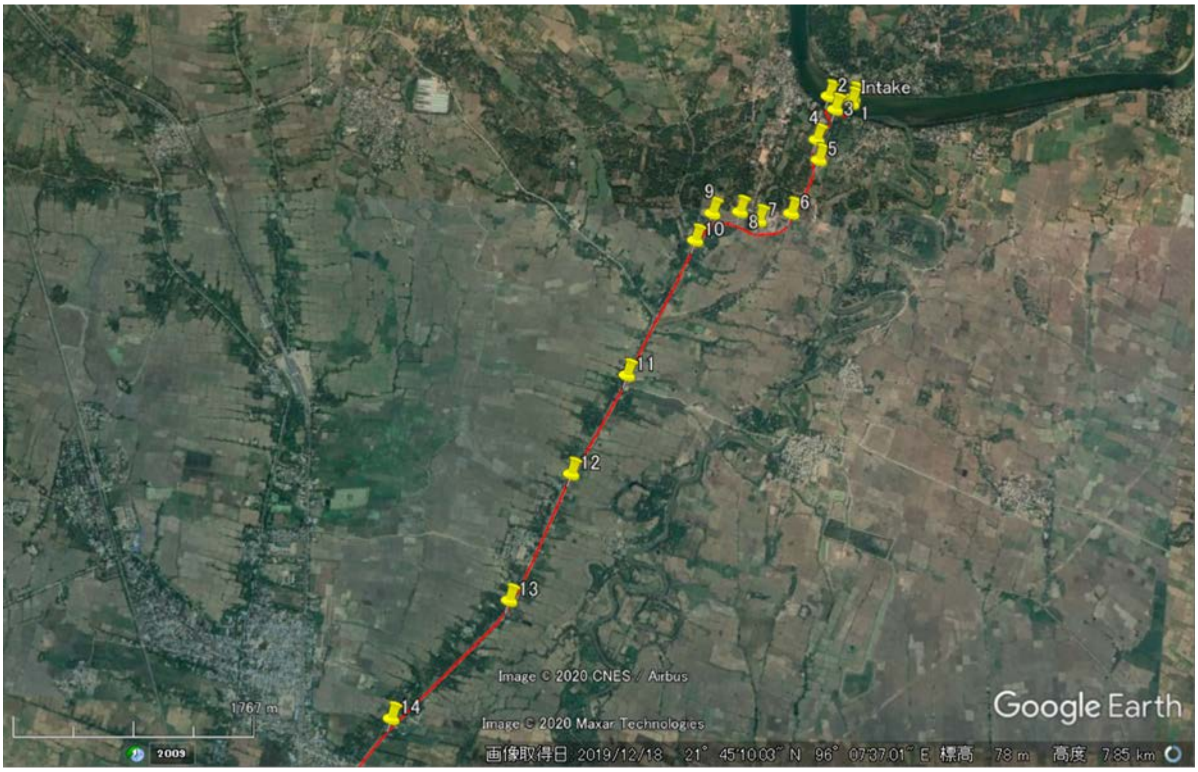
Figure 1.3-2 Location of the Gas Pipeline

Source: JICA Study Team

Figure 1.3-3 Current Status of Pipeline Route

(4) Water pipelines

- The Project requires water mainly for the steam turbine. Myitnge River which flows 11 km north of the project site is planned as the water source. The river has enough flow rate for water usage in the Project and the river water is available stably throughout the year. Other than this, there is no available water source near the site. The water transportation route is planned mainly along the existing irrigation canal and road, and the water pipelines will be laid underground. Intake and discharge station will be installed at the river bank as shown in Figure 1.3-4 to Figure 1.3-6. The current land use is shown in Figure 1.3-7 and Figure 1.3-8. Land acquisition is not necessary for the water pipeline and intake facility; however, temporal occupation will be necessary for installing pipeline. Besides, site clearance and/or permission from other authorities will not be necessary at the feasibility study stage but will be required at the basic/detail design stage. The current land use of water intake and pipeline areas are shown in Figure 1.3-7 and Figure 1.3-8.



Source: JICA Study Team based on the image by Google Earth Pro

Figure 1.3-4 Location of the Water Pipeline

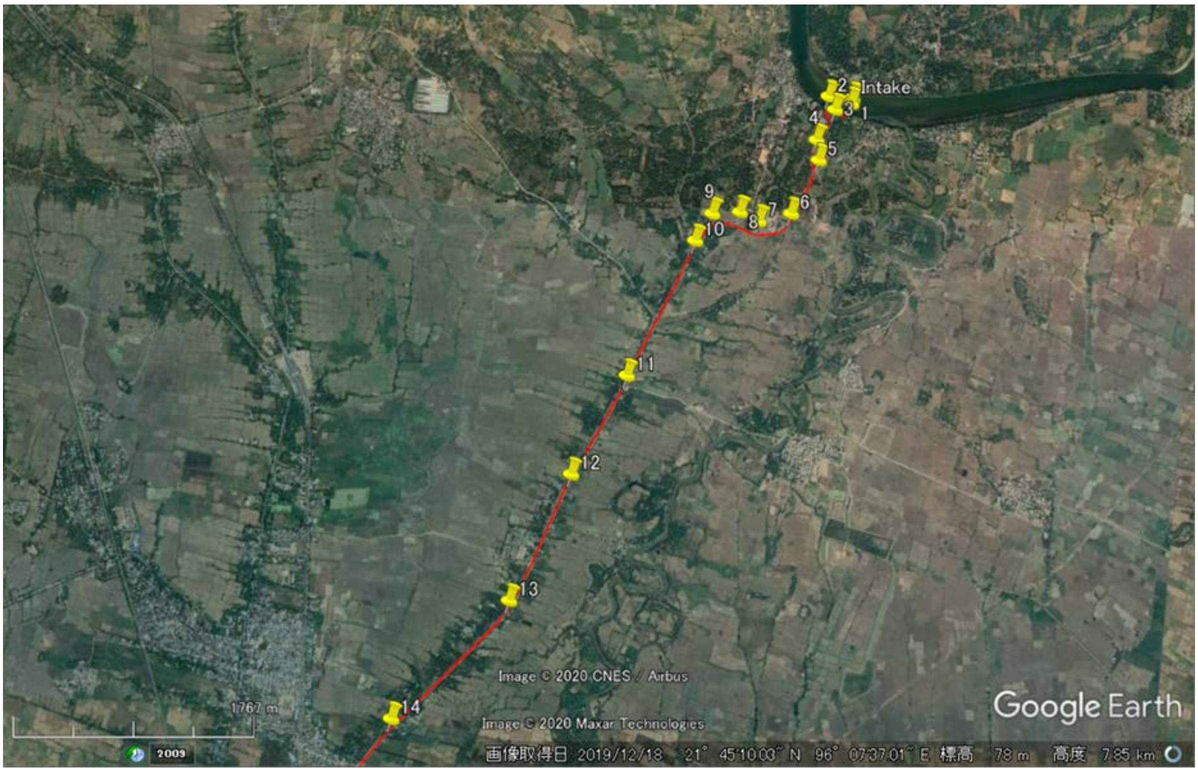
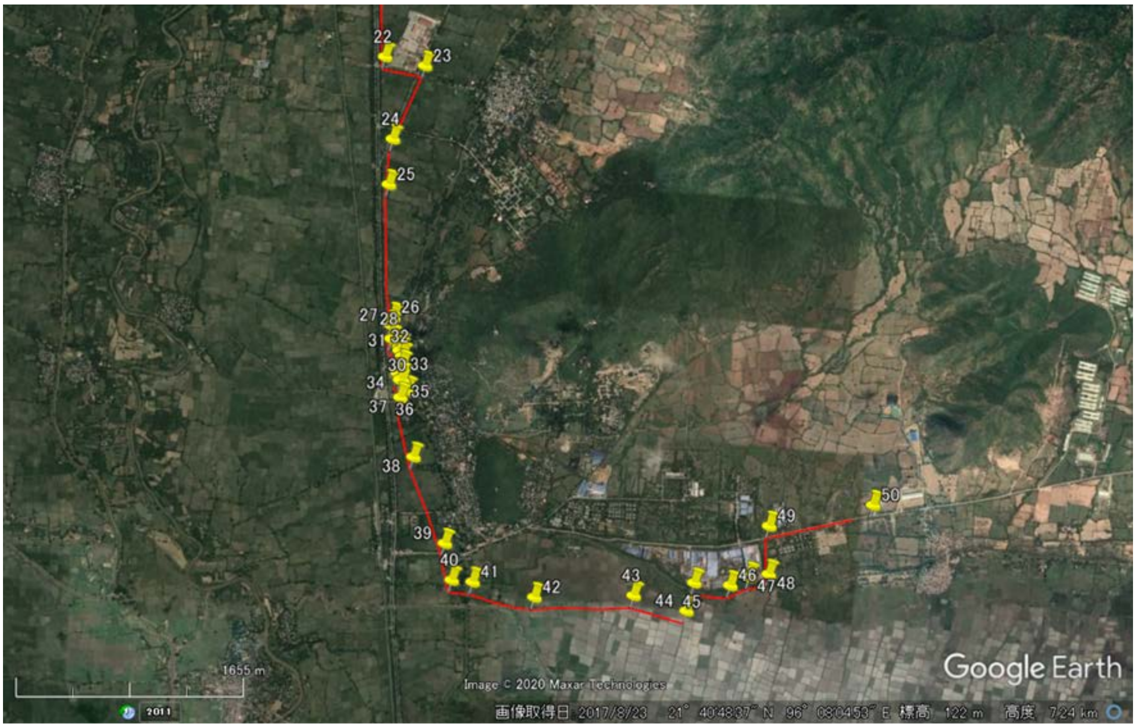


Figure 1.3-5 Location of the Water Pipeline

Source: JICA Study Team based on the image by Google Earth Pro



Source: JICA Study Team based on the image by Google Earth Pro

Figure 1.3-6 Location of the Water Pipeline

Source: JICA Study Team

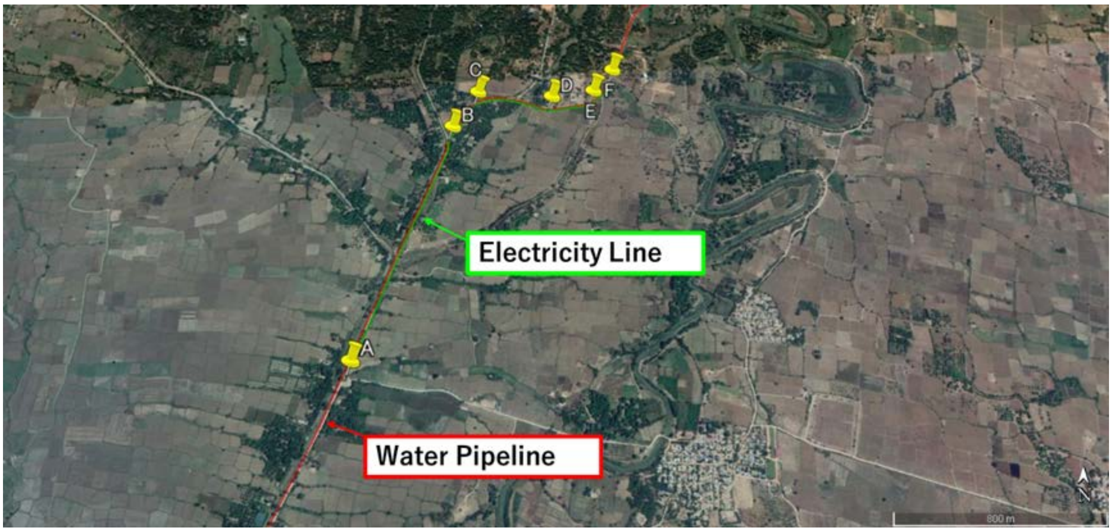
Figure 1.3-7 Candidate Site of Water Intake Station

Source: JICA Study Team

Figure 1.3-8 Current Status of Water Pipeline Route

(5) Electricity line

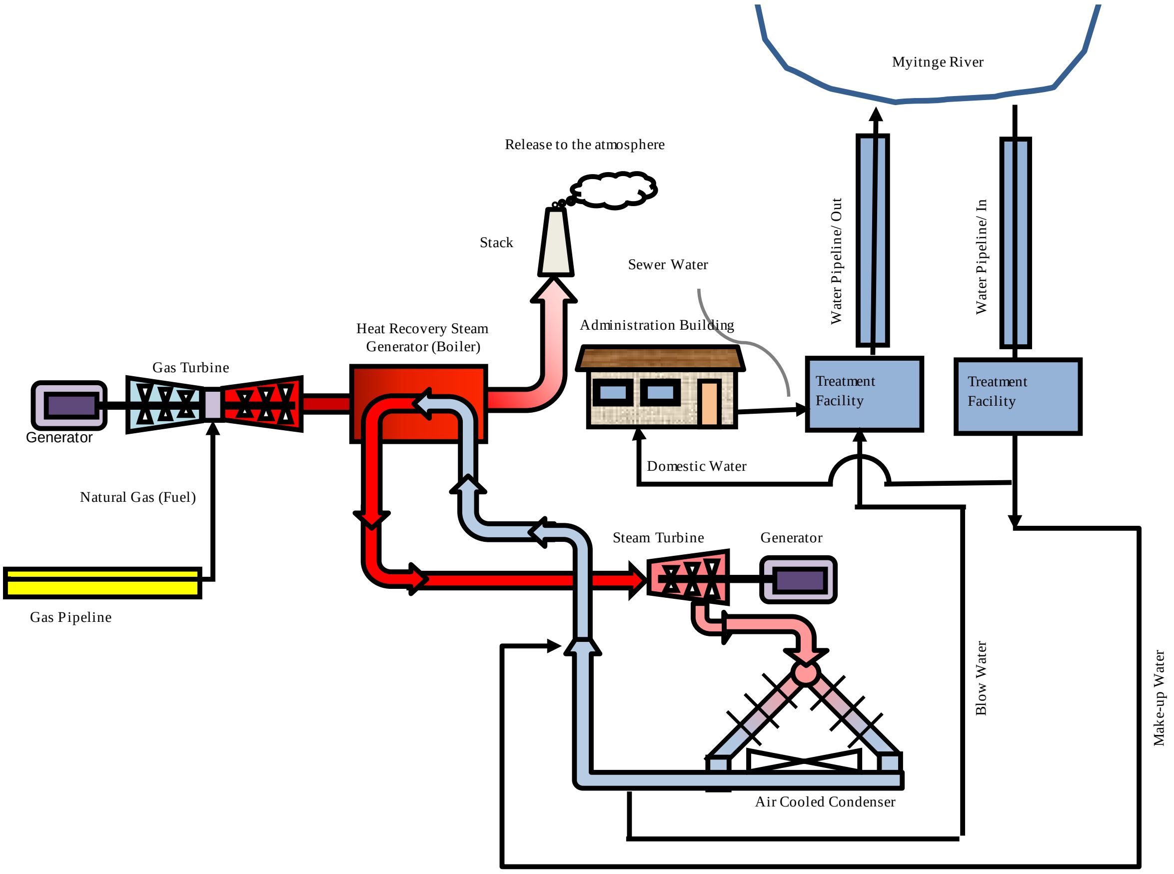
- For intake pump station, the electricity will be distributed by 6.6 kV electricity line from the Project site. There is the section, approximately 2 km, where 6.6 kV electricity line is currently not installed. For this section, installing power pole and electricity line will be necessary to supply electricity for operation of the intake pump station.



Source: JICA Study Team based on the image by Google Earth Pro

Figure 1.3-9 Location of the Electric Line

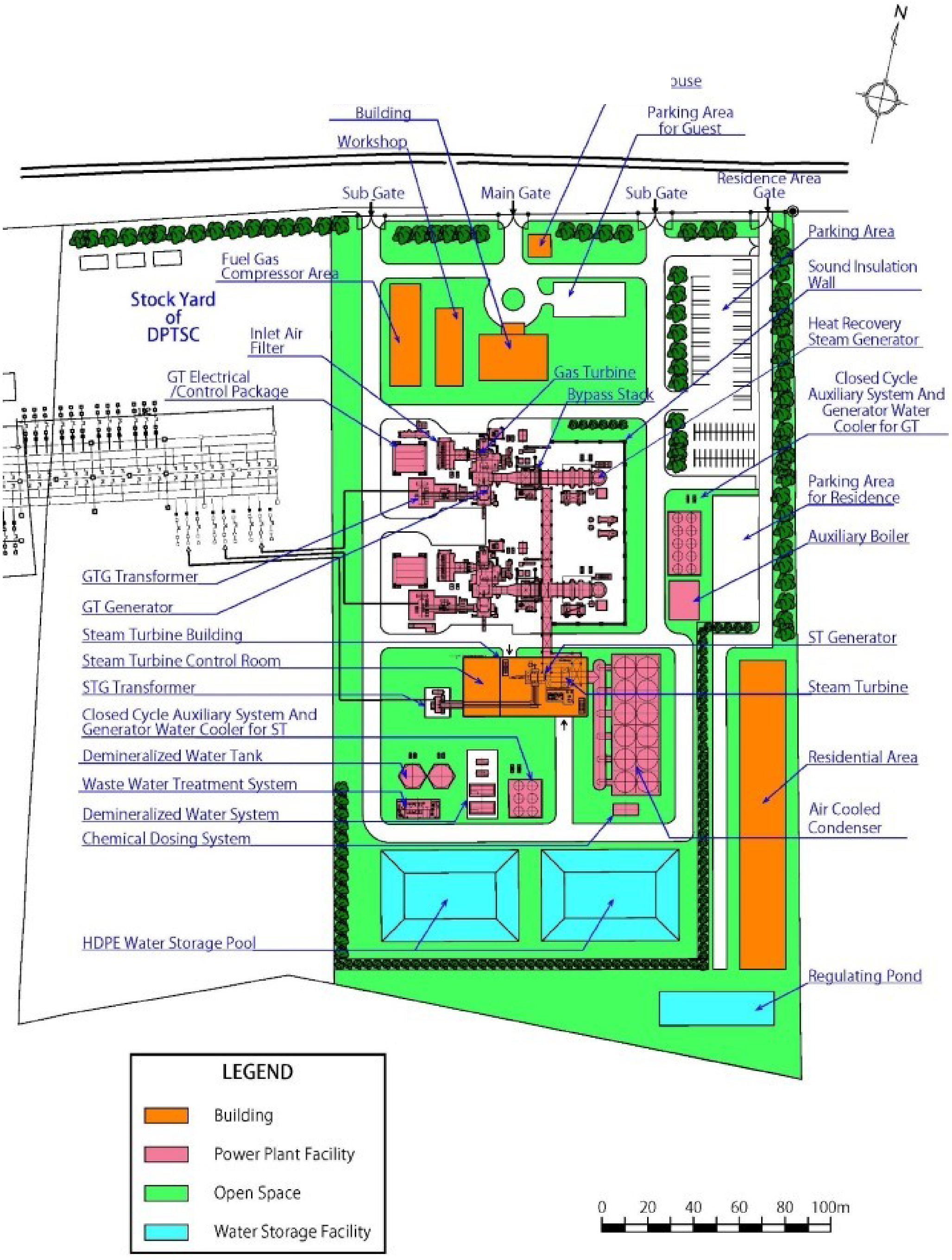
In a combined cycle power plant, the heat of the gas turbine's exhaust is used to generate steam by passing it through a heat recovery steam generator. The generated high-pressure steam is used to drive a steam turbine which generates further electricity. The waste gases are emitted to the atmosphere via stack. The conceptual process is shown in Figure 1.3-10.



Source: JICA Study Team

Figure 1.3-10 Conceptual Process

The facility layout plan is shown in Figure 1.3-11. Two gas turbines and one steam turbine will be installed in the center of the Project site. Cooling towers for steam condenser will be installed in the east side of the Project site. Water storage pool will be installed in the south side of the site.



Source: JICA Study Team

Figure 1.3-11 Facility Layout Plan

(1) Fuel Plan

Project site is located near Mandalay off-take station, on Shwe - China gas pipeline. The gas from the Shwe gas field will be utilized as source of fuel.

For the allocation of the Shwe Gas Field for domestic use, two new rental-based power plants of 135 MW and 90 MW capacities are in operation in Kyaukse City and in Myingyan City respectively. They are gas engine-powered station, and they will be in operation for five years since its inauguration (i.e. 2019 - 2024). The amounts of gas to be used are 30 mmscfd for Kyaukse City and 20 mmscfd for Myingyan City. After power generation will be stopped in2014, 50 mmscfd of gas will be allocated to the Project. Composition of the gas from Shwe Gas Field is shown in Table 1.3-2.

Table 1.3-2 Shwe Gas Composition

Component Name	Mole Percent	BTU Gross	Relative Density
C6 + 47/ 35/ 17	0.0199	1.05	0.0007
Propane	0.0297	0.75	0.0005
i- Butane	0.0109	0.36	0.0002
n- Butane	32.2 ppm	0.11	0.0001
i- Pentane	49.7 ppm	0.2	0.0001
n- Pentane	0.0000	0.00	0.0000
Nitrogen	0.2218	0.00	0.0021
Methane	99.5529	1007.81	0.5514
Carbon Dioxide	0.0491	0.00	0.0007
Ethane	0.1073	1.9	0.0011
Total	100	1012.18	0.557

Compressibility Factor (1/7) @ 14.73000 PSIA & 60.0 DEG.F = 1.100198

Base Pressures = 14.73

Gross Dry BTU = 1014.19 Corrected/ Z

Real Relative Density Gas = 0.5578

Un-normalized Mole Percent = 99.874

WOBBE = 1357.91

Source: EIA Study Team based on the data provided by EPGE

(2) Water Plan

The water to be used for the Project will be taken from Myitnge River. The total amount of daily intake will be about 1,600m3/day. The wastewater will be treated in the project site and discharged to Myitnge River. The total amount of daily discharge will be about 1,200 m3/day. Intake and discharge operation will be conducted around 8 hours in a day. The average flow rate

of intake and discharge will be 0.0521 m3/s and 0.0469 m3/s respectively, whereas 50th percentile value of flow rate of Myitnge River is 325 m3/s. Consequently, ratio of flow rate of intake/ discharge to Myitnge River will be 0.016 % and 0.014 %.

The intake river water will be transported to the project site through the water pipelines as shown in Figure 1.3-4 to 1.3-6. After receiving raw water into the site, it will be supplied for domestic use and process use of the power facility. As for the process use water, demineralization process will be applied, then demineralized water will be supplied to the steam turbine cycle process. Parallelly, the blow water will be generated from the steam turbine cycle process that will contain metal ions (copper and iron from metal pipe), silica, and oil in thicker concentration than that of intake water. In case the blow water needs to be recycled to the water purification system forming a closed cycle, it will deteriorate the function and performance of the water purification system. Thus, the full recycling of the process water is not applicable to the Project.

1.4 Measures to Minimize Involuntary Resettlement

Land acquisition and resettlement will cause significant impact physically and economically, which will take time and effort to rehabilitate to pre-project level. In order to minimize land acquisition and resettlement impact for local communities and people, the following principles were applied:

- Select the site for gas combined cycle thermal power plant in public land
- Avoid the residential area for installing water and gas pipelines, and utilize public land as much as possible

1.5 Scope of Abbreviated Resettlement Action Plan

(1) Definition for Preparing Abbreviated Resettlement Action Plan

The Project plans to utilize public land as much as possible and to avoid the residential area for minimizing impact on communities and living persons as explained in Section 1.4. Although such effort was made, some privately using land will be required for installing intake facilities, and water and gas pipelines. Accordingly, this document was prepared for planning adequate compensation for land to be acquired permanently or occupied temporarily by the Project. The total number of physically displaced persons is estimated as less than 200 people, and so an Abbreviated Resettlement Action Plan (A-RAP) was prepared according to the Para. 25 in World Bank (WB), Operational Policies (OP) 4.12-Involuntary Resettlement.

(2) Target of A-RAP

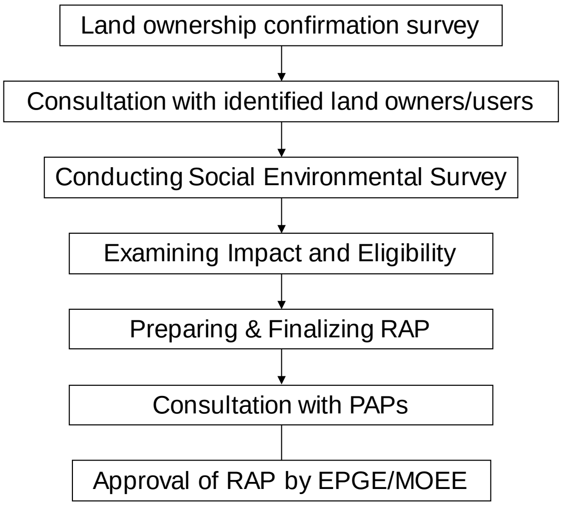
All areas permanently and temporarily necessary for the Project are the target of this A-RAP. The area for constructing the gas combined-cycle power plant is owned by MOEE and currently maintained by

DPTSC, and all properties located inside the area belongs to DPTSC. Therefore, the area for constructing the gas combined-cycle power plant was excluded from this A-RAP.

Regarding land for 6.6 kV distribution line and electric poles, land acquisition for Right-of Way of distribution line (i.e. 11 feet at each side from the centerline of the distribution line) will not be required but just land use will be limited. Meanwhile, the area for electric poles (i.e. 1m^2 size at every 45-60 m) will be acquired permanently. Therefore, only the area where electric poles were to be installed was the target of this A-RAP.

(3) Method for Preparing A-RAP

When the area to be used permanently and temporarily by the Project at this study level was examined, land and structure owners were confirmed with an officer from Land Record Department at Sintgain township[1] in the field since information of land ownership was not obtained at the desktop study or through interview to the concerned authorities. After land owners were identified, the 1st public consultation meeting was held to explain the outline of the project and the contents and schedule of field survey for A-RAP (refer Chapter 9 for details) prior to conducting field survey (i.e. census, socio-economic survey and inventory of asset) to ask identified land owners cooperation. Following to the 1st public consultation meeting, field survey was conducted, and its result was evaluated to examine the initial compensation contents. A-RAP was drafted including the survey results and initial compensation contents, and the 2nd public consultation meeting was held to explain the outline of Draft A-RAP. Reflecting comments obtained from the 2nd public consultation meeting, A-RAP was finalized and approved by EPGE and MOEE accordingly. Figure 1.5-1 shows flow of A-RAP preparation.



Source: JICA Study Team

Figure 1.5-1 Flow for Preparing A-RAP

[1] Land Record Department at each township is the jurisdiction department of land record at each township. Thus, land owners of the areas to be used by the Project were confirmed with this department.

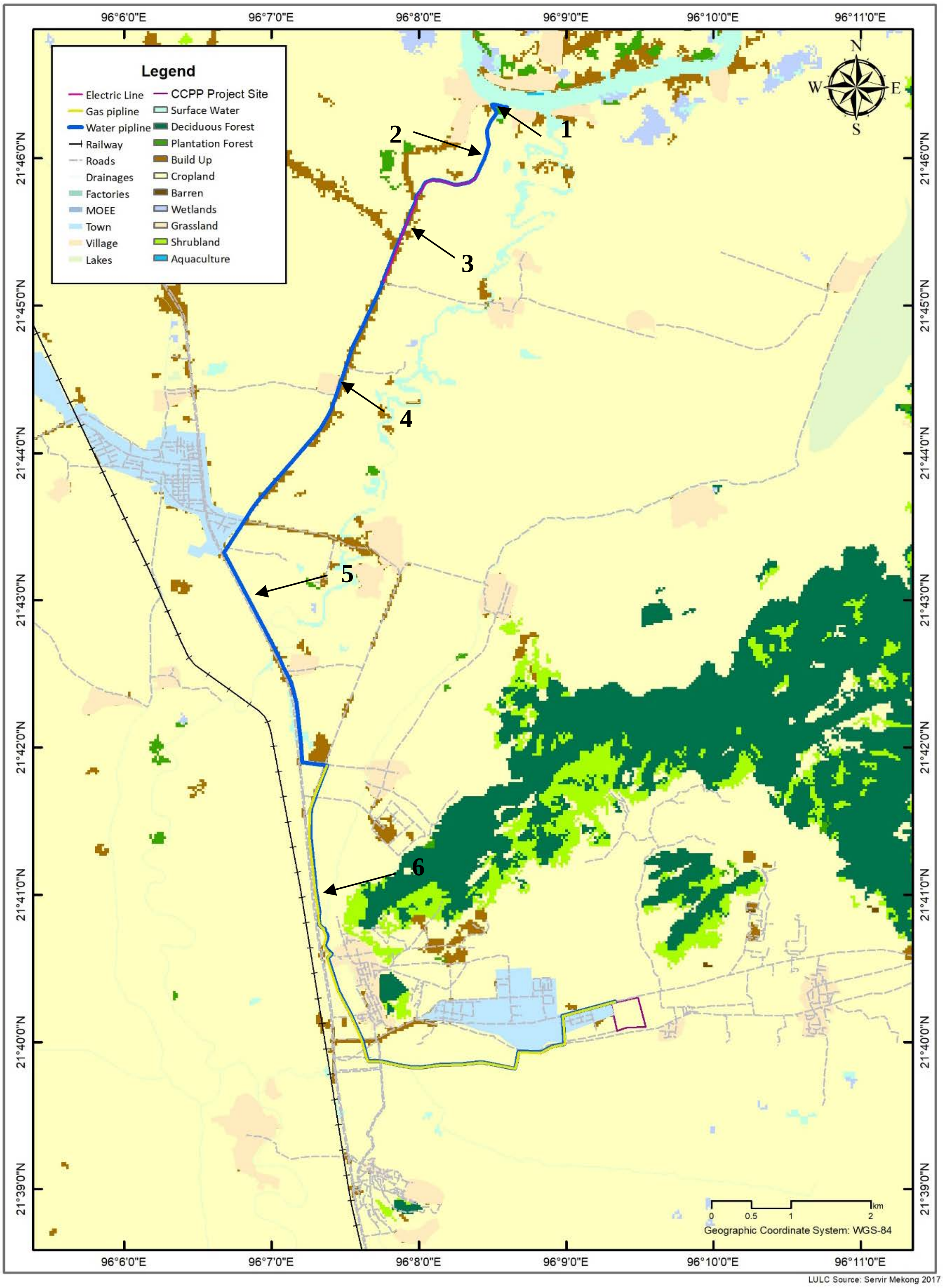
(4) Impact on Permanent Acquisition and Temporal Occupation

The Project requires land permanently for construction of the plant, water intake and electric pole for 6.6kv distribution line. In addition, temporal occupation of land for installing gas and water pipelines is necessary. The project was in the stage of preliminary design, and therefore, gas and water pipelines were designed based on the available map and satellite image without conducting field survey. Under this situation, scope of land acquisition and resettlement impact shown in Table 1.5-3 was examined with the following conditions.

(1) The site for installing the plant is owned by MOEE and all facilities situated in this land is owned by DPTSC. Thus, it was excluded from the scope of land acquisition and resettlement.

(2) There were no land marks on ground to show the right-of-way limit for the proposed gas and water pipelines or right-of-way of existing road. Thus, land size to be used by the project permanently or temporally was preliminary defined as shown in Table 1.5-1, and the affected size of land was estimated by the satellite image.

(3) Number of affected trees was counted as much as possible in the survey area. Affected amount of crops were examined based on cultivating amount obtained by the interview survey and affected size of land shown in Table 1.5-3.



Source: JICA Study Team

Figure 1.5-2 Location of Necessary Land

Table 1.5-1 Area and Size of Land to be used by the Project

	Items	Necessary Area/Width
1	Water intake facility	➢ Size: 200 m^2 in total
2	Route for water pipeline route	➢ Road width for the area of approx. 1 km length. Therefore, there is no private landowners.
3	Electric poles for 6.6kV distribution line	➢ 3 m width from the existing distribution line ➢ 1 m^2 at every 60 m within 2 km (approx. 34 points)
4	Route for installing water pipeline	➢ Right-of-way of Mon Paung Canal. Therefore, there is no private landowners.
5	Route for installing water pipeline	➢ 3 m width from the Right of Way of National Road No.1
6	Route for installing water and gas pipelines	➢ Gas pipeline: 2 m in total from the center line of APR/IPP gas pipeline (1 m at each side from the center line of APR/IPP gas pipeline) ➢ Water pipeline: 6 m next to the gas pipeline

Note: Nos. from 1 to 6 are corresponding to Figure 11.2-2.

Source: JICA Study Team

Table 1.5-2 Land to be used by the Project

No.	Facility	Acquisition Type	Area to be acquired at Each Land Use
1	Water Intake Facility	Permanent Acquisition	Village Land: 0.020ha
2	Electric poles for 6.6 kV distribution line	Permanent Acquisition	Paddy: 0.0033ha Village Land: 0.0001ha
3	Water Pipeline (from water intake station to gas off-take station)	Temporal occupation	Cultivated Land (paddy/crop): 2.0708ha Industrial Use Land: 0.0855ha Village Land (School): 0.0688ha Land owned by Irrigation Department: 1.510ha
4	Gas Pipeline & water pipeline (from gas off-take station to project site)	Temporal occupation	Cultivated Land (paddy/crop): 4.1823ha Village Land (School): 0.0049ha Land owned by Prison Department: 0.0473ha Land owned by Irrigation Department: 0.028ha Land owned by DPTSC: 0.5104ha

Source: JICA Study Team

Table 1.5-3 Summary of Land to be used for the Project*

No.	Facilities	Acquisition Type	No. of Affected Cultivting Plots	No. of Structures					Trees/Crops	
				No. of Structure	No. of Shops	No. of Stalls	No. of Fence	No. of Concreate Floor	Type	No.
1	Water Intake Facility	Permanent	0	0	0	0	0	0	0	0
2-1	Electric poles for 6.6kv distribution line	Permanent	16	0	0	0	1	0	Mango	8 trees
									Sesame	0.0022 acres (0.02baskets)
									Bean	0.001acres (0.01 baskets)
									Sunflower	0.00025Acres (0.004 baskets)
2-2	6.6 kv distribution line	No acquisition but vertical limitation	16	0	0	0		0	Mango	34 trees
									Palm	6 trees
									Teak	5 trees
3	Water Pipeline (from water intake station to gas off-take station)	Temporal	40	0	0	2	8	1	Mango	15 trees
									Banana	63 trees
									Sesame	1.45 acres (13.4 baskets)
									Paddy**	3.86 acres (301.4 baskets)
									Chilli	0.04 acres (28 kg)
									Coconut	1 trees
4	Gas Pipeline & water pipeline (from gas off-take station to project site)	Temporal	85	0	0	0	1	0	Mango	4 trees
									Onion	1.96 acres (8633.8kg)
									Bean	0.26 acres (6.05 baskets)
									Paddy**	6.694 acres (604 baskets)
									Sesame	7.3 acres (85.4 baskets)
									Roselle Fruit	0.18 acres (144 viss)
									Roselle Leave	0.18 acres (10000 bunches)
									Egg Plant	0.18 acres (1400 viss)
									Melon	0.18 acres (1400 viss)
									Tomato	0.18 acres (400 viss)
									Banana	39 plants

Notes:
* All affected land plots were included, but the amount of affected crops/tree for the un-surveyed was not included. Number of affected trees were based on field confirmation and the interview result.
** Paddy has started its cultivation from the rainy season (i.e., June or July). Cultivation of paddy was not confirmed since the survey was conducted at the dry season. However, it was mentioned in this table as referential information.
Source: JICA Study Team

CHAPTER 2: SOCIO-ECONOMIC PROFILE

2.1 Method of Social Environemntal Survey

Social Environmental Survey (i.e. census, socio-economic survey and asset inventory) was conducted from 30 April to 4 May 2019 with the aim of collecting socio-economic and asset information of Project Affected Households (PAHs) within the target area of this A-RAP. The outline of Social Environmental Survey is summarized in Table 2.1-1, while the forms are attached in Appendix-1.

Table 2.1-1 Outline of Social Environmental Survey

	Items	Contents
1	Survey period	30 April to 4 May 2019, 14 to 19 June 2019, 21 December 2019, 20 January 2020
2	Survey area	A-RAP Target Area
3	Survey targets	Households classified into following categories: - Owning land in the project area - Living in the project area - Doing business in the project area
3	Survey methodology	Conducted by household head, Township representatives and survey team jointly
4	Survey contents	
	(1) Census	- Confirmed family members, gender, age, education level, literacy rate, major occupation, etc. of PAHs
	(2) Inventory of Asset Loss	- Confirmed location of households and other structures of PAHs and cultivation areas - Listed and measured the affected properties of PAHs on the ground - Confirmed types of structures (e.g. living structure, hut) - Confirmed paddy size, agriculture products and production of PAHs
	(3) Socio-Economic Survey	- Confirmed socio-economic information of PAHs including incomes, income source and expenditures

Source: JICA Study Team

Table 2.1-2 shows number of owners by category and village respectively within the project area identified through land ownership confirmation survey. Numbers of owners mean the PAHs though interview of census and socio-economic survey was conducted only for the privately used land (not conducted for public land).

Table 2.1-2 No. of Survey Targets (Project Affected Households)

Category	No. of Owners*	No. of Surveyed	No. of Un-Surveyed
1. E Bya Village			
(1) Agriculture land	15	15	0
(2) Structure	6	6	
(3) Public land	1	-	-
Sub-total	22	21	0
2. Ohn Pin Chan Village			
(1) Agriculture land	13	12	1
(2) Structure	4	4	0
Sub-total	17	16	1
3. Pin Char Village			
(1) Agriculture land	7	6	1
(2) Structure	0	0	0

Category	No. of Owners*	No. of Surveyed	No. of Un-Surveyed
(3) Public land	1	-	-
Sub-total	8	6	1
4. Taw Ma Village			
(1) Agriculture land	19	14	5
Sub-total	19	14	5
5. Be Lin Village			
(1) Agriculture land	34**	20**	14
(2) Structure	0	0	0
(3) Public land	3	-	-
Sub-total	37	20	14
6. Taung Yin Village			
(1) Agriculture land	22	19	3
Sub-total	22	19	3
7. Mont Paung			
(1) Shop	2	2	0
Sub-total	2	2	0
Grand total	127	98	24

Notes:
* Public land was included into number of owners. However, socio-economic survey to public land was not conducted. Total numbers of owners of private use land is 122 (i.e. 127 of total land including public land minus 5 public land).
** 1 landowner owns land both of Be Lin Village and Taung Yin Village. This owner is counted as 1 owner at Taung Yin Village. There is 1 plot in Be Lin owned by brother together, and younger brother owns another plot next to the commonly owned plot. They are counted as 1 landowner. 1 household cultivate land inside the right of way of canal in Be Lin. This owner is not the landowner but conducted survey as 1 PAH in Be Lin.

Source: JICA Study Team

Among the identified above landowners, survey was not able to be conducted for 24 landowners. Among 24 surveyed landowners, 4 landowners were not available on their contact information, 19 landowners did not come to the designated venue for the survey and 1 landowner did not answer though he came to the designated venue for the survey.

2.2 Results of Social Environmental Survey

The results of Social Environmental Survey are summarized as shown below. As explained in Table 2.1-2, 98 answer of valid response was obtained.

2.2.1 Profile of Project Affected Households

Profiles of Project Affected Households (PAHs) identified through Social Environmental Survey are shown in Tables 2.2-1 and 2.2-2.

(1) Ethnic Groups

Among 98 surveyed households, 3 households were classified as Shan ethnic groups and others were classified as the Burma ethnic groups. 3 households considered as belonging to the minority groups lived by same lifestyle as majority households in the survey area. Thus, it is possible to consider that they have already assimilated into Burmese society and would not be required special attention to their living style.

(2) Number of Households

Number of family members at each household living in the project area at the time of COD is summarized in Table 2.2-1.

Table 2.2-1 Household Size

No. of Family Members per Household	Applicable PAHs (No.)
1 person	4
2 persons	9
3 persons	14
4 persons	19
5 persons	18
6 persons	15
7 persons	6
8 persons	2
9 persons	3
10 persons	2
No answer	6
Total	98

Source: JICA Study Team

(3) Types of Household-Heads

Types of household-heads living in the project area is summarized in Table 2.2-2.

Table 2.2-2 Types of Household-Heads

(Unit: No.)

Headed by Male	Headed by Female	Headed by Elderly	No Answer	Total
33	8	35*	8	98

Note: Including 7 families headed by the female elderly household-head.
Source: JICA Study Team

(4) Literacy of Household-Heads

The results of Social Environmental Survey indicated that almost all household-heads living in the project area were speak, read and write Myanmar language fluently except 1 household-head. 1 household-head answered able to speak but not able to read or write Myanmar language. In addition, there was 1 household answer was not obtained.

(5) Religion

The results of Social Environmental Survey showed that almost all households living in the project area were Buddhist. 1 household was Christian.

2.2.2 Socio-Economic Information of Project Affected Households

Socio-Economic information of PAHs identified through Social Environmental survey are shown below.

(1) Income Source of Household-Heads

Income source of household-heads is summarized in Table 2.2-3.

Table 2.2-3 Income Source of Household Head

(Unit: No.)

Odd job	Wage worker	Farmer (paddy)	Farmer (vegetable, fruit, tree)	Farmer (aquaculture)	Own business
0	2	26	28	1	15

Helping parent business	No job	Others	No answer	Total	-
2	9	7	8	98	-

Source: JICA Study Team

(2) Expenditure of Households

Ratio of expenditure of items in households living in the project area is summarized in Table 2.2-4.

Table 2.2-4 Expenditure of Households

(Unit: %)

Food	Education	Health	Public Service	Clothing	House Commodity	Transportation	Total
43	11	6	25	2	2	11	100

Source: JICA Study Team

(3) Drinking Water

Table 2.2-5 shows type of drinking water in households living in the project area used.

Table 2.2-5 Drinking Water of Households

(Unit: No.)

Purified Water	Tube Well	River Water	No Answer	Total
65	27	0	6	98

Source: JICA Study Team

(4) Vulnerable Groups

Following to the international practice, households under the poverty lines, headed by single parent or disabled person are regarded as the vulnerable groups. Regarding the poverty lines, WB issued Technical Poverty Estimation Report (Myanmar Poverty and Living Conditions Survey) in December 2017, and this report defined 1,303 kyats per adult equivalent per day or 1,241 kyats in per capita terms as the new poverty lines. A household is considered as a poor if it lives below these lines. Following this definition, this A-RAP applies 1,241 kyats in per capita terms as the poverty line. Table 2.2-5 shows households of vulnerable groups.

Among 35 households classified as the elderly headed households, 27 households have working persons in a household apart from the household-heads. It means that the elderly is regarded as a household-head, but there are income sources of his/her child generation. Thus, these households are excluded from vulnerable groups. Regarding minority groups, 3 families considered as belonging to the minority groups were found as described in Section 2.2.1-(1). Since these households lived by same life-style as majority households, they were not regarded as the vulnerable groups.

Table 2.2-6 Households classified as Vulnerable Groups

(Unit: No.)

Headed by female	Headed by elderly	Headed by disabled person	Household below poverty line	Total
8	8	0	1*	17

Notes:
* There was 10 households that total monthly income amount was not available. These households were not counted. In addition to 1 household classified as the below poverty line, there were additional 3 households below poverty line. Since these 3 households were classified into the “headed by elderly”, they were not classified into “household below poverty line”.

Source: JICA Study Team

2.2.3 Socio-Economic Information of Affected Shops

(1) Types of Shops

There were 2 shops in total in the project area. These 2 shops were selling betal. All shops did not hiring employees and did not hold a business license.

CHAPTER 3: LEGAL FRAMEWORK

3.1 Legislation Related to Land and Land Tenure in Myanmar

3.1.1 Laws and Regulations related to Land Acquisition and Land Use

Land Acquisition Act enacted in 1894 is the legal basis for land acquisition in Myanmar. There are many significant laws which govern land issues, land administration and land ownership respectively as shown major related laws in Table 3.1-1 though no law or regulation stipulates land acquisition and resettlement including rehabilitation of livelihood comprehensively after land acquisition/resettlement.

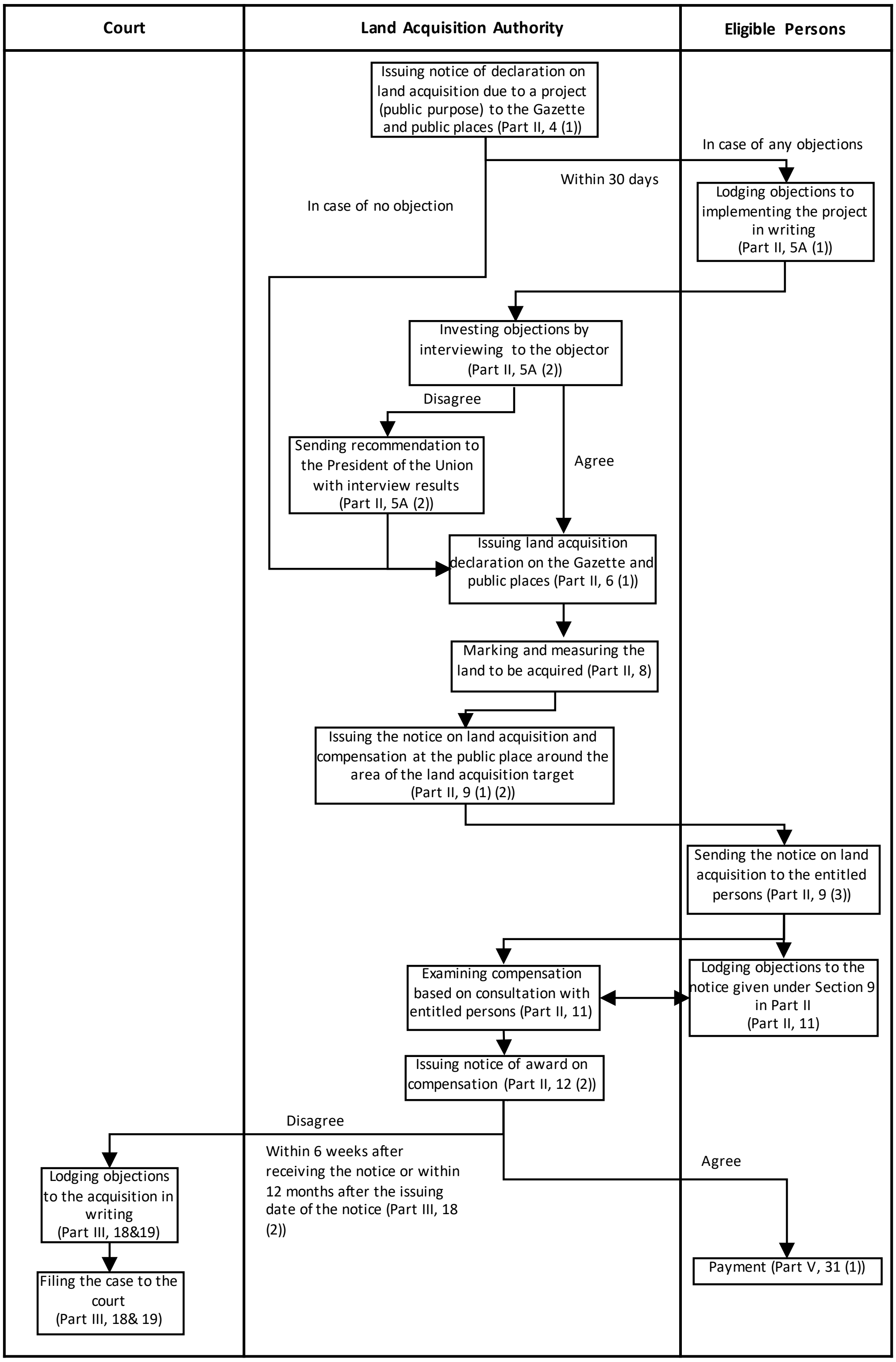
Table 3.1-1 Major Law for Land Acquisition and Land Use

No	Major Laws & Regulations	Issued Year
1	The Land Nationalization Act	1953
2	Disposal of Tenancies Law	1963
3	The Land and Revenue Act	1876
4	Land Acquisition Act	1894
5	Forest Law	1992
6	Farmland Law	2012
7	Farmland Rules	2012
8	Vacant, Fallow, and Virgin Lands Management Law	2012
9	Vacant, Fallow, and Virgin Lands Management Rules	2012

Source: JICA Study Team

3.1.2 Procedure of Land Acquisition under Myanmar Regulations

Land Acquisition Act 1984 stipulates procedure of land acquisition for a project of public interest. According to this act, notification of land acquisition for a project is announced in Gazette and a project area to disseminate necessity of land acquisition of a project. Then, a certain period is set for grievance on land acquisition of a project. Following to the grievance period, a declaration of land acquisition is publicized in Gazette and a project area, and land size and ownership will be confirmed. The notice on land acquisition and compensation is issued according to the confirmation results, and compensation is paid accordingly. If the issued notice on land acquisition and compensation is not agreeable, grievance can be lodged to the court. Figure 3.1-1 summarizes procedure of land acquisition according to Land Acquisition Act 1894.



Source: JICA Study Team based on Land Acquisition Act 1894

Figure 3.1-1 Procedure of Land Acquisition under Law in Myanmar

3.2 JICA Guidelines for Environemntal and Social Considerations (April 2010)

The key principles of land acquisition issues stipulated in the JICA Guidelines are summarized below.

a) Involuntary resettlement and loss of means of livelihood are to be avoided when feasible by exploring all viable alternatives. If population displacement is unavoidable, effective measures to minimize the impact and to compensate for losses should be taken.
b) People who must be resettled involuntary and people whose measures of livelihood will be hindered or losses must be sufficiently compensated and supported in timely manner. Compensation must be provided as full replacement cost as much as possible, and compensation and other kinds of assistance must be provided prior to displacement. So that, they can improve or at least restore their standard of living, income opportunities and production levels to pre-project levels
c) For projects that entail large-scale involuntary resettlement, resettlement action plans must be prepared and made available to the public. It is desirable that the resettlement action plan include elements laid out in the WB Safeguard Policy, OP 4.12, Annex. In preparing a resettlement action plan, consultations must be prompted in the planning, implementation, and monitoring of resettlement action plans.
d) Appropriate participation and accessible grievance mechanisms must be established for the affected people and their communities.

JICA also applies the policies stipulated in WB OP 4.12, and its main points are summarized below.

a) Affected people are to be identified and recorded as early as possible in order to establish their eligibility through an initial baseline survey (including population census that serves as an eligibility cut-off date, asset inventory, and socioeconomic survey), preferably at the project identification stage, to prevent a subsequent influx of encroachers of others who wish to take advance of such benefit.
b) Eligibility of Benefits include, the PAPs who have formal legal rights to land (including customary and traditional land rights recognized under law), the PAPs who don't have formal legal rights to land at the time of census but have a claim to such land or assets and the PAPs who have no recognizable legal right to the land they are occupying.
c) Preference should be given to land-based resettlement strategies for displaced persons whose livelihoods are land-based.
d) Provide support for the transition period (between displacement and livelihood restoration).
e) Particular attention must be paid to the needs of the vulnerable groups among those displaced, especially those below the poverty line, landless, elderly, women and children, ethnic minorities etc.
f) For projects that entail land acquisition or involuntary resettlement of fewer than 200 people, abbreviated resettlement plan is to be prepared.

3.3 Comparison between the JICA Guidelines and Myanmar Legislation

Table 3.3-1 summarizes the gaps between the JICA Guidelines for Environmental and Social Considerations, the World Bank's safeguard policies and Myanmar legislation about land acquisition and involuntary resettlement. Project resettlement policy or project policy is required to fill the gaps between them to help PAPs restore their living standard to their original state before the commencement of the project at least.

Section 7 of the EIA Procedure requires to adhere international good practice in case that adverse impact on involuntary resettlement or indigenous people are anticipated. In this case, there is no gap between JICA Guidelines and Myanmar regulations. however, EIA Procedure does not clearly explained detailed procedures. Accordingly, the EIA Procedure is not included in gap comparison in Table 3.3-1.

Table 3.3-1 Comparison between JICA Guidelines and Myanmar Legislation

No.	JICA Guidelines and WB OP 4.12	Laws of Myanmar		Identified Gaps and Required Project Policy to Fill in the Gaps
		Name of the Law	Provision Described	
1.	Involuntary resettlement and loss of means of livelihood are to be avoided when feasible by exploring all viable alternatives. (JICAGL)	None	There is no law in Myanmar, as well as corresponding provisions.	The Project examines all viable alternatives to avoid or minimize relocation impact.
2.	When population displacement is unavoidable, effective measures to minimize impact and to compensate for losses should be taken.(JICAGL)	Land Acquisition Act (1894), Article 3	Article 3 stipulates that a person who has right in the land would be entitled to claim compensation if the land was acquired under this act while examination of effective measures to minimize impact is not mentioned.	There is no difference. Effective measures to minimize the impacts and to compensate for losses is considered.
		Farm Land Law of 2012 (Article 26)	Article 26 stipulates that suitable compensation and indemnity in farmland acquisition for the interest of the state or public would be taken.	There is no difference. Appropriate compensation for permanent acquisition of farmland is considered.
		Farmland Rules of 2012 (Article 64)	Article 64 stipulates that the compensation in farmland for the interest of the state or public would be taken.	There is no difference. Appropriate compensation for permanent acquisition of farmland is considered
3.	People who must be resettled involuntarily and people whose means of livelihood will be hindered or lost must be sufficiently compensated and supported, so that they can improve or at least restore their standard of living, income opportunities, and production levels to pre-project levels.(JICAGL)	Land Acquisition Act (Article 23), Farmland Rules (Article 67)	Damage to standing crops/trees, lands, movable/immovable properties, relocation cost, economic activities are requested to compensate.	There is no stipulation of improving or at least restoring living standards. Compensation and support is prepared for eligible PAPs to restore their living standard to the pre-project condition
4.	Compensation must be based on the full replacement cost as much as possible. (JICAGL)	Land Acquisition Act 1894 (Article 23) Farmland Rules 2012 (Article 67)	For land, current market price and 15% of the market price as considerations in consideration of the compulsory nature of acquisition. For crops , compensation at 3 times of the average production of crops in the current market price.	Although the method of evaluation of market price is not clearly explained, there is no significant gap. Compensation is based on full replacement cost as much as possible.

No.	JICA Guidelines and WB OP 4.12	Laws of Myanmar		Identified Gaps and Required Project Policy to Fill in the Gaps
		Name of the Law	Provision Described	
			For trees, compensation at 3 times of the value based on the current market price.	
5.	Compensation and other kinds of assistance must be provided prior to displacement. (JICAGL)	None	There is no law in Myanmar, as well as corresponding provisions.	Compensation and other kinds of assistance is provided prior to displacement.
6.	For projects that entail large-scale involuntary resettlement, resettlement action plans must be prepared and made available to the public. (JICAGL)	None	No law specifically mentions the requirement of resettlement action plans for large-scale involuntary resettlement.	The Project entails relocation of fewer than 200 people. Thus, items on No. 16 is applied.
7.	In preparing a resettlement action plan, consultations must be held with the affected people and their communities based on sufficient information made available to them in advance. (JICAGL)	None	Same as above	Consultations are held with PAPs in timely manner.
8.	When consultations are held, explanations must be given in a form, manner, and language that are understandable to the affected people. (JICAGL)	None	No law specifically mentions the requirement of holding a consultation in understandable manner for PAPs.	A consultation with PAPs is held with understandable expression and explanation methods for PAPs.
9.	Appropriate participation of affected people must be promoted in the planning, implementation, and monitoring of resettlement action plans. (JICAGL)	None	No law specifically mentions the requirement of PAPs' participation.	Participation of PAPs is secured by announcing an appropriate way in timely manner.
10.	Appropriate and accessible grievance mechanism must be established for the affected people and their communities. (JICAGL)	Land Acquisition Act of 1894 (Article 5A, 18)	Article 5A of the Land Acquisition Act stipulates that any person whose land is affected (acquired) can object to land acquisition within thirty (30) days of the notification. Besides, Article 18 stipulates that any PAP who has not accepted the award can refer to the court for determination.	There is no fundamental difference. However, since the procedure of grievance in the Myanmar context is direct settlement at the court, the project establishes the procedure which is more convenient and accessible for PAPs.
11.	Affected people are to be identified and recorded as early as possible in order to establish their eligibility through an initial baseline survey (including population census that serves as an eligibility cut-off date, asset inventory, and socioeconomic survey), preferably at the project identification stage, to prevent a subsequent influx of encroachers of others who wish to take advance of such benefits (WB OP4.12 Para.6)	Land Acquisition Act (1894), Article 4	Article 4 of the act stipulates that a notification of land requirement for public purposes is published to start surveys and land marking.	The Myanmar contest does not precisely state the method to define the cut-off date and population census to establish eligibility. The Project conducts census and preliminary defines the cut-off date by applying the approach of World Bank.
12.	Eligibility of benefits includes, the PAPs who have formal legal rights to the land (including customary and traditional land rights recognized under the law), the PAPs who do not have formal legal right to the land they occupying. (WB OP 4.12 Para.11)	Land Acquisition Act (1894), Article 9	Article 9 of the act stipulates that an occupier (if any) of the land and all persons known or believed to have rights on the lands are notified or invited for explanations.	The Myanmar contest does not prescribe the eligibility. Eligibility for compensation of loss of assets and income caused by the Project is established.
13.	Preference should be given to land-based resettlement strategies for displaced persons whose livelihood are land-based. (WB OP 4.12	None	No law was identified on preference to land-based resettlement strategies for displaced person.	Resettlement is not anticipated.

No.	JICA Guidelines and WB OP 4.12	Laws of Myanmar		Identified Gaps and Required Project Policy to Fill in the Gaps
		Name of the Law	Provision Described	
	Para.11)			
14.	Provide support for the transition period (between displacement and livelihood restoration). (WB OP 4.12 Para.6)	None	No law was identified on the provision of support for the transition period.	Appropriate support to PAPs during transition period is provided for eligible PAPs.
15.	Particular attention must be paid to the needs of the vulnerable groups among those displaced, especially those below the poverty line, landless, elderly, women and children, ethnic minorities, etc. (WB OP 4.12 Para. 8)	None	No law was identified on particular attention to vulnerable groups.	Additional support is provided for vulnerable PAPs as necessary
16.	For projects that entail land acquisition or involuntary resettlement of fewer than 200 people, abbreviated resettlement plan is to be prepared. (WB OP 4.12 Para. 25)	None	No law was identified on the criteria of abbreviated resettlement plan.	Abbreviated Resettlement Action Plan (A-RAP) is prepared as the project entails fewer than 200 people of involuntary relocation.

Source: JICA Study Team

3.4 Key Principles on Relocation for the Project

Based on the results of comparison between JICA Guidelines and Myanmar legal framework on relocation, the Project established key principles on relocation:

- Involuntary resettlement and loss of means of livelihood are to be avoided or minimized as much as possible by exploring all viable alternative such as using road shoulders or other available public areas.
- Compensation for loss is provided in full replacement cost in timely manner by holding consultation with people in the project area.
- Support for appropriate transition period will be provided for eligible PAPs.
- Support for livelihood restoration of PAPs in case their income source is significantly affected.
- Additional support for eligible vulnerable PAPs will be provided as necessary.

CHAPTER 4: ENTITLEMENT AND ASSISTANCE

4.1 Eligibility

The Cut-off Date (COD) is the day to determine eligibility for entitlement of compensation to loss to be caused by a project. Persons (or households) living or doing income generation activities inside the project area on the COD are eligible for compensation, and persons (or households) who occupy the project area after the COD are not eligible for resettlement assistance.

The COD is normally the day that the census begins according to WB OP 4.12. In some neighboring countries, the COD is also set as the date of issuing official documents (i.e. notice or decree) on land acquisition for a project. In Myanmar, there is no precise stipulation to define the COD in laws or regulations. Accordingly, approach of WB to define the COD is applied to the Project. The Project is the F/S level, and the route for installing water and gas may be examined in more detail at the next project phase. Under this situation, census was initially conducted in the process of preparing this A-RAP. Accordingly, COD for the Project was preliminary set in 30 April 2019 as the starting day of census, and will be reviewed and revised as necessary when this A-RAP is updated in the Basic Design phase. Definition of COD was explained at the 1st consultation meetings, and the initial COD for the Project (i.e. 30 April 2019) was announced at the 2nd consultation meetings.

4.2 Entitlement

Table 4.3-2 shows the provisional entitlement matrix for the Project. It is prepared based on the key principles, the results of Social Environmental Survey and the outcome of gap analysis between international practices and laws and regulations in Myanmar.

Table 4.2-1 Provisional Entitlement Matrix

Type of Losses/ Category of Assistance	Eligibility	Assistance Policy	Remarks
(1) Compensation for Land			
1) Land to be acquired permanently	Person owning land at the time of cut-off date	- Cash compensation for the acquired area in full replacement cost[1]	- Compensation amount is calculated by the LCCC - In case top-up between the compensation amount calculated by LCCC and the amount in replacement cost is found, appropriate measures to cover the top-up will be implemented based on discussion among concerned authorities[3].
	Person tenanted land from the land owner at the time of cut-off date	- Cash compensation for crops/trees in the affected portion if the tenanted persons are crop owners (Refer to (3)-1) and/or (3)-2))	- Land compensation is basically provided to the land owners. For those who tenanted land from land owners, they shall need to discuss with the land owners according to the tenancy agreement.
2) Land to be occupied temporarily during the construction time	Persons cultivating land at the time of cut-off date	- Refer to (3)-1) and/or (3)-1) and 2)	- Land will not be acquired but be occupied during the construction work. Therefore, there will be no compensation for the land.
(2) Compensation for Structures			
1) Structure	People owning the affected structure (i.e. fence or cocreate floor) at the time of cut-off date	- Cash compensation in full replacement cost to the entire structure	- Compensation amount is calculated by the LCCC. - In case top-up between the compensation amount calculated by the LCCC and the amount in replacement cost is found, appropriate measures to cover the top-up will be implemented based on the discussion among concerned authorities[3].
2) Stall	People owning the affected stall at the time of cut-off date	- Relocation of a stall in the nearest available place, or - Allowance for temporal relocation for duration of the construction work in case a shop is not operated	- The affected shop is not a permanent structure (i.e. easily assembled structure) in public land. Since the shop is able to move temporarily to the adjacent area, there is no compensation for land or structure.
(3) Compensation for Crops and Trees			
1) Crop	People owning a crop	- 3 times of the value calculated based on the average production of the grain and other crops currently sowed and current market price of that	- Compensation amount is calculated by the LCCC. - In case top-up between the compensation amount calculated by the LCCC and the amount in replacement

Type of Losses/ Category of Assistance	Eligibility	Assistance Policy	Remarks
		area[2]	cost is found, appropriate measures to cover the top-up will be implemented based on the discussion among concerned authorities[3].
2) Tree	People owning a tree	- 3 times of the value calculated based on the current price of the tree and current market price of the trees in that area	- Planted trees in the project area are the target of compensation, but trees naturally grown in the project area are not compensated.
(4) Livelihood Restoration			
1) Income Loss	- Lose income source permanently or for long period - Affect income source temporarily during installation works of gas/water pipelines	- Support for changing income source - Provide administrative support - Provide the project related job preferentially if capability of PAPs and job requirements are matched	Condition of income source will be checked with all concerned parties
	- None	- Provide the project related jobs preferentially if capability of PAPs and job requirements are matched.	None
2) Vulnerable Groups	- Households classified as vulnerable groups	- Provide the project related jobs preferentially if capability of PAPs and job requirements are matched - Introduce available social welfare service if intention of PAPs and contents of program are matched.	Vulnerability of a household is confirmed with all concerned parties.

Note:

1. With regard to land and structures, "replacement cost" is defined as follows according to World Bank: For agricultural land, it is the pre-project or pre-displacement, whichever is higher, market value of land of equal productive potential or use located in the vicinity of the affected land, plus the cost of preparing the land to levels similar to those of the affected land, plus the cost of any registration and transfer taxes. In determining the replacement cost, depreciation of the asset and the value of salvage materials are not taken into account, nor is the value of benefits to be derived from the project deducted from the valuation of an affected asset. Where domestic law does not meet the standard of compensation at full replacement cost, compensation under domestic law is supplemented by additional measures so as to meet the replacement cost standard. Such additional assistance is distinct from resettlement measures to be provided under other clauses in OP 4.12, para. 6.

2. Compensation for crops and trees is calculated based on the affected yield amount or number of affected trees multiplying the unit price. Then, the calculated amount will be multiplying by 3 since the Art. 67 of Farmland Rules stipulates 3 times of prevailed market value at the time of compensation calculation. The unit price of land, crops and trees are to be set by LCCC through examining local market price at the time of compensation calculation, and budget for compensation will be arranged by EPGE and paid to the eligible affected households..

3. If any gaps are confirmed among the concerned parties, EPGE will take necessary actions (e.g. supplemental payment) as per the discussion result.

Source: JICA Study Team

4.3 Livelihood Restoration Program

(1) Target of Livelihood Restoration Program

The target of income restoration is the persons or households whose income source is significantly affected by the Project for long time. Economic activity in the project area is agriculture or owning a small shop. Thus, those who are engaged in agriculture or small shops in the project area; namely land owners, tenants, agriculture workers and shop owners and employees, are the targets of livelihood restoration to be provided by the Project.

(2) Contents of Livelihood Restoration program

As explained in Section 1.5, possible impact to implement the Project is permanent land acquisition and temporary occupation. As for permanent land acquisition, the target acquisition land is either vacant land for installing a water pipeline-related facility or small-scale agriculture land of approx. $1m^2$ for installing power poles of distribution line. At some areas, small shops are requested to shift temporarily. Thus, extensive livelihood restoration program is regarded as distant considering the scale of possible impact to livelihood. Accordingly, program shown in Table 4.3-1 is to be provided as practical and reasonable support to consistent with scale of possible impact to livelihood. The eligibility of livelihood restoration to be provided by the Project is defined in Table 4.3-1.

Table 4.3-1 Eligibility and Contents of Livelihood Restoration Program

Category	Criteria	Contents	Remarks
Agriculture landowners, tenants and employees, shop owners and employees	- Lose income source permanently or for long period - Affect income source temporarily during installation works of gas/water pipelines	➢ Support for changing income source ➢ Provide administrative support ➢ Provide the project related job preferentially if capability of PAPs and job requirements are matched	➢ Condition of income source will be checked with all concerned parties
	None	➢ Provide the project related jobs preferentially if capability of PAPs and job requirements are matched.	None
Vulnerable groups	Households classified as vulnerable groups	➢ Provide the project related jobs preferentially if capability of PAPs and job requirements are matched ➢ Introduce available social welfare service if intention of PAPs and contents of program are matched.	Vulnerability of a household is confirmed with all concerned parties.

Source: JICA Study Team

CHAPTER 5: INSTITUTIONAL FRAMEWORK

5.1 Institutional Framework

Farmland Law stipulates to form Farmland Management Body (FMB) at township, district, region/state and central levels for implementation, supervision and coordination of compensation process. Based on FMB at township level, Land and Crop Compensation Committee (LCCC) is formed with key members of FMB and personnel from relevant departments as the practical level. Table 5.1-1 outlines relevant agencies and their roles for relocation on the Project.

Table 5.1-1 Responsibilities of Relevant Organization for Implementing A-RAP

Organization	Responsibilities
Land and Crop Compensation Committee (LCCC) at Township Level	1) Assess compensation amount 2) Examine the approach to solve the raised grievance based on the result of initial investigation by GAD 3) Support PMU for conducting Internal Monitoring
Township General Administration Department (GAD)	1) Contact window of grievance from PAPs and conduct initial investigation of raised grievance
Village Administrator	1) Contact window of grievance from PAPs and support Township GAD on initial investigation of raised grievance
Administrative Department in EPGE	1) Arrangement of budget on compensation amount
Environmental and Social Staff in Project Management Unit (PMU) of EPGE*	1) Conduct Internal Monitoring based on A-RAP with Compensation Committee 2) Support Compensation Committee and Township GAD on solving raised grievance 3) Conduct internal monitoring

* PMU will be established prior to implement the Project.
Source: JICA Study Team

LCCC is the responsible party for evaluation of compensation amount. Loss of assets will be confirmed with LCCC and the concerned PAPs. Then, compensation for loss of assets will be evaluated based on the market value prevailing the time of compensation evaluation.

CHAPTER 6: GRIEVANCE REDRESS MECHANISM

6.1 Principles

A grievance redress mechanism is developed with a purpose of: i) ensuring easy access of PAPs and other parties involved into permanent land acquisition and temporary occupation to appeal issues, ii) ensuring all complains related to permanent land acquisition and temporary occupation are appropriately dealt with, and iii) taking adequate measures to solve the raised issues.

Grievance redress mechanism is established during the relocation phase and after the relocation phase. The eligible period of grievance redress mechanism related to compensation is until the site office is setup (the site office will be setup before the construction works). Once the construction works are commenced, the site office will be functioned as the contact window for grievance redress.

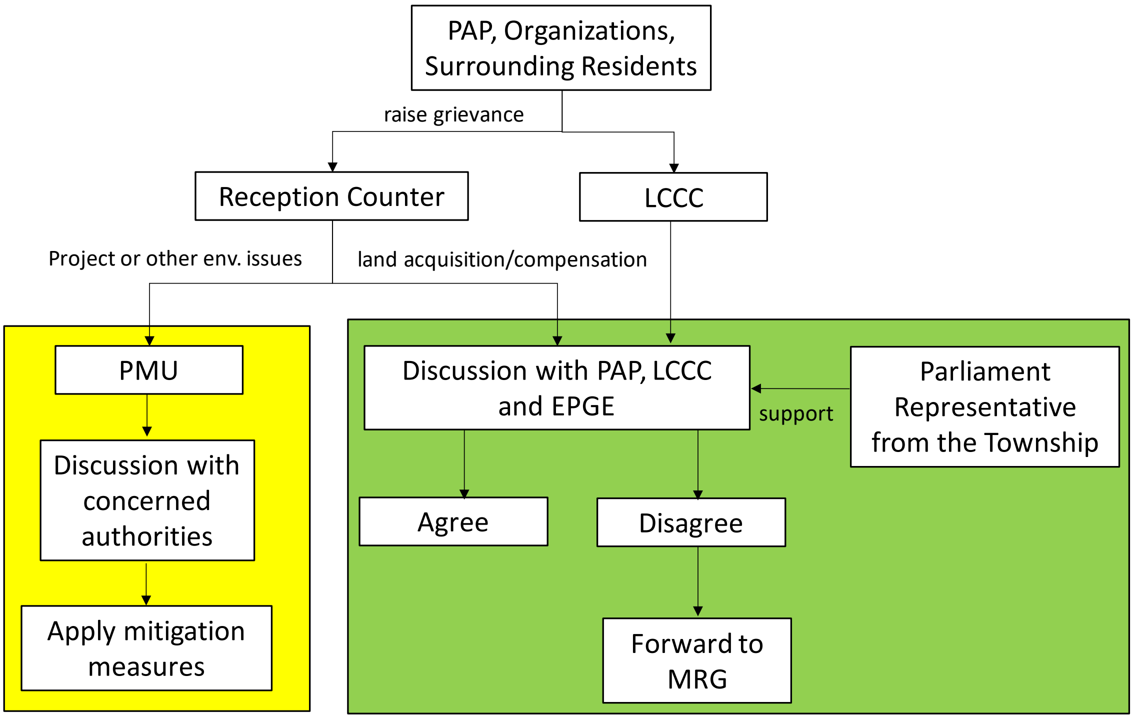
6.2 Procedure

If there are Project Affected Persons (PAPs) or parties who are involved into the land acquisition/ temporal land occupation activities of the Project have an issue on those activities, they are able to raises it to LCCC or EPGE (in Belin Substation, a reception counter for complaints will be established) directly or through respective Village Administrators. LCCC and EPGE confirm the status together by conducting a field visit and holding an interview with a person who raises an issue and hold a meeting to discuss the issue. A parliament representative from the township will support discussions between the PAP, LCCC and EPGE. If all parties agree at the discussion, compensation will be paid. If not agreed, it will be forwarded to Mandalay Region Government for further examination and decision.

Other grievances and inquires related to the Project will be also received at the same reception counter in the Belin Substation. Project Management Unit will receive any villager’s concern. According to the contents of grievance or inquires, the reception counter will categorize into land acquisition/compensation issues, the other project-related issues, or environmental issues. If a grievance is related to land acquisition/compensation issues, it will be handled at the aforementioned approach. In case a grievance is related to the Project or other environmental issues, it will be examined by the PMU and other concerned authorities to apply appropriate measures. The figure below shows the overall flow of grievance handling at the pre-construction phase.

The flow of grievances related to land acquisition and compensation was explained verbally by showing the flow at the public consultation meeting held in the process of preparing the RAP while the contact window on grievances related to the Project or other environmental issues was explained at the stakeholder meeting on EIA. There is no strict timeline at each step of the GRM, and moving to the next step will be decided as per discussion among concerned parties. However, 6 months are considered as the indicative maximum duration at each step. The eligible period of the GRM related to land acquisition and compensation is up to two years after physical displacement is done while the eligible period for the Project or other environmental issues will be applicable up to the closing phase.

No objection to the procedure was raised by participants. PAPs are able to raise their grievance directly or through Township GAD/village administrators as mentioned. Since communication with village administrators is general practice for villages, it is considered that the grievance redress procedure shown in the figure below is accessible based on the general practice in the area.



Notes:

1. Green part is the flow related to land acquisition/compensation grievance, Yellow part is the flow related to the Project or other environmental grievance.

2. PMU in the flow related to the Project or other environmental grievance will be worked at the construction and closing phases. EPGE will be the same function as PMU at the operation phase.

Figure 6.2-1 Provisional Grievance Redress Mechanism

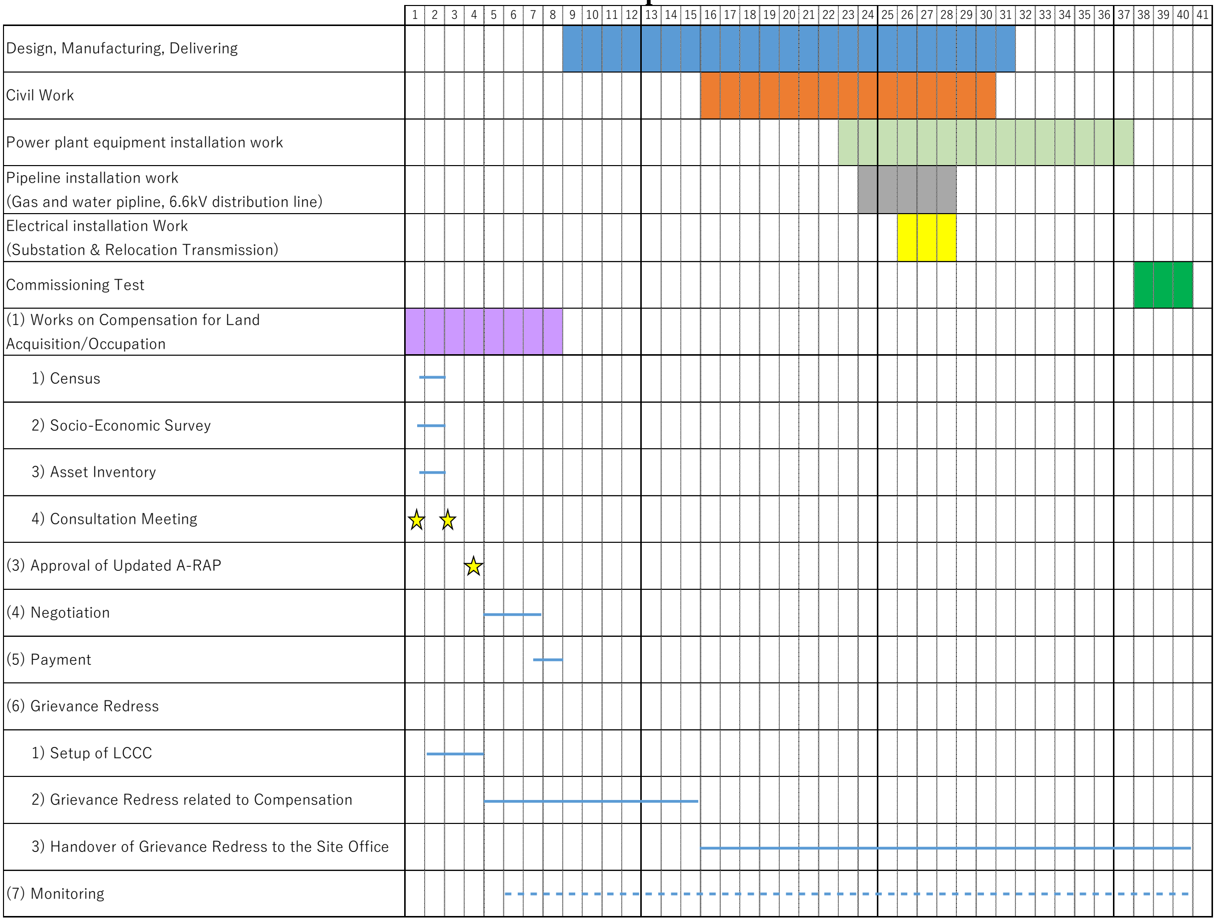
CHAPTER 7: IMPLEMENTATION SCHEDULE

7.1 Provisional Schedule

The land acquisition and temporal occupation works are mainly consisted of calculation of the amount, negotiation with PAPs and monitoring of land acquisition and temporal occupation. The provisional implementation schedule of these works is shown in Table 7.1-1.

The sequence or schedule may change due to circumstances and accordingly the time will be adjusted for the implementation of the works related to land acquisition and temporal occupation.

Table 7.1-1 Provisional Implementation Schedule



Source: JICA Study Team

CHAPTER 8: MONITORING

8.1 Principal

The Project will establish system on internal and external monitoring and evaluation. The purposes of monitoring and evaluation are to verify that:

1) Procedure, progress and obligation described in A-RAP are implemented properly
2) Contents of compensation and assistance are adequate and timely provided to eligible PAPs
3) The standard of living of PAPs is restored or improved
4) Grievances are properly addressed and appropriate corrective measures are adequately applied

8.2 Method

Monitoring for the Project will be conducted with the following methods:

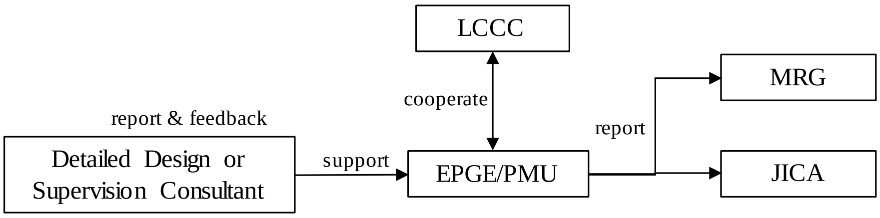
1) Internal monitoring by the project proponent
2) External monitoring and evaluation by the third party (e.g. a consultant, an institution or NGOs) to be hired by the project proponent

8.3 Internal Monitoring

The indicators to be monitored shall include:

1) Implementation status of A-RAP
2) Identifying that compensation for land acquisition and temporal land use is paid in accordance with contents of entitlement.
3) Confirming issues raised at the grievance mechanism and an approach to resolution
4) Confirming function and effectiveness of grievance redress system

Internal Monitoring will be conducted monthly from starting implementation of A-RAP until the livelihood is restored (in case livelihood restoration is implemented). PMU cooperated with LCCC will conduct Internal Monitoring, and the result of Internal Monitoring will be reported to Mandalay Region Government (MRG) and JICA at quarterly basis as a part of Project Status Report (PSR) as shown in Figure 8.2-1. A monitoring form is shown in Appendix-2.



Source: JICA Study Team

Figure 8.3-1 Reporting of Internal Monitoring Result

CHAPTER 9: CONSULTATION MEETING

9.1 First Public Consultation Meeting

The first Public Consultation Meeting (the 1st PCM) was held on 28 and 29 April 2019 by inviting identified land owners in the project area to explain; i) outline of the project, ii) applicable rules and regulations for preparing A-RAP, iii) contents and schedule of A-RAP survey, iv) work flow for preparing A-RAP and v) contents to be explained in the 2nd PCM. In total, 4 meetings were held to allow easy access of participants although the contents of explanation were same at each PCM. Table 9.1-1 shows a summary of the 1st PCM, and the minutes of meeting for the 1st PCM is attached in Appendix-3.

Table 9.1-1 Summary of the 1st PCM

Date and Time	Venue	No. of Participants	Major Questions and Answers
28 April 2019 9:30 – 11:00	Taung Yin Religious Hall	92	**Question by a villager from Taung Yin village:** Why the current project site was selected? Was it possible to select another location? **Answer from EPGE:** One reason was to select the location where gas is available. Another reason was availability of land. The location was selected based on the most suitable route and technology to minimize negative impact to local people. **Question by a villager from Na Be Bin:** What kind of benefit local people would receive from the project? **Answer from EPGE:** EPGE will ask the contractors to employ local people during the construction works.
28 April 2019 13:30 – 15:00	Taung U Religious Hall	36	**Question by a villager from Be Lin village:** Was it possible to install pipelines beside the road without passing through farmland? We afraid that land would not be sold due to installed pipelines. **Answer from EPGE:** Land would not be acquired, but temporarily occupied due to installing pipelines. Sufficient compensation for affected agriculture products would be provided and job opportunities as construction workers would be proposed. EPGE would pay careful attention not to harm the local communities.
29 April 2019 9:30 – 11:00	Kyauk Myint Thryar Religious Hall	56	**Question by a villager from Mat Ka Ya village:** If the project is implemented, the village connecting road and entrance road to the pagoda would be affected. In addition, land plots and fences would be affected. **Answer from EPGE:** The pipelines would be installed along the road but not crossing the road. In addition, land would be repaired after all installation works. **Question by a villager from E Bya village:** Would the project be implemented whether local people agreed or not? If the pipelines were needed to be installed in farmland, they must be installed at least 3 ft underground. So that, farmers could grow crops.

Date and Time	Venue	No. of Participants	Major Questions and Answers
			Answer from EPGE: The project would be implemented if the local farmers and the authorities were satisfied.
29 April 2019 13:30 – 15:00	Ohn Pin Chan Religious Hall	36	**Question by a villager from Taw Ma village:** Please let me now the place of pipeline installation, and whether agriculture work could be continued after installing the pipelines. **Answer from EPGE:** The water pipeline was planned to be installed 10 ft away from the existing road. EPGE made the best effort not to cause negative impact to the communities.

Source: JICA Study Team

During the 1st PCM, feedback forms were distributed to the participants to receive frank comments and opinions from them. The major comments and opinions written in the collected feedback forms (total 3 forms) were collected are as follows:

Followings are the summary of collected comment at the 1st PCM.
- Request for not causing any negative impact
- Concern about negative impact to the surrounding communities such as noise or cultural asset

9.2 Second Public Consultation Meeting

The 2nd Public Consultation Meeting (i.e. the 2nd PCM) was held on 14 and 15 June 2019 by inviting PAPs with the purpose of explaining the outline of the draft A-RAP. The 2nd PCM was held with the same manner as the 1st PCM to secure easy access of participants thought the contents explained were same at each PCM. In total, 5 meetings were held to allow easy access of participants although the contents of explanation were same at each PCM. Table 9.2-1 shows summary and the minutes of meeting for the 2nd PCM are attached in Appendix-4.

Table 9.2-1 Summary of the 2nd PCM

Date and Time	Venue	No. of Participants	Questions and Answers
14 June 2019 9:30 – 10:30	E Bya Kat Kyaw Religious Hall	44	**Question by a villager from Mat Kha Yar village:** Please make sure that local people shall not be affected by operation of machines. **Answer from EPGE:** We will post the signboard of the project areas and keep the proper vehicle speed.
14 June 2019 13:30 – 14:30	Ohn Pin Chan Religious Hall	21	**Question by a villager from Ohn Pin Chan village:** It is important to be fair in giving compensation for crops. Who will be responsible for compensation? **Answer from EPGE:** The local land management committee will discuss and coordinate for compensation. Crops will be compensated with the 3 times value of the current market price.
14 June 2019 16:00 – 17:00	Taw Ma Village Office	33	**Question by a villager from Pin Char village:** Is the compensation for the crops only? Affected areas will not be the same and different in location.

Date and Time	Venue	No. of Participants	Questions and Answers
			Answer from EPGE: Compensation will be considered depending on the conditions, and will be provided officially.
15 June 2019 10:00 – 11:00	Taung Yin Religious Hall	23	**Question by a villager from Taung Yin village:** How much amount of compensation will be provided? **Answer from EPGE:** If the pipelines occupy 0.2 acres of land, you will receive compensation for crops at 0.2 acres by 3 times of the market price. It means you will receive 3000 kyats for crops if the crop value is 1000 kyats.
15 June 2019 13:30 – 14:30	Taung U Religious Hall	29	**Question by a villager from Taung Oo village:** Is it possible to place the pipelines outside the fields to avoid any loss for farmers? **Answer from EPGE:** Comment is noted.

Source: JICA Study Team

Same as the 2nd PCM, feedback forms were distributed to the participants to receive frank comments and opinions from them. The major comments and opinions written in the collected feedback forms (total 11 forms) were collected are as show summary follows:

- Concern about negative impact to the surrounding communities such as noise or cultural asset (i.e. pagoda)
- Request for providing a job opportunity to local people
- Request for fixing fence if it is damaged during installation of pipelines

Additional consultation was held on 25 January 2020 for the PAPs located in the area where the route of water pipeline was modified. Table 9.2-2 shows summary and the minutes of meeting for the additional PCM are attached in Appendix-5.

Table 9.2-2 Summary of the Additional PCM

Date and Time	Venue	No. of Participants	Questions and Answers
25 January 2020 13:00 – 14:00	Kone Myint Thar Yar Religious Hall	38	**Question by a villager from E Bya village:** My fence might be affected due to the construction work. **Answer from EPGE:** Appropriate compensation will be provided. **Question by CSO:** Please explain how the project affects the water source. **Answer from EPGE:** The project will apply air cooling system, and it will save water consumption. Although the project plans to use Myitnge River water, water volume in Myitnge River will be saved. **Question by CSO:** I suggest to repair the road conditions if the project will affect. **Answer from EPGE:** The project will use 2% of profit as CSR. Your

Date and Time	**Venue**	**No. of Participants**	**Questions and Answers**
			suggestion will be included in CSR program.

Source: JICA Study Team

CHAPTER 10: BUDGET

10.1 Budget

Compensation is provided for eligible persons and households in accordance with the policy stipulated in the provisional entitlement matrix in Table 4.3-2. The provisional compensation amount was estimated as shown in Table 10.1-1 with the conditions listed below. The compensation amount was finalized with the following conditions.

- Compensation was estimated for the items and conditions confirmed by the Social Environmental Survey.
- For land by temporal occupation during the construction work, compensation will be provided for crops but not for land.
- Compensation of affected trees was calculated based on the number of affected trees counted as much as possible.
- Compensation for crops was calculated based on yield amount obtained from interview survey and affected size of land.
- There were several cases where farmers cultivated several types of crops (e.g. rice and sesame) per season in one plot. It means, for example, rice is cultivated in the rain season and sesame is cultivated in the remaining season. It was found by interview to the EPGE officer that the highest unit price among the cultivated crops would be applied in case several crops were cultivated in one plot regardless of cultivating seasons. This approach was applied for compensation estimation.
- For the plots not cultivating during the survey period, its compensation was calculated based on assumption to cultivate rice.

Table 10.1-1 Summary of Provisional Compensation Amount as of June 2019

No.	Compensation Items	Estimated Amount (MMK)	Budget Source
1	Compensation		EPGE
(1)	Land		
(2)	Structures		
(3)	Crops and Trees		
2	Allowance		EPGE
(a)	Shop		
3	Contingency (15% of direct cost)		EPGE
Total			

Notes:
1. Internal Monitoring is planned to be done by PMU, a part of EPGE, supported by the supervision consultant hired by MOEE. Thus, cost for internal monitoring is not estimated independently since it is included in the construction supervision fee.
2. The last 3 digits in the estimated amount is rounded up.
Source: JICA Study Team

Appendixes

Appendix-1

Questionnaire Form

01 Social Environmental Survey Form

PART 1: Census

	Question	Answer	
1	Living Category	1. Living inside the survey area 2. Living outside the survey area 3. Others (specify)	
2	Impact Category	1. Affecting owning land 2. Affecting tenant land 3. Affecting house 4. Affecting improvement (accessory of a house) 5. Affecting fixed shop 6. Affecting trees only (land belongs to public) 7. Others (specify)	
3	Survey Date		
4	Name of interviewee		
5	NRC No. of interviewee		
6	Relationship of interviewee with HH head		
7	Name of HH Head		
8	NRC No. of HH Head		
9	Farther Name of HH Head		
10	Religion of HH Head		
11	Ethnic Group of HH Head		
12	Contract Phone Number of HH Head or Interviewee	PH:	
		1) HH head' phone	*2) Other' phone-*
13	HH certificate or other equivalent documents	*(1) Yes*	*(2) No*
14	Take a picture of HH certificate if possible	*(1) Yes*	*(2) No*
15	Address of current resident (village, ward, village tract, township)		
16	Address of permanent resident (village, ward, village tract, township) if the current living place is temporary house		
17	Month & year starting to use the current address	Month	Year
18	Family members (Fill in all members living together to the following table)	Persons in total living together	

HH member number	(A) Relationship with HH head	Sex; Male (1) – Female (2)	Age	(B) Education	(C) Daily language	(D) Daily language ability	(E) Myanmar language ability	(F) Material status	(G) Characteristic	Highest income						Second highest income					
										(H) Income source	(I) Business sector	Location of work place	(J) Commuting mode	Total travel time to work	Monthly income (ks/month)	(H) Income source	(I) Business sector	Address of work place	(J) Commuting mode	Total travel time to work	Monthly income (ks/month)
01																					
02																					
03																					
04																					
05																					
06																					
07																					
08																					
09																					
10																					

Potential Answer

(A) Relationship with HH head		
1) Spouse	4) Father in law, Mother in law	7) Grand son, grand daughter
2) Son, daughter	5) Nephew, niece	8) Grand father, grand mother
3) Father, mother	6) Son in law, daughter in law	9) Other (specify)

(B) Education	**(C) Daily language**	**(F) Marital status**
1) No education	1) Myanmar	1) Married
2) Monestry education	2) Hindu	2) Single
3) Primary school	4) Other (specify)	3) Divorced
4) Middle school		4) Widow
5) High school	**(D) Daily language ability**	5) Other (specify)
6) University	1) Not able to speak, read or write	
7) Graduate	2) OK to speak, but not able to read or write	
	3) OK to speak, but read and write a little	
	4) Speak, read and write fluently	

(E) Myanmar language ability	
1) Not able to speak, read or write	
2) OK to speak, but not able to read or write	
3) OK to speak, but read and write a little	
4) Speak, read and write fluently	

(G) Characteristic	
1) Physically Disable	4) No significant characteristic
2) Illness	5) Other (specify)
3) Orphan	

(H) Type of income source		
1) Odd job	8) Farming (Fruit trees)	15) Helping parent business
2) Daily wage	9) Farming (other trees)	16) Keeping house
3) Daily wage – paid monthly	10) Farming (other crops such as vegetables, fruits but not grow as trees)	17) No job (18 yr old and above)
4) Wage – paid monthly	11) Farming aquaculture	18) Dependent
5) Farming rice (summer)	12) Government staff	19) Other (specify)
6) Farming rice (monsoon)	13) Retire	
7) Farming rice (summer+monsoon)	14) Own business	

(I) Business Sector		
1) Agriculture	5) Industrial	9) Government
2) Livestock	6) Garment	10) Education

3) Fishery	7) IT related	11) Trading/shopping
4) Construction	8) Transportation	12) Other

(J) Commuting mode (to work/to school)			
1) Walk	3) Motobike	5) Motobike taxi	7) Ferry (work, school)
2) Bicycle	4) Public bus	6) Taxi	8) Other

PART 2: Socio-Economic Survey

Sr	Question	Answer
19	Total number of working persons in a family living together	Persons in total
20	Total HH monthly income (Kyat) from No. 19 above	Ks/month
21	Monthly expenditure	(see table below)
22	Borrowing Money *Note: method of pay-off mean by cash, in-kind (e.g. agriculture products) etc,.; Expected pay-off time mean, 1, 2, 3 months etc*	(see table below)
23	Drinking water source	
24	Other domestic water source	
25	Righting	
26	Cooking fuel	
27	Toilet	
28	HH Possession	(see table below)

21 Monthly expenditure:

Item	Expenditure (ks/month)
For buying food	
For education	
For health	
For public service (electricity, telephone, gas, tub-water, etc)	
For transportation	
For clothing	
For house commodity/maintenance	
Other (specify)	
Other (specify)	
Total	

22 Borrowing Money:

Borrowing money or not	**Yes**	**No**
If yes, continue		
Purpose		
Source		
Amount		
Method of pay-off		
Expected pay-off time		

28 HH Possession:

Item	Qty	*(1) Own* *(2) Rent* *(3) Lease*
Water pump		
Electric fan		

		Fridge			
		Inverter			
		Battery for inverter			
		Solar panel			
		Generator			
		TV			
		VCD			
		Bicycle			
		Motorbike			
		Car			
		Mobile Phone			
		Landline Phone			
		Others (specify)			
		Others (specify)			
		Others (specify)			
		Others (specify)			
		Others (specify)			

Part 3: INVENTORY OF ASSET LOSS
(A) Land (record all land use separately in case of using more than 2 plots)

Answer Option for land use category, usage frequency and land status

(A) Current Land Use
(1) Living
(2) Commercial
(3) Cultivating
(4) Other (specify)

(B) Usage Frequency
(1) Permeant
(2) Seasonal usage only
(3) No usage
(4) Other (specify)

(C) Land Status
(1) Own (inherited)
(2) Own (purchased)
(3) Tenant (with tenancy agreement document)
(4) Tenant (without any document)
(5) No title
(6) Other (specify)

Plot 1

1	Current land use category (select from (A) box)		
2	Official land use category if you know		
3	Usage frequency (select from (B) box)		
4	Land status (select from (C) box)		
5	If land is tenanted, name of renter (if interview is made to a land owner)		
6	If land is tenanted, name of owner (if interview is made to a land renter)		
7	Permission for land use	**1) Yes**	**2) No**
8	Documents for land use permission	**1) Yes**	**2) No**
9	*If yes, what kind of document-*		
10	Monthly land use fee (or rental fee) if any	Kyats/month	
11	Date of starting to use land		
12	Total land size (acre) by interview	Acre	
13	No. of hired agricultural workers in a plot (if any)		

Plot 2

1	Current land use category (select from (A) box)		
2	Official land use category if you know		
3	Usage frequency (select from (B) box)		
4	Land status (select from (C) box)		
5	If land is tenanted, name of renter (if interview is made to a land owner)		
6	If land is tenanted, name of owner (if interview is made to a land renter)		
7	Permission for land use	**1) Yes**	**2) No**
8	Documents for land use permission	**1) Yes**	**2) No**

9	*If yes, what kind of document-*	
10	Monthly land use fee (or rental fee) if any	Kyats/month
11	Date of starting to use land	
12	Total land size (acre) by interview	Acre
13	No. of hired agricultural workers in a plot (if any)	

(B) Structure

(A) Type	(B) Ownership	(C) Condition
(1) House (2) Shop cum house (3) Improvement (4) Fixed shop (only shop) (5) Movable stall (6) Other (specify)	(1) Myself (2) Another private owner (specify owner name) (3) Government (specify owner) (4) Community (5) Other (specify)	(1) Existing and use (2) Existing but not use (3) Other (specify)

Materials					
(D) Roof	(E) Celling	(F) Beam	(G) Wall	(H) Floor	(I) Door
(1) (2) (3) (4) (5)	(1) (2) (3) (4) (5)	(1) (2) (3) (4) (5)	(1) (2) (3) (4) (5)	(1) (2) (3) (4) (5)	(1) (2) (3) (4) (5)

Sr. No.	(A) Type	(B) Ownership	(C) Condition	Monthly Rental Fee	Existing Years	No. of Story	Total Size (L x W)	Affected Size	Material
1									(D) (E) (F) (G) (H) (I)
2									(D) (E) (F) (G) (H) (I)
3									(D) (E) (F) (G) (H) (I)

(C) Crops

(E) Ownership	(F) Purpose
(1) Myself (2) Another private owner (specify owner)	(1) Domestic consumption (2) Selling

(3) Government (specify owner) (4) Community (5) Other (specify)	(3) Selling (4) Other (specify)

Plot No.	(A) Type of Crop	(B) Total quantity per harvest	(C) No. of harvest per year	(D) Cultivating duration per year	(E) Ownership	(F) Purpose	(G) Income per harvest (if any)	(H) Expenditure per harvest (if any)
1								
2								
3								
4								
5								

(D) Trees

(B) Purpose	(D) Ownership
(1) Domestic use (2) Selling timber (3) Selling fruit (4) Other (specify)	(1) Myself (2) Another private owner (specify owner) (3) Government (specify owner) (4) Community (5) Other (specify)

Plot No.	(A) Tree kind	(B) Purpose	(C) Tree age	(D) Number	(E) Ownership	(F) Total income from Tree/Fruit per year	(G) Total expenditure per year
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							

(E) Livestock

(B) Purpose	(D) Ownership
(1) Domestic use (2) Selling timber (3) Selling fruit (4) Other (specify)	(1) Myself (2) Another private owner (specify owner) (3) Government (specify owner) (4) Community (5) Other (specify)

No.	(A) Livestock Type	(B) Purpose	(C) Age	(D) Number	(E) Ownership	(F) Total income from livestock per year	(G) Total expenditure per year
1							
2							
3							
4							
5							
6							
7							
8							

9							
10							

Part 5: PERCEPTION

Sr	Question	Answer
1	**Project**	
(1)	Have you heard about the project?	(a) Yes (b) No
(2)	If "Yes", how did you know the project?	(a) government announcement (b) from friends/ relatives (c) from public consultation (d) others (specify)
(3)	What do you think about the project?	
(4)	What is the reason of the answer no. (3)?	
(5)	Do you have any concern or comments to the Project?	
2	**Income Rehabilitation**	
(1)	If you lose or decrease your income source, do you prefer to be offered any vocational training?	(a) Yes (b) No
(2)	If the answer is "No" in 2-(1), what is the reason?	
(3)	If the answer is "Yes" in 2-(1), which options would be preferable?	(a) job related to construction of the project (b) skill development training (c) other (specify)
(4)	If the answer is "skill development training" in 2-(3), which options would be preferable?	(a) vocational training to skill-up the current job (b) vocational training to get project related jobs, (c) any vocational training to get job opportunities in the area (d) other (specify)

Head of Household or Interviewee
(Sign, Full name)

Representative from Administrative Side
(Sign, Full name, Position)

Leader of Survey Team
(Sign, Full name)

Signed Date:

Appendix-2

Internal Monitoring Form

Internal Monitoring Form

Preparation Date:

No.	Activities	Progress		Expected Completion Date	Remarks
		Figure (Unit)	Narrative		
1. Compensation					
(1)	Compensation Calculation				
(2)	Negotiation				
(3)	Payment of Compensation Amount				
2. Temporary Relocation of Shops					
(1)	Temporary Relocation of Shops				
(2)	Set-back of Structures				
3. Livelihood Restoration Program					
(1)	Confirmation Prospect of Eligible PAPs to Vocational Program				
(2)	Arrangement of Vocational Training				
(3)	No. of PAPs participated in Vocational Training				
(4)	No. of PAPs completed Vocational Training				
(5)	No. of PAPs hired by Construction Workers				
4. Grievance					
(1)	Submitted Grievance				

No.	Activities	Progress		Expected Completion Date	Remarks
		Figure (Unit)	Narrative		
(2)	Solved Grievance				
(3)	Pending Grievance				

Appendix-3

Minutes of 1st Consultation Meetings

1.Meeting Agenda

1. Announcement of the commencement of the meeting
2. Explanation about project description for EIA and RAP by Excusive Engineer, Electric Power Generation Enterprise.
3. Explanation about the Resettlement action Plan by Local Consultant
4. Questions and Suggestions from the participants
5. Answers by Excusive Engineer, Electric Power Generation Enterprise and Local Consultant
6. Conclusion of the meeting

2.Record of PCM for RAP

Summary of the results of four sessions of PCM at RAP stage are presented in Table 1 and 4.

Table 1 Summarized results at the First session of PCM at RAP

Date: 28/4/2019 (Sunday) Time: Time: 9:30 to 11:00 am		Venue: Taung Yin Religious Hall
1. Participants	**Organization**	**Total**
	Township Education Department	1
	Farm Land Management and Statistics Department	1
	Electric Power Generation Enterprise (EPGE)	4
	Myanmar Oil and Gas Enterprise (MOGE)	1
	JICA Study Team	8
	Taung Yin Village	Men: 1 Women: Total: 1
	Na Be Bin Village	Men: 36 Women: 31 Total: 67
	Be Lin Village	Men: 2 Women: 6 Total: 8
	Taung U Village	Men: 0 Women: 1 Total: 1
	Total	92
	Opinion/Question	**Explanation and Response**
2. Main Discussion Points	**(Na Be Bin Village)** The projected is near our village. This power plant will generate 300 MW. I would like to know about vibration rate of the plant. And, will its vibration	**(EPGE)** Thank you for your question. The foundation of the plant is very deep-rooted. The facilities and machines in our project cannot stand the strong

	pose negative imapct on our village? "The Kin Pagoda", donated by the King Anawratha, is near this project site. I would like to know whether the vibration from the project affect this pagoda. Could you assure that the vibration will not affect the stability of the pagoda?	vibration effect. So, we are more afraid of that. To respond your question, there cannot be strong vibration. We will apply the most efficient system so as not to have negative impacts.
	(Na Be Bin Village) Will the noise from the project affect our religious practices such as the pagoda festival and the Pathan Recitations?	**(EPGE)** We will do our project work in accordance with JICA standards and Myanmar Standards. Our normal noise level have 20/30 dB. Our machines will generate less than 20/30 dB. The machines will be placed in soundproof rooms and we will also install noise reduction devices properly. Therefore, the remaining noise level will be under JICA standards. When the operations start we will invite a third party to monitor the noise level too.
	(Na Be Bin Village) Can there be gas explosions and hence damage our village?	**(EPGE)** In the past, the machines generated heat into the atmosphere. But, ours is combine cycle gas turbine (CCGT). It has the system to reduce the heat produced. That's why, it will produce less heat into the atmosphere. The gas pipelines are underground. Temperature of the gas is naturally less than normal atmospheric temperatures and will be flowing only in the pipelines in its own pace. Moreover, the gas pipelines will be buried deeply so that it will not interfere with the farming activities. Next, these pipe lines meet international standards. Thus, it is impossible to have leakages. **(MOGE)** In our country, we have not had such case as explosion of gas pipelines. In Ye Nan Chaung and Chauk townships, the gas pipelines have been in the community areas since long ago. The pipe lines we are using meet international standards and it will not impose negative impacts on our local people.
	(Taung Yin) Why do you choose the project site nearest to the village? Isn't it possible to choose other locations far from villages?	**(EPGE)** We have to choose the location where we can extract gas. Another reason is the availability of the land areas. We will consider the most suitable route and technology which will have least negative impacts on the local people. We have to consider the availability of the land areas. Current area is owned by the government. As we will use gas, we have to consider the possibility of getting the necessary gas. The public can come visit our project when it starts.

	(Taung Yin) How can you assure that the new plant will not produce noise?	**(EPGE)** We did monitoring before the commencement of the project. We also have our noise standards. If the noise level goes beyond that level, local people can inform to us and to the authorities concerned. We will also manage to accept complaint letters at ever village.
	(Na Be Bin) There were land acquisition cases in the past. We have three field areas ("kwin" in the Myanmar language) at Taung Yin. Field Area No. 117 is close to the village. If the constructions will be implemented in/near Field Area. 118, there will not be any problems.	**(EPGE)** The reason to build the power plant near Bel Lin is that Bel Lin Sub-station is distributing power to the whole Mandalay. Therefore, we chose the location near Bel Lin Sub-station. We will make sure that the local people will not be affected by that. **(Local Consultant)** For this project, we have conducted 3 public meetings till now. This is the third time. We understand the concerns of the local people. Our organization acts as a third party. We are here to study about potential environmental impacts. In the past, a project could be done without informing the local people and land acquisition was also done without notice. But nowadays, no project can be implemented like that. The situation has changed. Thus, we are here to conduct surveys for potential environmental impacts and prepare EIA report. We know that the local people have concerns for noise. We also suggest them to use new machines in the new power plant and install soundproof system. As this project will be done by the loan from Japan, if the local people have concerns for noise, Japanese experts will come and take necessary actions. Only then, the plant will start operating. We will suggest them to have a grievance center once the project starts. It is curcial for the local people to participate in the process.
	(Na Be Bin) The explanations of you all are great. We, the local people, would like to cooperate too. As this project will be near our village, I would like to know what kind of benefits we can get.	**(Local Consultant)** As the deputy chief engineer explained in the previous meeting, they will need about 10000 employees. For that, local people will be prioritised to get the jobs there. Later for the operations, if there are graduated people in your village, you may contact via the village administrator. **(EPGE)** For the project, there is cooperate social responsibility (CSR) after making contracts. They will be disclosed then. For the constructions of the facilities, we invite construction companies. We will ask them to

		employ local people for doing construction works. ” As the power plant will generate 300 MW, it is certain that about 1000 workers will be employed. That is the immediate benefit of the project. After the construction works and the operations start, we will need more engineers. So, if there are enginners and graduates in your village, they will be priortised for the vacacies. In addition, there will also be CSR programs too. Now, we do not still get the loan from JICA. Currently, we are conducting EIA/SIA stage. The project will take 2 or 3 years to start.
3. Photograph		

Table 2 Summarized results at the Second session of PCM at RAP

Date: 28/4/2019 (Sunday) Time: 1:30 to 3:00 am		Venue: Taung U Religious Hall
Participants	Organization	Total
	Farm Land Management and Statistics Department	1
	General Administrative Department	1
	Electric Power Generation Enterprise (EPGE)	4
	Myanmar Oil and Gas Enterprise (MOGE)	1
	JICA Study Team	8
	Taung U Village	Men: 8 Women: 1 Total: 9
	Be Lin Village	Men: 10 Women: 0 Total: 10
	Taw Ma Village	Men: 1 Women: 0 Total: 1
	Ban Da Village	Men: 1 Women: 0 Total: 1
	Total	36
2. Main Discussion Points	**Opinion/Question**	**Explanation and Response**
	(Be Lin) Compensations are for crops or lands? Isn't it possible to place the pipelines beside the roads without passing through the farmlands? Currently, our villagers do not get job at the industry near our village and they employ people from other places. Previous projects placed pipelines through the fields. We could not sell these fields as there were pipelines in these fields. We had so many losses.	**(EPGE)** According to the land law (2012), all land areas are owned by the state. Even the houses in town are living with long-term land-borrowing contracts. In this land law, the state has the right to acquire all types of lands for the sake of the country's development activities. But, we will not acquire the fields and we will give compensations for the plants and trees. We will not define the price of the crops. It will be done by the respective township land inspection committee. After burying the

		underground pipelines, we will not acquire the land for good. But, we request the farmers not to grow perennials above the pipeline areas because we are afraid that their roots will interfere with the pipelines. We will be careful not to harm the local communities as much as possible. Our project will take about 2 to 3 years. During construction phase, we will prioritize the local people to be employed. If there are engineers in nearby villages, they are invited to work with us during the operation phase also. We will also do CSR activities later. **(Local Consultant)** I would like to explain about compensation. Compensation has many forms. One type is compensation for land acquisition and the other is compensation for the crops. For this project, there will not be land acquisition for good. It is to manage the required land areas temporarily. For that, the pipelines will be buried at 5 ft depth not to interfere with the farming activities. We will conduct surveys again too. We will report what we have studied. Only after we finished preparing the report and submitted, the farmland administration committee will give compensations in accordance with the national laws. They will also have discussions with the local farmers too. Only after they can make agreements with the local farmers, the project will start. It will still take about 3 more years to start the project. We are now here to study potential environmental and social impacts .
3. Photograph		

Table 3 Summarized results at the 3rd session of PCM at RAP

Date: 29/4/2019 (Monday) Time: 9:30 to 11:00 am		Venue: Kone Myint Tharyar Religious Hall
1. Particip	Organization	
	Environmental Conservation Department	1
	General Administrative Department, Sintkaing Township	1
	Livestock Department, Sintkaing Township	2
	Farm Land Management and Statistics Department	1
	Fishery Department, Kyaukse District	1
	Agricultural Department	1

	Electric Power Generation Enterprise (EPGE)	3
	E Bya Village	Men: 11 Women: 8 Total: 19
	Met Ka Ya Village	Men: 9 Women: 0 Total: 9
	Mont Paung Village	Men: 1 Women: 2 Total: 3
	Sint Kaing Gyi Village	Men: 3 Women: 0 Total: 3
	Myit Nge Town	Men: 1 Women: 1 Total: 2
	Mandalay City	Men: 1 Women: 0 Total: 1
	Total	56
	Opinion/Question	**Explanation and Response**
2. Main Discussion Points	**(Mat Ka Ya)** Is it sure that the water pipeline for 300 MW power plant the will be placed along the Mat Ka Ya Village road?	**(EPGE)** JICA has already agreed to use the proposed route for the pipeline.
	(Mat Ka Ya) If so, we from the Mat Ka Ya Village will have losses. Both the villages-connecting road and the entrance road to the pagoda were built on our own with the leadership of the local monks. The conditions of the road will be changed and even damaged. Who will take the responsibility for this road to be accessible the whole year? Also in the village, some of the land lots will be passed through by the pipeline. The fences of these land lots will be affected and may be destroyed. Who will take the responsibility for this case?	**(EPGE)** Our project will be done both with responsibility and responsibility. We will dig the ground beside the roads but not through the roads. Even they lie in the pipeline route, we will repair them after all the activities. As our project will be implemented with the loan from JICA, they will also take care of it.
	(Mat Ka Ya) The power line till the Shwezigon Pagoda is transmitted from Mat Ka Ya. If this project will use underground cables, there may not be any problem. But, if they are designed in parallel with the existing cables, it is dangerous.	**(EPGE)** Currently, we planned to place the new cables in parallel with the existing ones. We will note down what you just said and write in the report. The cables we will use are very safe and have high efficiency.
	(E Bya) This is the first time that you meet with us, the local	**(EPGE)** As the Project will be implemented with the loan

	farmers. Will this project be implemented matter whether we agree or not? If the project is beneficial for the country, we also welcome this project to be implemented. But, is there any other option with less costs? There is an irrigation channel near the MaGyiKone Village. Can it be a better location for the pipelines? If the pipelines have to be placed passing through the fields if there is no option, they must be buried at least 3 ft undergound. Only then, we can grow crops.	from JICA, they will agree to give loans only the local farmers and the authorities are satisfied with the project. As with the current power demand, we will try to do the project to be a success. We will record what you said too.
	(E Bya) As the pipelines will be buried at 3 ft depth underground and there are water channels in our fields, they should be buried 3 ft below these channels.	**(EPGE)** We will be very careful during actual implementations. You can also give suggestions at that time.
	(E Bya) As the pipeline will pass through in front of our house, we have some concerns for that because we think that it is dangerous.	**(EPGE)** The duration for the placement of the pipeline will not take longer than one week. We will try our best not to harm the communities.
	(E Bya) There are some houses that have no access to electricity along the areas where the power cables will pass through. Is there any plan to let these houses get access to electricity from these transmission lines?	**(EPGE)** Currently, our state government has the plan for the countrywide electrification in 2030. We from the construction department are also trying to generate electrical power. We will record you said.
3. Photograph		

Table 4 Summarized results at the 4th session of PCM at RAP

Date: 29/4/2019 (Monday) Time: 1:30 to 3:00 am		Venue: Ohn Pin Chan Religious Hall
1. Participants	Organization	Name/ Title
	General Administrative Department	2
	Farm Land Management and Statistics Department	1
	Electric Power Generation Enterprise (EPGE)	4
	Myanmar Oil and Gas Enterprise (MOGE)	1
	JICA Study Team	8
	Ohn Pin Chan Village	Men: 2

		Women: 0 Total: 2
	Taw Ma Village	Men: 2 Women: 0 Total: 2
	Pin Char Village	Men: 9 Women: 0 Total: 9
	San Pya Village	Men: 2 Women: 0 Total: 2
	Sint Kaing Gyi Village	Men: 2 Women: 0 Total: 2
	Kyi Village	Men: 1 Women: 0 Total: 1
	Ka The Su Village	Men: 2 Women: 0 Total: 2
	Total	36
2. Main Discussion Points	**Opinion/Question**	**Explanation and Response**
	(Taw Ma) How will the gas pipeline pass through my field? And, how about the losses? How far will it be from the concrete road? I have been planning to use the fields with other purpose other than growing crops. If I grow crops, there is no problem even if the pipeline pass through the fileds. But, as I am planning to use the fields with other purposes, the pipelines can be barriers. As the project is for the country, I am willing to be a support. However, at the same time, I do not want to have many losses.	**(EPGE)** This is the water pipeline and it will be placed 10 ft away from the concrete road. We will try our best not to pose negative impacts on the communities.
3. Photograph		

Table 5 Feedback from participants at first session of PCM

No.	Name	Village	Contact No.	Comment/Suggestion
1		Taung Yin		Do not impact the environment.
2		Taung Yin		- We worried about the project. - This project is near the village and faced the noise pollution. - This project is gas turbine project. We worried about the dry weather condition .

				- We worried about the explosive and potential damage to destroy the village.
3		Taung Yin		- This project is near the archeological site. - We worried the cultural impact. - To consider the negative impact of the project on the village. - To consider about the benefit to the villagers.

Appendix-4

Minutes of 2nd Consultation Meetings

Meeting Agenda

1. Announcement of the commencement of the meeting
2. Explanation about project description for RAP by Assistant Engineer and Excusive Engineer, Electric Power Generation Enterprise.
3. Explanation about the Resettlement action Plan by Local Consultant.
4. Questions and Suggestions from the participants
5. Answers by Assistance Engineer and Excusive Engineer, Electric Power Generation Enterprise and Local Consultant
6. Conclusion of the meeting

2. Record of PCM for RAP

Summary of the results of four sessions of PCM at 2nd RAP stage are presented Table 1 and 5. The comments of the participant from feedback forms are also described in Table 6 and attendant.

Table 1 Summarized results at the First session of PCM at RAP

Date: 14/6/2019 (Friday) Time: 9:30 to 10:30 am		Venue: Kat Kyaw Religious Hall, E Bya Village
1. Participants	**Organization**	**Total**
	Environmental Conservation Department, Mandalay Region	1
	Electric Power Generation Enterprise (EPGE)	5
	JICA Study Team	7
	Met Ka Ya Village	Men:13 Women:4 Total: 17
	E Bya Village	Men: 9 Women: 5 Total: 14
	Total	Men: 29 Women: 15 Total: 44
2. Main Discussion Points	**Opinion/Question**	**Explanation and Response**
	(Met Kar Yar Village) -Please give us the contact address and phone number to contact you for any issue (if any issue during the project period and after the project) -Please be careful that the shady trees are not affected by the project	**(EPGE)** -We will give you the contact address and phone number. -We will repair/rebuild all the fences if they are damaged due to the installation of water pipelines.
	(Met Kar Yar Village)	**(EPGE)**

	-Please make sure that local people, including children, are not harmed by the operations of machines from the project construction period. -Please cooperate with the local people so that the project will be successfully accomplished.	We will make sure that there will be least impacts posed by the water pipelines of the project. Vehicles, such as cars and motor cycles, shall not exceed 15 km/20 km speed around the project area. We will coordinate with the local people. We will make sure that the project will have least negative impacts on the local people. We will post the relevant project signs around the project areas. And, we will have a person-in-charge.
3. Photograph		

Source: EIA Study Team

Table 2 Summarized results at the Second session of PCM at RAP

Date: 14.6.2019 (Friday) Time: 1:30 to 2:30 pm		Venue: Ohn Pin Chan Religious Hall
1. Particip	**Organization**	**Total**
	Electric Power Generation Enterprise (EPGE)	5
	JICA Study Team	7

	Ohn Pin Chan Village	Men: 8 Women: 1 Total: 9
	Total	Men: 15 Women: 6 Total: 21
2. Main Discussion Points	**Opinion/Question**	**Explanation and Response**
	(Ohn Pin Chan) -Will these land areas be used for the whole 30 years for the pipelines? Who will take the responsibility if there is the conflict between the land committee and the farmers? I think there may be conflicts at the time of giving compensations.	**(EPGE)** -As this is a state-owned project, it can acquire the necessary land areas. For land acquisition, it is mentioned in the regulations that crops will be compensated with the 3 times value of the current market price. As this is really an important project, there are land acquisitions by the government.
	(Ohn Pin Chan) It is important to be fair in giving compensations for crops. Who will take the responsibility if there are any disagreements?	**(EPGE)** The local land management committee will discuss and coordinate with the administration office for giving compensations. Crops will be compensated with the three times value of current market price. And, discussions and negotiations will be made between the land management committee and the local communities. May there be any complaints, you can inform MOEE. We will have boxes to receive complaint letters. Besides, there will be a person-in-charge for that.
	(Ohn Pin Chan) There are also land plots which have industrial permit for other business (not used for cultivation). Do you also consider the resistance of pipeline when passing the heavy machines over it? Why do you choose these areas?	**(EPGE)** We will also consider the resistance of pipelines on which the vehicles will go through. Also, we will make sure that the project will have least negative impacts for the local communities and they won't be underrated.
	(Ohn Pin Chan) Although there were three options for water pipelines, what made you decided to choose this location? Isn't it more suitable to install the water pipelines near the Zaw Gyi river?	**(EPGE)** This location is the shortest way for installation of pipelines. Moreover, it is not sure that the Zaw Gyi river can provide water the whole year. Also, we will not participate in deciding for giving compensations. The respective land committee will take the responsibility for that. And, compensations will be provided officially by holding events.
3. Photograph		

Source: EIA Study Team

Table 3 Summarized results at the 3rd session of PCM at RAP

Date: 14/6/2019 (Friday) Time: 4:00 to 5:00 pm		Venue: Taw Ma Village Office
1. Participants	Organization	Total
	General Administrative Department, Head of Village, Tawma, Sintkaing Township	1
	Electric Power Generation Enterprise (EPGE)	5
	JICA Study Team	7
	Taw Ma Village	Men: 9 Women: 3 Total: 12
	Pin Char Village	Men: 8 Women: 0 Total: 8
	Total	Men: 25 Women: 8 Total: 33
2. Main Discussion	**Opinion/Question**	**Explanation and Response**
	(Pin Char) How far is the pipeline from Yangon-Mandalay Express Way?	**(EPGE)** The two water pipelines will be about 5 ft away from the road vicinity. As we will use high-tech machines, there shall not be any unnecessary negative impacts from the project.

<table>
<tr><td></td><td>(Pin Char)
The compensation for the pipeline passage will be only for the crops? How do you consider the fact that all the affected areas will not be the same in the way the pipeline will pass through and the locations are different?</td><td>(EPGE)
Depending on the conditions of passage of the pipelines and differences in locations, MOEE will consider different types of compensations. The land committee will discuss with the relevant government departments. Also, compensations will be given by holding an official event. Compensations will be considered with the market price according to the legal requirements. If the project may have to do some unavoidable activities, we will make sure that the local communities won’t be underrated for receiving compensations.</td></tr>
<tr><td rowspan="3">3. Photograph</td><td>
</td><td>
</td></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td>
</td><td>
</td></tr>
</table>

Source: EIA Study Team

Table 4 Summarized results at the 4th session of PCM at RAP

<table>
<tr><td colspan="2">Date: 15/6/2019 (Saturday)
Time: 10:00 to 11:00 am</td><td>Venue: Taung Yin Religious Hall</td></tr>
<tr><td rowspan="3">1. Partic</td><td>Organization</td><td>Total</td></tr>
<tr><td>General Administrative Department</td><td>3</td></tr>
<tr><td>Electric Power Generation Enterprise (EPGE)</td><td>6</td></tr>
</table>

	JICA Study Team	8
	Taung Yin Village	Men: 5 Women: 2 Total: 7
	Total	Men: 13 Women: 10 Total: 23
	Opinion/Question	**Explanation and Response**
2. Main Discussion Points	**(Taung Yin)** How long will it take? How many pipelines will pass through the fields? It is not easy to have normal crop yields from the fields that the pipelines pass through. How much money will be compensated for 1 acre land? In the past, the local people did not get even the half of the market price. You cannot do as you like although you are from the government department. The local farmers experienced losses for the projects in the past.	**(EPGE)** The pipeline is about 1.5 ft wide. There are altogether 1 gas pipeline and 2 water pipelines. If the pipelines will occupy 0.2 acres of lands, you will get compensations for that 0.2 acres. “3 times of the market price” means that you will be compensated 3000 Kyats for the crops that have 1000 Kyat value.
	(Taung Yin) Previously, we didn’t get compensations for installing 2 pipelines. Moreover, the fields lost the original conditions. We thought that the crop yields of onions were declined due to the passage of the pipelines. Besides, the pipeline in the field has leakages. No one wants to buy these lands although we want to sell them because there are pipelines underground and power lines above. During previous projects, they did land reclamations. But, it did not last long. Although they did land reclamations by machines, the land was good just for a while. Moreover, it was not easy for us to get water supply. Thus, it was difficult to grow crops. It is okay if we can still do the farming activities like we did in the past.	**(EPGE)** As the gas pipeline has the cooling effect, it can moistness the surrounding ground. Moreover, they will be buried so that it will not disturb your normal farming activities eg: ploughing. You should know why this project will be implemented and who will get benefits from it. We will make sure that the local farmers will get proper compensations for the crops. For that, the land committee and the respective departments will take the responsibility. If there is any problem, you can directly inform EPGE. There will also be a person-in-charge for grievance mechanism.
3. Photograph		

Source: EIA Study Team

Table 5 Summarized results at the 5th session of PCM at RAP

Date: 15/6/2019 (Saturday) Time: 1:30 to 2:30 pm		Venue: Taung U Religious Hall
1. Participants	Organization	Total
	Electric Power Generation Enterprise (EPGE)	6
	JICA Study Team	8
	Taung U Village	Men: 9 Women: 6 Total: 15
	Total	Men: 17 Women: 12 Total: 29
2. Main Discussion Points	**Opinion/Question**	**Explanation and Response**
	(Taung U) Is it not possible to use the existing gas pipeline in the field? Is it not impossible to place the pipelines outside the fields? How will you consider for the farms that were requested to use with other purposes? Can we build houses in these fields?	**(EPGE)** The land management committee will take the lead for giving compensations. We have also considered to place the pipeline outside the fields. We made considerations for the long term.
	(Taung U) Is it not okay to install the pipelines outside the fields so that the local farmers won't have any	**(EPGE)** Will be noted.

	losses? We did not get any type of compensation in the past.	
3. Photograph		v

Table 6 Feedback from participants at all sessions of PCM at RAP

No.	Name	Village	Contact No.	Comment/Suggestion
1		Taw Ma		-As this project has high transparency and about 100 farmers will get benefits from it, it will be just time-consuming to resolve the complaints from only 10 farmers.
2		Na Be Bin		- Compensations for Crops and Land should be clearly described. - The children of those people who lost their lands due

				to land acquisition should be recruited by the project. - The 145 MW Power Plant near NabelPin Village, TaungYin Village Tract, Singaing Township makes so much noises, we are afraid that the new 300 MW Power Plant will make more noises than the former one. Besides, although "the Kin Pagoda" (King Anawratha's donation) is located at the other side of the creek, the villagers are afraid that this pagoda will be affected by the project. So, although it is true that this project is for the development of the country, we suggest that you should hold meetings with the villagers again.
3		Shan Kan		-Although some people might be squatters, it was found out that they also had the forms issued from land record department. -Shan Kan Village Tract Administrator from Singaing Township suggested that this project should continue doing its activities as it is for the development of our country. -When the villagers were informed about the overhead power lines, they said that they were pleased with them.
4		Mont Poung		-During installing gas and water pipe lines, the respective companies should take accountability and responsibility accordingly not to harm the local communities. -The needs of the local people (e.g., compensations for trees, crops, and lands) should not be neglected and they should not suffer from any natural hazards.
5		Be Lin		-There is no objection for this project as it will be a support to fulfill the power demand of the country. We wish that this project will be successfully accomplished as fast as possible. -Those people who are affected by installation of pipelines should be clearly explained about the compensations. -As the farmers are thinking that they will get compensations for land, you should explain them about compensations for trees and crops clearly. -As this project will supply electricity, we welcome

				this project.
6		E Bya		-To recruit the local people if they meet the requirements or skills for certain positions of the project. If there is any new job opportunity, you should inform them through the village administrator.
7		Ohn Pin Chan		-To recruit the local people if the requirements or skills for certain positions of the project meet with them.
8		Met Ka Ya		-Please repair the fences if they are destroyed by the project activities.
9		Met Ka Ya		-Please repair or rebuild the houses to restore their original conditions if they are damaged by the project activities.
10		Met Ka Ya		-Please repair or rebuild the houses to restore their original conditions if they are damaged by the project activities.
11		Met Ka Ya		-Our house is beside the road. I'm afraid that our house compound will be narrower if it is in the project areas. You should consider for our living conditions.

Appendix-5

Minutes of Additional Consultation Meetings

Record of Public Consultation

Summary of the results of Pre-meeting for Additional Public Consultation Meeting for Environmental & Social Considerations are presented in Table 1.

Table 1Summarized results at Additional Public Consultation Meeting for Environmental & Social Considerations

Date: 25/01/ 2020 (Saturday)		Time: 1:00 pm to 2:00 pm	Venue: Kone Myint Thar Yar Religious Hall
	Organization	Name/ Title	Total
1. Participants	General Administration Department (GAD) (Sintgaing Township)	➢ Deputy officer ➢ Senior Clerk	2
	Electric Power Generation Enterprise (EPGE)	➢ Superintendent Engineer ➢ Executive Engineer ➢ Assistant Engineer	6
	Education Department, Sintgaing Township	➢ Assistant township Education Officer	1
	Irrigation and Water Utilization Management Department, Sintgaing Township	➢ Staff Officer ➢ Staff	2
	Information and communication Department, Sintgaing Township	➢ Township Officer	1
	Immigration Department, Sintgaing Township	➢ Deputy Officer	1
	Electricity Department, Sintgaing Township	➢ (Electrical) Pa Leik Village Manager Office	1
	Health Department, Sintgaing Township	➢ Special Nurse ➢ Midwife ➢ Clerk	3
	Police Department, Sintgaing Township	➢ Village tract chief, Information Police Force, Sintgaing township	1
	EIA Study Team		7
	Sein Yaung So, CSO, Mandalay		2
	E Bya Village		Men: 10 for : 4 Total: 14
	Met Ka Ya Village		Men: 2 Women: 0 Total: 2
	Kyun U Village		Men: 1 Women: 0 Total: 1
	Kin Bat Village		Men: 1 Women: 0 Total: 1
	Total		45

	Opinion/Question	Explanation and Response
2. Main Discussion Points	**(Electricity Department)** If the pipeline is installed in the embankment, the pipeline might disturb the water distribution. The maintenance will also need to be considered.	**EPGE** The project is at Loan Proposal Stage of EIA. We will hire technical consultants after ECD approve EIA report and carry out Loan Contract with JICA. After loan was approved, we will discuss with related professionals and consultants to create appropriate design. Therefore, we cannot show detail design at present, but we will not disturb the water distribution. We will carry out detail field survey along the pipelines by discussing with technicians and consultants. We will use the water pipeline technology which do not leak water for this project.
	(Electricity Department) The gas pipeline is more concerning than the water pipeline as there are some persons who are against the installation of gas pipeline in their land.	**EIA Study Team** The project has already avoided passing through the land where landowners are against the gas pipeline as much as possible. During the process, gas pipeline route has been shifted to new route along the canal.
	(Met Ka Ya Village) There is a land marked as (villager's name)'s land beside the river. I wish to clarify that this land is not (person's name)'s property and it is owned by the village charity group. Therefore, I suggest marking this land as Village Land in addition to (villager's name)'s land.	**EIA Study Team** Acknowledged the point.
	(E Bya Village) I suggest compensation to village for (villager's name)'s land is necessary.	**EPGE** Yes, the compensation will be decided based on the discussions with relevant organizations, if the land is acquired. The pointed area is planned to use public area.
	(E Bya Village) My fence might be impacted by the project and I want to know how the project will take responsibility.	**EPGE** If the project affects the fence, appropriate compensation will be paid to repair it.
	(CSO) I want to know how this project will impact the water resource.	**EPGE** This project will apply air cooling system which can save water consumption. We will use Myitnge River water and save as much river water as possible by the project. This project will use at most thousands of gallons of water per day.
	(CSO) Is this government project?	**EPGE** Yes, this project is cooperation between government and JICA with loan. We will use Combine Cycle Gas Turbine to reduce environmental impacts as much as possible.
	(CSO) I suggest repairing of roads if the project will damage them.	**EPGE** Yes, this project will use 2 percent of profit as CSR. Therefore, your suggestion will be included in CSR program.

	(CSO) Are there any changes in electricity price due to the construction of gas turbine?	**EPGE** The government will bear the whole cost of the construction of gas turbine with the purpose of providing electricity to the public. The electricity bill will not be affected by the expense of the construction of the gas turbine and will be collected according to the defined rates by the government.
	(CSO) Are there any gas emissions from the project?	**EPGE** This project will use Japan Technology named Dry Low NOx Combustor (DLN). Nitrogen Oxide comes out from this combustor with high temperature. NOx will be emitted below NEQG, it doesn't mean NOx can be 0%. Moreover, we will plan to conduct environmental monitoring. We will submit monitoring report periodically.
3. Photos		

Source: EIA Study Team